MEMORANDUM OF AGREEMENT

FOR THE

CONSTRUCTION OF THE PHASE 2A IRT INFRASTRUCTURE: WORK PACKAGE E2 ALONG GOVAN MBEKI ROAD (M9) FROM WEST OF NY72 ROAD TO EAST OF KLIPFONTEIN ROAD

MADE AND ENTERED INTO BETWEEN

CITY OF CAPE TOWN METROPOLITAN MUNICIPALITY

And

MARTIN & EAST (PTY) LTD

REGISTRATION NO: [redacted]

CONTRACT NO. 412Q/2022/23

PREAMBLE

AND WHEREAS the City's Supply Chain Management Bid Adjudication Committee resolved in line with **SCMB 23/12/23** dated **04 December 2023**, to award to **MARTIN & EAST (PTY) LTD** tender **412Q/2022/23** for the **Construction of Phase 2A Trunk Infrastructure: Work Package E2 along Govan Mbeki (M9) from West of NY72 Road to East of Klipfontein Road** from date of commencement and terminate on **08 June 2028,** subject to a Section 33 process.

AND WHEREAS in accordance with the Supply Chain Management Bid Adjudication Committee resolution, prices will be subject to adjustment in accordance with the tender document Clause 6.8.2 and 6.8.3 of Part C1 .2 Contract Data.

Tendered Amount (contingency exclusive, Excluding VAT)	[redacted]
Contingency Amount or Percentage	[redacted]
Tendered Amount (contingency inclusive, Excluding VAT)	[redacted]

AND WHEREAS it is recorded that this Contract will be governed by the General Conditions of Contract for Construction Works, Third Edition, 2015 confirmed by the South African Institution of Civil Engineering (SAICE), read with the **Contract Specific Data ("CSD")** hereto marked **"PART C1.2: CONTRACT DATA".**

NOW THEREFORE THE PARTIES AGREE AS FOLLOWS:

1. PARTIES

The Parties to this Contract are:

1.1. **The City of Cape Town**, a metropolitan municipality, established in terms of the Local Government: Municipal Structures Act. 117 of 1998 read with the Province of the Western Cape: Provincial Gazette 5588 dated 22 September 2000, as amended ("**the**

Employer"), herein represented by the **City Manager** or his nominee duly authorised hereto;

1.2. **MARTIN & EAST (PTY) LTD** a private company duly incorporated in terms of the laws of the Republic of South Africa with registration no: [redacted] with its principal place of business situated at [redacted] (the "Contractor"), herein represented by its duly authorised representative, [redacted] in his capacity as [redacted].

Hereinafter, each a "Party" and together the "Parties".

2. INTERPRETATION

2.1. In the event of any conflict between the provisions of this Contract, the GCC, CSD and any Parts attached hereto, or any other document incorporated by reference to this Contract, save to the extent expressly stated to the contrary, such conflict will be resolved by giving precedence to such different parts of this Contract in the following order of precedence:

2.1.1. first, the terms and conditions of the CSD;
2.1.2. second, the terms and conditions of the GCC;
2.1.3. third, Parts and Annexures to this Contract; and
2.1.4. fourth, any other documents incorporated by reference.

2.2. The provisions of this Contract supersede and replace the provisions of any previous agreement entered into between the Parties relating to the same subject matter.

3. APPOINTMENT AND DURATION

3.1. The Employer hereby appoints the Contractor to perform the Scope of Work for the Employer from the Commencement Date.

3.2. Unless terminated earlier in accordance with the provisions as set out in the GCC or any other provision in terms of this Contract, this Contract shall terminate on **08 June 2028.**

4. MUTUAL GOOD FAITH / CO-OPERATION

4.1. The Parties represent and undertake to do all such things, perform all such acts and take all steps to procure the doing of all such things and the performance of all such acts, as may be necessary or incidental to give effect to the execution of this Contract.

4.2. The Parties shall at all times during the continuance of this Contract observe the principles of good faith towards one another in the performance of their obligations in terms of this Contract.

5. OBLIGATIONS OF THE EMPLOYER

5.1. The Employer undertakes to perform its obligations in accordance with the Contract, including but not limited to the Scope of Work (**PART C3: SCOPE OF WORK**), subject to the satisfactory fulfilment of the obligations by the Contractor as set out in this Contract.

5.2. The Employer shall monitor and evaluate the Contractor's performance in respect of the Scope of Work.

6. OBLIGATIONS OF THE CONTRACTOR

6.1. The Contractor hereby agrees and undertakes to perform the Services to the Employer as set out in Scope of Work (**PART C3: SCOPE OF WORK**).

6.2. The Contractor will perform the Works as expeditiously as possible and furthermore agrees and undertakes to perform the services in accordance with the operational requirements of the Employer.

6.3. The Contractor will ensure that the Works will be of a satisfactory quality and fit for purpose.

6.4. The Contractor shall, ensure that its employees, agents, representatives, sub-contractors and suppliers comply with this Contract and all applicable Laws in the execution of the Works.

6.5. The Contractor will not conduct any activity of whatsoever nature which may be detrimental to the Employer's reputation and goodwill.

7. PRICING DATA

7.1. The Contract Price for the Works shall be as set out in the Pricing Data annexed marked "**PART C2: PRICING DATA**".

7.2. The Contractor shall not be entitled to any other consideration for the rendering of the Works other than as provided for in this Contract.

COMPULSORY ENTERPRISE QUESTIONNAIRE

CITY OF CAPE TOWN
DIRECTOR: TRANSPORT INFRASTRUCTURE IMPLEMENTATION URBAN MOBILITY DIRECTORATE
CONTRACT NO. 412Q/2022/23
CONSTRUCTION OF THE PHASE 2A IRT INFRASTRUCTURE: WORK PACKAGE E2 ALONG GOVAN MBEKI ROAD (M9) FROM WEST OF NY72 ROAD TO EAST OF KLIPFONTEIN ROAD

SCHEDULE 1: COMPULSORY ENTERPRISE QUESTIONNAIRE

SEE RETURNABLE DOCUMENT

The following particulars must be furnished. In the case of a joint venture, separate enterprise questionnaires in respect of each partner must be completed and submitted.

Section 1: Name of enterprise: MARTIN & EAST (PTY) LTD

Section 2: VAT registration number, if any: [redacted]

Section 2a: National Treasury Central Supplier Database registration number [redacted]

Section 2b: SARS Tax Compliance Status PIN [redacted]

Section 3: cidb registration number, if any [redacted]

Section 4: Particulars of sole proprietors and partners in partnerships

NOT APPLICABLE

** Complete only if sole proprietor or partnership and attach separate page if more than 3 partners*

Section 5: Particulars of companies and close corporations

Company registration number [redacted]
Close corporation number [redacted]
Tax reference number [redacted]

Section 6: Foreign Bidding Suppliers	
Is tenderer the accredited representative in South Africa for the Goods / Services / Works offered?	☐Yes ☐No If yes, enclose proof
Is tenderer a foreign based supplier for the Goods / Services / Works offered?	☐Yes ☐No If yes, answer the Questionnaire to Bidding Foreign Suppliers (below)
Questionnaire to Bidding Foreign Suppliers	
a) Is the tenderer a resident of the Republic of South Africa or an entity registered in South Africa?	☐Yes ☐No
b) Is the tenderer a resident of the Republic of South Africa or an entity registered in South Africa?	☐Yes ☐No
c) Does the tenderer have a permanent establishment in the Republic of South Africa?	☐Yes ☐No
d) Does the tenderer have any source of income in the Republic of South Africa?	☐Yes ☐No
e) Is the tenderer liable in the Republic of South Africa for any form of taxation?	☐Yes ☐No

NOT APPLICABLE

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Tender
Part T2: Returnable Documents
Contract No. 412Q/2022/23

T2.2
Returnable Schedules

The undersigned, who warrants that he / she is duly authorised to do so on behalf of the enterprise:

i) authorizes the Employer to obtain a tax clearance certificate from the South African Revenue Services that my / our tax matters are in order;

ii) confirms that the neither the name of the enterprise or the name of any partner, manager, director or other person, who wholly or partly exercises, or may exercise, control over the enterprise appears on the Register of Tender Defaulters established in terms of the Prevention and Combating of Corrupt Activities Act of 2004 or Database of Restricted Suppliers;

iii) confirms that no partner, member, director or other person, who wholly or partly exercises, or may exercise, control over the enterprise appears, has within the last five years been convicted of fraud or corruption;

iv) confirms that I / we are not associated, linked or involved with any other tendering entities submitting tender offers and have no other relationship with any of the tenderers or those responsible for compiling the scope of work that could cause or be interpreted as a conflict of interest; and

iv) confirms that the contents of this questionnaire are within my personal knowledge and are to the best of my belief both true and correct.

Signed [redacted] Date [redacted]

Name [redacted] Position [redacted]

Enterprise name MARTIN & EAST (PTY) LTD

PART C1.1: AGREEMENT AND CONTRACT DATA

C1.1 Form of Offer and Acceptance

Offer

The employer, identified in the acceptance signature block, has solicited offers to enter into a contract for the procurement of:

CONTRACT NO. 412Q/2022/23: CONSTRUCTION OF THE PHASE 2A IRT INFRASTRUCTURE: WORK PACKAGE E2 ALONG GOVAN MBEKI ROAD (M9) FROM WEST OF NY72 ROAD TO EAST OF KLIPFONTEIN ROAD

The tenderer, identified in the offer signature block, has examined the documents listed in the tender data and addenda thereto as listed in the returnable schedules, and by submitting this offer has accepted the conditions of tender.

By the representative of the tenderer, deemed to be duly authorized, signing this part of this form of offer and acceptance, the tenderer offers to perform all of the obligations and liabilities of the contractor under the contract including compliance with all its terms and conditions according to their true intent and meaning for an amount to be determined in accordance with the conditions of contract identified in the contract data.

THE OFFERED TOTAL OF THE PRICES INCLUSIVE OF VALUE ADDED TAX IS:

Rand [redacted]

[redacted] (in words);

R [redacted] (in figures)

This offer may be accepted by the employer by signing the acceptance part of this form of offer and acceptance and returning one copy of this document to the tenderer before the end of the period of validity stated in the tender data, whereupon the tenderer becomes the party named as the contractor in the conditions of contract identified in the contract data.

Signature(s) [redacted]

Name(s) [redacted]

Capacity [redacted]

for the tenderer

(Name of organization/tenderer) MARTIN & EAST (PTY) LTD

(Address of organization/tenderer) [redacted]

Name and signature of witness [redacted]

Date 01 AUGUST 2023

For official use.		
INITIALS OF CITY OFFICIALS AT TENDER OPENING		
1.	2. LO	3.

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Acceptance

By signing this part of this form of offer and acceptance, the employer identified below accepts the tenderer's offer. In consideration thereof, the employer shall pay the contractor the amount due in accordance with the conditions of contract identified in the contract data. Acceptance of the tenderer's offer shall form an agreement between the employer and the tenderer upon the terms and conditions contained in this agreement and in the contract that is the subject of this agreement.

The terms of the contract are contained in:

Part C1: Agreements and contract data (which includes this agreement)
Part C2: Pricing data
Part C3: Scope of work
Part C4: Site information
Part C5: Information provided by the Contractor

and drawings and documents or parts thereof, which may be incorporated by reference into the above listed Parts.

Deviations from and amendments to the documents listed in the tender data and any addenda thereto as listed in the returnable schedules as well as any changes to the terms of the offer agreed by the tenderer and the employer during this process of offer and acceptance, are contained in the schedule of deviations attached to and forming part of this form of offer and acceptance. No amendments to or deviations from said documents are valid unless contained in this schedule.

The tenderer shall within two weeks after receiving a completed copy of this agreement, including the schedule of deviations (if any), contact the employer's agent (whose details are given in the contract data) to arrange the delivery of any securities, bonds, guarantees, proof of insurance and any other documents to be provided in terms of the conditions of contract identified in the contract data. Failure to fulfil any of these obligations in accordance with those terms shall constitute a repudiation of this agreement.

Notwithstanding anything contained herein, this agreement comes into effect on the date when the parties have signed the table below and confirms receipt from the employer of one fully completed original copy of this agreement, including the schedule of deviations (if any). The tenderer (now contractor**)** shall within five working days of the agreement coming into effect notify the employer in writing of any reason why he cannot accept the contents of this agreement as a complete and accurate memorandum thereof, failing which the agreement presented to the contractor shall constitute the binding contract between the parties.

The Parties	Employer	Contractor
Business Name	CITY OF CAPE TOWN	Martin & East (Pty) Ltd
Business Registration	N / A	[redacted]
Tax number (VAT)	4500193497	[redacted]
Physical Address	Civic Centre 12 Hertzog Boulevard Cape Town 8000	[redacted]
Accepted contract sum including tax	[redacted]	[redacted]
Accepted contract duration	from date of commencement and will terminate on 08 June 2028	from date of commencement and will terminate on 08 June 2028

Signed – who by signature hereto warrants authority		
Name of signatory	[redacted]	[redacted]
Signed: Date		
Signed: Location	[redacted]	[redacted]
Signed: Witness		
Name of Witness		

Schedule of Deviations

Notes:

1. The extent of deviations from the tender documents issued by the employer before the tender closing date is limited to those permitted in terms of the conditions of tender.
2. A tenderer's covering letter shall not be included in the final contract document. Should any matter in such letter, which constitutes a deviation as aforesaid, become the subject of agreements reached during the process of offer and acceptance, the outcome of such agreement shall be recorded here.
3. Any other matter arising from the process of offer and acceptance either as a confirmation, clarification or change to the tender documents and which it is agreed by the Parties becomes an obligation of the contract shall also be recorded here.
4. Any change or addition to the tender documents arising from the above agreements and recorded here, shall also be incorporated into the final draft of the Contract.

1 Subject : NONE

Details . NONE. . . . . .

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2 Subject : NONE

Details . .NONE . . . . . .

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3 Subject : NONE

Details . .NONE . . . . . .

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4 Subject : NONE

Details . .NONE . . . . . .

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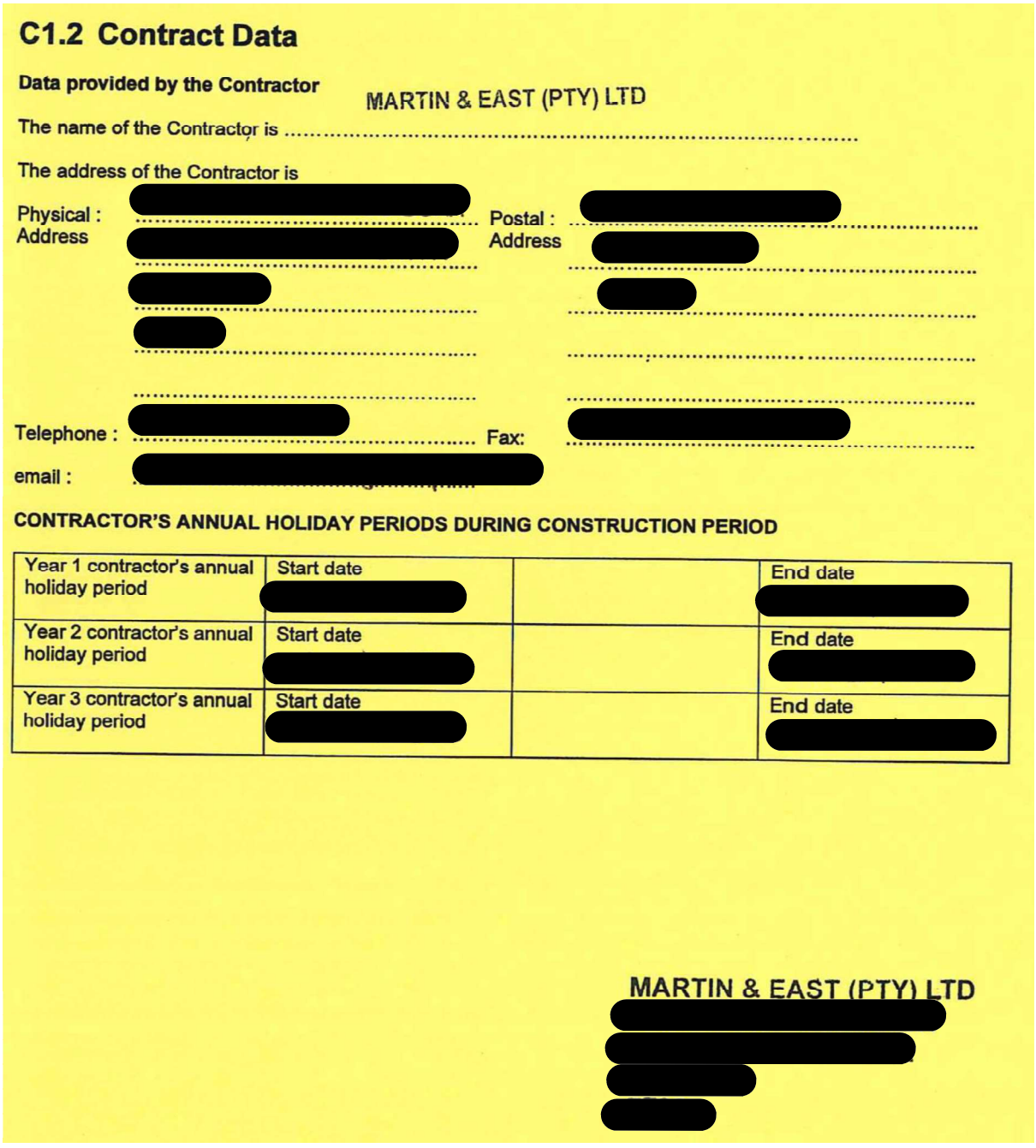
By the duly authorised representatives signing this agreement, the employer and the tenderer agree to and accept the foregoing schedule of deviations as the only deviations from and amendments to the documents listed in the tender data and addenda thereto as listed in the returnable schedules, as well as any confirmation, clarification or changes to the terms of the offer agreed by the tenderer and the employer during this process of offer and acceptance.

It is expressly agreed that no other matter whether in writing, oral communication or implied during the period between the issue of the tender documents and the receipt by the tenderer of a completed signed copy of this Agreement shall have any meaning or effect in the contract between the parties arising from this agreement.

C1.2 Contract Data

Data provided by the Contractor



C1.2 Contract Data

Data provided by the Contractor

The name of the Contractor is MARTIN & EAST (PTY) LTD

The address of the Contractor is

Physical : Address [redacted]

Postal : Address [redacted]

Telephone : [redacted] Fax: [redacted]

email : [redacted]

CONTRACTOR'S ANNUAL HOLIDAY PERIODS DURING CONSTRUCTION PERIOD

Year 1 contractor's annual holiday period	Start date [redacted]		End date [redacted]
Year 2 contractor's annual holiday period	Start date [redacted]		End date [redacted]
Year 3 contractor's annual holiday period	Start date [redacted]		End date [redacted]

MARTIN & EAST (PTY) LTD [redacted]

C1.2 Contract Data

Part 1: Contract Data provided by the Employer

GENERAL CONDITIONS OF CONTRACT

CITY OF CAPE TOWN
DIRECTOR: TRANSPORT INFRASTRUCTURE IMPLEMENTATION URBAN MOBILITY DIRECTORATE CONTRACT NO. 412Q/2022/23
CONSTRUCTION OF THE PHASE 2A IRT INFRASTRUCTURE: WORK PACKAGE E2 ALONG GOVAN MBEKI ROAD (M9) FROM WEST OF NY72 ROAD TO EAST OF KLIPFONTEIN ROAD

C1.2 Contract Data
Part 1: Contract Data provided by the Employer

GENERAL CONDITIONS OF CONTRACT

The following standardised General Conditions of Contract:

General Conditions of Contract for Construction Works, Third Edition, 2015

prepared by the South African Institution of Civil Engineering (SAICE) shall apply to and form the General Conditions of Contract for this contract. Copies of these conditions of contract are obtainable 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.

Copies of the General Conditions of Contract are available for inspection and scrutiny at the offices of the Employer.

The Pro-formas bound with the General Conditions of Contract 2015, on pages 96 to 113 shall not apply to this Contract and shall be replaced with the documents bound into this Contract Document.

The General Conditions of Contract make several references to the Contract Data for specific data, which together with these conditions collectively describe the risks, liabilities and obligations of the contracting parties and the procedures for the administration of the Contract. The Contract Data shall have precedence in the interpretation of any ambiguity or inconsistency between it and the general conditions of contract.

The General Conditions of Contract shall be read in conjunction with the variations, amendments and additions set out in the Contract Specific Data below. Each item of data given below is cross-referenced to the clause in the General Conditions of Contract to which it mainly applies.

The documents forming the Contract are to be taken as mutually explanatory of one another. For the purposes of interpretation, the priority of the documents shall be in accordance with the following sequence:

1. the Form of Offer and Acceptance,
2. the Contract Specific Data within the Contract Data,
3. the General Conditions of Contract for Construction Works, Third Edition, 2015,
4. the Drawings,
5. the Scope of Work,
6. the Pricing Data, and
7. the conditions of tender, the tender data and tender schedules

If an ambiguity or discrepancy is found in the documents, the Employer's Agent shall issue any necessary clarification or instruction.

CONTRACT SPECIFIC DATA

The following contract specific data, referring to the General Conditions of Contract for Construction Works, Third Edition, 2015, are applicable to this Contract:

Clause 1.1.1.2:

Add the following after "Bill of Quantities":

, also referred to as Bills of Quantities,

Clause 1.1.1.13:

The Defects Liability Period is **12** months.

Clause 1.1.1.14:

The time for achieving Practical Completion is **142 weeks**, inclusive of the 14 day period referred to in Clause 5.3.2 below, and inclusive of non-working days referred to in Clause 5.8.1 below, but exclusive of special non-working days (Clause 5.8.1).

Clause 1.1.1.15:

The **Employer** is the CITY OF CAPE TOWN, represented by the **DIRECTOR: TRANSPORT INFRASTRUCTURE IMPLEMENTATION URBAN MOBILITY DIRECTORATE** and/or such other person or persons duly authorised thereto by the Employer in writing.

The name of the Employer is: CITY OF CAPE TOWN, **DIRECTOR: TRANSPORT INFRASTRUCTURE IMPLEMENTATION URBAN MOBILITY DIRECTORATE**, and is referred to in the Contract documents by the terms "Employer", "City of Cape Town" or "Council" as the context provides.

Clause 1.1.1.16:

The **Employer's Agent**, referred to in the Contract documents, is the firm of GIBB (Pty) Ltd acting through a director, an associate or an official authorised thereto in writing.

The name of the Employer's Agent is: GIBB (Pty) Ltd or their successors duly appointed by the Employer

Clause 1.1.1.26:

The Pricing Strategy is a Re-measurement Contract

Add the following Clauses after Clause 1.1.1.34:

1.1.1.35 "**Drawings**" means all drawings, calculations and technical information forming part of the Contract Documents and any modifications thereof or additions thereto from time to time approved in writing by the Employer's Agent or delivered to the Contractor by the Employer's Agent.

1.1.1.36 "**Letter of Notification**" means the letters of formal notification, signed by the Employer, of the decision of the Supply Chain Management Bid Adjudication Committee sent to all tenderers. The notification of the decision does not form part of the Employer's Acceptance of the successful tenderer's Offer and no rights shall accrue.

1.1.1.37 **"Intellectual Property"** means any and all intellectual property rights of any nature anywhere in the world whether registered, registerable or otherwise, including patents, trademarks, registered designs and domain names, applications for any of the foregoing, trade or business names, copyright and rights in the nature of copyright, design rights, rights in databases, know-how, trade secrets and any other intellectual property rights which subsist in computer software, computer programs, websites, documents, information, techniques, business methods, drawings, logos, instruction manuals, lists and procedures and particulars of customers, marketing methods and procedures and advertising literature, including the "look and feel" of any websites

Clause 1.2.1.2:

The address of the Employer is:

Physical address: Tower Block
Civic Centre
12 Hertzog Boulevard
Cape Town
8001

Postal address: P O Box 298
Cape Town.
8001

E-mail address: [redacted]

Clause 1.2.1.2:

The address of the Employer's Agent is:

Physical address: [redacted]

Postal address: [redacted]

E-mail address: [redacted]

Clause 1.3:

Delete Clause 1.3.5 in its entirety and replace with the following:

1.3.5. Intellectual Property

1.3.5.1. The Contractor acknowledges that it shall not acquire any right, title or interest in or to the Intellectual Property of the Employer.

1.3.5.2. The Contractor hereby assigns to the Employer, all Intellectual Property created, developed or otherwise brought into existence by it for the purposes of the contract, unless the Parties expressly agree otherwise in writing.

1.3.5.3. The Contractor shall be deemed to have given the Employer a non-terminable, transferable, non-exclusive, royalty-free licence to copy, use and communicate the Contractor's documents, including making and using modifications of such documents for further work required to the Works.

1.3.5.4. The Contractor shall, and warrants that it shall:

1.3.5.4.1. not be entitled to use the Employer's Intellectual Property for any purpose other than as contemplated in this contract;

1.3.5.4.2. not modify, add to, change or alter the Employer's Intellectual Property, or any information or data related thereto, nor may the Contractor produce any product as a result of, including and/or arising from any such information, data and Intellectual Property, and in the event that it does produce any such product, the product shall be, and be deemed in law to be, owned by the Employer;

1.3.5.4.3. not apply for or obtain registration of any domain name, trademark or design which is similar to any Intellectual Property of the Employer;

1.3.5.4.4. comply with all reasonable directions or instructions given to it by the Employer in relation to the form and manner of use of the Employer Intellectual Property, including without limitation, any brand guidelines which the Employer may provide to the contractor from time to time;

1.3.5.4.5. procure that its employees, directors, members and contractors comply strictly with the provisions of clauses 1.3.5.4.1 to 1.3.5.4.3 above;

unless the Employer expressly agrees thereto in writing after obtaining due internal authority.

1.3.5.5. The Contractor represents and warrants to the Employer that, in providing goods, services or both, as the case may be, for the duration of the contract, it will not infringe or make unauthorised use of the Intellectual Property rights of any third party and hereby indemnifies the Employer from any claims, liability, loss, damages, costs, and expenses arising from the infringement or unauthorised use by the contractor of any third party's Intellectual Property rights.

1.3.5.6. In the event that the contract is cancelled, terminated, ended or is declared void, any and all of the Employer's Intellectual Property, and any and all information and data related thereto, shall be immediately handed over to the Employer by the contractor and no copies thereof shall be retained by the contractor unless the Employer expressly and in writing, after obtaining due internal authority, agrees otherwise.

Add the following Clause after Clause 1.3.6:

1.3.7. The parties agree that this contract shall also be subject to the Employer's Supply Chain Management Policy ('SCM Policy') that was applicable on the date the bid was advertised**, save that if the Employer adopts a new SCM Policy which contemplates that any clause therein would apply to the contract emanating from this tender, such clause shall also be applicable to that contract.** Please refer to this document contained on the CCT's website.

1.3.8. Abuse of the supply chain management system is not permitted and may result in cancellation of the contract, restriction of the supplier, and/or the exercise by the Employer of any other rights and remedies available to it as described in the SCM Policy.

Clause 3.1

Delete clause

Clause 3.2.2

Add the following at the end of the clause:

If, in exercising any discretion, the result of such decision would be to utilise the contingency allowance, increase the contract value or granting of time for practical completion, the Employer's Agent must obtain approval from the Employer that such funding or time is available and granted by the Employer to be awarded prior to finalising such a decision.

Clause 3.2.3:

The Employer's Agent shall obtain the specific approval of the Employer before executing any of his functions or duties according to the following Clauses of the General Conditions of Contract or Contract Data:

a) Clause 3.3.1 Nomination of Employer's Agent's Representative
b) Clause 3.3.4 Employer's Agent's authority to delegate
c) Clause 5.8.1 Non-working times
d) Clause 5.11.2 Suspension of the Works
e) Clause 5.12.4 Acceleration instead of extension of time
f) Clause 6 All actions in terms of the clause subject to 3.2.2 of Contract Data.
h) Clause 6.10.10 Advance payment, for items not listed in the Advance Payment Schedule.
i) Clause 10.1.5 All actions in terms of the clause subject to 3.2.2 of Contract Data.

Clause 3.3.2.2.3:

Delete the words "oral or" from the clause

Clause 3.3.2.2.4:
Delete the words "oral or" from the clause

Clause 4.1:

Add the following Clause after Clause 4.1.2:

4.1.3 Where the Contract is based on an alternative tender offer submitted by the Tenderer/Contractor, he shall, notwithstanding acceptance of the offer by the Employer, be liable for any deficiency in the alternatives proposed, for any costs in ensuring that the alternatives meet the Employer's standards and requirements, and for any loss or damage arising out of such error or deficiency.

Clause 5.3.1:

The documentation required before commencement with Works execution is:

a) Approved Health and Safety Plan (Refer to applicable clause in the Health and Safety Specification in Part C3.5 in the Scope Work)
b) Initial programme (Refer to Clause 5.6)
c) Security (Refer to Clause 6.2)
d) Evidence of Insurance (Refer to Clause 8.6)
e) Occupational Health and Safety Agreement (Part C1.5 in Agreements and Contract Data)
f) Letter of good standing from the Compensation Commissioner, or a licensed compensation insurer (Refer to Clause 4.3)
g) Protection of the Environment Declaration (Part C1.6 in Agreements and Contract Data)
h) Proof of Registration / Letter of Good Standing with the Bargaining Council for the Civil Engineering Industry (BCCEI)
i) Wayleave Approvals and work permits from the relevant service authority

Add the following to Clause 5.3.1:

Such instruction shall, where applicable, also be subject to the issuing, by the Provincial Director of the Department of Labour, of a construction work permit to perform the intended construction work in terms of Clause 5.3.4 below.

Clause 5.3.2:

The time to submit the documentation required before commencement with Works execution is within **14** days.

Clause 5.3.3:

Add the following to Clause 5.3.3:

Notwithstanding the above, where a construction work permit from the Provincial Director of the Department of Labour is required, commencement of the Works shall not be deemed to take place until such construction work permit has been issued by the Provincial Director.

Clause 5.3.4:

Add the following Clause after Clause 5.3.3:

5.3.4 Application for Construction Work Permit

Where the Employer is required to apply to the Provincial Director of the Department of Labour for a construction work permit to perform the intended construction work, the employer shall do so as soon as possible after its Bid Adjudication Committee has awarded the contract, and the period that the Department of labour requires to issue the permit will run concurrently with the appeal period.

Should the issuing of a construction work permit delay the Employer's Agent's instruction to commence executing the Works and this in turn causes a delay to Practical Completion by more than 60days, then the Contractor shall be entitled to make a claim in accordance with Clause 10.1. Should, however, the issuing of a construction work permit be delayed by the submission of a unacceptable draft Health and Safety Plan, in the opinion of either the Employer's Health and Safety Agent, or the Provincial Director of the Department of Labour, no claim for an extension of time will be entertained.

Clause 5.4.2:

Access to and possession of the Site shall not be exclusive to the Contractor insofar as the provisions of Clause 4.8 apply, and where ongoing use by the general public is required.

Add the following Clause after Clause 5.4.3:

5.4.4 The Contractor shall bear all costs and charges for special and temporary rights of way required by it in connection with access to the Site.

Clause 5.6.2.3:

Insert the following after "…approvals,":

… permits,

Clause 5.8.1:

The non-working days are Sundays. The special non-working days are:

a) All gazetted public holidays.

b) Year-end break(s) not exceeding 15 working days in duration.

Clause 5.12.2.2:

Add the following to Clause 5.12.2.2:

No extension of time will be granted in respect of any delays attributed to normal climatic conditions. Normal climatic conditions shall be deemed to include normal rainfall and associated wet conditions and materials, strong winds and extremes of temperature. However, in the event that delays to critical activities exceed the number of working days listed below for each month, then abnormal climatic conditions shall be deemed to exist, and an extension of time may be claimed in accordance with the provisions of Clause 5.12.

The number of days quoted below shall be regarded as a fair estimate of the delays to be anticipated and allowed for under normal climatic conditions where inclement weather prevents or disrupts critical work.

January	2 days
February	2 days
March	2 days
April	2 days
May	2 days
June	4 days
July	4 days
August	4 days
September	4 days
October	2 days
November	2 days
December	2 days

Claims for delays for abnormal climatic conditions shall be accompanied by substantiating facts and evidence, which shall be submitted timeously as each day or half-day delay is experienced.

It shall be further noted that where the critical path is not affected, no extension of time for abnormal climatic conditions or for any other reason will be entertained.

Clause 5.13.1:

The penalty for failing to complete the Works is **R25 000** per day.

Insert the following after "actual date of Practical Completion":

… or, in the case of termination by the Employer in terms of Clause 9.2.1, the actual date of termination,

Clause 5.16.3:

The latent defects period is **10** years.

Clause 6.2.1:

The security to be provided by the Contractor shall be a performance guarantee of **7%** of the Contract Sum. The performance guarantee shall contain the precise wording of the document included in Part C1.3 of the Contract Data: **Form of Performance Guarantee**, and it shall be issued by a financial institution approved by the Employer at the date when the guarantee is issued. The list of approved financial institutions current at the date of tender is attached to the **Form of Performance Guarantee**.

Clause 6.2.2:

Delete Clause 6.2.2 in its entirety.

Clause 6.2.3:

Delete Clause 6.2.3 in its entirety and replace with the following:

The Contractor shall ensure that the performance guarantee remains valid and enforceable until the Certificate of Completion of the Works is issued.

Clause 6.5.1.2.3:

The percentage allowance to cover overhead charges is **10%**

Clause 6.8.2:

Add the following to Clause 6.8.2:

The Contract Price shall be subject to contract price adjustment in accordance with Clause 6.8 of the General Conditions of Contract.

If special materials are specified in Part 2 of the Contract Data then the provisions of Clause 6.8.3 of the General Conditions of Contract shall apply to such special materials.

Where applicable, in terms of the foregoing, the value of the certificates issued shall be adjusted in accordance with the Contract Price Adjustment Schedule with the following values for "Concrete works" and/or "Roads and earthworks" and/or "Building, Electronic & Electrical":

The value of "x" is 0,10.

The values of the coefficients for "Concrete works" are:

a = 0,25 b = 0,15 c = 0,55 d = 0,05

The values of the coefficients for "Roads and earthworks" are:

a = 0,21 b = 0,27 c = 0,42 d = 0,10

The values of the coefficients for "Building, Electronic & Electrical" are:

a = 0,20 b = 0,10 c = 0,60 d = 0,10

The base month is one month prior to the month in which the tender closed.

Furthermore, the Contract Price Adjustment Schedule shall be amended as follows:

"L" is the "Labour Index" and shall be the Consumer Price Index (CPI) for "All items (CPI Headline)", as published in the Statistical News Release, P0141: Table A – Consumer Price Index: Main Indices of Statistics South Africa.

"P" is the "Plant Index" and shall be the Construction Materials Price Index for "Plant and Equipment" as published in the Statistical News Release P0151.1, Table 4 – Mining and construction plant and equipment price index of Statistics South Africa.

"M" is the "Materials Index" and shall be the Construction Materials Price Index for selected materials as published in the Statistical News Release P0151.1, Table 5 - Mechanical and electrical engineering input price indices & Table 6 – Civil engineering material price indices of Statistics South Africa as follows:

The Materials Index for Roadworks shall be from Table 6: "Civil Engineering material – roads, general (excluding bitumen)"
The Materials Index for Concrete Works shall be from Table 6: "Civil Engineering material – (excluding reinforcing metal work and bitumen)
The Materials Index for Building, Electronic & Electrical shall be from Table 5: "Electrical engineering"

"F" is the "Fuel Index" and shall be the Producer Price Index (PPI) for "Coal and Petroleum Products - Diesel", as published in the Statistical News Release P0142.1: Table 1 –PPI for final manufactured goods of Statistics South Africa.

The amount "Ac" shall be sub-divided into Ac1, Ac2, & Ac3 as appropriate, and each of these shall be multiplied by its Contract Price Adjustment Factor (CPAF), with the resultant amounts added together to produce the adjustment as envisaged in the CPA Schedule:

where

Ac1 is the proportion of Ac applicable to "Concrete works", and
Ac2 is the proportion of Ac applicable to "Roads and earthworks" and
Ac3 is the proportion of Ac applicable to "Building, Electronic & Electrical" and where

Ac1 = T1 – S1 – D1 – E1 – G1 – Ap1, and
Ac2 = T2 – S2 – D2 – E2 – G2 – Ap2 , and
Ac3 = T3 – S3 – D3 – E3 – G3 – Ap3 .

in which formulae the values associated with the symbols T1 , T2 and T3…. Ap1 , Ap2 and Ap3 shall be applicable to the proportions of T ….. Ap in "Concrete works" and "Roads and earthworks" and "Building, Electronic & Electrical", respectively.

Furthermore, the value of the General Items shall be proportional to the value of work done and materials on Site in T1 and T2 and T3 respectively.

Clause 6.8.3: Variation in the cost of special materials

Price adjustment for variations in the cost of special materials is provided for in the Special Materials Schedule at the end of this Part 1: Contract Data provided by the Employer.

Clause 6.8.4:

Add the following to Clause 6.8.4:

Notwithstanding the above, in the event that a public holiday is proclaimed after 28 days before the closing date for tenders, no costs other than those that can be claimed under Clause 5.12.3 shall be added to the contract price.

Add the following after Clause 6.8.4:

6.8.5. If price adjustment for variations in the cost of plant and materials imported from outside of South Africa is provided for in the contract data, such adjustment shall be based on the information contained on the schedule titled "**Price Basis for Imported Resources"**and as below. For the purposes of this clause the Rand value of imported Plant and Materials inserted on the schedule titled "**Price Basis for Imported Resources"** (column (F)) shall be the value in foreign currency (column (A)) converted to South African Rand (column (C)) by using the closing spot selling rate quoted by **Employer's** main banker, NEDBANK, on the Base Date (seven calendar days before tender closing date) rounded to the second decimal place (column(B)), to which shall be added any Customs Surcharge and Customs Duty applicable at that date (columns (D) and (E)).

6.8.5.1. Adjustment for variations in rates of exchange:

a) The value in foreign currency inserted in column (A) shall be subject to clause (h) below when recalculating the Rand value.

b) The rate of exchange inserted in column (B) shall be the closing spot selling rate quoted by **Employer's** main banker, NEDBANK, on the Base Date, rounded to the second decimal place, subject to sub-paragraph (c) below.

c) If the rate of exchange inserted by the Tenderer differs from the NEDBANK rate referred to above, then the NEDBANK rate shall apply and the Rand value in columns (C) and (F) shall be recalculated accordingly, without altering the price in the Schedules of Quantities for the relevant items.

d) If a tender from a supplier or sub-contractor provides for variations in rates of exchange, the Contractor may **only** claim for variations in rates of exchange if he binds the supplier or sub- contractor to the same provision to take out forward cover as described in sub-paragraph (e) below.

e) The Contractor (or supplier or sub-contractor) shall within five working days from the date of placing a firm order on an overseas supplier, cover or recover forward by way of a contract with a bank which is an authorised foreign exchange dealer, the foreign exchange component of the cost of any imported Plant and Materials inserted by the Tenderer on the schedule titled "**Price Basis for Imported Resources"**.

f) When the Contractor (or supplier or sub-contractor) so obtains forward cover, the Contractor shall immediately notify the Employer of the rate obtained and furnish the Employer with a copy of the foreign exchange contract note.

g) Based on the evidence provided in sub-paragraph (f) above, the value in Rand inserted in column (C) on the schedule titled "**Price Basis for Imported Resources"**shall be recalculated using the forward cover rate obtained, and any increase or decrease in the Rand value defined in this clause shall be adjusted accordingly, subject to sub-paragraph (h) below. Failure to provide such evidence shall result in no such recalculation shall be considered by the Employer.

h) The adjustments shall be calculated upon the value in foreign currency in the Contractor's (or supplier's or sub-contractor's) forward cover contract, provided that, should this value exceed the value in foreign currency inserted in column (A) of the schedule titled "Price Basis for Imported Resources", then the value in column (A) shall be used.

6.8.5.2. Adjustment for variations in customs surcharge and customs duty

(a) Any increase or decrease in the Rand value between the amounts of Customs Surcharge and Customs Duty inserted on the schedule titled "**Price Basis for Imported Resources"**and those amounts actually paid to the Customs and Excise Authorities, which are due to changes in the percentage rates applicable or to the foreign exchange rate used by the authorities, shall be adjusted accordingly.

(b) The Tenderer shall state the Customs Duty Tariff Reference applicable to each item and the Contractor shall advise the Employer's Agent of any changes which occur.

6.8.5.3. Adjustment for variation in labour and material Costs

If the prices for imported Plant and Materials are not fixed, the Contractor shall in his Tender specify the formula for calculating Contract Price Adjustments normally used in the country of manufacture and the indices and relative proportions of labour and material on which his Tender prices are based. Evidence of the indices applicable shall be provided with each claim. The indices applicable 42 days before contractual dispatch date from the factory will be used for the purposes of Contract Price Adjustment.

Failure to specify a formula in the Tender shall mean that the prices are fixed or shall be deemed to be fixed.

Clause 6.10.1.5:

Delete Clause 6.10.1.5 in its entirety and replace with the following:

6.10.1.5. The value of Plant and materials:

6.10.1.5.1. up to a percentage limit of **80%** for the Plant and materials referred to in Clause 6.9.1.1 brought on to the Site but not yet built into the Permanent Works;

Provided that the Contractor has produced documentary evidence of ownership of such Plant and/or materials and has delivered to the Employer an indemnity, approved in writing by the Employer, against any claim to or in respect of such Plant and/or materials by reason of the Contractor's sequestration or liquidation, or of any defect in the Contractor's title to the Plant and/or materials;

6.10.1.5.2. which have been manufactured and are stored at places other than the Site, in respect of which the Employer has indicated, on the Advance Payment Schedule, that advance payment will be permitted;

6.10.1.5.3. for which a deposit with order is required from the Contractor by a manufacturer/supplier, only in respect of which the Employer has indicated, on the Advance Payment Schedule, that advance payment will be permitted;

The terms and conditions for advance payment are set out in Clause 6.10.10 and in the Advance Payment Schedule at the end of this Part 1: Contract Data provided by the Employer.

Clause 6.10.1.7:

Add the following after the words "Clause 5.13":

or any other fines or penalties that become due under the Contract.

Clause 6.10.3:

Add the following to Clause 6.10.3:

Notwithstanding the provision of a performance guarantee in terms of Clause 6.2.1, interim payments to the Contractor shall be subject to a retention by the Employer of an amount of **5%** of the said amounts due to the Contractor, with no limit. A guarantee in lieu of retention is not permitted.

Clause 6.10.4:

Add the following to the last sentence of Clause 6.10.4:

…, dated as at the date of delivery of the Contractor's statement to the Employer's Agent.

Add the following to Clause 6.10.4:

Notwithstanding the above, the Employer's Agent shall be empowered to withhold the delivery of the payment certificate until the Contractor has complied with his obligations to report in terms of Clause 4.10.2 and as described in the Scope of Work.

The Contractor may submit a fully motivated application regarding more frequent payment to the Employer's Agent to be submitted to the Employer for consideration. Requests for more frequent payments will be considered at the sole discretion of the Employer and is not a right in terms of this contract.

Clause 6.10.10:

Add the following Clause after Clause 6.10.9:

6.10.10 Advance payment

Subject to Clauses 6.10.1.5.2 and 6.10.1.5.3, and the Advance Payment Schedule, the Employer shall make an advance payment for Plant and materials stored at places other than the Site, or in respect of which a deposit with order is required, only once the Contractor has submitted an advance payment guarantee in accordance with this Clause, the authenticity of which has been verified by the City's Treasury Department.

Unless and until the Employer receives this guarantee, the following paragraphs shall not apply.

The Employer's Agent shall issue an Interim Payment Certificate for, or including, advance payment after receiving a statement under Clause 6.10.1 and after the Employer has received a guarantee in an amount equal to the advance payment requested. This guarantee shall be issued by a financial institution approved by the Employer, as listed in the Annexure in Part C1.3 of the Contract Data, and shall be in the form of and shall contain the precise wording of the document included in Part C1.4: **Form of Advance Payment Guarantee** and shall come into force, be administered and expire in terms thereof**.**

The Employer shall return the guarantee to the Contractor within 14 days after the expiry date. The provision of the Advanced Payment Guarantee shall be at the Contractor's cost.
The term "deposit" or "deposit with order" used in the context of this Clause and elsewhere by reference to this Clause, means a sum payable by the Contractor to a manufacturer/supplier prior to the manufacture of an item of Plant or material, required at the time of placing an order, the balance of the value of the item being payable later.

Clause 8.6.1.1.2:

The value of Plant and materials supplied by the Employer to be included in the insurance sum is **R 0.00 (Nil)**.

Clause 8.6.1.1.3:

The amount to cover professional fees for repairing damage and loss to be included in the insurance sum is **R0.00 (Nil).**

Clause 8.6.1.3:

The limit of indemnity for liability insurance is R20 000 000.00 for any single claim – the number of claims to be unlimited during the construction and defects liability periods.

Clause 8.6.1.5:

In addition to the insurances required in terms of General Conditions of Contract Clauses 8.6.1.1 to 8.6.1.4 the following insurance is also required:

a) Insurance of Construction Equipment (including tools, offices and other temporary structures and contents) and other things (except those intended for incorporation into the Works) brought onto the site for a sum sufficient to provide for their replacement.

b) Insurance in terms of the provisions of the Compensation for Occupational Injuries and Diseases Act, 130 of 1993.

c) Motor Vehicle Liability Insurance comprising (as a minimum) "Balance of Third Party" Risks including Passenger Liability Indemnity.

d) Where the contract involves manufacturing and/or fabrication of the works or part thereof at premises other than the Site, the Contractor shall satisfy the Employer that all materials and equipment for incorporation in the works are adequately insured during manufacture and/or fabrication. In the event of the Employer having an insurable interest in such works during manufacture or fabrication then such interest shall be noted by endorsement to the Contractor's Policies of Insurance.

Clause 8.6.5:

Delete the following from Clause 8.6.5:

"and the terms thereof shall be subject to the approval of the Employer's Agent, which approval shall not be unreasonably withheld."

Clause 8.6.6:

Replace clause 8.6.6 with the following:

The Contractor shall provide evidence in the form stated in the contract data to the Employer's Agent that the required insurances are effected and that all premiums thereunder have been paid.

Clause 9.1:

In Clause 9.1.6 replace "and 9.1.3" with:

, 9.1.3 and 9.1.7

Add the following Clause after Clause 9.1.6:

9.1.7. Death of Sole Proprietor/Member

Upon the death of the Contractor who was a Sole Proprietor, or a sole member of a Close Corporation, the Contract will terminate forthwith. The Employer shall pay to the Contractor's estate any money which it considers due under the Contract in terms of Clause 9.1.5, in full and final settlement thereof.

9.1.8. Material Irregularity during procurement process

The Employer may terminate the contract if a material irregularity vitiates the procurement process leading to the conclusion of the contract, rendering the procurement process and the conclusion of the resulting contract unfair, inequitable, non-transparent, uncompetitive or not cost-effective, provided the Employer follows the processes as described in its SCM Policy.

9.1.9. Reputational risk or harm to the Employer\

The Employer, without prejudice to any other remedy for breach of contract, by written notice of default sent to the supplier, may terminate the contract if the implementation of the contract may result in reputational risk or harm to the City as a result of (inter alia):

9.1.9.1. reports of poor governance and/or unethical behaviour;
9.1.9.2. association with known family of notorious individuals;
9.1.9.3. poor performance issues, known to the Employer;
9.1.9.4. negative social media reports; or
9.1.9.5. adverse assurance (e.g. due diligence) report outcomes.

Add the following Clause after Clause 9.2.3:

9.2.4 Employer's Elections in case of Insolvency

In addition to anything else contained in this contract, the Employer may make either of the following elections to ensure its rights are protected and any negative impact on service delivery is mitigated:

9.2.4.1. accept a contractor's proposal (via the trustee / liquidator) to render delivery utilising the appropriate contractual mechanisms; or

9.2.4.2. terminate the contract, as the liquidator proposed contractor is deemed unacceptable to the employer, at any time by giving written notice to the contractor (via the trustee / liquidator).

Clause 10.5.3:

The number of ad-hoc Adjudication Board Members to be appointed is 1 (one).

ADDITIONAL CONDITIONS OF CONTRACT

Add the following Clause after Clause 10:

Clause 11 Details to be confidential

The Contractor shall treat the details of the Works comprised in this Contract as private and confidential (save in so far as may be necessary for the purposes hereof) and shall not publish or disclose the same or any particulars thereof in any trade or technical paper elsewhere without the prior written consent of the Employer's Agent.

SPECIAL MATERIALS SCHEDULE

Each material dealt with as a special material in terms of Clause 4.1 of the Contract Price Adjustment Schedule of the General Conditions of Contract is stated in the list below. The provisions of Clause 6.8.3 of the General Conditions of Contract shall apply to such special materials. The base prices for the special materials (current at the time of tender) shall be furnished by the tenderer/contractor. Only those materials listed by the Employer below shall be considered as special materials.

Special Material	Unit	Base Price
Bitumen (50/70 penetration grade)	t	[redacted]
Bitumen (70/100 penetration grade)	t	[redacted]
Structural steel	t	
Steel reinforcing bars	t	
Steel used in the manufacture of pipes	t	
Steel used in the manufacture of street light poles	t	

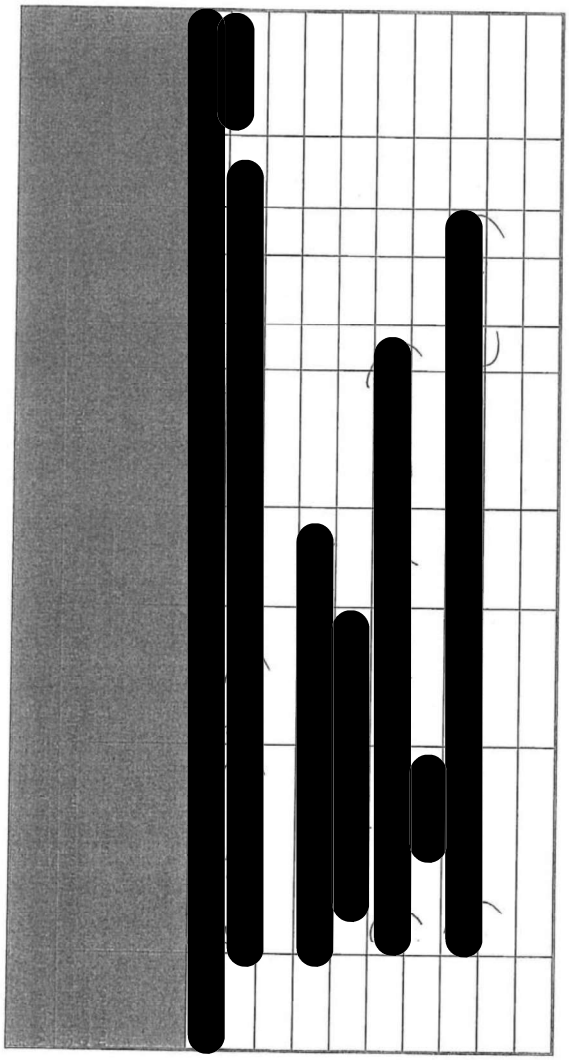
Conditions:

1) When called upon to do so, the contractor shall substantiate the prices to be used to determine the adjustment in respect of the special materials listed above with acceptable documentary evidence.
2) Where an adjustment for the variation in the price of bituminous products is claimed, the claim must be substantiated by a declaration from the manufacturer, confirming the source of bitumen used in such bituminous products at the time in question.
3) Where the source of bitumen (the refinery) is located in the Western Cape Province, or where bitumen sourced from abroad is landed at a port in the Western Cape, the cost of transporting such bitumen within the boundaries of the Western Cape shall be included in the rate for bituminous products. Extra-over rates to cover the cost of transporting bitumen from beyond the borders of the Western Cape have been measured separately in the Bill of Quantities.
4) The price of the imported bitumen itself must be expressed as a landed price in ZAR.

(1)

CITY OF CAPE TOWN
DIRECTOR: TRANSPORT INFRASTRUCTURE IMPLEMENTATION URBAN MOBILITY DIRECTORATE
CONTRACT NO. 412Q/2022/23
CONSTRUCTION OF THE PHASE 2A IRT INFRASTRUCTURE: WORK PACKAGE E2 ALONG GOVAN MBEKI ROAD (M9) FROM WEST OF NY72 ROAD TO EAST OF KLIPFONTEIN ROAD

SCHEDULE 23: PRICE BASIS FOR IMPORTED RESOURCES



SCHEDULE 23 = 3 PAGES

SEE ATTACHED

* State Customs Duty Tariff Reference for each item

Note:

CITY OF CAPE TOWN
DIRECTOR: TRANSPORT INFRASTRUCTURE IMPLEMENTATION URBAN MOBILITY DIRECTORATE
CONTRACT NO.412Q/2022/23
CONSTRUCTION OF THE PAHSE 2A IRT INFRASTRUCTURE: WORK PACKAGE E2 ALONG GOVAN MBEKI ROAD (M9) FROM WEST OF NY72 ROAD TO EAST OF KLIPFONTEIN ROAD
SCHEDULE 23: PRICE BASIS FOR IMPORTED RESOURCES

VALUE OF IMPORTED RESOURCES TO BE ADJUSTED						Customs Surcharge		Customs Duty		Total In Rand of (C) + (D) + (E) Included in Schedules in Schedules of Quantities Item (F)
Schedules of Quantities Item No	Description of Resources	Value in Foreign Currency (A)	Rate of Exchange as a BASE DATE (B)	Value in Rand (A) x (B) (C)		%	Rand (D)	%	Rand (E)	

Note Base cost of supplier of imported content

Schedule 23 - Traffic Signals

SCHEDULE 23 - CCTV CAMERA INSTALLATION

(3)

Item No	Description	Value in Foreign Currency	RoE at Base Date	Value in Rand	Customs Surcharge %	Customs Surcharge R	Customs Duty %	Customs Duty R	Total in Rands
[redacted]									

[redacted]

C1.3 FORM OF PERFORMANCE GUARANTEE

PERFORMANCE GUARANTEE

For use with the Conditions of Contract as described in C1.2: Contract Data Part 1: Contract Data provided by the Employer

GUARANTOR DETAILS AND DEFINITIONS

"Guarantor" means: .....

"Physical address: .....

"Employer" means: The City of Cape Town, **DIRECTOR: TRANSPORT INFRASTRUCTURE IMPLEMENTATION URBAN MOBILITY DIRECTORATE**

"Contractor" means: .....

"Employer's Agent" means: .....

"Works" means: **412Q/2022/23: CONSTRUCTION OF THE PHASE 2A IRT INFRASTRUCTURE: WORK PACKAGE E2 ALONG GOVAN MBEKI ROAD (M9) FROM WEST OF NY72 ROAD TO EAST OF KLIPFONTEIN ROAD**

"Site" means: The site as defined in the Contract Data.

"Contract" means: The Agreement made in terms of the Form of Offer and Acceptance and such amendments or additions to the Contract as may be agreed in writing between the parties.

"Contract Sum" means: The accepted amount inclusive of tax of R.....

Amount in words: .....

"Guaranteed Sum" means: The maximum aggregate amount of R.....

Amount in words: .....

"Expiry Date" means: The date of issue by the Employer's Agent of the Certificate of Completion of the Works.

CONTRACT DETAILS

Employer's Agent issues: Interim Payment Certificates, Final Payment Certificate and the Certificate of Completion of the Works as defined in the Contract.

PERFORMANCE GUARANTEE

1. The Guarantor's liability shall be limited to the amount of the Guaranteed Sum.

2. The Guarantor's period of liability shall be from and including the date of issue of this Performance Guarantee and up to and including the Expiry Date or the date of payment in full of the Guaranteed Sum, whichever occurs first. The Employer's Agent and/or the Employer shall advise the Guarantor in writing of the date on which the Certificate of Completion of the Works has been issued.

3. The Guarantor hereby acknowledges that:

3.1 any reference in this Performance Guarantee to the Contract is made for the purpose of convenience and shall not be construed as any intention whatsoever to create an accessory obligation or any intention whatsoever to create a suretyship;

3.2 its obligation under this Performance Guarantee is restricted to the payment of money.

4. Subject to the Guarantor's maximum liability referred to in 1, the Guarantor hereby undertakes to pay the Employer the sum certified upon receipt of the documents identified in 4.1 to 4.3:

4.1 A copy of a first written demand issued by the Employer to the Contractor stating that payment of a sum certified by the Employer's Agent in an Interim or Final Payment Certificate has not been made in terms of the Contract and failing such payment within seven (7) calendar days, the Employer intends to call upon the Guarantor to make payment in terms of 4.2;

4.2 A first written demand issued by the Employer to the Guarantor at the Guarantor's physical address with a copy to the Contractor stating that a period of seven (7) days has elapsed since the first written demand in terms of 4.1 and the sum certified has still not been paid;

4.3 A copy of the aforesaid payment certificate which entitles the Employer to receive payment in terms of the Contract of the sum certified in 4.

5. Subject to the Guarantor's maximum liability referred to in 1, the Guarantor undertakes to pay to the Employer the Guaranteed Sum or the full outstanding balance upon receipt of a first written demand from the Employer to the Guarantor at the Guarantor's physical address calling up this Performance Guarantee, such demand stating that:

5.1 the Contract has been terminated due to the Contractor's default and that this Performance Guarantee is called up in terms of 5; or

5.2 a provisional or final sequestration or liquidation court order has been granted against the Contractor and that the Performance Guarantee is called up in terms of 5; and

5.3 the aforesaid written demand is accompanied by a copy of the notice of termination and/or the provisional/final sequestration and/or the provisional liquidation court order.

6. It is recorded that the aggregate amount of payments required to be made by the Guarantor in terms of 4 and 5 shall not exceed the Guarantor's maximum liability in terms of 1.

7. Where the Guarantor has made payment in terms of 5, the Employer shall upon the date of issue of the Final Payment Certificate submit an expense account to the Guarantor showing how all monies received in terms of this Performance Guarantee have been expended and shall refund to the Guarantor any resulting surplus. All monies refunded to the Guarantor in terms of this Performance Guarantee shall bear interest at the prime overdraft rate of the Employer's bank compounded monthly and calculated from the date payment was made by the Guarantor to the Employer until the date of refund.

8. Payment by the Guarantor in terms of 4 or 5 shall be made within seven (7) calendar days upon receipt of the first written demand to the Guarantor.

9. The Employer shall have the absolute right to arrange his affairs with the Contractor in any manner which the Employer may deem fit and the Guarantor shall not have the right to claim his release from this Performance Guarantee on account of any conduct alleged to be prejudicial to the Guarantor.

10. The Guarantor chooses the physical address as stated above for the service of all notices for all purposes in connection herewith.

11. This Performance Guarantee is neither negotiable nor transferable and shall expire in terms of 2, where after no claims will be considered by the Guarantor. The original of this Guarantee shall be returned to the Guarantor after it has expired.

12. This Performance Guarantee, with the required demand notices in terms of 4 or 5, shall be regarded as a liquid document for the purposes of obtaining a court order.
13. Where this Performance Guarantee is issued in the Republic of South Africa the Guarantor hereby consents in terms of Section 45 of the Magistrate's Courts Act No 32 of 1944, as amended, to the jurisdiction of the Magistrate's Court of any district having jurisdiction in terms of Section 28 of the said Act, notwithstanding that the amount of the claim may exceed the jurisdiction of the Magistrate's Court.

Signed at .....

Date .....

Guarantor's signatory (1) .....

Capacity .....

Guarantor's signatory (2) .....

Capacity .....

Witness signatory (1) .....

Witness signatory (2) .....

ANNEXURE

LIST OF APPROVED FINANCIAL INSTITUTIONS

The following financial institutions are currently (as at 03 December 2021) approved for issue of contract guarantees to the City:

National Banks:
ABSA Bank Ltd.
FirstRand Bank Ltd.
Investec Bank Ltd.
Nedbank Ltd.
Standard Bank of SA Ltd.

International Banks (with branches in SA):
Barclays Bank plc.
Citibank n.a.
Credit Agricole Corporate and Investment Bank
HSBC Bank plc.
JP Morgan Chase Bank
Societe Generale
Standard Chartered Bank

Insurance companies:
Bryte Insurance Co. (Previously Zurich Insurance Co.) Coface SA
Compass Insurance Co.
Credit Guarantee Insurance Corporation of Africa
Guardrisk Insurance Co.
Hollard Insurance Company Ltd.
Infiniti Insurance Limited
Lombard Insurance
New National Assurance Co.
PSG Konsult Ltd (Previously Absa Insurance)
Regent Insurance Co.
Renasa Insurance Company Ltd.
Santam Limited

C1.4 FORM OF ADVANCE PAYMENT GUARANTEE

ADVANCE PAYMENT GUARANTEE

For use with the Conditions of Contract as described in C1.2: Contract Data Part 1: Contract Data provided by the Employer

GUARANTOR DETAILS AND DEFINITIONS

"Guarantor" means: .....

"Physical address: .....

"Employer" means: The City of Cape Town, **DIRECTOR: TRANSPORT INFRASTRUCTURE IMPLEMENTATION URBAN MOBILITY DIRECTORATE**

"Contractor" means: .....

"Employer's Agent" means: .....

"Works" means: **412Q/2022/23: CONSTRUCTION OF THE PHASE 2A IRT INFRASTRUCTURE: WORK PACKAGE E2 ALONG GOVAN MBEKI ROAD (M9) FROM WEST OF NY72 ROAD TO EAST OF KLIPFONTEIN ROAD**

"Site" means: The site as defined in the Contract Data.

"Contract" means: The Agreement made in terms of the Form of Offer and Acceptance and such amendments or additions to the Contract as may be agreed in writing between the parties.

"Plant and materials" means: The Plant and materials stored at places other than the Site, or in respect of which an advance payment prior to manufacture is required, which the Employer has agreed may be subject to advance payment, such Plant and materials being listed in the Schedule of Plant and materials.

"Schedule of Plant and materials" means: A list of Plant and materials which shows the value thereof to be included in the Guaranteed Advance Payment Sum.

"Guaranteed Advance Payment Sum" means: The maximum aggregate amount of R.....

Amount in words: .....

"Expiry Date" means: The date of the payment certificate wherein the Plant and materials have been certified by the Employer's Agent as having been built into the Permanent Works.

CONTRACT DETAILS

Employer's Agent issues: Interim Payment Certificates and Final Payment Certificate.

ADVANCE PAYMENT GUARANTEE

1. The Guarantor's liability shall be limited to the amount of the Guaranteed Advance Payment Sum.

2. The Guarantor's period of liability shall be from and including the date of issue of this Advance Payment Guarantee and up to and including the Expiry Date or the date of payment in full of the Guaranteed Advanced Payment Sum, whichever occurs first.

3. The Guarantor hereby acknowledges that:

3.1 any reference in this Advance Payment Guarantee to the Contract is made for the purpose of convenience and shall not be construed as any intention whatsoever to create an accessory obligation or any intention whatsoever to create a suretyship;

3.2 its obligation under this Advance Payment Guarantee is restricted to the payment of money.

4. Subject to the Guarantor's maximum liability referred to in 1, the Guarantor hereby undertakes to pay the Employer the sum certified upon receipt of the documents identified in 4.1 to 4.3:

4.1 A copy of a first written demand issued by the Employer to the Contractor stating that payment of a sum certified by the Employer's Agent in an Interim or Final Payment Certificate has not been made in terms of the Contract and failing such payment within seven (7) calendar days, the Employer intends to call upon the Guarantor to make payment in terms of 4.2;

4.2 A first written demand issued by the Employer to the Guarantor at the Guarantor's physical address with a copy to the Contractor stating that a period of seven (7) calendar days has elapsed since the first written demand in terms of 4.1 and the sum certified has still not been paid;

4.3 A copy of the aforesaid payment certificate which entitles the Employer to receive payment in terms of the Contract of the sum certified in 4.

5. Subject to the Guarantor's maximum liability referred to in 1, the Guarantor undertakes to pay to the Employer the Guaranteed Advance Payment Sum or the full outstanding balance upon receipt of a first written demand from the Employer to the Guarantor at the Guarantor's physical address calling up this Advance Payment Guarantee, such demand stating that:

5.1 the Contract has been terminated due to the Contractor's default and that this Advance Payment Guarantee is called up in terms of 5; or

5.2 a provisional or final sequestration or liquidation court order has been granted against the Contractor and that the Advance Payment Guarantee is called up in terms of 5; and

5.3 the aforesaid written demand is accompanied by a copy of the notice of termination and/or the provisional/final sequestration and/or the provisional liquidation court order.

6. It is recorded that the aggregate amount of payments required to be made by the Guarantor in terms of 4 and 5 shall not exceed the Guarantor's maximum liability in terms of 1.

7. Payment by the Guarantor in terms of 4 or 5 shall be made within seven (7) calendar days upon receipt of the first written demand to the Guarantor.

9. The Employer shall have the absolute right to arrange his affairs with the Contractor in any manner which the Employer may deem fit and the Guarantor shall not have the right to claim his release from this Advance Payment Guarantee on account of any conduct alleged to be prejudicial to the Guarantor.

10. The Guarantor chooses the physical address as stated above for the service of all notices for all purposes in connection herewith.

11. This Advance Payment Guarantee is neither negotiable nor transferable and shall expire in terms of 2, where after no claims will be considered by the Guarantor. The original of this Guarantee shall be returned to the Guarantor after it has expired.

12. This Advance Payment Guarantee, with the required demand notices in terms of 4 or 5, shall be regarded as a liquid document for the purposes of obtaining a court order.

13. Where this Performance Guarantee is issued in the Republic of South Africa the Guarantor hereby consents in terms of Section 45 of the Magistrate's Courts Act No 32 of 1944, as amended, to the jurisdiction of the Magistrate's Court of any district having jurisdiction in terms of Section 28 of the said Act, notwithstanding that the amount of the claim may exceed the jurisdiction of the Magistrate's Court.

Signed at .....

Date .....

Guarantor's signatory (1) .....

Capacity .....

Guarantor's signatory (2) .....

Capacity .....

Witness signatory (1) .....

Witness signatory (2) .....

Schedule of Plant and materials

For use with Advance Payment Guarantees on contracts using the General Conditions of Contract for Construction Works, Third Edition, 2015.

Employer The City of Cape Town, **DIRECTOR: TRANSPORT INFRASTRUCTURE IMPLEMENTATION URBAN MOBILITY DIRECTORATE**

Contractor ……..

Works **412Q/2022/23: CONSTRUCTION OF THE PHASE 2A IRT INFRASTRUCTURE: WORK PACKAGE E2 ALONG GOVAN MBEKI ROAD (M9) FROM WEST OF NY72 ROAD TO EAST OF KLIPFONTEIN ROAD**

Payment Certificate No. …….

Advance payment is requested in respect of the following items of Plant and materials, which have been manufactured and are stored at places other than the Site, or in respect of which a deposit with order is required from the Contractor by a manufacturer/supplier:

Bill of Quantities item no.	**Description of Plant and materials**	**Deposit with order required (Y/N)**	**Place of storage (or manufacture, if deposit with order is required)**	**Unit**	**Quantity**	**Unit price R c**	**Total Price R c**
Total Value of Plant and materials to be included in Guaranteed Advance Payment Sum R							

Signed at …….. on the ……..day of……..20……..

…….
for the Contractor

…….
As witness

……
Approved by Employer's Agent

C1.5 OCCUPATIONAL HEALTH AND SAFETY AGREEMENT

AGREEMENT MADE AND ENTERED INTO BETWEEN THE CITY OF CAPE TOWN (HEREINAFTER CALLED THE "EMPLOYER") AND

……..……. ,
(Contractor/Mandatary/Company/CC Name)

IN TERMS OF SECTION 37(2) OF THE OCCUPATIONAL HEALTH AND SAFETY ACT, 85 OF 1993 AS AMENDED.

I, ……..……. , representing

……..……. , as an employer
in its own right, do hereby undertake to ensure, as far as is reasonably practicable, that all work will be performed, and all equipment, machinery or plant used in such a manner as to comply with the provisions of the Occupational Health and Safety Act (OHSA) and the Regulations promulgated thereunder.

I furthermore confirm that I am/we are registered with the Compensation Commissioner and that all registration and assessment monies due to the Compensation Commissioner have been fully paid or that I/We are insured with an approved licensed compensation insurer.

COID ACT Registration Number: ……..

OR Compensation Insurer: ..... Policy No.: .....

I undertake to appoint, where required, suitable competent persons, in writing, in terms of the requirements of OHSA and the Regulations and to charge him/them with the duty of ensuring that the provisions of OHSA and Regulations as well as the Council's Special Conditions of Contract, Way Leave, Lock-Out and Work Permit Procedures are adhered to as far as reasonably practicable.

I further undertake to ensure that any subcontractors employed by me will enter into an occupational health and safety agreement separately, and that such subcontractors comply with the conditions set.

I hereby declare that I have read and understand the Occupational Health and Safety Specifications contained in this tender and undertake to comply therewith at all times.

I hereby also undertake to comply with the Occupational Health and Safety Specification and Plan submitted and approved in terms thereof.

Signed at .....on the.....day of.....20….

_____ _____
Witness **Mandatary**

Signed at ..... on the.....day of.....20 ....

_____ _____
Witness for and on behalf of
City of Cape Town

C1.6 PROTECTION OF THE ENVIRONMENT DECLARATION

PROTECTION OF THE ENVIRONMENT DECLARATION

The Contractor will not be given right of access to the Site until this form has been signed

CONTRACT NO.: 412Q/2022/23

CONTRACT TITLE: CONSTRUCTION OF THE PHASE 2A IRT INFRASTRUCTURE: WORK PACKAGE E2 ALONG GOVAN MBEKI ROAD (M9) FROM WEST OF NY72 ROAD TO EAST OF KLIPFONTEIN ROAD

I/ we,.....{Contractor} record as follows:

1. I/ we, the undersigned, do hereby declare that I/ we am/ are aware of the increasing requirement by society that construction activities shall be carried out with due regard to their impact on the environment.

2. In view of this requirement of society and a corresponding requirement by the Employer with regard to this Contract, I/ we will, in addition to complying with the letter of the terms of the Contract dealing with protection of the environment, also take into consideration the spirit of such requirements and will, in selecting appropriate employees, plant, materials and methods of construction, in-so-far as I/ we have the choice, include in the analysis not only the technical and economic (both financial and with regard to time) aspects but also the impact on the environment of the options. In this regard, I/ we recognise and accept the need to abide by the "precautionary principle" which aims to ensure the protection of the environment by the adoption of the most environmentally sensitive construction approach in the face of uncertainty with regard to the environmental implications of construction.

3. I/ we declare that I/ we have read and understood the contents of the Environmental Management Programme (which is comprised of the Environmental Management Specification and its Annexures) for this Contract, and that I/ we understand my/our responsibilities in terms of enforcing and implementing the Environmental Management Programme. I/ we also declare that I/ we have made appropriate provision in my/ our pricing of the Bills of Quantities items for the Environmental Management Programme.

4. I/ we acknowledge and accept the right of the Employer to deduct, should he so wish, from any amounts due to me/ us, such amounts (hereinafter referred to as fines) as the Employer's Agent shall certify as being warranted in view of my/ our failure to comply with the terms of the Contract dealing with protection of the environment, subject to the following:

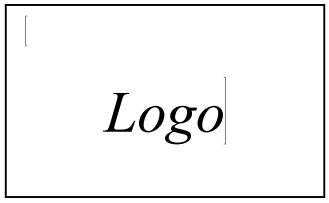
4.1 The Employer's Agent, in determining the amount of such fine, shall take into account, *inter alia*, the nature of the offence, the seriousness of its impact on the environment, the degree of prior compliance/non-compliance, the extent of the Contractor's overall compliance with environmental protection requirements and, in particular, the extent to which he considers it necessary to impose a sanction in order to eliminate/reduce future occurrences

4.2 The Employer's Agent shall, with respect to any fine imposed, provide me/ us with a written statement giving details of the offence, the facts on which the Employer's Agent has based his assessment and the terms of the Contract (by reference to the specific clause) which has been contravened.

Signed ..... Date.....
CONTRACTOR

C1.7 INSURANCE BROKERS WARRANTY

Pro Forma



Letterhead of Contractor's Insurance Broker

Date _____

CITY OF CAPE TOWN
City Manager
Civic Centre
12 Hertzog Boulevard
Cape Town
8000

Dear Sir

CONTRACT NO.: 412Q/2022/23

CONTRACT TITLE: CONSTRUCTION OF THE PHASE 2A IRT INFRASTRUCTURE: WORK PACKAGE E2 ALONG GOVAN MBEKI ROAD (M9) FROM WEST OF NY72 ROAD TO EAST OF KLIPFONTEIN ROAD

NAME OF CONTRACTOR:_____

I, the undersigned, do hereby confirm and warrant that all the insurances required in terms of the abovementioned contract have been issued and/or in the case of blanket/umbrella policies, have been endorsed to reflect the interests of the CITY OF CAPE TOWN with regard to the abovementioned contract, and that all the insurances and endorsements, etc., are all in accordance with the requirements of the contract.

I furthermore confirm that all premiums in the above regard have been paid.

Yours faithfully

Signed: _____

For: _____

C1.8 CONTRACT OF TEMPORARY EMPLOYMENT AS COMMUNITY LIAISON OFFICER

Construction Contract No.: .....

PROJECT.....

AGREEMENT made between the CONTRACTOR ..... and the Community Liaison Officer……, hereafter referred to as the CLO, for the appointment and employment of a CLO for the duration of the work in respect of the above named construction contract.

1. **THE PARTIES HAVE AGREED THAT**

The CLO will be employed by the CONTRACTOR on a temporary basis for the duration of the work from the date of signing this agreement to the date of practical completion as defined in the Contract, subject to all the conditions set out below.

2. **THE DUTIES OF THE COMMUNITY LIAISON OFFICER SHALL BE:**

1. to keep the community informed on the progress of the project;
2. to keep the Contractor informed on relevant Community affairs and possible grievances;
3. to manage the recruitment of workers from the Sub-Council Job-Seekers Database;
4. to assist the Contractor's supervisory staff in the management of the workers.

3. **THE FOLLOWING CONDITIONS OF EMPLOYMENT SHALL APPLY:**

The Conditions of Temporary Employment as applicable on this Contract for the workers recruited from the Community shall apply equally to the CLO, except that the rate of remuneration shall be **R 462** per working day. These conditions that apply are listed below as they appear in the Contract of Temporary Employment:

3.1 If required to work on a statutory public holiday or Sunday the payment will be double the amount stated in the previous paragraph.

3.2 Maximum hours of work:

(i) 9¼ hours per day
(ii) 45 hours per week;
(iii) 5 days per week;
(iv) 5 hours without an interval, whereupon there shall be an interval of at least 30 minutes;
(v) A spread-over period of 12 hours.

3.3 The CLO shall be entitled to payment where he is prevented from working by reasons which are within the control of the Contractor.

3.4 On days when it is raining the Contractor may, before 9 a.m., decide not to open the site and there will be no pay.

If the Contractor closes the site between 9 a.m. and 1 p.m., the CLO will be paid half the daily wage.

If the site works later than 1 p.m., the CLO will be paid the full daily wage.

3.5 Workers and the CLO will not be permitted to work under conditions of:

(i) undisciplined or unruly behaviour;
(ii) insubordination to Team Leader, Supervisors or Management;
(iii) abuse of intoxicating substances;
(iv) criminal actions by the employee;
(v) strike action or political stayaways.

3.6 Workers, including the CLO, may be dismissed after two official written warnings for the following behaviour:

(i) undisciplined or unruly behaviour;
(ii) insubordination to Team Leader, Supervisors or Management;
(iii) abuse of intoxicating substances;
(iv) wilful or negligent damage to or loss of machines or equipment.

The Contractor shall ensure that he has statements from at least two witnesses concerning any of the above situations.
The Contractor shall inform the CLO within 24 hours of any warning issued to workers employed from the Job-Seekers Database.

3.7 The CLO will be paid on a Friday afternoon every two weeks, one week in arrears.

3.8 The CLO shall be given a statement with each payment on which is recorded:

(i) the name of the Contractor;
(ii) the CLO's name;
(iii) the number of days worked by the CLO;
(iv) the rate per day;
(v) the details of any deductions made;
(vi) the actual amount paid to the CLO.

3.9 No deduction shall be made from the remuneration except where the CLO consents in writing or unless the Contractor is permitted or required to do so by law or the order of any competent court.

3.10 The CLO shall be supplied free of charge with all health and safety equipment required by the Occupation Health and Safety Act. The equipment shall remain the property of the Contractor.

3.11 The Contractor must give the CLO at least one week's notice of the termination of the Contract of Temporary Employment. If this is not done, the CLO must be paid earnings for five days. This condition does not apply if the CLO is dismissed.

3.12 At the end of the period of temporary employment, the Contractor shall provide a Certificate of Service recording the Contractor's name, the CLO's name and address, the period of service, the type of work on which the CLO was engaged and the rate of remuneration on termination.

4. **TERMINATION OF AGREEMENT**

4.1 If the CLO can no longer perform and execute his/her duties as detailed in this agreement, this agreement will be terminated without prejudice to any rights under this agreement.

5. **THE CONDITIONS OF THIS AGREEMENT**

5.1 The parties expressly declare that this agreement contains all the conditions negotiated between them, and no condition or stipulation not contained herein shall be binding upon the parties.

6. **THUS AGREED AND SIGNED BY THE PARTIES**:

Contractor: …….....

Community Liaison officer: .....

Date: .....

PART C2: PRICING DATA

C2.1 Pricing Assumptions

Pricing Assumptions mean the criteria as set out below, read together with all Parts of this contract document, which it will be assumed in the contract, that the tenderer has taken into account when developing his prices.

1. Measurement and payment shall be in accordance with the relevant provisions of the COLTO Standard Specification for Road and Bridge Works for State Road Authorities (1998 edition) as amended in the Scope of Works as well as the relevant provisions of the supplementary and other specifications in Part C3.4 of the Scope of Works

2. For the purpose of the Pricing Schedule, the following words shall have the meanings assigned to them:

Unit:	The unit of measurement for each item of work as defined in the COLTO Standard Specification for Road and Bridge Works for State Road Authorities (1998 edition).
Quantity:	The number of units of work for each item.
Rate:	The payment per unit of work for which the Service Provider tenders to do the work.
Amount:	The product of the quantity and the rate tendered for an item.
Lump Sum:	An amount tendered for an item, the extent of which is described in the Pricing Schedule, the Scope of Work or elsewhere, but of which the quantity of work is not measured in units.
Prime cost:	As defined in Clause 6.6.1 of the General Conditions of Contract
Provisional Sum:	As defined in Clause 6.6.2 of the General Conditions of Contract

3. The item numbers appearing in the Pricing Schedule refer to the corresponding item numbers in the COLTO Standard Specification for Road and Bridge Works for State Road Authorities (1998 edition) or the Scope of Work as applicable.

4. The short descriptions of the items of payment given in the Pricing Schedule are only for the purposes of identifying the items. More details regarding the extent of the work entailed under each item appear in the COLTO Standard Specifications and the Scope of Work.

5. The measurement and payment clauses in a specification in which further information regarding the scheduled items is given, are referenced under “Item” (pay items) in the Schedules of Quantities. The referenced clauses are not necessarily the only sources of information in respect of scheduled items. Further information and specifications may be found elsewhere in the Contract Documents. Standard and Project Specifications are identified by the first two digits of the specifications, e.g. 13 for COLTO Section – 1300.

6. Unless otherwise stated, items are measured net in accordance with the drawings, and no allowance is made for waste.

7. The quantities set out in the Bills of Quantities are the estimated quantities of the Contract Works, but the Contractor will be required to undertake whatever quantities may be directed by the Employer’s Agent from time to time. The Contract Price for the completed contract shall be computed from the certified quantities of work done, valued at the relevant unit rates and prices.

8. The prices and rates to be inserted in the Bills of Quantities are to be the full inclusive prices for the work described under the several items. Such prices and rates shall cover all costs and expenses that may be required in and for the execution of the work described, and shall cover the cost of all general risks, liabilities, and obligations set forth or implied in the documents on which the tender is based, as well as overhead charges and profit. Reasonable prices shall be inserted as these will be used as a basis for assessment of payment for additional work that may have to be carried out. The Contractor shall submit to the Employers Agent within 28 days after the Commencement Date a full breakdown of all rates. The rates are to be clearly referenced to the relevant payitem numbers, with each rate broken down into its labour, materials, plant, fuel, overhead charges and profit components.

9. A price or rate should be entered against each item in the Bills of Quantities, whether the quantities are stated or not. **An item against which no rate is/are entered, or if anything other than a rate or a nil rate (for example, a zero, a dash or the word "included" or abbreviations thereof) is entered against an item, it will also be regarded as a nil rate having been entered against that item, i.e. that there is no charge for that item.** The Tenderer may be requested to clarify nil rates, or items regarded as having nil rates; and the Employer may also perform a risk analysis with regard to the reasonableness of such rates.

10. Except where rates only are required, insert all amounts to be included in the total tendered price in the "Amount" column and show the corresponding total tendered price.

11. The units of measurement described in the Bills of Quantities are metric units. Abbreviations which may be used in these Bills of Quantities are as follows:

mm	=	millimetre	h	=	hour
m	=	metre	kg	=	kilogram
km	=	kilometre	t	=	ton (1000 kg)
m2	=	square metre	No.	=	number
m2.pass	=	square metre-pass	sum	=	lump sum
ha	=	hectare	MN	=	meganewton
m3	=	cubic metre	MN.m	=	meganewton-metre
m3.km	=	cubic metre-kilometre	P C sum	=	Prime Cost sum
l	=	litre	Prov sum	=	Provisional sum
kl	=	kilolitre	%	=	per cent
MPa	=	megapascal	kW	=	kilowatt
Km-pass	=	kilometre-pass	kPa	=	kilopascal

12. Where fractions of a cent occur in calculations of prices and amounts, they shall be rounded up/down to the nearest whole cent.

13. The Tenderer is referred to C.2.24 in Part T1.2 Tender Data regarding the pricing of Deviations and/or Qualifications.

14. Clause C.2.13.11 c) in Part T1.2 Tender Data shall be applicable to the submission of Bills of Quantities which have been priced electronically, and which the Tenderer wishes to submit as a printed version with his/her tender in the place of handwritten priced Bills of Quantities.

    If there is found to be any variance between the printed version and the original issued document, the original shall stand. However, where Addenda have been issued which amend the Bills of Quantities, then the printed Bills of Quantities shall take these into account.

    The pages of the issued Bills of Quantities should not be removed from the tender document.

15. All descriptions or clauses where trade names or proprietary products are specified, are deemed to include the phrase "or equal approved"

16. Tenderers are referred to Clause 6.8.2 in Part C1.2 Contract Data regarding contract price adjustment.

The following bills in Part C2.2 Bills of Quantities are deemed applicable to the following categories for the purposes of Contract Price Adjustment:

NO.	BILL	CPA CATEGORY
1.	GENERAL ITEMS	To be proportioned
2.	ROADWORKS	Roads and earthworks
3.	STRUCTURES	Concrete work
4.	SERVICES	Roads and earthworks
5.	ELECTRICAL & ELECTRONIC	Building, Electronic & Electrical
6.	BUILDING WORKS (ALL STATIONS)	Building, Electronic & Electrical
7.	LANDSCAPING	Roads and earthworks
8.	ENVIRONMENTAL MANAGEMENT & HEALTH AND SAFETY	To be proportioned

CITY OF CAPE TOWN
DIRECTOR: TRANSPORT INFRASTRUCTURE IMPLEMENTATION URBAN MOBILITY DIRECTORATE
CONTRACT NO. 412Q/2022/23
CONSTRUCTION OF THE PHASE 2A IRT INFRASTRUCTURE: WORK PACKAGE E2 ALONG GOVAN MBEKI ROAD (M9) FROM WEST OF NY72 ROAD TO EAST OF KLIPFONTEIN ROAD

C2.2 Bills of Quantities

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"

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SCHEDULE: 1 GENERAL
SECTION: 1200 GENERAL REQUIREMENTS AND PROVISIONS

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
B12.01	Payment to Service authorities for services relocation				
	(a) Actual cost of relocation	PC Sum	1		
	(b) Contractors handling costs, profit and all other charges in respect of sub-item B12.01(a)	%			
B12.02	Provision of Laboratory testing by the Employers Agent				
	(a) Actual cost of testing	PC Sum	1		
	(b) Contractors handling costs, profit and all other charges in respect of sub-item B12.02(a)	%			
B12.03	Provision of Ground Penetrating Radar and electronic service detection devices				
	(a) Actual cost of testing & interpretation	PC Sum	1		
	(b) Contractors handling costs, profit and all other charges in respect of sub-item B12.03(a)	%			
B12.04	Community Liaison Officer (CLO)				
	(a) Actual cost of remuneration of CLO	PC Sum	1		
	(b) Contractors handling costs, profit and all other charges in respect of sub-item B12.04(a)	%			
B12.05	Supply and install borehole, complete with sump pump, electrical connection, pipework, fittings and all other incidentals.				
	(a) Actual Cost for supply, installation, testing and commissioning complete borehole	PC Sum	1		
	(b) Contractors handling costs, profit and all other charges in respect of sub-item B12.05(a)	%			
B12.06	As-built Information to Employers Agent's Specification				
	(a) Independent Topographical Survey by Professional Surveyor	lump sum	1		
	(b) CCTV Camera Inspection				
	(i) Actual Cost for CCTV Camera Inspections	PC Sum	1		
	(ii) Contractors handling costs, profit and all other charges in respect of sub-item B12.06(b)(i)	%			
B12.07	Provision for Relocation of Informal Structures				
	(a) Actual cost for relocation of informal structures	PC Sum	1		
	(b) Contractor's handling costs, profit and all other charges in respect of item B12.07(a)	%			
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CONTRACT TITLE: CONSTRUCTION OF THE PHASE 2A IRT INFRASTRUCTURE: WORK PACKAGE E2 ALONG GOVAN MBEKI ROAD (M9) FROM WEST OF NY72 ROAD TO EAST OF KLIPFONTEIN ROAD

SCHEDULE: 1 GENERAL

SECTION: 1300 CONTRACTOR'S ESTABLISHMENT ON SITE AND GENERAL OBLIGATIONS

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
B13.01	Contractor's general obligations				
	(a) Fixed obligations	lump sum	1	[redacted]	
	(b) Value-related obligations	lump sum	1	[redacted]	
	(c) Time-related obligations				
	(i) for "start-up"	week	6	[redacted]	
	(ii) for "construction works period"	week	150	[redacted]	
B13.02	Provisional general obligations				
	(a) Extra over items 13.01(a), (b) and (c) for de-establishing and re-establishing upon written instruction from the Employers Agent	lump sum	1	[redacted]	
	Note: Item B13.01 (c) (ii) includes for special nonworking days as stipulated in the document				
TOTAL FOR SECTION 1300 CARRIED FORWARD TO SUMMARY					[redacted]

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SCHEDULE: 1 GENERAL

SECTION: 1400 HOUSING, OFFICES AND LABORATORIES FOR THE ENGINEER'S SITE PERSONNEL

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
14.01	Office and laboratory accommodation				
	(a) Offices (interior floor space only)	m²	200	[redacted]	
	(e) Ablution units	m²	10	[redacted]	
14.02	Office and laboratory furniture				
	(a) Chairs	No	40	[redacted]	
	(b) Draughtsman's stools	No	8	[redacted]	
	(d) Desks, complete with drawers and locks	No	8	[redacted]	
	(e) Drawing tables	No	4	[redacted]	
	(f) Conference tables	No	1	[redacted]	
14.03	Office and laboratory fittings Installations and equipment				
	(a) Items measured by number				
	(i) 220/250 volt power points	No	30	[redacted]	
	(iv) Double 55 watt fluorescent light fittings complete with ballast and tubes	No	10	[redacted]	
	(vi) Hand wash basins complete with taps and drains	No	2	[redacted]	
	(x) Fire extinguishers, 9,0 kg,all purpose dry powder type, complete, mounted on wall with brackets	No	5	[redacted]	
	(xi) Air conditioning units with 2,2 kW minimum capacity, mounted and with own power connection	No	6	[redacted]	
	(xii) Heater, space-heating type, minimum capacity 1,5kW	No	6	[redacted]	
	(xiv) General-purpose steel cupboards with shelves	No	6	[redacted]	
	(xv) Steel filing cabinets with drawers	No	6	[redacted]	
	(xvi) Refrigerators	No	1	[redacted]	
B14.03	(xix) Electric kettle	No	2	[redacted]	
B14.03	(xx) Plan holder	No	2	[redacted]	
B14.03	(xxi) Floodlights complete	No	2	[redacted]	
	(b) Prime-cost items and items paid for in a lump sum:				
	(i) Provision of telephone service, including the cost of calls in connection with contract administration and telephone rental	PC Sum	1	[redacted]	
	CARRIED FORWARD TO THE NEXT PAGE				[redacted]

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SCHEDULE: 1 GENERAL

SECTION: 1400 HOUSING, OFFICES AND LABORATORIES FOR THE ENGINEER'S SITE PERSONNEL

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	BROUGHT FORWARD FROM THE PREVIOUS PAGE				[redacted]
	(ii) Handling costs and profit in respect of subsubitem 14.03(b)(i) above	%		[redacted]	
B14.03	(ix) Cell phone costs, including pro rata rentals, for calls in connection with contract administration	PC Sum	1	[redacted]	
	(x) Handling costs and profit in respect of subsubitem 14.03(b)(ix) above	%		[redacted]	
	(c) Items measured by area				
	(vii) Venetian blinds	m²	40	[redacted]	
	(viii) Notice boards as specified	m²	20	[redacted]	
14.04	Car ports				
	(a) Car ports, as specified, at offices and laboratory buildings	No	8	[redacted]	
14.08	Services				
	(a) Services at office and laboratories				
	(i) Fixed costs	lump sum	1	[redacted]	
	(ii) Running costs	week	150	[redacted]	
	(e) Internet connectivity				
	(i) Fixed costs	lump sum	1	[redacted]	
	(ii) Running costs	week	150	[redacted]	
B14.10	Provision of printer/scanner/copier facilities	week	150	[redacted]	
B14.11	Security measures for the Employers Agent				
	(a) Security dog including handler / security guard (PSIRA Registered)	week	60	[redacted]	
	(b) Security guard (PSIRA Registered)	week	200	[redacted]	
	(b) Guardhuts	week	75	[redacted]	
	(d) Actual cost of additional security as instructed	PC Sum	1	[redacted]	
	(e) Handling costs and profit in respect of sub-item B14.11 (a)	%		[redacted]	
TOTAL FOR SECTION 1400 CARRIED FORWARD TO SUMMARY					[redacted]

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SCHEDULE: 1 GENERAL

SECTION: 1500 ACCOMODATION OF TRAFFIC

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
15.03	Temporary traffic-control facilities				
B15.03	(a) Flagmen	man-day	900		
	(b) Portable STOP and GO-RY signs	No	12		
	(d) Amber flicker lights	No	20		
	(e) Road signs, R- and TR-series, (1200mm diameter)	No	140		
	(f) Road signs, TW-series,				
	(i) 1500mm sides	No	20		
	(ii) 1200mm x 1600mm	No	100		
	(g) Road signs, STW-, DTG-, TGS- AND TG-series (excluding delineators and barricades)	m²	30		
	(h) Delineators (DTG50J) (1000mm x 250mm):				
	(i) Single	No	1,200		
B15.03	(iii) Double sided reboundable lane dividers (1 000 mm x 250 mm) with continuous interlocking base 1 m long	No	600		
B15.03	(iv) Additional interlocking base for item B15.03(h)(iii)	No	1200		
	(i) Moveable barricade/road sign combination (TW 411/TR 104 or TR 103 combinations)	No	10		
	(i) Traffic cones (750mm)	No	50		
	(m) Two-way communication devices	No	6		
B15.03	(n) Media Release				
	(i) Media release as approved by the Employer's Agent	Prov Sum	1		
B15.03	(o) Other traffic control measures ordered by the Employers Agent				
	(i) Provision of other traffic control measures	Prov Sum	1		
B15.03	(p) Covering of signs	m²	200		
B15.03	(q) Temporary information signs (TIN series)	m²	400		
B15.03	(r) Moveable barriers (Plastic road barriers - 1000mm height)	m	100		
B15.10	Accommodation of traffic where the road is constructed in half-widths				
	(a) Govan Mbeki	km	4.3		
	(b) NY72, Emms, New Eisleben and all other intersecting roads	km	2.5		
	CARRIED FORWARD TO THE NEXT PAGE				

CONTRACT: 412Q/2022/23
CONTRACT TITLE: CONSTRUCTION OF THE PHASE 2A IRT INFRASTRUCTURE: WORK PACKAGE E2 ALONG GOVAN MBEKI ROAD (M9) FROM WEST OF NY72 ROAD TO EAST OF KLIPFONTEIN ROAD

SCHEDULE: 1 GENERAL

SECTION: 1500 ACCOMODATION OF TRAFFIC

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	BROUGHT FORWARD FROM THE PREVIOUS PAGE				[redacted]
B15.11	Traffic Signals sets				
	(a) Supply of traffic signals sets	No	6	[redacted]	
	(b) Operation of signals	set-week	200	[redacted]	
B15.14	Provision of traffic safety equipment for use by the Employers Agent				
	(a) Safety jackets (level 2, Alt. 1)	No	8	[redacted]	
	(b) Rotating amber lights	No	6	[redacted]	
B15.15	Traffic Safety Officer	weeks	150	[redacted]	
B15.16	Orange safety netting, 1.2 m high, secured onto stakes in white painted barrels				
	(a) Supply & erect	m	2500	[redacted]	
	(b) Remove from site	m	2500	[redacted]	
B15.17	Amber flashing lights mounted on signs	No	10	[redacted]	
B15.18	Temporary Barriers				
	(a) Supply to site, initial placement and removal from site	m	1500	[redacted]	
	(b) Dismantling and re-erecting barriers during the works	m	3000	[redacted]	
	(c) Renting of barriers	metre/month	24000	[redacted]	
B15.19	Penalty to be deducted for non-compliance with requirements for accommodation of traffic				
	(a) Fixed penalty per occurence	No	-	[redacted]	
	(b) Time-related penalty	hr	-	[redacted]	
15/B34.03	Pavement layers constructed from gravel obtained from existing pavement layers, and material from temporary stockpiles:				
	(g) Gravel subbase (chemically stabilized material) compacted to 96% MDD, using				
	(i) Non-cemented material:				
	(1) C4 quality, 125mm thick	m^3	500	[redacted]	
15/42.11	Asphalt layer constructed for rehabilitation purposes in accordance with the provisions of subsubclauses 4213(f)(ii) or 4213(f)(iii):				
	(a) Asphalt base, stone skeletal mix, 20mm NMPS, Class 1 Grading, (level II design) using:				
	CARRIED FORWARD TO THE NEXT PAGE				[redacted]

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SCHEDULE: 1 GENERAL

SECTION: 1500 ACCOMODATION OF TRAFFIC

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	BROUGHT FORWARD FROM THE PREVIOUS PAGE				[redacted]
	(iii) 80mm thick (50/70 bitumen)	t	700	[redacted]	
	(b) Asphalt surfacing, sand skeletal mix, Class 2 Grading, using:				
	(i) 50mm thick, continuously graded, 14mm NMPS (level II design) using (A-P1 modified binder	t	450	[redacted]	
TOTAL FOR SECTION 1500 CARRIED FORWARD TO SUMMARY					[redacted]

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SCHEDULE: 1 GENERAL

SECTION: 1600 OVERHAUL

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
B16.02	Overhaul on material hauled in excess of 5.0 km to the nearest approved landfill site	m^3-km	300,000	[redacted]	
B16.03	Cost for spoiling at a Municipal Landfill Site				
	(a) Actual surcharge cost	PC Sum	1	[redacted]	
	(b) Contractor's Mark-up overhead costs and profit in respect of item B16.03 (a)	%	750,000.00	[redacted]	
TOTAL FOR SECTION 1600 CARRIED FORWARD TO SUMMARY					[redacted]

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SCHEDULE: 1 GENERAL

SECTION: 1700 CLEARING AND GRUBBING

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
17.01	Clearing and grubbing	ha	5		
17.02	Removal and grubbing of large trees and tree stumps				
	(a) Girth exceeding 1m up to and including 2m	No	75		
	(b) Girth exceeding 2m up to and including 3m	No	25		
17.04	Clearing and grubbing at inlets and outlets of hydraulic structures	m²	50		
17.05	Cleaning out of hydraulic structures				
	(a) Pipes with an internal diameter up to and including 750 mm	m³	250		
	(b) Pipes with an internal diameter exceeding 750 mm	m³	250		
B17.07	Remove topsoil to nominal depth (50mm), stockpile, maintain or dispose off-site as directed by the Employers Agent	m³	1500		
B17.08	Demolish and dispose off-site of miscellaneous concrete or building structures	m³	1200		
B17.09	Demolish, and dispose off-site, hydraulic structures, ducting and access chambers				
	(a) Pipes (All types up to 1000 mm internal diameter)	m	5000		
	(b) Manholes	No	40		
	(c) Catchpits, including foundations and frames of all sizes	No	100		
	(d) Existing headwalls	No	5		
	(e) Gate valves	No	10		
	(f) Fire hydrants	No	10		
B17.10	Remove and spoil existing kerbing and channelling of all radii				
	(a) Kerbs and Channel	m	9000		
	(b) Kerbing only	m	4500		
	(c) Edging	m	8000		
B17.11	Removal of sidewalk (100mm in depth) including layerworks, and dispose material off-site	m²	14000		
B17.12	Asbestos Specialist Services				
	(a) Actual costs of asbestos specialist services	PC Sum	1		
	(b) Contractor's Mark-up overhead costs and profit in respect of item B17.12 (a)	%			
TOTAL FOR SECTION 1700 CARRIED FORWARD TO SUMMARY					

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SCHEDULE: 1 GENERAL

SECTION: B1800 DAYWORKS

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
B18.01	Labour charges				
	(a) Unskilled labour	h	200		
	(b) Semi-skilled labour	h	200		
	(c) Skilled labour	h	200		
	(d) Ganger	h	100		
	(e) Foreman	h	100		
	(f) Surveyor (including 2 labourers, survey equipment and transport)	h	100		
B18.02	Material charges				
	(a) Procurement of materials	PC Sum	1		
	(b) Contractor's handling costs, profit and all other charges in respect of sub-item B18.02(a)	%			
B18.03	Plant charges				
	(a) Compressor (9 cfm) and three jackhammers	h	100		
	(b) Tipper trucks				
	(i) 6 m3	h	100		
	(ii) 10 m3	h	100		
	(c) Tractor-loader-backhoe (TLB, 75 kW)	h	100		
	(d) Excavator (140kW)	h	100		
	(e) Grader (Cat 140G or equivalent)	h	100		
	(f) Compactor (BOMAG WB 90 or equivalent)	h	100		
	(g) Water cart (500 litre)	h	100		
	(h) Water truck (10 000 litre minimum)	h	100		
	(i) Front end loader (90 kW)	h	100		
	(j) 11 ton vibratory roller	h	100		
	(k) Milling team, including plant and labour	h	50		
	(l) Asphalt paving team, including plant and labour	h	50		
	(m) Earthworks/gravel layers team, including plant and labour	h	50		
	(n) In-situ (CIR) recycling team, including plant and labour	h	50		
	CARRIED FORWARD TO THE NEXT PAGE				

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SCHEDULE: 1 GENERAL

SECTION: B1800 DAYWORKS

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	BROUGHT FORWARD FROM THE PREVIOUS PAGE				[redacted]
B18.04	Other plant / equipment not specified above				
	(a) Procurement of plant / equipment - Actual cost of plant / equipment not already specified in the tender by the Employer	PC Sum	1	[redacted]	
	(b) Contractor's handling costs, profit and all other charges in respect of sub item B18.04(a)	%	[redacted]		
B18.05	Transport				
	(a) LDV (1 ton load capacity)	km	2000	[redacted]	
	(b) Flatbed truck with crane (5 ton load capacity)	km	1000	[redacted]	
TOTAL FOR SECTION B1800 CARRIED FORWARD TO SUMMARY					[redacted]

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SCHEDULE: 1 GENERAL

SECTION: 5900 FINISHING THE ROAD AND ROAD RESERVE AND TREATING OLD ROADS

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
59.01	Finishing the road and road reserve:				
	(b) Single or Dual carriageway roads				
	(i) Govan Mbeki	km	4.3	[redacted]	
	(ii) NY72, Emms, New Eisleben and all other intersecting roads	km	2.5	[redacted]	
TOTAL FOR SECTION 5900 CARRIED FORWARD TO SUMMARY					[redacted]

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SCHEDULE: 2 ROADWORKS
SECTION: 2100 DRAINS

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
21.03	Excavation for subsoil drainage systems:				
	(a) Excavating soft material situated within the following depth ranges below the surface level:				
	(i) 0 m up to 1,5 m	m³	1800		
	(b) Extra over subitem 21.03(a) for excavation in hard material irrespective of depth	m³	100		
21.06	Natural permeable material in subsoil drainage systems (crushed stone):				
	(b) Crushed stone obtained from commercial sources (20mm)	m³	900		
	(c) Crushed stone obtained from commercial sources (14mm)	m³	50		
21.07	Natural permeable material in subsoil drainage systems (sand):				
	(b) Sand from commercial sources (medium grade)	m³	360		
21.08	Pipes in subsoil drainage systems:				
	(b) Unplasticised PVC pipes and fittings, normal duty complete with couplings				
	(i) 110 mm internal dia. slotted	m	3000		
	(ii) 75mm internal dia. slotted (DN75)	m	1800		
21.10	Synthetic-fibre filter fabric				
	(a) Geotextile Grade A2 or equivalent approved	m²	6600		
	(b) Geotextile Grade A3 or equivalent approved	m²	2450		
B21.12	Concrete outlet structures, manhole boxes, junction boxes and cleaning eyes for subsoil drainage systems:				
	(d) Cleaning eye & access box as per drawing SW1.2	No	50		
21.13	Concrete caps for sub-soil drain pipes	No	50		
B21.15	Overhaul for material hauled in excess of 5,0 km free-haul (normal overhaul)	m³.km	2000		
21.17	Test flushing of pipe subsoil drains	No	8		
	TOTAL FOR SECTION 2100 CARRIED FORWARD TO SUMMARY				

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SCHEDULE: 2 ROADWORKS

SECTION: 2200 PREFABRICATED CULVERTS

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
B22.01	Excavation				
	(a) Excavating soft material situated within the following depth ranges below the surface level:				
	(i) 0 m up to 1.0 m	m³	10500		
	(ii) Exceeding 1,0 m and up to 2,0 m	m³	10200		
	(iii) Exceeding 2,0 m and up to 3,0 m	m³	2950		
	(iv) Exceeding 3,0 m and up to 4,0 m	m³	920		
	(v) Exceeding 4,0 m and up to 5,0 m	m³	860		
	(vi) Exceeding 5,0 m and up to 6,0 m	m³	620		
	(vii) Exceeding 6,0 m and up to 7,0 m	m³	70		
	(b) Extra over subitem 22.01(a) for excavation in hard material, irrespective of depth	m³	200		
22.02	Backfilling:				
	(a) Using the excavated material	m³	10440		
	(b) Using imported selected material	m³	11670		
	(c) Extra over subitems 22.02(a) and (b) for soil cement backfilling				
	(ii) with 5% Cement	m³	1000		
22.03	Concrete pipe culverts:				
	(c) On class C bedding				
	(ii) 375 mm dia. Class 100D with Spigot and Socket	m	1980		
	(iii) 450 mm dia. Class 100D with Spigot and Socket	m	5380		
	(iv) 525 mm dia. Class 100D with Spigot and Socket	m	1095		
	(v) 600 mm dia. Class 100D with Spigot and Socket	m	540		
	(vi) 675 mm dia. Class 100D with Spigot and Socket	m	630		
	(vii) 750 mm dia. Class 100D with Spigot and Socket	m	460		
	(viii) 825 mm dia. Class 100D with Spigot and Socket	m	145		
	(ix) 900 mm dia. Class 100D with Spigot and Socket	m	120		
	(x) 1200 mm dia. Class 100D with Spigot and Socket	m	420		
22.17	Manholes, catchpits, precast inlet and outlet structures complete				
	(a) Manholes				
	CARRIED FORWARD TO THE NEXT PAGE				

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SCHEDULE: 2 ROADWORKS

SECTION: 2200 PREFABRICATED CULVERTS

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	BROUGHT FORWARD FROM THE PREVIOUS PAGE				[redacted]
	(1) Type: as per CCT standard detail drawing SW2.2 - Chamber dia. 1000mm				
	(i) Up to 1,0 m deep	No	5		[redacted]
	(ii) 1,0 m to 1,5 m deep	No	93		[redacted]
	(iii) 1,5 m to 2,0 m deep	No	17		[redacted]
	(iv) 2,0 m to 2,5 m deep	No	5		[redacted]
	(2) Type: as per CCT standard detail drawing SW2.2 - Chamber dia. 1250mm				
	(ii) 1,0 m to 1,5 m deep	No	18		[redacted]
	(iii) 1,5 m to 2,0 m deep	No	22		[redacted]
	(iv) 2,0 m to 2,5 m deep	No	17		[redacted]
	(v) 2,5 m to 3,0 m deep	No	2		[redacted]
	(3) Type: as per CCT standard detail drawing SW2.2 - Chamber dia. 1500mm				
	(iii) 1,5 m to 2,0 m deep	No	15		[redacted]
	(iv) 2,0 m to 2,5 m deep	No	6		[redacted]
	(v) 2,5 m to 3,0 m deep	No	2		[redacted]
	(4) Type: as per CCT standard detail drawing SW2.2 - Chamber dia. 1800mm				
	(ii) 1,0 m to 1,5 m deep	No	1		[redacted]
	(iii) 1,5 m to 2,0 m deep	No	1		[redacted]
	(iv) 2,0 m to 2,5 m deep	No	1		[redacted]
	(v) 2,5 m to 3,0 m deep	No	1		[redacted]
	(b) Catchpits				
	(1) Type A: as per CCT standard detail drawing SW3.1 - Grid Gully with Double Kerb Inlet				
	(i) Up to 1,0 m deep	No	77		[redacted]
	(ii) 1,0 m to 1,5 m deep	No	119		[redacted]
	(iii) 1,5 m to 2,0 m deep	No	4		[redacted]
	CARRIED FORWARD TO THE NEXT PAGE				[redacted]

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SCHEDULE: 2 ROADWORKS

SECTION: 2200 PREFABRICATED CULVERTS

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	BROUGHT FORWARD FROM THE PREVIOUS PAGE				[redacted]
	(iv) Extra over subitems 22.17(b)(1)(i) to (iii) for litter traps as per CCT standard detail drawing SW10	No	200	[redacted]	
	(2) Type: as per standard detail drawing IRT-2A-B-CE-J35437-XX REV1-4010 - Grid Gully with Triple Kerb Inlet				
	(i) Up to 1,0 m deep	No	33	[redacted]	
	(ii) 1,0 m to 1,5 m deep	No	9	[redacted]	
	(iii) 1,5 m to 2,0 m deep	No	1	[redacted]	
	(iv) Extra over subitems 22.17(b)(2)(i) to (iii) for litter traps as per CCT standard detail drawing SW10	No	43	[redacted]	
22.20	Benching	m²	525	[redacted]	
22.26	Hand excavation to determine the positions of existing services	m³	200	[redacted]	
	CARRIED FORWARD TO THE NEXT PAGE				[redacted]

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SCHEDULE: 2 ROADWORKS

SECTION: 2200 PREFABRICATED CULVERTS

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	BROUGHT FORWARD FROM THE PREVIOUS PAGE				[redacted]
B22.27	Reinstating trenches crossing road:				
	(a) Selected layers	m²	1100	[redacted]	
	(b) Subbase	m²	1100		
	(c) Base (including prime coat)	m²	1100		
B22.27	(f) Concrete encasement of stormwater pipe network (existing services) using class 20MPa/20 concrete	m³	200		
B22.29	Protecting, raising, and/or lowering of existing manhole, survey markers valve covers etc. prior to milling and their later reinstatement to the revised final road level				
	(a) Manhole covers	No	30		
	(b) Catchpits	No	30		
	(c) Valve boxes	No	30		
	(d) Survey markers	No	30		
B22.30	Extra-over item B22.01 for disposal of excavated material off-site to a spoil site located by the Contractor in excess of 5.0 km free haul distance	m³	13000		
B22.31	Convert existing catchpits into junction boxes	No	10		
B22.32	Protecting of existing services				
	(a) Services intersecting a trench or box cut				
	(1) Waterpipes				
	(ii) Greater than and including 110mm dia	No	80		
	(2) Sewer pipes				
	(i) Less than and including 160mm dia	No	24		
	(3) Stormwater pipes				
	(ii) Greater than and including 300mm dia	No	30		
	(4) Electrical cables				
	(ii) HV (High voltage)	No	92		
	(5) Communication cables				
	(ii) Optic fibre	No	115		
	(b) Services adjacent to a trench or box cut				
	CARRIED FORWARD TO THE NEXT PAGE				[redacted]

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CONTRACT TITLE: CONSTRUCTION OF THE PHASE 2A IRT INFRASTRUCTURE: WORK PACKAGE E2 ALONG GOVAN MBEKI ROAD (M9) FROM WEST OF NY72 ROAD TO EAST OF KLIPFONTEIN ROAD

SCHEDULE: 2 ROADWORKS

SECTION: 2200 PREFABRICATED CULVERTS

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	BROUGHT FORWARD FROM THE PREVIOUS PAGE				[redacted]
	(1) Waterpipes				
	(ii) Greater than and including 110mm dia	m	650	[redacted]	
	(2) Sewer pipes				
	(i) Less than and including 160mm dia	m	110	[redacted]	
	(3) Stormwater pipes				
	(ii) Greater than and including 300mm dia	m	110	[redacted]	
	(4) Electrical cables				
	(ii) HV (High voltage)	m	1000	[redacted]	
	(5) Communication cables				
	(ii) Optic fibre	m	300	[redacted]	
B22.33	Break into and connect to existing manhole	No	7	[redacted]	
22/B16.02	Overhaul on material hauled in excess of 5.0 km to the nearest approved landfill site	m³-km	60000	[redacted]	
	TOTAL FOR SECTION 2200 CARRIED FORWARD TO SUMMARY				[redacted]

CONTRACT: 412Q/2022/23
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SCHEDULE: 2 ROADWORKS

SECTION: 2300 CONCRETE KERBING, CONCRETE CHANNELLING, CHUTES AND DOWNPIPES, AND CONCRETE LININGS FOR OPEN DRAINS

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
23.01	Concrete kerbing				
	(a) Precast kerbing to SABS 927 - Type BK2				
	(i) 1000mm units	m	12000	[redacted]	
	(ii) 300/330mm units	m	400	[redacted]	
	(b) Precast kerbing to SABS 927 - Type E1				
	(i) 1000mm units	m	12600	[redacted]	
	(ii) 300/330mm units	m	200	[redacted]	
	(c) Delineator kerbs (as per CCT Standard Details)	m	620	[redacted]	
	(d) Precast kerbing to SABS 927 - Type Modified C1	m	50	[redacted]	
	(e) Precast kerbing to SABS 927 - Type C2				
	(i) 1000mm units	m	620	[redacted]	
	(ii) 300/330mm units	m	100	[redacted]	
	(f) Precast kerbing to SABS 927 - Type E3				
	(i) 1000mm units	m	1400	[redacted]	
	(ii) 300/330mm units	m	50	[redacted]	
	(g) Precast kerbing to SABS 927 - Type BK4				
	(i) 1000mm units	m	4100	[redacted]	
	(ii) 300/330mm units	m	100	[redacted]	
	(i) Precast Kassel kerb (excluding but including pickup, delivery and installation)	m	970	[redacted]	
	(h) Precast kerbing to SABS 927 - Type CK5				
	(i) 1000mm units	m	1050	[redacted]	
	(ii) 300/330mm units	m	40	[redacted]	
	(j) Cast in situ kerbing				
	(i) Transition Kerb Kassel to BK2	m	16	[redacted]	
	(ii) Transition BK2 to BK2 and C1	m	60	[redacted]	
	CARRIED FORWARD TO THE NEXT PAGE				[redacted]

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SCHEDULE: 2 ROADWORKS

SECTION: 2300 CONCRETE KERBING, CONCRETE CHANNELLING, CHUTES AND DOWNPIPES, AND CONCRETE LININGS FOR OPEN DRAINS

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	BROUGHT FORWARD FROM THE PREVIOUS PAGE				[redacted]
23.02	Concrete kerbing-channelling combination				
	(a) Precast kerb and channel to SABS 927 - Type BK2 and C1				
	(i) 1000mm units	m	17600	[redacted]	
	(ii) 300/330mm units	m	1100	[redacted]	
	(b) Precast C1/C1 (to SABS 927) V-channel combination with concrete in-fill				
	(i) 1000mm units	m	480	[redacted]	
	(ii) 300/330mm units	m	50	[redacted]	
23.04	Cast in situ concrete chutes (measured by components):				
	(a) Concrete (Class 25/20)	m³	180	[redacted]	
	(b) Formwork				
	(i) F2 surface finish	m²	835	[redacted]	
B23.16	Extra-over items 23.01 and 23.02 for the following				
	(a) Dropped kerbs	m	1155	[redacted]	
23/B73.04	Tactile paving blocks				
	(a) Tactile warning indicators (400mm x 400mm)	m²	350	[redacted]	
	(b) Tactile guidance indicators (400mm x 400mm)	m²	360	[redacted]	
TOTAL FOR SECTION 2300 CARRIED FORWARD TO SUMMARY					[redacted]

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SCHEDULE: 2 ROADWORKS

SECTION: 3300 MASS EARTHWORKS

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
B33.01	Cut to fill and stockpile to fill, including free-haul of up to 5 km				
	(a) Material in compacted layer thickness of 200 mm and less:				
	(ii) Compacted to 93% of MDD	m³	3500		
	(iii) Eight roller passes compaction	m³	1750		
	(iv) Sand Material compacted to 100% of MDD	m³	1700		
	(e) Pioneer layer (as specified in subclause 3207(c))	m³	900		
	(f) Sand filter blanket (as specified in subclause 3307(f))	m³	250		
33.02	Sand fills (as described in clause 3302, including freehaul up to 5.0km):				
	(a) Non-plastic sand with up to 20% passing through the 0,075 mm sieve, compacted to 100% of MDD	m³	350		
33.03	Extra over item 33.01 for excavating and breaking down material in:				
	(b) Hard excavation	m³	300		
B33.04	Cut to spoil or cut to stockpile including free-haul up to 5.0 km. Material obtained from:				
	(a) Soft excavation	m³	100000		
	(c) Hard excavation	m³	600		
B33.07	Removal of unsuitable material (including free-haul of 5 km):				
	(a) In layer thicknesses of 200 mm and less:				
	(i) Stable material	m³	400		
	(ii) Unstable material	m³	250		
33.09	Material bladed to windrow	m³	200		
33.10	Roadbed preparation and the compaction of material:				
	(b) Compaction to 93% of MDD	m³	10000		
	(d) Compaction of sand roadbed to 100% of MDD	m³	7500		
33.11	Three roller passes compaction:				
	(a) Vibratory roller	m²	1000		
	(b) Oscillatory roller	m²	500		
	(f) Pneumatic-tyred roller	m²	1000		
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SCHEDULE: 2 ROADWORKS

SECTION: 3300 MASS EARTHWORKS

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	BROUGHT FORWARD FROM THE PREVIOUS PAGE				[redacted]
33.12	In situ treatment of roadbed:				
	(a) In situ treatment by ripping	m^3	6500	[redacted]	
33.13	Finishing-off cut and fill slopes, medians and interchange areas:				
	(b) Fill slopes	m^2	2000	[redacted]	
B33.14	Extra over item 33.01 & 33.04 for excavating material from the pavements and fills of existing roads:				
	(a) Non-cemented material	m^3	7000	[redacted]	
	(b) Cemented material	m^3	2000	[redacted]	
B33.20	Extra-over Items B33.01 and 33.10 for compaction close to electrical / telecommunication and other services	m^3	1000	[redacted]	
B33.21	Preparation and management of stockpile area	lump sum	1	[redacted]	
33/32.06	Stockpiling of material	m^3	85000	[redacted]	
TOTAL FOR SECTION 3300 CARRIED FORWARD TO SUMMARY					[redacted]

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SCHEDULE: 2 ROADWORKS

SECTION: 3400 PAVEMENT LAYERS OF GRAVEL MATERIAL

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
B34.01	Pavement layers constructed with material obtained from commercial sources, including all haul				
	(a) Gravel selected layer (G7) compacted to:				
	(i) 95% of MDD (150mm thick)	m³	6000		
	(c) Gravel subbase (G5 unstabilized gravel) compacted to:				
	(ii) 97% of MDD (150mm thick)	m³	2000		
	(d) Gravel subbase (chemically stabilized material) compacted to:				
	(i) 96% of MDD, C4 quality, 300mm thick	m³	3100		
	(ii) 96% of MDD, C3 quality, 200mm thick	m³	180		
	(iii) 96% of MDD, C3 quality, 250mm thick	m³	125		
	(iv) 96% of MDD, C3 quality, 300mm thick	m³	6500		
	(f) Gravel base (chemically stabilized material) compacted to:				
	(i) 98% of MDD, C2 quality, 250mm thick	m³	3300		
	(ii) 98% of MDD, C3 quality, 250mm thick	m³	4630		
B34.01	(i) Gravel base (constructed for sidewalks or future closed median stations) compacted to				
	(i) 95% of MDD (G5 quality, 100mm thick)	m³	1500		
B34.03	Pavement layers constructed from gravel obtained from existing pavement layers and material from temporary stockpile areas				
	(a) Gravel selected layers compacted to 93% MDD, using:				
	(i) Non-cemented material (150mm thick)	m³	15000		
	(b) Gravel selected layers compacted to 95% MDD, using:				
	(i) Non-cemented material (150mm thick)	m³	5000		
	(d) Gravel subbase (unstabilized gravel) compacted to 95% of MDD, using:				
	(i) Non-cemented material (150mm thick)	m³	1300		
	(e) Gravel subbase (unstabilized gravel) compacted to 97% of MDD, using Non-cemented material:				
	(i) 97% of MDD (150mm thick)	m³	1000		
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CONTRACT TITLE: CONSTRUCTION OF THE PHASE 2A IRT INFRASTRUCTURE: WORK PACKAGE E2 ALONG GOVAN MBEKI ROAD (M9) FROM WEST OF NY72 ROAD TO EAST OF KLIPFONTEIN ROAD

SCHEDULE: 2 ROADWORKS

SECTION: 3400 PAVEMENT LAYERS OF GRAVEL MATERIAL

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	BROUGHT FORWARD FROM THE PREVIOUS PAGE				[redacted]
	(g) Gravel subbase (chemically stabilized material) compacted to 96% MDD, using				
	(i) Non-cemented material:				
	(1) C4 quality, 300mm thick	m³	3100	[redacted]	
	(2) C3 quality, 200mm thick	m³	180	[redacted]	
	(3) C3 quality, 250mm thick	m³	100	[redacted]	
	(4) C3 quality, 300mm thick	m³	3500	[redacted]	
	(k) Gravel base (chemically stabilized material) compacted to 98% MDD, using:				
	(i) Non-cemented material:				
	(1) C3 quality, 250mm thick	m³	1000	[redacted]	
B34.03	(p) Gravel base (constructed for sidewalks or future closed median stations) compacted to				
	(i) 95% of MDD (G5, 100mm thick)	m³	5900	[redacted]	
B34.04	In-situ reconstruction of existing pavement layers, including up to 50 mm of asphalt / milled material, using an approved in situ recycling machine as:				
	(f) Gravel subbase (chemically stabilized material) compacted to 96% of MDD, using Non-cemented material:				
	(1) C4 quality, 300mm thick	m³	500	[redacted]	
	(2) C3 quality, 250mm thick	m³	200	[redacted]	
	(1) C3 quality, 300mm thick	m³	1000	[redacted]	
	(m) Compulsory recycling trial section 250mm or 300mm thick, 400 - 600 m²	m³	150	[redacted]	
34.06	Extra over item 34.04 for adding extra material as specified in subsubclause 3207(b)(iii):				
	(b) Gravel subbase (G5 quality)	m³	100	[redacted]	
34.07	Extra over item 34.04 for temporarily blading the material to windrow	m³	50	[redacted]	
	(c) Gravel base (G3 quality)	m³	50	[redacted]	
34.10	Compacting the floors of pavement excavations (5 roller passes) with:				
	(a) Vibratory rollers	m²	2500	[redacted]	
	CARRIED FORWARD TO THE NEXT PAGE				23,215,272.80

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SCHEDULE: 2 ROADWORKS

SECTION: 3400 PAVEMENT LAYERS OF GRAVEL MATERIAL

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	BROUGHT FORWARD FROM THE PREVIOUS PAGE				[redacted]
	(e) Pneumatic-tyred rollers	m²	3500	[redacted]	
34.11	Watering the pavement excavation floor	kl	6	[redacted]	
TOTAL FOR SECTION 3400 CARRIED FORWARD TO SUMMARY					[redacted]

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SCHEDULE: 2 ROADWORKS

SECTION: 3500 STABILIZATION

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
35.01	Chemical stabilization extra over unstabilized compacted layers				
	(a) Subbase or base				
	(i) 200mm - 300mm thickness (C4 layer)	m³	6700	[redacted]	
	(ii) 200mm - 300mm thickness (C3 layer)	m³	17615	[redacted]	
	(iii) 200mm - 300mm thickness (C2 layer)	m³	3300	[redacted]	
35.02	Chemical stabilizing agent:				
	(a) CEM II B-L 32.5 MPa or CEM II B -M 32.5 MPa	t	1250	[redacted]	
TOTAL FOR SECTION 3500 CARRIED FORWARD TO SUMMARY					[redacted]

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SCHEDULE: 2 ROADWORKS

SECTION: 3800 BREAKING UP EXISTING PAVEMENT LAYERS

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
B38.02	Milling out existing bituminous material with an average milling depth:				
	(b) Exceeding 30 mm but not exceeding 60 mm	m³	3600	[redacted]	
	(c) Exceeding 60 mm but not exceeding 100 mm	m³	1650		
	(d) Exceeding 100 mm	m³	3165		
38.08	Sawing or cutting asphalt or cemented pavement layers:				
	(a) Sawing asphalt	m²	2000		
38/32.01	Providing a crushing and/or screening plant				
	(c) Screening plant	No	1		
	(d) Multiple-stage crusher and screening plant	No	1		
38/32.03	Crushing and screening				
	(a) Multiple- stage crusher	m³	8415		
	(c) Screening	m³	8415		
TOTAL FOR SECTION 3800 CARRIED FORWARD TO SUMMARY					[redacted]

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SCHEDULE: 2 ROADWORKS

SECTION: B3950 WATERBOUND MACADAM BASE

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
B39.51	Labour intensive waterbound macadam base:				
	(a) Compacted to 88% apparent relative density (180mm thick)	m^3	3000	[redacted]	
B39.52	Labour intensive trial section of waterbound macadam	m^2	300	[redacted]	
B39.53	Repairs to existing waterbound macadam base				
	(a) Compacted to 88% apparent relative density	m^2	2300	[redacted]	
TOTAL FOR SECTION B3950 CARRIED FORWARD TO SUMMARY					[redacted]

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SCHEDULE: 2 ROADWORKS

SECTION: 4100 PRIME COAT

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
41.01	Prime coat:				
B41.01	(f) E-prime or equivalent	litre	90000	[redacted]	
41.02	Aggregate for blinding	m²	400	[redacted]	
TOTAL FOR SECTION 4100 CARRIED FORWARD TO SUMMARY					[redacted]

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SCHEDULE: 2 ROADWORKS

SECTION: 4200 ASPHALT BASE AND SURFACING

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
42.04	Tack coat of 30% stable grade emulsion	litre	195000	[redacted]	
42.05	Binder variations (state type)				
	(a) Penetration Grade binder (50/70)	t	20	[redacted]	
	(b) Modified binder (A-P1)	t	80	[redacted]	
42.06	Variations in active filler content:				
	(b) Lime	t	25	[redacted]	
42.07	Trial sections				
	(a) Asphalt surfacing, 50mm thick using A-P1 modified binder	m²	300	[redacted]	
	(b) Asphalt base 80mm thick using A-P1 modified binder	m²	300	[redacted]	
42.11	Asphalt layer constructed for rehabilitation purposes in accordance with the provisions of subsubclauses 4213(f)(ii) or 4213(f)(iii):				
	(a) Asphalt base, sand skeletal mix, 20mm NMPS, Class 2 Grading, (level II design) using:				
	(i) 80mm thick (A-P1 modified binder)	t	2750	[redacted]	
	(ii) 90mm thick (A-P1 modified binder)	t	11100	[redacted]	
	(iii) 100mm thick (A-P1 modified binder)	t	9000	[redacted]	
	(iv) 80mm - 90mm thick (50/70 bitumen)	t	4800	[redacted]	
	(b) Asphalt surfacing, sand skeletal mix, Class 2 Grading, using:				
	(i) 50mm thick, continuously graded, 14mm NMPS (level II design) using A-P1 modified binder	t	12800	[redacted]	
	(ii) 30mm thick, continuously graded, 10mm NMPS (level IA design) for levelling layer using 50/70 binder	t	1350	[redacted]	
	(iii) 30mm thick, continuously graded, 10mm NMPS (level IA design) for sidewalks using 50/70 binder	t	3150	[redacted]	
B42.15	Application of an approved rubberised bitumen emulsion to the edges of a layer and/or joints	litre	3000	[redacted]	
42.17	Asphalt reinforcement				
	(a) Glas fibre grid, 115 KN/m x 115 KN/m	m²	3200	[redacted]	
42.20	Backfilling of excavations for patching with:				
	(a) Asphalt base	t	300	[redacted]	
	CARRIED FORWARD TO THE NEXT PAGE				[redacted]

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SCHEDULE: 2 ROADWORKS

SECTION: 4200 ASPHALT BASE AND SURFACING

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	BROUGHT FORWARD FROM THE PREVIOUS PAGE				[redacted]
B42.21	Transportation of bitumen binder supplied by a refinery outside the Western Cape Province				
	(a) Supplying from Kwazulu Natal	t	2000	[redacted]	
	(b) Supplying from the Free State	t	300	[redacted]	
B42.22	International Importation of bitumen	t	1000	[redacted]	
B42.23	Extra over items 42.11 for static rolling	m²	15000	[redacted]	
	TOTAL FOR SECTION 4200 CARRIED FORWARD TO SUMMARY				[redacted]

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SCHEDULE: 2 ROADWORKS

SECTION: B5000 MOLE BARRIERS

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
B50.01	Excavation of soft material in the following depth ranges				
	(a) 0 m up to 1,5m	m^3	625	[redacted]	
B50.02	Backfilling				
	(a) Using the excavated material	m^3	480	[redacted]	
	(b) Using imported selected material	m^3	150	[redacted]	
	(c) Extra over subitems (a) and (b) for soil cement backfilling (5% cement)	m^3	60	[redacted]	
B50.03	Installation of mole barrier				
	(a) HDPE sheeting (2 mm 1.0 m height)	m^2	920	[redacted]	
B50/B16.02	Overhaul on material hauled in excess of 5.0 km to the nearest approved landfill site	m^3-km	750	[redacted]	
TOTAL FOR SECTION B5000 CARRIED FORWARD TO SUMMARY					[redacted]

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SCHEDULE: 2 ROADWORKS

SECTION: 5100 PITCHING, STONEWORK AND PROTECTION AGAINST EROSION

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
51.04	Concrete pitching and block paving:				
	(a) Cast in situ concrete pitching (25Mpa/20mm), 200mm thick	m²	100	[redacted]	
51.05	Concrete edge beams (Concrete class 25Mpa/20mm)	m³	4	[redacted]	
51.07	Foundation trenches	m³	2	[redacted]	
	TOTAL FOR SECTION 5100 CARRIED FORWARD TO SUMMARY				[redacted]

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SCHEDULE: 2 ROADWORKS

SECTION: 5400 GUARDRAILS

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
54.01	Guardrails on timber posts:				
	(a) Galvanised	m	440	[redacted]	
54.04	End treatments:				
	(b) Bull noses	No	6	[redacted]	
54.06	Reflective plates	No	110	[redacted]	
54.07	Removing existing guardrails	m	100	[redacted]	
TOTAL FOR SECTION 5400 CARRIED FORWARD TO SUMMARY					[redacted]

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CONTRACT: 412Q/2022/23
CONTRACT TITLE: CONSTRUCTION OF THE PHASE 2A IRT INFRASTRUCTURE: WORK PACKAGE E2 ALONG GOVAN MBEKI ROAD (M9) FROM WEST OF NY72 ROAD TO EAST OF KLIPFONTEIN ROAD

SCHEDULE: 2 ROADWORKS

SECTION: 5500 FENCING

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
55.01	Clearing the fence line, 2m wide strip	km	1		
B55.02	Supply and erect new fencing material for new fences and for supplementing material in existing fences which are being repaired or removed:				
	(a) Zinc-coated barbed wire (grade and size indicated)	km	1		
	(c) Diamond mesh	m²	200		
	(h) Droppers (2.1m steel post)	No	40		
	(i) Straining posts, stays and anchors:				
	(ii) Inclined:				
	(1) Steel stays and anchors	No	10		
	(j) Galvanised steel palisade fencing				
	(i) 1.8 m high fence	m	200		
	(k) Concrete palisade fencing				
	(i) 2.1 m high fence	m	100		
	(l) Vibracrete (or equal approved) fencing				
	(ii) 1.8 m high fence	m	200		
55.03	New gates				
	(a) Standard Clearvu gate	No	2		
B55.05	Dismantling existing fences:				
	(a) Fences:				
	(iii) Pedestrian fences	km	0.6		
	(iv) Security fences	km	0.6		
	(v) Galvanised steel palisade fencing	m	300		
	(vi) Concrete palisade fencing	m	300		
	(vii) Vibracrete (or equivalent) fencing	m	300		
	(b) Gates	No	4		
B55.10	High security welded steel fences				
	(a) 1.8 m high fence	m	500		
B55.11	Supply and install 1.124 m high handrailing complete as per CCT specification and Drawings GE2A to GE2F	m	1200		
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SCHEDULE: 2 ROADWORKS

SECTION: 5500 FENCING

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	BROUGHT FORWARD FROM THE PREVIOUS PAGE				[redacted]
B55.12	Additional work required for the relocation of existing walls and fences	Prov.Sum	1	[redacted]	
TOTAL FOR SECTION 5500 CARRIED FORWARD TO SUMMARY					[redacted]

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SCHEDULE: 2 ROADWORKS

SECTION: 5600 ROAD SIGNS

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
B56.01	Road sign boards with painted or coloured semi-matt background. Symbols, lettering and borders in semi-matt black or in Class 1 retro-reflective material, where the sign board is constructed from:				
	(c) Prepainted galvanized steel plate (chromadek or approved equivalent):				
	(i) Area not exceeding 2 m²	m²	95		
	(d) Prepainted galvanized steel profiles (200 mm high chromadek or approved equivalent):				
	(ii) Area exceeding 2 m² but not 10 m²	m²	115		
	(iii) Area exceeding 10 m²	m²	120		
56.02	Extra over item 56.01 for using:				
	(a) Background of retro-reflective material of:				
	(i) Class I	m²	30		
	(iii) Class III	m²	290		
	(b) Lettering, symbols, numbers, arrows, emblems and borders of retro-reflective material:				
	(ii) Class III	m²	240		
B56.03	Road sign supports (overhead road sign structures excluded):				
	(a) Steel tubing (minimum 76mm diameter tubing and wall thickness of not less than 3.5mm). Hot-dip galvanised with the top 1.5m filled with concrete in accordance withdrawing RM4	No	395		
	(b) Timber (Tanalith treated)				
	(i) 125 mm diameter	m	26		
	(ii) 150 mm diameter	m	90		
	(iii) 175 mm diameter	m	130		
	(iv) 200 mm diameter	m	100		
56.05	Excavation and backfilling for road sign supports (not applicable to kilometre posts)	m³	35		
56.06	Extra over item 56.05 for cement-treated soil backfill (1:12 Soil:Cement ratio)	m³	4		
56.08	Dismantling, storing and re-erecting road signs with a surface area of:				
	(a) Up to 2 m²	No	7		
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SCHEDULE: 2 ROADWORKS

SECTION: 5600 ROAD SIGNS

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	BROUGHT FORWARD FROM THE PREVIOUS PAGE				[redacted]
	(b) Exceeding 2 m² but not 10 m²	No	4	[redacted]	
	(c) Exceeding 10 m²	No	2	[redacted]	
56.09	Dismantling and storing road signs with a surface area of:				
	(a) Up to 2 m²	No	4	[redacted]	
	(b) Exceeding 2 m² but not 10 m²	No	3	[redacted]	
	(c) Exceeding 10 m²	No	2	[redacted]	
B56.10	Extra over item 56.05 for concreting of sign supports (Class 25MPa concrete)	m³	10	[redacted]	
	TOTAL FOR SECTION 5600 CARRIED FORWARD TO SUMMARY				[redacted]

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SCHEDULE: 2 ROADWORKS

SECTION: 5700 ROAD MARKINGS

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
57.02	Retro-reflective road marking paint:				
	(a) White lines (broken or unbroken)				
	(i) 100 mm wide	km	18	[redacted]	
	(ii) 200 mm wide	km	4.1	[redacted]	
	(iii) 300 mm wide	km	2.6	[redacted]	
	(b) Yellow lines (broken or unbroken)				
	(i) 100 mm wide	km	9	[redacted]	
	(ii) 150 mm wide	km	0.2	[redacted]	
	(d) White lettering and symbols	m²	450	[redacted]	
	(e) Yellow lettering and symbols	m²	260	[redacted]	
	(f) Transverse lines, painted island and arrestor bed markings (any colour)	m²	920	[redacted]	
57.03	Hot-melt plastic road marking material (thermoplastic)				
	(a) White lines (broken or unbroken)				
	(i) 100 mm wide	km	18	[redacted]	
	(ii) 200 mm wide	km	4.1	[redacted]	
	(iii) 300 mm wide	km	2.6	[redacted]	
	(b) Yellow lines (broken or unbroken)				
	(i) 100 mm wide	km	9	[redacted]	
	(ii) 150 mm wide	km	0.2	[redacted]	
	(d) White lettering and symbols	m²	450	[redacted]	
	(e) Yellow lettering and symbols	m²	260	[redacted]	
	(f) Transverse lines, painted island and arrestor bed markings (any colour)	m²	920	[redacted]	
57.04	Variations in rate of application:				
	(a) White paint	litre	200	[redacted]	
	(b) Yellow paint	litre	200	[redacted]	
	(c) Red paint	litre	200	[redacted]	
	(d) Retro-reflective beads	kg	200	[redacted]	
	(e) Plastic road-marking paints (any colour)	litre	200	[redacted]	
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SCHEDULE: 2 ROADWORKS

SECTION: 5700 ROAD MARKINGS

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	BROUGHT FORWARD FROM THE PREVIOUS PAGE				[redacted]
57.05	Road studs				
	(a) Type RSA-1 (FerroLynx)	No	1200	[redacted]	
B57.06	Setting out and premarking the lines (Excluding traffic-island markings, lettering and symbols)	km	10	[redacted]	
57.08	Removal of existing, temporary or permanent road markings by:				
	(a) Sandblasting	m²	100	[redacted]	
B57.10	Cold plastic road marking material				
	(a) White lettering & symbols	m²	300	[redacted]	
	(b) Yellow lettering & symbols	m²	100	[redacted]	
	(c) Transverse lines, painted islands and arrestor bed markings (any colour)	m²	1000	[redacted]	
B57.11	Painting of kerb faces (any colour)	m²	4900	[redacted]	
B57.12	Polymer modified cement binder (spray applied) and dressed with fine aggregates (any colour)	m²	1700	[redacted]	
	TOTAL FOR SECTION 5700 CARRIED FORWARD TO SUMMARY				[redacted]

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SCHEDULE: 2 ROADWORKS

SECTION: 7100 CONCRETE PAVEMENTS

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
B71.01	Concrete trial pavement:				
	(a) CRCP Trial Section (230mm - 270mm thickness)	m³	80	[redacted]	
B71.02	Concrete pavement (excluding texturing and curing):				
	(b) 230mm thick CRCP	m³	5180	[redacted]	
	(d) 270mm thick CRCP	m³	3700	[redacted]	
	(e) Extra Over B71.02(a) – (d) for the addition of 4% red oxide (by mass)	m³	8880	[redacted]	
71.04	Texturing and curing the concrete pavement:				
	(a) Burlap-dragged and grooved (tinings) texture	m²	36000	[redacted]	
	(b) Curing	m²	37000	[redacted]	
71.05	Variation in the rate of application of the curing compound	litre	2500	[redacted]	
71.06	Joints:				
	(a) Expansion joints complete (excluding dowels)				
	(i) Seal, tied longitudinal joint	m	7200	[redacted]	
	(ii) Isolation joint	m	11500	[redacted]	
	(e) Tie bars (Y16 diameter and 1000mmm length):				
	(i) Installed in new concrete	No	10000	[redacted]	
71.08	Steel reinforcement in concrete pavement:				
	(a) Mild steel bars	t	22	[redacted]	
	(b) High tensile steel bars	t	1160	[redacted]	
TOTAL FOR SECTION 7100 CARRIED FORWARD TO SUMMARY					[redacted]

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SCHEDULE: 2 ROADWORKS

SECTION: 7400 PATENTED EARTH RETAINING SYSTEMS

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
74.01	Patented earth retaining systems				
	(d) Precast concrete retaining block (350mm x 280mm x 200mm) as per typical drawing and compliant with SANS 508:2020	m²	1800	[redacted]	
	(e) High tensile geogrid reinforcement (Tensar RE560 or equivalent)	m²	450	[redacted]	
74.02	Excavation for concrete bases for earth retaining systems				
	(a) In soft material	m³	900	[redacted]	
74.03	Concrete bases for earth retaining systems (class 25/20 concrete)	m³	560	[redacted]	
74/33.02	Sand fills (as described in clause 3302, including freehaul up to 5.0km):				
	(a) Non-plastic sand with up to 20% passing through the 0,075 mm sieve, compacted to 100% of MDD	m³	450	[redacted]	
74/34.01	Gravel base				
	(a) 95% of MDD (G5 quality, 100mm thick)	m³	225	[redacted]	
74/63.01	High-yield stress steel bars (hot-rolled, deformed)	t	0.4	[redacted]	
74/64.01	Cast in situ concrete				
	(a) 25/20 concrete infill to retaining blocks	m³	20	[redacted]	
TOTAL FOR SECTION 7400 CARRIED FORWARD TO SUMMARY					[redacted]

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SCHEDULE: 2 ROADWORKS

SECTION: 8100 TESTING MATERIALS AND WORKMANSHIP

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
B81.04	Surface regularity tests as described in subclauses B4213 and B7122				
	(a) Establishment of equipment				
	(i) Inertial Laser Profilometer	No	4	[redacted]	
	(b) Profiler surveys on:				
	(i) Asphalt surfacing using Inertial Laser Profilometer or Walking Profiler	km	12	[redacted]	
	(i) Concrete surfacing using Inertial Laser Profilometer or Walking Profiler	km	7	[redacted]	
TOTAL FOR SECTION 8100 CARRIED FORWARD TO SUMMARY					[redacted]

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SCHEDULE: 2 ROADWORKS

SECTION: C4000 TRAFFIC SIGNALS

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
C40.01	Testing and commissioning of installation	No	13		
C40.02	Controller (incl all inserts, software and earthing)				
	(a) MXPlus (18 phases)	No	9		
	(b) MX (8 phases)	No	3		
	(c) Uninterrupted power supply (UPS) (titanium)	No	12		
C40.03	Audio Tactile Pedestrian Push Buttons				
	(a) Audio tactile push buttons	No	114		
C40.04	Detection Equipment				
	(a) Flush mounted magnetometer, incl shell (as per CCT requirement)	No	229		
	(b) Repeater, incl mounting kit (as per CCT requirement)	No	117		
	(c) Extra over (a) and (b) for supply and install detection equipment hardware and software (incl access point (SPP0 & SPP1) and contoller connection)	No	12		
	(d) Extra over (a) and (b) for setting up and programming of magnetometers	No	13		
C40.05	Signage				
	(a) Standard ST sign	No	38		
	(b) BUS' ST accompanying sign (as per J35437-XX-7120)	No	74		
	(c) Bus only' information sign (as per J35437-XX-7120)	No	74		
	(d) Right Turn on Green Arrow Only' information sign (as per J35437-XX-7120)	No	35		
C40.06	Poles				
	(b) Standard pole, length not exceeding 4m	No	93		
	(d) Cantilever (overhang 5m)	No	8		
	(e) 5m extended poles	No	107		
	(f) 6m extended poles	No	1		
	(g) 8m poles for repeaters	No	117		
C40.07	LED Signal face modules (includes connection to supply cable)				
	(a) Relocation of existing				
	(i) 3 aspect signal lanterns into permanent positions	No	5		
	(ii) 5 aspect signal lanterns into permanent positions	No	1		
	CARRIED FORWARD TO THE NEXT PAGE				

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SCHEDULE: 2 ROADWORKS

SECTION: C4000 TRAFFIC SIGNALS

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	BROUGHT FORWARD FROM THE PREVIOUS PAGE				[redacted]
	(iii) 2 aspect signal lanterns into permanent positions	No	4	[redacted]	
	(b) Supply & Install new				
	(i) S1 with background screen	No	31	[redacted]	
	(ii) S2/S3/S4 with background screen	No	76	[redacted]	
	(iii) S5/S6/S7 with background screen	No	58	[redacted]	
	(iv) S8/S9 with background screen	No	20	[redacted]	
	(v) S10R/S10L with background screen	No	2	[redacted]	
	(vi) S11P/S11C with background screen	No	114	[redacted]	
	(vii) S1B with background screen	No	77	[redacted]	
C40.08	Connection pillars				
	(a) Relocate connection pillar into permanent position	No	4	[redacted]	
	(b) Supply and install connection pillars	No	51	[redacted]	
C40.09	Ring circuit cable (37 + 19 cores)				
	(a) Supply and install ring-circuit cable (37 + 19 cores)	m	4302	[redacted]	
	(b) Extra over (a) for laying the cable in the trench	m	251	[redacted]	
	(c) Extra over (a) for laying the cable in the duct	m	4051	[redacted]	
	(d) Extra over (a) for connecting to controller	No	13	[redacted]	
	(e) Extra over (a) for connecting to distribution pillar	No	55	[redacted]	
C40.10	Signal pole supply cable (19 core)				
	(a) Supply and install signal pole supply cable (19 cores)	m	11512	[redacted]	
	(b) Extra over (a) for laying the cable in a trench	m	658	[redacted]	
	(c) Extra over (a) for laying the cable in the duct	m	10854	[redacted]	
	(d) Extra over (a) for connecting to distribution pillar	No	209	[redacted]	
C40.11	Bare copper earth wire				
	(a) Supply and install bare copper earth wire of minimum cross sectional area 10mm2	m	15814	[redacted]	
	(b) Extra over (a) for laying in trench	m	909	[redacted]	
	(c) Extra over (a) for laying in duct	m	14905	[redacted]	
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SCHEDULE: 2 ROADWORKS

SECTION: C4000 TRAFFIC SIGNALS

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	BROUGHT FORWARD FROM THE PREVIOUS PAGE				[redacted]
C40.12	Mains Supply Cable				
	(a) Supply and install mains supply cable of minimum cross sectional area 16mm2	m	400	[redacted]	
	(d) Extra over (a) for laying in trench	m	140		
	(c) Extra over (a) for laying in duct	m	260		
	(b) Extra over (a) for connecting to controller	No	13		
	(e) Extra over (a) for connecting to power supply	No	13		
C40.13	Excavation				
	(a) Normal material	m³	990		
	(d) Difficult material	m³	100		
	(c) Installation of ducting for cables under surfaced areas (excl roads)	m	4300		
C40.14	Temporary Works				
	(a) Relocate standard 4m poles into temporary positions	No	68		
	(b) Install standard 4m poles into temporary positions	No	3		
	(c) Relocate 2 aspect signal lanterns into temporary positions	No	60		
	(d) Relocate 3 aspect signal lanterns into temporary positions	No	74		
	(e) Relocate 5 aspect signal lanterns into temporary positions	No	10		
	(f) Relocate connection pillar into temporary position	No	20		
	(g) Temporary cable joint	No	32		
	(h) Other temporary works	Prov Sum	1		
C40.15	Remove and return to City of Cape Town				
	(a) Standard 4m poles	No	69		
	(d) Cantilever pole	No	3		
	(c) 2 aspect signal lanterns	No	60		
	(d) 3 aspects signal lanterns	No	77		
	(e) 5 aspects signal lanterns	No	12		
	(f) Pedestrian push button	No	56		
	(g) Connection pillars	No	18		
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SCHEDULE: 2 ROADWORKS

SECTION: C4000 TRAFFIC SIGNALS

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	BROUGHT FORWARD FROM THE PREVIOUS PAGE				[redacted]
	(h) Controller	No	8	[redacted]	
C40.16	Traffic camera's				
	(a) Removal & reinstatement of traffic speed camera's	Prov.Sum	1	[redacted]	
C40.17	Allowance for additional costs due to design changes due to changes in CCT Standards	Prov.Sum	1	[redacted]	
TOTAL FOR SECTION C4000 CARRIED FORWARD TO SUMMARY					[redacted]

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SCHEDULE: 3 STRUCTURES
SECTION: 3A CANTILEVER SIGNS

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
6100	FOUNDATIONS FOR STRUCTURES				
61.01	Additional foundation investigations	Prov.Sum	1	[redacted]	
B61.02	Excavation:				
	Note: 1. Quantities do not allow for any working space around perimeter of excavations				
	2. The tendered rate shall include for strutting, shoring and safeguarding the excavations.				
	(a) Excavating soft material situated within the following successive depth ranges:				
	(i) 0 m up to 2 m	m³	15.1	[redacted]	
	(b) Extra over sub-item B61.02(a) for excavation in hard material irrespective of depth (Provisional)	m³	1.8	[redacted]	
	(c) Extra over sub-item B61.02(a) for additional excavation required by the engineer after the excavation has been completed	m³	1.8	[redacted]	
	(d) Extra over sub-item B61.02(a) for excavation by hand	m³	11.3	[redacted]	
61.03	Access and drainage:				
	(a) Access	lump sum	1	[redacted]	
61.04	Backfill to excavations utilising:				
	(a) Material from the excavation [compacted to 93% of MDD]	m³	15	[redacted]	
61.05	Fill within restricted areas (extra over item 33.01) - No separate payment will be made				
61.08	Foundation fill consisting of:				
	(e) Concrete screed 75 mm thick, class 15/20	m³	1.6	[redacted]	
6200	FALSEWORK, FORMWORK AND CONCRETE FINISH				
62.02	Vertical formwork to provide:				
	(a) Class F1 surface finish to				
	(i) Unexposed foundations	m²	18	[redacted]	
	(b) Class F2 surface finish to				
	(i) Stub Column	m²	10	[redacted]	
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SCHEDULE: 3 STRUCTURES

SECTION: 3A CANTILEVER SIGNS

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	BROUGHT FORWARD FROM THE PREVIOUS PAGE				[redacted]
6300	STEEL REINFORCEMENT FOR STRUCTURES				
63.01	Steel reinforcement for:				
	(a) Foundation and stub column				
	(i) Mild steel bars (hot-rolled, plain)	t	0.4	[redacted]	
	(ii) High-yield stress steel bars (hot-rolled, deformed)	t	1.4	[redacted]	
6400	CONCRETE FOR STRUCTURES				
B64.01	Cast in situ concrete:				
	(a) Concrete class 30/20				
	(i) Foundation and stub column	m³	8.7	[redacted]	
6700	STRUCTURAL STEELWORK				
67.01	Structural Steel				
	(a) Steel grade 355JR				
	(i) Base plate and stiffener plates	t	0.4	[redacted]	
	(ii) 350x350x6 RHS column and beam welded up sections	t	2.1	[redacted]	
	(iii) 60x60x6 Equal angles welded to beam sections	t	0.4	[redacted]	
67.02	Anchor bolts				
	(b) Hot dipped galavanised anchor bolts				
	(i) M20, grade 8.8 threaded rod, 1150mm long holding down bolts, including M20 nuts	No	8	[redacted]	
	(ii) M24, grade 8.8 threaded rod, 1150mm long holding down bolts, including M24 nuts	No	24	[redacted]	
	(iii) M30, grade 8.8 threaded rod, 1350mm long holding down bolts, including M30 nuts	No	24	[redacted]	
67.03	Corrosion protection				
	(b) Hot-dip galvanising				
	(i) Cantilever Structure	t	2.9	[redacted]	
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SCHEDULE: 3 STRUCTURES

SECTION: 3A CANTILEVER SIGNS

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	BROUGHT FORWARD FROM THE PREVIOUS PAGE				[redacted]
8400	PAINTING				
84.01	Painting				
	(d) Paint cantilever structure as follows: Degrease with galvanised iron cleaner and 3m scotch brite pads and rinse with fresh water prior to application of primer coat. Spray paint one coat of high build epoxy primer, 150 to 200 microns dft. Spray paint one coat acrylic polyurethane, 40 to 75 microns dft.	t	2.9	[redacted]	
TOTAL FOR SECTION 3A CARRIED FORWARD TO SUMMARY					[redacted]

CONTRACT: 412Q/2022/23
CONTRACT TITLE: CONSTRUCTION OF THE PHASE 2A IRT INFRASTRUCTURE: WORK PACKAGE E2 ALONG GOVAN MBEKI ROAD (M9) FROM WEST OF NY72 ROAD TO EAST OF KLIPFONTEIN ROAD

SCHEDULE: 3 STRUCTURES

SECTION: 3B OVERHEAD SIGNAGE

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
6100	FOUNDATIONS FOR STRUCTURES				
61.01	Additional foundation investigations	Prov.Sum	1	[redacted]	
B61.02	Excavation:				
	Note: 1. Quantities do not allow for any working space around perimeter of excavations 2. The tendered rate shall include for strutting, shoring and safeguarding the excavations.				
	(a) Excavating soft material situated within the following successive depth ranges:				
	(i) 0 m up to 2 m	m³	62	[redacted]	
	(b) Extra over sub-item B61.02(a) for excavation in hard material irrespective of depth (Provisional)	m³	6	[redacted]	
	(c) Extra over sub-item B61.02(a) for additional excavation required by the engineer after the excavation has been completed	m³	6	[redacted]	
	(d) Extra over sub-item B61.02(a) for excavation by hand	m³	32	[redacted]	
61.03	Access and drainage:				
	(a) Access	lump sum	1	[redacted]	
61.04	Backfill to excavations utilising:				
	(a) Material from the excavation [compacted to 93% of MDD density]	m³	56	[redacted]	
	(b) Imported material [compacted to 93% of MDD	m³	6	[redacted]	
61.05	Fill within restricted areas (extra over item 33.01) - No separate payment will be made				
61.08	Foundation fill consisting of:				
	(d) Mass concrete class 15/38	m³	0.5	[redacted]	
	(e) Concrete screed 75 mm thick, class 15/20	m³	3.4	[redacted]	
	CARRIED FORWARD TO THE NEXT PAGE				[redacted]

CONTRACT: 412Q/2022/23
CONTRACT TITLE: CONSTRUCTION OF THE PHASE 2A IRT INFRASTRUCTURE: WORK PACKAGE E2 ALONG GOVAN MBEKI ROAD (M9) FROM WEST OF NY72 ROAD TO EAST OF KLIPFONTEIN ROAD

SCHEDULE: 3 STRUCTURES

SECTION: 3B OVERHEAD SIGNAGE

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	BROUGHT FORWARD FROM THE PREVIOUS PAGE				[redacted]
6200	FALSEWORK, FORMWORK AND CONCRETE FINISH				
62.02	Vertical formwork to provide:				
	(a) Class F1 surface finish to				
	(i) Unexposed foundations	m²	38	[redacted]	
	(b) Class F2 surface finish to				
	(i) Stub Column	m²	14	[redacted]	
6300	STEEL REINFORCEMENT FOR STRUCTURES				
63.01	Steel reinforcement for:				
	(a) Foundation and stub column				
	(i) Mild steel bars (hot-rolled, plain)	t	0.1	[redacted]	
	(ii) High-yield stress steel bars (hot-rolled, deformed)	t	5.5	[redacted]	
6400	CONCRETE FOR STRUCTURES				
B64.01	Cast in situ concrete:				
	(a) Concrete class 30/20				
	(i) Foundation and stub column	m³	39	[redacted]	
6700	STRUCTURAL STEELWORK				
67.01	Structural Steel				
	(a) Steel grade 355JR				
	(i) Base plate and stiffener plates	t	1.4	[redacted]	
	(i) Column and beam welded up custom sections	t	7.8	[redacted]	
67.02	Anchor bolts				
	(b) Hot dipped galavanised anchor bolts				
	(i) M24, grade 8.8 threaded rod, 1150mm long holding down bolts, including M24 nuts	No	14	[redacted]	
	(ii) M30, grade 8.8 threaded rod, 1450mm long holding down bolts, including M30 nuts	No	28	[redacted]	
67.03	Corrosion protection				
	(b) Hot-dip galvanising				
	(i) Cantilever Structure	t	9.2	[redacted]	
	CARRIED FORWARD TO THE NEXT PAGE				[redacted]

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CONTRACT TITLE: CONSTRUCTION OF THE PHASE 2A IRT INFRASTRUCTURE: WORK PACKAGE E2 ALONG GOVAN MBEKI ROAD (M9) FROM WEST OF NY72 ROAD TO EAST OF KLIPFONTEIN ROAD

SCHEDULE: 3 STRUCTURES

SECTION: 3B OVERHEAD SIGNAGE

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	BROUGHT FORWARD FROM THE PREVIOUS PAGE				[redacted]
8400	PAINTING				
84.01	Painting				
	(d) Paint cantilever structure as follows: Degrease with galvanised iron cleaner and 3m scotch brite pads and rinse with fresh water prior to application of primer coat. Spray paint one coat of high build epoxy primer, 150 to 200 microns dft. Spray paint one coat acrylic polyurethane, 40 to 75 microns dft.	t	9.2	[redacted]	
TOTAL FOR SECTION 3B CARRIED FORWARD TO SUMMARY					[redacted]

CONTRACT: 412Q/2022/23
CONTRACT TITLE: CONSTRUCTION OF THE PHASE 2A IRT INFRASTRUCTURE: WORK PACKAGE E2 ALONG GOVAN MBEKI ROAD (M9) FROM WEST OF NY72 ROAD TO EAST OF KLIPFONTEIN ROAD

SCHEDULE: 3 STRUCTURES

SECTION: 3C CCTV MAST FOUNDATION

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
6100	FOUNDATIONS FOR STRUCTURES				
61.01	Additional foundation investigations	Prov.Sum	1	[redacted]	
B61.02	Excavation:				
	Note: 1. Quantities do not allow for any working space around perimeter of excavations 2. The tendered rate shall include for strutting, shoring and safeguarding the excavations.				
	(a) Excavating soft material situated within the following successive depth ranges:				
	(i) 0 m up to 2 m	m³	57	[redacted]	
	(b) Extra over sub-item B61.02(a) for excavation in hard material irrespective of depth (Provisional)	m³	6	[redacted]	
	(c) Extra over sub-item B61.02(a) for additional excavation required by the engineer after the excavation has been completed	m³	6	[redacted]	
	(d) Extra over sub-item B61.02(a) for excavation by hand	m³	30	[redacted]	
61.03	Access and drainage:				
	(a) Access	lump sum	1	[redacted]	
61.04	Backfill to excavations utilising:				
	(a) Material from the excavation compacted to 93% of MDD	m³	50	[redacted]	
	(b) Imported material compacted to 93% of MDD	m³	10	[redacted]	
61.05	Fill within restricted areas (extra over item 33.01) - No separate payment will be made				
61.08	Foundation fill consisting of:				
	(d) Mass concrete class 15/38	m³	1	[redacted]	
	(e) Concrete screed 75 mm thick, class 15/20	m³	3	[redacted]	
6200	FALSEWORK, FORMWORK AND CONCRETE FINISH				
62.02	Vertical formwork to provide:				
	(a) Class F2 surface finish to				
	(i) Foundations	m²	48.2	[redacted]	
	(ii) Stub-column	m²	60	[redacted]	
	CARRIED FORWARD TO THE NEXT PAGE				[redacted]

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CONTRACT: 412Q/2022/23
CONTRACT TITLE: CONSTRUCTION OF THE PHASE 2A IRT INFRASTRUCTURE: WORK PACKAGE E2 ALONG GOVAN MBEKI ROAD (M9) FROM WEST OF NY72 ROAD TO EAST OF KLIPFONTEIN ROAD

SCHEDULE: 3 STRUCTURES

SECTION: 3C CCTV MAST FOUNDATION

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	BROUGHT FORWARD FROM THE PREVIOUS PAGE				[redacted]
6300	STEEL REINFORCEMENT FOR STRUCTURES				
63.01	Steel reinforcement for:				
	(a) Foundation and stub-column				
	(i) Mild steel bars (hot-rolled, plain)	t	0.2	[redacted]	
	(ii) High-yield stress steel bars (hot-rolled, deformed)	t	1.7	[redacted]	
6400	CONCRETE FOR STRUCTURES				
B64.01	Cast in situ concrete:				
	(a) Concrete class 30/20 in:				
	(i) Foundation and stub-column	m³	33	[redacted]	
6700	STRUCTURAL STEELWORK				
67.02	Anchor Bolts:				
	(b) Supply and install hot dipped galavanised anchor bolts				
	(i) M30, grade 8.8 threaded rod, 1200mm long lampost holding down bolts, including M24 nuts	No	60	[redacted]	
TOTAL FOR SECTION 3C CARRIED FORWARD TO SUMMARY					[redacted]

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CONTRACT: 412Q/2022/23
CONTRACT TITLE: CONSTRUCTION OF THE PHASE 2A IRT INFRASTRUCTURE: WORK PACKAGE E2 ALONG GOVAN MBEKI ROAD (M9) FROM WEST OF NY72 ROAD TO EAST OF KLIPFONTEIN ROAD

SCHEDULE: 4 SERVICES
SECTION: B2500 MEDIUM PRESSURE PIPELINES

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
B25.01	Supply, lay, joint, bed as flexible pipes, test and disinfect pipes complete with couplings on Class C bedding				
	(a) Class 16 uPVC pipes to SABS 966 with spigot and socket ends in 6 m lengths				
	(i) 110mm Nominal diameter	m	270	[redacted]	
	(ii) 150mm Nominal diameter	m	50	[redacted]	
	(b) Steel concrete lined inner and outer				
	(i) 300mm Nominal diameter	m	470	[redacted]	
B25.02	Extra over items B25.01 for supply, lay, joint, bed, cut pipes, test and disinfect on Class C Bedding				
	(a) Tees				
	(i) 300mm x 110mm steel reducing tee	No	10	[redacted]	
	(b) End Caps				
	(i) 110mm uPVC	No	8	[redacted]	
	(ii) 150mm uPVC	No	2	[redacted]	
	(c) Bends				
	(i) 150mm x 11.25 degree steel	No	1	[redacted]	
	(ii) 150mm x 22.5 degree steel	No	1	[redacted]	
	(iii) 300mm x 22.5 degree steel	No	1	[redacted]	
	(iv) 300mm x 45 degree steel	No	1	[redacted]	
	(v) 300mm x 90 degree steel	No	1	[redacted]	
	(d) Valves				
	(i) Supply, install, joint, including cut pipes where necessary & test				
	(1) Flanged Class 16 Resilient Seal Valve (Drawing W1) - 110mm gate valve	No	8	[redacted]	
	(2) Flanged Class 16 Resilient Seal Valve (Drawing W1) - 150mm gate valve	No	2	[redacted]	
	(3) Flanged Class 16 Resilient Seal Valve (Drawing W1) - 300mm gate valve	No	6	[redacted]	
	CARRIED FORWARD TO THE NEXT PAGE				[redacted]

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CONTRACT: 412Q/2022/23
CONTRACT TITLE: CONSTRUCTION OF THE PHASE 2A IRT INFRASTRUCTURE: WORK PACKAGE E2 ALONG GOVAN MBEKI ROAD (M9) FROM WEST OF NY72 ROAD TO EAST OF KLIPFONTEIN ROAD

SCHEDULE: 4 SERVICES

SECTION: B2500 MEDIUM PRESSURE PIPELINES

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	BROUGHT FORWARD FROM THE PREVIOUS PAGE				[redacted]
B25.03	Fire Hydrants				
	(a) Supply and construct complete with all fittings and valves necessary in accordance with drawing IRT2A/B/CE/J35437/XX/6010/P/T0	No	8	[redacted]	
B25.04	Valve and Hydrant chambers complete including all cast iron surface boxes in accordance with standard details				
	(a) Fire Hydrants (Drawing IRT2A/B/CE/J35437/XX/6010/P/T0 \	No	8	[redacted]	
	(b) Valves (Drawing W1)	No	16	[redacted]	
B25.05	Anchor / Thrust blocks and pedestals in accordance with standard details				
	(a) Concrete (30Mpa/20)	m³	10	[redacted]	
	(b) Formwork	m²	20	[redacted]	
B25.06	Connection/cutting into existing water mains including cutting of pipes and all couplings and fittings				
	(a) 150mm water main	No	2	[redacted]	
	(b) 300mm water main steel	No	6	[redacted]	
B25.07	Concrete encasing for pipelines				
	(a) Concrete (20Mpa/20) for water main encasement	m³	70	[redacted]	
B25.08	Supply bulk metered water connection complete including chamber in accordance with standard details				
	(a) 110mm diameter	No	4	[redacted]	
B25.09	Break into and connect to existing water main chamber and make good	No	3	[redacted]	
B25.10	Directional Drilling for Driveways and Road Crossings complete with sleeves by accredited company				
	(a) Establishment and de-establishment of directional drilling plant, crew and equipment	No	4	[redacted]	
	(b) Excavation for launch- and receiving pits	m³	30	[redacted]	
	(c) Drilling/boring for the installation of product pipes				
	(i) HDPE PE100 PN16 pipes from 100mm up to and including 200mm in diamter	m	40	[redacted]	
	(ii) HDPE PE100 PN16 pipes from 200mm up to and including 300mm in diamter	m	20	[redacted]	
	CARRIED FORWARD TO THE NEXT PAGE				[redacted]

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CONTRACT: 412Q/2022/23
CONTRACT TITLE: CONSTRUCTION OF THE PHASE 2A IRT INFRASTRUCTURE: WORK PACKAGE E2 ALONG GOVAN MBEKI ROAD (M9) FROM WEST OF NY72 ROAD TO EAST OF KLIPFONTEIN ROAD

SCHEDULE: 4 SERVICES

SECTION: B2500 MEDIUM PRESSURE PIPELINES

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	BROUGHT FORWARD FROM THE PREVIOUS PAGE				[redacted]
	(d) Extra-over for removal of excess mud (bentonite) for directional drilling only, upon completion	m³	10	[redacted]	
	(e) Backfill, compaction and reinstatement of excavations upon completion	m³	25	[redacted]	
B25/B22.01	Excavation				
	(a) Excavating soft material situated within the following depth ranges below the surface level:				
	(i) 0 m up to 1.0 m	m³	2590	[redacted]	
	(ii) Exceeding 1,0 m and up to 2,0 m	m³	1300	[redacted]	
	(b) Extra over subitem 22.01(a) for excavation in hard material, irrespective of depth	m³	50	[redacted]	
B25/22.02	Backfilling:				
	(a) Using the excavated material	m³	3500	[redacted]	
	(b) Using imported selected material	m³	380	[redacted]	
B25/22.26	Hand excavation to determine the positions of existing services	m³	40	[redacted]	
B25/B22.32	Protecting of existing services				
	(a) Services intersecting a trench or box cut				
	(1) Waterpipes				
	(ii) Greater than and including 110mm dia	No	30	[redacted]	
	(2) Sewer pipes				
	(i) Less than and including 160mm dia	No	30	[redacted]	
	(3) Stormwater pipes				
	(ii) Greater than and including 300mm dia	No	30	[redacted]	
	(4) Electrical cables				
	(ii) HV (High voltage)	No	38	[redacted]	
	(5) Communication cables				
	(ii) Optic fibre	No	30	[redacted]	
	CARRIED FORWARD TO THE NEXT PAGE				[redacted]

CONTRACT: 412Q/2022/23
CONTRACT TITLE: CONSTRUCTION OF THE PHASE 2A IRT INFRASTRUCTURE: WORK PACKAGE E2 ALONG GOVAN MBEKI ROAD (M9) FROM WEST OF NY72 ROAD TO EAST OF KLIPFONTEIN ROAD

SCHEDULE: 4 SERVICES

SECTION: B2500 MEDIUM PRESSURE PIPELINES

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	BROUGHT FORWARD FROM THE PREVIOUS PAGE				[redacted]
	(b) Services adjacent to a trench or box cut				
	(1) Waterpipes				
	(ii) Greater than and including 110mm dia	m	100	[redacted]	
	(2) Sewer pipes				
	(i) Less than and including 160mm dia	m	50	[redacted]	
	(3) Stormwater pipes				
	(ii) Greater than and including 300mm dia	m	200	[redacted]	
	(4) Electrical cables				
	(ii) HV (High voltage)	m	500	[redacted]	
	(5) Communication cables				
	(ii) Optic fibre	m	500	[redacted]	
	TOTAL FOR SECTION B2500 CARRIED FORWARD TO SUMMARY				[redacted]

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CONTRACT TITLE: CONSTRUCTION OF THE PHASE 2A IRT INFRASTRUCTURE: WORK PACKAGE E2 ALONG GOVAN MBEKI ROAD (M9) FROM WEST OF NY72 ROAD TO EAST OF KLIPFONTEIN ROAD

SCHEDULE: 4 SERVICES

SECTION: B2600 CABLE DUCTS

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
B26.01	Excavate in all materials for trenches; backfill, compact and dispose of surplus material. Trench widths to SABS 1200 LC drg LC-1				
	(a) Trenches for single ducts for 110mm	m	750	[redacted]	
	(b) Trenches for two ducts for 110mm	m	950	[redacted]	
	(c) Trenches for four ducts for 110mm	m	3513	[redacted]	
	(d) Trenches for eight ducts for 110mm	m	4445	[redacted]	
	(e) Trenches for two ducts for 160mm	m	2482	[redacted]	
	(f) Trenches for four ducts for 160mm	m	370	[redacted]	
	(g) Trenches for six ducts for 160mm	m	230	[redacted]	
	(h) Trenches for eight ducts for 160mm	m	150	[redacted]	
B26.02	Supply, lay, bed and prove ducts including draw wires. All ducts to be class 34 uPVC ducts to SABS 791 with sleeve type couplings				
	(a) Single ducts for 110mm	m	750	[redacted]	
	(b) Two ducts for 110mm	m	950	[redacted]	
	(c) Four ducts for 110mm	m	3513	[redacted]	
	(d) Eight ducts for 110mm	m	4445	[redacted]	
	(e) Two ducts for 160mm	m	2482	[redacted]	
	(f) Four ducts for 160mm	m	370	[redacted]	
	(g) Six ducts for 160mm	m	230	[redacted]	
	(h) Eight ducts for 160mm	m	150	[redacted]	
B26.03	Import bedding material				
	(a) Non plastic bedding sand	m³	800	[redacted]	
B26.04	Concrete encasement of ducts (20MPa/20)	m³	20	[redacted]	
TOTAL FOR SECTION B2600 CARRIED FORWARD TO SUMMARY					[redacted]

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SCHEDULE: 4 SERVICES

SECTION: B2700 SEWER

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
B27.01	Supply, lay, bed (Class C) prove, test including couplings and pipes to SABS 791				
	(a) Class 34 uPVC heavy duty (Diameter as listed)				
	(i) 160mm diameter	m	700	[redacted]	
B27.03	Manholes and chambers complete with cover and frame in accordance with standard details				
	(a) Manholes in accordance with CCT Standard Details Drawing S-1 in CCT Standards Document, type with 1050mm diameter rings for depth as follows				
	(ii) Over 1.5 m and up to 2.0 m	No	6	[redacted]	
	(iii) Over 2.0 m and up to 2.5 m	No	6	[redacted]	
B27.07	Break into and connect to existing live manhole and make good	No	4	[redacted]	
B27/B22.01	Excavation				
	(a) Excavating soft material situated within the following depth ranges below the surface level:				
	(i) 0 m up to 1.0 m	m³	830	[redacted]	
	(ii) Exceeding 1,0 m and up to 2,0 m	m³	420	[redacted]	
	(b) Extra over subitem 22.01(a) for excavation in hard material, irrespective of depth	m³	10	[redacted]	
B27/22.02	Backfilling:				
	(a) Using the excavated material	m³	850	[redacted]	
	(b) Using imported selected material	m³	400	[redacted]	
B25/B22.32	Protecting of existing services				
	(a) Services intersecting a trench or box cut				
	(1) Waterpipes				
	(ii) Greater than and including 110mm dia	No	20	[redacted]	
	(2) Sewer pipes				
	(i) Less than and including 160mm dia	No	10	[redacted]	
	(3) Stormwater pipes				
	(ii) Greater than and including 300mm dia	No	20	[redacted]	
	CARRIED FORWARD TO THE NEXT PAGE				[redacted]

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SCHEDULE: 4 SERVICES

SECTION: B2700 SEWER

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	BROUGHT FORWARD FROM THE PREVIOUS PAGE				[redacted]
	(4) Electrical cables				
	(ii) HV (High voltage)	No	20	[redacted]	
	(5) Communication cables				
	(ii) Optic fibre	No	20	[redacted]	
	(b) Services adjacent to a trench or box cut				
	(1) Waterpipes				
	(ii) Greater than and including 110mm dia	m	50	[redacted]	
	(3) Stormwater pipes				
	(ii) Greater than and including 300mm dia	m	300	[redacted]	
	(4) Electrical cables				
	(ii) HV (High voltage)	m	100	[redacted]	
	(5) Communication cables				
	(ii) Optic fibre	m	100	[redacted]	
	TOTAL FOR SECTION B2700 CARRIED FORWARD TO SUMMARY				[redacted]

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CONTRACT TITLE: CONSTRUCTION OF THE PHASE 2A IRT INFRASTRUCTURE: WORK PACKAGE E2 ALONG GOVAN MBEKI ROAD (M9) FROM WEST OF NY72 ROAD TO EAST OF KLIPFONTEIN ROAD

SCHEDULE: 5 ELECTRICAL & ELECTRONIC
SECTION: 5A ELECTRICAL

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
C21.01	Removal & Relocation of Existing Streetlighting Infrastructure				
	Remove & Relocate all Existing Streetlighting Infrastructure that is in good condition to the responsible CCT Electrical Depot				
	(a) Remove & Relocate the Existing Streetlighting Infrastructure to the responsible CCT Electrical Depot	No	165	[redacted]	
C21.02	Trenching & Excavation				
	These rates for trenching and excavations shall include for all shoring necessary for support and all pumping necessary to remove water from the trenches and excavations.				
	(a) MV Trenching (Relocation of Existing Services)				
	(i) Trenches by hand in pickable soil - 1200 mm deep x 800 mm wide	m	4200	[redacted]	
	(ii) Backfilling of trench with imported sand 300 mm deep x 800 mm wide	m	4200	[redacted]	
	(iii) Backfilling with rough material 900 mm deep x 800 mm wide and compaction and reinstatement of trench surface	m	4200	[redacted]	
	(b) Trenching - Various Services - LV Cables, Substation Comms (Telecom, Protection, Fibre & Ducts) & Electonic Fibre/Ducts.				
	(i) Trenches by hand in pickable soil - 850 mm deep x 450 mm wide	m	27350	[redacted]	
	(ii) Backfilling of trench with imported sand 250 mm deep x 450 mm wide	m	27350	[redacted]	
	(iii) Backfilling with rough material 600 mm deep x 450 mm wide and compaction and reinstatement of trench surface	m	27350	[redacted]	
C21.03	Electrical Supply Applications for Various Services				
	The Electrical Contractor must liaise with the relevant supply authority (CCT/ESKOM) to ensure that the new electricity supply applications are submitted & installed timeously and that the equipment installed by the contractor is to the approval of CCT/ESKOM.				
	(a) Electrical Supply Applications from various Distribution Kiosks (DK's)				
	(i) Allowance for the application of Electrical Supplies to Streetlighting Kiosks	No	4	[redacted]	
	(ii) Allowance for the application of Electrical Supplies to Field CCTV Equipment	No	8	[redacted]	
	CARRIED FORWARD TO THE NEXT PAGE				[redacted]

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SCHEDULE: 5 ELECTRICAL & ELECTRONIC

SECTION: 5A ELECTRICAL

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	BROUGHT FORWARD FROM THE PREVIOUS PAGE				[redacted]
	(iii) Allowance for the application of Electrical Supplies to Traffic Intersections Traffic Lights	No	14	[redacted]	
	(iv) Allowance for the application of Electrical Supplies to IRT Bus Stations	No	5	[redacted]	
C21.04	Electrical Supply Cabling & Terminations				
	Supply and Install 3- & 4-core 600/1000V Aluminium PVC/SWA/PVC/PVC Armoured cable in trenches as specified. Gland and terminate cable where applicable - including all glands, terminations, insulated Pratley (or equivalent) connectors, earth conductor etc.				
	(a) 35 mm² Al x 4-core for SLK's Supply				
	(i) Supply	m	600	[redacted]	
	(ii) Install	m	600	[redacted]	
	(b) 4 Core 35 mm² Al SWA Terminations				
	(i) Supply	No	8	[redacted]	
	(ii) Install	No	8	[redacted]	
	(c) A25mm² Al x 4-core for IRT Bus Station Supply				
	(i) Supply	m	1950	[redacted]	
	(ii) Install	m	1950	[redacted]	
	(d) 4 Core 25 mm² Al SWA Terminations				
	(i) Supply	No	12	[redacted]	
	(ii) Install	No	12	[redacted]	
	(e) 25mm² Al x 3-core for Field CCTV Equipment & Traffic Light Station Supply				
	(i) Supply	m	2400	[redacted]	
	(ii) Install	m	2400	[redacted]	
	(f) 3 Core 25 mm² Al SWA Terminations				
	(i) Supply	No	28	[redacted]	
	(ii) Install	No	28	[redacted]	
	CARRIED FORWARD TO THE NEXT PAGE				[redacted]

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CONTRACT: 412Q/2022/23
CONTRACT TITLE: CONSTRUCTION OF THE PHASE 2A IRT INFRASTRUCTURE: WORK PACKAGE E2 ALONG GOVAN MBEKI ROAD (M9) FROM WEST OF NY72 ROAD TO EAST OF KLIPFONTEIN ROAD

SCHEDULE: 5 ELECTRICAL & ELECTRONIC

SECTION: 5A ELECTRICAL

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	BROUGHT FORWARD FROM THE PREVIOUS PAGE				[redacted]
C21.05	Remove and disposal of inactive electrical cable from excavations by civil contractor or in trenches for installation of new electrical cables				
	(a) MV & LV Cable	m	4000	[redacted]	
C21.06	Remove and disposal of overhead conductor and wooden poles				
	(a) MV	m	300	[redacted]	
C21.07	Streetlighting				
	(a) Luminaires - Supply and Install Beka LED-LUME MIDI 138W LED Optic 5248 Luminaire or equivalent approved by CCT				
	(i) Supply	No	343	[redacted]	
	(ii) Install	No	343	[redacted]	
	(b) Luminaires - Supply and Install Beka LED-LUME MIDI 97W LED Optic 5247 Luminaire or equivalent approved by CCT				
	(i) Supply	No	20	[redacted]	
	(ii) Install	No	20	[redacted]	
	(c) Galvanised Steel Poles				
	(i) Supply and install a 13.5m galvanised steel pole (11.8m mounting height), as per CCT Specification (Drawing SL 33) complete with access opening cover, gland plate, back plate, fuse & holder, all internal wiring and connections	No	325	[redacted]	
	(ii) Excavate 1.7m hole for pole, place pole, backfill and compact	No	325	[redacted]	
	(iii) Supply and install a 10m galvanised steel pole (8.5m mounting height), as per CCT Specification (Drawing SL 1) complete with access opening cover, gland plate, back plate, fuse & holder, all internal wiring and connections	No	2	[redacted]	
	(iv) Excavate 1.5m hole for pole, place pole, backfill and compact	No	2	[redacted]	
	(v) Supply and install a 5.2m galvanised steel pole (4m mounting height), as per CCT Specification (Drawing SL 37) complete with access opening cover, gland plate, back plate, fuse & holder, all internal wiring and connections	No	17	[redacted]	
	(vi) Excavate 1.2m hole for pole, place pole, backfill and compact	No	17	[redacted]	
	CARRIED FORWARD TO THE NEXT PAGE				[redacted]

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SCHEDULE: 5 ELECTRICAL & ELECTRONIC

SECTION: 5A ELECTRICAL

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	BROUGHT FORWARD FROM THE PREVIOUS PAGE				[redacted]
	(vii) Supply and install a 11m galvanised steel pole (±12m mounting height), as per CCT Specification (Drawing SL 11 with & SL51 Base Flange design) complete with access opening cover, gland plate, back plate, fuse & holder, all internal wiring and	No	2	[redacted]	
	(viii) Mount pole on the retaining wall where indicated	No	2	[redacted]	
C21.08	Outreach arm				
	(a) Supply and Install Decorative Adaptor as per CCT specification (Drawing SL45 RTS Decorative Outreach Arm)				
	(i) Supply	No	320	[redacted]	
	(ii) Install	No	320	[redacted]	
	(b) Supply and Install Double Decorative Adaptor as per CCT specification (Drawing SL45 RTS Decorative Outreach Arm)				
	(i) Supply	No	21	[redacted]	
	(ii) Install	No	21	[redacted]	
C21.09	Cabling - Supply and Install 4-core 600/1000V Aluminium PVC/SWA/PVC/PVC Armoured cable in trenches as specified, including earth conductor				
	(a) 25 mm² Al x 4-core for Streetlighting				
	(i) Supply	m	17076	[redacted]	
	(ii) Install	m	17076	[redacted]	
C21.10	Streetlight Pole Conductors				
	(a) Red, black and yellow/green 2.5mm² PVC conductor				
	(i) Supply	m	14754	[redacted]	
	(ii) Install	m	14754	[redacted]	
C21.11	Terminations				
	Gland and terminate cable in streetlight pole when required - including all glands, terminations, insulated Pratley or equivalent approved) connectors etc.				
	(a) 4 Core 25 mm² Al SWA				
	(i) Supply	No	391	[redacted]	
	(ii) Install	No	391	[redacted]	
	CARRIED FORWARD TO THE NEXT PAGE				[redacted]

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CONTRACT TITLE: CONSTRUCTION OF THE PHASE 2A IRT INFRASTRUCTURE: WORK PACKAGE E2 ALONG GOVAN MBEKI ROAD (M9) FROM WEST OF NY72 ROAD TO EAST OF KLIPFONTEIN ROAD

SCHEDULE: 5 ELECTRICAL & ELECTRONIC

SECTION: 5A ELECTRICAL

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	BROUGHT FORWARD FROM THE PREVIOUS PAGE				[redacted]
C21.12	Control Kiosks				
	(a) Supply and install Pole Mounted Streetlight Control Kiosk (6 Way Kiosk) complete with internal wiring and streetlight control as per Single Line Diagram and CCT specification drawing DR3055SH1&SH2.				
	(i) Supply	No	4	[redacted]	
	(ii) Install	No	4	[redacted]	
	(b) Upgrade of Existing Streetlight Control Kiosk (6 Way Kiosk) complete with internal wiring and streetlight control.	No	4	[redacted]	
	(c) Earthing of Streetlight Control Kiosks	No	8	[redacted]	
C21.13	Relocation of Existing				
	Electrical MV Primary & Secondary Cables				
	(a) Primary 11kV Cable 3 Core 300 mm² Al PILC				
	(i) Supply	m	4130	[redacted]	
	(ii) Install	m	4130	[redacted]	
	(b) Primary 11kV 3 Core 300 mm² AL PILC Cable Joints (1003). All inclusive as required by CCT.				
	(i) Supply	No	20	[redacted]	
	(ii) Install	No	20	[redacted]	
	(c) Primary 11kV 3 Core 300 mm² AL PILC Cable Terminations. All inclusive as required by CCT.				
	(i) Supply	No	3	[redacted]	
	(ii) Install	No	3	[redacted]	
	(d) Secondary 11kV Cable 3 Core 120 mm² AL PILC				
	(i) Supply	m	180	[redacted]	
	(ii) Install	m	180	[redacted]	
	(e) Secondary 11kV 3 Core 120 mm² AL PILC Cable Joints (1002). All inclusive as required by CCT.				
	(i) Supply	No	5	[redacted]	
	(ii) Install	No	5	[redacted]	
	CARRIED FORWARD TO THE NEXT PAGE				[redacted]

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SCHEDULE: 5 ELECTRICAL & ELECTRONIC

SECTION: 5A ELECTRICAL

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	BROUGHT FORWARD FROM THE PREVIOUS PAGE				[redacted]
	(f) Secondary 11kV 3 Core 120 mm² AL PILC Cable Terminations. All inclusive as required by CCT.				
	(i) Supply	No	1	[redacted]	
	(ii) Install	No	1	[redacted]	
	(g) Secondary 11kV Cable 3 Core 95 mm² AL PILC				
	(i) Supply	m	1200	[redacted]	
	(ii) Install	m	1200	[redacted]	
	(h) Secondary 11kV 3 Core 95 mm² AL PILC Cable Joints (1002). All inclusive as required by CCT.				
	(i) Supply	No	12	[redacted]	
	(ii) Install	No	12	[redacted]	
	(i) Secondary 11kV 3 Core 95 mm² AL PILC Cable Terminations. All inclusive as required by CCT.				
	(i) Supply	No	2	[redacted]	
	(ii) Install	No	2	[redacted]	
	(j) Telecom Instrumentation Cable (0.63mm²) 10 Pair XLPE OAM APL PVC				
	(i) Supply	m	575	[redacted]	
	(ii) Install	m	575	[redacted]	
	(k) Telecom Instrumentation Cable (0.63mm²) 10 Pair XLPE OAM APL PVC - Joints Cast Resin - 91A3				
	(i) Supply	No	2	[redacted]	
	(ii) Install	No	2	[redacted]	
	(l) Telecom Instrumentation Cable (0.63mm²) 10 Pair XLPE OAM APL PVC - Terminations				
	(i) Supply	No	1	[redacted]	
	(ii) Install	No	1	[redacted]	
	(m) Protection Cables (1.5mm²) 12 Pair XLPE OAM APL PVC				
	(i) Supply	m	5500	[redacted]	
	(ii) Install	m	5500	[redacted]	
	CARRIED FORWARD TO THE NEXT PAGE				[redacted]

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SCHEDULE: 5 ELECTRICAL & ELECTRONIC

SECTION: 5A ELECTRICAL

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	BROUGHT FORWARD FROM THE PREVIOUS PAGE				[redacted]
	(n) Protection Cables (1.5mm²)12 Pair XLPE OAM APL PVC - Joints Cast Resin - 91A3				
	(i) Supply	No	25	[redacted]	
	(ii) Install	No	25	[redacted]	
	(o) Protection Cables (1.5mm²) 12 Pair XLPE OAM APL PVC - Termination				
	(i) Supply	No	2	[redacted]	
	(ii) Install	No	2	[redacted]	
	(p) Substation Fibre Cables 12 Core Single-mode fibre				
	(i) Supply	m	1	[redacted]	
	(ii) Install	m	1	[redacted]	
C21.14	Allowance for additional costs due to design changes due to changes in CCT Standards	Prov.Sum	1	[redacted]	
	TOTAL FOR SECTION 5A CARRIED FORWARD TO SUMMARY				[redacted]

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SCHEDULE: 5 ELECTRICAL & ELECTRONIC

SECTION: 5B ELECTRONIC

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
C21.15	Electronic Field CCTV Camera Installation				
	(a) Fixed Field CCTV Cameras including 3rd party streaming licences, related equipment and ancillaries - HIKVISION iDS-2CD7A26G0/P-IZHS(Y) or equivalent				
	(i) Supply	No	32	[redacted]	
	(ii) Install	No	32	[redacted]	
	(b) Fixed camera mounting bracket for up to 4 cameras for 12m & 15m camera masts (316 stainless)				
	(i) Supply	No	10	[redacted]	
	(ii) Install	No	10	[redacted]	
C21.16	PoE Internet Switches				
	(a) 8 Port - PoE Network Switch for Mast Kiosk Cameras - Huawei (8 Port) S5735-L8P4S-A1 or equivalent				
	(i) Supply	No	10	[redacted]	
	(ii) Install	No	10	[redacted]	
	(b) 24 Port - PoE Network Switch at IRT Bus Station - Huawei (24Port) S5735-L32ST4X-A1 or equivalent				
	(i) Supply	No	3	[redacted]	
	(ii) Install	No	3	[redacted]	
C21.17	Fiber Optic Insattation				
	(a) 12 Core Single-mode fibre Cable				
	(i) Supply	m	5750	[redacted]	
	(ii) Install	m	5750	[redacted]	
	(b) Fiber Termination Boxes for Mast Kiosk				
	(i) Supply	No	10	[redacted]	
	(ii) Install	No	10	[redacted]	
	(c) Fiber Patch Panel at IRT Station				
	(i) Supply	No	4	[redacted]	
	(ii) Install	No	4	[redacted]	
	(d) Fiber Optic Patchleads				
	(i) Supply	No	20	[redacted]	
	(ii) Install	No	20	[redacted]	
	CARRIED FORWARD TO THE NEXT PAGE				[redacted]

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SCHEDULE: 5 ELECTRICAL & ELECTRONIC

SECTION: 5B ELECTRONIC

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	BROUGHT FORWARD FROM THE PREVIOUS PAGE				[redacted]
	(e) Fiber Optic Dome Joints				
	(i) Supply	No	45	[redacted]	
	(ii) Install	No	45	[redacted]	
	(f) Supply Pigtails and midcouplers, single-mode (LC/APC)				
	(i) Supply	No	20	[redacted]	
	(ii) Install	No	20	[redacted]	
C21.18	CCTV Galvanised Steel Masts				
	(a) 12 m Galvanised Steel Masts				
	(i) Supply	No	3	[redacted]	
	(ii) Install	No	3	[redacted]	
	(iii) Design of mast foundation by Professionally Registered Engineer (ECSA)	No	3	[redacted]	
	(b) 15 m Galvanised Steel Masts				
	(i) Supply	No	7	[redacted]	
	(ii) Install	No	7	[redacted]	
	(iii) Design of mast foundation by Professionally Registered Engineer (ECSA)	No	7	[redacted]	
C21.19	Electronic Pole Mounted Kiosks				
	(a) Pole mounted kiosk including electrical Distribition Board as per specification- ElectroMechanica RGS316-65 or equivalent				
	(i) Supply	No	9	[redacted]	
	(ii) Install	No	9	[redacted]	
C21.20	Electronic Routes, Manholes & Sleeves/Ducting				
	(a) Electronic Manholes Type 1 - Brick-Built				
	(i) Supply	No	2	[redacted]	
	(ii) Install	No	2	[redacted]	
	(b) Electronic Manholes Type 2 - Prefabricated GRC				
	(i) Supply	No	90	[redacted]	
	(ii) Install	No	90	[redacted]	
	CARRIED FORWARD TO THE NEXT PAGE				[redacted]

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SCHEDULE: 5 ELECTRICAL & ELECTRONIC

SECTION: 5B ELECTRONIC

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	BROUGHT FORWARD FROM THE PREVIOUS PAGE				[redacted]
	(c) Electronic Manholes Type 3 - Modular				
	(i) Supply	No	20	[redacted]	
	(ii) Install	No	20	[redacted]	
C21.21	Electronic Sleeves & Ducting: All Electronic sleeves/ducting will be installed by the civil contractor, the subducts will be installed by the Electronic Contractor				
	(a) Subducts for CCT Field CCTV Fibre Installation (4 way 14/10 ducts)				
	(i) Supply	m	6400	[redacted]	
	(ii) Install	m	6400	[redacted]	
	TOTAL FOR SECTION 5B CARRIED FORWARD TO SUMMARY				[redacted]

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SCHEDULE: 6 BUILDING WORKS (ALL 4 STATIONS)
SECTION: 6A EARTHWORKS

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	PREAMBLES				
	The Tenderer is referred to the relevant Clauses in SANS 2001-BS1 and 2001-BE1 and Section C3000 of the Project Specifications.				
	SUPPLEMETARY PREAMBLES				
	Nature of ground:				
	The nature of the ground is assumed to be loose sandy material, therefore earth, but possibly interspersed with hard rock or soft rock.				
	Materials:				
	No natural aggregates are to be used for non-structural purposes (eg building base course, sub-grade to footpaths and backfill to service trenches)				
	Carting away of excavated material:				
	Descriptions of carting away of excavated material shall be deemed to include loading excavated material onto trucks directly from the excavations or, alternatively, from stock piles situated on the building site.				
A1	EXCAVATION ETC				
A1.1	Excavation in earth not exceeding 2000mm deep:				
	(a) Trenches	m³	1646	[redacted]	
	(b) Holes	m³	61	[redacted]	
	(c) Trenches for piping	m³	257	[redacted]	
A2	AUGER BORING FOR SLEEVES				
A2.1	Approved auger boring for sleeves under existing roadways etc, including shallow launch pits on one side and receiving pits on other side, excavation, filling, compaction, etc of pits, cart away of excavated material				
	(a) 110mm Diameter sleeved under roadways etc	m	1267	[redacted]	
A2.2	Back excavation of vertical sides of excavation in earth for working space, including backfilling compacted to 95% MDD:				
	(a) Not exceeding 500mm deep for placing and removing formwork to walls etc 500mm away from excavated face	m²	4526	[redacted]	
A2.3	Extra over trench and hole excavation in earth for excavation in:				
	(a) Soft rock	m³	188	[redacted]	
	(b) Hard rock	m³	97	[redacted]	
	CARRIED FORWARD TO THE NEXT PAGE				[redacted]

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SCHEDULE: 6 BUILDING WORKS (ALL 4 STATIONS)

SECTION: 6A EARTHWORKS

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	BROUGHT FORWARD FROM THE PREVIOUS PAGE				[redacted]
A2.4	Extra over all excavations for carting away:				
	(a) Surplus material from excavations and/or stock piles on site to a dumping site to be located by the Contractor	m^3	1515	[redacted]	
A2.5	Risk of collapse of excavations:				
	(a) Sides of trench and hole excavations not exceeding 1500mm deep	m^2	4821	[redacted]	
A2.6	Keeping excavations free of water:				
	(a) Keeping excavations free of all water other than subterranean water (Sum per station)	lump sum	4	[redacted]	
A3	FILLING, ETC.				
A3.1	Earth filling supplied and carted on to site by the Contractor compacted to 95% MDD density:				
	(a) Backfilling to trenches, holes, etc.	m^3	667	[redacted]	
	(a) Under paving etc of G5 material	m^3	247	[redacted]	
A3.2	Earth filling supplied and carted on to site by the Contractor compacted to 100% MDD density:				
	(a) Under paving etc of G7 material	m^3	247	[redacted]	
A3.3	Approved clean sand filling supplied and carted onto site by the Contractor compacted to 100% MDD:				
	(a) Under floors, steps, paving, etc.	m^3	412	[redacted]	
A3.4	Compaction of surfaces:				
	(a) Compaction of ground surface under floors, paving, etc, including scarifying for a depth of 200mm, breaking down oversize material, adding suitable material where necessary and compacting to 100% MDD density	m^2	3715	[redacted]	
TOTAL FOR SECTION 6A CARRIED FORWARD TO SUMMARY					[redacted]

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SCHEDULE: 6 BUILDING WORKS (ALL 4 STATIONS)

SECTION: 6B CONCRETE, FORMWORK & REINFORCEMENT

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	PREAMBLES The Tenderer is referred to the relevant Clauses in SANS 2001-CC1 and Section C3000 of the Project Specifications. SUPPLEMENTARY PREAMBLES Concrete A minimum of 60% of the absolute quantity of Portland cement, as an average across all mixes, is to be replaced with industrial waste products (such as flyash or slag or silica fume), or with oversized aggregate. No industrial waste product may come from industrial facilities that are co-fired with hazardous waste, A minimum of 10% of all aggregate used for structural purposes is to be recycled concrete aggregate (RCA) or slag aggregate. RCA must be classified as Class 1 RCA in accordance with Australian code HB 155-2002, "Guide to the Use of Recycled Concrete and Masonry. All concrete mixes and aggregates to be approved by the structural engineer. All backfill and sub base mixes to be approved by the structural engineer. Formwork: Descriptions of formwork shall be deemed to include use and waste only (except where described as left in or permanent), for fitting together in the required forms, wedging, plumbing and fixing to true angles and surfaces as necessary to ensure easy release during stripping and for reconditioning as necessary before re- The vertical strutting shall be carried down to such construction as is sufficiently strong to afford the required support without damage and shall remain in position until the newly constructed work is able to support itself. Formwork to soffits of solid slabs etc., shall be deemed to be slabs not exceeding 250mm thick unless otherwise described. Formwork should be designed to be re-used without a subsequent loss in quality of the concrete finish. The design of the formwork is to be submitted for approval by the Employers Agent. Formwork is to be inspected by the Architect prior to placement of concrete. Formwork to sides of bases, pile caps, ground beams, etc., will only be measured where it is prescribed by the Engineer for design reasons. Formwork necessitated by irregularity or collapse of excavated faces will not be measured and the cost thereof shall be deemed to be included in the allowance for taking the risk of collapse of the sides of the excavations, provision for which is made in Earthworks Classification of formwork:				
	CARRIED FORWARD TO THE NEXT PAGE				[redacted]

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SCHEDULE: 6 BUILDING WORKS (ALL 4 STATIONS)

SECTION: 6B CONCRETE, FORMWORK & REINFORCEMENT

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	BROUGHT FORWARD FROM THE PREVIOUS PAGE				[redacted]
	Smooth-special: Formwork shall be metal or wrought timber with a degree of accuracy II. Surfaces of the concrete must be completely rubbed or treated to form a smooth finish of uniform texture, appearance and colour.				
	Elements of works should be finished as follows:				
	Foundations and concrete that are not visible: ROUGH				
	Floor slab: Floated and prepared to allow for later screeding.				
	Formed and unformed surfaces of visible concrete elements apart from the floor slab. (Includes all walls, columns and the concrete infill between Kassel Kerb and walls): SMOOTH SPECIAL				
	Reinforcement:				
	All concrete reinforcing steel must have a minimum of 54% (by mass) or greater recycled content.				
	Repairs:				
	A method statement for any repair work to the concrete or finishing work done after the shutters are stripped is to be provided for approval by the architect and Structural Engineer.				
	The approved methods are to be assessed after application to the test panel for final approval by the architect and engineer prior to proceeding with the works.				
	Documentation:				
	The contractor is to identify all concrete uses on site and describe the mix and product used. The contractor is to ensure the supplier confirms:				
	The quantities of Portland cement, industrial waste products and aggregate (both recycled and non-recycled) supplied to site.				
	That no industrial waste product came from industrial facilities co-fired with hazardous waste.				
	That where recycled concrete aggregate is used, it is classified as Class 1 RCA in accordance with Australian code HB 155-2002				
	The contractor is to confirm the total mass of steel re-inforcing used within the building structure, and is to obtain from the supplier:				
	Confirmation of the total quantity of steel reinforcing supplied for the building structure				
	The post-consumer recycled content of the steel reinforcing.				
	Cost associated with preambles:				
	CARRIED FORWARD TO THE NEXT PAGE				[redacted]

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SCHEDULE: 6 BUILDING WORKS (ALL 4 STATIONS)

SECTION: 6B CONCRETE, FORMWORK & REINFORCEMENT

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	BROUGHT FORWARD FROM THE PREVIOUS PAGE				[redacted]
	Cost stemming from these preambles are to be included within the rates of the associated items hereunder, if not specifically measured.				
B1	UNREINFORCED CONCRETE CAST AGAINST EXCAVATED SURFACES				
B1.1	15MPa/20mm Concrete:				
	(a) Surface blinding under footings and bases.	m³	134.2	[redacted]	
B2	REINFORCED CONCRETE				
B2.1	5MPa/20mm Concrete:				
	(a) Columns	m³	5	[redacted]	
B2.2	25MPa/20mm Concrete:				
	(a) Strip footings.	m³	960	[redacted]	
B2.3	30MPa/20mm Concrete:				
	(a) Ground beams.	m³	75	[redacted]	
	(b) Base	m³	34	[redacted]	
	(c) Filling between bottom of conrete wall and precast concrete kebs	m³	187	[redacted]	
B2.4	35MPa/20mm Concrete:				
	(a) Slabs cast in panels	m³	473	[redacted]	
	(b) Walls	m³	375	[redacted]	
B3	FINISHING TOP SURFACE OF CONCRETE				
B3.1	Finishing top surfaces of concrete smooth with a steel trowel:				
	(a) Sloping tops of walls	m²	749	[redacted]	
B3.2	Finishing top surfaces of concrete smooth with a power float:				
	(a) Slabs	m²	2055	[redacted]	
B4	ROUGH FORMWORK (DEGREE OF ACCURACY III)				
B4.1	Rough formwork to sides:				
	(a) Strip footings.	m²	2497	[redacted]	
	(b) Ground beams.	m²	503	[redacted]	
	(c) Bases	m²	43	[redacted]	
	CARRIED FORWARD TO THE NEXT PAGE				[redacted]

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SCHEDULE: 6 BUILDING WORKS (ALL 4 STATIONS)

SECTION: 6B CONCRETE, FORMWORK & REINFORCEMENT

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	BROUGHT FORWARD FROM THE PREVIOUS PAGE				[redacted]
	(d) Columns	m²	55	[redacted]	
B5	SMOOTH SPECIAL FORMWORK (DEGREE OF ACCURACY II)				
B5.1	Smooth formwork to sides:				
	(a) Walls	m²	2609	[redacted]	
	(b) Edges, risers, ends and reveals exceeding 300mm high or wide	m²	223	[redacted]	
	(c) Edges, risers, ends and reveals not exceeding 300mm high or wide	m²	1439	[redacted]	
B5.2	Smooth formwork to soffits:				
	(a) Edges, risers, ends and reveals not exceeding 300mm high or wide	m²	1214	[redacted]	
B6.3	Boxing in smooth formwork to form:				
	(a) 25 x 25mm Deep recesses along tops.	m	339	[redacted]	
	(b) 25 x 25mm Vertical chamfers at corners.	m	694	[redacted]	
	(c) 30 x 30mm Vertical chamfers at corners.	m	39	[redacted]	
	(d) 25 x 25mm Horizontal chamfers along top or bottom edges.	m	3350	[redacted]	
	(e) 30 x 30mm Horizontal chamfers along top or bottom edges.	m	139	[redacted]	
	(f) 80 x 30mm Deep recess along top or bottom edges.	m	57	[redacted]	
	(g) 85 x 30mm Deep recess along top or bottom edges.	m	529	[redacted]	
	(h) 220 x 50mm Deep recesses with weathered top surface along top or bottom edges	m	681	[redacted]	
	(i) 285 x 50mm Deep recesses with weathered top surface along top or bottom edges	m	199	[redacted]	
	(j) 270 x 25mm Deep recesses along tops edge	m	342	[redacted]	
	(k) 300 x 50mm Deep recess in top of concrete surface bed	m	34	[redacted]	
	(l) 90 x 110 x 200mm Deep recesses in tops	m	319	[redacted]	
	(m) 100 x 85 x 200mm Deep recesses in tops	m	65	[redacted]	
	(n) 110 x 180 x 200mm Deep recesses in tops	m	6	[redacted]	
	(o) 160 x 85 x 200mm Deep recesses in tops	m	92	[redacted]	
	(p) 50 x 245mm Projection or nib along tops	m	339	[redacted]	
	CARRIED FORWARD TO THE NEXT PAGE				[redacted]

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CONTRACT: 412Q/2022/23
CONTRACT TITLE: CONSTRUCTION OF THE PHASE 2A IRT INFRASTRUCTURE: WORK PACKAGE E2 ALONG GOVAN MBEKI ROAD (M9) FROM WEST OF NY72 ROAD TO EAST OF KLIPFONTEIN ROAD

SCHEDULE: 6 BUILDING WORKS (ALL 4 STATIONS)

SECTION: 6B CONCRETE, FORMWORK & REINFORCEMENT

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	BROUGHT FORWARD FROM THE PREVIOUS PAGE				[redacted]
	(q) Drip groove size 20mm wide x 10mm high along bottom	m	969	[redacted]	
B6	MOVEMENT JOINTS ETC				
B6.1	Expansion joints with 'Jointex' between vertical concrete surfaces:				
	(a) 10mm Joints exceeding 300mm wide	m	900	[redacted]	
B6.2	Expansion joints with 'Jointex' between horizontal concrete surfaces:				
	(a) 10mm Joints exceeding 300mm wide	m	1131	[redacted]	
B6.3	Vertical joggle construction joints through concrete including thick cement slurry to one face:				
	(a) Walls.	m	154	[redacted]	
	(b) Footings not exceeding 300mm thick	m	239	[redacted]	
B6.4	Sawcut joints				
	(a) 3 x 35mm Saw cut Joints in splayed tops of filling between kerbs and walls	m	266	[redacted]	
B7	REINFORCEMENT				
B7.1	Mild steel reinforcement to structural concrete work:				
	(a) 12mm Diameter bars	t	1.12	[redacted]	
	(b) 10mm Diameter bars	t	3.45	[redacted]	
	(c) 18mm Diameter bars	t	1.09	[redacted]	
B7.2	High tensile steel reinforcement to structural concrete work:				
	(a) 30mm Diameter bars	t	19.23	[redacted]	
	(b) 25mm Diameter bars	t	50.84	[redacted]	
	(c) 16mm Diameter bars	t	33.39	[redacted]	
	(d) 12mm Diameter bars	t	31.95	[redacted]	
	(e) 10mm Diameter bars	t	96.42	[redacted]	
B7.3	Galvanised high tensile steel dowel bars:				
	(a) 25mm Diameter dowel bar 1000mm long with one end embeded 500mm deep in side of concrete at expansion joint and the other end coated with two coats 'Flintkote 3' and 10mm soft plug to end, including hole through formwork, etc.	No	1618	[redacted]	
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SCHEDULE: 6 BUILDING WORKS (ALL 4 STATIONS)

SECTION: 6B CONCRETE, FORMWORK & REINFORCEMENT

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	BROUGHT FORWARD FROM THE PREVIOUS PAGE				[redacted]
B7.4	Fabric reinforcement:				
	(a) Type 245 fabric reinforcement in concrete topping slabs etc	m²	2055	[redacted]	
TOTAL FOR SECTION 6B CARRIED FORWARD TO SUMMARY					[redacted]

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SCHEDULE: 6 BUILDING WORKS (ALL 4 STATIONS)

SECTION: 6C MASONRY

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	PREAMBLES The Tenderer is referred to the relevant clauses in the Model Preambles for Trades (2008 Edition) and Section C3000 of the Project Specifications. SUPPLEMENTARY PREAMBLES BRICKWORK Sizes in descriptions: Where sizes in descriptions are given in units, 'one brick' shall represent the length and 'half brick' the width of the brick Specification: Block paving to be manufactured in accordance with SABS Specification 1058 to the following compressive strength: Class 25 or 35MPa. Paving to be laid in accordance with SABS 1200MJ, SABS 1058 and the Concrete Manufacturers Association's specifications. Clean dry jointing sand complying with SABS 1200MJ is to be swept into joints between roadstones. All block paving to be inspected and re-sanded after 3 months.				
C1	BRICKWORK IN FOUNDATIONS				
C1.1	Brickwork of NFX bricks (14MPa nominal compressive strength) in Class I mortar:				
	(a) One brick walls.	m²	70	[redacted]	
C1.2	Brickwork reinforcement:				
	(a) 150mm Wide reinforcement built in horizontally.	m	721	[redacted]	
TOTAL FOR SECTION 6C CARRIED FORWARD TO SUMMARY					[redacted]

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SCHEDULE: 6 BUILDING WORKS (ALL 4 STATIONS)

SECTION: 6D WATERPROOFING

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	PREAMBLES				
	The Tenderer is referred to the relevant Clauses in SANS 10021-2012 Ed 3.3 and Section C3000 of the Project Specifications.				
	SUPPLEMENTARY PREAMBLES				
	Waterproofing:				
	Waterproofing of roofs, basements, etc. shall be laid under a ten year guarantee. Waterproofing to roofs shall be laid to even falls to outlets etc. with necessary ridges, hips and valleys. Descriptions of sheet or membrane waterproofing shall be deemed to include additional labour to turn-ups and turn-downs.				
D1	DAMPPROOFING OF WALLS AND FLOORS				
D1.1	One layer of 350 micron"Hyperlastic Orange" waterproof sheeting sealed at laps with Gunplas Pressure Sensitive Tape:				
	(a) Under surface beds.	m²	2054	[redacted]	
D1.2	Two coats 'Flintkote 3' bitumen emulsion waterproof coating:				
	(a) On concrete walls.	m²	613	[redacted]	
	(b) On brick walls.	m²	70	[redacted]	
D2	JOINT SEALANTS ETC				
D2.1	Approved two-part grey polysulphide sealing compound, including backing cord, bond breaker, primer, etc:				
	(a) 10 x 10mm In expansion joints in floors.	m	246	[redacted]	
	(b) 10 x 10mm In expansion joints	m	145	[redacted]	
	(c) Saw cuts joints.	m	266	[redacted]	
TOTAL FOR SECTION 6D CARRIED FORWARD TO SUMMARY					[redacted]

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SCHEDULE: 6 BUILDING WORKS (ALL 4 STATIONS)

SECTION: 6E ELECTRICAL INSTALLATION

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	GENERAL NOTES The following shall apply to all material and equipment supplied and installed on site and shall conform to the general specifications and project specific specification unless specifically stated otherwise. The schedules of quantities form part of and shall be read in conjunction with the specification, which contains full description of the work required to be performed and the materials and equipment to be supplied and used in the execution of the works.Tenderers shall refer to the specification for the full meaning and description of work to be executed and materials and equipment to be supplied or used in the execution of the No changes, additions or omissions to the contents of the schedules of quantities shall be permitted. If any changes, additions or omissions are made these shall not be recognised and the original wording of the schedules of quantities shall apply. The responsibility of the accuracy of the quantities included in the schedules, remains with the person who prepared the schedules. The tenderer is relieved from the responsibility of the measurement of quantities at tender stage and the tender amounts shall be for the quantities as listed in the schedules. It is however expected from the tenderer to include for minor construction items such as would be required for the complete execution of works in accordance with the specification. The quantities in these schedules of quantities shall not be used for the ordering of materials. All items are measured to the net final quantity as indicated on the drawings with the completed work in the position as indicated on the drawing. All prices and rates shall allow for wastage for whatever reason, irrespective of any other standard measurement which may be currently used elsewhere. The schedule of quantities shall be adjusted to reflect the quantities of materials used on completion of whole or part of the works as a result of remeasurement, qualification or variations. The remeasured quantities shall form the basis for the calculation of payment certificates. The schedules of quantities are not intended for the ordering of materials, etc. and the contractor is advised to extract the quantities for the ordering of materials directly from the drawings and specification. Any order placed directly from the schedules of quantities shall be solely at All rates shall allow for the testing and commissioning procedures required for equipment and systems. All quantities are net except where otherwise specified and tenderers shall make allowances in their rates for all wastage.				
	CARRIED FORWARD TO THE NEXT PAGE				[redacted]

CONTRACT: 412Q/2022/23
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SCHEDULE: 6 BUILDING WORKS (ALL 4 STATIONS)

SECTION: 6E ELECTRICAL INSTALLATION

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	BROUGHT FORWARD FROM THE PREVIOUS PAGE				[redacted]
	CONDUITS AND DRAW BOXES				
	PVC conduits chased into brickwork, fixed in partitioning, roof spaces, surface on concrete, cast into concrete or brickwork to be complete with saddles, couplings and terminations to drawboxes, as indicated on the drawings. Draw boxes to be PVC type. All visible exposed conduits to be galvanised bosal terminating into bosal round boxes, sizes as indicated on drawings. All cutting and terminations to be included.				
	TERMINATIONS				
	Termination of LV cable to be as specified including connection of conductors, cable lugs, captive cone glands, shrouds, etc. for the relevant cable sizes.				
E1	SLEEVES AND MANHOLES				
E1.1	Trenching, backfilling and compacting				
	(a) 600 (w) x 600 (d) mm	m	2023	[redacted]	
E1.2	Cable Marker				
	(a) Supply	m	2023	[redacted]	
	(b) Install	m	2023	[redacted]	
E1.3	Sleeves				
	Sleeves installed in ground including all slow bends and connectors				
	(a) 160mm Diameter				
	(i) Supply	m	1882	[redacted]	
	(ii) Install	m	1882	[redacted]	
	(b) 110mm Diameter				
	(i) Supply	m	10835	[redacted]	
	(ii) Install	m	10835	[redacted]	
	(c) 75mm Diameter				
	(i) Supply	m	9383	[redacted]	
	(ii) Install	m	9383	[redacted]	
	CARRIED FORWARD TO THE NEXT PAGE				[redacted]

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SCHEDULE: 6 BUILDING WORKS (ALL 4 STATIONS)

SECTION: 6E ELECTRICAL INSTALLATION

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	BROUGHT FORWARD FROM THE PREVIOUS PAGE				[redacted]
E1.4	Manholes				
	(a) 600mm x 600mm brick build manhole , 1 meter deep. With cast iron cover				
	(i) Supply	No	66	[redacted]	
	(ii) Install	No	66	[redacted]	
	(b) 300mm x 300mm drawbox with lockable cover. Cover must be able to accomdate tile insert				
	(i) Supply	No	22	[redacted]	
	(ii) Install	No	22	[redacted]	
E2	BUILDING WORK				
E2.1	Installation of building sand in server room and compacted for soft concrete topping	m³	133	[redacted]	
E2.2	Soft concrete topping 50mm thick	m³	45	[redacted]	
E3	EARTHING INSTALLATION				
	Kwena or equivalent copper earth conductor				
E3.1	70mm² x Bare copper earth conductor cadwelded to reinforcing	m	190	[redacted]	
E3.2	Earth Rod				
	(a) 12mm² x 3.6 meter Earth Rod	No	18	[redacted]	
E4	LUMINAIRES				
E4.1	Type C - Equivalent to Regent Lotis 7W Brick Light - only backbox	No	172	[redacted]	
E5	CONDUITS				
E5.1	PVC conduit cast into concrete, chased in walls, in ceiling space or surface mounted including all accessories and fixings				
	(a) 20mm	m	3130	[redacted]	
	(b) 25mm	m	1626	[redacted]	
	(c) 32mm	m	943	[redacted]	
E5.2	Galvanised (Bosal) conduit installed in roof spaces or surface mounted including all accessories and fixings				
	(a) 20mm	m	450	[redacted]	
	CARRIED FORWARD TO THE NEXT PAGE				[redacted]

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SCHEDULE: 6 BUILDING WORKS (ALL 4 STATIONS)

SECTION: 6E ELECTRICAL INSTALLATION

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	BROUGHT FORWARD FROM THE PREVIOUS PAGE				[redacted]
E6	OUTLET BOXES				
E6.1	PVC draw and outlet boxes (including cover plates) cast into concrete, chased in walls, in ceiling space or surface mounted including all accessories and fixings				
	(a) 100mm x 100mm x 50mm deep	No	67	[redacted]	
	(b) 100mm x 50mm x 50mm deep	No	67	[redacted]	
	(c) 60mm Round box	No	421	[redacted]	
TOTAL FOR SECTION 6E CARRIED FORWARD TO SUMMARY					[redacted]

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SCHEDULE: 6 BUILDING WORKS (ALL 4 STATIONS)

SECTION: 6F FIRE SERVICES

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
F1.1	MANHOLE AND VALVE				
	(a) Manhole	No	4	[redacted]	
	(b) Water metre	No	4	[redacted]	
	(c) Shut-off valve	No	8	[redacted]	
	(d) Non-return valve	No	4	[redacted]	
F2	PIPING BELOW GROUND				
	All equipment as per SABS approved standards				
F2.1	All costs for connecting, delivery, fittings, connections, bends, junctions,trenching and backfilling less than 1m deep to be included.				
	(a) HDPE class 12, 40mm	m	45	[redacted]	
	(b) HDPE class 12, 32mm	m	500	[redacted]	
TOTAL FOR SECTION 6F CARRIED FORWARD TO SUMMARY					[redacted]

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SCHEDULE: 6 BUILDING WORKS (ALL 4 STATIONS)

SECTION: 6G MECHANICAL SERVICES

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
G1	DRAINAGE SYSTEM				
	Work shall comply with the relevant conditions and installation specifications of SANS 10252-2, manufacturers specifications and local By-laws and Regulations. Contractor shall issue a certificate of compliance in terms of local By-laws upon completion. All works, equipment and practices shall be SABS compliant and equipment stamped as such.				
G1.1	Supply and install Geberit HDPE, or equal alternative pipe:				
	(a) 63mm pipe				
	(i) Supply	m	20	[redacted]	
	(ii) Install	m	20	[redacted]	
	(b) 75mm pipe				
	(i) Supply	m	40	[redacted]	
	(ii) Install	m	40	[redacted]	
	(c) 110mm pipe				
	(i) Supply	m	100	[redacted]	
	(ii) Install	m	100	[redacted]	
	(d) 160mm pipe				
	(i) Supply	m	830	[redacted]	
	(ii) Install	m	830	[redacted]	
	(e) 63mm 45° branch junction				
	(i) Supply	No	4	[redacted]	
	(ii) Install	No	4	[redacted]	
	(f) 75mm 45° branch junction				
	(i) Supply	No	8	[redacted]	
	(ii) Install	No	8	[redacted]	
	(g) 110mm 45° branch junction				
	(i) Supply	No	16	[redacted]	
	(ii) Install	No	16	[redacted]	
	CARRIED FORWARD TO THE NEXT PAGE				[redacted]

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SCHEDULE: 6 BUILDING WORKS (ALL 4 STATIONS)

SECTION: 6G MECHANICAL SERVICES

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	BROUGHT FORWARD FROM THE PREVIOUS PAGE				[redacted]
	(h) 63mm 90° bend				
	(i) Supply	No	16	[redacted]	
	(ii) Install	No	16	[redacted]	
	(i) 75mm 90° bend				
	(i) Supply	No	16	[redacted]	
	(ii) Install	No	16	[redacted]	
	(j) 110mm 90° bend				
	(i) Supply	No	28	[redacted]	
	(ii) Install	No	28	[redacted]	
	(k) 63mm 45° bend				
	(i) Supply	No	12	[redacted]	
	(ii) Install	No	12	[redacted]	
	(l) 75mm 45° bend				
	(i) Supply	No	16	[redacted]	
	(ii) Install	No	16	[redacted]	
	(m) 110mm 45° bend				
	(i) Supply	No	20	[redacted]	
	(ii) Install	No	20	[redacted]	
	(n) 110 x 63mm 45° reducing branch junction				
	(i) Supply	No	8	[redacted]	
	(ii) Install	No	8	[redacted]	
	(o) 110 x 75mm 45° reducing branch junction				
	(i) Supply	No	8	[redacted]	
	(ii) Install	No	8	[redacted]	
	(p) 160 x 75mm 45° reducing branch junction				
	(i) Supply	No	4	[redacted]	
	(ii) Install	No	4	[redacted]	
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SCHEDULE: 6 BUILDING WORKS (ALL 4 STATIONS)

SECTION: 6G MECHANICAL SERVICES

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	BROUGHT FORWARD FROM THE PREVIOUS PAGE				[redacted]
	(q) 160 x 110mm 45° reducing branch junction				
	(i) Supply	No	8	[redacted]	
	(ii) Install	No	8	[redacted]	
	(r) 76 x 63mm reducer for floor drain				
	(i) Supply	No	2	[redacted]	
	(ii) Install	No	2	[redacted]	
	(s) 63mm rodding eye and cap				
	(i) Supply	No	8	[redacted]	
	(ii) Install	No	8	[redacted]	
	(t) 75mm rodding eye and cap				
	(i) Supply	No	8	[redacted]	
	(ii) Install	No	8	[redacted]	
	(u) 110mm rodding eye and cap				
	(i) Supply	No	18	[redacted]	
	(ii) Install	No	18	[redacted]	
	(v) 110mm oval rodding eye and cap				
	(i) Supply	No	6	[redacted]	
	(ii) Install	No	6	[redacted]	
	(w) 63mm screw on stopend				
	(i) Supply	No	8	[redacted]	
	(ii) Install	No	8	[redacted]	
	(x) 75mm screw on stopend				
	(i) Supply	No	8	[redacted]	
	(ii) Install	No	8	[redacted]	
	(y) 110mm screw on stopend				
	(i) Supply	No	28	[redacted]	
	(ii) Install	No	28	[redacted]	
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SECTION: 6G MECHANICAL SERVICES

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	BROUGHT FORWARD FROM THE PREVIOUS PAGE				[redacted]
	(z) 63mm one way vent valve				
	(i) Supply	No	8	[redacted]	
	(ii) Install	No	8	[redacted]	
	(aa) 75mm one way vent valve				
	(i) Supply	No	6	[redacted]	
	(ii) Install	No	6	[redacted]	
	(bb) 110mm one way vent valve				
	(i) Supply	No	22	[redacted]	
	(ii) Install	No	22	[redacted]	
G1.2	(a) Supply & install manholes additional to the manholes provided by the civil engineer located in the station spaced maximum 90m apart. Manholes to be adhere to civil specification and requirements and to be connected to main reticulation.				
	(i) Supply	No	8	[redacted]	
	(ii) Install	No	8	[redacted]	
G1.3	(a) Supply and install stainless steel drain gully with water trap and connect to sewer line				
	(i) Supply	No	4	[redacted]	
	(ii) Install	No	4	[redacted]	
G1.4	(a) Supply and install Herbish HB125 Stainless Steel floor drain to architects specification				
	(i) Supply	No	3	[redacted]	
	(ii) Install	No	3	[redacted]	
G1.5	Test drainage installation (L/Sum per station)	lump sum	4	[redacted]	
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SCHEDULE: 6 BUILDING WORKS (ALL 4 STATIONS)

SECTION: 6G MECHANICAL SERVICES

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	BROUGHT FORWARD FROM THE PREVIOUS PAGE				[redacted]
G2	DOMESTIC WATER PIPING				
	Work shall comply with the relevant conditions and installation specifications of SANS 10252-1, manufacturers specifications and local By-laws and Regulations. Sub-Contractor shall issue a certificate of compliance in terms of local By-laws upon completion. All works, equipment and practices shall be SABS compliant and equipment stamped as such. Rates shall include allowance for fixings and bracketing of piping reticulation to vertical walls and soffits.				
G2.1	Supply and install Geberit Mepla, or equal alternative, pipe (outside diameter):				
	(a) 32mm pipes				
	(i) Supply	m	40	[redacted]	
	(ii) Install	m	40	[redacted]	
G2.2	Supply and install Geberit Mepla, or equal altenative, fittings:				
	(a) 32mm 90° bend				
	(i) Supply	No	40	[redacted]	
	(ii) Install	No	40	[redacted]	
	(b) 50 x 32 x 50mm reducing tee				
	(i) Supply	No	8	[redacted]	
	(ii) Install	No	8	[redacted]	
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SCHEDULE: 6 BUILDING WORKS (ALL 4 STATIONS)

SECTION: 6G MECHANICAL SERVICES

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	BROUGHT FORWARD FROM THE PREVIOUS PAGE				[redacted]
G2.3	Supply and install valves including threaded capillary fittings for connection to sanitary fixtures, etc. to mepla, or equal alternative, pipe:				
	(a) 32mm stop valve				
	(i) Supply	No	16	[redacted]	
	(ii) Install	No	16	[redacted]	
	(b) 32mm stop end				
	(i) Supply	No	8	[redacted]	
	(ii) Install	No	8	[redacted]	
	(c) Supply and install 32mm valve chamber with water meter, backflow preventor, pressure reducing valve and strainer c/w shut off valves as per civil engineer's specification				
	(i) Supply	No	4	[redacted]	
	(ii) Install	No	4	[redacted]	
	(d) 63mm Class 12 uPVC (1200kPa minimum working pressure) pipe to be used for fire and municipal (potable) water supply. Council pressure and flow to be tested prior to installation.				
	(i) Supply	m	830	[redacted]	
	(ii) Install	m	830	[redacted]	
	(e) 50mm Class 12 uPVC (1200kPa minimum working pressure) pipe to be used for fire and municipal (potable) water supply. Council pressure and flow to be tested prior to installation.				
	(i) Supply	m	80	[redacted]	
	(ii) Install	m	80	[redacted]	
G2.4	Connect new water supply line to exisiting water line (L/Sum per station)	lump sum	4	[redacted]	
G2.5	Testing of complete installed domestic water system (L/Sum per station)	lump sum	4	[redacted]	
G3	GENERAL ITEMS				
G3.1	Complete set of operation manuals and as-built drawings per building (L/Sum per station)	lump sum	4	[redacted]	
	TOTAL FOR SECTION 6G CARRIED FORWARD TO SUMMARY				[redacted]

CONTRACT: 412Q/2022/23
CONTRACT TITLE: CONSTRUCTION OF THE PHASE 2A IRT INFRASTRUCTURE: WORK PACKAGE E2 ALONG GOVAN MBEKI ROAD (M9) FROM WEST OF NY72 ROAD TO EAST OF KLIPFONTEIN ROAD

SCHEDULE: 7 LANDSCAPING
SECTION: 7A PRELIMINARIES, GENERAL & DAY WORKS

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	PRELIMINARIES, GENERAL & DAY WORKS				
B58.13	Allow for co-ordinating and receiving all plant material for this contract, including quality control, holding and maintenance	lump sum	1	[redacted]	
58/B1800	Dayworks				
B18.01	Labour charges				
	(a) Unskilled labour	h	20	[redacted]	
	(b) Semi-skilled labour	h	20	[redacted]	
	(e) Foreman	h	20	[redacted]	
B18.02	Materials				
	(a) Procurement of materials	prov sum	1	[redacted]	
	(b) Contractor's handling costs, profit and all other charges in respect of sub-item B18.02(a)	%	[redacted]		
B18.04	Other plant / equipment not specified above				
	(a) Procurement of plant / equipment - Actual cost of plant / equipment not already specified in the tender by the Employer	prov sum	1	[redacted]	
	(b) Contractor's handling costs, profit and all other charges in respect of sub item B18.04(a)	%	[redacted]		
TOTAL FOR SECTION 7A CARRIED FORWARD TO SUMMARY					[redacted]

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SCHEDULE: 7 LANDSCAPING

SECTION: 7B EARTHWORKS + INSTALLATIONS FOR LANDSCAPE WORKS

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	EARTHWORKS + INSTALLATIONS FOR LANDSCAPE WORKS				
58.01	Trimming				
	(a) Machine trimming	m²	1630	[redacted]	
	(b) Hand trimming	m²	3260	[redacted]	
B58.14	Dumping of material				
	Cleaning landscape areas, to be free of rubble, concrete and all foreign materials. Materials to be dumped at a registered dump site.				
	(a) Dumping of organic materials at registered dump site.	m³	10	[redacted]	
	(b) Dumping rubble / stone (inorganic material) at registered dump site	m³	162	[redacted]	
	Excavate in-situ soil as directed below:				
B58.15	Excavation into in-situ soil				
	(a) Excavate 250L tree holes for planting in soft landscape areas - The volume is calculated from the quantity of trees by the specified size of the hole (1.5x 1.5 x 1.5m)	m³	972	[redacted]	
B58.16	Distribute and shape unwanted excavated material from planting areas (40%) to site as directed by the Landscape Architect	m³	392	[redacted]	
B58.17	Shaping				
	(a) Allow for rough shaping of all lawn and planting areas before planting medium is installed to the satisfaction of the landscape architect.	m²	6515	[redacted]	
	(b) Allow for fine shaping of all lawn and planting areas once planting medium is installed to the satisfaction of the landscape architect.	m²	32600	[redacted]	
B58.21	Eradiction of invasive aliens				
	(a) Minor mechanical or handpulling of alien bushes between 1-2m high	lump sum	1	[redacted]	
	(b) Spray of invasive grasses with use of approved herbacide	lump sum	1	[redacted]	
	(c) Cutting down, and chippping of large trees	lump sum	1	[redacted]	
TOTAL FOR SECTION 7B CARRIED FORWARD TO SUMMARY					[redacted]

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SCHEDULE: 7 LANDSCAPING

SECTION: 7C PLANTING MEDIUM

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	PLANTING MEDIUM				
	Trees: Planting medium mix to consist of 60% in-situ soil and 40% approved compost				
	General Planting Areas: 100 mm approved compost to all planting areas				
	Supply imported compost according to specifications: (sample for landscape architects approval)				
B58.03	Preparing the areas for grassing				
	(g) Compost				
	(i) Compost to tree holes (40% of volume)	m³	392	[redacted]	
	(ii) Compost to planting areas(100 mm per m²)	m³	3260	[redacted]	
	(e) Supply organic fertiliser to specifications:				
	(i) All tree planting areas: 1kg / m³	kg	290	[redacted]	
	(ii) All planting areas: 0.250kg / m²	kg	8140	[redacted]	
	(e) Supply of Bonemeal to specification:				
	(i) All tree planting areas: 1kg / m³	kg	290	[redacted]	
	(ii) All planting areas: 0.12kg/ plant	kg	3910	[redacted]	
	Tree preparation				
B58.15	Excavation into in-situ soil				
	(a) Mix and place medium in tree pits,60%: 40%: top soil and compost including organic fertiliser as specified.	m³	975	[redacted]	
	Shrub/ ground cover planting areas preparation				
	(a) Spread and mix compost & additives to all planting area as per specification and measurement	m³	3260	[redacted]	
	(d) Mix additives in with planting medium to a depth of 300mm	m³	32585	[redacted]	
	Hydroseeding areas preparation				
B58.03	Preparating the areas for grassing				
	(e) Providing and applying chemical fertilisers and/or soil-improvement material:				
	(i) 5mm compost at 700kg/ha	kg	830	[redacted]	
	(ii) Microbial inoculant: Bio-Tricho (1L/ha)	litre	2	[redacted]	
	(iii) Microbial inoculant Environoc 401 (2L/ha)	litre	2	[redacted]	
	CARRIED FORWARD TO THE NEXT PAGE				[redacted]

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CONTRACT TITLE: CONSTRUCTION OF THE PHASE 2A IRT INFRASTRUCTURE: WORK PACKAGE E2 ALONG GOVAN MBEKI ROAD (M9) FROM WEST OF NY72 ROAD TO EAST OF KLIPFONTEIN ROAD

SCHEDULE: 7 LANDSCAPING

SECTION: 7C PLANTING MEDIUM

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	BROUGHT FORWARD FROM THE PREVIOUS PAGE				[redacted]
	(iv) Microbial inoculant Environoc 501 (2L/ha)	litre	2	[redacted]	
	(v) Hydropam soil binder (at 6kg/ha)	kg	6	[redacted]	
	(vi) Dustex soil binder (at 600kg/ha)	kg	6	[redacted]	
	(vii) Smoke treatment as per specialist requirements - soak seeds in dilution for 30min before seeding (1ltr/kg seed)	litre	388	[redacted]	
	(viii) Water (10000ltr/ha)	K.litre	12	[redacted]	
	(ix) Mix all of the above with water and seed mixes and apply to areas as directed by the landscape architect	K.litre	12	[redacted]	
	Water Retainers For Soil Mediums				
B58.03	Preparating the areas for grassing				
	(h) Water retainer				
	(i) Supply "Hydrogel B/ Aquasorb/ Stockosorb" or approved equal product	kg	1004	[redacted]	
	(ii) Apply "Hydrogel B/ Aquasorb/ Stockosorb or equivalent approved product' mixing: To be applied in the hydrated form and placed in each plant and tree hole. Application rate to be in accordance with manufacturers specifications.	K.litre	204	[redacted]	
B58.12	Provide soil test				
	(a) Provide soil tests ("Go bio farming":Nico Uys, Cell: 083 565 7337) before starting of planting works to Landscape Architect's requirement	No	6	[redacted]	
58.10	Extra work for landscaping: Provide a provisional sum for selected plant material for in-fill as directed by the Landscape Architect	Prov Sum	1	[redacted]	
TOTAL FOR SECTION 7C CARRIED FORWARD TO SUMMARY					[redacted]

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SCHEDULE: 7 LANDSCAPING

SECTION: 7D PLANTING WORKS

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	PLANTING WORKS				
	PLANT INSTALLATION				
58.09	Trees and shrubs				
	Excavate into planting fill, dust roots with bone meal, place plant, backfill, compact and level surplus soil				
	(b) Planting and establishing				
	(ii) Cuttings	No	30552	[redacted]	
	(ii) Ecotray/plugs	No	32000	[redacted]	
	(ii) 4kg container size	No	28000	[redacted]	
	Tree planting preparation				
	Plant within mixed medium in tree pits, 60%:40% in-situ top soil : compost including organic fertiliser as specified.				
	(i) 250litre tree	No	289	[redacted]	
	(c) Plant support				
	Plant within mixed medium in tree pits, 60%:40% in-situ top soil : compost including organic fertiliser as specified.	No	271	[redacted]	
58.10	Extra work for landscaping: provisional sum for fertiliser as required by the results of the soil analyses as directed by the Landscape Architect	Prov Sum	1	[redacted]	
	TOTAL FOR SECTION 7D CARRIED FORWARD TO SUMMARY				[redacted]

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SCHEDULE: 7 LANDSCAPING

SECTION: 7E PLANTING LIST

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	PLANTING LIST				
	Note : rates tendered for plants to be inclusive of supply and delivery: transport, holding, handling and mark-up.				
	Note : 200plug tray & Eco trays quantities are numbers of plantlets				
58.04	Grassing (Supply & deliver)				
	(c) Hydroseeding				
	(1) Melinis nerviglumis 10kg/ha	kg	4	[redacted]	
	(2) Aristida junciformis 10kg/ha	kg	4		
	(3) Themeda triandra 10kg/ha	kg	4		
	(4) Cynodon dactylon (Hydroseed) 20kg/ha	kg	40		
	(5) Eragrostis curvula (Hydroseed) 10kg/ha	kg	20		
	(6) Erharta calycina (Hydroseed) 5kg/ha	kg	2		
	(7) Merxmuellera stricta (Hydroseed) 10kg/ha	kg	2		
	(8) Hyparrhenia hirta (Hydroseed) 5kg/ha	kg	2		
58.09	Trees and shrubs				
	(a) Shrubs: Supply & Deliver				
	(1) Athanasia dentata	4kg	2000		
	(2) Chrsyanthemoides monilifera	4kg	2000		
	(3) Eriocephalus africanus	4kg	2000		
	(4) Cliffortia obcordata	4kg	2000		
	(5) Felicia filifolia	4kg	2000		
	(6) Ficinia lateralis	4kg	2000		
	(7) Helichrysum patulum	4kg	2000		
	(8) Metalasia muricata	4kg	2000		
	(9) Muraltia (Nylandtia) spinosa	4kg	2000		
	(10) Pelargonium betulinum	4kg	2000		
	(11) Pelargonium capitatum	4kg	2000		
	(12) Tarconanthus camphoratus	4kg	2000		
	(13) Salvia Africanalutea	4kg	2000		
	(14) Watsonia meriana	4kg	2000		
	CARRIED FORWARD TO THE NEXT PAGE				[redacted]

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SCHEDULE: 7 LANDSCAPING

SECTION: 7E PLANTING LIST

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	BROUGHT FORWARD FROM THE PREVIOUS PAGE				[redacted]
	(b) Seed mix: Supply & Deliver				
	(1) Felicia filifolia 15kg/ha	kg	38	[redacted]	
	(2) Ficinia lateralis 15kg/ha	kg	38		
	(3) Salvia africana-lutea 15kg/ha	kg	38		
	(4) Helichrysum silver lace 15kg/ha	kg	38		
	(5) Helichrysum cymosum subsp. cymosum 15kg/ha	kg	38		
	(6) Lampranthus blandus 15kg/ha	kg	38		
	(7) Arctotis stoechadifolia 15kg/ha	kg	38		
	(8) Arctotis laevis 15kg/ha	kg	38		
	(c) Groundcovers: Supply & Deliver				
	(1) Carpobrotus edulis (plugs)	No	30550		
	(2) Arctotis stoechadifolia (plugs)	No	16000		
	(3) Helichrysum cymosum (plugs)	No	16000		
	(d) Trees: Supply & Deliver				
	(1) Syzygium cordatum	250litre	94		
	(2) Washingtonia robusta	250litre	194		
	TOTAL FOR SECTION 7E CARRIED FORWARD TO SUMMARY				[redacted]

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SCHEDULE: 7 LANDSCAPING

SECTION: 7F HARD LANDSCAPING

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	HARD LANDSCAPING				
B58.18	Hard landscape elements				
	(a) Paving: Intersections & Medians				
	Supply & install				
	See .dwg no. 483-OvP-IRT-400 Rev 0 & Details Paving 483-OvP-IRT-403 Rev 0 Details Paving Median Feature				
	(1) 100mm thick G5 sub-base compacted to 96% MDD	m³	2650	[redacted]	
	(2) 120mm 35Mpa in-situ concrete with 20mm washed exposed brown stone aggregate finish	m³	2520	[redacted]	
	(b) Seat walls				
	See .dwg no. 483-OvP-IRT-401 Rev 0 Details Bollards & Seat Units				
	Precast concrete by specialist supplier				
	1200(l) x 500(b) x 400(h)				
	35Mpa polished concrete to approved sample				
	Supply & install	No	64	[redacted]	
	(c) Bollards				
	Precast concrete by specialist supplier				
	See .dwg no. 483-OvP-IRT-401 Rev 0 Details Bollards & Seat Units				
	415(l) x 415(b) x 820(h) with 25mm corner chamfers set in concrete base				
	35Mpa 6mm Hornsveld washed exposed aggregate concrete				
	Supply & install	No	23	[redacted]	
	(d) Tree Guards				
	Posts: 4 No. 100(l) x 100(b) x 2,5(t)mm SHS, Horizontal Rails:4 No. 76 x 38 x 2,5(t) SHS & Vertical Bars:28 No. 20 x 20 x 2,5(t) SHS				
	All fixings welded & complete unit hot dip galvanised (unpainted), 4 No. 50 x 40 x 8mm fixings to be provided for fixing of frame to concrete edging with M16 exp. bolts.				
	See .dwg no. 483-OvP-IRT-403 Rev 0 Details Paving Median Feature				
	Supply & install	m²	19	[redacted]	
	CARRIED FORWARD TO THE NEXT PAGE				[redacted]

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SCHEDULE: 7 LANDSCAPING

SECTION: 7F HARD LANDSCAPING

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	BROUGHT FORWARD FROM THE PREVIOUS PAGE				[redacted]
	(e) Landscape Features - Hardscape Installation at Medians				
	See .dwg no. 483-OvP-IRT-403 Rev 0 Details Paving Median Feature				
	Selected sandstone rocks placed and 60% buried in concrete (concrete paid under B58.18a(2)). approx. size 100mm - 400mm Ø or biggest that can be man-handled without machine (max	m²	500	[redacted]	
B58.19	Concrete barrier/seat				
	(a) Concrete barrier seat (Class W40/20 concrete), complete, including excavation, non-shrink grout, blinding, concrete, formwork and surface finishes and reinforcement as per drawing number 8106.	No	240	[redacted]	
	TOTAL FOR SECTION 7F CARRIED FORWARD TO SUMMARY				[redacted]

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SCHEDULE: 7 LANDSCAPING

SECTION: 7G MAINTENANCE

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
	MAINTENANCE				
B58.20	Maitenance				
	(a) Pre-contract completion maintenance				
	Allow for all aspects of maintaining the plants and irrigation in their final positions until the Certificate of Completion is issued.	m²	32585	[redacted]	
58.10	Extra work for landscaping	Prov Sum	1	[redacted]	
TOTAL FOR SECTION 7G CARRIED FORWARD TO SUMMARY					[redacted]

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SCHEDULE: 8 ENVIRONMENTAL MANAGEMENT & HEALTH AND SAFETY
SECTION: 8E ENVIRONMENTAL MANAGEMENT

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
E8.2	Contractor's obligations in respect of Environmental Management				
	(a) Fixed obligations in respect of Environmental Management Plan	lump sum	1	[redacted]	
	(b) Time-related obligations in respect of Environmental Management Plan	week	150	[redacted]	
	(c) Provision of environmental emergency measures	PC Sum	1	[redacted]	
	(d) Contractor's charge to allow for handling costs and profit in respect of subitem C10.01(c)	%	[redacted]		
TOTAL FOR SECTION 8E CARRIED FORWARD TO SUMMARY					[redacted]

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SCHEDULE: 8 ENVIRONMENTAL MANAGEMENT & HEALTH AND SAFETY

SECTION: 8H HEALTH & SAFETY

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE R	AMOUNT R
H10.1	Contractor's obligations in respect of Health & Safety				
	(a) Fixed obligations in respect of Health & Safety	lump sum	1	[redacted]	
	(b) Time-related obligations in respect of Health & Safety	week	150	[redacted]	
TOTAL FOR SECTION 8H CARRIED FORWARD TO SUMMARY					[redacted]

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CONTRACT TITLE: CONSTRUCTION OF THE PHASE 2A IRT INFRASTRUCTURE: WORK PACKAGE E2 ALONG GOVAN MBEKI ROAD (M9) FROM WEST OF NY72 ROAD TO EAST OF KLIPFONTEIN ROAD

SCHEDULE	DESCRIPTION	AMOUNT R
SCHEDULE 1	GENERAL	
1200	GENERAL REQUIREMENTS AND PROVISIONS	[redacted]
1300	CONTRACTOR'S ESTABLISHMENT ON SITE AND GENERAL OBLIGATIONS	[redacted]
1400	HOUSING, OFFICES AND LABORATORIES FOR THE ENGINEER'S SITE PERSONNEL	[redacted]
1500	ACCOMODATION OF TRAFFIC	[redacted]
1600	OVERHAUL	[redacted]
1700	CLEARING AND GRUBBING	[redacted]
B1800	DAYWORKS	[redacted]
5900	FINISHING THE ROAD AND ROAD RESERVE AND TREATING OLD ROADS	[redacted]
SCHEDULE 1	GENERAL TOTAL	[redacted]
SCHEDULE 2	ROADWORKS	
2100	DRAINS	[redacted]
2200	PREFABRICATED CULVERTS	[redacted]
2300	CONCRETE KERBING, CONCRETE CHANNELLING, CHUTES AND DOWNPIPES, AND CONCRETE LININGS FOR OPEN DRAINS	[redacted]
3300	MASS EARTHWORKS	[redacted]
3400	PAVEMENT LAYERS OF GRAVEL MATERIAL	[redacted]
3500	STABILIZATION	[redacted]
3800	BREAKING UP EXISTING PAVEMENT LAYERS	[redacted]
B3950	WATERBOUND MACADAM BASE	[redacted]
4100	PRIME COAT	[redacted]
4200	ASPHALT BASE AND SURFACING	[redacted]
B5000	MOLE BARRIERS	[redacted]
5100	PITCHING, STONEWORK AND PROTECTION AGAINST EROSION	[redacted]
5400	GUARDRAILS	[redacted]
5500	FENCING	[redacted]
5600	ROAD SIGNS	[redacted]
5700	ROAD MARKINGS	[redacted]
7100	CONCRETE PAVEMENTS	[redacted]
7400	PATENTED EARTH RETAINING SYSTEMS	[redacted]
8100	TESTING MATERIALS AND WORKMANSHIP	[redacted]
C4000	TRAFFIC SIGNALS	[redacted]
SCHEDULE 2	ROADWORKS TOTAL	[redacted]
SCHEDULE 3	STRUCTURES	
3A	CANTILEVER SIGNS	[redacted]

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SCHEDULE	DESCRIPTION	AMOUNT R
3B	OVERHEAD SIGNAGE	[redacted]
3C	CCTV MAST FOUNDATION	[redacted]
SCHEDULE 3	**STRUCTURES TOTAL**	[redacted]
SCHEDULE 4	**SERVICES**	
B2500	MEDIUM PRESSURE PIPELINES	[redacted]
B2600	CABLE DUCTS	[redacted]
B2700	SEWER	[redacted]
SCHEDULE 4	**SERVICES TOTAL**	[redacted]
SCHEDULE 5	**ELECTRICAL & ELECTRONIC**	
5A	ELECTRICAL	[redacted]
5B	ELECTRONIC	[redacted]
SCHEDULE 5	**ELECTRICAL & ELECTRONIC TOTAL**	[redacted]
SCHEDULE 6	**BUILDING WORKS (ALL 4 STATIONS)**	
6A	EARTHWORKS	[redacted]
6B	CONCRETE, FORMWORK & REINFORCEMENT	[redacted]
6C	MASONRY	[redacted]
6D	WATERPROOFING	[redacted]
6E	ELECTRICAL INSTALLATION	[redacted]
6F	FIRE SERVICES	[redacted]
6G	MECHANICAL SERVICES	[redacted]
SCHEDULE 6	**BUILDING WORKS (ALL 4 STATIONS) TOTAL**	[redacted]
SCHEDULE 7	**LANDSCAPING**	
7A	PRELIMINARIES, GENERAL & DAY WORKS	[redacted]
7B	EARTHWORKS + INSTALLATIONS FOR LANDSCAPE WORKS	[redacted]
7C	PLANTING MEDIUM	[redacted]
7D	PLANTING WORKS	[redacted]
7E	PLANTING LIST	[redacted]
7F	HARD LANDSCAPING	[redacted]
7G	MAINTENANCE	[redacted]
SCHEDULE 7	**LANDSCAPING TOTAL**	[redacted]
SCHEDULE 8	**ENVIRONMENTAL MANAGEMENT & HEALTH AND SAFETY**	
8E	ENVIRONMENTAL MANAGEMENT	[redacted]
8H	HEALTH & SAFETY	[redacted]

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SCHEDULE	DESCRIPTION	AMOUNT R
SCHEDULE 8	ENVIRONMENTAL MANAGEMENT & HEALTH AND SAFETY TOTAL	[redacted]
	NET TOTAL OF TENDER	[redacted]
	ADD CONTINGENCIES 10.00% OF NET TOTAL	[redacted]
	TENDER AMOUNT	[redacted]
	CONTRACT PRICE ADJUSTMENT PROVISION	[redacted]
	ALLOWANCE FOR VAT AT 15.00%	[redacted]
	TOTAL TENDER SUM	[redacted]

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SUMMARY OF BILL OF QUANTITIES

SCHEDULE 1	**GENERAL**	
1200	GENERAL REQUIREMENTS AND PROVISIONS	[redacted]
1300	CONTRACTOR'S ESTABLISHMENT ON SITE AND GENERAL OBLIGATIONS	[redacted]
1400	HOUSING, OFFICES AND LABORATORIES FOR THE ENGINEER'S SITE PERSONNEL	[redacted]
1500	ACCOMODATION OF TRAFFIC	[redacted]
1600	OVERHAUL	[redacted]
1700	CLEARING AND GRUBBING	[redacted]
B1800	DAYWORKS	[redacted]
5900	FINISHING THE ROAD AND ROAD RESERVE AND TREATING OLD ROADS	[redacted]
SCHEDULE 2	**ROADWORKS**	
2100	DRAINS	[redacted]
2200	PREFABRICATED CULVERTS	[redacted]
2300	CONCRETE KERBING, CONCRETE CHANNELLING, CHUTES AND DOWNPIPES, AND CONCRETE LININGS FOR OPEN DRAINS	[redacted]
3300	MASS EARTHWORKS	[redacted]
3400	PAVEMENT LAYERS OF GRAVEL MATERIAL	[redacted]
3500	STABILIZATION	[redacted]
3800	BREAKING UP EXISTING PAVEMENT LAYERS	[redacted]
3950	WATERBOUND MACADAM BASE	[redacted]
4100	PRIME COAT	[redacted]
4200	ASPHALT BASE AND SURFACING	[redacted]
B5000	MOLE BARRIERS	[redacted]
5100	PITCHING, STONEWORK AND PROTECTION AGAINST EROSION	[redacted]
5400	GUARDRAILS	[redacted]
5500	FENCING	[redacted]
5600	ROAD SIGNS	[redacted]
5700	ROAD MARKINGS	[redacted]
7100	CONCRETE PAVEMENTS	[redacted]
7400	PATENTED EARTH RETAINING SYSTEMS	[redacted]
8100	TESTING MATERIALS AND WORKMANSHIP	[redacted]
C4000	TRAFFIC SIGNALS	[redacted]
SCHEDULE 3	**STRUCTURES**	
3A	CANTILEVER SIGNS	[redacted]
3B	OVERHEAD SIGNS	[redacted]
3C	CCTV MAST FOUNDATION	[redacted]
SCHEDULE 4	**SERVICES**	
B2500	MEDIUM PRESSURE PIPELINES	[redacted]
B2600	CABLE DUCTS	[redacted]

B2700	SEWER	[redacted]
SCHEDULE 5	**ELECTRICAL & ELECTRONIC**	
5A	ELECTRICAL	[redacted]
5B	ELECTRONIC	[redacted]
SCHEDULE 6	**BUILDING WORKS (ALL 4 STATIONS)**	
6A	EARTHWORKS	[redacted]
6B	CONCRETE, FORMWORK & REINFORCEMENT	[redacted]
6C	MASONRY	[redacted]
6D	WATERPROOFING	[redacted]
6E	ELECTRICAL INSTALLATION	[redacted]
6F	FIRE SERVICES	[redacted]
6G	MECHANICAL SERVICES	[redacted]
SCHEDULE 7	**LANDSCAPING**	
7A	PRELIMINARIES, GENERAL & DAY WORKS	[redacted]
7B	EARTHWORKS + INSTALLATIONS FOR LANDSCAPE WORKS	[redacted]
7C	PLANTING MEDIUM	[redacted]
7D	PLANTING WORKS	[redacted]
7E	PLANTING LIST	[redacted]
7F	HARD LANDSCAPING	[redacted]
7G	MAINTENANCE	[redacted]
SCHEDULE 8	**ENVIRONMENTAL MANAGEMENT & HEALTH AND SAFETY**	
8E	ENVIRONMENTAL MANAGEMENT	[redacted]
8H	HEALTH & SAFETY	[redacted]
SUB-TOTAL		[redacted]
CONTINGENCIES Allow the sum of 10% (ten percent) of the above Sub-total for Contingencies to be spent as the Employer's Agent may direct and to be deducted in whole or in part if not required.		[redacted]
TOTAL INCLUDING CONTINGENCIES		[redacted]
VALUE ADDED TAX ADD: VAT at the rate of 15%		[redacted]
TOTAL INCLUDING CONTINGENCIES AND VAT		[redacted]
ALL INCLUSIVE CONTRACT SUM CARRIED FORWARD to Part C1.1 Form of Offer and Acceptance		[redacted]

PART C3: SCOPE OF WORK

C3.1 Description of the Works

CONTENTS

3.1.1 EMPLOYER'S OBJECTIVES
3.1.2 OVERVIEW OF THE WORKS
3.1.3 EXTENT OF THE WORKS
3.1.4 LOCATION OF THE WORKS
3.1.5 TEMPORARY WORKS

3.1.1 EMPLOYER'S OBJECTIVES

The City of Cape Town has developed a City wide Integrated Public Transport Network (IPTN) that sets the scale and extent for the Integrated Rapid Transit (IRT) public transport for Phase 2A. To meet the objectives put forward in the ITPN with regard to establishing an IRT system, the City of Cape Town has embarked on Phase 2A of Cape Town's MyCiTi Integrated Rapid Transit (IRT) System, hereinafter simply be referred to as Phase 2A which currently carries in the order of 50% of all road-based public transport trips within the metropolitan area.

Phase 2A will link the south-eastern suburbs of the Cape Town metropolitan area (known as the Metro- South East) with nodes along the Southern Suburbs rail line. More specifically, Phase 2A's two principal trunk routes will operate between Mitchells Plain and Claremont; and Khayelitsha and Wynberg.

Phase 2A consists of trunk and feeder services. The primary difference between trunk and feeder services is that trunk services generally travel on dedicated rights of way lanes (median busways) while feeder services generally travel in mixed traffic (kerbside lanes and stops).

Phase 2A feeder services covers numerous routes and includes the areas of Mitchells Plain, Khayelitsha, Philippi and surrounds, Crossroads, Nyanga, Gugulethu, Manenberg, Hanover Park, Athlone, Rylands, Gatesville, Heideveld, Surrey Estate, Lansdowne, Wetton, Ottery, Southfield, Grassy Park, Plumstead, Wynberg, Hout Bay, Constantia, Bishopscourt, Newlands, Kenilworth, Rondebosch, Claremont, Rondebosch East and Kenwyn.

The infrastructure for along the routes primarily encompasses but is not limited to the following:

- Trunk busway infrastructure; including the construction of dedicated busways, general traffic lanes, station sub-structures and associated services where required.
- Non-Motorised Transport; including the construction of dedicated or shared cycleway & pedestrian facilities,
- Intersection upgrades to accommodate the MyCiTi bus service and increase the Level of Service where reasonably possible,
- Feeder infrastructure; including the construction of kerbside bus stops and holding areas.
- Relocation of services.

Construction for the infrastructure works mentioned above have been divided into Work Packages which would define the boundaries of the extents of the works. This project involves the construction of Work Package E02 (Incorporating previous sub packages E02A and E02B) with the following details:

E2 – Govan Mbeki Road (M9) from west of NY72 Road to east of Klipfontein – Length ±4.30 km
The project also comprises of a section of Emms Drives and New Eisleben Rd (M18)
Drawings have been issued in the following sub packages:

- E02A: from west of NY72 Road to west of New Eisleben – Length 2.271km
- E02B: west of New Eisleben to East of Klipfontein – Length 1.978km

The description of the project contained in the Scope of the Works is merely an outline of the Contract Works and shall not limit the work to be carried out by the contractor under this Contract. Details of some of the major items are given in this section and approximate detailed quantities for each category of work to be carried out in accordance with the Contract Documents are included in the Bill of Quantities.

3.1.2 OVERVIEW OF THE WORKS

The works for E2 covers a section of the M9 Govan Mbeki running in an east west orientation and is from a point just to the West of NY72 Road to a point just east of Klipfontein Road as well as a section of Emms Drive and New Eisleben Road. The works involve tieing in with the works by others on work packages E01 (to the west) and E3 (to the east). The roadworks involve the and upgrading the road cross section along the work package to include for a dedicated busway, new stations as well as NMT facilities.

3.1.3 EXTENT OF THE WORKS

Work Package E02 involves the upgrade of the road cross section of the M9 Govan Mbeki to include for a dedicated busway, stations as well as NMT facilities. The works covers a section of the M9 Govan Mbeki running in an east west orientation and is from a point just to the West of NY72 Road to a point just east of Klipfontein Road as well as a section of Emms Drive and New Eisleben Drive.

The works involves the following but is not limited to:

- Tie into work package E01 (by others) on the M9 Govan Mbeki.
- Tie into work package E03 (by others) on the M9 Govan Mbeki.
- Construction of a dedicated concrete busway in both east and west directions with overtaking lanes at the station locations and associated stormwater infrastructure.
- Reconstruction of the general traffic lanes to accommodate the addition of the dedicated bus lanes and stations.
- Construction of the substructure for four (Link, Emms, New Eisleben & Stock) median stations (top structure by others).
- Dealing with existing services including the relocation of any services required.
- New streetlighting installation, including new control kiosks, supply cables, poles, IRT outreach arms & Luminaires.
- New LV supply reticulation from the nearest COCT Distribution Kiosk to various services including Streetlighting Kiosks, IRT Bus Stations, Intersection Traffic Signals & Field CCTV Masts.
- New Installation of ducting/sleeves for electrical & electronic reticulation, Field CCTV equipment Masts & IRT Bus Stations Requirements.
- Relocation of electrical infrastructure as required.
- Construction of steel structures to support road signage that cantilevers over sidewalk or road.
- Construction of CCTV masts on reinforced concrete foundations.

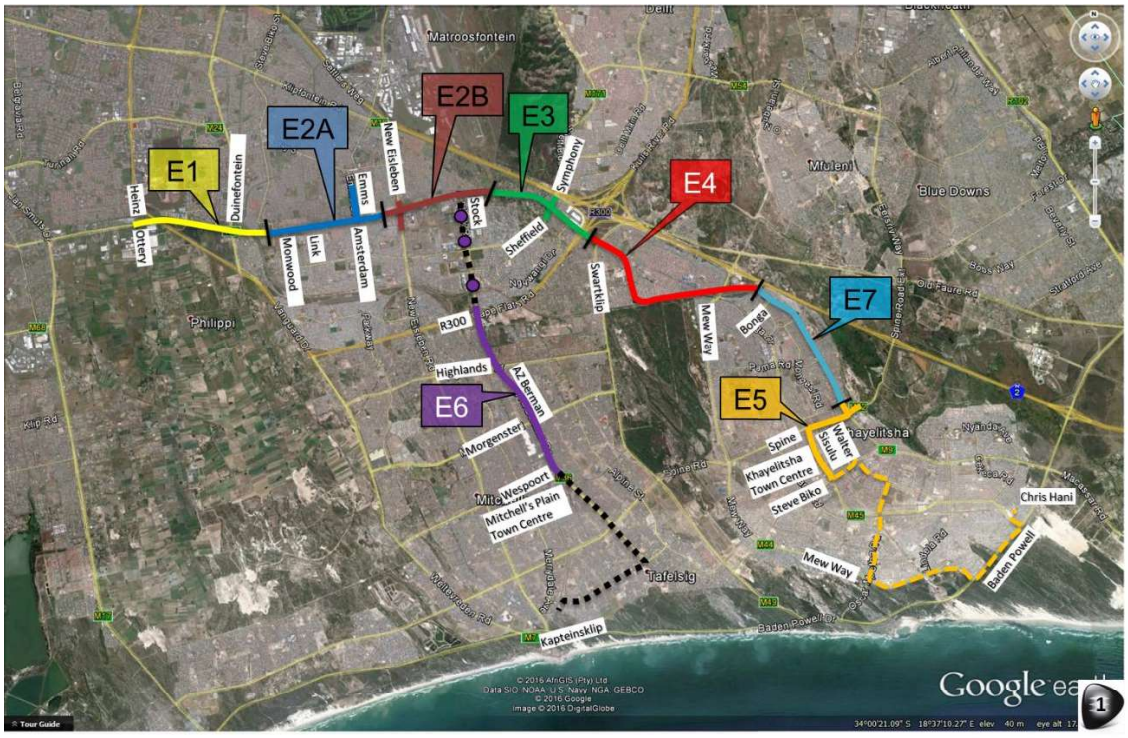
3.1.5 TEMPORARY WORKS

The temporary works involves the following but is not limited to:

- Accommodation of traffic, traffic deviation, temporary traffic markings, protection of the road users and pedestrians;
- Preparation and management of temporary stockpile areas;
- Environmental and erosion protection of the works;
- Shoring, dewatering and protection of excavations, banks and temporary cut & fill slopes;
- Formwork, staging, supports, platforms and protective screening for all structures;
- Temporary traffic signal movement during construction;
- Temporary electrical and electronic connections during construction.

3.1.4 LOCATION OF THE WORKS

The location of Work Pacakage E2 covers a section of the M9 Govan Mbeki running in an east west orientation and is from a point just to the west of NY72 intersection to a point just east of Klipfontein Road.



3.1.6 SAFETY OF THE PUBLIC

Access to all properties and businesses adjacent to the work area must be maintained at all times. The safe accommodation of vehicular and pedestrian traffic along the existing road network and sidewalks must be maintained. The Contractor shall provide and maintain hoarding/barricading, temporary traffic signs and warning lights to adequately provide safety to the general public in the

vicinity of the work area; protect, secure and light the works and the site; and take any other precautions necessary to prevent injury to the public and damage to private property.

The Contractor will not be permitted to hinder pedestrians or block off entire sections of sidewalks to pedestrians. All work shall be programmed and sequenced in such a way so as to ensure minimum disruption to pedestrian flows. In addition, pedestrians shall be separated from work areas with the appropriate temporary fencing/barricades. The minimum sidewalk width to be maintained during construction shall not be less than 1.5 m unless otherwise agreed by the Employer's Agent.

Driveway accesses to private residences and businesses are to be constructed such that a minimum access width of 3 m is maintained at all times.

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 construction equipment and vehicles to ensure safety on site.

Failure to maintain road signs, warning signs or flicker lights, etc, in a satisfactory condition will result in the Employer's Agent stopping the Works until the traffic-control facilities have been replaced or repairedto the Employer's Agent's satisfaction.

The Contractor may not commence construction activities before adequate consultation with the traffic department personnel has taken place and the traffic plan has been approved by the Employer's Agent. The traffic plans and traffic-control measures shall be in accordance with the requirements of the South African Road Traffic Signs Manual.

3.1.7 SITE FACILITIES AVAILABLE

Location of Contractor's Camp Site

No location for a site camp for the Contractor has been provided. The Contractor will be required to make his own arrangements for suitable site camp(s) and provision of services, including obtaining all necessary statutory approvals for its intended use.

The Contractor shall make his own arrangements for water, electricity, foul sewer, refuse removal, or anyother service that he may require. No unauthorised connections to existing services may be made. The cost of water, electricity and any other service shall be included in the rates for the relevant items.

3.1.8 SITE FACILITIES REQUIRED

The Contractor shall provide, operate, maintain, service and upon completion, remove the site facilities required by themselves. Provision must also be made for suitable office facilities for temporary use by the Employer's Agent and for holding site meetings as measured in the Bill of Quantities. Facilities for the Employer's Agent shall be established within two weeks of commencement of work.

3.1.9 CONSTRUCTION CONSTRAINTS

Besides the items mentioned elsewhere in the description of the works, the following constraints shall be considered and taken into account when the construction programme is developed:

(a) Traffic accommodation measures will be critical for the various construction activities required on the roadways and crossing roads. In particular, traffic accommodation measures including temporary lane closures and full carriageway closures shall be planned and approved prior to the following construction activities:

- Rehabilitation/reconstruction measures on the existing carriageways and crossing roads;and
- All other construction activities requiring traffic access.

The construction of road widenings, as well as reconstruction in intersections shall be carried out under full traffic operating conditions with all traffic accommodated on the existing roadways, albeit on a reduced width.

The traffic accommodation requirements and restrictions are fully described in Section 1500 of the project specifications.

(b) The main source of cut on the project is the reconstruction of the roadways. The cut material which is suitable for fill or selected layers or subbase, shall be loaded and transported directly to the point of use wherever possible. The Contractor will need to identify the closest available work area which can be prepared for the receipt and placing of cut materials. Traffic control measuresshall be put in place for egress from and ingress to the work area. The traffic control measures and working restrictions are more fully described in Section 1500 of the project specifications.

(c) The staging or phasing of construction has been planned and indicated on the drawings to accommodate the existing traffic flows.

(d) Restricted working hours shall be applicable to all works on the contract for any construction activities on the carriageways, or within the intersections, which negatively affect the traffic capacity during the peak periods in order to prevent excessive disruption during the morning and evening peak periods.Further details of these are provided under B1502(m).

(e) Special non-working days and holidays are stipulated in the Contract Data.

(f) The carriageways and the crossing roads shall be adequately lit at night during the construction period. This restricts the removal of existing streetlights, unless alternative lighting measures are put in place. The new streetlights shall be in position and ready to be switched on before the existing streetlights can be disconnected and removed.

(g) The removal and replacement of existing signboards with new signboards shall, as far as possible, be planned and implemented in such a way that permanent signage or temporary signage is in place at all times to guide the road user. New or temporary signboards shall therefore be in place before existing signboards can be removed. The Contractor shall make arrangements in consultation with the Employer's Agent to provide temporary signage if required.

(h) The Contractor's attention is drawn to the requirements under B1224 and B1502(m) related to the construction contract for the installation of new Steenbras bulk watermain and associated secondary water lines within the Govan Mbeki road reserve. Access to the section of Govan Mbeki between the start (SV 0 – E02A) of the project and the New Eisleben Road Intersection (SV340 – E02B) may not be granted simultaneously with the remainder of the road section and access for this section may be delayed by an estimated period of 8 months while the contractor on the Steenbras Watermain completes their work on this section.

(i) The Contractor shall make provisions in his programme for providing access to the station platforms for the stations superstructure contractor who's work on the station superstructure will commence prior to the completion of this contract.

(j) Informal settlements are located within the planned construction area along the route of this road. The location of existing informal settlements may have an impact in the Contractors programme and the Contractor shall, within the period stated in Clause 5.4.1, liaise with the Employer and the Engineer as to the locations of these informal settlements so as to provide input into their initial Programme. The Contractor is to also take note that these informal settlements are to be relocated and provision has been made in the Schedule of Quantities for this process.

3.1.10 LABORATORY TESTING

The Employer's Agent will request quotations from existing commercial laboratories for the provision of all testing. All of the Employer's Agent's acceptance control testing will be carried out by this commercial laboratory.

A Provisional Sum has been provided in the Bill of Quantities under Item B12.02 for the Employer's

Agent's acceptance control testing, not the Contractor's process control testing.

The Employer's Agent reserves the right to base his evaluation and approval of the works on the Contractor's submitted process control test results, with additional testing carried out by the Employer's Agent's independent laboratory to check the test results submitted by the Contractor. The Employer's Agent will select a different commercial laboratory to that utilised by the Contractor.

The Contractor may elect to set up his own laboratory on site, or use a commercial laboratory.

C3.2 Engineering / Design

CONTENTS

3.2.1 DESIGN SERVICES AND ACTIVITY MATRIX
3.2.2 EMPLOYER'S DESIGN
3.2.3 DRAWINGS

3.2.1 DESIGN SERVICES AND ACTIVITY MATRIX

The design responsibilities shall be as follows:

All permanent work:	Employer / Employers Agent
Temporary works	Contractor
Preparation of as-built drawings	Contractor with the Assistance of the Employers Agent when requested

3.2.2 EMPLOYER'S DESIGN

The Employer is responsible for concept, feasibility, basic engineering and detail layout to tender stage of the project. The Contractor is responsible for design of all temporary works and the preparation of record drawings.

Civil Engineering designs and drawings have been provided by the Employer's Consulting Engineers. The Contractor is responsible to provide method statements for the works and all temporary works.

3.2.3 DRAWINGS

The following drawings are applicable to the contract and are issued with this tender document and will form part of the Contract Documents.

PROJECT DRAWINGS (E02A)	
DWG No.	**TITLE**
	COVER PAGE
01	INDEX
02	PACKAGE EXTENTS
	ROADS
	CIVILS
03	WORK PACKAGE E02A REV 1 – KEY PLAN
09	TYPICAL PERPENDICULAR AND LONGITUDINAL DROPPED KERB AND TACTILE PAVING LAYOUTS SHEET 1 OF 3
10	TYPICAL PERPENDICULAR AND LONGITUDINAL DROPPED KERB AND TACTILE PAVING LAYOUTS SHEET 2 OF 3
11	TYPICAL PERPENDICULAR AND LONGITUDINAL DROPPED KERB AND TACTILE PAVING LAYOUTS SHEET 3 OF 3
12	TYPICAL MEDIAN CROSSING ISLAND – STAGGERED CROSSINGS AT PHASED SIGNALISED PEDESTRIAN CROSSING ONLY
13	TYPICAL CROSS SECTION FOR PROPOSED SERVICES
15	PROPOSED PAVEMENT TYPICAL DETAILS

16	TYPICAL RETAINING DETAILS FOR BACK OF SIDEWALK
1000	WORK PACKAGE E02A REV1 - EXISTING SERVICES LAYOUT – SHEET 1
1001	WORK PACKAGE E02A REV1 - EXISTING SERVICES LAYOUT – SHEET 2
1002	WORK PACKAGE E02A REV1 - EXISTING SERVICES LAYOUT – SHEET 3
1003	WORK PACKAGE E02A REV1 - EXISTING SERVICES LAYOUT – SHEET 4
1004	WORK PACKAGE E02A REV1 - EXISTING SERVICES LAYOUT – SHEET 5
1005	WORK PACKAGE E02A REV1 - EXISTING SERVICES LAYOUT – SHEET 6
1006	WORK PACKAGE E02A REV1 - EXISTING SERVICES LAYOUT – SHEET 7
3000	WORK PACKAGE E02A REV1 - LAYOUT PLAN – KEY PLAN – SCHEDULE
3001	WORK PACKAGE E02A REV1 - LAYOUT PLAN - SHEET 1 OF 2
3002	WORK PACKAGE E02A REV1 - LAYOUT PLAN - SHEET 2 OF 2
3100	WORK PACKAGE E02A REV1-GENERAL TRAFFIC LONG SECTION – SHEET 1 OF 3
3101	WORK PACKAGE E02A REV1-GENERAL TRAFFIC LONG SECTION – SHEET 2 OF 3
3102	WORK PACKAGE E02A REV1-GENERAL TRAFFIC LONG SECTION – SHEET 3 OF 3
3120	WORK PACKAGE E02-REV1 – CENTRAL BUSWAY LONG-SECTION – SHEET 1 OF 3
3121	WORK PACKAGE E02-REV1 – CENTRAL BUSWAY LONG-SECTION – SHEET 2 OF 3
3122	WORK PACKAGE E02-REV1 – CENTRAL BUSWAY LONG-SECTION – SHEET 3 OF 3
3130	WORK PACKAGE E02A-REV1 – JUNCTION LONG-SECTIONS – SHEET 1 OF 2
3131	WORK PACKAGE E02A-REV1 – JUNCTION LONG-SECTIONS – SHEET 2 OF 2
3140	WORK PACKAGE E02A-REV1 – GENERAL TRAFFIC CROSS SECTIONS – SHEET 1 OF 3
3141	WORK PACKAGE E02A-REV1 – GENERAL TRAFFIC CROSS SECTIONS – SHEET 2 OF 3
3142	WORK PACKAGE E02A-REV1 – GENERAL TRAFFIC CROSS SECTIONS – SHEET 3 OF 3
3160	WORK PACKAGE E02A-REV1 – CENTRAL BUSWAY CROSS-SECTIONS - SHEET 1 OF 2
3161	WORK PACKAGE E02A-REV1 – CENTRAL BUSWAY CROSS-SECTIONS SHEET 2 OF 2
3180	WORK PACKAGE E02A-REV1 – JUNCTION CROSS-SECTIONS - SHEET 1 OF 2
3181	WORK PACKAGE E02A-REV1 – JUNCTION CROSS-SECTIONS - SHEET 2 OF 2
3200	WORK PACKAGE E02A-REV1 – PROPOSED ROAD PAVEMENT LAYOUT - SHEET 1 OF 7
3201	WORK PACKAGE E02A-REV1 – PROPOSED ROAD PAVEMENT LAYOUT - SHEET 2 OF 7
3202	WORK PACKAGE E02A-REV1 – PROPOSED ROAD PAVEMENT LAYOUT - SHEET 3 OF 7
3203	WORK PACKAGE E02A-REV1 – PROPOSED ROAD PAVEMENT LAYOUT - SHEET 4 OF 7
3204	WORK PACKAGE E02A-REV1 – PROPOSED ROAD PAVEMENT LAYOUT - SHEET 5 OF 7
3205	WORK PACKAGE E02A-REV1 – PROPOSED ROAD PAVEMENT LAYOUT - SHEET 6 OF 7
3206	WORK PACKAGE E02A-REV1 – PROPOSED ROAD PAVEMENT LAYOUT - SHEET 7 OF 7
3240	PROPOSED PAVEMENT TYPICAL CROSS SECTION DETAILS – SHEET 1 OF 3
3241	PROPOSED PAVEMENT TYPICAL CROSS SECTION DETAILS – SHEET 2 OF 3
3242	PROPOSED PAVEMENT TYPICAL CROSS SECTION DETAILS – SHEET 3 OF 3
3243	TYPICAL DETAIL CONCRETE PAVEMENT

3250	DUAL CARRIAGEWAY TRAFFIC ACCOMMODATION PHASING LAYOUT – SHEET 1 OF 2
3251	DUAL CARRIAGEWAY TRAFFIC ACCOMMODATION PHASING LAYOUT – SHEET 2 OF 2
4000	WORK PACKAGE E02A-REV1 – STORMWATER LAYOUT PLAN – SHEET 1 OF 5
4001	WORK PACKAGE E02A-REV1 – STORMWATER LAYOUT PLAN – SHEET 2 OF 5
4002	WORK PACKAGE E02A-REV1 – STORMWATER LAYOUT PLAN – SHEET 3 OF 5
4004	WORK PACKAGE E02A-REV1 – STORMWATER LAYOUT PLAN – SHEET 4 OF 5
4010	TYPICAL TRIPLE GULLY GRID WITH KERB INLET CATCHPIT
4100	WORK PACKAGE E02A – STORMWATER LONGSECTIONS – SHEET 1 OF 7
4101	WORK PACKAGE E02A – STORMWATER LONGSECTIONS – SHEET 2 OF 7
4102	WORK PACKAGE E02A – STORMWATER LONGSECTIONS – SHEET 3 OF 7
4103	WORK PACKAGE E02A – STORMWATER LONGSECTIONS – SHEET 4 OF 7
4104	WORK PACKAGE E02A – STORMWATER LONGSECTIONS – SHEET 5 OF 7
4105	WORK PACKAGE E02A – STORMWATER LONGSECTIONS – SHEET 6 OF 7
4106	WORK PACKAGE E02A – STORMWATER LONGSECTIONS – SHEET 7 OF 7
5000	WORK PACKAGE E02A REV1 - EXISTING SERVICES: TELECOMMS AND FIBRE - SHEET 1
5001	WORK PACKAGE E02A REV1 - EXISTING SERVICES: TELECOMMS AND FIBRE - SHEET 2
5002	WORK PACKAGE E02A REV1 - EXISTING SERVICES: TELECOMMS AND FIBRE - SHEET 3
5003	WORK PACKAGE E02A REV1 - EXISTING SERVICES: TELECOMMS AND FIBRE - SHEET 4
5004	WORK PACKAGE E02A REV1 - EXISTING SERVICES: TELECOMMS AND FIBRE - SHEET 5
5005	WORK PACKAGE E02A REV1 - EXISTING SERVICES: TELECOMMS AND FIBRE - SHEET 6
5006	WORK PACKAGE E02A REV1 - EXISTING SERVICES: LOW, MEDIUM & HIGH VOLTAGE – SHEET 1
5007	WORK PACKAGE E02A REV1 - EXISTING SERVICES: LOW, MEDIUM & HIGH VOLTAGE – SHEET 2
5008	WORK PACKAGE E02A REV1 - EXISTING SERVICES: LOW, MEDIUM & HIGH VOLTAGE – SHEET 3
5009	WORK PACKAGE E02A REV1 - EXISTING SERVICES: LOW, MEDIUM & HIGH VOLTAGE – SHEET 4
5010	WORK PACKAGE E02A REV1 - EXISTING SERVICES: LOW, MEDIUM & HIGH VOLTAGE – SHEET 5
5011	WORK PACKAGE E02A REV1 - EXISTING SERVICES: LOW, MEDIUM & HIGH VOLTAGE – SHEET 6
5100	WORK PACKAGE E02A REV1 - STREET LIGHTING LAYOUT SHEET 1
5101	WORK PACKAGE E02A REV1 - STREET LIGHTING LAYOUT – SHEET 2
5102	WORK PACKAGE E02A REV1 - STREET LIGHTING LAYOUT - SHEET 3
5103	WORK PACKAGE E02A REV1 - STREET LIGHTING LAYOUT - SHEET 4
5104	WORK PACKAGE E02A REV1 - STREET LIGHTING LAYOUT - SHEET 5
5105	WORK PACKAGE E02A REV1 - STREET LIGHTING LAYOUT – SHEET 6
5110	WORK PACKAGE E02A REV1 – SCHEMATIC LAYOUT SLK1 & SLK2– SHEET 1
6000	WORK PACKAGE E02 REV1 SEWER AND WATER LAYOUT - SHEET 1 OF 5
6001	WORK PACKAGE E02 REV1 SEWER AND WATER LAYOUT - SHEET 2 OF 5
6002	WORK PACKAGE E02 REV1 SEWER AND WATER LAYOUT - SHEET 3 OF 5
6003	WORK PACKAGE E02 REV1 SEWER AND WATER LAYOUT - SHEET 4 OF 5
6004	WORK PACKAGE E02 REV1 SEWER AND WATER LAYOUT - SHEET 5 OF 5
6010	STEEL WATER PIPE RETICULATION – TYPICAL DETAILS

7000	WORK PACKAGE E02A REV1-PROPOSED ROAD MARKING AND SIGNAGE LAYOUT: SHEET 1 OF 7
7001	WORK PACKAGE E02A REV1-PROPOSED ROAD MARKING AND SIGNAGE LAYOUT: SHEET 2 OF 7
7002	WORK PACKAGE E02A REV1-PROPOSED ROAD MARKING AND SIGNAGE LAYOUT: SHEET 3 OF 7
7003	WORK PACKAGE E02A REV1-PROPOSED ROAD MARKING AND SIGNAGE LAYOUT: SHEET 4 OF 7
7004	WORK PACKAGE E02A REV1-PROPOSED ROAD MARKING AND SIGNAGE LAYOUT: SHEET 5 OF 7
7005	WORK PACKAGE E02A REV1-PROPOSED ROAD MARKING AND SIGNAGE LAYOUT: SHEET 6 OF 7
7006	WORK PACKAGE E02A REV1-PROPOSED ROAD MARKING AND SIGNAGE LAYOUT: SHEET 6 OF 7
7020	WORK PACKAGE E02A REV1-PROPOSED DIRECTIONAL SIGNAGE INFORMATION
7030	WORK PACKAGE E02A REV1-PROPOSED DIRECTIONAL SIGNAGE DETAILS - SHEET 1 OF 2
7031	WORK PACKAGE E02A REV1-PROPOSED DIRECTIONAL SIGNAGE DETAILS - SHEET 2 OF 2
7100	WORK PACKAGE E02A REV1-PROPOSED TRAFFIC SIGNAL ASPECT LAYOUT-TRAFFIC SIGNAL SET 1 – SHEET 1 OF 7
7101	WORK PACKAGE E02A REV1-PROPOSED TRAFFIC SIGNAL ASPECT LAYOUT-TRAFFIC SIGNAL SET 2 – SHEET 2 OF 7
7102	WORK PACKAGE E02A REV1-PROPOSED TRAFFIC SIGNAL ASPECT LAYOUT-TRAFFIC SIGNAL SET 3 - SHEET 3 OF 7
7103	WORK PACKAGE E02A REV1-PROPOSED TRAFFIC SIGNAL ASPECT LAYOUT-TRAFFIC SIGNAL SET 4 - SHEET 4 OF 7
7104	WORK PACKAGE E02A REV1-PROPOSED TRAFFIC SIGNAL ASPECT LAYOUT-TRAFFIC SIGNAL SET 5 - SHEET 5 OF 7
7105	WORK PACKAGE E02A REV1-PROPOSED TRAFFIC SIGNAL ASPECT LAYOUT-TRAFFIC SIGNAL SET 6 - SHEET 6 OF 7
7106	WORK PACKAGE E02A REV1-PROPOSED TRAFFIC SIGNAL ASPECT LAYOUT-TRAFFIC SIGNAL SET 7 - SHEET 7 OF 7
7200	WORK PACKAGE E02A REV1-PROPOSED TRAFFIC SIGNAL DETECTION LAYOUT-TRAFFIC SIGNAL SET 1 – SHEET 1 OF 7
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RD13.1	GUARDRAIL DETAILS – SHEET 1
RD13.2	GUARDRAIL DETAILS – SHEET 2
RD14	MOLE BARRIER
RM4	INSTALLATION DETAIL FOR GROUND MOUNTED ROAD SIGN (SIGNS < 0.5m²)
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W3	TYPICAL WATER CONNECTION

Notes:

1. The drawings that form part of the tender documents shall be used for tender purposes only.
2. Although the drawings are issued under the description of the previous sub-packages (E02A and E02B) this shall not be seen as different portions of work in terms of Clause 5.14 of GCC 2015.
3. The Contractor will be supplied with three (3) paper prints of each of the drawings required for construction. These copies are issued free of charge and the Contractor shall make any additional copies he may require at his own cost.
4. Only figured dimensions shall be used and drawings shall not be scaled unless otherwise instructed.
5. Any information in the possession of the Contractor, which the Employer's Agent requires to complete his record drawings shall be supplied to the Employer's Agent before a certificate of completion will be issued.
6. Originals of reduced tender drawings are available for inspection at the offices of the Employer's Agent or prints may be purchased by arrangement with the Employer's Agent. No claim for misunderstanding reduced drawings will be considered.

C3.3 Procurement

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3.3.1 PREFERENTIAL PROCUREMENT
3.3.2 SUB-CONTRACTING PROCEDURES

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 the specific goals

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

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Replace 3203 with the following:

"B3203 STOCKPILING THE MATERIAL

"The contractor shall so plan his activities that materials excavated from existing pavement layers and cuttings, in so far as is possible, can be transported direct to and placed at the point where it is to be used. However, where utilizing materials in this manner is impracticable, and, if so instructed by the Empoyers Agent in writing, it shall be temporarily stockpiled for later loading and transportation to where it will be used. Compensation for stockpiling materials will be payable only in regard to material stockpiled in accordance with the Empoyers Agent written instructions.

The temporary stockpiling of material within the cutting area in heaps with a view to loading, or any other stockpiling method used in connection with the loading method adopted by the contractor in the cutting, will not be classified as temporary stockpiling. The costs for these processes will be deemed to be covered by the rates for the various items of work for which material so stockpiled is used.

Stockpiling areas shall be identified by the contractor and approved by the Empoyers Agent. Before any stockpiling of material may be done, the site shall be cleaned, and all loose stones or any vegetation or other material which may cause contamination shall be removed. A stockpiling management plan shall be compiled by the Contractor and submitted to the Employers Agent for approval and destintive areas shall be allocated for the various types & quality of materials.

After the stockpiled material has been removed, the site shall be reinstated as closely as possible to its original condition, and the surface shall be lightly scarified to promote vegetation growth.

Payment will be made for stockpiling the material from existing pavements only if the material is intended for re-use and if its stockpiling has been approved or directed by the Empoyers Agent.

(a) Stockpiling of topsoil

Dedicted topsoil stockpiles shall be created at the stockpile site and shall be carefully managed to minimise any contamination of the topsoil materials with any other materials.

Topsoil stockpiles shall not be moved unless authorised by the Employers Agent.

(b) Stockpiling reclaimed asphalt and reclaimed pavement materials

Each stockpile of reclaimed asphalt (RA) shall be constructed in such a manner that will restrict segregation and compaction of the stockpiled material as follows:

- Each stockpile shall not exceed 1000 t.
- The stockpile shall not exceed a height of 2,5 m to prevent consolidation of the RA.
- The RA stockpile shall be located on the sloping stockpile site so that the water drains away from the loading end.
- The stockpile shall be shaped so that water drains off the top and down the stockpile side slopes.
- Side slopes shall not be steeper than 1 vertical(V) : 2 horizontal(H).
- The loads of RA shall be dumped uniformly over the entire RA stockpile area.
- A light bulldozer or front-end loader shall then doze the material into a ramp-shaped stockpile, in layers.
- Careful management of the stockpiled RA shall be undertaken to ensure that consolidation of RA does not occur.
- Travel on the stockpile by heavy equipment such as the front-end loader or the light bulldozer shall be minimized.
- Trucks shall not travel on the stockpile.

Each stockpile of reclaimed pavement materials shall be constructed in such a manner that will restrict segregation and compaction of the stockpiled material as follows:

- Each stockpile of reclaimed material shall not exceed a height of 3,0 m.
- Side slopes shall not be steeper than 1V:2H.
- The loads of reclaimed material shall be dumped uniformly over the entire material stockpile area.
- A light bulldozer or front-end loader shall then doze the material into a stockpile in layers.
- The reclaimed material shall be placed in layers no more than 1,0 m thick. Each layer shall be completed and levelled prior to placing the next layer.
- The layers shall be constructed horizontally or constructed at a maximum slope of 1V:3H.
- Trucks shall not travel on the stockpile.”

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PART D: LABOUR SPECIFICATIONS

PART E: ENVIRONMENTAL SPECIFICATIONS

PART H: HEALTH AND SAFETY SPECIFICATIONS

1. APPLICABLE STANDARDISED SPECIFICATIONS

The COLTO Standard Specifications for Road and Bridge Works for State Road Authorities prepared by the Committee of Land Transport Officials shall apply to this Contract.

The contractors attention is also drawn to the changes related to some of the Test Methods referred to in COLTO where the Standard Methods of Testing Road Construction Materials: Technical Methods for Highways (TMH1), 1979 has been replaced by the South African National Standards (SANS) 3000 series.

2. PROJECT SPECIFICATIONS REFERING TO THE STANDARDISED SPECIFICATIONS

The Standard Specifications provide, in certain clauses, for a choice to be specified in the Construction 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 Specifications. It also contains some additional specifications required for this particular contract.

The number of each clause and each payment item in the Particular (Project) Specifications consists of the prefix B followed by a number corresponding to the number of the relevant clause or payment item in the Standard Specifications. The number of a new clause or a new payment item, which does not form part of a clause or a payment item in the Standard Specifications and is included here, is also prefixed by B followed by a new number. The new numbers follow on the last clause or item number used in the relevant section of the Standard Specifications.

SECTION B1100 : DEFINITIONS AND TERMS

B1115 GENERAL CONDITIONS OF CONTRACT

Replace Clause 1115 with the following:

The General Conditions of Contract for Construction Works (3rd Edition) 2015 published by the South African Institute of Civil Engineering, together with the Special Conditions of Contract form part of the contract.

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

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

TABLE 1115/1: REFERENCES IN COLTO STANDARD SPECIFICATIONS TO THE COLTO GENERAL CONDITIONS OF CONTRACT AND RELEVANT SAICE GENERAL CONDITIONS OF CONTRACT FOR CONSTRUCTION WORKS 2015

COLTO Standard Specification		**COLTO General Conditions of Contract 1998 (GCC)**		**SAICE General Conditions of Contract for Construction Works: 3rd Edition 2015**	
Clause No	Page No	Clause No	Description or Reference	Clause No	Description or Reference
1115	1100-2		Definition of GCC		Definition of SAICE
1202	1200-2	15	Construction programme	5.6	Programme
1206	1200-3	14	Setting out of works and beacons		Omitted
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	Completion
1212(l)	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(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)	5.2	Commencement of the Works
1303	1300-2	45	Payment Item 13.01 (c)	5.12	Payment Item 13.01 (c)
1403(c)(ii)	1400-4	40(1)	Variation for rented accommodation	6.4	Variation for rented accommodation
1505	1500-3	40(1)	Variation for temporary drainage	6.4	Variation for temporary drainage
Item 15.08	1500-8	48	Payment of Provisional Sum	6.6	Payment of Provisional Sum
Item 15.09	1500/8	48	Payment of Provisional Sum	6.6	Payment of Provisional Sum

COLTO Standard Specification		COLTO General Conditions of Contract 1998 (GCC)		SAICE General Conditions of Contract for Construction Works: 3rd Edition 2015	
Clause No	Page No	Clause No	Description or Reference	Clause No	Description or Reference
Item 15.11	1500-8	48	Payment of Provisional Sum	6.6	Payment of Provisional Sum
Note (2)	3100-4	40	Payment for prospecting for materials	6.5.2	Payment for prospecting for materials
3204(b)(iii)	3200-2	40	Payment for oversize material	6.5.2	Payment for oversize material
3303(b)	3300-2	2	Engineer's decisions, with reference to materials classification	3.2	Employer's Agent's decisions, with reference to materials classification
5803(c)	5800-3	40	Variation, for landscaping	6.4	Variation, for landscaping
5805(d)	5800-4	40	Variation, for grassing	6.4	Variation, for grassing
Item 58.10	5800-10	48	Payment for Extra Work	6.4	Payment for Extra Work
8103(c)	8100-1	40	Variation, for testing material	6.4	Variation, for testing material
Item 81.03	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

Replace "Engineer" in COLTO Standard Specification for road and Bridge Works 1998 Edition and all volumes of this tender with "Employers Agent" as defined in GCC 2015 Clause 1.1.1.16.

B1156 SANS, SANS SPECIFICATIONS AND OTHER REFERENCE DOCUMENTS

Where reference is made in the project specifications or the standard specifications to SANS or to SANS specifications, the latest published national standard shall be applicable.

To check the latest situation regarding publication, go to www.SANS.co.za and find the Web Store page.

TMH1 test methods are no longer applicable and SANS 3001 methods must be used.

www.SANS.co.za and find the Web Store page.
Under "Quick Search Criteria" enter "3001" to get a list of methods published to date.

Where reference is made in the specifications or drawings to other standard technical or guideline documents such as TRH, TMH, TG or SABITA manuals then this refers to the latest published version of those documents at time of tender submission shall be applicable.

B1157 AGGREGATE SIZE

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

Aggregate size (TMH1)	New aggregate size (SANS)
53	**50**
37.5	37.5
26,5	**28**
19	**20**
13,2	**14**
9,5	**10**
6,7	**7.1**
4,75	**5**
2,36	**2**
1,18	**1**

B1158 ACCEPTANCE CONTROL

Acceptance control is the responsibility of the Employer's Agent and refers to all testing requirements to be executed during the Works to determine the acceptability or otherwise of the materials and workmanship of the Works as executed by the Contractor.

It is the responsibility of the contractor to ensure that completed work is presented in writing to the Employer's Agent timeously for acceptance in order to ensure that necessary sampling and testing can be performed as required.

B1159 COMPACTION

The standard for compaction efforts for soils and gravels shall change from Modified AASHTO Density as per TMH1 Test Method to Maximum Dry Density (MDD) as per SANS 3001. Where reference is made to soils or gravels compaction or to Modified AASHTO Density in the tender documentation or the standard specifications or wherever there is conflict between the tender documentation and the standard specifications, the SANS 3001 specification and terminology shall govern.

The standard for compaction efforts for asphalts shall change from Maximum Theoretical Relative Density as per TMH1 Test Method to Maximum Voidless Density (MVD) as per SANS 3001. Where reference is made to asphalt compaction or to Maximum Theoretical Relative Density in the tender documentation or the standard specifications or wherever there is conflict between the tender documentation and the standard specifications, the SANS 3001 specification and terminology shall govern.

SECTION B1200 : GENERAL REQUIREMENTS AND PROVISIONS

B1202 SERVICES

The Contractor shall take cognisance of all conditions and requirements stipulated by the service authorities.

Replace all paragraphs after the first paragraph with the following:

"a. Protection of overhead and underground services

The City of Cape Town has endeavoured to locate all services and sub-surface obstructions likely to be affected by the work from available records and from surveys; these will be indicated to the Contractor prior to the commencement of works in the wayleaves obtained. Although every care has been exercised in the presentation of the available data, the City of Cape Town cannot and does not vouch for the accuracy or completeness of the information shown.

Existing (mapped) services indicated on the wayleave drawings show the approximate positions of these services. The accuracy of/or completeness of the service information is not guaranteed. The Contractor shall verify details, positions and levels of all existing services well in advance of undertaking related works to prevent any possible delays if such services are not as mapped. No claims related to the late verification of existing services shall be entertained.

The Contractor is fully responsible for the protection of all services. The Contractor will be held responsible for damage to services, which are:

1. In the approximate position of services indicated on construction drawings.

2. Where the presence of such services can reasonably be foreseen by an experienced Contractor from associated surface structures or markings or underground warning tape.

3. Where they have been informed of the presence of such services by any person or authority.

Although the location of all mapped services has been shown on the wayleave drawings, the Contractor should anticipate encountering services which have been abandoned or services which are in use but not recorded (unmapped).

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

Whenever the Contractor deems it necessary to determine the exact location of an existing service or obstruction, he shall at their 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 inaccuracy of services or obstructions.

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

As soon as an underground service not previously indicated by the service provider or Employers Agent 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 cover of making good such damage will be met by the Employer, unless it is established by the Employers Agent that the Contractor did not exercise reasonable diligence and care and that the damage was avoidable. 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 Employers Agent who will issue instructions as to the necessary repairs or protective measures to be undertaken. The cost thereof shall be borne by the Contractor irrespective of whether the repairs or

protective measures were carried out by them or on behalf of the service authority or department concerned.

b. Existing services

"Existing services" 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 item B1202(a) and is satisfied that all such services were in an acceptable and serviceable state at the commencement of the works. All valves that may have an impact on working in a particular section must be checked and serviced before work in that section commences to ensure that services can be properly isolated without delay should such service be damaged or require relocation.

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 and protection of existing services

During the course of the works, all existing services including traffic signals, water mains, sewers and stormwater reticulation, electricity 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 Employers Agent. The Contractor shall bear all costs in this regard in respect of the services shown on the Contract Drawings. The Contractor's tendered rates are to include for working around and adjacent to existing services and no additional payment, except where specific rates are provided, will be made to the Contractor in this regard.

Unless the contrary is clearly specified in the Contract or ordered by the Employers Agent, the Contractor shall not carry out alterations to existing services. When any such alterations become necessary, the Contractor shall promptly inform the Employers Agent, who will either make arrangements for such work to be executed by the owner of the service, or instruct the Contractor to make such arrangements himself.

B1204 PROGRAMME OF WORK

(a) General requirements

Delete the first paragraph.

Insert the following at the beginning of the clause:

""It is critical that the works shall be programmed and executed in such a way as to cause minimum disruption to the public including residents, businesses and other parties requiring access to the areas in which construction is taking place.

It is essential that the construction programme be determined in consultation with the Engineer to ensure that these obligations can be met. In special circumstances, where the Contractor must co- ordinate with service providers for the relocation of services which would hinder programmed key dates, then the Contractor shall, with approval of the Engineer, postpone the completion of the affected works to the next phased completion date.

The Contractor shall submit their programme, within the time stated in the Contract Data, to the Employers Agent for approval. The programme shall be in the form of a bar chart (Gantt chart) or any other time-activity form acceptable to the Employers Agent, and shall clearly show:

(i) The proposed rate of progress in order to complete the Works within the required period as tendered, showing the various activities, their durations and proposed resourcing levels (major plant and labour) for each element of the Works. Sufficient detail shall be provided to enable the Employers Agent to be able to gauge construction progress. All activities, including establishment on site, trimming and finishing and the completion of all minor ancillary works are to be included in the programme.
(ii) The sequence of activities and any dependence (time or resource related) between them.
(iii) The critical path activities.

(iv) Key dates in respect of work to be carried out, or information, etc., to be provided, by others.
(v) The anticipated value of work to be done during each month.
(vi) Other information indicated in C3.1-C3.6 or specifically required by the Employers Agent.

When drawing up their programme, the Contractor shall, inter alia, take into consideration and make allowance for:

a. Working hours are between sunrise and sunset on Mondays to Saturday, excluding special non-working days,
b. Expected weather conditions and their effects,
c. Known physical conditions or artificial obstructions,
d. The six (6) week period allowed for the "start-up period" as defined in payment item B13.01,
e. Submission and approval of traffic accommodation plans,
f. The accommodation and safeguarding of public traffic and associated restrictions in working hours,
g. Verification of existing services,
h. Dealing with, wayleave processes, altering and installing services,
i. Procurement of sub-contractors in terms of C3.3 Procurement,
j. Liasising with and accommodating other contracts and contractors within the boundaries of the project, amongst which are following known projects that may impact the programme:
    i. Construction contract for the installation of the superstructures for the IRT stations. The substructures will be constructed under this project.
    ii. Construction contract for the installation of new Steenbras bulk watermain and associated secondary water lines within the Govan Mbeki road reserve. (alignment is shown on the drawings).
    iii. The planning and sequencing of the programme shall also be based on access to the Govan Mbeki section between the start (SV 0 – E02A) of the project and the New Eisleben Road Intersection (SV340 – E02B) being delayed by an estimated period of 8 months while the contractor on the Steenbras Watermain completes their work on this section. The programme shall therefore be based on the initial works be undertaken from New Eisleben and the end of the project and also Emms Drive (excluding the watermain crossing of Govan Mbeki). After this estimated 8th month period, continued co-ordination with the Steenbras watermain contractor will be required.

    Regular liaison/co-ordination meetings shall be organised by the contractor and conducted with these and any other contractors occurring simulatatiously within the boundaries of the site. The Employers Agent shall be invite to these liaison/co-ordination meetings.
k. The location of existing Informal settlements within the planned construction area along the route of this road and the requirement for the relocation of these informal settlements.
l. Submission of method statements, mix designs, construction of trial sections and the Employers Agents approval of these,
m. All other activities required in terms of this Contract.

A schedule of proposed plant and labour resources for each major activity and a detailed accommodation of traffic proposal (giving lane closures, section lengths, sequencing etc.) shall accompany the programme.

The Contractor shall allow within the construction programme adequate time for application and renewal of wayleaves throughout the contract period."

Add the following sub-clause 1204 (c) after clause 1204 (b):

"c) Reporting

The Contractor shall submit to the Employers Agent at least three days before each monthly site meeting a monthly progress report which shall include the following:

(i) A summary of progress on site over the month immediately preceding the monthly site meeting. This shall be in the form of a detailed narrative to the contract programme.
(ii) Highlight activities running late, indicating what steps have (or will) be taken (e.g. reprogramming), additional plant and/or labour resources, etc.) to ensure that the specified date of completion is not overrun.
(iii) Status report of all plant employed on site.
(iv) Status report of all labour resources employed on site, including proportion of women.
(v) Status report of all material on site.

No separate payment will be made for observing these requirements as it is deemed to be included in the amounts tendered for Section 1300: Preliminary and General.

d) Material Delivery Programme

The Contractor must prepare a programme showing their planned material delivery dates, and to this end, they must ensure that orders are placed timeously with suppliers to meet their programme.

No separate payment will be made for observing these requirements as it is deemed to be included in the amounts tendered for Section 1300: Preliminary and General."

B1205 WORKMANSHIP AND QUALITY CONTROL

Delete the second to fifth paragraphs and replace with the following:

"The Contractor shall submit a proposed Quality Management Plan for this contract to the Employers Agent within 14 days of the Commencement Date and any amendments required thereof shall be submitted prior to the commencement of construction activities. Once accepted by the Employers Agent, the Contractor shall not deviate from it unless written notification of proposed changes have been submitted and approved. The system shall record the lines and levels of responsibility and indicate the method and frequency by which testing procedures will be conducted.

Payment for work done will not be made until the results of the Contractor's process control testing have been submitted and the Employers Agent has approved the work. The Employers Agent shall conduct such tests as he may deem necessary to verify the process control test results and shall retain all rights as determined in the General Conditions of Contract related to bad workmanship or unacceptable materials. This shall also be applicable to accepted alternative (mix) designs and related specifications."

Insert the following new sub clauses:

"Commercial laboratory

A Commercial laboratory will be appointed by the Employers Agent to undertake acceptance control testing of construction materials and workmanship. All sampling and testing by the Commercial laboratory will be done on the strict instruction of the Employers Agent. Materials will be sampled on site or at commercial supply sources or at the Contractor's asphalt or concrete plant. Results will be reported to the Employers Agent for interpretation and possible action. The Commercial laboratory will invoice the Contractor for the cost of material sampling and testing and for reporting the test results to the Employers Agent. This cost will be reimbursed under the provisional sum item on approval by the Employers Agent.

The Contractor will be required to accommodate and support the sampling procedures of the Commercial laboratory during the course of the contract. Representatives of the Employers Agent and the Commercial laboratory will be allowed to inspect any stockpile, storage facility or processing activity for the purpose of quality control."

Every completed layer or section of the Works shall be subject to check testing by the Contractor. Once the Contractor has satisfied himself with the standard of his works, the Employers Agent will be requested to perform acceptance testing for the particular section. When giving notice, the Contractor shall provide the Employers Agent with the results of his check testing indicating that the work is to specification.

Failure by the Contractor to notify the Employers Agent or to provide the required information or, where specified, to perform the required test, will be grounds to exempt the Employer from payment for the associated work and for all subsequent work which would be affected by the failure of the work to be tested.

The Employers Agent will be under no obligation to the Contractor to perform the tests. If the Employers Agent elects not to perform a particular test after notification by the Contractor, he will issue the Contractor with a written instruction to proceed with the relevant works without the acceptance test being performed.

Nothing contained in this clause will relieve the Contractor of his responsibilities under the specification or in any way limit the tests, which the Employers Agent may call for or perform in terms of the specification.

B1206 SETTING OUT OF WORK AND PROTECTION OF BEACONS

Add the following to after the first paragraph of this clause:

"Sufficient beacons will be provided on site to allow the Contractor to set out the works.

An accurate land survey of the site was carried out during the design process but the information shown on the drawings may not be accurate due to other activities, which were conducted on the site after the survey was completed.

The Contractor shall arrange for the detail survey of the site prior to the commencement of works to verify site levels and submit any discrepancies to the Employers Agent where so required. Failure to survey the site and submit any discrepancies in the format required by the Employers Agent by the Commencement of the Works in terms of Clause 5.3.1 will be considered as acceptance of the Employers Agent's site survey for setting out purposes and in determining bulk earthwork's quantities. **No claims related to the inaccuracy of existing survey information shall be entertained.**

All survey shall be carried out in accordance with the standard specifications TMH 11 Standard Survey Methods and to the Variations and Additions as specified in Annex 8. Only topographic surveys are permitted with ground detail, contour and DTM surveys to Section 3.2.1.

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

B1207 NOTICES, SIGNS AND ADVERTISEMENTS

Delete the second paragraph and replace with the following:

"At each end of the works the contractor shall provide and erect, as part of his obligations under section 1300, and on approved locations, at the starting and ending points of the works, signboards of sound, weatherproof construction, painted by an approved firm of signwriters and in accordance with the specifications under Section 5600 using a semi-matt background and semi-matt lettering. The contractor is to make allowance for 2 signs of 14m^2 each with 30% of this area allowed for lettering."

Delete the final paragraph and replace with the following:

"All contractual 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 de-establishment. Payment under sub-item 13.01(a) for the final instalment of 15% of the tendered lump sum shall not be made unless all the advertisements, notices and temporary signs have been removed."

B1209 PAYMENT

(b) Rates to be inclusive

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

(c) The meanings of certain phrases in payment clauses

(i) Procuring and furnishing (material)

Add the following:

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

(e) Materials on the site

Add the following at the end of sub-clause B1209 (e):

"In addition to the above, the Employers Agent may at his sole discretion allow payments under "Materials on Site" in respect of any construction materials if stored off-site, providing that:

- The site selected for this purpose is approved by the Employer;
- Such land is physically separated from any production plant or operation;
- Only materials for use under this contract are stockpiled on such land.

The Contractor has provided proof of an agreement with the owner of such land that the owner has no objection to using the land for these purposes and has no claim whatsoever on any materials stockpiled on such land."

Before any payment for materials on site is certified by the Employers Agent, the Contractor shall submit to the Employers Agent for approval cessions from each of the Contractor's suppliers vesting ownership of materials delivered for use on the site or any authorised extended site to the Contractor.

Add the following new sub-clauses, (g), (h) and (i) after item B1209 (f):

"(g) Trade names

Where materials are specified under trade names, tenders must be based on these materials. Alternative materials may be submitted and the Employers Agent may, after receipt of tenders, approve the use of equivalent materials.

(h) Work in confined areas

This contract will take place under traffic within the suburban area and within an operational bus staging area. It will be necessary for the contractor to work in single lanes, confined areas and to construct narrow pavement layer widths. In certain places the width of pavement layers may decrease to zero and working space will be confined. The contractor must note that payment will be made in accordance with the specified, approved cross sections and dimensions only and that **no additional payment whatsoever will be made for work done in restricted areas**, irrespective of the method used to achieve these cross sections and dimensions. The tendered rates shall include full compensation for all special requirements, equipment and construction methods and for all difficulties encountered when working in confined areas, narrow widths and at or around obstructions. No claims for additional payment for working in confined areas and narrow widths will be considered.

(i) Work in Residential Areas

The work will generally be undertaken in or in close proximity to residential/ commercial/industrial areas and the Contractor shall price the works accordingly."

B1210 CERTIFICATE OF PRACTICAL COMPLETION OF THE WORKS

Add the following paragraphs after item (h):

"Notwithstanding that there might be natural or programmed sections of the works that will result in them being completed in their entirety before other sections, nor the issuing of drawings as previous sub-packages E02A and E02B, no consideration shall be given to the issuing of practical completion certificates for portions of the works. The use of any completed roadway or portions of the work, whether for unhindered use by the public or for accommodation of traffic while other portions are being constructed, shall not constitute use or occupation by the Employer.

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

(i) The estimated cost to complete the outstanding work is less than 2% of the tendered value of work plus the cost of any variation or extra work orders, but excluding CPA and VAT.
(ii) The written list of outstanding items of work can be completed within 28 days of the list having been accepted in writing by the Contractor.
(i) Any information in the contractor's possession, which is required by the Employer's Agent and has been requested in writing, has been supplied.

B1211 TRAFFIC OVER COMPLETED PAVEMENT LAYERS

Add the following:

"It is a specific requirement of this contract that traffic will have to be accommodated on completed pavement layers on certain road sections during peak hours and overnight. The final decision regarding the timing of opening of the completed pavement layers to traffic shall rest with the Employer's Agent. Completed asphalt surfacing shall not be opened to traffic until the asphalt has sufficiently cooled. The Contractor shall not allow construction equipment or public traffic, which is likely to cause damage, over the completed asphalt surfacing."

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

Under subclause (e) replace the opening paragraph with:

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

and add the following sub subclauses:

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

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

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

B1215 EXTENSION OF TIME RESULTING FROM ABNORMAL RAINFALL

Delete the entire clause and replace with the following:

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

Table B1215/1: Anticipated days lost due to normal inclement weather 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 Employer's Agent will certify a day lost due to inclement weather 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 inclement weather conditions will be calculated monthly as being equal to the absolute value of number of days certified by the Employer's Agent as lost due to inclement weather 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 Employer's Agent claims for all time lost due to inclement weather within 1 working day of the claim day. A record of inclement weather shall be kept by the Contractor and recorded at site meetings on a regular basis. The onus is on the Contractor to prove these claims."

B1216 INFORMATION FURNISHED BY THE EMPLOYER

Add the following after the second paragraph:

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

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

Add the following:

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

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

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

B1219 WATER

Add the following:

"The Contractor shall make the necessary arrangements for the provision of non-potable water such as treated effluent required by him for the execution of the works. Potable water shall not be used for construction purposes, unless otherwise instructed by the Employer's Agent.

Provisions have been made in the document for the installation of a borehole, if possible. This water may be used to supplement the water required for the project. The quality of the water will need to be tested regularly to ensure that it is compatible for the intended use."

B1224 THE HANDING-OVER OF THE ROAD RESERVE

Add the following:

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

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

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

The road reserve within the defined limits of the contract may fall within the limits of other contracts. These contracts relate to other services located within the road reserve as well as the following known contracts that are planned to take place within the project limits and during the same period:

- Construction contract for the installation of the superstructures for the IRT stations. The substructures will be constructed under this project.
- Construction contract for the installation of new Steenbras bulk watermain and associated secondary water lines within the Govan Mbeki road reserve. Access to the section of Govan Mbeki between the start (SV 0 – E02A) of the project and the New Eisleben Road Intersection (SV340 – E02B) may not be granted simultaneously with the remainder of the road section and access for this section may be

delayed by an estimated period of 8 months while the contractor on the Steenbras Watermain completes their work on this section.

The Contractor will be required to liaise and coordinate works with these above mentioned and other contracts."

B1229 SANS CEMENT SPECIFICATIONS

Add the following to this clause:

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

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

All cement products on site shall conform to the specification and shall bear the inspection seal or brand mark of the SANS (South African Bureau of Standards).

Further details of the latest codes and standards for cements is reference on the Concrete Institute website https://www.theconcreteinstitute.org.za/concrete-standards

For stabilization of pavement granular layerworks in this contract CEM II B-L 32.5 MPa or CEM II B -M 32.5 MPa shall be used."

Add the following new clauses:

"B1230 SANS BITUMEN SPECIFICATIONS

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

SANS 4001-BT1:2014 - Penetration Grade Bitumen's
SANS 4001-BT2:2012 - Cutback Bitumen
SANS 4001-BT3:2014 - Anionic Bitumen Road Emulsion
SANS 4001-BT4:2014 - Cationic Bitumen Road Emulsion
SANS 4001-BT5:2014 - Inverted Bitumen Emulsion

B1231 MATERIALS

(a) SANS Compliance

All products used on this contract shall, where a SANS specification exists for such product, conform to the specification and shall bear the inspection seal or brand mark of the SANS (South African Bureau of Standards).

(b) 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 Bill of Quantities are preliminary and should therefore be considered to be only approximate quantities. The Contractor shall, before ordering materials of any kind, confirm with the Employers Agent that he has the latest drawings and that no changes to the drawings are envisaged. The Employer will accept no liability whatsoever for materials ordered by the contractor unless they have been correctly ordered in accordance with written confirmation by the Employers Agent of the scope of intended work.

B1232 As-Built Plans

As-built plans shall be provided by the Contractor, where required, in order to inform all required parties of the state or design of existing infrastructure. The as-built plans shall include topographical surveys and/or CCTV footage.

(a) Topographical Surveys

Where topographical Surveys are required, these shall be undertaken by Professional Topographical Surveyor, registered as either a Professional Engineering Surveyor or Professional Land Surveyor in

terms of the Professional and Technical Surveyors' Act 40 of 1984 with the South African Council for Professional and Technical Surveyors (PLATO).

An electronically produced ASCII file in LYXZ format, an AutoCAD file and an Adobe pdf file shall be supplied by an independent surveyor (post construction survey) which shall include, but not be limited to, the centre points of all surface boxes (manholes, catchpits, valves, fire hydrants etc.), kerb face positions at beginning and end points of all curves and changes in direction invert levels of sewer and stormwater pipes, top and bottom of embankments etc.

The project name, company name and contact details must appear on the data set. Drawings shall be produced in different layers for each service. All attribute data, i.e. pipe sizes, materials, slopes, cover, lengths and invert levels, clearly indicated on the layout drawings, positioned at the entity. Grid positions to be indicated on all drawings which must be referenced in WGS84 coordinate system.

All survey shall be carried out in accordance with the standard specifications TMH 11 Standard Survey Methods and to the Variations and Additions as specified in Annex 8. Only topographic surveys are permitted with ground detail, contour and DTM surveys to Section 3.2.1.

(b) Closed-circuit television (CCTV) footage

The Contractor shall appoint a suitably qualified service provider to undertake Closed-circuit television (CCTV) camera inspections of all completed sewer main lines, prior to the completion of the main backfill. The footage shall be recorded and provided on a DVD with an accompanying written report for approval by the Employers Agent.

Where CCTV footage is required, this footage shall be provided on a CD and/or other approved digital submission, accompanied by a written report of all findings relating to the CCTV footage. The footage provided shall be clearly visible, as approved by the Employers Agent, and the portion of works for which separate footage was obtained shall be clearly indicated.

The Contractor shall ensure that the necessary health and safety precautions have been considered and applied before carrying out any surveys or gathering any footage."

B1233 MEASUREMENT AND PAYMENT

Item	**Unit**
B12.01 Payment to Service authorities for services relocation	
(a) Actual cost of relocation……	Prime Cost Sum (PC Sum)
(b) Contractors handling costs, profit and all other charges in respect of sub-item B12.01(a)……	Percentage (%)

Prime Cost sum items shall be paid for in accordance with the provisions of the General Conditions of Contract. The tendered percentage is a percentage of the amount actually spent under the relevant item, which shall include full compensation for the handling costs of the Contractor, and the profit in connection with providing the specified service.

This item is only to be utilised where items listed elsewhere in the bill of quantities (e.g. trenching and reinstatement of trenching, concrete encasement of services, concrete slabs over services, etc.) are not of a similar nature or similar scope of works required to relocate a specific service, or where nominated subcontractors are required to deal with the services.

Item	**Unit**
B12.02 Provision of Laboratory testing by the Employers Agent	
(a) Actual cost of Testing……	Prime Cost Sum (PC Sum)
(b) Contractors handling costs, profit and all other charges in respect of sub-item B12.02(a)……	Percentage (%)

Prime Cost sum items shall be paid for in accordance with the provisions of the General Conditions of Contract. The tendered percentage is a percentage of the amount actually spent under the relevant Prov Sum item, which shall include full compensation for the handling costs of the Contractor, and the profit in connection with providing the specified service.

Item	**Unit**

B12.03 Provision of Ground Penetrating Radar and electronic service detection devices

(a) Actual cost of Testing and interpretation……Prime Cost Sum (PC Sum)
(b) Contractors handling costs, profit and all other charges in respect of sub-item B12.03(a)……Percentage (%)

Prime Cost sum items shall be paid for in accordance with the provisions of the general conditions of contract. The tendered percentage is a percentage of the amount actually spent under the relevant item, which shall include full compensation for the handling costs of the contractor, and the profit in connection with providing the specified service.

The Contractor will be required to undertake and complete this exercise prior to the commencement of excavation for any other service, unless otherwise instructed by the Employers Agent. Data will need to be topographically surveyed and provided in AutoCAD .dwg format in WGS84 datum.

Item **Unit**

B12.04 Community Liaison Officer (CLO)

(a) Actual cost of remuneration of CLO……Prime Cost Sum (PC Sum)
(b) Contractor's handling costs, profit and all other charges in respect of item B12.04(a)……Percentage (%)

Prime Cost sum items shall be paid for in accordance with the provisions of the general conditions of contract. The tendered percentage is a percentage of the amount actually spent under the relevant item, which shall include full compensation for the handling costs of the contractor, and the profit in connection with providing the specified service.

The Contractor will be required to identify, interview and take into employment one or more Community Liaison Officers for the duration of the project. Details of the terms of employment are covered in C1.8.

Item **Unit**

B12.05 Supply and install borehole, complete with sump pump, electrical connection, pipework, fittings and all other incidentals.

(a) Actual Cost for supply, installation, testing and commissioning complete borehole…… Prime Cost Sum (PC. Sum)
(b) Contractor's handling costs, profit and all other charges in respect of item B12.05……..Percentage (%)

Prime Cost sum items shall be paid for in accordance with the provisions of the general conditions of contract. The tendered percentage is a percentage of the amount actually spent under the relevant item, which shall include full compensation for the handling costs of the contractor, and the profit in connection with providing the specified service.

Water sourced through the borehole may be used to supplement the water requirements of the project.

Item **Unit**

B12.06 As-built Information to Employers Agent's Specification

(a) Independent Topographical Survey by Professional Surveyor…….. Lump Sum

The tendered lump sum for the As-built Topographical Surveys shall include full compensation for all labour, plant, materials and incidentals required in order to undertake these topographical surveys by a Professional Surveyor in accordance to TMH 11 Standard Survey Methods Version 3.0 of April 2017 (or any updated version).

(b) CCTV Camera Inspection
  (i) Actual Cost for CCTV Camera Inspection……..……..Prime Cost Sum (PC. Sum)
  (ii) Contractor's handling costs, profit and all other charges in respect of item B12.06(b)(i)……Percentage (%)

Prime Cost sum items shall be paid for in accordance with the provisions of the general conditions of contract. The tendered percentage is a percentage of the amount actually spent under the relevant item,

which shall include full compensation for the handling costs of the contractor, and the profit in connection with providing the specified service."

B12.07 Provision for Relocation of Informal Structures

(i) Actual cost for relocation of informal structures……..……..……Prime Cost Sum (PC. Sum)
(ii) Contractor's handling costs, profit and all other charges in respect of item B12.07(a)..……Percentage (%)

Prime Cost sum items shall be paid for in accordance with the provisions of the general conditions of contract. The tendered percentage is a percentage of the amount actually spent under the relevant item, which shall include full compensation for the handling costs of the contractor, and the profit in connection with providing the specified service."

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

B1301 SCOPE

Add the following at the end of the first paragraph:

"This section also covers payment for the costs incurred for having to de-establish and for re-establishing, only under the written instruction of the Employers Agent."

B1302 GENERAL REQUIREMENTS

Add the following new subclauses after 1302 (c):

"(d) Services

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

(e) Security

The project is located in a high crime area. The Contractor shall take every precaution to ensure adequate safety and security on the Site of the Works and to protect the Works from theft and vandalism. The Contract shall be responsible for the safety and security of his personnel, plant, temporary works and permanent works, strict control of access, materials on site and the Works in general at all times (24hours a day for the full duration of the project). The Contract shall therefore continuously acquaint himself with the current and anticipated situation in the area with regard to safety and security (liaising with the local police as necessary) and shall provide all security measures (including the employment of accredited security services), as deemed necessary to comply with the requirements under this clause on the Contract.

No additional pay item is included for the provision of these safety and security measures and are deemed to have been included in the preliminary & general rates tendered.

The security as provided under item B14.11 is for use by the Employer or Employers Agent and shall be at the sole discretion of the Employers Agent."

B1303 PAYMENT

B13.01 Contractor's general obligations

Amend sub-item (c) as follows:

"Item **Unit**

B13.01 (c) Time related obligations

(i) for "start-up period"……. Week
(ii) for "construction works period"……..Week

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

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

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

The tendered sum for (ii) will be paid weekly, pro rata for parts of a week, from the date following the completion and receipt by the Employer of all requirements of Clause 5.3.1 (including sub-item (i)) until the end of the period for completion of the works, plus any extension thereof as provided in clause 5.12 of the general conditions of contract, provided that –"

Add the following new sub-items between the last paragraph and the second last paragraph:

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

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

Add the following new payment item, B13.02, after item B13.01:

"B13.02 Provisional general obligations

"(a) Extra over items 13.01(a), (b) and (c) for de-establishing and re-establishing upon written instruction from the Employers Agent……. Lump Sum (L/sum)

The unit of measurement for (a) shall be lump sum. Payment for the tendered lump sum shall be as follows: 50% shall be paid in the payment certificate after the complete de-establishment and the remaining 50% shall be paid in the payment certificate after re-establishment has been completed in full and to the satisfaction of the Employers Agent.

The rate tendered shall include full compensation for all costs incurred for de-establishing and re-establishing, where applicable. No additional payment shall be made and no claims will be considered for costs incurred in this regard."

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

B1402 OFFICES AND LABORATORIES

b) Offices

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

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

Add the following sub-clauses:

"(xviii) Plan holders which shall be able to accommodate 30 A0 – sized drawings hanging vertically and of a robust construction to withstand continuous use over the duration of the contract.

(xix) An electric refrigerator of specified capacity.

(xx) Floodlights which are to be controlled by a photocell for security purposes at the offices and laboratory. Floodlights shall be complete with poles and 500Watt minimum globes (or LED equivalent as may be approved by the Employers Agent)"

(xxi) Constant electricity supply.
A back up power supply (either generator or battery/inverter systems shall be provided for use during power outages. The power supply shall be regulated by a suitable voltage regulator in order to maintain a constant current and voltage level at all times to prevent damage to the office and related machinery during power surges. In the event of damage to the office and laboratory equipment and related machinery because of a faulty voltage regulator, the contractor shall be liable for payment of all repair or replacement costs of such damaged items. The costs for these shall be deemed to be included in 14.08."

Add the following item, B1402 (i), after 1402 (h):

(i) Guard Hut

A guard hut shall be provided for the security guard at the Employers Agent's offices. The hut shall have minimum dimensions of 1 m x 1.5 m for the internal floor area, 1.5 m wall height and shall be fitted with two windows. The hut shall also be equipped with a veranda with a roof covering this veranda. The cost for this guard hut shall be deemed to be covered under the contractos rates in Section 1300.

If so instructed by the Employers Agent, additional guard huts shall be provided in the work area. Any additional guard huts instructed by the Employers Agent will be reimbursed through payment item B14.11(c)."

B1404 SERVICES

Add the following new subitem:

(e) Internet connectivity

The contractor shall make available an internet connection with minimum speed of 10Mbps (upload & download speeds) for the sole use of the Employers Agents personnel. The connectivity shall also be equipped with Wi-Fi routers and boosters to ensure connectivity to all the Employers Agents personnel irrespective of the office layout chosen by the contractor.

B1406 MEASUREMENT AND PAYMENT

Add the following new sub-items:

"Item		**Unit**
B14.03	**Office and laboratory fittings Installations and equipment**	
(a)	Items measured by number	
(xix)	Electric kettle……..	Number (No)
(xx)	Plan holder……	Number (No)
(xxi)	Floodlights complete……..	Number (No)

B14.03 Office and laboratory fittings Installations and equipment
(b) Prime-cost items and items paid for in a lump sum:

(ix) Cell phone costs, including pro rata rentals,
for calls in connection with contract administration…….Prime Cost Sum (PC. Sum)
(x) Handling costs and profit in respect of Sub item 14.03 (b) (ix) above……Percentage (%)"

Add the following new sub-items:

"Item **Unit**

B14.08 Services
(e) Internet connectivity
(i) Fixed costs…… lump sum
(ii) Running costs…….week"

Replace the word "month" with "weeks" in the description paragraph.

Amend the title of item 14.10 as follows:

"B14.10 Provision of printer/scanner/copier facilities…….week**"**

Replace the first paragraph under item 14.10 with the following:

"The tendered rate per week shall include full provision for providing and maintaining an approved combination printer, scanner and copiers (capable of making A3-sized colour prints/copies) and its use, including all accessories such as paper, etc., for making a maximum of 1000 A4 prints/copies per month."

Add the following payment items.

"Item **Unit**

B14.11 Security measures for the Employers Agent

(a) Security dog including handler / security guard (PSIRA Registered)…….. week
(b) Security guard (PSIRA Registered)…….. week
(c) Guard huts…….week
(d) Actual cost of additional security as instructed……. Prime Cost Sum (PC Sum)
(e) Contractor's charges in respect of subitem B 14.11(a) above……Percentage (%)

The tendered sum shall include for the provision of 1(Number) trained security dog with handler / security guard in terms of (a) and 1 (Number) security guard under item (b). and 1 (Number) guardhut under item (c). These security personnel & equipment will be used where instructed by the Employers Agent.

The security personnel/ service provider shall be registered with the PSIRA (Private Security Industry Regulating Authority) in terms of the PSIR Act 56 of 2001. It should also be noted that security personnel handling dogs must be qualified in dog handling skills as required by the regulations.

The tendered rate per week for (a) & (b) shall include full compensation for the cost of the security personnel and security dogs to conduct their duties for a 24hr period. It should also include for all administrative, supervisory, operative and contingent costs, relating to the supply of personnel.

The tendered rate per week for (c) shall include full compensation for the cost of providing, maintaining, moving and overhead costs for the security hut but excluding security personell covered under (a) & (b).

The tendered sum for (a), (b) and (c) will be paid weekly, pro-rata for parts of a week, under the instruction of the Employers Agent and will only be valid from the commencement of the construction works period.

Expenditure under items (d) and (e) shall be made in accordance with the general conditions of contract.

The provisional sum is allowed to cover the cost of all authorized security required for the project and specifically instructed by the Employers Agent. The Measurement and payment shall be based on invoices submitted to the Employer's Agent.

The tendered percentage is a percentage of the amount actually spent under subitem (d) and shall include full compensation of all charges and incidental costs of the Contractor, profit and overheads in connection with the additional security."

SECTION B1500 : ACCOMMODATION OF TRAFFIC

B1502 GENERAL REQUIREMENTS

(a) Safety

Add the following after the end of the last paragraph:

"The site will be handed over to the Contractor at the commencement of the contract as described in C3.1 of this document. Traffic shall generally be accommodated on the existing road without deviations. The travelling public shall have the right of way on public roads, and the Contractor shall make use of approved methods to control the movement of their equipment and vehicles so as not to constitute a hazard on the road.

Furthermore, the Employers Agent will have the right to stop any operation where the traffic accommodation measures are not to specification or as ordered and the Employers Agent considers that the risk to the travelling public is unacceptable.

The contractor may not commence construction activities before adequate provision has been made to accommodate traffic in accordance with the requirements of this document and the latest edition of the South African Road Traffic Signs Manual and specifically the latest SARTSM, VOL2, CHAPTER 13.

The following additional conditions shall be adhered to:

i) All construction vehicles, equipment or plant left on the site during non-working hours shall be parked at approved areas.

ii) All self-propelled items of plant, heavy vehicles and delivery/staff vehicles to be used on the construction site shall be equipped with "Construction Vehicle" signs of a minimum size of 2.4 m x 0.6 m and amber flashing hazard lights. These lights shall be operational whenever the vehicles operate within the construction area. The type and mounting detail of the signs and flashing lights shall be to the approval of the Employers Agent. Flashing lights on vehicles shall be fitted and maintained at the Contractor's expense.

(iii) The following restricted working conditions will apply:

a. Working hours, where extended 24-hour lane closures will be required, are between sunrise to sunset on Mondays to Saturday, excluding special non-working days.
b. Only one traffic lane per direction may be closed to traffic at any given time. Closure of a traffic lane or partial lane will only be permitted once the traffic control facilities, temporary traffic diversions / deviations and the traffic accommodation plan has been approved by the relevant authorities and accepted by the Employers Agent.
c. All long-term 24-hour lane closures to be barricaded/fenced off with concrete New Jersey barriers for the duration of the lane closures.
d. Provision must be made for the Contractor's plant and materials delivery trucks to enter and leave the construction area with the least possible disruption to public traffic.

iv) If the Contractor wishes to work or is forced to programme his work as such that he is required to work after sunset, then permission shall be obtained from the Employers Agent and relevant traffic authorities at least 48 hours in advance.

Suitable approved lighting equipment, additional high intensity flicker lights and more security (if required) at the start of all construction areas shall be provided. Such additional requirements for lighting, security etc shall be at the contractors own expense unless the Contractor is specifically instructed to work at night."

Add the following paragraph at the end of Clause 1502 (g):

"Temporary entrance and exit roads from the existing open lanes or temporary stockpile/plant storage/campsite areas, if any, shall conform to the recommendations of the SARTSM Vol 2 Chapter 13 and must be approved by the traffic authorities and the Employers Agent beforehand."

(i) Traffic safety officer

Add the following after the second paragraph:

The Contractor shall submit a CV of the candidate to the Employer's Agent for approval before the candidate is appointed as the traffic safety officer.

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

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

Delete sub subclauses (ii) and (iii) and replace with the following

(ii) Record on neat and dimensioned sketches and submit to the Employer's Agent 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 Employer's Agent.

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 Employer's Agent 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.

(iv) Remove, transport, store, re-erect all temporary traffic control devices daily as required"

Add the following new sub subclauses:

(ix) The traffic safety officer/s shall be equipped with a cellular telephone and shall have a vehicle and sufficient labour at his disposal 24 hours a day including all special non-working days, and shall not be utilized for other duties. He shall be directly answerable to the contractor's site agent. The traffic safety vehicle shall be a truck with a capacity of approximately 1 ton and shall be equipped with a high visibility rear panel in accordance with the requirements of the SARTSM. The words "TRAFFIC CONTROL" shall be written on a warning sign in highly legible letters, not less than 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 Employer's Agent 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 (or LED equivalent). 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 Employer's Agent 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 Employer's Agent 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.

Add the following sub-clauses (j) and (k) after item B1502 (i) as amended:

"(j) Site Personnel

The contractor shall ensure that all his personnel are equipped with reflective safety jackets and other required PPE and that these are worn at all times when working on or near the travelled way. Any person found not wearing a reflective jacket and or other required PPE under these circumstances shall be removed from the site until such time as he is in possession of and wearing the required PPE.

(k) Traffic diversions

Add the following:

The Contractor's attention is drawn to the heavy volume carried on the affected roads and shall make due allowance therefore in his construction programme. Link AM peak hour traffic volumes for 2016 are provided in 4.3 of Section C4 of this document.

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

The Contractor shall submit a drawing showing details concerning each traffic diversion to the Employer's Agent for approval at least 7 working 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. Legally the the public must be notified at least 3 days before a closure is implemented.

(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 3 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. Temporary deviations may be required at certain road sections, junctions / intersections under this contract. Accommodation of traffic will generally be carried out by closing off one lane of traffic at a time and accommodating the traffic on the other lane(s), or in the case of the two-lane carriageway sections, partly onto the temporary-surfaced shoulder.

Temporary closure or occupation of traffic lanes will only be permitted as specified and the Contractor shall ensure that all traffic control facilities no longer applicable to the situation are removed or effectively covered.

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

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

(i) Individual work areas shall be clearly demarcated with traffic signs and delineators / cones as specified. The lengths and widths of the individual working areas shall be agreed with the Employers Agent in order to accommodate a working day's production in the case of operations within the roadway which are of short duration. Where longer working sections are practical, for example widening on the outer edges of carriageways, the lengths of the individual working areas and widths of encroachment onto existing shoulders shall be agreed with the Employers Agent with a view to accommodate safe access and egress for plant, labour and materials; adequate weave distance between access/egress points and exits so that heavy vehicles do not weave across traffic lanes in an unsafe manner; adequate clearance between barriers and the passing traffic; and adequate working space for the Contractor's operations.

(ii) Only one traffic lane per direction may be closed to traffic at a time. Where two lanes are required to be closed on a three-lane multilane directional roadway to create a work area, one lane shall be dropped at a time with a suitable stabilizing area between the two lane drop as shown on the drawings.

(iii) Closure of a traffic lane or partial lane shall be permitted only once the traffic-control facilities and temporary traffic diversions / deviations have been approved.

(iv) No work shall be carried out simultaneously on both sides of a carriageway.

(ii) A minimum single trafficable lane width of 3.4 m on all roads shall be maintained. This width may be reduced to 3.2m on single carriageway sections of Govan Mbeki Rd between the restricted working hour periods as defined in (xi) below (i.e. between 09:00 and 15:00), subject to the approval of the Employers Agent. This lane width requirement may result in the need for the temporary widening into the median to ensure the required width. Provisions for temporary widening have been included in the Schedule of Quantities.

(iii) For turning lanes the lane width may be reduced to 3.0 m and lanes on side roads may be reduced to 3.0 m with a minimum width of 2.7 m allowed for turning slots. All proposals shall be subject to the approval of the Employers Agent.

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

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

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

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

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

(v) Before re-opening a lane to traffic after work operations, temporary road marking as specified shall be applied.

(vi) Where there are sharp drop-offs or excavations adjacent to the traffic lanes, or workers are in close proximity to moving traffic causing unsafe working conditions, movable concrete barriers shall be placed adjacent to the trafficked lane for the full length of the work area.

(vii) Only approved barriers (see 1503(d)) shall be utilized. The approach ends of all barriers shall be protected with impact attenuators or if approved by the Employers Agent sand bags may be permitted.

(viii) A minimum clearance of 300mm shall be allowed between the shoulder line and the edge of the barrier. Exits and entrances to the working area shall be controlled with appropriate traffic control measures, impact attenuators and flagmen.

(ix) There shall be restricted working hours for any construction activities on the carriageways, or within the intersections, which negatively affect the traffic capacity during the peak periods. The restricted working hours for any operations which encroach onto the usable traffic lanes (excluding shoulders) shall be as follows

- 06:00 to 09:00: and
- 15:00 to 19:00.

The time periods given above are the times when no disruptive work shall be permitted within the usable lanes

(x) The operations which involve high volumes of heavy vehicle traffic, plant and materials shall be programmed and managed so that disruption to through traffic is minimised. The access and egress shall therefore be restricted during the peak operating hours.

(xiii) The safe passage of pedestrians shall be maintained at all times, in particular scholar access to the adjacent schools. Appropriate signage shall be provided to guide pedestrians through the work areas or to alternative pedestrian routes. For pedestrian or traffic safety reasons, the Employers Agent may order that open excavations next to the existing roadway or on pedestrian paths be temporarily backfilled, or that tipped material for the pavement layers be flattened, shaped and compacted. No payment (except for approved signs) for this activity shall be made but shall be deemed to the included under the tendered rates for traffic accommodation in the Bill of Quantities.

(xiv) The Contractor shall programme his work so that on extended special non-working day periods (e.g. December shutdown & Easter weekend), all existing traffic lanes shall be open to traffic across the full width of the existing carriageways in a safe manner including temporary and temporary markings or tapers.

- Transverse steps during these extended special non -working periods shall be tapered off at a slope of 1 vertical to 20 horizontal (1:20) to tie in with the existing surface.

- Longitudinal joints exposed to traffic shall be provided with a taper of compacted asphalt material over the full length of the exposed joint. The width of the taper shall be at least 5 times the difference in level between the old and new work.

Appropriate traffic control measures and signage shall be in place to warn the road user. During these non-working periods, the Contractor shall shut down normal construction activities and ensure that the maximum possible surfaced width is available to public traffic. Only emergency work shall be permitted and the traffic safety officer shall patrol during these non-working periods (excl December shut down) and ensure that all temporary traffic-control facilities are in place and functional. The accommodation of traffic team shall be on standby.

(xv) The Contractor shall make provisions in his programme for providing access to the station platforms for the stations superstructure contractor who's work on the station superstructure will commence prior to the completion of this contract.

(xvi) The planning and sequencing of the works shall also be based on access to the Govan Mbeki section between the start (SV 0 – E02A) of the project and the New Eisleben Road Intersection (SV340 – E02B) being delayed by an estimated period of 8 months while the contractor on the Steenbras Watermain completes their work on this section. The sequencing in the programme shall therefore be based on the initial works be undertaken between the New Eisleben Road Intersection to the end of the end project and also Emms Drive (excluding the watermain crossing of Govan Mbeki). After this estimated 8 months period continued coordination with the Steenbras watermain contractor will be required.

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

(n) Failure to comply with provisions

Failure or refusal on the part of the contractor to take the necessary steps to ensure the safety and convenience of the travelling public, accommodation of traffic, plant and personnel in accordance with these specifications or as required by statutory authorities or ordered by the Employers Agent, shall be sufficient cause for the Employers Agent to apply fines as follows:

A fixed fine of R10 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, a time-related fine of R2 500.00 per hour over and above the fixed fine shall be deducted for non-compliance to rectify any defects in the accommodation of traffic within the allowable time after the

Employers Agent has given an instruction to this effect. The Employers Agent'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 fine shall be applied from the time the instruction was given.

(o) Media Releases and Public Relations

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

B1503 TEMPORARY TRAFFIC CONTROL FACILITIES

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

"The contractor shall provide, erect and maintain the necessary traffic-control devices, road signs, channelization devices, barricades, warning devices and road markings (hereinafter referred to as traffic-control devices) in accordance with these special provisions and as shown on the drawings and in the SARTSM and remove them when no longer required. It shall be incumbent upon the contractor to see to it that the above-mentioned 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 and the drawings. The recommended arrangements of the traffic control devices illustrated and/or drawings issued by the Employers Agent shall not be departed from without prior approval of the Employers Agent. The arrangements expected to be most commonly used in the contract are given on the tender drawings.

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

(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 B1503(d).

Traffic channelisation shall be carried out by means of plastic type delineators (Sign TW401 / TW402) in accordance with SANS 1555. The sign face shall be 250 mm x 1000 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 only for roadmarking operations and other short-term lane deviations during daylight. Cones used on deviations shall be 750 mm high with suitable heavy bases to prevent the cones from being blown over by wind or turbulence from moving traffic.

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

d) Barriers

Add the following:

"Barriers for preventing vehicles from leaving the permitted lanes shall be movable barriers with an approved safety shape design (e.g. New Jersey, F-shape or single slope). Temporary movable barriers shall be obtained from suppliers and placed between the existing road and the construction areas. They shall comply with the requirements of either of the following specifications:

(i) The European Specification EN 1317 with containment level H1, or
(ii) The American Federal Highways Administration Specification NCHRP Report 350 with containment level TL4.

When applying these specifications the contractor must take cognisance of his liabilities relating to the installation of temporary works to provide protection to the permanent Works and safety to his personnel and select a barrier system appropriate to his chosen work methodology. Particularly pertinent is the working width rating of a barrier system; the displacement width of the system shall not exceed the available safe width to the nearest edge of the construction. All moveable barriers shall be installed in accordance with the manufacturer's instructions or generally accepted best practice and shall be submitted to the Employer's Agent for review and comment."

(e) Warning devices

Add the following after the first paragraph:

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

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

(i) Vehicle mounted flashing lights

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

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

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

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

(ii) Sign mounted flashing lights

Where work is anticipated to take place at night, two amber flashing lights shall be vertically mounted on top of the traffic signs at each end of each traffic accommodation section. The lights shall be operated during the hours of darkness..

(iii) Amber flashing lights for the Employer's Agent

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

The provision and maintenance of rotating amber flashing lights for the use of the Employer's Agent and his staff shall be paid under Item B15.17."

Add the following new subclauses:

(g) Other traffic control measures ordered by the Employer's Agent

The Employer's Agent 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 Employer's Agent. 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 Employer's Agent may arrange for advertising in the press and/or for other forms of publicity.

Add the following sub-items (h & i) after sub-item B1503 (g):

"(h) Flagmen

Flagmen shall be provided where shown on the drawings or required by the specification and by the Employers Agent. During the daytime, one flagman shall be provided to calm traffic down at the start of each closure (lane or shoulder closures) and one shall be provided to indicate to the traffic at the end of each closure. At night appropriate light shall be provided.

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 of 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.

"(i) 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 ten (10) 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 ten (10) percent of the scheduled items damaged by public traffic or stolen shall be payable at tendered rates."

B1517 MEASUREMENT AND PAYMENT

B15.03 Temporary traffic control facilities

Amend item B15.03(a) to read as follows:

"Item **Unit**

(a) 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 shall be measured as fractions of a man-day.

Flagmen required in terms of B1503(h) shall be covered under payment item B15.10."

(h) Delineators

Add the following sub items after item (h) (ii):

"(iii) Double sided reboundable lane dividers (1 000 mm x 250 mm) with continuous interlocking base 1 m long…… number (No)
(iv) Additional interlocking base for item B15.03(h)(iii)……..metre (m)

The unit of measurement for sub item B15.03(h)(iii) shall be the number (No) of interlocking lane dividers (1 m long) complete with attached delineator initially supplied and placed in position on site as agreed with the Employers Agent. The unit of measurement for sub item B15.03(h)(iv) shall be the length in metres of interlocking lane divider base only initially supplied and placed in position on site as agreed with the Employers Agent.

The tendered rates shall include full compensation for all costs incurred procuring, transporting and initial placement of the lane dividers and bases as instructed by the Employers Agent. The relocation of the interlocking lane dividers and bases to other areas on site shall be deemed to be covered under item 15.10"

Add the following new sub items:

(n) Media release
(i) Media release as approved by the Employer's Agent……Prov sum

(o) Other traffic control measures ordered by the Employers Agent:
(i) Provision of other traffic control measures …… Prov sum

(p) Covering of signs…….. square metre (m^2)
(q) Temporary information signs (TIN series)…… square metre (m^2)
(r) Moveable barriers (Plastic road barriers - 1000mm height)……. metre (m)

Change the paragraph headed "(g)" *to read* "(g), (p) and (q)".

Add the following new sub paragraphs (o)

The expenditure under item B15.03(n) and (o) shall be made in accordance with the general conditions of contract, sub-clause 6.6.1.

Add the following new sub paragraphs (r)

The unit of measurement shall be the metre of barrier provided as specified or as approved by the Employers Agent.

The tendered rates for the barriers shall include full compensation for provision thereof, maintenance in good working order, all movement of the barriers as required on site and the final removal of the barrier off site once no longer required."

Amend the title of item B15.10 as follows:

B15.10 Accommodation of traffic where the road is constructed in half-widths

Add the following sub-items before the first paragraph:

(a) *Indicate road section*……. kilometre (km)"

Replace the first paragraph with the following:

"The unit of measurement for the accommodation of traffic where the road is constructed in half-widths shall be the kilometre measured along the centre line of the road where the road is a single carriageway and shall be measure along the centre of the median where the road is a dual carriageway of the road.

Where provisions for payment have been made for intersecting roads the length shall be measure from the outer edge of the main through road (i.e. tie in location) along the centre line of the road tying into the main through road.

Flagmen required in terms of B1503(h) shall be included in this rate"

"Amend item B15.11 to read as follows:

Item Unit

B15.11 Traffic signals sets

(a) Supply of traffic signals sets…… number (No)
(b) Operation of signals……set-week

The unit of measurement for sub-item (a) shall be the number of traffic signal sets (one set consists of two traffic signals) provided and erected in position on site complete as specified.

The tendered lump sum shall include full compensation to provide equipment for construction areas, namely traffic signal lights on 2,5 m high steel poles complete with all electrical wiring, 3 m^2 all weather shelter complete with lighting, portable chemical latrines, generators and standby generators to provide electricity to traffic signals and floodlights, 2x400w metal halide floodlights, or LED equivalent, mounted onto a 5m pole bolted to a 1,5 m buried galvanised stem complete with electrical wiring, and the necessary personnel and flagmen approved by the Employer's Agent to operate these traffic signals in accordance with the SARTSM. The two-way communication devices are measured separately in item 15.03 (m).

The unit of measurement for sub-item (b) shall be the set-week, for the time each traffic signal system set is operational complete as specified.

The tendered rate per week shall include full compensation for the operation of the traffic signals, equipment, signs, lights, etc as specified. It shall also include the provision of power to operate the lights, replacing bulbs as required and keeping the lenses clean and visible."

Add the following new payment items after item 15.13:

"Item **Unit**

B15.14 Provision of traffic safety equipment for use by the Employers Agent

(a) Safety jackets (level 2, Alt. 1) ..... number (No)
(b) Rotating amber lights ..... number (No)

The unit of measurement shall be the number of each item provided as specified, and as approved by the Employers Agent.

The tendered rates for the various safety items shall include full compensation for provision thereof and maintenance in good working order.

Item **Unit**

B15.15 Traffic safety officer ..... Week

The unit of measurement shall be the period in weeks that the approved traffic safety officer/s are employed.

The tendered rate per month shall include full compensation for the cost of the traffic safety officer/s to conduct his duties as specified in sub-clause B1502 (i).

Item **Unit**

B15.16 Orange safety netting, 1.2 m high, secured onto stakes in white painted barrels:

(a) Supply and erect……metre (m)
(b) Remove from site……metre (m)

The unit of measurement for the orange safety netting shall be the metre of orange netting supplied and erected (a) and removed upon completion of the works (b).

The tendered rate shall include full compensation for all materials, plant and labour required in order to install this netting, complete with stakes, barrels and any incidentals, as required.

Item **Unit**

B15.17 Amber flashing lights mounted on signs ..... number (No)

The unit of measure shall be the number of lights provided.

The tendered number shall include full compensation to provide, erect, operate and maintain two amber flashing lights per sign at each end of the traffic accommodation sections. It shall also include the provision of power to operate the lights, replacing bulbs as required and keeping the lenses clean and visible.

B15.18 Temporary Barriers

(a) Supply to site, initial placement and removal from site……..metre (m)
(b) Dismantling and re-erecting barriers during the works……...metre (m)
(b) Renting of barriers……metre/month

The unit of measurement for subitems (a) and (b) shall be the metre of movable barrier as per B1503(d).

The tendered rate for subitem (a) shall include full compensation to supply the barriers to the site, initial placement and erecting in position and removal off-site when no longer required.

The tendered rate for subitem (b) shall include full compensation for dismantling and re-erecting the movable barriers and moving between locations on site where required, as and when approved by the Employers Agent.

The unit of measurement for subitem (c) shall be the metre of barrier required for the period in use in months. The tendered rate for subitem (c) shall include full compensation for the cost of general maintenance of the barriers, cost of insurance to replace structurally damaged barriers and other overhead cost.

B15.19 Penalty to be deducted for non-compliance with requirements for accommodation of traffic

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

In subitem B15.18(a) a fixed penalty of R10 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 (to subitem B15.18(b)), a time-related penalty of R2 500-00 per hour over and above the fixed penalty in subitem B15.18(a) shall be deducted for non-compliance to rectify any defects in the accommodation of traffic within two hours after an instruction to this effect has been given by the Employer's Agent. The Employer's Agent instruction shall state the time in hours for reinstatement 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.

SECTION B1600 : OVERHAUL

B1602 DEFINITIONS

(b) Overhaul

Replace the contents of sub-clause (b) with:

"Payment shall only be made for material hauled in excess of 5 kilometres. Overhaul shall be measured as the product of the volume of material hauled and the overhauled distance.

There shall be no overhaul on material from commercial sources."

(d) Free-haul distance

Replace the last sentence of sub-item (d) with the following:

"This distance shall be 5 kilometres in the case of all overhaul materials"

B1603 MEASUREMENT AND PAYMENT

Amend the title of item 16.02 as follows:

"Item	**Unit**
B16.02 Overhaul on material hauled in excess of 5.0 km to the nearest approved landfill site……	cubic metre kilometre (m^3km)"

Replace the payment description with the following:

"The unit of measurement shall be the cubic metre of overhaul material hauled in excess of 5,0 km multiplied by overhaul distance. The volume shall be calculated from the measured dimensions of the original position the material was removed from. Loose volumes in trucks will not be measured."

Delete the first paragraph of the first set of notes.

Add the following new item, B16.03 after item B16.02:

"Item	**Unit**
B16.03 Cost for spoiling at a Municipal Landfill Site	
(a) Actual surcharge cost……	Prime Cost Sum (PC. Sum)
(b) Contractor's Mark-up overhead costs and profit in respect of item B16.03 (a)……	Percentage (%)

Prime Cost sum items shall be paid for in accordance with the provisions of the general conditions of contract. The tendered percentage is a percentage of the amount actually spent under the relevant item, which shall include full compensation for the handling costs of the contractor, and the profit in connection with providing the specified service.

Detailed records of the registration numbers and time the truck leaving the site shall be kept provided to the Employers Agent. Only weighbridge dockets reflecting registration numbers corresponding to those that left the site shall be accepted for payment. The applicable rate per ton shall be the rate published annually by the City of Cape Town's Solid Waste Department."

SECTION B1700 : CLEARING AND GRUBBING

B1704 MEASUREMENT AND PAYMENT

Add the following new items B17.07 – B17.12 after item 17.06:

"Item **Unit**

B17.07 Remove topsoil to nominal depth (*depth specified*), stockpile, maintain or dispose off-site as directed by the Employers Agent……..……..cubic metre (m^3)

The removal of topsoil shall be measured per cubic metre for the depth(s) specified. The rates shall include full compensation for the removal and stockpiling of topsoil as specified in item 1702 (c) of this document as well as any incidental costs occurred.

Item **Unit**

B17.08 Demolish and dispose off-site, miscellaneous concrete or building structures……..……..cubic metre (m^3)

The unit of measurement shall be the volume, in cubic metres, of concrete or building demolished and disposed to an approved stockpile or spoil site.

The tendered rates shall include full compensations, inclusive of all plant, materials and labour required for breaking down, excavating, loading and transporting the material to an approved stockpile or spoil sites for a free-haul distance of 5.0km and for loading and properly placing the material in stockpile or spoil dumps.

The volume used for calculating overhaul shall be taken as 70% of the loose volume of the material measured in the hauling vehicles.

Note: This item specifically excludes any asbestos items, if any are encountered. Should any aspbestos products be encountered then this shall immediately be brought to the Employers Agents attention and special arrangements will be made for the safe handling and disposal of these items.

Item **Unit**

B17.09 Demolish, and dispose off-site, hydraulic structures, ducting and access chambers

(a) Pipes (All types, **–** *indicate size*)…….…… metre (m)

(b) Manholes…… Number (No)

(c) Catchpits, including foundations and frames of all sizes…… Number (No)

(d) Existing headwalls…… Number (No)

(e) Gate valves…… Number (No)

(f) Fire hydrants……. Number (No)

The unit of measurement for (b) to (f) shall be the number of manholes, catchpits, access chambers, etc, removed as instructed by the Employers Agent and (a) shall be for the linear metre of pipes of all types (excluding asbestos pipes). The tendered rate shall include full compensation for all the plant and labour needed and work that is necessary for excavations, breaking out, removing of manholes, catchpits, pipes and access chambers and transporting and disposing of materials offsite to a site determined by the Contractor, and approved by the Employers Agent, the Local Authority and the Environmental Officer, backfilling where required and inclusive of all costs relating to overhaul and associated taxes, and all additional costs due to inaccessibility.

Note: This item specifically excludes any asbestos items, if any are encountered. Should any aspbestos products be encountered then this shall immediately be brought to the Employers Agents attention and special arrangements will be made for the safe handling and disposal of these items.

Item **Unit**

B17.10 Remove and spoil existing kerbing and channelling of all radii

(a) Kerbs and Channel…… metre (m)
(b) Kerbing Only……... metre (m)
(c) Edging ……..……... metre (m)

The unit of measurement shall be the linear metre of existing concrete kerb and/or channels and edging removed as instructed by the Employers Agent.

The tendered rates shall include full compensation for all costs, materials, labour and plant required for the removal of kerbing and/or channels, including edging, granite and sandstone kerb and channelling, and spoiling offsite to a site determined by the Contractor, and approved by the Employers Agent, the Local Authority and the Environmental Officer, and inclusive of all costs relating to overhaul and associated taxes, and all additional costs due to inaccessibility. Granite and Sandstone kerbs and channels shall be removed with care and not be broken into smaller pieces and transported to a CCT Roads depot, as instructed by the Employers Agent, within a 25 km range from the site.

Item **Unit**

B17.11 Removal of sidewalk *(depth indicated)*, including layerworks and dispose material off-site …… square metre (m^2)

The unit of measurement shall be the square metre of existing sidewalk removed as instructed by the Employers Agent.

The tendered rates shall include full compensation for all costs, materials, labour and plant required for the removal of sidewalk, including existing layerworks and surfacing, and spoiling offsite to a site determined by the Contractor, and approved by the Employers Agent, the Local Authority and the Environmental Officer, and inclusive of all costs relating to overhaul and associated taxes, and all additional costs due to inaccessibility.

Item **Unit**

B17.12 Asbestos Specialist Services

(a) Actual costs of the asbestos specialist services……Prime Cost Sum (PC. Sum)
(b) Contractor's Mark-up overhead costs and profit in respect of item B17.12 (a)…… Percentage (%)

Prime Cost sum items shall be paid for in accordance with the provisions of the general conditions of contract. The tendered percentage is a percentage of the amount actually spent under the relevant item, which shall include full compensation for the handling costs of the contractor, and the profit in connection with providing the specified service."

Add the following new section to Series 1000: General of the Standard Specifications:
"SERIES 1000: GENERAL

SECTION B1800 : DAY WORK

CONTENTS
B1801 SCOPE
B1802 GENERAL REQUIREMENTS
B1803 LABOUR
B1804 MATERIALS
B1805 PLANT
B1806 MEASUREMENT AND PAYMENT

B1801 SCOPE

This section covers the evaluation and method of measurement and payment for work, ordered by the Employer's Agent in writing, carried out on a daywork basis, all in accordance with subclause 6.5 (GCC2015) of the General and/or Special Conditions of Contract.

B1802 GENERAL REQUIREMENTS

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

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

The Contractor shall keep and submit records of the work performed in accordance with the requirements of 6.5.4 (GCC2015) of the General and/or Special Conditions of Contract.

B1803 LABOUR

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

Gross remuneration, as specified in subclause 6.5.1.2.1 (GCC2015) of the general and/or special conditions of contract, will be deemed to include the following:

(a) Basic salary/wage

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

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

and costs payable due to statutory requirements, which may include:

- Workmen's Compensation Fund contribution
- Unemployment Insurance Fund contributions
- District Council levies or the equivalent thereof

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

B1804 MATERIALS

The nett cost price of materials (exclusive of VAT) actually delivered to the site to be included as daywork charges shall include the costs of delivery to the usual points at which materials are received on the site. Before ordering any material, the Contractor shall submit quotations to the Employer's Agent for his approval, and shall submit such receipts or vouchers to the Employer's Agent as may be necessary for proving the amount claimed.

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

B1805 PLANT

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

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

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

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

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

B1806 MEASUREMENT AND PAYMENT

Item		**Unit**
B18.01	**Labour charges**	
(a)	Unskilled labour……..	hour (h)
(b)	Semi-skilled labour……	hour (h)
(c)	Skilled labour…….	hour (h)
(d)	Ganger……	hour (h)
(e)	Foreman……	hour (h)
(f)	Surveyor (incl 2 labourers, survey equipment and transport)……	hour (h)

The unit of measurement shall be the hour of time worked by the particular employee on the designated work on instruction by the Employer's Agent.

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

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

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

Item **Unit**

B18.02 Material charges

(a) Procurement of materials…… Prime Cost Sum (PC. Sum)
(b) Contractor's handling costs, profit and all other charges in respect of sub item B18.02(a)……. Percentage (%)

Expenditure under this item shall be made in accordance with clause 6.6 of the General Conditions of Contract. The provisional sum allowed shall include for the actual cost incurred for materials used in authorised daywork. The actual costs for materials shall not be subject to contract price adjustment.

The tendered percentage is a percentage of the amount actually spent under subitem B18.02(a) and shall include full compensation for the handling costs of the Contractor, profit, overheads and incidentals in connection with materials used for daywork on the instructions of the Employer's Agent.

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

Item **Unit**

B18.03 Plant charges

(a) Compressor and three jackhammers (9cfm)…… hour (h)
(b) Tipper trucks
  (i) 6 m^3 …… hour (h)
  (ii) 10 m^3……hour (h)
(c) Tractor – loader – backhoe (TLB, 75kW) ……hour (h)
(d) Excavator (140kW)…… hour (h)
(e) Grader (CAT 140G or equivalent) ……hour (h)
(f) Compactor (BOMAG WB 90 or equivalent)……hour (h)
(g) Water cart (500 litre)…….. hour (h)
(h) Water truck (10 000 litre)……. hour (h)
(i) Front end loader (90 kW)…….. hour (h)
(j) 11 ton vibratory roller……. hour (h)
(k) Milling team, including plant and labour……. hour (h)
(l) Asphalt paving team, including plant and labour……... hour (h)
(m) Earthworks/gravel layers team, including plant and labour……. hour (h)
(n) In-situ (CIR) recycling team, including plant and labour…….. hour (h)

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

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

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

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

Item **Unit**

B18.04 Other plant / equipment not specified above

(a) Procurement of plant / equipment - Actual cost of plant / equipment not already specified in the tender by the Employer…….. Prime Cost Sum (PC. Sum)
(b) Contractor's handling costs, profit and all other charges in respect of sub item B18.04(a)……. Percentage (%)

The provisional sum provided to cover the cost of other plant / equipment shall be expended in accordance with clause 6.6 of the General Conditions of Contact.

Item **Unit**

B18.05 Transport

(a) LDV (1 ton)…… kilometre (km)
(b) Flatbed truck (5t load capacity), with crane……kilometre (km)

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

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

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

SECTION B2100 : DRAINS

B2104 SUBSOIL DRAINAGE

(a) Materials

(i) Pipes

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

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

"The pipes to be used shall be either slotted unplasticized PVC pipes or perforated double walled HDPE pressure pipes. For road subsoils and infiltration trenches, DN110 shall be used and DN75 shall be used in any retaining block walls."

(ii) Natural permeable material

Replace the third paragraph with the following:

"Crushed stone shall comply with the requirements given in SANS 1083: Table 5 and shall be of the nominal sizes given in the bill of quantities and in the drawings. "

(iii) Synthetic-fibre filter fabric

Add the following at the end of this sub-clause:

"Grade A2 quality geotextile shall be utilized."

B2107 MEASUREMENT AND PAYMENT

Amend the description of payment item 21.15:

"**Item** **Unit**

B21.15 Overhaul for material hauled in excess of 5,0 km free-haul (normal overhaul)……cubic metre- kilometre (m^3·km)"

SECTION B2200 : PREFABRICATED CULVERTS

B2203 MATERIALS

(a) Prefabricated concrete pipe culvert units

Delete the second sentence and replace with the following:

"Pipes of Class D loading with spigot and socket joints shall be used on this Contract."

B2212 INLET AND OUTLET STRUCTURES, CATCHPITS AND MANHOLES

Add the following new sub-clause after item B2202 (i):

"(j) Protection of manhole covers

Prior to commencing construction, the Contractor shall lower and protect all the manhole covers etc. which will be affected by the road construction to a depth where they will not be affected by the Contractor's operations. The Contractor shall give the relevant service authorities at least 7 days' notice prior to lowering the manholes to give the authorities the opportunity to attend to any work which must be accessed from the affected manholes. The manholes must be accurately referenced so that they can be located immediately in the event access to the manholes is required and also so that the new base layer is not unnecessarily disturbed when raising the manholes to the new final road level.

After completion of the base but before paving the asphalt surfacing, the manholes shall be raised so that they are either flush with the asphalt or lower than the asphalt by not more than 4 mm after the asphalt has been paved.

Manholes shall be raised into position prior to the asphalt surfacing. 1:10 ramps are to be placed around the raised manholes. Patching around manholes in the final surfacing is not acceptable. Any repairs are to be carried out in full lane width at an extents 10m before and after the manhole, all at the contractor's expense.

Prior to construction the conditions and cleanness of storm-water and sewerage pipes to be checked and recorded by the Contractor."

B2218 MEASUREMENT AND PAYMENT

Item	**Unit**

B22.01 Excavation

(a) Excavating soft material situated within the following depth ranges below the surface level

Amend the sub-items of item B22.01 (a) Excavation as follows:

"(i) From 0 m up to 1,0 m……. cubic metre (m^3)
(ii) Exceeding 1,0 m and up to 2,0 m…….cubic metre (m^3)
(iii) Exceeding 2,0 m and up to 3.0 m…….cubic metre (m^3)
(iv) Exceeding 3,0 m and up to 4,0 m…….cubic metre (m^3)

Item	**Unit**

B22.27 Reinstating trenches crossing roads:

Add the following item, B22.27 (f) after B22.27 (e):

"(f) Concrete encasement of stormwater pipe network (existing services) using class 20Mpa/20 concrete……cubic metre (m^3)"

Add the following to the payment item description after the second paragraph:

"The unit of measurement for (f) shall be the cubic metre of concrete placed as measured on site and agreed with the Employers Agent"

Add the following new payment items after item B22.28 (B22.29 – B22.33):

Item	**Unit**

B22.29 Protecting, raising, and/or lowering of existing manhole, survey markers valve covers etc. prior to milling and their later reinstatement to the revised final road level

(a) *Specify Element to be lowered/raised/etc*…….. number (No)
(b) *Specify element to be lowered/raised/etc*…….. number (No)

The unit of measurement shall be the number of manholes, valve boxes or survey marks etc. lowered and/or protected and later reinstated to the level and cross-fall of the revised final level prior to placement of the final wearing course.

The tendered rate shall include full compensation for all labour, equipment, materials and all else necessary to lower and/or protect the manhole, survey markers, valve boxes etc and to later reinstate these to the revised final level as well as for referencing the manholes and valve boxes etc. Each manhole shall be measured only once for the entire lowering and raising process. The tendered rate for survey markers shall also include the cost of re-surveying the survey markers. The Contractor shall be paid 50% of the tendered rate per manhole when the manhole is lowered and the remaining 50% when the manhole is raised.

Item **Unit**

B22.30 Extra-over item B22.01 for disposal of excavated material off-site to a spoil site located by the Contractor in Excess of 5.0 km free haul distance…….cubic metre (m^3)

The unit of measurement shall be the cubic metre of excavated material disposed off-site to an agreed spoil site located by the contractor including all disposal charges.

The tendered rate shall include full compensation for all costs incurred for the disposal, including all labour, plant, material and transportation and disposal costs.

Item **Unit**

B22.31 Convert existing catchpits into junction boxes……No (Number)

The unit of measurement shall be the number of catchpits converted into junction boxes.

The tendered rate shall include full compensation for all costs incurred for demolition of a portion of the existing catchpit, spoiling material with a free-haul of 5km, breaking in new pipework and making good, benching, brickwork, plastering, cover slab and backfill of material.

Item **Unit**

B22.32 Protection of existing services

(a) Services intersecting a trench or box cut
  (1) Type of Service…….. Number (no)
    (i) Diameter as specified in the BOQ
    (ii) Etc. for other diameters

  (2) Etc. for other services…… Number (no)
    (i) Diameter as specified in the BOQ
    (ii) Etc. for other diameters

(b) Services adjacent to a trench or box cut
  (1) Type of Service…… Metre (m)
    (i) Diameter as specified in the BOQ
    (ii) Etc. for other diameters

  (2) Etc. for other services…….…….. Metre (m)
    (i) Diameter as specified in the BOQ
    (ii) Etc. for other diameters

The unit of measurement for sub-item (a) shall be the number of existing services exposed from an intersecting trench whereby protective measures have been carried out as agreed with the Employers Agent and relevant service authority. The unit of measurement for sub-item (b) shall be the linear metre of existing services exposed from excavations whereby protective measures have been carried out as

agreed with the Employers Agent and relevant service authority. Services that are closer than 300 mm shall be deemed to be one service.

The tendered rates shall include all costs incurred for effective protection measures of exposed services and shall ensure that the existing exposed services are securely shored, strutted or slung and sufficiently protected to ensure that no damage can be done to them, including theft and vandalism."

	Item	**Unit**
B22.33	**Break into and connect to existing manhole**……	Number (No)

The unit of measurement will be the number of connections to existing manholes constructed.

The tendered rate shall include full compensation for all costs including materials, labour and plant for constructing a connection to an existing manhole and to make good to the satisfaction of the Employers Agent."

SECTION B2300 : CONCRETE KERBING, CONCRETE CHANNELING, CHUTES AND DOWNPIPES, AND CONCRETE LININGS FOR OPEN DRAINS

B2301 SCOPE

Add the following to Clause B2301 of the Specifications:

This section also covers the replacement of damaged kerbing.

B2302 MATERIALS

b) Kerbing, channelling and edging

Delete first paragraph and replace with the following:

All prefabricated kerbs, channels, edgings and inlet kerbs shall be of precast concrete units complying with the relevant requirements of SANS 927:2022 Amdt 4. Cross-sections of the various approved precast sections are shown on the drawings and tendered rates shall be based on the details on the drawings.

B2307 MEASUREMENT AND PAYMENT

Add the following new payment item after item B22.15:

"Item **Unit**

B23.16 Extra-over items 23.01 and 23.02 for the following:

(a) Dropped kerbs…….. metre (m)

The unit of measurement for (a) shall be the linear metre of concrete dropped kerb placed as measured on site and agreed with the Employers Agent.

The tendered rate for (a) shall include full compensation for any costs over payment items 23.01 and 23.02 for the construction of a dropped kerb, including transition kerbs, at a vehicular or pedestrian crossing or at any other location as directed by the Employers Agent."

SECTION 2000 : DRAINAGE

Add the new section B2500: MEDIUM PRESSURE PIPELINES:

"SECTION B2500 : MEDIUM PRESSURE PIPELINES

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B2500 PRESSURE PIPELINES
B2501 SCOPE
B2502 INTERPRETATIONS
B2503 MATERIALS AND TESTING
B2504 PLANT
B2505 CONSTRUCTION
B2506 TOLERANCES
B2507 TESTING
B2508 MEASUREMENT AND PAYMENT

B2500 PRESSURE PIPELINES

B2501 SCOPE

The provisions of *SANS 1200 L Clause 1 Scope* and all its sub-clauses shall apply.

B2502 INTERPRETATIONS

The provisions of *SANS 1200 L clause 2. Interpretations* and all its sub-clauses shall apply.

B2503 MATERIALS AND TESTING

(a) Pipe Materials

- All pipes, fittings and accessories shall be class 16, in compliance to the latest edition of the relevant SANS or ISO specifications and JASWIC approval.
- All bends, tee's reducers etc. to PVC pipes be Ductile Iron to EN 12842, fusion bonded thermoplastic coated internally and externally to minimum 0.25mm coating thickness.

"TABLE 2503/1: STEEL PIPE DETAILS

Nominal Size (mm)	Outside Diameter (mm)	Minimum Steel Thickness (mm)
75	88.90	4.50
100	114.30	4.50
150	165.10	4.50
230	241.30	4.50
305	323.85	4.50
380	393.70	4.50
460	469.90	4.50
535	546.10	6.00
610	622.30	6.00
685	704.85	6.00

(b) Valves

- All valves shall be in accordance with SANS 1200 or SANS 664/1974, and be approved by the Director: Water.
- Valves are to be of the resilient seal or wedge-gate type. Resilient seal valves.
- Valves shall be clockwise opening, left hand closing.
- Direction of opening is to be clearly marked on valve body or spindle cap.
- Valves shall be heavy duty; class 16.
- Valves shall have non-rising spindles.
- Valves shall be fitted with cast iron cap tops, secured with retaining bolts.
- Cast iron gate type valves shall be downright or approved equivalent.
- Only valves supplied with minimum thickness of 225 micron Copon EP 2300 epoxy paint applied to all internal surfaces after it has been thoroughly cleaned by grit blastings to SA 2 ½ finish in compliance with the requirements of SIS 05 09 00 or valves with similar approved coatings, will be acceptable.

- Valve chambers shall be constructed in accordance with the City of Cape Town's Drawing W1.
- Valve bell tobies shall be polymer concrete conforming to SANS 50124
- Valve covers for general purpose valves shall be painted blue and shall protrude about 25mm above ground level in non-paved areas.
- Valve covers for zonal valves and valves which generally remain closed, shall be painted red and shall protrude about 25mm above ground level.

(c) Fire Hydrants

- The position of all fire hydrants must be clearly marked with the appropriate symbol painted onto the road surface at the nearest point on the road, or by painting a kerb (1 m) yellow at the closest point on the same side as the hydrant.
- Fire hydrants shall be installed in accordance with SANS 1200, comply with the local Fire
- All Fire Hydrants shall be 65 mm diameter (internal).
- Outlets shall be London round thread with loose cap and securing chain.
- Hydrant spindles shall be provided with cast iron caps, secured with retaining bolts.
- Hydrants shall be clockwise opening / left hand closing.
- Only hydrants supplied with minimum thickness of 225 micron epoxy paint applied to all internal surfaces after it has been thoroughly cleaned by grit blastings to SA 2 ½ finish in compliance with the requirements of SIS 05 09 00 or hydrants with similar approved coatings, will be acceptable.
- Hydrant covers shall be polymer concrete conforming to SANS 50124 and shall be painted with a minimum of two coats yellow oil paint, or impregnated with yellow colouring during casting. The covers are to be secured to the frame with a galvanised chain or cable.
- Hydrants shall be supplied and installed complete with a flanged CI extension piece complete with cadmium-plated nuts and bolts to ensure depth not greater than 400mm.
- Hydrant chambers are to be constructed in accordance with Drawing IRT2A/B/CE/J35437/XX/6010/P/T0.
- Hydrants shall be installed at the end of dead "runs" for charging and bleeding the lines.

(d) Fittings and Specials

- Fittings and specials for uPVC pipes shall be cast iron or ductile iron with spigot and socket rubber ring joints and shall comply with the relevant requirements of SANS 966 or EN 12842.
- All cast iron or ductile iron fittings shall be fusion bonded thermoplastic coated internally and externally to a minimum thickness of 250 micron.
- Only stainless steel bolts and nuts shall be used on all fittings such as saddles, flanges, short collar couplings, etc.

(e) Bulk water meter chambers

- Bulk water meter chambers to be constructed in accordance with the City of Cape Town's Drawing W4
- Bulk water meter chambers to be painted externally with coats to approve water tightness.
- In the case of private developments, the valves directly after the bulk water meter chambers, shall be fitted with hand wheel, instead of a cast iron cap tops.

(f) Testing of Water Mains

- All water mains shall be pressure tested as specified in SANS1200-L with all fittings, specials and house connections and leadings in place.

(g) Corrosion Protection Specifications

- All mild steel pipes, specials and fittings with nominal diameter up to and including 150mm shall be hot dipped galvanized to sans 121 and sans 32. All steel pipes, specials and fittings with nominal diameter greater than 150mm shall be lined internally and coated externally with Protective Epoxy Paint Product applied in three coats of minimum 125 microns dft (dry film thickness) per coat to manufacturer's specifications.
- All bolts, nuts and washers for mild steel pipework shall be hot dip galvanised to SANS 121 and
- SANS 32. All bolts and nuts shall be grade 8.8 to SANS 1700 and ISO 898. Two washers shall be used with every bolt connection to prevent damage to coatings.
- Suitable isolation shall be provided between flanges, washers and bolts to prevent galvanic corrosion between dissimilar metals (e.g. between stainless steel and mild steel or cast iron). Shaft thread shall be covered with heat shrink insulation (or approved equivalent) and 3 mm Caf nonconductive washers shall be used with standard washers where dissimilar fittings are joined.
- Plain ended fittings shall be joined with approved couplings coated with 300 microns of a Polymer Resin product to the manufacture's specifications.

(h) Flanges

- All flanges to be drilled in accordance with BS 10 Table D.

B2504 PLANT

The provisions of *SANS 1200 L Clause 4 Plant* and all its sub-clauses shall apply.

B2505 CONSTRUCTION

The provisions of SANS 1200 L Clause 5 and all its sub-clauses shall apply.

Add the following to sub-clause 5.14 of SANS 1200 L:

"Water mains shall be laid so that the cover to the top of the pipe barrel from finished surface level is generally, but not less than 800 mm in case of water mains less than 300 mm in diameter and 1.0 m for mains and 300 mm or more diameter. During construction, cover shall be absolute minimum of 500 mm."

Add the following to sub-clause 5.2.1 of SANS 1200 L:

"Unless otherwise specifically detailed on the drawings, uPVC water pipes, specials and fittings shall coupled with spigot and socket joints fitted with rubber sealing rings. Viking Johnson couplings shall be used where pipes have to be cut to fit specials in designated positions."

Add the following sub-clause 5.3 of SANS 1200 L:

"Valves and hydrants shall be so sited that the valve spindle or hydrant outlet is directly opposite an erf side boundary or splay corner peg, to within 150 mm, or as otherwise dimensioned on the drawing. Where specials are required in close proximity of one another the minimum pipe length between specials shall not be less than one metre unless adequate precautions are taken to prevent excessive movement of the numerous flexible couplings.

The shortening of the adjacent pipes may be necessary to achieve the above and ensure compliance with the position of specials".

Add the following new item after item 5.10 of SANS 1200 L:

"5.11 Connecting to Existing Mains

Connections to existing mains shall be made under the supervision of the Local Authority. The Contractor shall supply all materials required for these connections. The Contractor shall expose the existing mains well in advance and coordinate the connection with the local authority."

B2506 TRENCHLESS TECHNOLOGIES

The following specifications shall also be applicable for all work relating to trenchless technologies:

- SASTT Technical Technical standard, trenchless construction works, Part TT3: Horizontal directional drilling, as published by the South African Society for Trenchless Technology (SASTT).
- Chapter 16 of the "City of Cape Towns – Standards and Guidelines for Roads & Stormwater Version 3.0

B2507 TOLERANCES

The provision of SANS 1200 L clause 6 Tolerances and all its sub-clauses shall apply.

B2508 TESTING

The provision of SANS 1200 L clause 7 Testing and all its sub-clauses shall apply.

Add the following to sub-clause 7.3 Standard Hydraulic Pipe Test of SANS 1200L:

"The Contractor shall do the required test in the presence of the Employers Agent. All test pressures shall be taken as 1800 kPa (18 bar). No payment for pipe laying will be made prior to testing, disinfections and acceptance of pipelines.

No testing against closed valves will be allowed unless approved by the Employers Agent. Field tests on mains shall be carried out, prior to the installation of saddles, ferrules and/or erf connections.

Water pipelines once disinfected are to be tested as per Policy No. EH 04/06 (included in Annex 9). A Health Clearance Certificate will be required prior to Practical Completion or occupation of the site."

B2509 MEASUREMENT AND PAYMENT

Item **Unit**

B25.01 Supply, lay, bed, test, disinfect pipes complete with couplings on Class C bedding

(a) Class 16 uPVC pipes to SANS 966 with spigot and socket ends in 6 m lengths
(i) *Diameter and type as specified in the bill*……..metre (m)

(b) Etc. for other types and class specified
(ii) *Diameter and type as specified in the bill*……..metre (m)

The unit of measurement shall be the metre of pipeline laid. No deduction will be made for specials and valves. Separate items will be scheduled for each diameter and each type and class of pipe laid. The rates shall include full compensation for the provision of pipes complete with couplings, and the costs of the handling, inspecting, transporting, bedding, laying, jointing, cutting, testing, when relevant disinfecting of the pipes and the joints and the necessary testing required for issue of a Health Clearance Certificate (See 8.2.4).

Excavation and backfilling of trenches shall be measured separately under items B22.01 and B22.02 respectively. Attention is drawn to sub-clauses 2205 (a) and (b) which shall apply in particular.

Item **Unit**

B25.02 Extra over items B25.01 for supply, lay, joint, bed, cut pipes, test and disinfect on Class C Bedding

(a) Tees (*type/size as specified in the bill*)……Number (No)
(b) End Caps (*type/size as specified in the bill*)…… Number (No)
(c) Bends (*type/size as specified in the bill*)……Number (No)
(d) Valves *(type/size as specified in the bill*)…….…… Number (No)

The unit of measurement shall be the number of specials installed.

The tendered rate shall be extra over the rate for pipework and shall include full compensation for the supplying and installing of extras as well as cutting of pipe, jointing, testing and disinfecting the installed specials. Specials and valves will be measured by the number of each type, class, and size. The supply and construction of valve chambers shall be scheduled separately under item B25.04.

No extra payment over and above the rates will be made in respect of any additional cutting, turning, and drawings.

Unless specific provision is made in the schedule, no separate payment will be made for the supply and fitting of any additional joints and jointing materials which may be required for the connection of shortened pipe lengths.

Item **Unit**

B25.03 Fire Hydrants *(describe)* ……. Number (No)

The unit of measurement shall be the number of the fire hydrants installed in accordance with the standard details.

The tendered rate shall include full compensation for the supply, installation, testing and commissioning of fire hydrants in hydrant chambers. The supply and construction of valve chambers will be scheduled separately under item B25.04.

Item **Unit**

B25.04 Valve chambers and Hydrant chambers complete including all cast iron surface boxes in accordance with standard details

(a) *Type as specified in the bill*…….. Number (No)

Valve and hydrant chambers, manholes, etc. will be measured as complete units. The rate shall include full compensation for additional excavation materials, plant, and labour necessary for the complete construction including the installation of the surface boxes or covers.

The provision of SANS 1200 L sub-clause 8.2.13 shall apply.

Item **Unit**

B25.05 Anchor / Thrust blocks and pedestals in accordance with standard details

(a) Concrete (*strength and type as specified in the bill*)…….cubic metre (m^3)
(b) Formwork……...square metre (m^2)

The unit of measure for (a) above shall be the cubic metre of concrete as measured from the standard details. The tendered rate shall include full compensation for the procurement, delivery to site, placement of the concrete and all labour and equipment required to place the concrete.

The unit of measure for (b) above shall be the square metre of formwork required to cast the thrust block/anchor/pedestal etc. as measured off the standard details. The tendered rate shall include full compensation for all materials, labour and equipment required to correctly erect the formwork to the Employers Agents satisfaction.

Item **Unit**

B25.06 Connection/cutting into existing water mains including cutting of pipes and all couplings and fittings

(a) *Type as specified in the bill*……..Lump Sum

The unit of measurement shall be per lump sum of connections into the existing live main. The tendered rate shall include full compensation for connection to a stub on an existing main. Different sizes shall be scheduled separately.

Item **Unit**

B25.07 Concrete encasing for pipelines…….cubic metres (m^3)

The unit of measurement shall be cubic metres of concrete. The rate shall include full compensation for the encasing of the pipeline in 20 MPa concrete in short sections including formwork as may be required as described above.

Concrete for encasing will be measured nett and will exclude the volume of the pipeline.

Item **Unit**

B25.08 Supply bulk metered water connection complete including chamber in accordance with standard details

(a) *Type as specified in the bill*……Number (No)

The unit of measurement shall be the number of metered connections.

The tendered rate shall include full compensation for the supply of all components and the installation in accordance with the standard details.

Item **Unit**

B25.09 Break into and connect to existing water main chamber and make good……..Number (No)

Connecting into the existing main chamber shall include breaking into the existing wall, cutting into the existing line, where applicable, connecting new line(s) to the existing water main and making good the water main chamber. In order to undertake this item, the Contractor should liaise with the relevant City official for the required cut-off and commissioning times. Rates shall include all costs for labour plant, materials and any incidentals required in order to undertake this item to the required degree of accuracy. Rates supplied shall be per number of water main chambers.

B25.10 Directional Drilling for Driveways and Road Crossings complete with sleeves by accredited company:

(a) Establishment and de-establishment of directional drilling / plant, crew and equipment…….. Number (No)

(b) Excavation for launch- and receiving pits…….cubic metre (m^3)

(c) Drilling/boring for the installation of product pipes up to 300mm diameter

(i) (*lengths as specified in the bill*)…… metre (m)

(d) Extra-over for removal of excess mud (bentonite) for directional drilling only, upon completion……..cubic metre (m^3)

(e) Backfill, compaction and reinstatement of excavations upon completion……cubic metre (m^3)

The unit of measurement for (a) shall be the number of establishments and de-establishments made, with each number representing the establishment/de-establishment pair.

The tendered rate for (a) shall include full compensation for establishment and de-establishments, including all materials, plant and labour required. The unit of measurement for (b) shall be the cubic metre of materials excavated for the launch and receiving pits.

The tendered rate for (c) shall include all excavation and stockpiling of material. The unit of measurement for (c) shall be the linear metre of drilling/boring for each diameter indicated in the Bill.

The tendered rate for (d) shall include full compensation for all costs associated to drill/thrust the specified diameters specified. The unit of measurement for (d) shall be the cubic metre of excess mud removed. The tendered rates for (d) shall include full compensation, inclusive of all plant, labour and materials required, in order to remove the excess mud (bentonite).

The unit of measurement for (e) shall be the cubic metre of materials used in order to backfill the excavation. The tendered rates shall include full compensation for backfilling, compacting to minimum 93% MDD density and reinstatement of excavation upon completion.”

SECTION 2000 : DRAINAGE

Add the following new section:

"SECTION B2600 : CABLE DUCTS

CONTENTS

B2601 SCOPE
B2602 INTERPRETATIONS
B2603 MATERIALS
B2604 PLANT
B2605 CONSTRUCTION
B2606 TOLERANCES
B2608 MEASUREMENT AND PAYMENT

B2601 SCOPE

This section covers the supply, laying and bedding in trenches of pipes as ducts for the protection of telephone and electric power cables and irrigation pipelines.

B2602 INTERPRETATIONS

The provisions of SANS 1200 LC clause 2 and all its sub-clauses shall apply.

B2603 MATERIALS

Ducts

Telkom ducts shall be 110 mm diameter uPVC pipes and will be supplied free of charge. The Contractor shall liaise with Telkom regarding the collection/delivery of pipes.

Electricity and irrigation ducts shall be 110 mm and 160 mm nominal diameter uPVC Class 4 pipes supplied by the Contractor. Duct shall comply with SANS 791.

Ducts shall be colour coded for the various service providers, as follows:

TABLE B2603/1: DUCTING COLOURS

Colour	Service Description
Dark Green	Telkom
Purple	Dark Fibre Africa
Light Blue	Telecomms (Includes Communication for CCTV)
Light Green	Neotel
Yellow	MTN

B2604 PLANT

The provisions of *SANS 1200 LC clause 4 Plant* and all its sub-clauses shall apply.

B2605 CONSTRUCTION

The provisions of *SANS 1200 LC clause 5 Construction* and all its sub-clauses shall apply.

Add the following clauses to 5.1 of SANS 1200 LC:

"Trenches shall be in accordance with SANS 1200 drawing LC-1, except where indicated to the contrary.

Where this specified depth is such that the level of the duct conflicts with other service pipes, the Employers Agent will modify the duct depth so as to pass over or under the service pipe"

Add the following clauses to 5.8 Road Crossings of SANS 1200 LC:

"Ducts together with draw-wires shall be laid at right angles across road carriageways unless otherwise indicated on the drawings and shall extend 1.0m beyond the edge of the back of sidewalks or 1.0m beyond face of kerb or as indicated by the Employers Agent."

Add the following clauses to 5.9 Duct Route Markers of SANS 1200 LC:

"Notwithstanding the method of marking specified in sub-clause 5.9 and the positions of the marked specified in sub-clause 5.10, the Contractor shall mark the position and type of all ducts on kerbs by cutting the following symbols 5mm deep into the concrete surface with an angle grinder.

E for electricity ducts
T for Telkom ducts

After the symbols have been cut a number of notches shall be cut next to the symbol indicating the number of ducts laid. The symbol and figure shall be painted with an approved colour paint.

After the laying of road kerbs and channels the Contractor shall expose the ends of the ducts before marking the position of the duct crossing. The subsequent backfilling of the duct ends shall not be carried out until the Employers Agent's Representative has inspected and approved the position of the markings. The tolerance on marking shall be such that when a line is strung over the centre of the markings the centre of the ducts or duct groups shall be within 150 mm either side of the line"

B2606 TOLERANCES

The provisions of *SANS 1200 LC clause 6 Tolerances* and all its sub-clauses shall apply.

B2607 TESTING

The provisions of *SANS 1200 LC clause 7 Testing* and its sub-clauses shall apply.

B2608 MEASUREMENT AND PAYMENT

Item **Unit**

B26.01 Excavate in all materials for trenches; backfill, compact and dispose of surplus material. Trench widths to SANS 1200 LC drg LC-1

(a) Trenches for single ducts for 110 mm…….. metre (m)
(b) Trenches for two ducts for 110 mm…….. metre (m)
(c) Trenches for four ducts for 110 mm……..metre (m)
(d) Trenches for eight ducts for 110 mm…… metre (m)
(e) Trenches for two ducts for 160 mm…….. metre (m)
(f) Trenches for four ducts for 160 mm……. metre (m)
(g) Trenches for six ducts for 160 mm…… metre (m)
(h) Trenches for eight ducts for 160 mm…… metre (m)
(i) Trenches for ten ducts for 160 mm…….. metre (m)

The provisions of *SANS 1200 LC* sub-clause *8.2.2(a) Excavation* shall apply.

Item **Unit**

B26.02 Supply, lay, bed and prove ducts including draw wires. All ducts to be class 4 uPVC ducts to SANS 791 with sleeve type couplings

(a) Trenches for single ducts for 110 mm…….. metre (m)
(b) Trenches for two ducts for 110 mm…….. metre (m)
(c) Trenches for four ducts for 110 mm……..metre (m)
(d) Trenches for eight ducts for 110 mm…… metre (m)
(e) Trenches for two ducts for 160 mm…….. metre (m)
(f) Trenches for four ducts for 160 mm……. metre (m)
(g) Trenches for six ducts for 160 mm…… metre (m)
(h) Trenches for eight ducts for 160 mm…… metre (m)
(i) Trenches for ten ducts for 160 mm…….. metre (m)

The provisions of SANS 1200 LC sub-clause 8.2.5 shall apply.

"Item **Unit**

B26.03 Import bedding material

(a) Non plastic bedding sand ….…..... cubic metre (m^3)

The provisions of SANS 1200 LC sub-clause 8.2.6 shall apply.

A separate item will be scheduled for each selected material obtained from designated sources. The rate shall include full compensation for acquiring, loading, and transporting the material from the designated source, and of distributing the material along the length of the trench.

Item **Unit**

B26.04 Concrete encasement of ducts (20Mpa/20)…….cubic metre (m^3)

The unit of measurement shall be cubic metre of concrete in place. Quantities shall be calculated from the dimensions shown on the drawings or as authorised. No deduction in volume measured for payment shall be made for the volume of reinforcing steel, inserts and pipes or conduits up to 160mm in diameter embedded in the concrete.

The tendered rate shall include full compensation for the encasement in 20MPa/20 concrete of duct group including excavating, backfill, procuring and furnishing all the materials, storing the materials, providing all plant, mixing, transporting, placing and compacting the concrete, curing and protection of the concrete, and disposal of surplus material off site.

SECTION 2000: DRAINAGE

Add the following new section:

"SECTION B2700: SEWER

CONTENTS

B2701 SCOPE
B2702 INTERPRETATIONS
B2703 MATERIALS
B2704 PLANT
B2705 CONSTRUCTION
B2706 TOLERANCES
B2707 TESTING
B2708 MEASUREMENT AND PAYMENT

B2701 SCOPE

The provision of *SANS 1200 LD clause 1 Scope* and all its sub-clauses shall apply.

B2702 INTERPRETATIONS

The provision of *SANS 1200 LD clause 2 Interpretations* and all its sub-clauses shall apply.

B2703 MATERIALS

(a) Pipe Materials

- 110 to 160 uPVC Class 34
- 100 to 300 Class 34 heavy duty complying to SANS 966 using spigot and socket rubber ring joints or Fibre cement C.O.D. Class D bitumen dipped complying to SANS 1223 with Triplex Couplings
- >300 mm as specified by the Technical Support Services Manager of the relevant Administration.
- All pipes, fittings and accessories shall comply with the latest edition of the relevant SANS specification.

(b) House Connections

- Refer to drawing S5.
- Sewer house connections shall be 110 mm nominal diameter and shall extend 1m into the erf boundary.
- The sewer house connection shall be terminated with an end cap, rodding eye or boundary chamber. In low income housing developments where the house is constructed within 2 m from the road reserve the house connection shall be extended so that the rodding eye is positioned against the house wall, orientated to facilitate rodding.
- Shared connection for two properties will only be permitted in low income housing projects.
- House connection depth shall generally be 1,0 m, but deep enough to drain the furthest possible point of an erf. House connections shall not be deeper than 1,2 m.
- Junctions and specials to be same wall thickness as the sewer main.
- Each house connection shall be linked to the main with a Y-junction or be connected at a manhole.
- The position of the house connection shall be marked on the kerb by cutting a slot 5 mm deep into the concrete surface with an angle grinder. The slot shall be painted with an approved paint.
- Marker posts to be installed at sewer house connection points to consist of 75 mm x 150 mm x 1 000 mm concrete edging stones placed vertically, protruding 100 mm above finished ground level.

(c) Manholes

- Refer to drawing S1.
- Manholes shall be provided at all horizontal and vertical changes in direction, at all pipe junctions and end points.
- All pipe connections excluding backdrop connections shall be crown to crown.
- Manholes are to be precast concrete ring type manholes (minimum 1 050mm diameter) with precast top slabs up to 2.5m in depth. Deeper manholes to be solid
- Dolomite aggregate and low alkali sulphate resistant cement to SANS 471 shall be used for all concrete, mortar and screeding.
- All brickwork shall be plastered internally and externally
- All manholes shall be watertight. – See Drawing S1 when using manhole rings
- Connecting pipework shall be fitted with flexible joints.
- Maximum distance between manholes shall be 90 m.

(d) Rodding Eyes

- The following requirements will be adhered to when installing rodding eyes:
- Long radius bends must be used at rodding eyes.
- The rodding eye must be covered with a standard Heavy Duty manhole cover and frame as. Refer to Drawing S2.

B2704 PLANT

The provisions of *SANS 1200 LD clause 4 Plant* and all its sub-clauses shall apply.

B2705 CONSTRUCTION

The provisions of *SANS 1200 LD clause 5* Construction and all its sub-clauses shall apply.

B2706 TOLERANCES

The provisions of *SANS 1200 LD clause 6* Tolerances and all its sub-clauses shall apply.

B2707 TESTING

The provisions of *SANS 1200 LD clause 7* Testing and all its sub-clauses shall apply.

Add the following to sub-clause 7.2 Tests and Acceptance/Rejection Criteria of SANS 1200 LD:

"All acceptance tests shall be carried out in the presence of the Employers Agent's Representative in accordance with the air test.

The following test is to be carried out on the completed manhole before it is backfilled in the case of a brick manhole and after backfilling in the case of a precast manhole.

The manhole shall be completely filled with water and allowed to stand for 24 hours. At the end of this period enough water shall be added to refill the manhole and in the subsequent period of 24 hours the water level shall not drop by more than 75 mm per metre of depth of the manhole measured from the channel invert of the underside of the concrete cover slab."

B2708 MEASUREMENT AND PAYMENT

Item	**Unit**

B27.01 Supply, lay, bed (Class C) prove and test, including couplings, pipes to SANS 791

(a) Class 34 uPVC heavy duty (*Diameter as specified in the bill*)……. metre (m)
(b) Class 16 uPVC heavy duty (*Diameter as specified in the bill*)……..metre (m)

The pipeline will be measured linearly on slopes overall as laid. No deductions will be made for specials, but deductions will be made for the internal length of manholes.

The tendered rates shall include full compensation to cover the cost of providing the pipes and the cost of laying, bedding, jointing, making connections into manholes, testing the pipeline.

Excavation and backfilling of trenches shall be measured separately under items B22.01 and B22.02 respectively. Attention is drawn to sub-clauses 2205 (a) and (b) which shall apply in particular.

Item	**Unit**

B27.02 Extra-over item B27.01 for specials

(a) *Special as specified in the bill*…….. Number (No)

The unit of measurement will be the number of specials laid. Separate items will be scheduled for specials of each type and size.

The tendered rates shall include full compensation for these specials and shall cover the cost of supplying, laying, bedding, jointing, and testing each special.

Item	**Unit**

B27.03 Manholes and chambers complete with cover and frame in accordance with standard details

(a) Manholes in accordance with CCT Standard Details Drawing S-1 in CCT Standards Document, type with 1050mm diameter rings for depth as follows:

(i) Over 1.0 m and up to 1.5 m……. Number (No)
(ii) Over 1.5 m and up to 2.0 m……. Number (No)
(iii) …etc. in depth increments of 0.5 m.

The unit of measurement shall be the number of manholes constructed complete in accordance with the standard details and as measured according to its depth category.

The tendered rate shall include full compensation for procurement of the concrete rings, covers and frames, bases, steps and all plant labour and other materials required to construct the full manhole as per the standard details.

Depth of manholes shall be defined as the distance from the top of the cover to the lowest invert level of the manhole.

	Item	**Unit**
B27.07	**Break into and connect to existing manhole**……	Number (No)

The unit of measurement will be the number of connections to existing manholes constructed.

The tendered rate shall include full compensation for all costs including materials, labour and plant for constructing a connection to an existing sewer manhole and to make good to the satisfaction of the Employers Agent. The rate shall also include flexible joints and making good of all benching.”

SECTION 3000 : EARTHWORKS AND PAVEMENT LAYERS OF GRAVEL OR CRUSHED STONE

SECTION B3200 : SELECTION, STOCKPILING AND BREAKING-DOWN THE MATERIAL FROM BORROW PITS, CUTTINGS AND EXISTING PAVEMENT LAYERS, AND PLACING AND COMPACTING THE GRAVEL LAYERS

Replace 3203 with the following:

"B3203 STOCKPILING THE MATERIAL

"The contractor shall so plan his activities that materials excavated from existing pavement layers and cuttings, in so far as is possible, can be transported direct to and placed at the point where it is to be used. However, where utilizing materials in this manner is impracticable, and, if so instructed by the Empoyers Agent in writing, it shall be temporarily stockpiled for later loading and transportation to where it will be used. Compensation for stockpiling materials will be payable only in regard to material stockpiled in accordance with the Empoyers Agent written instructions.

The temporary stockpiling of material within the cutting area in heaps with a view to loading, or any other stockpiling method used in connection with the loading method adopted by the contractor in the cutting, will not be classified as temporary stockpiling. The costs for these processes will be deemed to be covered by the rates for the various items of work for which material so stockpiled is used.

Stockpiling areas shall be identified by the contractor and approved by the Empoyers Agent. Before any stockpiling of material may be done, the site shall be cleaned, and all loose stones or any vegetation or other material which may cause contamination shall be removed. A stockpiling management plan shall be compiled by the Contractor and submitted to the Employers Agent for approval and destintive areas shall be allocated for the various types & quality of materials.

After the stockpiled material has been removed, the site shall be reinstated as closely as possible to its original condition, and the surface shall be lightly scarified to promote vegetation growth.

Payment will be made for stockpiling the material from existing pavements only if the material is intended for re-use and if its stockpiling has been approved or directed by the Empoyers Agent.

(a) Stockpiling of topsoil

Dedicted topsoil stockpiles shall be created at the stockpile site and shall be carefully managed to minimise any contamination of the topsoil materials with any other materials.

Topsoil stockpiles shall not be moved unless authorised by the Employers Agent.

(b) Stockpiling reclaimed asphalt and reclaimed pavement materials

Each stockpile of reclaimed asphalt (RA) shall be constructed in such a manner that will restrict segregation and compaction of the stockpiled material as follows:

- Each stockpile shall not exceed 1000 t.
- The stockpile shall not exceed a height of 2,5 m to prevent consolidation of the RA.
- The RA stockpile shall be located on the sloping stockpile site so that the water drains away from the loading end.
- The stockpile shall be shaped so that water drains off the top and down the stockpile side slopes.
- Side slopes shall not be steeper than 1 vertical(V) : 2 horizontal(H).
- The loads of RA shall be dumped uniformly over the entire RA stockpile area.
- A light bulldozer or front-end loader shall then doze the material into a ramp-shaped stockpile, in layers.
- Careful management of the stockpiled RA shall be undertaken to ensure that consolidation of RA does not occur.
- Travel on the stockpile by heavy equipment such as the front-end loader or the light bulldozer shall be minimized.
- Trucks shall not travel on the stockpile.

Each stockpile of reclaimed pavement materials shall be constructed in such a manner that will restrict segregation and compaction of the stockpiled material as follows:

- Each stockpile of reclaimed material shall not exceed a height of 3,0 m.
- Side slopes shall not be steeper than 1V:2H.
- The loads of reclaimed material shall be dumped uniformly over the entire material stockpile area.
- A light bulldozer or front-end loader shall then doze the material into a stockpile in layers.
- The reclaimed material shall be placed in layers no more than 1,0 m thick. Each layer shall be completed and levelled prior to placing the next layer.

- The layers shall be constructed horizontally or constructed at a maximum slope of 1V:3H.
- Trucks shall not travel on the stockpile."

SECTION B3300 : MASS EARTHWORKS

B3303 CLASSIFICATION OF CUT AND BORROW MATERIAL

Add the following paragraph at the end of the first paragraph:

"For this projected material shall either be classified as soft or hard. No materials shall be classified as intermediate. Material that is able to be ripped by a grader or excavated by excavator shall be classified as soft material. The sizes of the excavator and grader shall be as provided in Section 1800 and where necessary the Employers Agent may call on this equipment to assist with the classification of the material.

Material that requires blasting shall be classified as hard. The Contractor shall notify the Employers Agent of any material that they deem to be hard. The Employers Agent shall then inspect and make a final determination of the material classification. Once and if determined as hard materials then the Contractor will make arrangements for the blasting of the hard materials."

B3304 CLASSIFICATION OF COMPACTION

Add the following paragraph at the end of the first paragraph:

"In restricted areas, close to electrical or telecommunications services where the specified rollers especially vibratory rollers cannot be used, compaction shall be carried out with hand operated mechanical compaction, equipment or approved oscillating vibrator or smaller vibratory rollers. The revised compaction procedure shall be predetermined and approved during the laying of trial sections and, if required, a relaxed density specification shall be applicable as determined by the Employers Agent"

B3312 MEASUREMENT AND PAYMENT

Add the following clause to "General Directions".

"(4) Freehaul distance

The freehaul distance for all payment items in this section and for materials not obtained from Commercial Sources shall be 5.0 km."

Amend the heading of item B33.01 to read as follows:

"B33.01 Cut to fill and stockpile to fill, including free-haul of up to 5 km:"

Add the following sub-item (iv) to B33.01 (b) after sub-item (iii):

"(iv) Sand Material compacted to 100% of MDD"

Amend the title of item B33.04 as follows:

"B33.04 Cut to spoil or cut to stockpile including free-haul up to 5.0 km. Material obtained from:"

Amend the title of item B33.07 as follows:

"B33.07 Removal of unsuitable material (including free-haul of 5 km):"

Amend the title of item B33.14 as follows:

"B33.14 Extra over item B33.01 & B33.04 for excavating material from the pavements and fills of existing roads:"

Add the following new payment items after item B33.19:

"Item **Unit**

B33.20 Extra-over Items B33.01 and 33.10 for compaction close to electrical / telecommunication and other services..... cubic metre(m^3)

The unit of measurement shall be cubic metres as defined in the wayleave conditions. The rate shall be extra-over the rate of B33.01 and 33.10 and shall include full compensation for additional costs related

to the use of static and/or smaller vibratory rollers for compaction in restricted areas close to electrical or telecommunication services."

Item		Unit
B33.21	**Preparation and management of stockpile area**……	Lump Sum (L/sum)

The unit of measurement shall be lump sum. Payment for the tendered lump sum shall be as follows. The first instalment of 50% shall be paid in the payment certificate after the complete of the preparation and approval by the Employers Agent of the stockpile area. The second instalment of 35% shall be paid when the value of the work done reaches one half of the tendered sum and the third and final instalment of 15% shall be paid once the stockpile area has been fully rehabilitated to the satisfaction of the Employers Agent.

The rate tendered shall include full compensation for all costs incurred for preparing of the stockpile area, including the initial stripping & stockpiling of topsoil, preparation of the stockpile floors, erosion, stormwater and environmental management, fencing and final rehabilitation of the stockpile area."

SECTION B3400 : PAVEMENT LAYERS OF GRAVEL MATERIAL

B3401 SCOPE

Add the following paragraph after the last paragraph of clause B3401:

"This section also covers the in-situ reconstruction consisting of the reprocessing of existing pavement subbase layers by means of milling/recycling and in-situ cement stabilization.

B3402 MATERIALS

(a) General

Add the following at the end of the second paragraph:

"For chemically stabilised layers the material shall conform to the requirements in table B3402/5.

Add the following paragraph after the final paragraph of item (a):

“Earth, stone, gravel, sand, asphalt and all other materials excavated, milled or present on the Site or in borrow areas provided by the Employer shall not become the property of the Contractor, but will be at his disposal only in so far as they are approved for use on the Contract. The material will remain the property of the Employer and will be disposed of in accordance with the Employers Agent instruction.”

Replace Table 3402/5 with:

"TABLE B3402/5: REQUIREMENTS FOR CHEMICALLY STABILISED LAYERS

Classification	C1	C2	C3	C4
Material before treatment	At least G2 quality	At least G3 quality	At least G5 quality	At least G6 quality
PI after treatment	Non-plastic	Non-plastic	6 max. *(1)	6 max. *(1)
UCS (MPa) *(2)	6 min.	4 min.	1,5 min	0,75 min.
ITS (kPa) *(3)	-	-	250 min.	200 min.
WDD (% loss)	5 max.	10 max.	20 max.	30 max.
Durability: Fines lost Wet/Dry	All characteristics, including amongst others the carbonated values with regard to durability, shall comply with the requirements in the project specifications.		20% maximum	30% maximum

Note:
* (1) For materials derived from the basic crystalline rock group, the Plasticity Index after stabilisation shall be non-plastic.
* (2) Unconfined Compressive Strength @ 100% of MDD
* (3) Indirect tensile Strength @ 100% of MDD
* (4) Wet/Dry Durability according to SANS 3001-GR55

(b) Compaction requirements

Revise the compaction requirements as follows :

“The minimum compaction of sand and gravel material on this project shall be as specified hereinafter for the respective layers in terms of a percentage of maximum dry density.

Sand	100%	
Lower selected layer	93%	
Upper selected layer	95%	
Subbase	97%	for material not chemically stabilized
	96%	for chemically stabilized (C4 or C3) material
Base	98%	for chemically stabilized (C3 or C2) material
Base (Shoulders)	95%	

Revise the relevant portion of Table 3402/2 as follows:

“Table B3402/2Requirements for types G7 to G9 materials

PROPERTY	TYPE OF MATERIAL		
	G7	G8	G9
STRENGTH (CBR)	CBR at compaction of 93% of maximum dry density, 100% for sand, shall be at least 15%.	CBR at compaction of 93% of maximum dry density, 100% for sand, shall be at least 10%.	CBR at compaction of 93% of maximum dry density, 100% for sand, shall be at least 7%.

"

Add the following new subclauses:

"(d) Selection of material

Material from the existing pavement structure shall only be used as directed by the Employer's Agent.

Should the tenderer wish to use Pedogenic material (ferricrete or calcrete) for cement-treated subbase, he shall submit with his tender the name of the source together with a mix design based on cement contents of 2%, 4% and 6% by mass of cement per mass of untreated subbase material.

The shoulder wearing course gravel shall be Type 2 as described in Table 3402/4, with the exception that the CBR shall be 25% and not 15%."

"(e) Extra material added to existing pavements

Extra material of quality specified shall be added to existing pavement layers, in order to achieve levels required and must be approved by the Employers Agent beforehand. The Employers Agent may also specify that additional material be added and/or new levels in localised areas where special repairs are required.

The additional material shall be placed (after milling) on top of the existing pavement layer and spread to a uniform profile in such a way as to ensure that the final road levels and base quality is obtained (after the in situ recycling and stabilizing/treatment).

Extra (new) material which is added to existing layers which is in excess of that required to achieve the final road levels will not be paid for. This would be based on dips to achieve the required levels."

B3403 CONSTRUCTION

(a) Requirements applying prior to the construction of the layer

Add the following paragraph at the end of sub-clause B3403 (a):

"The area and lateral extent of the road to be milled and in-situ stabilized shall be as specified by the drawings, (or on site by the Employers Agent) and the Contractor shall not exceed the outline by more than 25 mm. Pavement layers and/or joints damaged or otherwise disturbed outside the outlined area shall be repaired by the Contractor at his own expense and to the satisfaction of the Employers Agent, before commencement and opening of the road."

(d) Stabilization

Add the following paragraph at the end of clause B3403 (d):

"Where instructed by the Employers Agent, the area to be recycled shall be pre-milled (after the placing and spreading of additional material where required) mixing in the required moisture (augmented by blade mixing should the distribution of the in-situ/added moisture not be to the Employers Agents satisfaction), shaping and lightly rolling the layer so as to ensure uniformity and level surface during the spreading and in-situ recycling of the cement/slag chemical modifying agent.

The contractor is to allow for blade mixing with a grader to augment the Cold in-situ recycling (CIR) mixing if even distribution of the stabilising agent is not obtained with the CIR machine. The CIR machine is only capable of mixing in the vertical plane and the stabilising agent shall be uniformly spread on the surface in order to obtain satisfactory distribution."

(b) Placing and compacting

Add the following to the first paragraph:

"The Contractor shall make provision during placing, processing and compaction of layers during half

width (or designated lane widths) construction to construct layers wider than theoretically required in order to achieve the required compaction and level control. Provision shall also be made for cutting back and benching at least 150 mm into the existing road layers to sound material when the road widening is constructed. Rates tendered under section 3400 shall include for all additional costs to provide longitudinal joints as specified. "

Add the following subclauses:

"(iii) Maximum layer thickness

Although the drawings and the payment items indicate pavement layers in excess of 250 mm this shall not been seen as automatic approval for the construction of these thick layers in one operation. The contractor shall plan his operations to ensure that these pavement layers are built up of lifts of between 150 mm and 250 mm thick layers.

Should the contractor consider it feasible to construct a 300 mm layer in one single operation then they shall submit, for the Employers Agent's approval, a detailed method statement indicating the additional plant that will be provided, proposed materials testing protocols, any mitigation measures to minimise effects on services, and any other information or documents to support the proposal. If approved by the Employer's Agent the method statement shall be used to construct a trial section of the thicker layer which shall then be assessed and if satisfactorily completed may be approved by the Employers Agent. No additional costs shall be paid to the contractor for this process or for the construction of the trial section.

(iv) Temporary stockpiling of material

The contractor shall plan his activities so that materials imported from commercial sources can be directly transported to and placed at the designated points.

The temporary stockpiling of material will not be paid for separately unless instructed by the Employer's Agent, and full compensation will be deemed to have been included in the rates tendered for the various payment items for work for which the material is to be used.

This subclause does not apply to the excavation and temporary stockpiling of existing pavement layers as instructed by the Employer's Agent, in terms of subclause B3403(i), as these will be measured and paid for separately.

(v) Storing recovered pavement material

Excavated pavement material intended for reprocessing but which cannot be reprocessed in place or cannot, in the opinion of the Employer's Agent, be placed in a windrow next to the excavation, nor directly placed in position anywhere else, shall be transported to approved stockpile or dumping sites with written permission from the Employer's Agent.

Stockpile sites for material to be recycled or reprocessed shall be located as approved by the Employer's Agent.

The stockpile site shall be cleaned, and all stones, vegetation and other materials which may cause contamination shall be removed. The site shall be graded smooth with an adequate slope to ensure proper drainage of water. If instructed by the Employer's Agent, the surface shall be watered and compacted to a depth of at least 150mm and to a density of 90% of maximum dry density. The compacted surface shall be firm. Upon completion, the surface shall be swept clean.

Stockpile sites shall be large enough to allow the different types of material to be stockpiled without overlapping or exceeding the limits of the prepared site. Enlargement of the stockpile sites after the stockpiles have been placed will not be permitted without the Employer's Agent's approval.

Upon completion of the work, the stockpile sites shall be rehabilitated in accordance with the Employer's Agent instructions.

Pay Item 32.06 shall be used for the payment for cleaning and preparing the stockpiling sites, all environmental process, and also for levelling and reinstating of the site after completion of the work.Any excess stockpiled material shall be first offered to CCT and if not needed by CCT then it shall be removed to spoil. Payment for this handling and management of this excess stockpiled material shall be paid for under item B33.04"

B3404 PROTECTION AND MAINTENANCE

Add the following at the end of clause B3404:

"The Contractor will be liable for the cost of repairs of any damage to the surface of the base caused by traffic that will be using the road prior to the paving of the asphalt layers. The cost of all such repairs which may be required shall be deemed to be included in the Contractor's tendered rates."

Add the following new subclauses:

"(a) Protection of Existing Services

The Contractor shall exercise the necessary care to prevent damage to known services during construction operations. Major excavating equipment and other plant shall not be operated in dangerously close proximity to these services. Where necessary, and where authorised by the Employer's Agent, excavation in close proximity to these services shall be carefully carried out by means of suitable hand tools, excluding picks wherever their use could cause damage to the services. Services left exposed shall be suitably protected from damage and theft.

The exact position of manhole(s) or service chamber(s) shall be determined before reconstruction, rehabilitation, resurfacing or recycling of the pavement layers commences. The utmost care shall be taken when working around existing service frames and covers and the Contractor shall ensure that manholes and service chambers remain free of debris. Any damage done shall be repaired at the Contractor's expense.

(b) Raising or lowering of existing manholes and chambers

Where shown on the drawings or ordered by the Employer's Agent, existing manhole chambers, chimneys, covers and frames shall be adjusted in level to suit the new surroundings. Demolition and breaking out shall be executed with care and only the minimum consistent with the requirements shall be removed. The Contractor shall exercise due care to ensure that debris does not fall into manholes and block them.

The Contractor shall make good, careless or excessive demolition at his own expense. New construction shall be in accordance with the drawings and the Specifications. The Contractor will be held responsible for the timely adjustment of all covers and frames in advance of surrounding construction whether they are indicated on the drawings or by the Employer's Agent or not. No claims for delays arising from the failure of the Contractor to effect the necessary adjustments in good time will be allowed."

B 3406 QUALITY OF MATERIALS AND WORKMANSHIP

Add the following:

"Test results and measurements shall be assessed in accordance with the provisions of section 8300, Quality Control (Scheme 2)"

B3407 MEASUREMENT AND PAYMENT

Delete the first paragraph of clause B3407 and replace with the following:

"No additional payment will be made for work that has to be executed in restricted areas. Full payment for those items of work which must be executed in restricted areas must be included in the pay items included in the schedule of quantities."

Amend the description of pay item B34.01 as follows:

"Item **Unit**

B34.01 Pavement layers constructed with material obtained from commercial sources, including all haul"

Add the following new sub-item no. B34.01 (i):

"(i) Gravel base (constructed for sidewalks or future closed median stations) compacted to:

(1) Specify thickness & compacted…….cubic metre (m^3)"

Add the following to the end of the second paragraph in the description:

"Rates for (d) shall be inclusive of establishment, in situ recycling, stabilising as required and the compaction to the specified density and thickness. The rate shall also be inclusive of the pre-milling of

existing in situ materials, the spreading of the specified stabilising agent, the re-milling of this material to blend the stabilising agents, and the placing to level and compaction of the final product.

No additional payment shall be made for re-establishment or movement of the recycling machine on site."

Amend the description of pay item 34.03 as follows:

"Item **Unit**

B34.03 Pavement layers constructed from gravel obtained from existing pavement layers and material from temporary stockpile areas"

Add the following new sub-item no. B34.03 (p):

"(p) Gravel base (constructed for sidewalks or future closed median stations) compacted to:
(1) Specify thickness & compacted…….…….cubic metre (m^3)"

Add the following new paragraph:

The material used from the temporary stockpiles maybe required to incorporate recycled asphalt materials if so instructed by the Employers Agent. The final new pavement layer may therefore consist of recovered granular materials, recovered recycled asphalt materials or combinations of these. The breaking down of the recycled asphalt materials prior to being used in the new pavement layer is covered under payment items in section 3800. No other additional costs, except as covered in 3800, will be applicable for the incorporation of the recovered recycled asphalt materials into the new layers."

Amend the title of item B34.04 as follows:

Item **Unit**

"B34.04 In-situ reconstruction of existing pavement layers, including up to 50 mm of asphalt / milled material, using an approved in situ recycling machine as:"

Add the following new sub item:

"(m) Compulsory recycling trial section 250 mm or 300 mm thick, 400 - 600 m²……...cubic metre (m^3)

Add the following after the last paragraph:

"Rates for sub-item B34.04 (f) and (i) shall be inclusive of the establishment, in situ recycling, stabilizing as required and the compaction to the specified density and thickness. It shall also include the adding and spreading of the cement by hand, in situ recycling to blend the stabilizing agents, the placement to final level and the compaction of the final product."

The rate shall also include for loading and transporting to spoil of any bulked material for a free haul distance of 5.0 km. No additional payment shall be made for double handling of material that is temporarily stockpiled for use elsewhere on site, or prior to removing from site to spoil or permanent stockpile at a depot as instructed.

No additional payment will be made for the re-establishment or for movement of the recycling machine. The widths will be as indicated in the drawings or as otherwise instructed on site.

The unit of measurement for sub-item B34.04 (m) for trial sections shall be the cubic metre of trial section carried out as measured on site. The rates are to include full compensation for all construction equipment and labour required to carry out the trial sections in the manner described for sub-item 34.04(f) or (i). The trial section will be used to determine work methods that will successfully complete the works and to ascertain compaction, UCS and ITS results. No work shall continue after the trial section until such time as all the results have been received and approved and as such the rates shall also include for all establishment, standing time and de-establishment costs, if any, associated with the waiting for and processing of these results. No additional payment shall be made, or claims considered in any regard relating to the trial sections. If the first trial section is not approved, a second trial section will be carried out and so on until the trial section is approved. Only one successful trial section will be paid for."

SECTION B3500 : STABILIZATION

B3502 MATERIALS

(a) Chemical stabilising agents

Delete sub-clauses (ii) Ordinary Portland cement and (iii) Portland blast-furnace cement and replace with the following:

"Cement shall comply with the relevant requirements of SANS 50197-1. The use of strength classes greater than 32.5 shall not be permitted.

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

B3503 CHEMICAL STABILISATION

(a) Preparing the layer

Add "and clause B3403 (a)" *after* "section 3200" *in the first sentence.*

(b) Applying the stabilising agent

Add the following to the first paragraph:

"Spreading of the chemical additive by means of a mechanical spreader will not be permitted."

(d) Mixing in the stabilizing agent

Add the following:

"Where pavement layers are to be widened, no stabilising agent may be spread or mixed beyond the required width. The Contractor will not be permitted to mix material for stabilization on adjacent asphalt surfacing unless he has obtained prior permission from the Employer's Agent, in writing. Where the existing surfaces of the road may not be used for this purpose, the Contractor shall apply other approved methods of mixing.

Payment over and above payment for work in restricted areas will not be considered for additional overhaul or other costs arising from this manner of mixing or working."

(i) Construction limitations

Add the following:

"No stabilisation shall be done with falling air temperatures, when the air temperature falls to beneath 7°C, or during rising air temperatures, when the air temperature is beneath 3°C."

B3506 TOLERANCES

(b) Uniformity of mix (chemical stabilisation)

Replace the first sentence with the following:

"The uniformity of the mix shall be determined using Test Method (ii)."

B3508 STABILISATION WORK IN RESTRICTED AREAS

Add the following

"No work in connection with the chemical stabilization of the pavement layers shall be classified as being work in restricted areas."

B3509 QUALITY OF MATERIALS AND WORKMANSHIP

Replace the second paragraph with the following:

"Test results and measurements shall be assessed in accordance with the provisions of section 8300, Quality Control (Scheme 2)".

Delete "(clauses 8206 and 8208)" *in the third paragraph.*

SECTION B3800 : BREAKING UP EXISTING PAVEMENT LAYERS

B3805 CONSTRUCTION

(c) Treatment of pavement excavation floor

Add the following:

"Where applicable, the floor of the excavation shall be thoroughly cleaned for inspection by the Employer's Agent by means of a compressor prior to the application of the tack coat."

Add the following new subclauses after subclause B3805(c):

"(d) Setting out and Control of Work

The Contractor shall establish his own reference and level beacons for the setting out and control of the works.

Where a layer or layers require to be excavated from the existing pavement over full or partial width, the limit of the work shall be clearly demarcated. The limit of work shall not be exceeded by the Contractor by more than 100 mm. Pavement layers broken down outside the specified limits shall be repaired by the Contractor at his own cost, to the satisfaction of the Employer's Agent.

Prior to commencement of any milling or reconstruction work on the existing road, the Contractor shall prepare and deliver to the Employer's Agent reference drawings showing the position of all road lane, edge and gore markings, service covers/frames and survey beacons/marks relative to reference markers placed on both sides of the carriageway. The maximum longitudinal spacing of reference markers shall be 100 metres on straights and 20 metres on curves.

Upon completion of this referencing work, the Contractor shall, at his own cost, take cross-sections at 20 metre intervals over the length of road to be reconstructed and submit the resulting grid of lane and edge levels and/or kerb/channel levels to the Employer's Agent for his approval. The setting-out of the grid shall be agreed with the Employer's Agent prior to the taking of the levels. The Contractor shall supply these levels at least 7 days before the reconstruction work is programmed to commence. The Employer's Agent will take control measurements to determine the accuracy and adequacy of the cross-sections, and may instruct the Contractor to correct any faulty work and to take such additional measurements and cross-sections as may be deemed necessary by him. The Employer's Agent will then determine and finalise the design levels for the section of roadway to be reconstructed and instruct the Contractor accordingly.

At least 48 hours before reconstruction work is programmed to commence on any inner lane of the carriageway, the Contractor shall, at his own cost, take levels at 20 metre intervals over the length of road to be reconstructed and submit the resulting lane edge levels and lane levels to the Employer's Agent for his approval. The Employer's Agent will check these levels against the previously accepted shoulder lane and edge levels, determine and finalise the design levels for the inner lane and instruct the Contractor accordingly.

All survey work will not be measured and paid for directly and compensation for all work involved in survey associated with reference and level control of the works will be deemed to be covered by the rates tendered and paid for the various items of work included in the Contract.

(e) Operational Limitations

The Contractor shall arrange his milling, excavating and reconstruction of existing pavement layer operations to minimise the disruption of public traffic. Every effort shall be made to ensure the safety of the travelling public on existing roads through the site of the works at all times. Milling, excavating and reconstruction operations shall be carefully planned and executed in accordance with the following limitations:

(a) Individual work areas shall be clearly demarcated with traffic signs, delineators and traffic control facilities as specified.

(b) Within individual working areas, the Contractor shall make adequate provision for drainage of milled, excavated and/or asphalt overlay areas where water can pond or be contained against a difference in depth on the roadway. No separate payment will be made for the provision and use of standby pumps and dewatering equipment or cutting of drainage slots and/or channels to effectively drain the roadway surface where instructed by the Employer's Agent in the interests of

safety for the travelling public. The Contractor shall make due allowance for this drainage in this tendered rates.

(c) Delineators shall be placed along each longitudinal step exceeding 20 mm between adjacent lanes of the roadway.

(d) The maximum allowable step within a lane open to traffic shall be restricted to 20 mm. If, due to plant breakdown or other unforeseen circumstances, a longitudinal or transverse step higher than 20 mm occurs within a lane, the strip shall be feathered off, by means of a compacted wedge over a distance of 7,5 times the height of the step.

(e) The maximum length of longitudinal step left open to traffic shall be limited to 500 metres.

(f) Prior to opening a lane of the roadway to traffic at the end of the shift, the longitudinal taper between the section being worked and the surface at the ends of the work area section shall not exceed a gradient of 1:100 relative to the general grade of the road.

(g) Temporary road marking shall be placed on milled, excavated or reconstructed surface areas as specified or directed by the Employer's Agent prior to opening to traffic.

(h) After completion of the work all equipment tools and unused material shall be removed from work area. All waste materials and rubbish shall be collected and disposed of to the satisfaction of the Employer's Agent.

(g) Protection and Maintenance

Clause 4212 and subclause 2304(j) of the Specifications shall apply.

Where shown on the drawings or ordered by the Employer's Agent, existing covers and frames shall be removed and the opening lowered and protected by covering with steel plates and patch mix during the milling of asphalt surfacing. The frames and covers shall be replaced and adjusted in level to suit the new surroundings. Demolition and breaking out shall be executed with care and only the minimum consistent with the requirements shall be removed. The Contractor shall exercise due care to ensure that debris does not fall into manholes and block them.

The Contractor shall make good, careless or excessive demolition at his own expense. New construction shall be in accordance with the drawings and the Specifications. The Contractor will be held responsible for the timely adjustment of all covers and frames in advance of surrounding construction whether they are indicated on the drawings or by the Employer's Agent or not. No claims for delays arising from the failure of the Contractor to effect the necessary adjustments in good time will be allowed.

Bridge nosings, bridge joints and neoprene seals shall be protected by covering with steel plates during the breaking up or milling of asphalt layers adjacent to bridge joints.

The steel plates shall be held firmly in place during these operations and shall only be removed when construction has been completed.

(h) Weather Limitations

Clause 4205 of the Specifications shall apply.

Milling operations shall not commence if any of the weather limitations pertaining to asphalt. (See Clause 4205 of the Specifications) is present or likely to be present before the asphalt can be laid."

B3806 STORING RECOVERED PAVEMENT MATERIAL

Add the following paragraph:

"Earth, stone, gravel, sand, asphalt, milled asphalt material and all other materials excavated, milled or present on the Site or in the borrow areas provided by the Employer shall not become the property of the Contractor, but will be at his disposal only in so far as they are approved for use on the Contract. The material will remain the property of the Employer and will be disposed of at the Employer's Agents 'approval."

B3807 MEASUREMENT AND PAYMENT

(b) Overhaul

Add the following paragraph:

"The freehaul distance for all payment items in this section shall be 5.0 km."

Item		Unit
B38.02	**Milling out existing bituminous material with an average milling depth:"**	

Amend the subitems as follows:

"(a) Not exceeding 30 mm……cubic metre (m^3)
(b) Exceeding 30 mm but not exceeding 60 mm……..cubic metre (m^3)
(c) Exceeding 60 mm but not exceeding 100 mm……cubic metre (m^3)
(d) Exceeding 100 mm……cubic metre (m^3)"

Add the following new section:

"SECTION B3950 : WATERBOUND MACADAM BASE

CONTENTS

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B3952 MATERIALS
B3953 REQUIREMENTS BEFORE THE WATERBOUND MACADAM LAYER MAY BE CONSTRUCTED
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B3957 ROUTINE INSPECTIONS AND TESTS
B3958 TRIAL SECTIONS
B3959 MEASUREMENT AND PAYMENT

B3951 SCOPE

This section covers the procuring, furnishing and placing of approved waterbound macadam (WM) layer on top of the completed subbase layer in accordance with these specifications. Labour intensive methods shall be used for the construction of this layer.

This section also includes any repairs to the existing WM layer on this contract that may have been disturbed during the milling operation.

B3952 MATERIALS

Coarse Aggregate

The aggregate used for WM base shall not contain more than 0.1% by pass of unwanted material such as wood, coal or similar organic material.

Aggregates containing mica, such as granite, gneiss, mica schist, pegmatite, sandstone shall not contain more than 2% by mass of free mica, especially muscovite, when assessed by visually separating the particles or more than 4% by volume when assessed by means of microscopic slides. Aggregate containing easily detectable quantities (more than 1%) of olivine, serpentine and sulphide minerals such as pyrites and marcasite, must be considered with caution, and may warrant additional evaluation to the satisfaction of the Employers Agent. Argillaceous rocks may only be used if specified in the project specifications, or with the Employers Agent's written approval.

Soft or weathered particles shall be controlled by the Durability Mill Index values specified in B3602(e) Durability).

Provision has been made in clause B8108(b)(iii), calculation, for the determination and calculation of the Apparent Density for aggregates with a total water absorption greater than 1.5%, when total water absorption is determined according to SANS 3001-AG20 (replacing TMH1 method B14) and SANS 3001-AG21 (replacing TMH1 method B15).

a) Aggregate crushing value

The aggregate crushing value (ACV) shall be determined in accordance with SANS method 841. This value shall not exceed 30%.

b) Flakiness index

The flakiness index determined on the -53 +37.5 mm shall not exceed 30.

c) Soluble salts

Where the electrical conductivity (EC) is less than or equal to 0.15m^1, the material may be used. Where the EC is greater than 0.15 m^1, the pH of the material shall be determined. Where the pH is less than 6.0, the material shall be treated with lime until the pH is greater than or equal to 10. The material may then be used.

d) Grading requirements

The grading of the nominally single sized aggregate to be used as a coarse aggregate for the WM shall be as shown in Table 3952/1.

TABLE B3952/1: GRADING REQUIREMENTS FOR COARSE AGGREGATES

Sieve Size mm	% by mass passing
63.0	100
53.0	85 – 100
37.50	0 - 30
28	0 - 5
10	–

Fine Aggregate

The fine aggregate to be used as a filler between the coarse aggregate in the WM shall be approved by the Employers Agent and may be either crusher dust or sand or a combination thereof, but shall comply with the following requirements:

(1) Atterberg limits

The fine material shall consist of material that complies with the requirements shown in Table 3952/2.

TABLE B3952/2

Property	Requirements
Liquid limit	25 max
Plasticity index	6 max
Linear shrinkage	3% max

(2) Grading

The grading of the fine material to be used as a filler between the coarse aggregate in the WM shall be as shown in Table 3952/3.

TABLE B3952/3

Sieve Size mm	% by mass passing
7	100
5	85 – 100
0.075	10 - 20

e) Durability Requirements

The 10% fines aggregate crushing values, as determined in accordance with SANS 3001-BT12 (replacing TMH1 Method B2), shall conform to requirements in Table 3602/2.

B3953 REQUIREMENTS BEFORE THE WATERBOUND MACADAM LAYER MAY BE CONSTRUCTED

Before any WM layer is constructed, the following requirements shall be met:

The underlying layer shall comply with the requirements for the layer concerned.

The WM layer shall, where specified, be supported along the outer edges by a gravel shoulder, a concrete channel or kerb and channel, as shown on the drawings.

The aggregate shall not be rolled to lock it in place if the underlying layer, either on account of rain or by any other cause, is so wet as to constitute a danger of the underlying layers being either damaged or inundated.

B3954 CONSTRUCTION

(a) WM edge restraint

A concrete edge restraint, a concrete channel or a kerb and channel combination bedded on concrete shall be constructed to support the edge of the WM layer prior to the construction of the WM layer. The construction of the layer is to form part of the labour-intensive works. The work is to be completed using hand tools and conventional compaction equipment and as specified in section 3400 of the standard specification.

(b) Spreading the aggregate

Aggregate stone material complying with the requirements specified above shall be dumped in quantities sufficient to ensure a layer or the required line, level, thickness and density can be formed. The dumped material shall be evenly spread by hand to the line and level that will allow the compacted layer to meet the line, level and thickness required by the specification.

Depth guides shall be used to control thickness of the layer and the surface shall be frequently checked at intervals of not more than 1.0 metres by means of boning rods and straight edges and any high or low spots remedied by removing or adding stone as required.

(c) Initial dry rolling

After the stone has been spread, the layer shall be lightly compacted with approved rollers and any irregularities that may appear in the surface of the layer shall again be corrected by removing or adding stone, as the case may be. This operation shall be repeated until the surface is uniformly smooth, free of any irregularities and in accordance with the specified requirements.

After the layer has been shaped, as described above, it shall be compacted over its full width using law amplitude, high frequency, vibrating rollers of static mass not less than 8 metric tons. Rolling shall progress gradually from the low side of the layer by lapping uniformly each preceding pass of the roller by one half the width of the roller drum and shall continue until the entire area of the layer has been covered. Rolling shall continue until the coarse aggregate has been thoroughly keyed and compacted and no movement of the aggregate under the rollers can be detected.

Should any irregularities that exceed 10 mm when tested with a 3 metre straight-edge develop in the surface of the layer during the course of rolling, such irregularities shall be corrected by loosening the surface over the area so affected by re-shaping the stone and rolling the area again until the requirements are met. The contractor shall use 26.5mm size aggregate where necessary to take out minor slacks or depressions.

(d) Adding fine aggregate and rolling

Fine aggregate shall be added by the dry method as described below:

After the initial dry rolling described above has been completed and the compacted coarse aggregate layer has been approved, a layer of dry fine aggregate shall be evenly applied over the surface of the coarse aggregate by hand in a layer thickness not exceeding 15 mm. At the time of application, the moisture content of the fine aggregate shall not exceed 4 percent by mass. Dry rolling shall then be continued with vibrating rollers so that the jarring effect of the rollers will cause the fine aggregate to settle into the coarse aggregate. During this process it may be necessary to broom the surface with hand brooms to assist in the distribution of the fine aggregate. A further layer of fine aggregate shall then be applied to any process of spreading, rolling and brooming shall continue until no more fine aggregate can be worked into the voids in the coarse aggregate.

When no more fine aggregates can be worked in dry, the layer shall be well watered, using water tankers fitted with sprinkler bars, or by means of pressure distributors. Additional fine aggregate shall be added when necessary and a slushing process consisting of watering, rolling and brooming shall commence using 22 tonne pneumatic tyred rollers, in conjunction with 8 tonne static steel drum rollers and shall continue until all the voids in the coarse aggregate are completely filled with fine aggregate and a firm base with a closely knit surface is obtained, free of areas of segregated materials, loose aggregate and other irregularities.

All excess fines shall be swept off the surface and the layer shall be allowed to dry out sufficiently before proceeding with the next stage of the work.

(e) Final brooming

On completion of the base and when it has dried off sufficiently, i.e. 50% of OMC of infill material, the surface shall be swept clean with hand brooms to present mosaic of regular stone face free from fine aggregate and foreign material before the prime coat is applied.

(f) General

(i) Kerbs and channels

Care shall be taken during rolling to ensure that concrete kerbs and channels already laid are not displaced or damaged. Any concrete kerb or channel damaged during construction shall immediately be replaced or repaired by the contractor at his own expense.

(i) Excess WM material

Excess WM material shall not be spread over the shoulder or the side fills but shall be loaded and removed. It shall not be re-used unless it has been separated into its constituent parts and retested to ensure that it conforms to the grading requirements.

B3955 PROTECTION AND MAINTENANCE

The contractor shall protect and maintain the completed layer at his own expense until the next layer or the seal or the surfacing is applied. Maintenance shall include the immediate repair or any damage to or defects in the layer and shall be repeated as often as necessary. Repairs shall be so made as to ensure an even and uniform surface to be restored after the repair work. Traffic shall not be allowed on any unprimed WM unless so authorised or directed by the Employers Agent.

B3956 CONSTRUCTION TOLERANCES AND FINISHES

(a) Surface finish

The finished surface of the base shall be true to level and cross-section, be uniform and smooth, free from corrugations, humps and depressions. The layer is to be shaped within the tolerance given in subclause B3956(b) below. Any section of base not conforming to specified requirements and which, in the opinion of the Employers Agent, cannot be satisfactorily corrected, shall be broken up and reconstructed. In such event, the condemned section of base shall be removed over the full depth of the layer, the fine aggregate shall be cleared away, crushed stone conforming to specified requirements shall be placed and the section shall be reconstructed as specified hereinbefore, all at the contractor's expense.

(b) Finished levels and layer thickness

The contractor shall submit to the Employers Agent the level of the finished waterbound macadam base taken at five points in each cross-section at centre-line, edges and at intermediate mid-points, at 10 metre intervals, for approval of levels and layer thickness prior to any further work being done on the layer.

(i) Level

At least ninety percent of the differences between the design and the finished level shall be less than, or equal to, 20 mm and no difference at any point shall exceed 25 mm.

(ii) Thickness

At least ninety percent of the thicknesses calculated from levels taken, shall be more than the specified thickness minus 21 mm, no thickness shall be less than the specified thickness minus 27 mm, and the mean thickness shall not be less than the specified thickness minus 5 mm.

(iii) Crossfall

The departure from the design grade due to differences between the actual and the design levels shall not exceed the following:

Length of Grade Measured (m)	Maximum Variation %
2	0.34
5	0.27
10	0.21
20	0.13
30	0.08

Notwithstanding that the level differences themselves may be within the permitted tolerances.

(iv) Surface Regularity

When a 3 metre straight-edge is laid up on the finished surface, the gap between the straight-edge and the coarse aggregate in the surface shall not at any point exceed 10 mm when placed either parallel or at right angles to the centreline of the road.

(v) Dimensions

The width of the base shall not vary from the specified width by more than 50 mm.

B3957 ROUTINE INSPECTIONS AND TESTS

Routine tests and inspections will be made by the Employers Agent to determine whether the quality of the materials and the workmanship complies with the requirements of the section.

The density of the completed layer shall be tested by the Employers Agent using the "Rondavel" test described in NITRR Technical Note TP/52/83. Density tests shall be carried out at a frequency of approximately one test of every 130 cubic metres of compacted waterbound macadam. In addition, the Employers Agent may call for a proof rolling test to be carried out in his presence, at which he will inspect for audible grinding of the coarse aggregate or visible movement in the layer as the roller passed, indicating the full interlock of the stone has not been achieved, nor maximum density attained. Additional "Rondavel" tests may then be called for to further investigate any suspect areas detected during this inspection.

The density requirements shall be deemed to have been satisfied provided that at least 75% of the test results of the section tested exceed 88% of the Apparent Relative Density of the successful trial section described in clause B3956 of this project specification and no single test result falls below 93% of that density.

Should these density requirements not be complied with, the section shall be condemned and corrective action shall be taken as described in clause B3956 above.

B3958 TRIAL SECTIONS

The contractor shall construct a trial section of WM to the above specifications as soon as the proposed aggregate and filler material is available. This section will form part of the deviations with WM being placed on the subbase of the deviation. The construction of the layer will be observed and its performance over the short period of time will be assessed by the Employers Agent before approval to use the materials in the permanent works is granted.

The purpose of this trial section is to establish:

(a) The loose to tight compaction factors for the coarse aggregate.

(b) The loose volume of fine aggregate required per cubic metre of completed layer.

(c) The loose depth of coarse aggregate required to provide the specified final layer thickness.

(d) Construction techniques, tools and procedures that will achieve the maximum possible density and produce the surface requirement specified.

(e) The average Relative Density achieved by means of the "Rondavel" test, which shall exceed 88% of the Apparent Relative Density of the combined coarse and fine aggregates.

(f) The optimum time to prime.

Payment for this trial section of WM base will be made under pay item B39.52.

B3959 MEASUREMENT AND PAYMENT

Item	**Unit**

B39.51 Labour intensive waterbound macadam base

(a) Compacted to 88% apparent relative density (*thickness stated*)……cubic metre (m^3)

The unit of measurement shall be the cubic metre of completed WM in place and compacted to the specified density. The quantity shall be computed from the authorised dimensions of the layer as shown on the drawings or ordered by the Employer's Agent.

The tendered rate shall include full compensation for procuring, furnishing and placing all material including the filler material, for hauling the material over an unlimited free-haul distance, for processing, rolling, slushing and correcting the layers and for testing, protecting and maintaining the layer as specified.

The tendered rate shall include compensation for procuring, furnishing and placing all material required for the construction of the concrete edge restraints as detailed on the drawings.

Item **Unit**

B39.52 Labour intensive trial section of waterbound macadam……square metre (m^2)

The unit of measurement shall be square metre of completed WM, 180 mm thick, in place and completed to 88% apparent density. The quantity shall be computed from the authorised plan dimensions of the layer as directed by the Employers Agent.

The tendered rates shall include compensation for procuring, furnishing and placing all material including the filler material, for hauling the material over an unlimited free-haul distance, for processing, rolling, slushing and correcting the layers and for testing, protecting and maintaining the layer as specified.

Item **Unit**

B39.53 Repairs to existing waterbound macadam base

(a) Compacted to 88% apparent relative density……square metre (m^2)

The unit of measurement shall be the square metre of completed repairs to the WM in place and compacted to the specified density.

The tendered rate shall include full compensation for procuring, furnishing and placing all material including the filler material, for hauling the material over an unlimited free-haul distance, for processing, rolling, slushing and correcting the layers and for testing, protecting and maintaining the layer as specified. The tendered rate is to allow for a thickness of 150 mm. Where repairs are required greater than 150mm and instructed by the Employers Agent then the rate shall be adjusted pro rata for any existing layer requiring repairs greater than 150 mm thick."

SECTION B4000 : ASPHALT PAVEMENTS AND SEALS

SECTION B4100 : PRIME COAT

B4102 MATERIALS

(b) Aggregate for blinding

Add the following sentence at the end of the first paragraph of item (b):

"Blinding of the primed surface with aggregate shall only be permitted if instructed by the Employers Agent in writing."

B4104 WEATHER AND OTHER LIMITATIONS

Replace paragraph (g) with the following:

"(g) When the moisture content of the upper 50 mm of the layer is higher than 50% of the optimum moisture content determined according to SANS 3001-GR30. In the event of rain after priming, the base shall be allowed to dry out to meet the above moisture content requirement prior to surfacing."

B4106 APPLICATION OF THE PRIME COAT

Add the following sentence at the end of paragraph (c):

"The nominal application rate of the E-prime shall be 1.0 ℓ/m^2."

Add the following new sub-clause B4106 (j) after item B4106 (i):

"(j) All items in the close proximity of the area to be primed or tacked shall be protected against staining. Priming or tacking will not be allowed on windy days. All kerbing and other adjacent items shall be protected by black plastic sheeting during priming or tacking operations."

Replace the first paragraph with the following:

"The actual spray rates measured at spraying temperature shall not deviate by more than 8.0% from that ordered by the Employers Agent. The Employers Agent may, at his discretion, conditionally accept application rates falling outside this tolerance at reduced payment in accordance with Table B4108/1.

TABLE B4108/1: PAYMENT REDUCTION FACTORS FOR CONDITIONALLY ACCEPTED PRIME COAT

Deviation specified spray rate at spraying temperature. (%)	Payment reduction factor of tendered rate.
±8,0	1.00
±9,0	0.97
±10,0	0.95
±11,0	0.90
±12,0	0.85
±13,0	0.80

Any deviation outside these limits shall not be paid for. The Employers Agent shall however have the right to instruct the contractor to make up any deficiency, or blind excessive prime without additional payment. Where so instructed, the material for blinding shall consist of approved, screened 5 mm nominal single size aggregate. The use of crusher dust for blinding shall not be permitted. If under-spraying occurs, and it is accepted by the Employers Agent, only the actual quantities applied shall be paid for."

B4109 TESTING

Add the following paragraph after the first paragraph of item B4109:

"No payment will be made if this condition is not adhered to. The contractor shall provide, at his cost, representative samples of every batch of prime delivered to site."

B4110 MEASUREMENT AND PAYMENT

Add the following at the end of this clause:

"The tendered rates for all priming application and tacking shall include full compensation for the protection against staining of all items as specified in clause B4106."

"Item **Unit**

"B41.01 Prime coat

Add the following new payment sub-item (f) after (e):

"(f) E-prime or equivalent ..... litre (ℓ)"

SECTION B4200 : ASPHALT BASE AND SURFACING

B4202 MATERIALS

Add the following paragraph before item (a) (i):

"Any tests referred to in the publication TG1 - Technical Guideline "Use of Modified Bituminous Binders in Road Construction, November 2020, Asphalt Academy", shall supersede those specified in the COLTO Standard Specifications for Road and Bridge Works 1998. This document is available from the Asphalt Academy.

The reference to TRH21 refers to "Use of Reclaimed Asphalt in the Production of Asphalt (Sabita Manual 36 / TRH 21)". This document is available from Sabita."

(a) Bituminous binders

Reference is drawn to Clause B1230: SANS BITUMEN SPECIFICATIONS of the project specifications with regards to SANS Bitumen Specifications that shall apply to this contract

i) Conventional binders:

Add the following at the start of item B4202 (a)(i):

"The conventional binder to be used for this project will be 50/70 penetration grade bitumen, unless otherwise specified. The binders shall comply with SANS 4001 Latest Amendment.

The tack coat shall consist of a 30 % stable grade bitumen emulsion."

(iii) Homogeneous modified Binders

Replace the last sentence with:

"The modified binder to be used on this project shall be A-P1.

The homogeneous modified binder shall be manufactured according to the guidelines contained in "Technical Guideline: The use of Modified Bituminous Binders in Road Construction (TG 1): Asphalt Academy". The base bitumen shall conform to SANS 4001-BT1, or a blend of SANS 4001-BT1 grades. The properties of the homogeneous modified binder shall comply with the relevant requirements for binder class A-P1 as listed in table B4202/12.

TABLE B4202/12: PROPERTIES OF POLYMER-MODIFIED BINDER FOR HOT-MIX ASPHALT

Property	Unit	Test Method	Class
Before ageing			**A-P1**
Softening point [2]	°C	MB-17	63-73
Elastic recovery @ 15°C	%	MB-4	30 - 50
Dynamic viscosity @ 165°C	Pa.s	MB–18	≤ 0,55
Storage stability @ 180°C [1]	°C	MB-6	≤ 5
Flash point	°C	ASTM D92	≥ 230
After ageing (RTFOT)			
Mass change	%	MB-3	≤ 1,0
Softening point (min)	°C	MB–17	61
Elastic recovery @ 15°C	%	MB-4	

TABLE B4202/15: TEMPERATURE/TIME LIMITS FOR POLYMER MODIFIED BINDERS

Binder Class	Short Term Handling/ Transportation		Storage [1]		Spraying/Asphalt Mixing/Application		
	Max Temp (°C)	Max Holding Time (hrs)	Max Temp (°C)	Max Holding Time [2] (hrs)	Max Temp (°C)	Min Temp (°C)	Max Holding Time (hrs)
A-P1	180	24	150	240	170	150	24

[1] When storing product for 48 – 240 hours, it is recommended that the tank has agitation circulation.
[2] If the recommended maximum holding time has been exceeded, the binder should be resampled and tested to ensure compliance with the specification.

(b) Aggregates

Add the following at the end of the first paragraph:

"The fine aggregate for the asphalt wearing course and bitumen treated base shall consist of crushed aggregate only. Natural sand shall not be permitted."

(v) Absorption*:*

Substitute the phrase "shall not exceed 1% by mass, and that of the fine aggregate shall not exceed 1.5% by mass" *with:*

"shall not exceed 0,5% by mass."

(vii) Design requirements

Add the following after the first paragraph of (vii):

"The designs shall conform to the requirements of Design Level IA, II or III of the latest version of "Design and Use of Asphalt in Road Pavements (Sabita Manual 35 / TRH 8)" and as indicated in the payment item of the bill of quantities."

(viii) Grading

Delete this subsection and replace with the following:

"All grading requirements shall comply with the requirements as indicated in Sabita Manual 35 / TRH 8 and shall be based on the aggregate packing type, nominal maximum particle size and grading class as indicated for each pavement layer."

(c) Fillers

Add the following after the last paragraph:

"For tender purposes the active filler shall be hydrated lime. Alternative proven nanotechnology may be considered in place of lime provided performance criteria are met"

(e) Asphalt reinforcing

Delete entire sub-clause and replace with the following:

"(i) Description

The work shall consist of supplying and placing an approved glass fibre grid for the purpose of reinforcing the asphalt surfacing layer.

(ii) Materials

Glass fibre grid

The glass fibre grid used with this specification shall be constructed of fibreglass reinforcement coated with an elastomeric polymer and a pressure sensitive adhesive backing. The material shall furthermore be resistant to chemical attack (from fluxoils, paraffins or any other solvents used in bituminous binders),

UV attack, mildews, and rot; and shall meet the physical requirements listed in the table below:

TYPE CHARACTERISTICS	UNIT	GLASS FIBRE GRID VALUES		GLASS FIBRE KNITTED TO A PAVING FABRIC VALUES
Minimum Tensile Strength (across width)	kN/m	50	100	50
Minimum Tensile Strength (across length)	kN/m	50	100	50
Minimum Elongation at break (maximum)	%	< 5%	< 5%	< 3%
Minimum melting point	^{o}C	218	218	265
Mass per unit area	g/m^2	185	370	185
Roll width	m	1.5	1.5	2.45
Grid size	mm x mm	25 x 25	12.5 x	50 x 50

(iii) Installation procedure

Surface preparation
The prepared base on which the glass fibre grid is to be placed shall be free of loose soil, dust, water, organic material or other deleterious substances. Sweeping shall be carried out with a mechanical broom.

Product preparation
In order to preserve its adhesive properties, the material must be stored inside a dust-free environment and kept dry at the job site.

Test for proper adhesion
- Cut 1 m^2 of glass fibre grid.
- Place on area to be paved (after application of tack coat).
- Activate self-adhesive glue by rolling with a rubber tired roller or by walking on the sample.
- Insert hook of spring balance under centre of glass fibre grid.
- Pull upwards until grid starts to pull away from the surface.
- Record results in kilogram.
- If the pull-away force is greater than 2 kg paving can commence.
- Any movement or rippling of the grid shall result in the immediate abortion of the paving operation.

(iv) Placement of grid

Placement of the glass fibre grid shall be done in strict accordance with the manufacturer=s specifications and to the satisfaction of the Employer's Agent. The following points should be noted:
- The grid shall only be placed after the tack coat has been applied to the recycled base.
- Workers must wear gloves while handling the material.
- The grid must be applied without ripples. Sufficient tension during application will eliminate this problem.
- Activate self-adhesive glue by rolling with a rubber tyred roller.
- All transverse joints shall overlap by 300 mm. Overlaps must be shingled in the direction of paving.
- All longitudinal joints shall overlap by 300 mm.
- Prior to paving only construction vehicles shall be allowed to drive on the installed grid.
- The glass fibre shall be placed a minimum of 30 minutes prior to the paving operation.

v) Weather limitations

The glass fibre grid shall not be placed when weather conditions, in the opinion of the Employer's Agent, are unsuitable."

(h) General

Add the following after the second paragraph:

"In case where drum mixing is used the aggregate stockpiles shall be tested every second day or whenever new material is delivered. The test results must be presented to the Employers Agent."

Add the following new subclause:

"(i) Importation of penetration grade bitumen

The Contractor shall inform the Employer's Agent at least two (2) weeks before any shortage of bitumen develops of the circumstances surrounding the impending shortage; shall indicate the expected tonnage to be imported; shall demonstrate that every local source and facility has been or will be exhausted and shall obtain the Employer's Agent written permission to import SANS standard penetration grade bitumen.

A pay item (B42.22) has been included in the Schedule of Quantities for the additional costs for the importation of bitumen on the written instruction of the Employer's Agent to cover shortfalls of SANS standard penetration grade bitumen arising at the local refinery, local sources and facilities during this Contract."

B4203 COMPOSITION OF ASPHALT BASE AND SURFACING MIXTURES

In the first paragraph, third last line, after "or active filler content" *add*:

"or aggregate content"

In the fifth paragraph, delete "TRH 8*" and replace with* "Design and Use of Asphalt in Road Pavements (Sabita Manual 35 / TRH 8), or as may be revised" and where the inclusion of recycled asphalt (RA) is included this shall also include requirements of TRH21."

Add the following at the end of this clause:

"The asphalt base shall consist of a continuously graded hot-mix asphalt, stone skeletal mix, 20mm MMPS with Class 1 grading. The binder shall consist of either 50/70 penetration grade binder or A-P1 quality modified bitumen as specified or indicated in the bill of quantities. Nominal mix proportions for tender purposes are indicated in Table B4202/6.

The BTB can contain 15% to 30% RA in terms of binder replacement in terms of TRH 21"

TABLE B4202/6: NOMINAL MIX PROPORTIONS FOR ASPHALT BASE

Nominal Mix Proportions by Mass	
Aggregate	94.5%
Binder	4.5%
Active Filler (hydrated lime)	1.0%

The asphalt surfacing used within the road shall consist of a continuously graded hot-mix asphalt surfacing, sand skeletal mix, 14mm MMPS with Class 2 grading. The binder shall consist of A-P1 quality modified bitumen. Nominal mix proportions for tender purposes are indicated in Table B4202/7.

The asphalt surfacing used within sidewalks shall consist of a continuously graded hot-mix asphalt surfacing, sand skeletal mix, 10mm MMPS with Class 2 grading. The binder shall consist of 50/70 penetration grade binder. Nominal mix proportions for tender purposes are indicated in Table B4202/7.

The asphalt surfacing can contain up to 15% RA in terms of binder replacement in terms of TRH 21.

TABLE B4202/7: NOMINAL MIX PROPORTIONS FOR ASPHALT SURFACING

Nominal Mix Proportions by Mass		
Nominal Maximum Particle Size (mm)	**14**	**10**
Aggregate	94.0%	93.5%
Binder	5.0%	5.5%
Active Filler (hydrated lime)	1.0%	1.0%

"The designs shall conform to the requirements of Design Level IA, II or III of the latest version of "Design and Use of Asphalt in Road Pavements (Sabita Manual 35 / TRH 8) or as may be revised" and as indicated in the payment item of the bill of quantities. The costs for compiling the mix designs shall be deemed to have been included in the rates tendered under item 42.11.

As different design methodologies or levels have minimum time periods for completion, assessment and approval, the Contractor shall ensure that he commences the specified design processes for the specific

mix type and design level timeously to ensure that there are no delays to his construction program. The minimum time that shall be allowed for in the construction program is:

- Sabita Manual 35: Level 1: 6 weeks
- Sabita Manual 35: Level 2: 10 weeks
- Sabita Manual 35: Level 3: 12 week.

Performance testing results provided must not be older than 6 (six) months."

B4204 PLANT AND EQUIPMENT

(c) Mixing plant

Add the following:

"The asphalt shall be produced by an approved commercial supplier."

(c) Spreading Equipment

(i) Paver

Add the following after the last paragraph of B4202 (c) (i):

"The Contractor shall use a self-propelled paver with levelling beams (9m minimum) and automatic screed control on both sides for the construction of all surfacing layers. Paving teams for asphalt surfacing layers shall have at least three rollers of which one shall be an approved heavy vibratory roller and one an approved heavy pneumatic roller."

(d) Rollers

(i) General Requirements

Add the following:

"Paving teams for asphalt surfacing layers shall have at least three rollers of which one shall be an approved heavy vibratory roller and one an approved heavy pneumatic roller.

No heavy vibrating compaction equipment may be used on bridge decks. For bridge work, a suitable light roller with static and dynamic modes shall be used, with the latter capable of adjustable frequency and amplitude settings."

B4205 GENERAL LIMITATIONS AND REQUIREMENTS AND THE STORAGE OF MIXED MATERIALS

(c) Surface requirements

(iii) Tack coat

Add the following paragraph at the end of this sub-item:

"Bridge deck concrete and concrete channels (if required) are to be tacked with a 30% spray grade emulsion at 0.4 ℓ/m^2 (no priming required); all other tack coats, (to be used for all asphalt overlays and infills), shall be applied at 0.55 ℓ/m^2. Where instructed or when rain is imminent the BTB is to receive an application of 30% emulsion at 0.5 ℓ/m^2

B4207 SPREADING THE MIXTURE

Add the following to sub-clause (a):

"Special precautions shall be taken by the Contractor to ensure that the temperature of the total mass of asphalt does not decrease by more than 15°C from point of dispatch to the point where it is to be paved. The use of thermal blankets is obligatory at all times.

The following paving restrictions will strictly apply:

- No paver stops will be allowed for reversing supply trucks
- Paver speed to be regulated to prevent supply related stops where practically possible,
- Levelling skid-beams (>6m length with free wire between ends) or wire guide system to be used on both sides – no joint matchers except if agreed or instructed by the Employers Agent,
- Automatic auger feed control, which can keep the asphalt mount in-front of the screed constant,

is required,
- No pneumatic rolling as breakdown rolling on the final surfacing layer.

In the case of non-compliance with the above the Employers Agent's personnel shall stop the paving operations. No paving will be allowed until such time as the Contractor is in a position to comply with the above. Asphalt paved after such instruction to stop paving shall be removed and re-executed at the Contractors cost."

B4208 JOINTS

Add the following after the last paragraph of this clause:

"All asphalt joints shall be cut by a roller or milling machine in a straight line or smooth curve to the satisfaction of the Employers Agent and in accordance with the joint detail drawings. Paving to be full half widths where practically possible. Where full half width paving is not possible, all joints shall be paved such that they do not fall anywhere in a lane or on a wheel track i.e. all longitudinal joints shall be on the centre line or yellow shoulder line. In the case of climbing lanes or widening areas e.g. bell mouths and turning lanes, a longitudinal joint will be allowed on the fast lane and climbing lane/widened area dividing line.

No saw-cutting will be allowed on newly placed asphalt.

Whenever the paver stops for more than 10 minutes and/or the un-compacted material already laid cools down to below compaction temperature (100°C), a joint shall be constructed as specified and all cooled un-compacted materials removed from the road up to a position where the completed compacting effort stopped. All unlaid asphalt that has cooled to below the specified spreading temperature (120°C for BTB and asphalt surfacing mixes) shall be removed from the paver and from the site.

The cost of all such joint construction activities (temporary and permanently, transverse and longitudinal joints) shall be included into the relevant asphalt layer rates. Transverse joints to be similarly cut-back and treated as specified for the longitudinal joints. Temporary transverse joints to be rolled smooth to the Employers Agent's satisfaction.

The cut edges of all asphalt joints shall receive a coat of Colseal (rubberized bitumen emulsion) or an approved equivalent before the adjacent asphalt is placed against it."

Add the following after the final paragraph of item B4208:

Where the difference in level between the new work and the existing road surface exceeds 25 mm, joints shall be treated as follows:

Transverse steps at the end of a day's work shall be tapered off at a slope of 1 vertical to 20 horizontal (1:20) to tie in with the existing surface. The tapered section shall be removed before surfacing is recommenced and a joint formed in accordance with Clause 4208 of the specification.

Longitudinal joints exposed to traffic shall be provided with a taper of compacted asphalt material over the full length of the exposed joint. The width of the taper shall be at least 5 times the difference in level between the old and new work.

The tapered section shall be removed before surfacing is recommenced and a joint formed in accordance with Clause 4208 of the specification. Cutting the joint and the removal of the asphalt tapers shall take place just prior to paving the adjacent area after closure to traffic.

All costs involved in the provision of, cutting the joint and removal of these temporary ramps shall be deemed to have been included in the rates tendered for the relevant asphalt pay item."

B4210 COMPACTION

Replace the sixth paragraph with the following:

"The sequence of rollers used in compaction is at the discretion of the Contractor provided the completed layers shall have minimum and maximum density as specified in table B4210 below.

Table B4210/1 : Minimum and Maximum Compaction Specifications		
Layer	**Min Compaction**	**Max Compaction**
Asphalt base (BTB)	93% MVD	96.5% MVD

Asphalt Surfacing	93% MVD	96.5% MVD

In addition thereto the compaction immediately adjacent to joints shall be done to ensure densities of not less than 2% as specified (above) in the rest of the layers (including all hot and cold joints). Joint densities across the joint shall not have densities of less than 3% of the minimum specified layer density. A combination of Calibrated thin layer nuclear gauge testing and Marvel permeability testing (both methods to be calibrated versus asphalt cores densities), will be used to assess and approve joint densities before covering thereof with consecutive layers."

Replace sub-clause (e) with the following:

"In restricted areas, or on bridge decks, where the specified rollers cannot be used, compaction shall be carried out with hand operated mechanical compaction equipment or approved smaller vibratory rollers. The revised compaction procedure shall be predetermined and submitted to the Employers Agent for approval. No vibratory rollers shall be used where services are located in close proximity as specified from where work is being undertaken."

B4213 CONSTRUCTION TOLERANCES AND FINISH REQUIREMENTS

(a) Construction tolerances

(iii) Thickness

Replace item (iii) with the following:

"The thickness tolerance for asphalt surfacing shall be as follows:

- Average thickness less than the specified minimum thickness = 0 mm.
- Average thickness greater than specified minimum thickness = 5 mm

The thickness tolerance for asphalt base shall be as follows:

- Average thickness less than the specified minimum thickness = 0 mm.
- Average thickness greater than specified minimum thickness = 7 mm (base thickness < 80 mm)
- Average thickness greater than specified minimum thickness = 10 mm (base thickness ≥ 80 mm)

Asphalt thickness shall be determined on a lot for lot basis. Lots shall not be combined to improve results. If the average thickness of a lot is greater than the specified minimum thickness plus the allowable tolerance, only the maximum tolerance thickness shall be paid for.

If the average thickness of a lot is less than the minimum specified thickness the lot shall be rejected and shall be replaced or repaired via approved remedial actions. The Employer reserves the right to reject any proposed remedial actions that are not deemed by him to be satisfactory and request that the thin asphalt be removed and replaced to the correct thickness."

(v) Surface regularity

Insert the following before the first paragraph:

"For the lanes and surfaced shoulders wider than 2.0 m of the through road as well as cross roads, except where the cross roads are less than 200m long, the roughness of the surfacing will be determined by using an inertial laser profilometer or Walking Profiler capable of producing a Class 1 vertical measurement resolution, and a Class 3 longitudinal sampling distance as defined in ASTM standard (E950-09). Surface shoulders less than 2.0 m wide, will be assessed according to measurements obtained from the adjacent slow lane.

The inertial laser profilometer or Class 1 Walking Profiler shall be used to record the longitudinal profile in both wheel tracks of each traffic lane or shoulder wider than 2.0 m, as determent according to the final line markings that will be applied on road surface after completion of construction. For Inertial laser profilometer three repeated runs will be required, for the Class 1 Walking Profiler only single measurement will be required per wheel track. The two-wheel tracks shall be 1,75 m apart. Should the two tracks not be measured simultaneously during the same pass, then procedures shall be implemented to ensure that the longitudinal profile data recorded for the two-wheel tracks are at the same longitudinal location on the road.

The measured longitudinal profiles will then be processed using the Quarter-Car simulation model with parameter values as defined in ASTM standard (E1170-97) for Ride Meter-Vehicle Mounted. The

simulated suspension mentioned will then be linearly accumulated and divided by the length to yield 100 m IRI (International Roughness Index) values in units of mm/m or m/km for each wheel track. The last 50 metres, and the joining first 50 metres of adjacent sections will be evaluated as a 100 m section in the direction of vehicle travel. For each measured lane the left and the right 100 m IRI values from the three runs will then be average to produce the Average IRI as follows:

Run1 $IRI_{100m\ Ave}$ = (100m $IRI_{Left\ wheel\ track}$ + 100m $IRI_{Right\ Wheel\ track}$) / 2

Run2 $IRI_{100m\ Ave}$ = (100m $IRI_{Left\ wheel\ track}$ + 100m $IRI_{Right\ Wheel\ track}$) / 2

Run3 $IRI_{100m\ Ave}$ = (100m $IRI_{Left\ wheel\ track}$ + 100m $IRI_{Right\ Wheel\ track}$) / 2

Average IRI_{100m} = (Run1 $IRI_{100m\ Ave}$ + Run2 $IRI_{100m\ Ave}$ + Run3 $IRI_{100m\ Ave}$) / 3

For the Class 1 Walking Profiler measurements the Average IRI will be calculated as follows:

Average IRI_{100m} = (100m $IRI_{Left\ wheel\ track}$ + 100m $IRI_{Right\ Wheel\ track}$) / 2

The Average IRI_{100m} values is then evaluated and judged according to Table B4213/2 to determine whether the 100m section needs corrective work or payment adjustments.

For the Asphalt Surfacing, the applicable Payment Bracket in Table B4213/2 for the measured lanes and shoulders will be determined as follows:

TABLE B4213/2: PAYMENT ADJUSTMENT FACTORS FOR ASPHALT BASES AND ASPHALT SURFACINGS

Target $IRI_{100m\ Ave}$ (m/km)	**PAYMENT ADJUSTMENT (Applicable to the final surfacing layer only)**	
	Full Payment Full or Partial Reconstruction Type N1 – N3 & N6 – N8 Type R2 & R6 – R9 Type I1 – I4	Full Payment Mill & Replace (≤140mm) Type R1 & R3 - R5
< 1.00	1.050	1.050
1.01 to 1.10	1.025	1.050
1.11 to 1.20	1.010	1.050
1.21 to 1.30	1.000	1.050
1.31 to 1.40	0,990	1.025
1.41 to 1.50	0,975	1.010
1.51 to 1.60	0,955	1.000
1.61 to 1.70	0,930	0,990
1.71 to 1.80	0,900	0,975
1.81 to 1.90	0.865	0,955
1.91 to 2.00	Reject	0,930
2.01 to 2.10	Reject	0,900
2.11 to 2.20	Reject	0.865
>2.21	Reject	Reject

Adjustment to the payment for asphalt surfacing will be reflected separately, as provided in the Bill of Quantities, in the contractor's monthly certification of the works. The adjustment will be calculated by multiplying the full payment value for each 100 m section, for payment items 42.02 by the payment adjustment factor derived from Table B4213/2. Contract Price Adjustment will not be applicable to the payment adjustment for the asphalt surfacing. The payment adjustment shall apply to the total asphalt layer width placed during a single pass by the paver over the 100 m sections in question.

Surfaced shoulders less than 2 m wide will be assumed to have the same roughness measurements as the adjacent lane and the quantity of material in the shoulder shall be added to the quantity of material of the adjacent lane for determination of the payment adjustment factor.

Neither the payment adjustment factors nor acceptance/rejection based on Table B4213/2 shall be applicable to any intersecting / tie roads with a length less than 200 m due to the short length of these roads.

On sections where the Average IRI_{100m} is worse than the cut-off value listed in Table B4213/2 the section is rejected and corrective work will be necessary.

Any corrective work required shall be made by the removal, through milling of the total asphalt layer width placed during a single pass of the paver over the 100 m section in question, followed by reinstatement. The contractor shall submit his method statement for any corrective work to the Employers Agent for approval, prior to commencing with any corrective work. Corrective work shall be done at the contractor's expense and shall be completed prior to determining pavement thickness. After completion of the corrective work, the 100 m sections shall be re-evaluated according to the abovementioned procedure.

For asphalt surfacing, as an absolute minimum, measurements shall be provided to the Employers Agent after 10%, 50% and 100% of the surfacing area of the project has been completed. The Contractor will be paid for these profilometer measurements under payment item B81.04. No additional payment will be made to the contractor for additional measurement and analysis of profiles if ordered for his own assessment purposes, or if additional surveys are required as a result of any remedial/corrective work identified and subsequently completed.

The raw measurements from the inertial laser profilometer or Walking Profiler is also to be provided to the Employers Agent."

Add the following new sub clause:

"(viii) Surface regularity at manholes and transverse joints

The maximum value of any irregularity when measured with a 3 m straight edge in any direction across at any manhole or manhole cover, belltoby, valve chamber or any service access point in the road and when measured across a transverse joint shall be 4 mm. Should the surface regularity tolerance not be met, the contractor is to mill out the full lane width for 10 m either side of the manhole or other regularity defect, reset the manhole or other service cover to correct levels where necessary and repave the milled area using a mechanical paver at the contractors cost."

(f) Construction tolerances for overlays

In the second paragraph, delete the following text entirely:

"except those of sub subclause 4213 (a) (iii) which relate to thickness."

Delete the fifth & sixth paragraph and replace with the following:

"The tolerance specified in sub-clause 4213 (a) (iii) which relate to thickness shall apply."

(c) Gradings

Replace the first sentence with the following:

"The tolerance (permissible deviations) on the approved grading shall be as indicated in the "Design and Use of Asphalt in Road Pavements (Sabita Manual 35 / TRH 8)."

B4214 QUALITY OF MATERIALS AND WORKMANSHIP

Add the following to this clause:

"Quality Control Scheme 1 given in Section B8200 will apply to the asphalt paved on this contract".

(b) Coring of asphalt layers

Add the following after the last paragraph:

"Cores may only be drilled when the road temperature is 20°C or less. Core holes must be tacked, dried out and backfilled immediately with hot mix asphalt. Coring shall be carried out within 48 hours after the paving has been completed. The process control core test results and material testing results shall be submitted to the Employers Agent 24 hours after coring and sampling respectively".

(c) Routine inspection and tests

Add the following paragraph after the last paragraph of item B4214 (c):

"The contractor shall keep accurate records of:

(i) The position where every truckload of asphalt is paved (chainage, lane, time and date).
(ii) The temperatures of the asphalt in the trucks both at the mixing plant and at the paving equipment immediately prior to discharging the load.

The truck and load number from which control samples are taken. All samples taken shall be appropriately numbered."

Add the following new sub-clause:

"(d) Special tests

n-Heptane-Xylene Equivalent (Spot test) (AASHTO-T102)

If the Employers Agent suspects that bitumen or asphalt has been overheated, he may order that the bitumen, or the bitumen recovered from the asphalt, be subjected to the Spot Test. Recovery of binder for use in the Spot Test shall be carried out according to an approved method.

Any bitumen having an n-Heptane-Xylene equivalent in excess of 36, or in excess of the manufacturers test result on the dispatched stock, shall be considered to have been overheated and shall be deemed to be rejected unless proven otherwise."

B4215 MEASUREMENT AND PAYMENT

Amend Item B42.15 as follows:

"Item **Unit**

B42.15 Application of an approved rubberised bitumen emulsion to the edges of a layer and/or joints……litre (ℓ)

In the first paragraph replace "30% stable grade emulsion" *with "*an approved rubberised bitumen emulsion"

Add the following new item:

Item **Unit**

"B42.21 Transportation of bitumen binder supplied by a refinery outside the Western Cape Province

(a) Supplying from Kwazulu Natal…… tons (t)

(b) Supplying from the Free State……tons (t)

The unit of measurement shall be the ton of net cold penetration-grade bitumen binder in the asphalt placed. The mass of binder shall be determined for each day's work based on the average field density of the asphalt placed and the average binder content of the mix.

The tendered rate shall be paid extra over the applicable pay items for asphalt surfacing and shall include full compensation for the additional transport costs incurred for having to import, at the express instruction of the Employers Agent, bitumen which complies with SANS 4001-BT1 from a refinery or other sources outside the Western Cape Province.

Item **Unit**

"B42.22 International Importation of bitumen……..tons (t)

The unit of measure shall be the ton of bitumen imported.

The landed cost of the imported bitumen shall be used as the gate price in the calculation of the special materials. If the approved imported bitumen is landed in Kwazulu Natal then the transportation of the bitumen to the Western Cape shall be covered under the tendered rate of B42.21"

The tendered rate for B42.22 shall therefore include full compensation for all other additional transportation, storage and other cost not reflected under the special materials adjustment or under B42.21 for the importation of the binder on instruction from the Employers Agent from approved international sources. Payment under this item will be applicable to all bituminous products specifically having been approved in terms of B4202(i).

Item		Unit
B42.23	**Extra over items B42.11 for static rolling**…….square metre (m^2)	

The unit of measurement shall be the square metre of asphalt base and/or surfacing rolled statically at the instruction of the"Employer Agent".

The tendered rate shall be paid as extra over the rates tendered for the items above, and shall include full compensation for all additional costs to statically roll the asphalt base and/or surfacing as instructed by the Employer Agent."

Add the following new section to Series 5000: Ancillary Roadworks:

SERIES 5000 : ANCILLARY ROADWORKS

SECTION B5000 : MOLE BARRIERS

CONTENTS

B5001 SCOPE
B5002 MATERIALS
B5003 CONSTRUCTION
B5004 MEASUREMENT AND PAYMENT

B5001 SCOPE

This section covers the furnishing of materials and the construction of mole barriers at the locations and to the dimensions as shown on the drawings or as directed by the "Employer Agent".

B5002 MATERIALS

(a) Backfill

Backfill sand shall comply with the following grading requirements:

Sieve Size (mm)	Cumulative % Passing
2	95 – 100
1	80 – 97
0.600	70 – 90
0.300	40 – 70
0.150	5 – 20
0.075	0 – 3

If the in-situ sand material excavated from the trench is suitable and is easily compactable it may be used as backfill on either side of the mole barrier sheeting.

(b) Barrier sheeting

The synthetic-fibre barrier sheeting shall be manufactured from high density polyethylene (HDPE) processed into a homogeneous sheet.

The mole barrier shall comprise of 2 mm nominal thickness HDPE sheeting placed in the centre of a trench excavated to the required depth in the road verge as shown on the drawings or as directed by the"Employer Agent".

Perforation of the HDPE sheets may be specified and/or instructed in certain areas. Perforation shall be made in a 200 mm x 200 mm grid with 8 mm diameter holes punched through.

B5003 CONSTRUCTION

The mole barrier shall be constructed as a continuous wall of 2 mm thick HDPE sheeting placed on the outside face of the trench excavated to the required depth in the road verge as shown on the drawings or as directed by the "Employer Agent". The overlap of the sheets must be at least 200 mm at either end bonded by plastic welding or other approved methods.

Allowance shall be made for all necessary cutting and shaping of the HDPE sheeting to accommodate services passing through the barrier. Gaps larger than 25 mm in diameter shall be patched and mortared over.

Installation trenches shall be excavated at the locations and to the dimensions shown on the drawings or as directed by the "Employer Agent". The trench width shall be at least 450 mm wide. The barrier sheeting shall be installed in the centre of the trench and held vertical by means of pegs or other approved methods at 2 metre interval spacing. The alignment of the barrier sheeting at terminal points shall be approved by the "Employer Agent". Backfilling shall commence at the joints between the sheets in order to keep the barrier sheets properly aligned.

Backfilling shall be placed alongside the placed barrier sheeting at optimum moisture content and compacted systematically in layers not exceeding 150 mm after compaction, to 98% Mod ASSHTO

density to the top of the barrier sheeting by means of vibration or other approved compaction methods. Backfilling shall be carried out to prevent buckling of the sheeting from occurring.

After the backfilling on either side of the barrier has been completed, the upper portion of the trench shall be backfilled over the top of the barrier sheeting using a wet mixture of soil cement. A wet mixture of soil cement shall consist of an approved soil or gravel (excavated trench material or other material as directed by the "Employer's Agent") mixed with 5% of Portland cement and sufficient water to give a consistency that will permit the soil cement to be placed with vibrators or other approved compaction methods. The soil cement backfill material shall cover at least the upper 100 mm of the barrier sheeting. The soil cement material shall be compacted to 93% Mod ASSHTO density. In areas where the barrier is installed directly below the kerbing or edging, the soilcrete backfill shall be replaced by the kerbing/edging concrete foundation directly on top of the barrier sheeting.

Any excess or surplus material from the trench excavation shall be spread evenly on the side slopes, removed and spoiled as directed by the "Employer Agent". The backfilled surface of the trench shall be neatly finished off and trimmed to suit the required road verge slides slopes.

B5004 MEASUREMENT AND PAYMENT

Item	**Unit**

B50.01 Excavation of soft material in the following depth ranges:

(a) 0 m up to 1,5 m……cubic metre (m^3)
(b) Exceeding 1,5 m to 3,0 m……cubic metre (m^3)

The unit of measurement shall be the cubic metre of material excavated within the specified widths over the lengths and depths authorized by the "Employer Agent". Excavation in excess of the widths specified or authorized by the "Employer Agent" shall not be measured for payment.

Irrespective of the total depth of the excavation, the quantity of material in each depth range shall be measured and paid for separately.

The tendered rates shall include full compensation for all excavation, temporary timbering, shoring and strutting, for preparing the bottom of the excavation for the barriers, the disposal of excavated material unsuitable for backfilling, keeping excavations safe, dealing with any surface or subsurface water, and for any other operations necessary for completing the work as specified.

Item	**Unit**

B50.02 Backfilling

(a) Using the excavated material……cubic metre (m^3)
(b) Using imported selected material……cubic metre (m^3)
(c) Extra over subitems (a) and (b) for soil cement backfilling (*percentage of cement indicated*)……cubic metre (m^3)

The unit of measurement shall be the cubic metre of material in place after compaction. The quantity shall be calculated from the leading dimensions of the backfilling as specified or as authorized by the "Employer Agent".

If excavations were carried out in excess of the dimensions authorized by the "Employer Agent", the quantity of backfilling will nevertheless be based on the authorized dimensions.

The tendered rates shall include full compensation for backfilling under, alongside and over barriers, for watering, and for compacting the backfill material to the specified density. The tendered rate for subitem (b) shall, in addition, include full compensation for supplying selected material of the specified sand quality from approved sources including all haul.

The tendered rate for subitem (c) shall be additional to the rates tendered for subitems (a) and (b) and shall include full compensation for all incidentals required for the complete backfilling with soil cement as specified.

Item	Unit

B50.03 Installation of mole barriers

(a) HDPE sheeting (2 mm thick 1.0 m height)…… square metre (m^2)

The unit of measurement shall be the square metre of barrier sheeting actually placed. The quantity shall be calculated from the prescribed height and the length as specified or as authorized by the "Employer Agent".

The tendered rates include full compensation for furnishing all materials and labour, cutting, overlapping, jointing, placing, erecting and protecting the mole barriers complete, as well as all installation pegs, temporary sheeting supports, wastage and for all other incidentals necessary to execute the work as specified.

SECTION B5500 : FENCING

B5501 SCOPE

Add the following:

"This section also covers all work related to the removal of all existing fences, walls and gates on the existing property/road reserve boundaries and their re-erection/reconstruction on the revised boundaries as shown on the drawings. Existing wire fences, precast concrete walls and palisade fences shall be dismantled and re-erected in new positions. All brick walls with brick columns shall be demolished and reconstructed in new positions. All combination brick walls with brick columns with fencing or palisade components shall be demolished/dismantled and reconstructed in new positions. The Contractor will be required to survey and set out the revised boundaries.

All such new fencing and fencing removal shall be carried out to the satisfaction of the Employer's Agent and each property owner. In this regard the fencing subcontractor shall allow for prior notice to the property owner, before entering onto his property; and daily consultation to keep him informed about progress and about any matters which affect the property owner's access and safety.

The fencing strategy shall be to erect temporary fencing on one erf or property at a time, so that residents and property owners are fully protected from unlawful entry or trespassing onto their properties. This will include temporary gates and pedestrian gates. Temporary fencing and gates shall be to at least the same height as the existing fence and gate. The temporary fence shall be fully erected prior to demolishing/dismantling the existing fence. The new fence shall then be reconstructed/re-erected in its new location as quickly as possible, using the recovered components of the existing fence; or building new brick walls, brick columns, brick buttresses, etc., together with all existing additional fencing components and accessories; including electrical connections, electrical security fencing, gate motors, telecoms systems, remote gate openers, communications systems, property numbers on walls, razor wire, etc.

This scope also covers the repairing of existing fences where it is necessary. In this regard the Tenderer shall allow in his prices for the replacement of at least an amount of 10% of all fencing components, which could already be damaged, or could be unavoidably damaged in the dismantling operations. This includes all posts, standards, straining posts, concrete panels, mesh panels and all required accessories and fittings such as nuts, bolts, washers, screws, fasteners, gate hinges, etc.

All wire fencing, palisade fencing, wire netting, Clear-vu fencing, etc., shall be at least to the standard of the existing fence or better. All fencing materials shall conform to the minimum specifications as stipulated in Clause 5502 of the standard specifications, particularly in terms of Class A galvanizing to suit coastal conditions. Spacings of standards, posts, straining posts, etc., shall match that of the existing fence. The fencing subcontractor shall therefore measure up the existing fences and walls prior to demolition or dismantling, including the taking of photographs, so that there can be no arguments with property owners after the fact."

B5502 MATERIALS

Add the following subclauses after (j):

(k) Proprietary high security welded steel fences

High security (ClearVu or equal approved) shall be zinc galvanized welded steel. All steel materials shall be South African commercial quality steel. All pipes shall be galvanized, one piece without joints.

The welded steel mesh panels shall be galvanized complete after all cutting, welding and bending of steel mesh panels. Zinc coating shall be smooth and essentially free from lumps, globs, or points. All miscellaneous steel components and fittings shall be zinc galvanized.

All materials for manufacturing the fence shall be made in South Africa and all fabrication of the fencecomponents shall be carried out in South Africa.

(i) Steel mesh panels

The steel mesh panels shall consist of wires with a minimum diameter of 3 mm, welded in a mesh.

Mesh panel aperture sizes shall be 76.2mm x 12.7mm to the centre of the wire. The panels shall be reinforced with 4 x 50mm deep 'V' formation horizontal recessed bands (for rigidity).

Panels shall have 2 x 70° flanges along sides (internal fixtures- all fixtures shall be on the inside of the fence line) Panels shall have 2 x 30° flanges along the top and toe (integrated rigid angle).
Panels shall be affixed to the post over 48 line wires using 8 x double-bolt comb clamps and 8 x single-bolt comb clamps using 24 x anti-vandal bolts.

Panels and fixtures shall be galvanized.

(ii) Steel posts

Posts shall have a flush panel post finish with no climbing aid. The posts shall be 3 m long with a locking recessmechanism to secure the panel edges. Posts shall be zinc galvanized and sealed with a UV stabilized polymer cap.

(iii) Fence Corner Configuration

The fence configuration should not have any sharp corners and all internal angles at changes of direction should not be less than 130 degrees.

(iv) Fence spikes

A 100 mm high toughened steel Shark Tooth spike shall be affixed to the top of the panel at 150 mm intervals using anti-vandal bolts on the inner face. Spike finish shall be hot-dipped galvanized, then Marine Fusion Bondcoat.

(l) Galvanised steel palisade fencing

Galvanised steel palisade fencing shall be shall meet the following minimum requirements:

a) Fence panel length (post spacing) shall not be greater than 3.0 m;
b) Maximum pale spacing shall be 150 mm;
c) Minimum pale width shall be 40 mm;
d) Fence post shall be square tubing and shall have a width of not less than 75 mm;
e) Fence posts are to be embedded at least 600 mm under the ground level and Post foundations shall be 600 mm x 500 mm², 20 MPa concrete, unless indicated otherwise;
f) Height shall be as indicated in the BoQ;
g) All square tubing posts are to receive steel caps;
h) All other miscellaneous materials shall be galvanised.

Dimensioned drawings and full product details are to be submitted to the Employers Agent of the proposed steel palisade fence for the Employers Agents approval.

(m) Concrete palisade fencing

Concrete palisade fencing shall be shall meet the details of standard drawing GE3 and the following minimum requirements:

a) Concrete palisades are to be prestressed and shall meet a minimum of 30MPa strength requirement. All concrete elements are to be fully cured in accordance with SANS requirements;
b) The posts are to 2.7 m long and slotted to accept the horizontal load-bearing rails. The thickness of the post must be at least 150 mm. Posts must be spaced at 2.0 m intervals in a concrete foundation. The post's top is angled at a 45-degree angle.
c) The pales are to be 1.9 m long and include two 10 mm holes for carriage bolts that are 8mm in diameter. The thickness of the pales must be 100 mm. A total of 9 pales are installed spaced at +/- 200 mm centres;
d) Fence posts are to be embedded at least 600 mm under the ground level and Post foundations shall be 600 mm x 500 mm^2, 20 MPa concrete, unless indicated otherwise

Dimensioned drawings and full product details are to be submitted to the Employers Agent of the proposed concrete palisade fence for the Employers Agents approval.

(n) Vibracrete (or equal approved) fencing

Vibracrete fencing shall be shall meet the following minimum requirements:

a) Fence panels are to be 300 mm in height and 1 440 mm in width;
b) Panels are to have a smooth finish;
c) Posts are to be spaced 1.5 m apart;
d) Vibracrete fence shall have a height indicated in the BoQ, above the ground;
e) Each individual post must be sealed with a neat cement layer after the vibracrete panels have been inserted to ensure that the slabs cannot be removed;
f) Fence posts are to be embedded at least 600 mm under the ground level and Post foundations shall be 600 mm x 500 mm², 20 MPa concrete, unless indicated otherwise;

Dimensioned drawings and full product details are to be submitted to the Employers Agent of the proposed steel palisade fence for the Employers Agents approval.

B5512 TEMPORARY FENCING

Add the following paragraph after the final paragraph of item 5512:

"Temporary fencing shall have a minimum height of 1.8 m at any point along the fence line. Where ground surfaces with varying slopes exist, the Contractor shall ensure that the minimum height is never lower than the prescribed minimum height as stated above, whilst also maintaining a wholly impassable fence line.
The posts and standards need not be backfilled with concrete due to the temporary nature of the fence. Temporary single-leaf gates shall be provided where necessary for vehicles and pedestrians. Vehicle gates shall be 1.8m high and have a minimum width of 3m and pedestrian gates 900mm. All gates shall be provided with locks, chains and locking mechanisms for use by the property owner. All temporary gates shall be of galvanized tubular steel construction with plastic coated diamond mesh attached to the frame."

B5513 GENERAL REQUIREMENTS

"The ground line along original fence positions shall be backfilled, levelled, compacted and reinstated to its original condition. After completion of the fence or wall in the new position, the excavations shall be backfilled, levelled, compacted and the surrounding ground reinstated to its original condition. All surplus materials, cut-offs, loose wire and netting, bricks, concrete or mortar fragments shall be removed to off site to an approved dump including all haul.

The Contractor shall liaise and communicate regularly with the property owner in order to keep him informed as to the progress of the works and not compromise his access or safety.

All existing fences will be reviewed during construction to ensure compliance with the latest version of the City of Cape Town Boundary Walls and fences policy. This inter alia relates to maximum height, visibility, aesthetics and danger to pedestrians."

B5514: MEASUREMENT AND PAYMENT

Item	**Unit**

"B55.02 Supply and erect new fencing material for new fences and for supplementing material in existing fences which are being repaired or removed:

Add the following items to B55.02:

(j) Galvanised steel palisade fencing *(height indicated)*…….. metre (m)

(k) Concrete palisade fencing *(height indicated)*…….. metre (m)

(l) Vibracrete (or equal approved) fencing *(height indicated)*…….. metre (m)

The unit of measurement for items (j) to (l) shall be the metre of new fencing installed. The quantity shall be calculated from the prescribed length as specified or as authorized by the Employer Agent.

The tendered rate shall include full compensation for procuring and furnishing all materials and for installing the fence complete as indicated in the CCT standard drawings and specified by the approved supplier, including all excavations, backfilling, concrete foundations, posts, panels, all fittings, disposing

of excavated material to approved dumping sites including all haul, as approved by the Employers Agent."

Item **Unit**

"B55.05 Dismantling existing fencing:

Add the following items to B55.05:

(a) Fences:

(v) Galvanised steel palisade fencing……. metre (m)

(vi) Concrete palisade fencing ……metre (m)

(vii) Vibracrete (or equivalent) fencing ……. metre (m)"

The unit of measure for subitems (v) – (vii) shall be metre. The tendered rate shall include full compensation for procuring and furnishing all materials and for removing the fence complete including all excavations, backfilling, disposing of excavated material, damaged fencing material and debris to approved dumping sites including all haul, as approved by the Employers Agent."

Add the following new payment items after B55.09:

Item **Unit**

B55.10 High security welded steel fences

(a) High security fence (*height indicated*)…….metre (m)

The tendered rates for the fences shall be per metre and shall include any materials, plant or labour required for the complete installation of these fences as per specifications and/or drawings. Rates shall include all posts, mesh, clamps, bolts, topping, under dig, post caps, coil, electrification, PVC coating and any other materials required in order to provide the complete installation of these fences as per the specifications and/or drawings..

The high security welded steel fences under subitem (a) shall be installed as per item B5515 of these Specifications forming part of this Contract.

Item **Unit**

B55.11 Supply and install 1.124 m high handrailing complete as per CCT specification and Drawings GE2A to GE2E……metre (m)

The tendered rate shall include full compensation for procuring and furnishing all materials and for installing the fence complete as indicated in the CoCT standard drawings, including all excavations, backfilling, concrete foundations, posts, panels, all fittings, couplers, end caps and diamond mesh and installation."

Item **Unit**

B55.12 Additional work required for the relocation of existing walls and fences…… Provisional Sum (Prov Sum)

Expenditure under this shall be made in accordance with the general conditions of contract. Where existing rates within this document may be applicable then the Employers Agent may select to use these rates tendered rates."

Add the following after Clause 5514:

"B5515 ERECTING HIGH SECURITY WELDED STEEL FENCES

All fencing and gates shall be installed in accordance with the drawings, specifications and manufacturer'sinstructions.

Terminal posts shall be set at abrupt changes in vertical and horizontal alignment. Post holes shall be cleared of loose material. Waste material shall be removed from site or spread where directed by the

Employers Agent. The ground surface irregularities along the fence line shall be eliminated to the extent necessary so that the ground line closely follows the underside of the fence without excessive gaps.

Posts shall be set plumb and follow the indicated alignment. All posts shall be set to the depth indicated on the drawings. Concrete shall be thoroughly consolidated around each post, free of voids, and finished with a domedshaped surface, with the base of dome at the correct elevation. Concrete shall be allowed to cure prior to installing any additional fence components on the posts.

Concrete footings shall extend to at least the depth indicated on the drawings and shall not be smaller than the dimensions shown. Where a rock layer is encountered within the required depth to which the post is to be excavated, a hole of a diameter slightly larger than the largest dimension of the post may be drilled into the rock and the post grouted in. The regular concrete footing shall then be placed between the top of the rock and the top of the footing elevation. Posts shall be centred in the concrete footings. All concrete shall be placed promptly andconsolidated by tamping or other approved methods.

Where the ground is firm enough to permit excavation of the post hole to neat vertical lines, the concrete may beplaced without forms by completely filling the hole.

Where the ground cannot be satisfactorily excavated to neat vertical lines, forms shall be used to place the concrete footings. Under these conditions the earth and forms coming into contact with the concrete shall be moistened and all ponded water shall be removed from the hole prior to placing concrete. When forms are removed, the gap between the footing and the wall of the excavation shall be backfilled with moistened material, and thoroughly tamped.

The top of the concrete footing shall be temporarily covered with not less than 100 mm of loose moistened material immediately after placing the concrete for curing purposes, or a curing compound may be used.

All excess material from footings, including loose material used for curing, shall be disposed of off-site, or as directed by the Employers Agent.”

SECTION B5600 : ROAD SIGNS

B5601 SCOPE

Replace "South African Road Traffic Signs Manual" *in the second paragraph with*:

"SADC Road Traffic Signs Manual"

B5603 MANUFACTURING OF ROAD SIGN BOARDS AND SUPPORTS

(a) Road sign boards

Add the following:

"The contractor shall make every effort to ensure that signboards are correct in all respect and before dispatching the boards from the manufacturer's factory shall provide the Employer's Agent with a 100 mm x 150 mm colour photograph of each sign face for approval of the correctness of the legend. Such approval will not imply final acceptance of the board. If the contractor is in any doubt as to the correctness of the sign detail, the sign designer shall be contacted for verification."

B5605 STORAGE AND HANDLING

Add the following:

"The following shall not be allowed on the sign face:

- Drilling of holes, except for the fastening of overlays
- Application of any form of adhesive
- Cleaning with any chemicals that are not specifically approved by the manufacturer of the retro-reflective material.
- Covering the sign face with an impermeable material that does not allow free circulation of air."

B5606 ERECTING ROAD SIGNS

(c) Erection

Add the following:

"After erection the signboard shall be thoroughly cleaned with a cleaning agent approved (where necessary) by the retro-reflective material's manufacturer.

All vegetation obstructing the new or replaced sign board shall be removed and disposed of as instructed by the Employer's Agent."

B5606 DISMANTLING, STORING AND RE-ERECTING EXISTING ROAD SIGNS

Add the following:

"Existing overhead and ground mounted road signs that are being replaced by new signs shall be dismantled and disposed of by the Contractor. Where possible the dismantling of the signs shall not be before the replacement sign is erected and displayed. Where dismantling of the sign is required before erection of the replacement sign, the dismantling shall not take place until immediately before work is to commence on the replacement, and the replacement shall be completed and the new sign displayed as soon as possible thereafter (within 72 hours).

Dismantling shall include sign panels and ground mounted sign supports.

Ground mounted sign supports shall be cut off just below ground level. Material excavated for removal of buried poles shall be replaced, and any depression made good using excess material from excavation for new signs.

Pay-items are provided in the Pricing Schedule. Payment will differentiate between different types of sign panels."

B5609 MEASUREMENT AND PAYMENT

Item **Unit**

B56.01 Road sign boards with painted or coloured semi-matt background. Symbols, lettering, and borders in semi-matt black or in Class I retroreflective material, where the sign board is constructed from:

Amend the last two lines of the second paragraph to read:

"completion, delivery, installation of the road sign board complete as specified, and the removal and disposal of all vegetation obstructing the motorists' view of the new or replaced sign board."

Replace the title of B56.03 as well as sub-items (a) and (b) with the following:

"Item **Unit**

B56.03 Road sign supports (over-head road sign structures excluded):

(a) Steel tubing (*diameter and wall thickness indicated*)……Number (No)
(b) Timber(*diameter and treatment type indicated* ……Number (No)"

Replace the first paragraph starting with: "(a) The unit of measurement of supporting structures manufactured from steel tubing…" *with the following paragraph:*

"(a) The unit of measurement of supporting structures manufactured from steel tubing shall be the number of supports used. Bolts and other accessories shall not be measured. Only the actual number of completed posts shall be measured.

Replace the second paragraph starting with: "(a) The unit of measurement for timber supporting structures…" *with the following paragraph:*

"The unit of measurement for timber supporting structures shall be the number of each post used. Bolts and other accessories shall not be measured. Only the actual number of completed posts shall be measured. Cut-off sections shall not be measured."

Add the following payment items:

"Item **Unit**

B56.10 Extra over item 56.05 for concreting of sign supports (Class 15Mpa concrete)…… cubic metre (m^3)

The unit of measurement shall be the cubic metre of excavation backfilled with 25MPa concrete measured as specified for item B56.05.

The tendered rate shall include full compensation for the additional cost of providing, placing and compacting the concrete and removal of surplus excavated material."

SECTION B5700 : ROAD MARKINGS

B5701 SCOPE

Replace "South African Road Traffic Signs Manual" *in the second paragraph with* "SADC Road Traffic Signs Manual"

Add the following:

"Retro-relective road marking paint shall be used for marking of the road during the construction process. The entire road shall be remarked using plastic roadmarking paint prior to the issuing of a Certificate of Completion."

B5702 MATERIALS

Insert the following before subclause (a) Paint:

"The selection of the appropriate road marking paint and materials for permanent road markings to ensure conformance with the requirements of this specification rests with the contractor. Such paint and material shall have technical characteristics (brightness, luminance, skid resistance, durability) equal to or greater than road marking paint and materials specified in subclauses B5702(a), (b) and B5702(c).

Where plastic road-marking material (hot-melt plastic (also known as thermoplastic) and two-component (also known as cold plastic)) is used, the contractor shall obtain an approved guarantee from the manufacturer that the paint complies with the specification. This shall be submitted to the "Employer Agent" on request."

(a) Paint

Replace sub-subclause B5702(a)(i) with the following:

"(i) Road marking paint

Road marking paint shall be Type 1 as specified in SANS 731-2. Only paint, manufactured in a SANS approved and accredited facility shall be accepted. The no-pick-up time of road-marking paint shall comply with the Class 1 requirement in accordance with SANS 731-2.

The paint shall be delivered at the site in sealed containers marked in accordance with SANS 731-2.

The viscosity of the paint shall be such that it can be applied without being thinned down."

(ii) Retro-reflective road-marking paint

Amend paragraph as follows:

"Retro-reflective road marking paint shall comply with the requirements of sub subclause 5702 (a)(i)"

(iii) Plastic road-marking material

Add the following:

"Plastic road-marking material shall be of the hot-applied hydro-carbon resin type with a minimum application thickness of 1,25 mm. Tendered rates shall be based on an application thickness of 1,25 mm."

Replace sub-subclause B5702(a)(iii) with the following:

"(iii) Thermoplastic road marking material

Thermoplastic road marking material shall comply with the requirements of SANS 51423 for drop-on glass beads for road marking and anti-skid aggregates and mixtures thereof. Blending of thermoplastic road marking material and glass beads shall comply with SANS 51424.

The binder shall be an elasticised synthetic resin and the material shall be reflectorised by mixing in 25% by mass Class A glass beads in accordance with SANS 51424. An additional topping of glass beads shall be applied to the hot surface of the material for instant retro-reflectivity.

The white road marking material shall contain 6% by mass minimum titanium dioxide content and shall have a skid resistance of 45 S.R.T. – units or higher. SANS 6248:2007 Edition 2 shall be used for determination of traffic wear index; indication of durability.

The following minimum lumination values are required for the completed product:

- 250 mcd/m2.lux & 120 mcd/m2.lux for white & yellow lines respectively, at 30 days after application.
- 200 mcd/m2.lux & 100 mcd/m2.lux for white & yellow lines respectively, at 6 months after application.

Determination of coefficient of retro-reflected luminance by means of portable retro-reflectometer shall be carried out using SANS 6261: 2008. Application of the permanent roadmarking will thus have to be performed within the first 6 months of the 12 month defects liability period to allow for the second measurement to fall within the contract dates. Should the application of the permanent road-marking fall outside the first half of the defects liability period for whatever reason, the settlement of the retention money will be delayed until the second measurement of luminance can be performed at the stipulated time.

Two-component cold plastic road marking material shall be used for symbols, arrows and letters (hand painted markings) unless otherwise instructed by the "Employer Agent"."

Add the following sub-subitem:

"(v) Cold plastic road marking material

Cold plastic road marking material shall be used for symbols, arrows and letters (hand painted markings) and shall consist of a solvent-free reactive acrylic resin, stuffing, beads and pigment to which a hardener shall be added. Application is carried out using a trowel. Material applied by paint brush shall not be used.

Cold plastic road marking material shall be reflectorized by mixing in 25% by mass (or 400 g/m2) Class A glass beads in accordance with SANS 51424. An additional topping of glass beads is applied to the wet surface of the material after application and will comply with SANS 51424."

(b) Roadstuds

Replace the second sentence with the following:

"All square roadstuds shall have a footprint of 100 mm x 100 mm and a height of at least 20 mm. Round roadstuds shall be 100 mm in diameter and not less than 20 mm in height."

Add the following new paragraph:

"In terms of SANS 1442 The following are definitions of the various categories of roadstuds:

Category A roadstuds	Corner cube retro-reflectors
Category B roadstuds	Biconflex retro-reflectors
Category C roadstuds	Omnidirectional retro-reflectors"

Add the following sub-item:

(c) Retro-reflective beads

"Retro-reflective glass beads shall be applied to the wet paint, thermoplastic and cold plastic.

The beads shall comply with Class A beads in accordance with SANS 51424, with the following requirements or as approved by the "Employer Agent":

- colour : crystal clear
- roundness : > 80%
- size range of : 14 – 200 US Mesh (75 – 1400 Microns)
- refractive index : > 1.5
- specific gravity : ± 2.5
- granulometry :

CUMULATIVE RETAINED MASS		
SIEVE	**MINIMUM**	**MAXIMUM**
1700	0	2
1400	0	10
1180	5	30
850	40	80
600	70	100
425	80	100
355	90	100
212	95	100
Pan	100	100

The beads shall be delivered to the site in sealed bags, marked with the name of the manufacturer, the batch number and an inspection seal of SANS, confirming that the beads form part of a lot tested by SANS and comply with the requirements of SANS 51424. Alternatively, the Contractor shall at all times have a SANS certificate on the site, identifying the batches to which the inspection seals apply and certifying that they have been tested by SANS, and comply with the requirement of SANS 51424."

B5704 MECHANICAL EQUIPMENT FOR PAINTING

Add the following sentence at the end of the first paragraph:

"The road-marking machine shall be fitted with a device to guide the operator to the centre of the line to be painted. This device shall be used at all times of operation."

B5705 SURFACE PREPARATION

Add the following at the end of the second paragraph:

"The onus is on the contractor to ensure that the surface on which the road markings are to be applied is sufficiently clean and dry to ensure that the quality of the road markings will not be adversely affected. The contractor is also responsible for protecting road studs from being painted over, and the subsequent cleaning thereof if such over-painting did occur."

B5706 SETTING OUT THE ROAD MARKINGS

Add the following:

"Where road markings are to be replaced after milling/overlay seal, it is essential that all existing barrier lines and other road marking lines be accurately referenced before commencement of milling or other operations which will obliterate the existing road markings. The position of barrier lines shall be re-assessed on site by the "Employer Agent" before the contractor commences with the road marking."

B5707 APPLYING THE PAINT

Insert the following before the first paragraph:

"The Contractor's establishment on site and general obligation shall be deemed to fully include the establishment of the road-marking team, irrespective of the number of times the road-marking team is required to be on site or is required to move within the site."

Replace the sixth paragraph with the following:

"Road marking paint shall be applied at a nominal rate of 0,42 ℓ/m^2 or as directed by the "Employer Agent". Thermoplastic road marking shall be applied at a nominal rate of 2,5 kg/m^2 to achieve a minimum thickness of 1,25 mm to 1,5 mm or as directed by the "Employer Agent". The two-component road marking material shall be applied by hand by means of a trowel. The desired symbol or line shall be marked with a tape or a template on the road surface. Thereafter apply the required volume of material and spread uniformly over the entire area. When dry/set, remove the tape or template. A spreading rate of 4,5 kg/m^2 is estimated to achieve a 2,0 mm material thickness.

In order to ensure proper coverage on all types of surfaces the "Employer Agent" may order an increase in the above nominal application rates. Payment for these variations in application rates shall be made under item 57.04.

A daily log-sheet, provided by the Employer, shall be completed and signed by the Contractor and the "Employer Agent" representative, recording the quantities of paint and glass beads used on that day and shall be available for inspection at all times. The completed and signed log-sheet for the period covered by a payment certificate shall be attached to the payment certificate."

Replace the last paragraph with the following:

"Initial road marking as specified by the "Employer Agent" shall be carried out within 7 days of opening the road full width to traffic after the completion of the surfacing.

If in the in the opinion of the "Employer Agent", conditions are unsafe, the centre-line shall be painted immediately after 1,0 km of continuous road has received a new asphalt layer."

B5708 APPLYING THE RETRO-REFLECTIVE BEADS

In the first paragraph, replace the nominal application rate of 0,8kg/litre with "400 gm/m^2*".*

Replace the second paragraph with the following:

"The thermoplastic road marking material and two-component road marking material shall contain in-situ glass beads of minimum content of 25% in order to obtain night visibility (reflectivity). The contractor shall immediately apply additional glass beads at 400g/m^2 to obtain immediate reflectivity. The beads shall be sprayed onto the road marking layer by means of a pressure sprayer. Where letter, symbol, traverse line and island road marking is undertaken by hand, the glass beads may be applied by hand if approved by the "Employer Agent". Prior to any hand application work, the contractor shall first request approval from the "Employer Agent"."

Add the following:

"Beads shall be applied in accordance with SANS 51424."

B5710 TOLERANCES

Add the following paragraphs to subclause (c) Alignment of markings*:*

"When an unbroken line and a broken line are painted alongside each other, the beginning and the end of the unbroken line shall coincide with the beginning of one broken line and the end of another broken line. When existing lines are repainted, the new markings shall not deviate more than 100 mm in the longitudinal direction nor 10 mm in the transverse direction from the existing marking.

The alignment of the road studs shall not deviate from the true alignment by more than 10 mm and shall be positioned so that the reflective faces are within 5° of a right angle to the centre line of the road."

Add the following subclause:

"(e) Testing

(1) Plant

Before painting any permanent road markings, the Contractor shall satisfy himself and the Employer's Agent, by painting test lines on a section of pavement other than the section required to be marked:
(i) that the painting machine is in good working order and properly adjusted;
(ii) that the operator is fully experienced; and
(iii) that the machine sprays at the specified rate of paint application.

The Contractor shall bear the cost of all materials and workmanship required for the above plant tests.

In addition, the Contractor shall conduct random paint thickness tests and dip/spread tests as required by the "Employer Agent"."

B5711 GENERAL

Insert the following into the last sentence of the last paragraph between "black paint" *and* "or chemical paint remover":

", bituminous emulsion, slurry"

Add the following to the last paragraph:

"Where black paint is used, it shall be matt."

Add the following clause:

"The Contractor shall provide temporary traffic control facilities in accordance with Section B1500 of the COLTO's standard specifications for road and bridge works to ensure traffic safety where work is being executed.

Property and/or road signs damaged by the Contractor, his personnel, his agents or sub-contractors shall be repaired or restored to their condition prior to the damage at his own cost."

B5712 FAULTY WORKMANSHIP OR MATERIAL

Add the following paragraphs to this item:

"The Contractor shall rectify in an acceptable manner and at his own costs; all marking that do not comply with the specified requirements.

While work is in progress, tests shall be carried out on materials and/or the quality of work to ensure compliance with the specified requirements. The sampling methods are specified in SANS 731-2. The sampling methods described in TMH5 shall be followed where applicable."

B5713 PROTECTION

Add the following paragraph

"Traffic cones shall be placed on the road not further than 48m apart. Cones shall not be removed before the paint on the road has hardened to such an extent that it will not be damaged by traffic. All marks on the road caused by traffic driving over wet paint shall be removed by the Contractor at his own cost."

B5714 MEASUREMENT AND PAYMENT

Add the following pay items:

"Item **Unit**

B57.10 Cold plastic road marking material

(a) White lettering and symbols…… square metre (m^2)

(b) Yellow lettering and symbols……square metre (m^2)

(c) Transverse lines, painted island and arrestor bed markings (any colour)……square metre (m^2)

The unit of measurement for applying the road-marking material for the lettering, symbols, transverse lines, islands and arrestor bed markings shall be the square metre, and the quantity to be paid for shall be the actual surface area of the lettering, symbols, transverse lines, islands and arrestor bed markings, completed in accordance with the instructions of the Employer's Agent.

The tendered rate per square metre for applying the road-marking material shall include full compensation for procuring and furnishing all material, including the retro-reflective beads and all necessary equipment, and for applying, protecting and maintenance as specified, including the setting out of lettering, symbols, transverse lines, islands and arrestor bed markings."

Item **Unit**

B57.11 Painting of kerb faces…….square metre (m^2)

The unit of measurement for painting of kerb faces shall be the square metre of kerb face painted as measured on site and approved by the Employer's Agent.

The tendered rate shall include full compensation for establishment of a kerb painting team and equipment on site as many times as may be required, procuring and furnishing all equipment and

material, and for all personnel costs required to paint the kerbs faces. The tendered rate shall also include for the preparation of the kerb faces prior to painting to ensure adequate adhesion."

Item		Unit
B57.12	**Polymer modified cement binder (spray applied) and dressed with fine aggregates (any colour)**……	square metre (m^2)

The unit of measurement for shall be the square metre of as measured on site and approved by the Employer's Agent. The tendered rate shall include full compensation for procuring and furnishing all equipment and material, and for all personnel costs required to paint the designated areas.

The compound consists of a combination of cementitious powder, plasticizer, sand (1-3mm particle size) and water such as Endurablend or equivalient approved. The coating is generally applied in a hexagon pattern (by use of a stencil), in order to provide a hard wearing and skid resistant surface coating of a minimum thickness of 2mm."

SECTION B5800 : LANDSCAPING AND PLANTING PLANTS

B5801 SCOPE AND DEFINITION

a) Scope

Add the following:

"This section includes all areas affected by construction activities. It includes landscaping, grassing, rehabilitation, erosion protections and planting trees and shrubs."

b) Definition

WEEDS

Delete the following:

"(as listed in bulletin 413 issued by the Department of Agriculture, Directorate of Agricultural Information)"

and replace it with:

"(as listed in "National Environmental Management: Biodiversity Act 2004 (Act No, 10 of 2004) Alien and Invasive Species Lists, 2014")"

Add the following section (c-k):

c) Sequence and programming

"The Landscape Contractor must allow for changes in the timing and sequence of other on-going contracts on site. While every attempt will be made to keep all parties informed of actual construction programmes, due allowance must be made in the construction programme and in the tendered price for changes in the overall sequence of operations.

d) Co-ordination with other contractors

The Landscape Contractor shall by means of careful programming and liaison take full account of other contracts in his/her programming and shall provide other Contractors with access for installation of services or other work as may be necessary. Envisaged are such activities as installation where certain services and paving must be linked.

Sufficient programme time must be provided for these other Contractors to complete their work. Other work which may also interfere with or need to be interfaced with work in this contract may become apparent during the contract period.

In general, the Landscape Contractor must adopt an approach to this contract which allows for changes in the programme. Any such changes must be co-ordinated with such re-distribution of workmen and/or teams so as to eliminate or minimise delays or additional cost.

e) Programming of the works

Practical completion of the landscape works is to be scheduled to comply with the programme of the main contractor.

f) Phased returning to site

Within the Scope of Work, the Landscape Contractor will be required to return to site and complete work in a stop - start manner. Rates for such phased returning to site will be deemed to be included in the tender amount.

Urgently required work that does not fall in the natural flow of work that requires the Contractor to return to site for one day or less will be compensated on the rates for Day Works. No claims for such phased returning will be entertained unless requested from and approved in writing by the Landscape Architect, prior to any work being put in hand.

g) Qualifications

The landscape contractor must be a registered member of SALI (South African Landscape Institute). All work shall be executed by experienced personnel under the direction of a Landscape Technician/Technologists or skilled foreman (with 5 years or more experience) and in accordance with "SALI Best Practice Construction Document".

Planting works to be executed under the supervision of a qualified horticulturalist, Landscape Technician/Technologists. All handing of plants and storage thereof will be in accordance with "SALI Best Practice Construction Document" and according to best practices as stipulated by SANA (South African Nursery Association).

The irrigation sub-contractor or irrigation works to be executed, must be undertaken by a registered member of LIA (Landscape Irrigation Institute of South Africa).

Curriculum vitae, qualifications of proposed LIA member, Landscape Technician/Technologists and Horticulturalist, must be submitted with the tender. Alternatively, motivation must be provided for experienced staff without qualifications.

h) Quality of materials and workmanship

All materials used and workmanship employed in connection with the Contract Works shall be in accordance with the Contract and of the best quality, and shall at all times be subject to the approval of the Landscape Architect, who may inspect and test the materials and the workmanship at any stage of the work.

If during the progress of the Contract Works the Landscape Architect shall be dissatisfied with any part of the Contract Works, the Contractor shall immediately remove such items from site and re-construct such part / parts of the Contract Works of a quality to the satisfaction of the Landscape Architect.

Such removal and re-construction of the contract works or any part/s thereof shall be executed at the cost of the contractor and no extension of the date of completion shall be granted by reason of such re-construction.

i) Measurements

Before ordering any materials or doing any work, the Landscape Contractor shall be responsible for the correctness of the same. No extra charge or compensation will be allowed on account of difference between actual dimensions and the dimensions indicated on the drawings. Any differences which may be found shall be submitted to the Landscape Architect for consideration before proceeding with the work.

All delivery slips of material delivered to site MUST be retained and issued to the Employers Agent and Landscape Architect for claim purposes.

j) Setting out works

The Landscape Contractor shall be responsible for the correctness of the positions, levels and dimensions of the Contract Works according to the contract and any written instructions of the Landscape Architect or other contractors in setting out such positions, levels and dimensions. If at any time during the progress of the Contract Works any errors shall appear or arise therein, the Landscape Contractor shall, on being required to do so by the Landscape Architect, remove and modify such works at his own expense to the reasonable satisfaction of the Landscape Architect, and shall be responsible for the consequences of any such error.

k) Nurseries on Site

All activities to abide by the best practice stipulated by SANA (South African Nursery Association) and SALI (South African Landscape Institute) Refer to " SANA Best practices guidelines for nurseries"

The Landscape Contractor is to set up a secure holding nursery close to the construction site under the direction of the main contractor who will provide a reliable water connection for irrigation purposes. Locate the site as to maximise adherence to Sustainable Green Principles.

All harvested seeds and seedlings, as well as plants removed for transplanting which are not immediately re-planted, are the responsibility of the Contractor and must be kept under approved nursery conditions. All specified species supplied or bought in from nurseries or lifted from open ground must be delivered

and / or retained in containers or bags as specified. Ensure that the nursery is properly equipped with the necessary implements, containers, fertilizers and other equipment necessary to function efficiently.

Take all necessary precautions to ensure that procured plants arrive on site in conditions suitable so as to ensure healthy and successful growth. Delivered plants must be healthy, full in shape, well rooted, free of insects, pests and diseases. Damaged or deformed plant material will not be received, stored or planted on the Site.

All plants must be fully maintained by staff dedicated from the date of receipt until the end of the Maintenance Period. This includes watering, weeding, fertilising, etc. All plants must be regularly watered and fertiliser applied as required. All plants must be protected against wind, frost and direct sunlight, until such time as they are fully acclimatised. Provide shade net or a shade house as required for this purpose. Plants held in the nursery for more than one year, must be replanted into larger containers. The Contractor must regularly inspect and replace broken containers. The Contractor will be held liable for the replacement of plants lost due to his negligence or mismanagement."

B5802 MATERIALS

a) Fertiliser/soil-improvement material

Delete the following:

(i) Soil-improvement materials such as dolomitic lime, basic slag, gypsum, superphosphate and agricultural lime.

(ii) Fertilisers such as limestone ammonium nitrate, 2:3:2 (22) and 3:2:1 (25)."

Add the following:

"All fertiliser to be organic, e.g. Neutrog or approved equivalent

Apply all organic fertiliser as per manufacturer's specifications in quantities and at recommended periods throughout maintenance."

i) Trees: 150g a tree once in Spring and in Autumn
ii) Planting: 100g/m² once in Spring and in Autumn
iii) Irrigate the lawn, grasses and planting well directly after the application of fertilizer"

b) Grass cuttings

Remove section, not applicable

c) Grass seeds

Add the following:

"The grass seed mixture per ha shall be as follows but shall be confirmed with the Employers Agent or Landscape Architect prior to purchase of the seed:

i) Melinis nerviglumis 10 kg/ha
ii) Aristida junciformis 10 kg/ha
iii) Themeda triandra 10k g/ha
iv) Cynodon dactylon (Hydroseed) 20 kg/ha
v) Eragrostis curvula (Hydroseed) 10 kg/ha
vi) Erharta calycina (Hydroseed) 5 kg/ha
vii) Merxmuellera stricta (Hydroseed) 10 kg/ha
viii) Hyparrhenia hirta (Hydroseed) 5 kg/ha

The application of the seed mix shall be 30 kg/ha"

d) Trees & Shrubs

Add the following between the second & third paragraph:

"Plants shall be established for at least 6 months in their containers and shall not be root-bound"

Delete the following:

"8,0 ltr capacity, and shall have a height of at least 1 500 mm."

And replace it with:

"250 ltr capacity, and shall have a height of at least 2 000 mm."

Delete the following:

"at least 4,5 ltr capacity and shall have a height of at least 500 mm."

And replace it with:

"at least 4,5 ltr capacity and shall have a height of at least 200-500 mm, species dependent. "

Add the following below:

"Each ground cover shall be supplied in a 200-plug tray to have visible strong root growth from underneath the tray and should be a minimum of 150 mm in length. Overgrown seedling trays resulting in lanky bare plants will not be accepted"

Add the following at the end of the first paragraph:

"Substitutions will not be permitted without the prior agreement of the Landscape Architect. If proof is submitted that specific seed, plants or sizes are unobtainable, proposals will be considered for the nearest equivalent size or variety with equitable adjustments of contract rates.

All plant material and seeds will be inspected and approved by the Landscape Architect. Plant names indicated on plans must conform to the standard nursery and/or botanical nomenclature and prevailing revisions of the time.

Plants should be true to type (species, genus and variety) and structurally sound, well-branched, healthy and vigorous and free of disease, insect infestations, rodent damage, sunscald and other abrasions or scars to the bark. They must be densely foliated when in leaf and have a healthy, well developed root system. Pruning wounds should show vigorous bark on all edges and all parts shall be moist and show live, green cambium tissue when cut.

Plants shall not be pruned prior to delivery. All trees will be straight stemmed and of equal size/ height for each genus and species. No stunted, dwarfed, malformed or trees with crooked stems will be accepted.

All plant materials shall conform to the measurements specified in the schedule. Plants larger than specified may be used if approved by the Landscape Architect. The use of such plants shall not increase the contract price. If larger plants are used, the ball of earth excavated shall be increased in proportion to the size of the plant.

All plants shall be measured when the branches are in their normal position. Height and spread dimensions specified refer to the main body of the plant not from branch tip to root base or from branch tip to branch tip.

Specimens lacking compactness or proper proportions, which are weak or thin, or injured by too close planting in nursery rows will not be accepted.

The seed mix quantities and purity levels shall be specified and approved by the Landscape Architect. Seed shall be utilised for direct hand sowing or mechanical distribution with a mechanical seed dispenser. Tree species are indicated on the planting plans and must be strictly adhered to.

i) Plant material

(Extracted from: The South African Landscape Institute Best Practice document is produced and accepted by the South African Landscape Institute (SALI), the professional body representing the landscape industry within South Africa. (Revised June 2018)

All plant material should be healthy, vigorous and free from damage or disease, parasites or insects.

No pot bound plants should be accepted.

Plant containers should be weed free.

Plants in containers should be well rooted with a well- balanced root system.

Roots should be evenly spread through the root medium.

No broken, bruised or misshaped plants should be stored or planted on the site.

Dead plants should immediately be removed from the site.

Plants should preferably be hardened off before being delivered to site to match site hydrozone requirements.

ii) Plants from open ground

Plants from open ground should be ground covers, trees and shrubs, grass runners, perennials and bulbs that have been carefully lifted and transported to the site under ideal conditions i.e. kept moist protected against sun and wind.

Plants should be replanted, as far as possible, on the same day as being lifted, or laid in soil on site to prevent their roots drying out. Plants should be sourced from a legal vendor and comply with conservation regulations.

Plants should preferably be hardened off before being prepared for lifting and delivery to site to match site hydrozone requirements.”

e) Grass sods

Remove section, not applicable

f) Anti-erosion compounds

Add the following at the end:

“Hydropam soil binder to be added to the Hydroseed mix.

Hydropam soil binder (at 6kg/ha)”

g) Topsoil

Add the following at the end of the first paragraph:

“The contractor shall be responsible for the control of any germination of weed seeds within topsoil used on site.”

Add the following at the end of the second paragraph:

“Areas such as stockpiles, borrow pits and spoil sites shall be stripped of all topsoil before work may commence within the area. Should a larger site for any of the above be required during construction, the contractor shall refer to the DEO for best practice methods on ensuring the preservation of the additional stripped topsoil.”

Add the following paragraph:

“The topsoil shall be kept free of all foreign material generated during construction. This shall include all stone and bituminous products. Topsoiling shall not be accepted should it contain any of the above material.”

h) Manure

Remove section, not applicable

i) Compost

Add the following at the end:

"The type of compost should be in accordance with the requirements as recommended by the soil tests from the soil samples taken from prescribed location on site."

"A sample of the compost that the Landscape Contractor proposes to use must be submitted to the Landscape Architect for approval. The source of the compost supplier must be revealed and under no circumstances may the Landscape Contractor change his source without the written approval of the Landscape Architect."

i) Compost to tree holes (40% of volume)

"Mix and place medium in tree pits,60%: 40%: topsoil and compost including organic fertiliser as specified."

ii) Compost to planting areas (100 mm per m²)

"Spread and mix compost & additives to all planting area as per specification and measurement, Mix additives in with planting medium to a depth of 300 mm"

j) Water retainers for soil mediums

Add the following at the end:

"Hydrogel B/ Aquasorb/ Stockosorb or other equivalent product approved by the Landscape Architect shall be utilised as water retention during planting works. The product should be applied in the hydrated form to each plant and tree hole. The application rate shall be strictly in accordance with selected manufacturer's specifications."

k) Plant Material Sourcing

Add the following:

"The Landscape contractor to work closely with the Landscape Architect in order to formulate the correct composition and ratio of the plant diversity on site both in plant species and seed.

All plants in this specification are indigenous and as far as possible endemic to the region. Plant material should thus be sourced locally where possible.

All plant material, unless otherwise approved by the Landscape Architect, must be nursery-grown in accordance with good horticultural practice.

The Landscape Architect must be timeously notified, where the landscape contractor is not able to source the specified plant material from local nurseries. Propagation of such material from sources on-site can then be discussed as an alternative.

The Landscape Contractor shall allow for the holding and maintenance of pre-purchased plants at his cost.

Plant material may be provided to the landscape contractor for use in the landscape installation where available and deemed to be appropriate."

l) Plants Quality and Sizes

Add the following:

"Plants shall be established for at least 6 months in their containers and shall not be root-bound.

Seedlings in 150 & 200 plug trays to have visible strong root growth from underneath the tray and should be a minimum of 150 mm in length. Overgrown seedling trays resulting in lanky bare plants will not be accepted.

Substitutions will not be permitted without the prior agreement of the Landscape Architect. If proof is submitted that specific seed, plants or sizes are unobtainable, proposals will be considered for the nearest equivalent size or variety with equitable adjustments of contract rates.

All plant material and seeds will be inspected and approved by the Landscape Architect. Plant names indicated on plans must conform to the standard nursery and/or botanical nomenclature and prevailing revisions of the time.

Plants should be true to type (species, genus and variety) and structurally sound, well-branched, healthy and vigorous and free of disease, insect infestations, rodent damage, sunscald and other abrasions or scars to the bark. They must be densely foliated when in leaf and have a healthy, well developed root system. Pruning wounds should show vigorous bark on all edges and all parts shall be moist and show live, green cambium tissue when cut.

Plants shall not be pruned prior to delivery. All trees will be straight stemmed and of equal size/ height for each genus and species. No stunted, dwarfed, malformed or trees with crooked stems will be accepted.

All plant materials shall conform to the measurements specified in the schedule. Plants larger than specified may be used if approved by the Landscape Architect. The use of such plants shall not increase the contract price. If larger plants are used, the ball of earth excavated shall be increased in proportion to the size of the plant.

All plants shall be measured when the branches are in their normal position. Height and spread dimensions specified refer to the main body of the plant not from branch tip to root base or from branch tip to branch tip.

Specimens lacking compactness or proper proportions, which are weak or thin, or injured by too close planting in nursery rows will not be accepted.

The seed mix quantities and purity levels shall be specified and approved by the Landscape Architect. Seed shall be utilised for direct hand sowing or mechanical distribution with a mechanical seed dispenser.

Tree species are indicated on the planting plans and must be strictly adhered to."

m) Guarantee, Replacements and Inspection

Add the following:

"Plant materials shall be subject to inspection prior to planting for conformity to specification requirements, including quality, size and variety. The contractor shall give timely notice in writing to the Landscape Architect when such materials are available for inspection. Final inspection of all planting will be made at the end of the specified maintenance period. At the time of inspection all plants shall be alive and in a healthy, satisfactory growing condition. If this is not the case, plants must be replaced immediately to the satisfaction of the Landscape Architect.

All plant materials shall be guaranteed by the Landscape Contractor on delivery and for a period of six (6) months commencing from the start of the Maintenance period.

During the guarantee period, all plant materials found dead or not in a healthy, satisfactory growing condition or which, in any other way does not meet with the requirements of the specifications, shall be replaced without delay by the Landscape Contractor at his own expense.

All required replacements shall be with plants of the same size and species as specified and shall be supplied and planted in accordance with the drawings and specifications."

B5803 LANDSCAPING THE AREAS

b) Trimming

Delete the following:

"all stones in excess of 50 mm in size and"

B5804 PREPARING THE AREAS FOR PLANTS

a) Soil ripping

Add the following:

"Where possible the landscape contractor is to place and spread the 100 mm layer compost on the planting area prior to ripping, allowing the compost to be worked in simultaneously with the de-compacted in-situ soil. "

e) Verdyol Complex or equivalent

Replace this section with:

"e) Microbial inoculant

In certain limited and unique cases, where topsoil is not available or cannot be retained on a steep slope, Bio-Tricho and Environoc 401 & 501 be used at an approved application rate, at the discretion of the Employers Agent. The application rate is to be according to the requirements from the soil analysis and according to the manufacturers specifications."

*Add the following heading below **(f) general**:*

l) Shaping

i) Rough shaping

"Rough shaping of all planting areas, rake the area to an even grade, breaking all clumps and remove any foreign materials (bricks, concrete, etc.)."

ii) Fine shaping

"Fine shaping of all planting areas before the addition and working in of soil additives and again before planting, Note that the levels must fall/ drain away from road/ path edges and tie up with pathways and ramps where necessary."

B5805 GRASSING

(c) Hydroseeding

Replace "Verdyol Complex" *with "Bio-Tricho and Environoc".*

Add the following below the last paragraph

"The contractor shall be solely responsible for establishing an acceptable cover (75%) and for the cost of replanting re-hydroseeding where no acceptable cover has been established. Where however, in the opinion of the contractor, it is doubtful from the outset if it will be possible to establish an acceptable cover they may inform the Landscape Architect of their reasons therefore, and the Landscape Architect may, if they agree, either adopt another method of hydroseeding or agree to accept whatever cover can be obtained, provided that all reasonable efforts shall be made to establish a good cover by the proposed method. Any such agreement shall be valid only if given in writing by the Landscape Architect beforehand. All hydroseeding seeds are to be obtained from an approved, reliable and licensed source. It is the contractor's responsibility to check seed prior to handover of the hydroseed batch for any fungus or pests, such as Argentinian ants. If necessary, eradicate with approved pesticide."

Add the following items (i-p):

***i)* The Hydroseeder**

The hydroseeder shall be capable of pumping the specified seed mix, fertiliser, soil stabiliser, aqueous smoke solution, mulch and wetting-agent (mixed in water) at specified rates over the areas to be seeded.

The hydroseeder shall have an agitation system, which shall be sufficient to agitate, suspend and homogeneously mix the specified slurry.

The slurry distribution lines shall be large enough to prevent stoppage. The discharge line shall be equipped with a set of hydraulic spray nozzles suitable for the even distribution of the slurry on the various slopes to be seeded.
The slurry tank shall be mounted on a travelling unit, either self-propelled or drawn by a separate unit. The travelling unit shall be capable of placing the slurry tank and spray nozzles within sufficient proximity to the areas to be seeded so as to provide uniform distribution without waste.

j) Application rate

Hydroseed the labelled seed batches to the cut slope on the east of the site with the following mixture:

Seed mixture: Locally sourced seed

- 5 mm compost at 700 kg/ha
- Microbial inoculant: Bio-Tricho (1L/ha)
- Microbial inoculant Environoc 401 (2L/ha)
- Microbial inoculant Environoc 501 (2L/ha)
- Hydropam soil binder (at 6 kg/ha)
- Dustex soil binder (at 600 kg/ha)
- Smoke treatment as per specialist requirements - soak seeds in dilution for 30 minutes before seeding (1 ltr/kg seed)
- Water (10 000 ltr/ha)
- Mix all of the above with water and seed mixes and apply to areas as directed by the landscape architect.

k) Application Method

Where it is specified that hydroseeding is to be carried out on topsoil, the thickness of the topsoil layer shall be as specified in the project specifications or as directed by the Landscape Architect.

The types and mixtures of seeds to be used shall be as specified in the project specifications. If not so specified therein it shall be agreed on by the Landscape Architect and the contractor before any seed they may wish to use is ordered by the contractor. The contractor shall be solely responsible for establishing an acceptable cover, and any approval by the Landscape Architect of seed or seed mixtures intended for use by the contractor shall not relieve him of this responsibility.

Mulch shall be added to the hydroseeding mix at an approved rate. Hydroseeding shall then be carried out with an approved hydroseeding machine at a rate of application of not less than 30 kg of seed mixture per hectare, unless otherwise specified in the project specifications.

When the use of anti-erosion compounds is required and such compound is to be applied simultaneously with the hydroseeding, it shall be mixed with the hydroseeding mixture before application. Should Verdyol Complex or approved equivalent be used, the quantities of the fertilisers shall be adjusted accordingly, subject to the Landscape Architect's approval.

All hydroseeded areas shall be adequately watered at regular and frequent intervals to ensure the proper germination of seeds and growth of plants until the plants has established an acceptable cover and thereafter until the beginning of the maintenance period of the plants. The quantity of water and the frequency of watering shall be subject to the Landscape Architect’s approval. With hydroseeding the commencement of watering may be postponed until a favourable time of the year, but watering shall in any case commence and continue as soon as the seeds have germinated and growth has started.

l) Time for planting

Hydroseeding shall only be done from **March – May (Autumn)**. Areas that are excessively wet shall be allowed to dry before application.

m) Sowing by hand

Seed should be installed with a drop seeder that will accurately metre the types of seed to be planted.

Calibrate the drop seeder according to the seed type. Keep all seeds uniformly mixed during the seeding.

The drop seeder should be equipped with a cultipacker assembly or rake attachment to ensure seed-to-soil contact. Alternatively rake lightly after seeding to ensure seed-to-soil contact.

Veld grasses will be seeded at a ratio of 50 g per 25 m².

n) Lawn planting preparation

Loosen soil to depth of 300 mm, removing rubble, stones, etc. and rake to approximate final grades.

Fertilise with approved organic fertiliser, as per bill of quantities or as per supplier’s recommendations.

Spread compost as per bill of quantities, over the entire area and cultivate.

Rake the area to a fine even grade, breaking all clots and continue to remove stones, etc. as set out in FINE GRADING.

Level the area with a 3M levelling plank allowing no more than 10 mm tolerance.

The final level of the grass must be equal to that of the surrounding paving.

Rolling: rolling shall be done in 2 (two) directions perpendicular to each other. The roller shall be a hand roller weighing not more than 90 kg, nor less than 70kg. Roll in such a manner so as to eliminate the necessity of walking on the finished grade.

After rolling, check finished grading for depressions, lumps or any other irregularities. Repair and re-roll all areas as directed by the Landscape Architect.

o) Seeds

The seed mix quantities and purity levels shall be specified and approved by the Landscape Architect. Seed shall be utilised for:

- The propagation of material for re-vegetation.
- Direct hand sowing, mechanical broadcasting and or Hydroseeding.

Seed must be pre-dried then stored under cool, dry, insect free conditions until required either for cultivation in the nursery or in the rehabilitation process. Only viable, ripe seed shall be used.

A record of all stock (specify plants, seeds, mulch, etc.) relevant to the project that is held in the nursery shall be provided to the Landscape Architect on a monthly basis. Seed shall be stored at the Contractor's expense.

The seed weight is based on clean seed. Seed to be free of any foliage/foreign materials or chaff.

p) Harvested seed

Indigenous seed shall be harvested in an area, or areas, free of alien/ invasive vegetation, either at the Site prior to clearance or from suitable neighbouring sites, as indicated by the Landscape Architect.

Where seed is harvested from the Site prior to clearing, 100% of seed shall be removed during a phased seed harvesting programme. The programme shall ensure that seed is harvested on a regular, plant species specific basis i.e. correct time of the year, from time of commencement of contract until the Site is cleared. (Seed availability is not always predictable and allowance must be made for a lead-in period during which seeds may be harvested, this period should ideally be one full year).

When harvesting from plant communities off-site (with the correct authorisations), no more than 25% of available seed shall be harvested from any individual plant, plant community or locality.

Following harvesting, the seed shall be dried under cool airy conditions, or propagated immediately, where appropriate. The seed shall be insect and pathogen free and shall be stored in containers under cool conditions that are free of rodents or insects. No wet, mouldy or otherwise damaged seed is acceptable.

Seed harvested by hand from selected species, should be treated, and stored separately, with appropriate labelling.

Seed gathered by vacuum-harvester, or other approved mass collection method, from suitable shrubs or from the plant litter surrounding the shrubs shall be kept apart from individually harvested seed, and labelled appropriately.

Harvested seed, obtained by means of vacuum harvesting, shall be free of excessive quantities of organic and/ or substrate material.

Study of the plant composition of the surrounding area to dictate the quantity of each species harvested.

q) Storage of Seed

Facilities should be available to store seed in paper packets, in rodent- and insect-free, cool (7 - 10°C), and dry conditions.

Treat all collected seed with Carbryl. (Very low toxicity)

Check seed prior to propagation or handover of Hydro seed mix for any fungus or pests, such as Argentine ants. If necessary, eradicate with approved pesticide.

Submit monthly progress reports to Landscape Architect of seed collected, stored and propagated."

B5807 TREES AND SHRUBS

a) Positions of trees and shrubs

Add the following at the end:

"All tree positions must be pegged out on site for the Landscape Architect's approval prior to preparation and planting. Tree species are indicated on the planting plans and must be strictly adhered to.

Shrub and groundcover areas are indicated on the planting plans and setting out of them is to be approved by the Landscape Architect, before planting takes place."

b) Preparing plant holes

Add the following at the end:

"For trees, excavate a hole in the growing medium big enough to take the root ball of the nursery-grown tree. Remove the plant from its container and plant it in a planting medium as previously described. The top of the soil ball is to be level with the finished ground level. Form a basin 1,9 m in diameter x 150 mm deep around tree where applicable and water with hand-held hose directly after planting."

c) Planting

Delete the following:

"All trees shall be tied by means of treated sisal rope to two creosote-treated timber stakes planted firmly in the ground on both sides of the tree directly opposite each other. The distance between the stakes shall be 1,0 m. The stakes shall have a minimum diameter of 50 mm and shall be at least 300 mm longer than the planted tree, but its length shall not exceed 1,5 m above ground level."

And replace it with:

"Stakes shall be a minimum of 75 mm diameter tanalith-treated SA Pine timber posts, at least 2 400 mm in length or as otherwise detailed.

All trees shall be braced upright in position by two stakes, all aligned up with other tree stakes unless otherwise instructed by the Landscape Architect. Orientation of tree stakes must be considered to protect from prevailing winds.

The stakes shall be equally spaced around each tree, sharpened at one end, driven vertically into the ground to a depth of 1m or as otherwise detailed. Trees shall be fastened to the stake with approved tree ties, in such a manner as not to injure the tree stems.

Tree ties shall be new rubber (3.8x25x25 mm rubber chain lock tree ties) as approved by Landscape Architect.

Trees ties to be fastened in a figure eight (8) manner, preventing chafing and increase grip on tree to prevent slipping down of the tree tie.

These ties will have to be replaced / removed, etc. as part of the general maintenance of the works."

Delete the following:

"The ground surface around each tree shall be covered with a plastic membrane with a surface area of 1,0 m² and a thickness of 150 micron. Thereafter rocks or stones measuring 150 mm to 250 mm in diameter shall be placed in a riprap fashion following the contours of the plant hole."

Add the following (i-v) as new sub-items:

"i) General plant installation

Planting must be done during suitable periods with respect to weather conditions and locally accepted practice.

Plants must be set plumb in the centre of the pits and at the same relation to grade as originally grown, after settlement has taken place.

Trees and other plant materials must be faced to give the best appearance or relationship to adjacent structures to the approval of the Landscape Architects.
Shrubs, groundcovers and climbers must be planted at the rate indicated on the drawings.

Any plastic or metal containers must be removed completely without damaging the root ball. Metal containers must be cut for plant removal. All shrubs and small trees must be handled by the root ball and not by the plant stem. Soil mixture must be backfilled in 100 mm layers and each layer must be firmly tamped in place in such a manner that the plant retains its vertical position.

Particular care shall be taken to ensure that air pockets remain under or around the roots. Running water can be used to dispel pockets of air at the time of planting and during backfilling.

All trees and irrigation pipes must be protected from damage during all phases of work.

ii) **Handling of plants**

All plants must be well protected against damage and drying out from the time of acceptance and until they are planted on the site.
No roots may be cut or pruned without the written permission of the Landscape Architect. No roots may be split or torn at any stage. Should pruning be necessary, the root ball must be cut at the edge of the ball with clean, sterilised and sharp tools. A 1:10 solution of Sodium Hypochlorite (Jik) can be used to sterilise tools prior to use.

Plants shall be transported with care taken to prevent damage. Branches shall be carefully tied in such a manner so as not to break or damage trunks. Points of contact with equipment shall be padded.

Root balls, trunks, branches and leaves shall be protected from sun and wind desiccation.

iii) **Positioning of plants**

All tree positions must be pegged out on site for the Landscape Architect's approval prior to preparation and planting. Tree species are indicated on the planting plans and must be strictly adhered to.

Shrub and groundcover areas are indicated on the planting plans and setting out of them is to be approved by the Landscape Architect, before planting takes place.

iv) **Planting of Plants**

For trees, excavate a hole in the growing medium big enough to take the root ball of the nursery-grown tree. Remove the plant from its container and plant it in a planting medium as previously described. The top of the soil ball is to be level with the finished ground level. Form a basin 1,9 m in diameter x 150 mm deep around tree where applicable and water with hand-held hose directly after planting.

For shrubs and groundcovers, excavate a hole to suit root ball of plant; remove plant container and plant shrubs in hole in pre-prepared planting medium as previously described. The top of the soil ball is to settle level with the finished grades."

B5808 GENERAL

a) Time for planting

Add the following at the end:

"Hydroseeding shall only be done from March – May (Autumn). Areas that are excessively wet shall be allowed to dry before application.

Trees and shrubs shall be planted as far as is practical during June (possibly moving into the first two weeks of July). The contractor shall make every effort to programme his operations in such a manner that grass, trees and shrubs shall, as far as is possible, be planted during this period.

Planting of areas will take place at staggered times and only commencing once all civil construction has been completed."

B5809 MEASUREMENT AND PAYMENT

Item **Unit**

Change payment item B58.03 to add planting to the heading:

B58.03 Preparation of areas for grassing & planting

(e) Providing and applying chemical fertilisers and/or soil-improvement material:

Replace sub item (I - iv) as follows and add subitems (v – xi):

i) 5 mm compost at 700 kg/ha……. kilogram (kg)
ii) Microbial inoculant: Bio-Tricho (1ℓ /ha)…… litre (ℓ)
iii) Microbial inoculant Environoc 401 (2ℓ /ha)…… litre (ℓ)
iv) Microbial inoculant Environoc 501 (2ℓ /ha)…… litre (ℓ)
(v) Supply organic fertiliser to specifications …….. kilogram (kg)
(vi) Supply of Bonemeal to specification: …… kilogram (kg)
(vii) Hydropam soil binder (at 6kg/ha)…….. kilogram (kg)
(viii) Dustex soil binder (at 600kg/ha) …… kilogram (kg)
(ix) Smoke treatment (*describe*) …… litre (ℓ)
(x) Water (10 kℓ /ha) ……..…… kilolitre (kℓ)
(xi) Mix all of the above with water and seed mixes and apply to areas as directed by the landscape architect.…….…… kilolitre (kℓ)

Add the following new payment subitems

(g) Compost
  (i) Compost to tree holes (40% of volume)…….cubic mertre (m³)
  (ii) Compost to planting areas (100 mm per m²)…….cubic mertre (m³)

(h) Water retainer
  (i) Supply "Hydrogel B/ Aquasorb/ Stockosorb" or equivalent approved product……kilogram (kg)
  (ii) Apply "Hydrogel B/ Aquasorb/ Stockosorb" or equivalent approved product'……kilolitre (K.litre)

The unit of measurement for (g) will be per cubic metre, based on clean, approved compost that has been supplied, delivered and used on site. Compost that has not been used or approved by the Landscape Architect may not be claimed for.

The unit of measurement for material in item (h)(i) shall be based on kilograms of powdered product used in creating the correct ratio of solution specified by the manufacturer & supplier, as approved and directed by the landscape architect.

The unit of measurement for application in item (h)(ii) shall be based on Kilolitres of solution installed as per the volume recommended by the manufacturer & supplier per plant, as approved and directed by the landscape architect.

Add the following new payment items

"Item **Unit**

B58.12 Provide soil test……. number (no)

The unit of measurement will be the number of tests. The rate for the test must include all actions required in harvesting the sample, sending the sample off to the approved laboratory, retrieving the results and issuing a report thereof with the recommended corrective additives.

Item **Unit**

B58.13 Allow for co-ordinating and receiving all plant material for this contract, including quality control, holding and maintenance…….Lump Sum (L/sum)

The unit of measurement shall be lump sum. Before ordering any materials or doing any work, the Contractor shall be responsible for the correctness of the same. No extra charge or compensation will be allowed on account of difference between actual dimensions and the dimensions indicated on the drawings. Any differences which may be found shall be submitted to the Landscape Architect for consideration before proceeding with the work.

All delivery slips of material delivered to site MUST be retained and issued to the Quantity Surveyor or Landscape Architect for claim purposes.

Item **Unit**

B58.14 Dumping of material

(a) Dumping of organic materials at registered dump site……..…….cubic metre (m^3)
(b) Dumping rubble / stone (inorganic material) at registered dump site……..cubic metre (m^3)

The unit of measurement for (a) shall be cubic metre. The unit of measurement for organic material will be based on per cubic metre of chipped material, placed directly in a refuse bag and remove from site or loaded loosely on a vehicle and dumped on a lawful dumping site.

The unit of measurement for (b) shall be cubic metre. The unit of measurement for inorganic material will be based on per cubic metre of material, placed directly in a bag and removed from site or loaded loosely on a vehicle and dumped on a lawful dumping site.

Remove all foreign material manually, making sure to remove any small fragments.
Care should be taken not to spread any foreign material and residue on the landscape in the process.
This material can be removed either in bags or loaded on a vehicle and taken to a registered dump site or placed as directed by the Employers Agent or Landscape Architect

The unit of measurement will be based on per cubic metre of material, placed directly in a bag and removed from site or loaded loosely on a vehicle and dumped on a lawful dumping site.

Item **Unit**

B58.15 Excavation into in-situ soil……cubic metre (m^3)

The bulk of excavation will be for the planting of trees, shrubs and groundcovers into growing medium, consisting of 40% compost and 60% in situ topsoil.

Material excavated must be excavated on merit and disposed of as follows:

- Sub-soil excavated from soil horizons deeper than 200 mm, must be placed and spread on planting areas where directed by Landscape Architect.
- Soil excavated from the top 200 mm horizons or from pre-prepared areas must be used either in backfilling when planting or the remainder to be evenly distributed in planting beds.

Tree pits to be excavated to a size of 1 500x1 500x1 500 mm and backfilled with specified soil mix.

The volumes of excavation, filling, compost, etc. are the net, compacted, in-situ quantities. Prices for excavation, filling, compost, etc. are to allow for the additional volume required due to bulking and for the consequent additional handling and carting involved as no allowance has been made in the measurement for same.

(a) Tree hole excavation……..…….cubic metre (m^3)
(b) Tree hole backfill……..……cubic metre (m^3)

The unit of measurement for tree pit excavation will be based on each cubic metre of soil excavated as instructed or as per specification.

The unit of measurement for the backfilling of tree holes will be based on per cubic metre of growing medium mix.

Item **Unit**

B58.16 Distribution and shape unwanted excavated material from planting areas (40%) to site as directed by the Landscape Architect……..……,cubic metre (m^3)

The unit of measurement for the distribution of unwanted soil will be based on per cubic metre of soil distributed at the approved thickness, either locally around the plant or carted on site, as directed by the Landscape Architect.

Item **Unit**

B58.17 Shaping

(a) Allow for rough shaping of all lawn and plant areas before planting medium is to be installed to the satisfaction of the landscape architect……..…square metre (m^2)

(b) Allow for fine shaping of all lawn and plant areas once planting medium is to be installed to the satisfaction of the landscape architect……..……square metre (m^2)

The unit of measurement for (a) will be based on per square metre of area rough shaped and must include the above-mentioned scope. Only identified areas and areas instructed by the Employers Agent or Landscape Architect will be allowed to be claimed for.

The unit of measurement for (b) will be based on per square metre of area fine shaped and must include the above-mentioned scope. Only identified areas and areas instructed by the Employers Agent or Landscape Architect will be allowed to be claimed for.

Item **Unit**

B58.18 Hard landscape elements

(a) Paving: Intersections & Medians
(i) *Pavement layer type specified*…….……cubic metre (m^3)
(b) Seat walls……..……number (No.)
(c) Bollards……..……number (No.)
(d) Tree guards……..……number (No.)
(e) Landscaping features (*described*)……...…square metre (m^2)

The following specifications are guidelines, the Employers Agents specifications and drawings are to be used for costing and constructions.

The unit of measurement for (a) will be cubic metre and will be based on the drawing and specification issued by the Employers Agents with reference to the Landscape Architects drawing; 483-OvP-IRT-400 Rev 0 Details Paving E04

The unit of measurement for (b) will be number will be based on the drawing and specification issued by the Employers Agents with reference to the Landscape Architects drawing; 483-OvP-IRT-401 Rev 0 Details Bollards & Seat Units E02A or E02B

The unit of measurement for (c) will be number and will be based on the drawing and specification issued by the Employers Agents with reference to the Landscape Architects drawing; 483-OvP-IRT-401 Rev 0 Details Bollards & Seat Units E02A or E02B.

The unit of measurement for (d) will be number and will be based on the drawing and specification issued by the Employers Agents with reference to the Landscape Architects drawing; 483-OvP-IRT-402 Rev 0 Details Tree Guards- E02A or E02B.

The unit of measurement for (e) will be square metre and will be based on the drawing and specification issued by the Employers Agents with reference to the Landscape Architects drawing; 483-OvP-IRT-403 Rev 0 Details Paving Median Feature- E02A or E02B.

Item **Unit**

B58.19 Concrete barrier/seat

(b) Concrete barrier seat *(describe)*……..……number (No.)

The unit of measurement shall be the number of concrete barrier seats manufactured and installed as per drawing number IRT/2A/B/SE/J35437/XXREV1/8106.

The tendered rate shall include full compensation for the manufacture, supply, installation, all labour, materials and equipment to install as per drawing number 8106.

The tendered rate shall also include for the bedding grout and 50mm concrete (15Mpa/20) concrete screed but shall exclude all other pavement layers which shall be covered elsewhere in the document.

Item	**Unit**

B58.20 Maintenance

(a) Pre contract completion maintenance……..……square metre (m^2)

The unit of measurement will be square metre of landscaping maintained for the period from installation up until the issuing of the Certificate of Completion."

Item	**Unit**

B58.21 Eradication of invasive aliens

(a) Minor mechanical or handpulling of alien bushes between 1-2m high……Lump Sum (L/sum)
(b) Spray of invasive grasses with use of approved herbicide……Lump Sum (L/sum)
(c) Cutting down, and chippping of large trees……..Lump Sum (L/sum)

The unit of measurement for (a) – (c) will be lump sum and shall allow for all costs associated with the eradiction of the invasive aliens within a 30m road reserve.

The rate for (b) should include a minimum of two sprayings."

SECTION B6000 : STRUCTURES

SECTION B6100 : FOUNDATIONS FOR STRUCTURES

B6103 GENERAL

a) Subsurface Data

Add the following:

"It is expressly understood that, while all subsurface information is given in good faith, the correctness of the information furnished is not guaranteed. Where the actual foundation conditions encountered are considerably at variance with conditions visualised and described in the Contract documents and those terms for which the rate or price provided for in the Contract is rendered unreasonable or inapplicable, such other rate or price consistent with the rates set out in the Contract shall be fixed as set out in Clause 6.3 of the GCC subject always to a founding depth variation not exceeding 2.5 m in any foundation component (except piling depth) of the permanent structure not, by itself, being held to constitute cause for variation for the Contract rates or prices."

B6104 ACCESS AND DRAINAGE

a) General

Add the following:

"Tenderers shall submit with their tender concept details of their intended method of accommodating the flow in water courses while removing existing and constructing new structures."

c) Drainage

Add the following:

"Where dewatering and keeping dry of excavations has not been billed separately as per item 61.03 "Access and Drainage", it shall be deemed to be included in the rates tendered and paid for excavation and backfill."

B6105 EXCAVATION

a) General

Add the following:

"Excavation required for diverting, channelling or widening streams within 5.0 m of concrete structures shall be measured and paid for under item 61.02. Excavations beyond the 5.0 m limit shall be measured and paid for under the appropriate items in Sections B2100 and B3300.

Where an existing structure is to be replaced with a new structure at the same location, excavation required for the removal of the existing structure shall be measured and paid for under item B61.02."

c) Excavation

Add the following paragraphs:

"Where excavation is in soft material, the final 0.75 m and in the case of hard material, the final 0.25 m of material shall be removed using suitable hand tools such as pick and shovel or pneumatic tools.

g) The safety of excavations

Add the following paragraph:

"Where in the opinion of the Employer's Agent local conditions dictate, excavations shall be temporarily shored by means of an approved lateral support system to safeguard the stability of the excavated faces, this being particularly imperative adjacent to road, rail or pedestrian traffic. The Contractor shall submit to the Employer's Agent for his consideration and acceptance and prior to the commencement of the work, the design calculations and detailed drawings and installation procedures for all shoring.

The design for shoring, signing of the drawings and inspection prior to construction of the permanent works of excavations to ensure it is safe shall be undertaken by the contractor's competent person, who shall be a Professional Engineer with the relevant experience.

The Contractor shall ensure that all temporary works are undertaken strictly in accordance with the approved drawings and procedures and in compliance with the relevant sections of the Occupational Health and Safety Act and the Construction Regulations. Notwithstanding the Employer's Agent's acceptance, the Contractor takes sole responsibility for the safety and adequacy of the lateral support work. Approval and/or acceptance given by the Employer's Agent for the designs, drawings and installation will be subject to the provisions of clause 1221 of the Standard Specifications.

The excavations shall be adequately protected by a barrier fence marked with reflective tape and of height at least 1,0m erected as close to the excavation as practical. In addition, red warning lights shall be provided at night. The Contractor shall employ watchmen to ensure that the barricades and lights are effective at all times.

Any ground anchorage that may be used in the shoring system shall be proof loaded to at least 125% of the working load of the anchorage and accepted by the Employer's Agent prior to undertaking any further excavation stages. Such authority and acceptance shall not relieve the Contractor of his responsibility for the adequacy of the shoring and excavation.

Except where lateral support to excavations is specifically provided for under payment item B61.51, no separate payment will be made for any cost incurred in complying with the above requirements, the cost thereof being deemed included in the relevant rates for excavation."

B6106 FOUNDING

Add the following clause at the end of the last paragraph:

"Where foundation slabs are cast directly against the face of the excavations, the volume of concrete measured for payment shall be the total volume of concrete placed or the volume based on the plan dimensions detailed on the drawings plus a 100 mm allowance for overbreak on each applicable side whichever is the lesser. No formwork to the footing shall be measured when the concrete is cast against the face of the excavations".

B6109 FOUNDATION FILL

In the 5th paragraph, 7th line delete "60" *substitute* "45".

Add the following after the 6th paragraph:

"Concrete blinding shall extend 100 mm all round beyond the horizontal dimensions of all formed footings to facilitate placing of the formwork, unless otherwise directed by the Employer's Agent.

In the case of structures where excessive ground water is encountered, the blinding layer may extend over the full plan area of the base of the excavation and beyond the edge of the foundation where required. Payment shall be made for the quantity of concrete calculated as the product of the specified thickness of blinding layer and the actual area of blinding placed subject to a maximum distance of 500mm beyond the edge of the foundation."

B6115 MEASUREMENT AND PAYMENT

B61.02 Excavation

In the 2nd last paragraph replace the comma in the 2nd last line with a full stop and replace the remaining part of the sentence "and strutting……the excavations." with the following:

"Unless specifically measured and paid for separately under item B61.51, the tendered rate shall also include full compensation for strutting, shoring and safeguarding the excavations."

Add the following pay item:

"Item **Unit**

B61.51 Lateral support to excavations

(a) Location (description of location indicated):

(i) 0 to 5 m depth…… square metre (m^2)

(ii) 5 to 10 m depth……. square metre (m^2)

(b) Other locations (description of location indicated):

The unit of measurement shall be the square metre of excavated face supported over the successive depth ranges, measured down from the existing road levels.

The tendered rate shall include full compensation for procuring and installing the lateral support system, as well as for removal, if required. It shall include for all materials, labour, plant, equipment and incidentals to provide support to the excavated faces for the duration of substructure construction.

The work will be paid for in three instalments. The first instalment of 50% shall become payable when all equipment and material is on site and the first element of the lateral support system has been installed. The second instalment of 40% shall become payable after the lateral support system has been completed, and the final instalment of 10% shall be paid after the system has been removed from the site.

The cost of excavating the material shall not be included, but paid for under items B61.02 and B61.03."

SECTION B6200 : FALSEWORK, FORMWORK AND CONCRETE FINISH

B6201 SCOPE

Add the following:

"This section shall also cover the provision and subsequent removal of temporary access and work platforms and screens required for the protection of road, rail and pedestrian traffic during construction of the works."

B6203 GENERAL

Add the following:

"The contractor shall submit the design calculations and drawings, certified by a registered professional engineer to comply with all current applicable safety regulations regarding strength and stability for all loads that can be anticipated, of the falsework and formwork required for the construction work to the Employer's Agent for consideration and approval. Final erection of the falsework and formwork shall be inspected and approved in writing by the said professional engineer to be in accordance with the approved design prior to the casting of any concrete.

Notwithstanding anything to the contrary contained or implied in the Conditions of Contract, the contractor takes sole responsibility for the safety and adequacy of the falsework and formwork in accordance with clause B6203 of the Standard Specifications. Approval and/or acceptance given by the Employer's Agent for such designs and drawings will be subject to the provisions of clause 1221 of the Standard Specifications."

B6204 DESIGN

a) General

Add the following:

"The Contractor shall submit to the Employer's Agent at least 4 weeks before the structure is scheduled for construction a detailed analysis showing the effect of the stresses that will be induced by the Contractor's chosen method of construction. The cost of any additional pre-stressing, reinforcing steel, concrete, etc. required as a result of the Contractor's chosen method of construction shall be to the Contractor's account. No construction shall commence until the Employer's Agent has given his written approval."

b) Falsework

Add the following:

"In the view of the possibility of flooding in watercourses during construction, the Contractor shall not be permitted to adopt a method for supporting the formwork which is vulnerable to damage during flooding. Although the Contractor is free to select suitable arrangements for the support work, the arrangements shall be subject to acceptance by the Employer's Agent. Should the Employer's Agent consider the proposed arrangement unsuitable, the Contractor shall be required to amend and resubmit alternative arrangements acceptable to the Employer's Agent. The Contractor shall not be entitled to additional payment or extension of time arising from the Employer's Agent's rejection of his proposals.

Unless instructed otherwise by the Employer's Agent, the Contractor shall submit his design criteria and detailed drawings of the staging to the formwork for the Employer's Agent's consideration and acceptance. The design, signing of the drawings and inspection of the falsework prior to construction of the permanent works shall be undertaken by the Contractor's competent person, who shall be a professional engineer with the relevant experience."

B6205 CONSTRUCTION

b) Formwork

(i) <u>General</u>

Add the following:

"Formwork to faces of structures with a gradient equal to or greater than ten vertical to one horizontal shall be classified as vertical formwork.

Formwork to faces of structures with a gradient less than ten vertical to one horizontal, or equal to or greater than one vertical to ten horizontals, shall be classified as inclined formwork.

Formwork to faces of structures with a gradient of less than one vertical to ten horizontal shall be classified as horizontal formwork."

(ii) Formwork to exposed surfaces

Add the following:

"The formwork at construction joints shall have moulding strips 25 mm x 25 mm neatly butted and set at the position of the construction joint.

The arrangement of formwork and boards shall present a neat and regular appearance. The Contractor is required to submit his proposed arrangement to the Employer's Agent for approval."

B6207 FORMED SURFACES: CLASSES OF FINISH

d) Class F3 surface finish

Replace the second paragraph with the following:

"Steel forms for Class F3 surface finish shall only be used with the written approval of the Employer's Agent and then only if:

(i) the forms are in good condition, free of rust, dust and any other foreign material which would result in staining of the formed surface

(ii) any resulting depressions and projections which occur in the formed surface do not exceed 3 mm when measured with a straight edge placed between joint lines created by the forms

(i) the edges of forms are straight and flat to ensure that forms butt without forming gaps along the joints and that steps and hollows at the joint lines do not occur."

Add the following clause:

"B6211 TEMPORARY WORK PLATFORMS AND PROTECTIVE SCREENS FOR DEMOLITION

Where works comprising demolition are to be undertaken adjacent to road traffic or watercourses, appropriate, stable and safe temporary access structures, working platforms, barriers, protection screens and debris collection facilities and dust control measures shall be provided for the relevant aspects of the work to ensure the proper accommodation and protection of road traffic and pedestrians and to protect natural watercourses, all to the approval of the Employer's Agent. The design and erection of such work shall be in accordance with the requirements for falsework as specified in Section 6200 of the Standard Specifications and clause B6204.

Except where specifically provided for under payment item B62.10, no separate payment will be made for any cost incurred in complying with the above requirements, the cost thereof being deemed included in the relevant rates for formwork."

B6210 MEASUREMENT AND PAYMENT

Add the following pay item:

"Item **Unit**

B62.10 Temporary work platforms and protective screens:

(a) Location (*description of location indicated*)……lump sum"

SECTION B6300 : STEEL REINFORCEMENT FOR STRUCTURES

B6302 MATERIALS

(a) Steel bars

Add the following before the first paragraph:

"Unless specified or directed otherwise by the Employer's Agent, all steel reinforcing bars shall be either high yield stress hot-rolled deformed bars (Y-bars) or mild steel hot-rolled plain round bars (R-bars) as indicated on the drawings. Cold-worked reinforcing bars will not be permitted."

Add the following paragraph:

"Substitution of mild steel reinforcement as indicated on the drawings by an equivalent area of high yield stress reinforcement or vice versa will not be permitted."

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 B6404/6. Prior to fixing the steel, samples of the proposed cover and spacer blocks shall be submitted to the Employer's Agent 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."

Add the following:

"Steel bars shall be spaced accurately in accordance with the drawings to comply with the following tolerances:
Specified spacing 200 mm and less: ±10 mm
Specified spacing greater than 200mm: ±15 mm"

B6307 COVER AND SUPPORT

Amend the second paragraph as follows:

Replace the second sentence, commencing with:

"Where no cover is indicated…shown in Table 6306/1" with the sentence "Where no cover is indicated, the contractor shall inform the Employer's Agent who shall after consultation with the design engineer indicate the required cover in writing and the as-built drawings shall indicate such cover".

Add the following to the end of the fifth paragraph:

"Concrete cover and spacer 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 colour, shrinkage, thermal movements and strain are minimised. Cover blocks shall be water cured by submersion for a minimum of 7 days and thereafter kept submerged in water until immediately before fixing onto reinforcing steel. Where concrete cover blocks, subsequent to fixing, have visually dried out they shall be remoistened by an appropriate method so that they are damp before the placing of concrete. Only semi-spherical concrete cover blocks shall be used. Where fixing wire is inserted into cover blocks, it shall be galvanised. Cover and spacer blocks manufactured from other materials e.g. plastic or wood, shall not be permitted. All cover blocks regardless of the type of material manufactured from, shall not be visible on exposed concrete surfaces."

Delete Table 6306/1 in its entirety.

SECTION B6400 : CONCRETE FOR STRUCTURES

B6401 SCOPE

Add the following paragraph:

"The contractor shall take and submit samples of materials and/or mixtures to the Employer's Agent who must approve mix designs before construction work can commence."

B6402 MATERIALS

a) Cement

Replace the colon at the end of the first paragraph with a comma, and add the following:

"taking into account the adoption of the new SANS 50197-1:2000 code for cements: (refer to C&CI website www.theconcreteinstitute.org.za)"

Add the following paragraphs:

"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 as approved by the Employer's Agent.

With the exception of the standard SANS approved cement blends supplied by the primary cement producers, the blending of CEM1 and extenders shall not be permitted unless specifically approved by the Employer's Agent on the basis of an acceptable quality assurance procedure and subject to the extender complying with SANS 1491.

The source of supply for each type of approved cementitious material shall not be changed during the contract period.

The Contractor shall submit certificates from the supplier indicating compliance with the requirements of SANS 1491 for any cement extenders used in blending the cement.

Test certificates from an approved laboratory shall be furnished by the Contractor for all cements and prior to their use in the works, indicating the alkalinity of the cement expressed as the equivalent sodium monoxide content (calculated as Na_2O). Cement with such an alkalinity content in excess of 0,60% shall only be used with the written authority of the Employer's Agent regardless of whether or not the aggregates are considered to be potentially alkali reactive. For further restrictions regarding the use of cementitious binders in respect of all concrete refer to clause B6404(h)(iii)."

b) Aggregates

Delete the remainder of the sentence after "exceed" *in sub-clause (i)(1) and replace with the following:*

"150% of that of the reference norite aggregate or any of the other three reference aggregates"

Delete the remainder of the sentence after "exceed" *in sub--clause (i)(2) and replace with the following:*

"200% and of the coarse aggregate 175% of that of the reference norite aggregate or any of the other three reference aggregates"

Delete the remainder of the sentence after "exceed" *in the first paragraph of sub-clause (i)(3) and replace with the following:*

"235% of that of the reference norite aggregate or any of the other three reference aggregates"

Replace the 2nd last paragraph of sub-clause (i) with the following:

"The aggregates used in all structural 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 and prior to their use in the works indicating compliance with the above limiting shrinkage values."
Delete the entire last paragraph of sub-clause (i) commencing with "The drying shrinkage of concrete…"

Add the following to subclause (iv):

"Test certificates from an approved testing authority shall be furnished by the Contractor for all aggregates and prior to their use in the works, indicating the potential reactivity, then the use of such an aggregate in the works shall only be permitted if the total alkali content of the concrete as determined from all its constituents does not exceed between 2,1 kg/m^3 to 2,8 kg/m^3 depending on the assessed severity of the potential reactivity of the aggregate, and then only with the written authority of the Employer's Agent."

Add the following sub-clauses:

"(vi) The maximum chloride ion content of fine aggregate shall be 0,03% by mass of aggregate as specified by SANS 1083:2002. Where concrete is situated in a chloride environment the value shall be reduced from 0,03% to 0,01%.

(vii) Test certificates from an approved testing authority shall be furnished by the Contractor for all aggregates and prior to their use in the works, indicating the potential for Alkali Silica Reaction (ASR). Use of any potentially ASR reactive aggregate in the works shall be subject to the conditions specified in clause B6404(h)(iii)."

(viii) The grading of the fine aggregate shall in addition to the requirements in SANS 1083 also comply with the grading limits in the following table:

TABLE 6402/1 GRADING OF THE FINE AGGREGATE

Sieve size (mm)	Cumulative percentage passing sieve
4,75	90 - 100
2,36	75 - 100
1,18	60 - 90
0,60	40 - 60
0,30	20 - 40
0,15	10 - 20
0,075	Natural sand 5 – 10 Crusher sand 5 - 20

Blending of fine and coarse sands will be permitted where necessary to achieve the above grading limits for fine aggregate."

d) Water

Add the following:

"Water for concrete other than prestressed concrete, shall not contain chlorides, calculated as sodium chloride, in excess of three thousand parts per million (3 000 ppm) nor sulphates, calculated as sodium sulphate, in excess of two thousand parts per million (2 000 ppm).

Water for curing concrete shall not contain impurities in sufficient amount to cause discolouration of the concrete or produce etching of the surface.

No sea-water or water containing salts shall be used."

e) Admixtures

Add the following sub-sub-clauses:

"(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 20°C.

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

Add the following:

"Note: Only admixtures of the type that do not increase the water content of the mix will be considered by the Employer's Agent. In addition, no admixtures shall be added on site to ready mix concrete prior to placing to improve workability."

f) Curing agents

Add the following:

"Full technical specifications and product data sheets as well as a sample of not less than 1 litre of each proposed curing agent shall be submitted to the Employer's Agent for approval, and no curing agent shall be used until approved by the Employer's Agent."

B6404 CONCRETE QUALITY

a) General

Insert the following paragraph after the second paragraph:

"When structural concrete prefixed 'W' is shown on the drawings, it shall, in addition to the strength requirement, comply with the durability requirements specified in sub-clause B6404(h), 'W' class concrete shall not apply to minor structural elements such as side drains and catchpits except in very severe environmental conditions of exposure. Requirements for concrete quality (including any durability requirements) for concrete pavements are found in Section 7100 of the Standard Specifications."

b) Strength concrete

Add the following sub-clauses:

"**h) Concrete durability**

(i) General

It is the Employer's Agent's responsibility to approve the component materials and their mix properties, however it is the contractor's responsibility to utilise acceptable component material and to achieve mix properties complying with the specifications. It is the contractor's responsibility to design and blend materials to produce concrete of the specified quality.

(iii) Cement content

In order to avoid the possibility of Alkali Silica Reaction (ASR), the following shall be taken into account when designing the mixes:

1. Where the cementitious contents is less than 350 kg/m^3, the maximum equivalent sodium monoxide content (calculated as Na_2O) permitted shall be 0.60%, unless a test certificate from the CSIR (Built Environment) is provided stating that the long term testing has proved the aggregate to be non-reactive.
2. Where the cement content exceeds 350 kg/m^3, the maximum equivalent sodium monoxide (Na_2O) content permitted shall be 2.1kg/m^3 of concrete.
3. Where potentially ASR reactive aggregate is used, the maximum cement content shall be 400 kg/m^3 and the maximum equivalent sodium monoxide (Na_2O) content permitted shall be 2.4 kg/m^3 of concrete.
4. The contractor shall prior to the use of cement provide test certificates from an approved laboratory confirming the equivalent sodium monoxide (Na_2O) content of the batch of cement to be used.
5. Special literature should be consulted e.g. Fulton's Concrete Technology.

i) Mix design approval procedures

Testing for approval purposes shall be carried out by an accredited laboratory approved by the Employer's Agent, the costs of which are deemed to be included in the contractor's rates for structural concrete.

Concrete mix designs submitted for approval shall also include the following information:

- Target strength and slump
- 7 and 28 day compressive strength results with measured slumps

- Cement source and type
- Brand and dosage of any admixtures
- Proportions of all constituents in the mix
- Cement quality certificates including Na_2O equivalent
- Certificates of compliance in respect of any cement extenders used (SANS1491)
- Data sheets for admixtures
- Aggregate source and test results to confirm compliance with SANS 1083, including grading, flakiness and FM
- Shrinkage characteristics and potential alkali reactivity of fine and coarse aggregate"

B6406 MIXING

(f) Ready-mixed concrete

Add the following:

"Delivery tickets for all ready-mixed concrete delivered to site shall be checked to ensure the correct mix has been delivered and the time of arrival recorded and compared to the time of batching to ensure consistency with the expected travel time and that no undue delay has occurred between dispatch and delivery.

The temperature limits at the point of delivery shall be as specified in SANS 878:2004 unless the Employer's Agent has specified other limits due to specific design requirements.

No water or admixtures shall be added after batching during transit or on site prior to placing the concrete to improve or maintain workability. Prior to placing all concrete delivered to site shall be checked for workability using the slump cone test and concrete having a slump outside of the limits set for the design mix shall be rejected and removed from the site.

The rate of change in concrete properties shall be closely monitored. When, in the opinion of the Employer's Agent, the workability drops to the extent that the concrete cannot be satisfactorily placed and compacted with the available equipment and manpower it shall be deemed unsuitable for use and removed from the site of the works. Under no circumstances shall water be added to maintain or reinstate workability."

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 Employer's Agent. In all cases the proposed method of forming the joint shall be discussed and agreed with the Employer's Agent."

B6409 CURING AND PROTECTION

Add the following to the end of sub-clause B6409(f):

"Where a curing compound is used, it shall consist of an approved water based low viscosity clear wax emulsion applied in accordance with the manufacturer's instructions."

Add the following paragraphs to the end of this sub-clause:

"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 Employer's Agent.

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, then the surface must be protected immediately by appropriate methods approved by the Employer's Agent 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. In order to prevent early

settlement and shrinkage of the concrete, the concrete placed shall be re-vibrated after initial compaction while the concrete is still in a plastic state. Any remedial measures shall be as approved in writing by the Employer's Agent.

For all concrete curing shall be excluded from the make-up of rates for measurement under items B64.01 and B64.02 and will paid for separately under pay item B64.07. Where the application of a curing compound is used, the type and nominal application rate thereof shall be as specified in the schedule of quantities or to the manufacturer's nominal specified rates."

B6410 ADVERSE WEATHER

Add the following sub-clause:

"**d) Temperature and hydration of concrete**

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

Ready mix concrete: In the case of ready mix concrete the temperature limits at point of delivery shall be as specified in SANS 878 2004 unless the Employer's Agent has specified other limits due to specific design requirements. If slump loss occurs at concrete temperatures of over 30°C and more than two hours after mixing, the concrete shall be rejected.

Care must also be taken not to cast concrete onto hot steel shutters as this might induce cracking.

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 final paragraph:

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

Prior to the manufacture of any units the manufacturer shall submit his Quality Plan to be approved by the Employer's Agent. As part of the Quality Plan submitted for approval, copies of calibration certificates of gauges used for proof loads used at the factory shall be supplied to the Employer's Agent. The originals of these certificates shall at all stages also be available for inspection at the factory premises. The Employer's Agent's representative may visit the factory at any stage to ascertain adherence to the quality plan. Should the manufacturer not be adhering to their Quality Plan the Employer's Agent may exercise the right to reject the use of products from the manufacturer concerned. The Employer shall also be informed in all such cases."

B6414 QUALITY OF MATERIALS AND WORKMANSHIP

a) Criteria for compliance with the requirements

*In the first paragraph, delete "*and 8300*".*

B6416 MEASUREMENT AND PAYMENT

Add the following at the beginning of clause B6416:

"Note that pay items B64.01, B64.02 and B64.07 below are applicable to all concrete."

Item	**Unit**

B64.01 Cast in situ concrete

Amend the descriptions of subitems B64.01(a) and (b) to read as:

"(a) Normal concrete ……. cubic metre (m^3)

(i) *Indicate part of structure and strength e.g. Bases (30/20)*
(ii) *Etc. for other parts of structure"*

SECTION B6600 : NO-FINES CONCRETE, JOINTS, BEARINGS, PARAPETS AND DRAINAGE FOR STRUCTURES

B6606 DRAINAGE FOR STRUCTURES

(c) Synthetic-fibre filter fabric

Replace the last paragraph with the following:

"Synthetic-fibre filter fabric shall be manufactured from polymeric material processed into a continuous, permeable, homogeneous, non-woven sheet which shall be mechanically, heat or chemically bonded. It shall be made from polyester, polypropylene or polyethylene and show no detectable reduction of the specified properties when subjected to chemical and biochemical conditions found in soils or in saline solution, specifically:

- soil and ground water with a pH in the range 4 to 12 (pH to be determined by MethodA20, TMH1)
- soil (as paste) and ground water containing salts with a conductance of up to 1,0 Siemens per metre (S/m) (conductivity to be determined by Method A20T, TMH1);

In addition the filter fabric shall not be attractive to rodents or termites nor support the growth of algae; it shall be rot-proof and shall maintain at least 80% of the original tensile strength after direct exposure of 1 500 hours to sunlight.
Synthetic-fibre fabric shall be classified according to the following:

Table B6606/1: CLASSIFICATION OF SYNTHETIC-FIBRE FABRIC"

Grade	Penetration load (kN)	Elongation at rupture (%)		Permeability (litres/sq.m/s)
	Min	Min	Max	Min
A	4,5	10	50	20
B	3,0	20	50	20
C	2,5	20	-	20
D	2,0	20	-	20
E	1,5	20	-	20

The above properties shall be measured in accordance with the test methods of SANS 10221."

Add the following new sub clause:

"(e) Synthetic-fibre filter fabric backing with perforated drainage pipes and drainage strips

Where shown on the drawings and unless otherwise specified, the drainage system shall consist of perforated drainage pipes, drainage strips and filter fabric placed against the earth faces of the abutments and walls and wrapped around the perforated drainage pipe as detailed on the drawings.

The filter fabric shall be suitably hung or fixed by approved means to the wall to prevent displacement during backfilling. The perforated drainage pipe shall be placed on a 300mm x 100mm concrete bedding strip, or other impervious material, and the bottom of the pipe shall line up with the inverts of the weep holes."

SECTION B7100 : CONCRETE PAVEMENTS

B7101 SCOPE

Add the following paragraphs:

"The contractor shall take and submit samples of materials and/or mixtures to the Employers Agent who must approve designs before construction work can commence.

B7102 MATERIALS

Add the following paragraph before sub-clause B7102(a):

"Materials shall comply with the requirements of Series B7100 except for the following additional/amendments contained in this clause."

(a) Cement

Add the following to the end of the clause:

"In order to avoid the possibility of Alkali Silica Reaction (ASR), the following shall be taken into account when designing the mixes:

(i) Where the cementitious contents is less than 350 kg/m^3, the maximum equivalent sodium monoxide content (calculated as Na2O) permitted shall be 0.60%, unless a test certificate from the CSIR (Built Environment) is provided stating that the long- term testing has proved the aggregate to be non-reactive.
(ii) Where the cement content exceeds 350 kg/m^3, the maximum equivalent sodium monoxide content permitted shall be 2.1 kg/m^3 of concrete.
(iii) Where potentially reactive aggregate is used, the maximum cement content shall be 400 kg/m^3 and the equivalent sodium oxide (Na2O) content permitted shall be 2.4 kg/m^3 of concrete.
(iv) The contractor shall prior to the use of cement provide test certificates from an approved laboratory confirming the equivalent sodium oxide (Na2O) content of the batch of cement to be used.
(v) Special literature should be consulted e.g. Fulton's Concrete Technology."

(b) Water

Add the following:

"Water for concrete shall not contain chlorides, calculated as sodium chloride, in excess of three thousand (3 000) parts per million nor sulphates, calculated as sodium sulphate, in excess of two thousand (2 000) parts per million. Water for pre-stressed concrete shall not contain chlorides, calculated as sodium chloride, in excess of four hundred (400) parts per million no sulphates, calculated as sodium sulphate in excess of four hundred (400) parts per million.

The temperature of the water used for the concrete mix shall be carefully recorded and monitored and if so required or instructed by the Employers Agent the contractor shall replace some of the water with ice.

Water for curing concrete shall not contain impurities in sufficient amount to cause discolouration of the concrete or produce etching of the surface.

No sea-water, or water otherwise salty, shall be used".

(c) Aggregate for Concrete

Add the following to the second paragraph of Sub Clause (i):

"The contractor is to provide in their method statement full details of the handling and storage of the aggregates at the concrete supplier as well as a proposal to reduce the fluctuation of the aggregate temperatures during the project. Careful recording and monitoring of the aggregates temperatures shall be kept."

Add the following new paragraph to Sub Clause (i):

"And a test certificate from an approved laboratory shall be furnished".
Add the following to Sub Clause (ii) Part (7):

"The proposed aggregate shall be tested in accordance with sub-clause 8105(f) for Alkali Reactivity and Clause B7103 Requirements in respect of a concrete (a) General shall be strictly applied".

(d) Admixture to Concrete

Add the following:

"Only admixtures of the type that reduce the water content of the mix will be considered by the Employers Agent. Any proposed admixtures shall also provide full details of the effects of the admixture on the viscosity of the proposed concrete mix. The Employers Agent may reject proposed admixtures or request alternative admixtures for consideration so as to lower viscosity of the mix."

(e) Materials for Joints

(iii) Silicone sealant

Add the following:

"Tear strength determined in accordance with ASTM 0624 using Die C = 5,25 kN/m minimum."

(xi) Polysulphide Sealant

Add the following:

"For this Contract, the joints shall be sealed with approved polysulphide sealant or silicone sealant with rubber chord inserted into joint as per drawings."

(g) Curing Compound

Add the following:

"The Contractor shall submit details of the curing compound he proposes to use together with the required test certificates to the Employers Agent for his approval".

B7103 REQUIREMENTS IN RESPECT OF CONCRETE

(b) Specified Strength

Add the following as a fifth value:

"(v) The 28-day compressive strength corresponding to a 28-day flexural strength of 4,2 MPa. The road may only be opened to traffic when the concrete has attained a flexural strength of 3,5 MPa."

(f) Workability of the Concrete

Add the following:

"The target slump for the concrete shall not exceed 50 mm, unless otherwise approved by the Employers Agent and alternative methods to reduce the possible shrinkage cracking are incorporated into the method statement and successfully implemented in the trial section".

B7105 BATCHING MIXING AND TRANSPORTING CONCRETE

Add the following the first paragraph:

"The concrete for concrete pavements shall be purchased from an approved commercial supplier but only if such product complies in all respects with the desired strength, workability and durability characteristics and only if the required paving output as provided in the method statement and approved by the Employers Agent, will be achieved. The Contractor shall remain responsible for providing suitable materials, determining the mix proportions, providing the mix design details and samples of the components of the concrete, manufacturing the concrete of the required quality as specified."

B7107 GENERAL REQUIREMENTS IN RESPECT OF PLACING AND COMPACTING

Add the following paragraphs:

"**The Contractor shall, with his tender, submit a detailed method statement of his proposed placing/slipform paving technique."**

(v) Placing concrete in windy conditions

"When placing of concrete is undertaken in windy conditions the contractor shall implement appropriate measures to combat the effects of wind.

Concrete placing shall cease when the wind speed exceeds 35km/h at the point of placing.

(vi) General considerations due to weather.

Appropriate measures shall include, amongst other measures, a physical roof and side barrier that will be able to protect and the newly placed concrete from wind and direct sun during the initial setting period and application of curing compound.

The size of the physical roof and side barrier shall be of sufficient size to be able to protect a full days work. This roof and side barrier shall be used throughout the period of concrete pavement placement."

B7111 PLACING, COMPACTING AND FINISHING WITH HAND EQUIPMENT

(a) General

Add the following:

"For this contract in order to achieve the standard of finish required the use of mechanical equipment is preferred, however other placement methods will be permitted subject to an approved method statement and achievement of the required specified finish and rideability."

(b) Forms

Add the following:

"In addition, the side forms and rails shall be made from steel sections. Further, any side forms and rails not complying with the specification at any time shall be repaired or removed from site".

B7112 REINFORCED CONCRETE PAVEMENT

(i) General

Replace this clause with the following:

"The term "reinforced concrete pavement" in this context shall mean continuously reinforced concrete pavement (CRCP)"

B7113 SURFACE TEXTURE

(i) General

Add the following between the two paragraphs:

"The surface texturing for the concrete shall be achieved through the use of an approved tine grooving device. "

(ii) Equipment

Add the following between the two paragraphs:

"The tine grooving device shall have the ability to ensure a consistent depth of grove of 3 mm if so instructed by the Employers Agent."

B7113 SURFACE TEXTURE

(a) Pre-formed Elostomeric Compression Seals

Add the following:

"Pre-formed elastomeric compression seals shall not be used on this contract."

B7122 CONSTRUCTION TOLERANCES

(f) Surface regularity

Add the following at the end:

"For the concrete pavements the roughness of the surfacing will be determined by using an inertial laser profilometer or Walking Profiler capable of producing a Class 1 vertical measurement resolution, and a Class 3 longitudinal sampling distance as defined in ASTM standard (E950-09).

The method of measurement and calculation of the IRI shall be as described in B4213(a)(v).

The Average IRI_{100m} values is then evaluated and judged according to Table B7122/1 to determine whether the 100 m section needs corrective work or payment adjustments.

For the Concrete Pavements, the applicable Payment Bracket in Table B7122/1 for the measured lanes and shoulders will be determined as follows:

TABLE B7122/1: PAYMENT ADJUSTMENT FACTORS FOR CONCRETE PAVEMENT SURFACINGS

Target $IRI_{100m\ Ave}$ (m/km)	PAYMENT ADJUSTMENT
	Full Payment construction Concrete Pavements Pavement Types B1 – B4
<3.00	1.050
3.01 to 3.10	1.025
3.11 to 3.20	1.010
3.21 to 3.30	1.000
3.31 to 3.40	0,975
3.41 to 3.50	0,950
3.51 to 3.60	0,925
3.61 to 3.70	0,900
3.71 to 3.80	0,865
> 3.8	Reject

Adjustment to the payment for concrete surfacing will be reflected separately, as provided in the Bill of Quantities, in the contractor's monthly certification of the works. The adjustment will be calculated by multiplying the full payment value for each 100m section, for payment items B71.02 by the payment adjustment factor derived from Table B7122/1. Contract Price Adjustment will not be applicable to the payment adjustment for the concrete surfacing. The payment adjustment shall apply to the total concrete layer lane width placed over the 100 m sections in question.

Surfaced shoulders less than 2 m wide will be assumed to have the same roughness measurements as the adjacent lane and the quantity of material in the shoulder shall be added to the quantity of material of the adjacent lane for determination of the payment adjustment factor.

On sections where the Average IRI_{100m} is worse than the cut-off value listed in Table B7122/1 the section is rejected and corrective work will be necessary.

Any corrective work required shall be made by the removal of the total concrete layer width placed over the 100 m section in question, followed by reinstatement. The contractor shall submit his method statement for any corrective work to the Employers Agent for approval, prior to commencing with any corrective work. Corrective work shall be done at the contractor's expense and shall be completed prior to determining pavement thickness. After completion of the corrective work, the 100m sections shall be re-evaluated according to the abovementioned procedure.

For concrete surfacing, as an absolute minimum, measurements shall be provided to the Employers Agent after 10%, 50% and 100% of the surfacing area of the project has been completed. The Contractor will be paid for these profilometer measurements under payment item B81.04. No additional payment will be made to the contractor for additional measurement and analysis of profiles if ordered for his own assessment purposes, or if additional surveys are required as a result of any remedial/corrective work identified and subsequently completed.

The raw measurements from the inertial laser profilometer or Walking Profiler is also to be provided to the Employers Agent.

B7124 QUALITY CONTROL AND WORKMANSHIP

(a) Compressive Strength Control

Add the following to the first paragraph:

"The Employers Agent shall evaluate the acceptance control on a daily basis as the 28 day test results become available".

B7127 MEASUREMENT AND PAYMENT

Amend payment item B71.01 as follows:

Item	**Unit**
B71.01 Concrete trial pavement	
(a) CRCP trial section (*thickness stated*)	cubic metre (m^3)

"The unit of measurement for the trial pavement shall be the cubic metre of completed trial section. The trial section shall not be greater than 80m^3 without prior approval from the Employers Agent. The trial shall be constructed as per clause 7121 except for the trial section dimensions which shall be as per this description.

The tendered rate shall include full compensation for constructing the trial pavement complete as specified including all reinforcement, texturing, curing and 4% by mass of red oxide."

Amend payment item 71.02 as follows:

Item	**Unit**
B71.02 Concrete pavement excluding texturing and curing	
(a) 160mm CRCP	cubic metre (m^3)
(b) 230mm CRCP	cubic metre (m^3)
(c) 240mm CRCP	cubic metre (m^3)
(d) 270mm CRCP	cubic metre (m^3)
(e) Extra Over B71.02(a) – (d) for the addition of 4% red oxide (by mass)	cubic metre (m^3)

Replace the first paragraph with the following:

"The unit of measurement shall be the cubic metre of concrete pavement placed and finished in accordance with the specifications and the project specifications. The quantity shall be calculated from the dimensions shown on the drawings or as authorised. No deduction in volume measured for payment shall be made for the volume of any reinforcing steel."

Add the following paragraph at the end.

"The tendered rate for (e) shall be extra over rates (a) – (d) and shall include all compensation for all additional costs associated with the supply, mixing and placing of the concrete pavement with the stipulated red oxide added."

SECTION B7300 : CONCRETE BLOCK PAVING FOR ROADS

B7302 : MATERIALS

(a) Bedding sand

Replace the bedding sand grading requirements with the following:

Sieve size (mm)	Percentage passing
10	100
5	95 – 100
2	73 – 86
1	43 - 78
0,600	25 – 60
0,300	10 - 30
0,150	5 – 15
0,075	5 - 10

Note: Refer to standard COLTO table for COLTO grading if required

(b) Concrete Paving Blocks

Replace "Portland Cement Institute" *with* "Cement and Concrete Institute".

Add the following to the end of the paragraph:

"The maximum allowable abrasion depth shall be 1.5mm."

Add the following sub-clause, B7302 (f), after sub-clause B7302 (e):

"(f) Tactile Paving Blocks

Tactile Paving Blocks shall be provided as per the Drawings or as instructed by the Employers Agent. The colour of these blocks shall be as indicated on the Drawings. Tactile Paving Blocks comprise of guiding tactile indicators and warning tactile indicators. Guiding tactile indicators include protruding ribs, whilst warning tactile indicators include protruding knobs. All tactile paving blocks shall be compliant with the latest version of SANS 784."

7304 MEASUREMENT AND PAYMENT

Add the following new item, B73.04 after item B73.03:

"Item **Unit**

B73.04 Tactile paving blocks

(a) Tactile warning indicators..... square metre (m²)
(b) Tactile guidance indicators ..... square metre (m²)

The unit of measurement shall be the square metre of completed tactile paving. The quantity shall be calculated from the dimensions in the drawings or authorised by the Employers Agent.

The tendered rate shall include full compensation for furnishing all material, bedding, concrete infills with slip-resistant surface, and other concrete work required for these pavement systems."

SECTION B8100 : TESTING MATERIALS AND WORKMANSHIP

B8102: TESTING METHODS

Insert the following as a new first paragraph:

"Where reference is made to TMH test methods in this specification or the standard specifications, it shall be replaced with the relevant current published SANS test method."

B8114 GEOTEXTILE AND GEOTEXTILE – SOIL COMPATIBILITY TESTS

Add the following new sub-clause:

"c) Other Tests:

i. Thickness (mm):
The thickness of the material shall be specified by the contractor (or supplier).
Thickness and compressibility tests shall be carried out in accordance with Code of Practice SANS 0221:1988. The Testing of Geo-textile, to check that the material supplied conforms to the thickness specified by the contractor.

ii. Mass per unit area (g/m2):
Testing shall be carried out in accordance with Code of Practice SANS 0221.

iii. Tensile strength (kN/m):
Testing shall be carried out in accordance with Code of Practice SANS 0221.

iv. Penetration load (kN):
Testing shall be carried out in accordance with Code of Practice SANS 0221.

v. Puncture resistance (mm):
Testing shall be done in accordance with test procedures laid down by CSIR, Pretoria.

vi. Permeability (l/s/m2):
Testing shall be carried out in accordance with Code of Practice SANS 0221."

"B81.04 Surface regularity tests as described in subclauses B4213 and B7122

(a) Establishment of equipment:
  (i) Inertial Laser Profilometer ..... number (No)
  (ii) Walking Profiler: (*Make and Model*) .....number (No)
(b) Profiler surveys on:
  (i) Asphalt surfacing using Inertial Laser Profilometer or Walking Profiler……..kilometre (km)
  (ii) Concrete surfacing using Inertial Laser Profilometer or Walking Profiler……kilometre (km)

The unit of measurement for sub-item B81.04(a) shall be the number of times the particular piece of equipment is established and de-established on site to perform acceptance control measurements, as approved by the Employers Agent.

The tendered rates for sub-item B81.04(a) shall include full compensation for providing and establishing the equipment on site, and for the subsequent de-establishing and removal of the equipment from site when no longer required.

The unit of measurement for sub-item B81.04(b) shall be the kilometre of road surveyed in accordance with, and as specified in, sub-clauses B4213 and B7122 respectively.

The tendered rates for sub-item B81.04(b) shall include full compensation for surveying the specified layer, and for analyzing and determining the longitudinal profiles and 100 m International Roughness Index (IRI), all as specified in clauses B4213 and B7122 of the specifications. The tendered rates must also include full compensation for the number of runs per lane as specified."

SECTION B8200 : QUALITY CONTROL (SCHEME 1)

B8201 SCOPE

Add the following paragraph:

"Quality Control Scheme 1 as specified in section 8200 shall apply to this contract (except for parts of C1000 for which the items as provided in 8300 shall apply)."

B8206 JUDGEMENT PLAN B

Notes (Table 8206/3)

Replace note 1(a) with the following:

"(a) Density Ls = 93% of MVD, see also clause B4210)."

Replace note (b) with the following:

"(b) Binder content (conventional and homogeneous modified binders)

For continuously graded mixes:
Ls = Specified binder content – 0.2% binder
L's = Specified binder content + 0.2% binder"

Replace note 1(c) with the following:

"(c) Voids

Ls = specified values – 1 percentage point
L's = specified values + 1 percentage point"

SECTION B8300 : QUALITY CONTROL (SCHEME 2)

B8305 PROCEDURES

d) Cementitious binder content of stabilised layers and uniformity of mix.

Replace "50 samples" *with* "6 samples" *in the entire paragraph*

ii) *Replace* "not more than 12" *with* "not more than 2".

Table 8305/1

Add the following:

Table 8305/1 ACCEPTANCE LIMITS IN RESPECT OF COMPACTION

Layer	Prescribed Compaction	Unit of measurement	Minimum average relative compaction for the following sample sizes						Minimum value for any single test for the following sample sizes					
			4		5	6	7	8	9	4	5	6	7	8	9
Recycled granular base	98,0%	Maximum dry density (MDD)	98,4	98,6	98,7	98,9		99,0	94,4	94,2		94,0	93,9	93,8	93,7

Table 8307/1

Add the following:

Property	Structure
Relative compaction	(iv) Recycled granular base

Table 8307/2

Add the following:

Property	Structure	Rejection limits (L_r and $L=_r$)
Relative compaction	(c) Recycled granular base	L_r = (L_a – 2,000)% relative compaction

SECTION B8400 : PAINTING

B8407 : PAINTING STRUCTURAL STEEL

b) Surface preparation

a) New Structures

Add the following last paragraph:

"Where painted finish is specified on galvanised steel, degrease with galvanised iron cleaner and ultra fine hand pad, providing consistent abrasive action for conditioning metal surfaces, paint preparation and cleaning, that does not rust or leave fine metal splinters during use, consisting of a silicon carbide abrasive mineral incorporated into a non-woven/open web, fibre matrix materials and rinse with fresh water after galvanising has been completed, prior to application of primer coat"

c) Primer

Insert the following as a last paragraph:

"Galvanised structural steel shall be spray painted with one coat of high build epoxy primer, 150 to 200 microns dft."

d) Under coat

Insert the following last paragraph:

"Galvanised structural steel does not require to be spray painted with an undercoat."

e) Finishing coat

Insert the following last paragraph:

"Galvanised structural steel shall be spray painted with one coat acrylic polyurethane, 40 to 75 microns dft."

3. ADDITIONAL AND SUPPLEMENTARY SPECIFICATIONS

This part of the Project Specifications contains comprehensive additional specifications for matters not covered by and work which is not carried out in terms of the Standard Specifications.

The number of each clause and each payment item in this part of the Project Specification is prefixed with an C to differentiate these clauses and items as supplementary works.

The following additional specifications are covered under this part of the Project Specifications:

SECTION C1000: COLD INSITU RECYCLING – Not applicable in this project

SECTION C2000: ELECTRICAL & ELECTRONIC

SECTION C3000: BUILDING WORKS

SECTION C4000: TRAFFIC SIGNALS

"SECTION C2000 : ELECTRICAL & ELECTRONIC

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SECTION C2101 : GENERAL

This document is prepared for the electrical & electronic installation of the IRT Phase 2A Trunk and Feeder Support Infrastructure (East) project in Khayelitsha & Mitchells Plain, Cape Town. The extent of work described herein shall be read in conjunction with the other parts of the specification, City of Cape Town specifications, technical schedules and accompanying drawings.

SECTION C2102 : CONTRACTORS RESPONSIBILITY

The Electrical & Electronic Contractor shall be responsible for the supply, installation, testing, commissioning and free maintenance during the 12-month guarantee period of the installation, detailed in this specification and on the accompanying drawings.

The Electrical & Electronic Contractor shall provide all materials, equipment, labour and services necessary for the complete, safe and efficient operation of the electrical installation in accordance with the intent of this Specification and Drawings.

The works shall be carried out strictly in accordance with the following:

- This Technical Specification
- The Departmental Norms, Standards & Specifications
- The Occupational Health and Safety Act No. 85 of 1993 and the relevant Regulations as amended.
- The Code of Practice for the Wiring of Premises - SANS 10142-1 & 2.
- National Building Regulations
- The relevant local bylaws and regulations of the Supply Authority.

The Electrical & Electronic Contractors shall make note of his responsibilities in respect of:

- As-Built Drawings
- Conflicts between Specification and Drawings

In terms of Government Notice No 17548, it is the Electrical & Electronic Contractors responsibility to ensure that all electrical fittings installed comply with the relevant SANS safety standards, applicable to the particular class of fitting. In the event of fittings specified by the Employers Agents /Architect which do not comply with the SANS safety standards, it shall be the Electrical & Electronic Contractors responsibility to notify the Employers Agents immediately in writing, so that alternative fittings which do comply with the SANS safety standards may be timeously selected.

The Electrical Contractor shall not install any fitting or equipment under any circumstance which does not comply with the SANS safety standards unless specifically instructed in writing by the Employers Agents on an item for item basis.

Where a product is claimed to comply with the SANS safety standard by compliance to an alternative foreign safety standard recognised and accepted by the SANS, the Contractor shall obtain and submit proof of such acceptance. Where the SANS grants a permit for the use of equipment which does not carry the SANS/SANS mark, the contractor shall submit copies of the permits and test reports to the Employers Agents at the time of tender.

All equipment tendered shall comply with the SANS safety standard as required by the above legislation. The contractor shall provide copies of SANS certificates of compliance for electrical fittings upon request by the Employers Agents. No claim will be considered on the basis that equipment tendered did not comply with the relevant SANS standard.

SECTION C2103: SCOPE OF WORKS INCLUDED

The Electrical & Electronic Contractors work shall be the complete electrical & electronic installation respectively including commissioning and the following systems and duties:

- Liaison with the relevant supply authority (City of Cape Town/Eskom) to ensure that the new electricity supplies are installed timeously and that the equipment installed by the contractor is to the approval of CCT/Eskom.
- MV & LV Distribution Cabling (Relocation)
- Excavation and Backfilling of Trenches for Underground Cables
- Earthing
- Street Lighting Kiosks (SLK)
- Distribution Kiosks (DK)
- Metering
- Street & Intersection Lighting
- Wiring and Connections
- Electrical Signs Notices and Labelling
- Painting of Electrical Equipment
- Workshop Drawings and Samples
- Managing Subcontractors and Suppliers to the Electrical Contract
- Provision of own Hoisting and Lifting
- CCT Field Closed Circuit Television System (CCTV)
- Production of as-built drawings (Copies of the Employers Agent's drawings may be modified by the Electrical Contractor such that they become the master as-built originals).

SECTION C2104: PROGRAMME

The Electrical & Electronic Contractors will be required to comply with the Main contractor programme for the Works, to discuss, agree and arrange the programme for all the sub-contractors to ensure that no delay will be incurred.

SECTION C2105: DEFINITIONS

Supply	:	To purchase or procure and deliver complete with all necessary and additional specified accessories.
Erect	:	To place or mount and fix in position.
Install	:	To erect, connect up and commission, complete with related accessories.
Indicated, Shown, Noted	:	As indicated or shown on drawings.
Approved Alternative	:	Approved in writing by the Employers Agent
Similar, Equal	:	Equal or better in efficiency of performance, construction and compatibility with installation.
Tenderer	:	After contract award, Tenderer shall also mean Electrical Contractor where applicable.
Electrical Contractor	:	Where the tender/subcontract document is based on an Electrical Subcontract, Electrical Contractor in this extent of work shall mean the Electrical Subcontractor.
Electronic Contractor	:	Where the tender/subcontract document is based on an Electronic Subcontract, Electronic Contractor in this extent of work shall mean the Electronic Subcontractor.

SECTION C2106: CONFLICTS BETWEEN SPECIFICATIONS AND DRAWINGS

Should there be conflict between the specification and drawings then sections shall be considered in the following order of priority:

Department's Standard Specifications

This document:

- Extent of Work
- Drawings
- Bill of Quantities
- Standard Technical Specifications

Should the Contractor note an inconsistency between the Specification and drawings he shall be responsible for notifying the Employers Agent and obtaining clarification or instructions prior to ordering or installing equipment.

SECTION C2107: WORKSHOP DRAWINGS, SAMPLES AND INSPECTIONS

The Electrical & Electronic Contractors shall timeously provide workshop drawings, catalogues and/or samples of the following items for the Employers Agent's review:

- Street Lighting Kiosks
- Distribution Kiosks
- Luminaires
- Miniature Substations
- Ring Main Units
- CCTV Cameras
- Network switches
- Heavy duty Fibre optic 12 core single mode cables
- CAT 6 unshielded patch leads complete with moulded plugs

Manufacture and/or delivery of these items shall not proceed without the Employers Agent's written instruction to proceed.

The Electrical Contractor shall timeously advise the Employers Agent that the following items may be inspected at the manufacturer's premises to enable the Employers Agent to inspect the items at the manufacturer's premises prior to delivery:

- Street Lighting Kiosks
- Distribution Kiosks
- Miniature Substations
- Ring Main Units

SECTION C2108: ELECTRICITY CONNECTION

The Supply Authority is Eskom for the Project Sections E02B, E03, E04, E05 & E07.

When and if required the Electrical Contractor will be responsible to relocate 11 kV switchgear, transformers and the cabling from the Supply Authority's 11 kV switchgear to the 11 kV switch unit and from the 11 kV switch unit to the transformers as per the drawings.

SECTION C2108: EARTHING

The entire installation shall be properly and effectively earthed and bonded in accordance with SANS 10142. Self-tapping screws are not acceptable as means of securing earth conductors. All equipment shall be earthed at earth bars/studs which shall in turn be connected to the main earth system.

A third of the armouring of all cable ends shall be twisted together and then lugged onto the earth bar. The streetlight luminaire earth terminals shall be connected to the streetlight cable armour on the earth stud using 2,5 mm² PVC insulated copper conductors and banded with a suitable line tap.

Where lugs are used for terminating stranded earth conductors, the lugs shall be crimped with an approved type of crimping tool. The lug stud size shall correspond to the fixing bolt and the lug shall be so positioned that the full contact area of the lug is utilised. All bolts and screws used for the earthing shall be stainless steel, brass or cadmium plated mild steel bolts.

SECTION C2109: OPERATING INSTRUCTIONS, PARTS LIST AND MAINTENANCE MANUALS AND AS-BUILT DRAWINGS

The Electrical & Electronic Contractors shall supply, after approval by the Employers Agent, three bound sets of operating instructions, parts lists, maintenance manuals and as-built drawings including the following details and information:

- Contractor's and Supplier's details (name, address, email address, telephone and facsimile numbers)
- Contractor's emergency (after hours) contact details
- A General Description of the Reticulation and Key Control Features
- Schedule of Luminaires and Lamps indicating Manufacturer, Supplier, Brand Name and Type Number
- Cable Layouts, including Feeder and Control Cable Marking Numbers and Details
- Distribution Boards
- Subcontractors/Suppliers Documents
- Test Certificates
- Certificates of Compliance per distribution board
- Guarantees and Warranties

The Contractor shall mark up one full set of the Employers Agent's drawings with relevant as-built changes and information and submit to the Employers Agent for his scrutiny 30 days before practical completion. The contract will not be accepted as complete until these have been supplied, complete and to the satisfaction of the Employers Agent.

SECTION C2110: ELECTRICIAL REQUIREMENTS FOR THIS PROJECT

(a) Street lighting Installation

(i) Street lighting Cables

Street lighting cables shall be Aluminium conductor, PVC PVC SWA PVC cables with 25 mm² cross sectional area minimum. Only four core cables shall be used as indicated on the drawings.

Street lighting cables shall be buried in trenches with a minimum 600 mm and not exceeding 750 mm covered depth below finished ground level when in a single trench and at a same depth as LV distribution cables when in a common trench with LV distribution cables maintaining the minimum 75 mm required spacing.

The street lighting cable shall maintain the same depth. The cable routes shall be so planned as to minimize the number of cross overs of cables.

(ii) Luminaires

There are two types of luminaires used in this project:

- BEKA Schreder LED - LUME MIDI 64LED/138W 5248, or equivalent approved
- BEKA Schreder LED - LUME MIDI 64LED/97W 5247, or equivalent approved

All the performance and manufacturing requirement for a City of Cape Town installation are covered under the latest City of Cape Town luminaire specification.

(iii) Galvanised steel poles and outreach arms

The following lengths of galvanised steel poles are used in this project:

- 13,5 m galvanised steel pole with a mounting height of 11.8 m
- 10 m galvanised steel pole with a mounting height of 8.5 m
- 5,2 m galvanised steel pole with a mounting height of 4 m
- 11 m surface mounted galvanised steel pole

All the performance and manufacturing requirement for a City of Cape Town installation are covered under the latest City of Cape Town pole specification. The CCT drawing reference for each of the galvanised steel poles mentioned above are listed below:

- **SL – 33:** 13,5 m galvanised steel STREETLIGHT POLE
- **SL – 1:** 10 m galvanised steel STREETLIGHT POLE
- **SL – 37:** 5,2 m galvanised steel STREETLIGHT POLE
- **SL – 11:** 11 m galvanised steel STREETLIGHT POLE with surface mounted baseplate **SL51**

Poles shall be installed plumb and proper backfill material (cement mixture if required), shall be used to ensure permanent positioning. When the galvanised steel poles need to be installed on a retaining wall the universal base plate **–** drawing number **SL51 –** must be used for the mounting installation.

The CCT drawing reference for the single and double galvanised steel outreach arms are listed below, the double outreach arm is a mirrored single outreach arm:

- **SL – 45:** Decorative outreach arm

(iv) Cable termination

A cable glanding is not required for the cable termination. One third of cable armouring at both ends of each cable shall be twisted together and linked to the earth conductor by means of a suitable lug onto the earth stud. The lugged third of the armouring is to be wrapped around the balance of the armouring remainder of the cable armouring to ensure a good connection with all the armouring to improve the earth connection.

(v) Metering of Street lighting Installations

The metering of streetlight installations within the City of Cape Town supply area is not required except where a developer chooses not to handover the streetlight installation.

In areas outside the City of Cape Town supply areas, i.e. Eskom supply area. An application for supply shall be made by the developer to Eskom. The developer is responsible for the connection cost of the installation. While the City will take over the responsibility of the monthly energy charge and maintenance.

(vi) Sleeves/Ducts

A 110 mm diameter sleeve shall be provided for every low voltage cable crossing. Up to four street lighting cables OR up to four service connection cables OR one low voltage distribution cable may be drawn into a low voltage sleeve. One spare sleeve per low voltage crossing shall be provided.

A galvanized draw wire shall be installed within each sleeve and the end shall protrude for at least 500 mm. The sleeve ends shall be capped. Spare sleeves shall be provided with rust free draw wire and the PVC covering shall remain over the sleeve ends after installation.

Sleeves shall extend 1 m beyond the curbs on either side of the road. All sleeves shall be installed at 1 m covered depth.

The sleeves shall be placed on a layer of selected granular material and shall be bedded in selected sand. Backfill shall be compacted in layers and shall comply with the requirements of the City's Roads Engineer and the Principal Engineer: Public Lighting Development.

(vii) Street Lighting Kiosks

The Street lighting kiosks (SLK) will feed from the nearest CCT/ESKOM distribution kiosks (DK's) and will be a pole mounted as indicated on the drawing. The SLK will be manufactured according to the applicable single line diagram and in accordance with the CCT reference drawing for Street Lighting Kiosks:

- **DR3055SH1:** Streetlighting Control Kiosk
- **DR3055SH2:** Streetlighting Control Kiosk

The kiosks shall be manufactured from polyethylene and shall have two doors. The front door shall give access to the circuit breakers and the rear door shall give access to the busbars.

The distribution kiosk shall be polyethylene metering kiosks for split prepayment meters as per the attached.

The kiosks shall be sized for the installation of consumer circuit breakers and the active meter component for split prepayment metering arrangement.

The number and rating of consumer circuit breakers shall be as noted on the contract drawings and the circuit breakers shall be installed by the kiosk manufacturer at his premises. The kiosk, feeder circuit breaker and cable shall be labelled for identification.

The circuit breakers for all service connections shall be single phase, 80A, 5 kA, curve 1 and shall include connections to the busbars. All circuit breakers shall have brass terminals.

A danger sign and kiosk number (both non-corrodible) shall be secured to the kiosk (in accordance with Eskom specification D-WC-6637) onto the door of the kiosk facing the road.

The kiosk, feeder circuit breaker and cables shall be labelled for identification.

The label for the erf identification number must be pop riveted immediately above the corresponding circuit breaker and fixed to the internal glass fibre cover.

The LV feeder cables shall be adequately labelled as specified. The label should clearly indicate its origin and destination at either end of the cable and shall be marked at the mini substation feeder protective fuse pillars and in the kiosk.

The kiosk shall have identification name on the outside as well as on the inside door facing the street.

Doors to be vermin and weatherproof. All openings shall be inaccessible, and the kiosk shall have a minimum ingress protection rating of IP53.

(ii) Construction

1) Manufactured to SANS 141 of 1971 removable from support frame.
2) The standard size to accommodate up to 12 single phase customers.
3) The final finish shall be colour F48 (Cloud Grey) to SANS 1091.
4) Busbar material tinned copper with 25 x 6 mm or alternatively 32 x 6.3 minimum dimensions for phase and neutral 300A rating. Neutral bar on consumer side: 5 kA

The Electrical Contractor shall ensure that each customer is connected to the specific phase as indicated on the single line diagram.

Low voltage insulators epoxy resin mounting against board (9.5 mm Masonite board fixed to hot-dipped galvanised mild steel frame).

Circuit breakers will be the Hy-mag SFI-G3 type or approved equivalent on DIN rail mounted. The rating shall be 80A 5 kA curve 1 delay.

A M10 brass bolt on gland plate, complete with nuts, washers and locknuts, to allow 50 mm earth lugs for distribution earth. A 70 mm2 Insulated (Cu) lugged connection between earth stud and neutral busbar. Continuous earth wires between distribution kiosks to be terminated onto earth stud.

Provision shall be made for three cables of a maximum size of 150 mm2 to be connected directly to the busbars.

The kiosks must be installed 1m from curb and minimum 500 mm from erf boundary.

(b) Electrical Supplies to Various Services

There are various services that require electrical supplies along the IRT Trunk & Feeder Project route. The Electrical Contractor must liaise with the relevant supply authority (City of Cape Town/ESKOM) to ensure that the new electricity supply applications are submitted & installed timeously and that the equipment installed by the contractor is to the approval of CCT/ESKOM.

All the services indicated below will feed from the nearest City of Cape Town/Eskom Distribution Kiosk as stated on the drawings depending on the Project section involved:

Various Services:

- Street Lighting
- Field CCTV Equipment
- Traffic Intersection - Traffic Lights
- IRT Bus Stations

Supply Cables:

The following supply cables will be required to supply each of the above-mentioned services with an electricity connection:

- Street Lighting Kiosk – 35 mm² Al 4 Core PVC PVC SWA PVC armoured cable.
- Field CCTV Equipment – 25 mm² Al 3 Core PVC PVC SWA PVC armoured cable.
- Traffic Intersection Traffic Lights – 25 mm² Al 3 Core PVC PVC SWA PVC armoured cable.
- IRT Bus Stations– 25 mm² Al 4 Core PVC PVC SWA PVC armoured cable with BCEW.

(c) Relocation of Existing Electrical & Telecommunication Services

The existing services that needs to be relocated are shown on the existing services drawings. These drawings where obtained from the City of Cape Town and serves as a guideline as to where the existing services are currently located.

The new proposed routes for the relocation of the existing services are also shown on the same drawings and must be followed as far as practically possible.

The existing services that needs to be relocated are listed below:

- Low & Medium Voltage primary & secondary supply cables
- Electrical Primary feeder pilot cables
- Electrical Protection Cables
- Telecommunication Cables
- HDPE Ducts

(i) MV Cabling:

All MV cables shall comply with City of Cape Town specifications.

The MV cable shall be plain soft copper, three core, screened, XLPE, 6.35/11 kV, sheathed cable to Table 19 of SANS 97. The size required for this project is 150 & 300 mm².

Cable connections throughout the 11 kV system shall follow the same phase rotation and core numbers shall be allocated to the various phases as follows. (or as required from the Local Supply Authority).

Red Phase : Core No 1
White Phase : Core No 2
Blue Phase : Core No 3

MV cables shall be laid at a depth of 1 m below finished ground level with a spacing of 75 mm to other MV cables, 150 mm to LV cables and 300 mm to all other services. Orange PVC warning sheet shall be laid along the entire 11 kV cable route. These sheets shall be installed at minimum 300 mm above the cable.

All cable termination and jointing accessories shall comply with CCT specifications. Details of the type of joints and terminations proposed by the contractor shall be submitted to the Employers Agent for approval before work commences. All cable through joints and terminations shall be made in accordance with the cable manufacturer's recommendations and shall be carried out by a qualified cable jointer.

Cable terminations shall be Raychem Tank type, heat-shrink terminations or equivalent. Eskom approved Cable Jointer must ensure that termination kits are equipped with Torque shear lugs.

Cable terminations labels, manufactured from an A1 plate or Plastic/Engraved Celeron, complete with 7 mm black letters on an orange background shall be used, containing the following:

- Cable destination
- Cable voltage
- Cable size
- Conductor material
- Cable type (PILC, XLPE)

Termination ID tags shall be provided, excluding the following:

- Manufacturer's name
- Manufacturer's part number
- Jointer's name
- Date of installation

(The ID tag shall be attached to the termination crutch).

The Contractor shall supply test certificates for the insulation of the installed cable, i.e. HV pressure test of all 11 kV cables.

(ii) LV Feeder Cables:

The Electrical Contractor shall supply and install LV feeder cables in accordance with City of Cape Town/Eskom specification depending on the project section.

LV cables shall be PVC/SWA/PVC/PVC Cu 4-core to SANS 1507. LV cables and their associated earth conductors shall be laid at a depth of 700 mm below finished ground level.

LV cables shall be terminated by means of tinned crimped lugs complete with shrouds. The shank of the cable lugs shall be sealed and insulated by means of colour coded heat shrink sleeves.
Joints shall only be made at full drum length intervals.

Orange PVC warning sheet shall be laid along the entire LV cable routes. These sheets shall be installed 300 mm below final ground level.

The Contractor shall issue test certificates for the insulation of the installed cables i.e. “Megger” test for all LV cables.

(d) General Electrical Specifications

Further to the requirements of the general technical specifications and/or notwithstanding the requirements therein the following requirements shall apply:

(i) Underground Cables

Cable drums shall be transported on a suitable cable trailer or on a lorry in such a way that they will not roll and cause damage to the cable. The cable shall preferably be unwound slowly from a drum carried on a slow-moving cable trailer and man-handled into the prepared trench without dragging across the ground. Where this method is not practicable, the cable drum shall be placed on a spindle to allow the drum to turn freely and the cable man-handled or hauled into the trench taking care not to stretch the cable or drag it across stones or sharp objects. The cable drum shall be turned by hand and on no account shall tension on the cable be used to unwind it from the drum.

The cables shall be laid in the position indicated on the drawing or wayleave plan. At street or road crossings, they shall be pulled through protective ducts. Cables shall not be bent during installation to a radius smaller than twelve times the overall diameter. Care should be taken during installation that the protective sheathing serving is not damaged. Cables crossing voids shall be suitably supported in an approved manner and be protected against damage. The installation work shall be carried out strictly in accordance with the municipal byelaws and any special requirements of the local supply authorities.

(ii) Laying cables in prepared trenches

Before the cables are laid, the bottom of the trench shall be covered with a 75 mm layer of earth which shall have been passed through a sieve with a maximum mesh of 12 mm. The Electrical Contractor shall lay the cables on the prepared bed carefully to avoid cuts and damage. Cable rollers shall be used.

The trench shall be backfilled with clean builder’s sand to provide 150 mm of cover as soon as possible after the cable has been laid. To prevent theft and possible damage, long lengths of cable shall not be left exposed in an open trench overnight. The trench shall be backfilled and compacted in layers to achieve 100% compaction. Water shall not be allowed to accumulate at any part of the works.

The Electrical Contractor will therefore ensure that no cable laying is carried out until the trenches are free from water. The minimum cover over the cables shall be 600 mm for LV cables and 1 000 mm for MV cables. All side channels, sumps or temporary excavations for dewatering purposes shall be filled in after use.

(iii) Plastic cable warning sheeting

All cables shall be covered with a yellow/orange plastic warning sheet of approved design with the skull and cross bones insignia together with the words "DANGER, GEVAAR, INGOZI" printed in black at regular intervals. The warning shall be placed 300 mm above the top of the cables.

(iv) Cable markers

The routes of all underground cables and duct ends shall be marked by means of approved concrete markers having cast insert the words "Electric Cables". They shall be positioned at every change of direction, and every point of crossing another cable, or service, and not less than one per 30 metres of straight run.

(v) Luminaire Installation

The Electrical Contractor shall comply with the installation requirements of the luminaire manufacturer when installing light fittings.

(vi) Labels

All labels shall be in English. All labels on SLK's shall be of ivorine or plastic and securely fixed by screws or rivets. Lettering shall be block capitals, minimum size 4 mm. Where distribution board labelling is by means of legend cards, the permanent legend cards shall be clearly typed, laminated in clear plastic and secured to the distribution board in a permanent legend cardholder.

(vii) Screws

Cover plate securing screws for all electrical or telecommunications boxes shall be chromium plated.

(viii) Danger Notices

The Electrical Contractor shall supply and install all danger and substation notices in terms of the relevant regulations.

(ix) Corrosion

The Electrical Contractor shall take adequate measures to protect the installations against corrosion, according to the site conditions.

C2111: ELECTRONIC REQUIREMENTS FOR THIS PROJECT

(a) Field CCTV Installation

The field CCTV installation required for this project is situated along the IRT Bus Route as described in Section 2, mainly at the traffic intersections. All cameras used in the design are IP Based Cameras.

The IP cameras are positioned on a 12m or 15m steel mast and all the required electronic equipment is contained within the mast or pole mounted kiosk. The IP cameras are connected to a PoE Internet Switch and then to a Fibre Termination Box within the mast or pole mounted kiosk.

The fibre optic cable will then reticulate to the nearest IRT Bus Station Network Room - Fibre Patch Panel and Network Switch.

(i) Fixed Field CCTV Cameras

The Fixed Field CCTV Cameras are situated along the IRT Trunk & Feeder Project route mounted on steel masts. These cameras shall be suited for outdoor use, functioning in both high daylight conditions as well as in low level LED streetlighting. The cameras are generally located on all traffic intersections and shall therefore be positioned to view traffic from all directions.

Property	Description
Camera Type	Bullet Colour/Day Night Camera
Image Sensor	2 MP
Max resolution (effective)	1920 × 1080
Minimum scene illumination	Colour: 0.001 Lux @ (F1.2, AGC ON); B/W: 0.0003 Lux @ (F1.2, AGC ON)
Electronic iris/shutter control	1 s to 1/100,000 s
Back light compensation	auto or manual, intelligent backlight compensation
Video output	IP
Image	Wide Dynamic Range
Equivalent or equal	HIKVISION iDS-2CD7A26G0/P-IZHS(Y)
Lenses	The Security Contractor shall select the lenses that suits the area where the camera is installed to obtain the optimum view of the monitored/viewed area.

(ii) Equipment Enclosures - Mast Kiosk, Pole Mounted Kiosk & Electrical DB

Where specified, the field equipment and relevant power supplies shall be mounted in a high impact resistant, non-corrosive enclosure, suitable for outdoor use. The enclosure must be an approved colour and be equipped with a lockable door. The enclosure shall be manufactured from 316 stainless steel or better with a minimum material thickness of 1.6 mm. The enclosure must be properly sealed against dust and moisture and have at least an IP65 rating.

All cables entering the enclosure shall have a cable gland fixed onto a gland plate in the cabinet floor. The contractor shall ensure that the enclosure is sufficiently designed, so that no overheating of equipment will occur inside the cabinet. In the event of the equipment operating at excessive temperatures for long periods of time, the contractor shall submit possible solutions to prevent the overheating of the equipment. The solution shall be submitted to the Employers Agent for approval and will be for the account of the contractor.

The kiosk shall be of double skin construction with an air gap of at least 20 mm between the skins and shall have an access door on the one side only. The door shall be locked with a pad-lockable swivel unit with two steel rods penetrating the doorframe at the top and bottom. The padlock shall be housed in a recess in the door and shall be covered by a vandal proof steel plate fixed with stainless steel tamperproof fixing screws. The screws shall be of the T30 type to conform to previous installations. All screws and bolts installed at the equipment enclosure shall be of stainless-steel type.

The enclosure shall be fitted with a removable wooden backboard to which all the equipment and trunking shall be mounted. The installed equipment shall include circuit breakers, a kWh meter, surge arrestors and a single socket outlet for temporary connecting of external equipment.

Ventilation shall be top and bottom natural ventilation. The free airflow shall be achieved by providing slotted openings in the base and along the side panels of the enclosure. The ventilation openings shall be vermin proof. Two of the side ventilation slots shall have matching holes through the inside skin of the enclosure for possible future mounting of extractor fans. The holes shall be covered by a suitable cover plate.

Typical enclosure examples are given in the drawings section. Sizes indicated on the drawings shall be used as guides only. Shop drawings of the proposed kiosk layout shall be submitted to the Employer for scrutiny prior to manufacture. The contractor shall keep the enclosure as small as possible to house all the required equipment and still provide sufficient airflow to prevent overheating of the equipment.

Where specified, the contractor may be required to supply and install a smaller equipment enclosure to house a lesser amount of equipment. The smaller enclosure shall be specified by the Employer to be of single-skinned 316 stainless steel or Sheet Moulding Compound (SMC)/polycarbonate type. The enclosure shall be fitted with a removable wooden backboard to which all the equipment and trunking shall be mounted. The installed equipment shall include circuit breakers, a kWh meter, surge arrestors and a single socket outlet for temporary connecting of external equipment. The enclosure shall also be capable of being locked with a padlock-type lock to prevent unauthorized access into the enclosure.

Building Mount Enclosures:

A location may require that the kiosk and camera be mounted onto a building. The contractor shall allow for all required conduit or trunking to ensure a professional installation. The dimensions of the enclosure shall allow for the easy installation of all the required equipment with adequate ventilation around the various items as well as easy access to all items.

Pole/mast Mount Enclosures:

A location may require that the kiosk and camera be mounted onto the camera pole/mast. The contractor shall allow for all required conduit or trunking to ensure a professional installation. The dimensions of the enclosure shall allow for the easy installation of all the required equipment with adequate ventilation around the various items as well as easy access to all items.

The Mast- or Pole mounted Kiosk (ElectroMechanica RGS316-65 or equivalent) must be able to house the following electrical & electronic Equipment:

Pole mounted Kiosk: (ElectroMechanica RGS316-65 or equivalent)

Required Specifications:

- Colour: Brushed Stainless Steel
- Material: 316 Stainless Steel
- Degree of protection: IP65
- Dimensions (mm): (H) 600 x (W) 500 x (D)220

- Supply with bottom stainless steel 316 gland plate and mounting brackets.
- Supply with internal mild steel white powder coated chassis plate -2 mm.

Electrical Equipment:

Small Distribution Board with the following Circuit breakers:

- Main Circuit Breaker : 60A DP MCB 10Ka 230Vac
- Surge Protection Device : SPD DP Class 2 10Ka 230Vac
- Dedicated plug circuit : 16A SP MCB
- Dedicated DSO (red) : 16A Dedicated Red DSO
- Conductor as per SANS : Copper PVC insulated

Electronic Equipment:

- PoE Internet Switch 8 Port & Power Supply
- Fibre Termination Box
- All electronic cabling

Floor Standing Enclosures:

The locations where it is possible or allowed the kiosk will be mounted on a plinth near the camera mast. The contractor shall allow for all required ducting between the kiosk and mast. The dimensions of the enclosure shall allow for the easy installation of all the required equipment with adequate ventilation around the various items as well as easy access to all items.

The floor mounted kiosk shall have a 316 or better stainless-steel base of approximately 300 mm high and shall be bolted onto a concrete plinth. The concrete plinth shall be designed and constructed by the contractor and shall have a minimum of 2x110 mm sleeves installed for cable access.

(iii) PoE Network Switches

The IP cameras are connected to a PoE Internet Switch at the mast and ultimately at the IRT Bus Station:

- Mast PoE Network Switch - Huawei (8 Port) S5735-L8P4S-A1 or equivalent
- Station PoE Network Switch - Huawei (8 Port) S5735-L32ST4X-A1 or equivalent

(iv) Fibre Optic Installation

The equipment, material and method of installation shall comply strictly with the requirements and specifications set out by the City of Cape Town **–** Fibre Cable Installation Specifications.

Fibre Optic Cable:

12 Core Single-mode fibre (G655.D):

The City of Cape Town primarily uses single mode optic fibre cable produced in accordance with ITU standard G.655D, with the following characteristics:

- Fibre Attenuation: <0.4 dB/km at 1550nm
- Chromatic dispersion: <6.2ps/nm.km at 1550nm
- Polarisation Mode Dispersion: <0.2ps/ km

Please note that G.655D specification does not cover the 1310nm window, which means that the cable is not rated for operation outside of the C-band (1530-1565nm).

- Maximum splice attenuation (1550nm) = 0.15dB
- Maximum connector attenuation (1550nm) = 0.22dB

Fibre Optic cable Installation:

Sub-Duct
Sub-Ducts will be required. The Fibre Optic cable shall be installed in the sub-ducts within the underground 110 mm primary sleeves.

Fibre installation

(a) Pre-installation Attenuation testing

Prior to installation, the fibre optic cable shall be tested to verify compliance with the minimum attenuation specifications quoted by the ITU-G.651 standard, and to the values quoted below.

Every fibre within the cable shall be tested while still on the delivery drum.

No individual fibre within a cable shall exceed 0.4db/km attenuation. Further, the average attenuation of the fibres in the cable being tested shall not exceed 0.35db/km. Cable drums not complying with this specification shall be rejected by the contractor before the consignment is accepted.

The contractor shall perform the attenuation test and deliver a copy of the results to the Employers Agent for review and record keeping.

(b) Pulling of cable

Only one fibre optic cable is to be pulled into a sub-duct.

The fibre optic cable shall be hand pulled into the sub-ducts. Mechanised winching will not be allowed. A 0.7 mmϕ nylon ski-rope should be used for this purpose.

Any lubrication system employed shall have a long-term compatibility with the cable and the sub-duct material and be safe from an occupational health point of view.

Detergent based lubrication will not be allowed.

The underground infrastructure has manholes spaced regularly and well within best practice recommendations. The cable shall be pulled from manhole to manhole, i.e. manholes shall not be skipped.

The looping of fibre on the ground, as it is being prepared for pulling into the ducts, shall be in accordance with best practice installations, i.e. figure-8 loops, in order to avoid twisting of the cable in the duct.

The contractor shall ensure the cable is never over bent, particularly during installation where large forces are at play. The minimum radius the cable should ever experience is 115 mm.

(c) Cable Joints

The fibre optic cable shall be continuous from the point of connection to the point of distribution. Strictly, no joints will be allowed between these end points.

(d) Slack

Three metres (3 m) of slack shall be coiled in every manhole. The contractor shall ensure proper coiling methods are practiced in order to prevent cable twisting should the cable ever be pulled back in the future. Methods such as the “Fold-Over” method or the “Garden Hose” method are some examples of acceptable coiling methods. The coils shall be shaped into 1m diameters and cable tied.

Furthermore, five metres (5 m) of cable at the end points is required, for splicing purposes.

Fibre Termination:

Prior to commencement of splicing the fibres to the termination pigtails, the newly installed cable shall be inspected and the attenuation tests repeated and approved by the Employers Agent. All test results shall be presented to the Employers Agent for review and record keeping.

Labelling:

Labelling is an important feature of the installation. The labelling method shall be permanent and robust. The method of preference is the proprietary Arrow-Tag and Oval grip character systems developed. The tag shall be black, and the grip characters shall be yellow.

(v) CCTV Galvanised Steel Masts

The contractor shall supply and install camera masts as described below.

Where applicable, the camera shall be mounted on the mast and the related equipment shall be mounted in an enclosure that shall either be mounted onto a wall of a building, next to the mast on the ground or on the mast itself. The exact position of the masts shall be determined prior to installation.

It shall be the duty of the Contractor to survey the site in detail and to plan installation of the new masts in such a way that disruption to normal traffic and movement is kept to a minimum. All safety precautions shall be duly taken and the proposed method and schedule of work submitted to the Employers Agent and relevant SSU personnel well in advance.

Where required, the design and installation shall include the construction of an appropriate concrete foundation for each mast length and for the different site conditions, installation of sleeves and the electrical earthing of the masts. In this project Type C & D masts would be used.

The following are standard mast types:

Mast Type	Material	Height above ground
A	Concrete	7 m
B	Concrete	9 m
C	Steel	12 m
D	Steel	15 m
E	3-sided steel lattice	15 m
F	100 mm x 100 mm galvanised pole	4 m

Design Parameters:

The masts shall be designed by the mast manufacturer/supplier according to the SANS Code of Practice for the Design and Construction of Lighting Masts (SANS 0225). The design parameters are as follows.

Description	Requirement
Design wind speed	$40ms^{-1}$
Terrain category	2
Altitude	10-200 m ASL
Maximum deflection at wind speed	25 mm
Exposed area for deflection	500 mm^2

The masts shall be designed to meet the design parameters when fully equipped with cameras, cables, safety ladder, etc.

The mast manufacturer shall also be responsible for the design and specification of the foundations for all the different mast lengths used, and the design shall be altered to accommodate the specific site conditions. The bolt cage to be cast into the foundation shall be supplied by the mast supplier, and the complete cage shall be hot dip galvanised, including the full length of the bolts.

Full manufacturing shop drawings shall be submitted for scrutiny, prior to manufacture.

1. Construction Details:

Concrete masts shall be manufactured in a single section and shall have a conical or tapered shape. Masts shall be manufactured for planting directly into the ground. The mast shall be hollow throughout and shall have one access opening of approximately 350 x 20 mm at 500 mm above ground level. The access cover shall be secured with stainless steel tamperproof captive screws and shall have a rubber or silicone gasket for waterproofing. The access openings shall be suitably reinforced.

The steel masts shall be manufactured from high tensile steel and shall be hot dip galvanised. The mast may be manufactured in a single section or in several conical sections that, when assembled, shall form a tapered column. The conical sections shall fit into one another, and no bolting or welding of sections shall be allowed. The mast shall have a steel base plate for bolting onto the concrete foundation.

The masts shall have two access openings, one at 500mm above ground level measuring 300 mm x 400 mm, and the other one at 400mm below the top of the mast measuring 200 mm x 300 mm. The opening shall have a lip of at least 10mm all the way around and shall have a rubber or silicone gasket to ensure adequate waterproofing. The access covers shall be secured with grade 8.8 cadmium bolts. The mast shall also have at least four access points at a height specified by the Employer to enable the

mounting of static cameras to the side of the mast with the cables to the cameras neatly routed through the centre of the mast and through sprague to the camera. The access points shall be 25mm holes drilled into the side of the mast prior to galvanising. The holes shall be closed off if not used and if used the cable entry shall be done with a suitable PVC gland.

Both access covers shall be fixed to the mast on one side with stainless steel hinges. The access openings shall be suitably reinforced.

The steel mast top shall be fully closed and thoroughly weatherproofed and shall be equipped with a lightning protection spike. Three ø63x3 mm, 500 mm long spigots shall be allowed at the top of the mast to allow for the mounting of camera lollipops. Where a spigot is not used, a suitable covering cap will be provided that can be tightened into place to prevent water ingress into the mast. Two flange plates of 250x140 mm each shall be fixed to the mast below the top with entry holes into the mast for camera mountings.

A removable stainless-steel cable shall be installed inside the mast for supporting the camera cables. The cable shall be attached onto a lug at the top and bottom of the mast, within reach of the access openings. The camera cables shall be strapped onto the steel cable in such a way that there is no vertical tension on the camera connections.

The contractor shall be responsible for the adequate electrical earthing of the masts to protect the camera equipment from damage due to lighting strikes.
Two round mounting flanges for the mounting of equipment enclosures shall be fixed to the mast in a back-to-back fashion that will allow the equipment enclosures to be mounted at a height of 5 000 mm above ground level. The mounting flanges shall have entry holes into the mast for cable routing. Where flanges are not used for equipment closures, suitable cover plates shall be provided and fixed into place to prevent water ingress into the mast. As an alternative to the above, the mast may be constructed without the mounting flanges for equipment enclosures and provide secure space within the mast for the installation of cabling and equipment. The mounting boards for the installation of cabling and equipment shall be easily removable to ensure ease of access for technicians. The client and/or Employers Agent shall specify on a per project basis whether the poles to be supplied shall have external mounting flanges or internal equipment spaces.

The mast shall be equipped with a ring of anti-theft intruder spikes located at 4 000 mm above ground level.

The steel lattice mast shall be manufactured from high tensile steel and shall be hot dip galvanised. The mast shall be of triangular shape and shall be manufactured in 3 m long sections that are bolted together to achieve the 15 m requirement. Each side of the triangle shall be 1 200 mm in length and the bottom section shall have suitable mounting flanges for bolting onto the concrete foundations. The concrete foundations shall include 50 mm sleeves for cable access into the legs of the mast. One ø63x3 mm, 500 mm long spigot shall be allowed at the top of the mast to allow for the mounting of a camera lollipop.

The lattice mast shall be equipped with a ladder on the inside of the triangle and shall provide a mounting point for the equipment enclosure within the triangle of the top section of the mast. The technician shall be able to easily gain access to the equipment enclosure from the ladder. The lattice mast shall be equipped with a lightning protection spike that is suitably earthed and shall provide fastening points for stay wires on the three main axis should it be required to provide additional stays to the mast.

The lattice mast shall be equipped with a ring of anti-theft and anti-climbing spikes located at 4 000 mm above ground level as well as a lockable hatch at the same level within the triangle to prevent unauthorized climbing of the ladder. The hatch shall be fitted to the mast with hinges on one side and shall hang downward when in the open position to allow easy climbing of the ladder.

2. Cat ladder:

The steel masts shall be equipped with a cat ladder to provide access to the top of the mast. The cat ladder shall be without a cage or handrails to minimize the visual impact and shall be installed from above the equipment enclosure mounting flanges only. Access to the cat ladder shall be by means cherry picker.

Allowance shall be made along the length of the ladder for the attending technician to hook a safety harness onto, with supports every 1 000 mm. A safety hook must be provided at the top of the mast where the harness can be clipped onto when working at the top.

3. Assembly and Erection:

Concrete masts shall be planted directly into the ground, and the contractor shall ensure that the base and backfill material is of such a nature that the mast will not sag or tilt over time. Planting depth shall be a minimum of 1.8 m but may be deeper to ensure that the camera will be positioned at the specified height above ground level. The masts shall be installed with the access opening facing away from the street.

Steel masts shall be assembled on site if in sections and shall be erected and bolted onto a concrete foundation. The mast shall be installed in such a way that the access openings and cat ladder face away from the street. Once vertically aligned and secured the concrete foundation is to be shuttered and filled with concrete to meet the level of the mast base to prevent vandalism and theft by boring into the mast from beneath. Care must be taken, by either grouting or shuttering the void between the mast and the foundation before performing this task, so as not to fill the access duct into the mast with concrete in the process.

The Contractor shall be responsible for all excavations, backfilling and the construction of foundations including the installation of all sleeves. Special precautions must be taken to ensure that the zinc galvanizing of the mast is not damaged during the transport or installation.

4. Security fence around camera mast:

The contractor may be required to supply and install a security fence around the camera mast to prevent unauthorized access to the camera mast and equipment. The fence shall be made of welded mesh type panels with small apertures preventing climbing and cutting of the fence. The fence posts shall be vandal-resistant to prevent easy removal of the panels and the fixing mechanisms shall be of stainless-steel tamper-proof shear-off nuts. The fence posts shall be encased in concrete to ensure a high-security installation.

Each side of the security fence shall be 3m in length and the panels shall be 2 400 mm in height with a strip of security spikes at the top to prevent climbing over.

(vi) Manholes & Sleeves/Ducting

1. Sleeves/Ducts

Ducts must generally be 110 mm diameter, black in colour, manufactured of uPVC. They must be corrugated on the outside and have a smooth bore. A draw rope shall be inserted in each duct. Ducts must be cleared of all sand, debris and other obstructions and the ends must be sealed with suitable stoppers.

Where pipes/ducts cross with a vertical height difference of less than 150 mm, a block of soft material (polystyrene or similar) must be placed between them and the backfill material well compacted to ensure that the pipes do not sag. The contractor will be held responsible for any damage to pipes resulting from the construction of pipe crossings.

2. Manholes

Manholes and draw boxes must be constructed strictly to the details provided. Manholes will generally be constructed in non-trafficked areas and the covers must be flush with the ground surface.

3. Brick-built Manholes

A Brick-built Manhole (BBM) is a manhole constructed (by hand) primarily from Bricks, Mortar and Cement. It is more durable than prefabricated designs and is the preferred type when installing a manhole in a location that experiences a high volume of traffic, i.e. roads. Generally, conditions on site will dictate the size and type of manhole required and what is most suitable – depending on the service requirements. The Employers Agent or Fibre Planner will dictate which type of manhole is constructed in each case.

To ensure Public and Traffic Safety on sidewalks, roads, pavements, etc. – it is essential that an even, level, non-protruding, ground-level Manhole cover is fitted. This is to minimise any possible risk to the damage and injury of vehicles, pedestrians, path or road users and the public in general. The manhole frame and cover shall be at the same level as the surrounding area. The sizes mentioned below are the interior measurements from inner-wall to inner-wall as well as the floor to the surface.

There a three basic volume sizes listed in the points below. Should any difficulty encountered prevent the actual measurements from being achieved, the Route Supervisor is to be consulted.

- 800 mm - the minimum internal distance between the walls is to be 800 mm and the depth of the hole should not be less than 800mm from the top of the base to the underside of the manhole coping / roof of the manhole. This results in internal dimensions of 800 mmx800 mmx800 mm

- 1 200 mm - the minimum internal distance between the walls is to be 1 200 mm and the depth of the hole should not be less than 1 200 mm from the top of the base to the underside of the manhole coping / roof of the manhole. This results in internal dimensions of 1 200 mmx1 200 mmx1 200 mm. The overall volume must not be less than 1.728 m³. If it is unavoidable that one of the dimensions must be decreased, the other dimensions must be increased to maintain the volume at 1.728 m³. No dimensions may be smaller than 800 mm. All deviations from the norm must be approved in writing by the Employers Agent or Fibre Planner and an instruction issued accordingly.

- 1 500 mm - the minimum internal distance between the walls is to be 1 500 mm and the depth of the hole should not be less than 1 500 mm from the top of the base to the underside of the manhole coping / roof of the manhole. This results in internal dimensions of 1 500 mmx1 500 mmx1 500 mm. The overall volume must not be less than 3.375 m³. If it is unavoidable that one of the dimensions must be decreased, the other dimensions must be increased to maintain the volume at 3.375 m³. No dimensions may be smaller than 800 mm. All deviations from the norm must be approved in writing by the Employers Agent or Fibre Planner and an instruction issued accordingly.

All BBMs must be constructed with sleeve entries (stubs) according to the following minimum specification:

- All BBMs shall have a minimum of 2 x 110 mm sleeve entry points on all 4 sides and must be cemented inside and outside, around the sleeve
- The bottom of each sleeve entry point shall be 100 mm above the manhole base (staggered layout)
- Sleeves are to be inserted at the side of the manhole wall face, NOT in the middle. The first sleeve must be installed 100 mm from the side of the next (parallel) wall, and the following a maximum of 50 mm further in. The Employers Agent or Fibre Planner will dictate on the plan which side must be used (i.e. 100 mm from the East or West wall, in the case of a North or South entry).
- Unused sleeve entries shall be sealed with 110 mm end caps or foam sealed
- Sleeves shall be High-Density Polyethylene (HDPE) sleeves with couplings (including rubbers/O-rings) between links
- Sleeves shall be of 110 mm outer diameter
- Sleeves must be cut back to a min. of 50 mm from the wall (i.e. ducts must “stick out” into the manhole by 50 mm, and not be cut flush with the wall)
- Where applicable, draw-wires to be replaced by 7 mm ski-rope.

Manholes either have a prefabricated concrete coping, or a coping that is cast offsite, as specified by the Employers Agent or Fibre Planner. The following rules apply when casting a coping:

- The coping must be cast together with the roof (slab) to ensure the there are no weak points between the coping and roof. The frame of the manhole must also be cast into the concrete coping
- The frame will either be a polymer-concrete frame (2A) or a ductile iron frame (D400), as specified by the Fibre Planner
- Concrete must slope to the outside to prevent undercutting from water (site-specific, determined by the Route Supervisor)
- The coping outer edges is to be chamfered – to trim sharp edges, as per Route Supervisor
- From coping parameter edge to frame: (300 mm -Polymer or 150 mm – Ductile Iron)
- The coping must be at least 100 mm to 150 mm thick concrete at 30MPa
- Wood-float finish to prevent slipping
- When the manhole is built on a pavement with brick surfacing, a ±80 mm gap must be left on the coping, the coping must be 80 mm below the top of the frame, brick re-instatement to be done to the outer edge of the frame opening.
- When the manhole is built in a road or pavement with tar surfacing, a ±30 mm gap must be left on the coping if it is on the pavement and a ±75 mm gap must be left when in the roadway to allow tar reinstatement to be done
- When there is a fall in the ground level to one side the manhole frame must be adjusted to the grading of the ground.

4. Prefabricated GRC Manhole:

All prefabricated manholes shall be cylindrical. Except in exceptional circumstances, both brick-built and prefabricated manholes shall adhere to the same installation specification. The Prefabricated manhole shall not be used within high traffic roads used by heavy vehicles.

Two sizes of prefabricated manholes will be used.
- 800 mm – inside diameter of manhole
- 1 200 mm – inside diameter of manhole

5. Installation Depth (1 200 mm manhole)

- Excavate for the Manhole depth of:
- Frame & Cover 145 mm or
- Coping 150 mm
- Prefab Manhole 1 200 mm
- Bedding 100 mm

6. Preferred Installation Method

Regardless of the size of the prefab MH, the below shall apply:

- The Manhole shall be excavated to a depth of 1 500 mm to allow for the access of compaction equipment, as well as 100 mm Bedding
- Over –excavate the sides to allow for compaction equipment, allowing for sufficient space for compacting
- The base of the excavation shall be a level, compacted surface
- Place the Prefab manhole carefully into the excavation ensuring flush and proper seating before backfilling
- Ensure that the Prefab manhole duct entry holes align with trench/duct direction
- Once the manhole has been positioned correctly, insert the ducting from the trenches
- Carefully seal the ducts to the entry points to prevent moisture from entering the MH
- Unused Duct entries shall be sealed off with Duct caps (on the outside)
- Once the ducts have been inserted and entry points sealed, proceed with backfilling in 300 mm layers
- Compacted backfilling is to be at least as strong as the surrounding virgin soil
- Backfilling shall be to the top of the manhole rendering the manhole completely concealed

Bedding material will constitute an even floor and consist of optimally compacted material 100mm deep. The Employers Agent or Route Supervisor will determine whether the material is too dry or if it requires moisture. Under no circumstances shall material which is saturated with water be used for Bedding or Backfill. Bedding shall consist of virgin soil (site specific).

Backfill material shall consist of virgin soil. The contractor may use soil that has been excavated for the manhole for Backfilling, however, any rocks, debris et al are to be removed.

During the compacting of Bedding and Backfill material, the contractor will exercise care to ensure that Manhole chamber, ducts and duct joints are not harmed or disturbed in any way.
Once the manhole has been installed and completely sealed, the dome(s) may be installed and splicing of fibres may be implemented.

Manhole Covers must be installed in accordance with the manufacturer's instructions. All covers shall be equipped with a locking mechanism. The manhole covers sealing the manholes must comply with the following specifications:

- The cover must be supplied with a frame into which it fits snugly
- The cover must form a watertight seal with the frame
- The cover must have a locking mechanism which requires a special key to open
- The cover must bear the logo of the City of Cape Town as well as the words, "City of Cape Town SSU Optic Fibre"
- The fibre planner will specify which cover and frame shall be fitted to each manhole

The 2A frame and cover are lightweight polymer resin products. The lid is fitted with lock assembly and can withstand 135kN of pressure. The 2A Polymer cover comes fitted with the Prefab manhole as a unit.

- The 2A manhole cover and frame must be manufactured from a polymer concrete material
- The installed 2A cover must be heavy duty and able to withstand 135kN of force
- The outer diameter of the cover must be 600 mm
- The inner diameter of the frame must be ≥ 540 mm

- The frame must be no thicker than 140 mm

7. Manhole Locks

Manhole covers are to be secured using the standard plastic and steel lock mechanisms (the Green Lock). Older covers may use different locking mechanisms and these should be retrofitted with the standard Green lock. Should the design of the cover prohibit the Green lock from being fitted, the cover should be changed to accommodate the approved locking mechanism. The frame will not be altered in this regard. Currently, The CCT uses 2 types of Green locks: B (for Polymer Concrete Manhole Covers) and C (for the Ductile Iron Manhole Covers). The only difference between the two designs is the length. Type C is 50 mm longer to accommodate the dimensions of the Ductile Iron Manhole Cover.

8. Modular Manholes

The Contractor may be required to supply and install modular manholes in certain projects as defined by the Employer. The manholes shall comply to the following minimum specifications. The preferred type shall be RHI-NODE 1000 or equivalent. Installation of the manhole to be done according to the manufacturer's instructions/ training manual. Manhole alignment, 110 mm pipes entries to be aligned in line with trench direction.

Feature	Minimum Requirement
Material	Polypropylene or Sheet moulded compound (SMC)
Daylight opening	650 mm
Depth	1 000 mm
Coping size	900 mm OD
Chamber base	Included
Duct access	12x 110 mm knock-out minimum 4x 160 mm split entry
Lockable lid	Yes with CCT SSU Fibre Optic logo and lock
Load rating	EN-124B125 (125kN)

C2112 : TESTING AND COMMISSIONING

The Electrical & Electronic Contractor shall test the electrical installations prior to commissioning in accordance with the requirements of SANS 10142 and the equipment manufacturer's/supplier's recommendations.

The Electrical & Electronic Contractors shall notify the Employers Agent timeously, prior to testing and commissioning, in order that the Employers Agent may witness such tests as he chooses.

The Employers Agent requires, in any event, to witness the following tests and commissioning:

- MV Cables
- MV Switchgear
- Transformers
- Main Earth
- LV Cables

After commissioning, before practical completion, the Electrical Contractor shall arrange a thermal (infrared scan) survey of the following items as a minimum:

All Distribution Boards

A complete colour printed report shall be submitted to the Employers Agent. In the event of any hotspots identified by the thermal survey, the Electrical Contractor shall, at own cost, remedy the fault/s and submit further thermal survey reports to prove that the fault/s have been remedied.

C2113 : TRAINING

The Electrical & Electronic Contractors shall provide training to the Employer/Employer's agent at practical completion.

Training shall be provided in respect of the standard/routine operation and maintenance for all electrical installations provided under this Subcontract.

C2114 : GUARANTEE AND FREE MAITENANCE

The Electrical Contractor shall provide a 12 month guarantee (from date of practical completion) to replace or repair, free of charge, any part of the installation in which defects may develop as a result of manufacturing defects or poor workmanship.

C2115 : STANDARD TECHNICAL SPECIFICATIONS

The works are to be executed subject to these specifications, standards, and workmanship requirements. Please note that compliance with all these specifications and standards, including requirements in terms of qualifications, accreditation (where applicable) and work experience of both the tendering entity and its key people will be material in the employer's risk assessment for awarding this contract.

Standard Specifications

Where reference is made to the standard specifications in this contract, it means the latest edition of the documents which apply to the specific discipline involved in the works, as referenced under any of the headings below. The standard specifications may, due to their generality and completeness, also cover items not applicable to this particular contract.

Project specifications

Project specifications include amendments to the standard specifications as well as supplemental specifications applicable to work items not covered by the standard specifications. Project specifications, where applicable, may be found throughout the Works Information of this document, including works drawings.

In the event of any discrepancy between the project specifications and a part of the standard specifications found in the Works Information of this document, the project specifications take precedence.

Regulations and codes of practice

All Motors, Generators, Switchgear apparatus, component parts, cables, fittings and materials supplied and installed, whether expressly specified herein or not, shall conform in respect of quality, manufacture, tests and performance with the requirements of the appropriate current South African Bureau of Standards Specifications, or where these do not apply, with the requirements of the British Standard Specifications and addenda thereto, and/or the American Standard Safety Code for Elevators and all work shall be carried out in accordance with the following, and all amendments thereto, as appropriate:

The following standard specifications apply to this project but are not included in this document. The SANS specifications may be obtained or viewed at the South African Bureau of Standards (SANS).

The latest published issue of each standard at tender closing date shall apply.

INDEX Electrical & Electronic Standards

The SAIEE Code of Practice.

The Local Authorities Standard Electricity Supply By-Law and appropriate Additional Byelaws or Regulations.

SANS 156	Moulded-case circuit-breakers
SANS 164-1 to 7	Plug and socket-outlet systems for household and similar purposes for use in South Africa
SANS 556-1	Low-voltage switchgear
SANS 767-1	Earth leakage protection units
SANS 950	Unplasticized polyvinyl chloride rigid conduit and fittings for use in electrical installations
SANS 1085	Wall outlet boxes for the enclosure of electrical accessories
SANS 1195	Busbars
SANS 1213	Mechanical cable glands
SANS 1239	Plugs, socket-outlets and couplers for industrial purposes

SANS 1473-1	Low-voltage, switchgear and control gear assemblies – Part 1: Type-tested, partially type-tested and specially tested assemblies with a rated short-circuit withstand strength above 10 kA
SANS 1545	All related parts. Specifications for lifts and escalators
SANS 1574	Electric cables – Flexible cords and flexible cables
SANS 1765	Low-voltage switchgear and control gear assemblies (distribution boards) with a rated short-circuit withstand strength up to and including 10 kA
SANS 10114	Interior lighting
SANS 10142 -	Part 1 The wiring of premises; low voltage insulations
SANS 10198	The selection, handling and installation of electric power cables of rating not exceeding 33 kV
SANS 10400	National Building Regulations
SANS 60269/IEC 60269	Low-voltage fuses
SANS 60309/IEC 60309	Plugs, socket-outlets and couplers for industrial purposes
SANS 60439-4/IEC 60439-1	Low-voltage, switchgear and control gear assemblies – Part 1: Type-tested and partially type-tested assemblies
SANS 60439-5/IEC 60439-5	Low-voltage switchgear and control gear assemblies - Part 5:
SANS 60598-1/IEC 60598-1	Luminaires: General requirements and tests
SANS 60529/IEC 60529	Degrees of protection provided by enclosures (IP Code)
SANS 60669/IEC 60669	Switches for household and similar fixed-electrical installations
SANS 61000-4-5/IEC 61000-4-5	Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test
SANS 61084/IEC 61084	Cable trunking and ducting systems for electrical installation
SANS 61386/IEC 61386	Conduit systems for electrical installations
SANS 62305	Lightning protection
IEC 60730-2-7	Automatic electrical controls for household and similar use Part 2-7: Particular requirements for timers and time switches
IEC 61643-1	Surge protective devices connected to low voltage distribution systems

All Electronic standards governing the equipment described in this specification shall be adhered to. These shall include:

- SANS 1200/1400 for all civil work
- ITU G652 spec for all single-mode fibre optic cabling
- ITU G655 spec for all single-mode fibre optic cabling
- ITU G651.1 spec for all multimode fibre optic cabling

All equipment supplied shall comply with the following Electromagnetic Compatibility (EMC) standards for Immunity and Emission, including conducted emissions AC mains Class A. Further applicable standards shall include:

- IEC 801-2 Electrostatic discharge immunity
- IEC 801-3 Radiated immunity (3V/m)
- IEC 801-4 Electrical fast transient/burst immunity (500V)
- FCC Part 76 Up to 450 MHz
- EN 55022
- IEC CISPR22
- SANS CISPR 11
- SANS CISPR 13
- SANS CISPR 14
- SANS CISPR 22

Wireless Ethernet equipment must support 802.11w standard

Variations in the scope and extent of the work included in the schedules shall be allowed to meet the Employer's requirements and shall be measured and costed at rates entered in the schedules where appropriate and shall form an addition to or deduction from the total of the schedules. Any items or variation for which rates have not been included in the schedules shall be agreed and priced in accordance with the provisions of the contract.

The Contractor and the Employer or his agent may agree that the total of any schedule or schedules, including any variations by way of additions thereto or deductions therefrom, represents a fair and accurate quantification of the items set out in the schedules and the parties may agree final payment on that basis. In the event of any disputes as to the quantities, then the disputed item or items shall be adjusted where necessary.

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C2114 : GUARANTEE AND FREE MAITENANCE

The Electrical Contractor shall provide a 12 month guarantee (from date of practical completion) to replace or repair, free of charge, any part of the installation in which defects may develop as a result of manufacturing defects or poor workmanship.

C2115 : STANDARD TECHNICAL SPECIFICATIONS

The works are to be executed subject to these specifications, standards, and workmanship requirements. Please note that compliance with all these specifications and standards, including requirements in terms of qualifications, accreditation (where applicable) and work experience of both the tendering entity and its key people will be material in the employer's risk assessment for awarding this contract.

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All equipment supplied shall comply with the following Electromagnetic Compatibility (EMC) standards

for Immunity and Emission, including conducted emissions AC mains Class A. Further applicable standards shall include:

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- IEC 801-3 Radiated immunity (3V/m)
- IEC 801-4 Electrical fast transient/burst immunity (500V)
- FCC Part 76 Up to 450 MHz
- EN 55022 (1987)
- IEC CISPR22 (1993)
- SANS CISPR 11
- SANS CISPR 13
- SANS CISPR 14
- SANS CISPR 22

Wireless Ethernet equipment must support 802.11w standard

Variations in the scope and extent of the work included in the schedules shall be allowed to meet the Employer's requirements and shall be measured and costed at rates entered in the schedules where appropriate and shall form an addition to or deduction from the total of the schedules. Any items or variation for which rates have not been included in the schedules shall be agreed and priced in accordance with the provisions of the contract.

The Contractor and the Employer or his agent may agree that the total of any schedule or schedules, including any variations by way of additions thereto or deductions therefrom, represents a fair and accurate quantification of the items set out in the schedules and the parties may agree final payment on that basis. In the event of any disputes as to the quantities, then the disputed item or items shall be adjusted where necessary.

SECTION C3000 : BUILDING WORKS

CONTENTS

C3001 SCOPE
C3002 STRUCTURAL SERVICES
C3003 ELECTRICAL & ELECTRONIC SERVICES
C3004 FIRE SERVICES
C3005 MECHANICAL SERVICES

C3001 SCOPE

This section covers the work on the station substructures. The station substructure works comprise components of Structural Services, Electrical & Electronic Services, Fire Services and Mechanical Services. The top structure is not included in this project and will be implemented by others.

The specifications included in Section C3000 are applicable only to work as listed in Schedule 6 (Building Works) as included in the Bill of Quantities.

These specifications have been extracted from the original specifications as provided by the various specialist engineers that are involved in the design and implementation of the superstructure that will be undertaken after the completion of this project.

Therefore, the Contractor is to note that some references on the drawings may not correlate to the same references in this (Section C3000) specifications. Where any references are not clear, clarification is to be obtained from the Employers Agent.

C3002 STRUCTURAL SERVICES

(a) General

All structural engineering drawings are to be read in conjunction with all relevant architectural and other consultants' drawings.

Refer any discrepancies to the Employers Agent in writing prior to commencement of work.

Refer to other Consultants' and Specialists' drawings for service requirements.

No drawing is to be scaled. Figured dimensions to be used at all times.

Unless otherwise stated, Permissible Deviation (PD) will be to Grade II in terms of SANS 10155, except for the RC Walls for the Pods and Links which is to be Grade I in terms of Table 4 of SANS 10155.

The Contractor is to locate and identify existing services on site and to protect them for the duration of the works.

All waterproofing details to Architect's specifications.

(b) Earthworks

Site Clearance and Earthworks to be in accordance with SANS 2001-BS1 and 2001-BE1.

Stockpile material only in approved locations on site or as indicated on the drawings.

Approved selected cohesionless backfill around columns and walls, above bases and beneath surface beds, must be compacted to a minimum density of 100% M.D.D in layers not exceeding 200mm thick unless otherwise specified.

No natural aggregates are to be used for non-structural purposes (e.g. building base course, sub-grade to footpaths and backfill to service trenches).

(c) Concrete

Concrete, formwork and reinforcement to be in accordance with SANS 2001-CC1.

Reinforcement to conform to SANS 920, reinforcement detailing to conform to SANS 10144, and bending dimensions to conform to SANS 282.

The cementitious binder shall, unless otherwise specified in note 6 below, be a blend (by mass) of 40% CEM I 42.5 and 60% GGCS (Ground Granulated Corex Slag) or GGBS (Ground Granulated Blastfurnace Slag). CEM I to comply with the requirements of SANS 50197-1. GGCS and GGBS to comply with the requirements of SANS 55167-1.

For exposed concrete (including concrete on or below ground) made with alkali-reactive coarse aggregate, the total alkali content (i.e. the product of the Na_2O-equivalent of the cementitious binder and the binder content of the concrete) must be limited to the following values:

Rock Type	**Total Na_2O equivalent (kg/m^3)**
Witwatersrand Supergroup quartzite/shale	2,0
Malmesbury Group metasediments	2,1
Dolomite Group chert, Table Mountain Group orthoquartzite, Bokkeveld Group arkose, Natal Group quartzite and sandstone, Dwyka Formation quartzite pebbles, Quaternary quartzite gravels	2,8
Cape Granite	4,0

Required limiting values for concrete mix design purposes (for reinforced concrete structures near to or on the coast, i.e. exposed to airborne salt but not in direct contact with sea water):

Element Description	**Concrete Class (f_{cu} in MPa)** *Note (a)*	**Nominal Coarse Aggregate Size (mm)**	**Maximum W/B Ratio** *Note (b)*
Unreinforced concrete (e.g. mass concrete, blinding & strip footings	15	19	-
Reinforced strip footings	20	19	0,7
Bases and foundation beams (non-aggressive soil)	25	19	0,65
Bases and foundation beams (moderately aggressive soil)	30	19	0,55
External suspended slabs (e.g. unprotected exposed ground floor slabs and roof slabs)	35	19	0,45
Internal suspended slabs and beams	30	19	0,55
Walls	30	19	0,55
No-fines concrete	5	19	-

Notes: (a) f_{cu} = Required minimum characteristic compressive strength at 28 days
(b) W/B Ratio = Maximum Water/Binder Ratio

Ground slabs to be cast on selected clean cohesionless material, compacted to 100% M.D.D. Unreinforced slabs to be cast in approximately square panels with maximum side length not exceeding 30 times the slab thickness. All joints to be positioned and formed in accordance with detail drawings.

All movement joints to be 10 mm wide, formed by gluing an approved closed cell expanded polyethylene joint filler to the 1st cast concrete. Joint sealing to Architect's specifications.

All foundations are to be founded on competent material, and final founding levels are to be determined in consultation with the Employers Agent.

Provide 50 mm unreinforced concrete blinding under all bases, ground beams and pit floor slabs.

Minimum concrete cover to any reinforcing bar, including links, to be as tabulated below unless otherwise specified:

- Concrete in contact with the ground 50 mm

- Slab top surfaces: External 40 mm
  Internal 30 mm
- Slab soffits 30 mm
- Walls: 40 mm

Provide all exposed concrete corners with 25mm x 25mm chamfers, unless otherwise specified by the Architect.

Standard of concrete finish to be to Architect's specifications.

Curing and protection of concrete shall be carried out strictly in accordance with Clause 4.7.13 of SANS 2001-CC1.

Propping procedures to be discussed with and approved by the Employers Agent, and formwork removal to be carried out strictly in accordance with Clause 4.3.8 of SANS 2001-CC1.

Quality control:

- All mix designs to comply with SANS 10100-2:2014 and to be submitted to the Employers Agent for approval, prior to any concrete being cast.
- Testing of concrete to be in compliance with SANS 2001-CC1 and SANS 10100-2:2014.
- All testing to be carried out by an approved independent laboratory.
- Frequency of testing: At least one sample (a sample being 3 concrete cubes) for 28 day testing shall be taken from each day's casting, and from at least every $50m^3$ of concrete of each mix design placed per day.
- Initially, for the first 3 pours of every mix design, an additional sample (a sample being 3 concrete cubes) to be taken and tested at 7 days.
- The Contractor may elect to continue taking additional 7 day test cubes for early strength testing, to his account. These shall not be used for assessment of strength as per the above testing procedures.
- A concrete control register to be kept on site recording the following for each cube result:
  - Unique cube number
  - Location placed
  - Concrete mix description and source, e.g. ready mixed concrete or site batch, to be clearly identified
  - Date cast
  - Date tested
  - Age tested
- All cube test results to be submitted to the Employers Agent within 1 week of the test date.
- No-fines concrete blocks must be tested to confirm adequate permeability performance.

(d) Masonry Walling

Refer to the relevant Architect's drawings for setting out and details of all masonry walls.

Refer to Employers Agent's details for joints in brickwork and connections to steel and concrete.

Masonry walls to be constructed in accordance with standards and tolerances of SANS 2001-CM1,SANS 10164-1 and SANS 10145.

Masonry walls to be constructed using cement complying with the requirements of SANS 50413-1 type MC 5.

Masonry walls to be constructed using mortar Class II to SANS 10164-1 (1 part cement : 1 part lime : 6 parts sand) unless otherwise specified. Mortar testing to be carried out in accordance with Section 6 of SANS 10164-1:

- Preliminary mortar tests (each test comprising 3 number 100 mm nominal size cubes) must be carried out at least six weeks before commencement of masonry construction work on site.
- Works mortar tests (each test comprising 3 number 100 mm nominal size cubes) must be carried out at a frequency to be agreed with the Employers Agent, but at least one test shall be carried out on any day when load bearing masonry construction work is carried out.

Clay bricks to be solid masonry units complying with SANS 227, unless otherwise noted. They should have moisture expansion properties not exceeding Category II limitations and must not be laid earlier than six weeks after removal from the kiln.

The Employers Agent may require that samples of masonry units be submitted for laboratory testing in accordance with SANS 10164-1.

Loadbearing walls:

- Provide a slip layer comprising 1 layer of 3-ply malthoid on a smoothly trowelled mortar bedding (with 2 layers of continuous brick reinforcement in the top 2 courses) at the wall/slab interface. This does not apply over reinforced masonry columns, or where specifically indicated otherwise.
- Loadbearing walls must not be chased either vertically or horizontally without the prior approval of the Employers Agent.

Required characteristic compressive strength of loadbearing masonry wall units:

- All loadbearing walls 14 MPa (Class NFX or FBX only)
- All other walls 7 MPa (Class FBS, FBA or NFP to Architect's specification).

All metal straps & brick reinforcement to be galvanized.

DPC used in masonry walls to be rough-surfaced, e.g. "Brickgrip" or approved equivalent.

Brick reinforcement (2,8 mm minimum diameter longitudinal wires):

Install with 250 mm minimum lap lengths, properly tied in at corners and wall junctions.

Spacing as follows, unless otherwise specified:

- Walls generally:

TYPE OF MASONRY UNIT	APPROX. COURSE HEIGHT	REINFORCEMENT SPACING
Imperial sized units	85 mm	Every 4th course

- Walls with door/window openings: install two layers of continuous brick reinforcement at door/window head and window cill levels.

Hoop iron straps (1,6 mm thick x 32 mm wide):
Install as specified, 1 per skin, at:

- Junctions of masonry walls and RC columns/walls, unless otherwise specified.
- Junctions of masonry walls and steel columns, unless otherwise specified.
- Movement joints in masonry walls.

Spacing as follows, unless otherwise specified:

TYPE OF MASONRY UNIT	APPROX. COURSE HEIGHT	SPACING OF 2- STRAPS
Imperial sized units	85 mm	Every 4th course

Movement joint former (10 mm thick closed cell expanded polyethylene strips, e.g. "Sondor Jointex"):

- At junctions of masonry walls and RC columns/walls, unless otherwise specified.
- At junctions of masonry walls and steel columns, unless otherwise specified.
- At movement joints in masonry walls.
- Between top of non-loadbearing walls and soffits of slabs and/or beams over.

(e) Structural Steelwork

All steelwork to be manufactured in accordance with SANS 2001-CS1: 2005.

Guide Posts & 'Dancing Columns' to be erected to a Required Maximum Deviation
(i.e. Position =+-5 mm, Plumbness for Guide Posts =+-5mm, Plumbness for
"Dancing Columns'=+-4 mm)
The remaining steel to be as per Table 11 of SANS 10155 i.e. Grade II

All structural steelwork drawings are to be read in conjunction with all relevant Architect's and other Consultant's drawings and specifications.

All dimensions are to be verified on site prior to fabrication.

Grade of steel:

Unless otherwise specified on the design drawings, the following grades of steel shall be used:

- Hot-rolled sections (other than angles with leg lengths of 50mm or less), plates and tubular sections – S355JR
- Holding down bolts - 300WA minimum
- Cold formed purlins & girts, gutters, downpipes and angles with leg lengths of 50 mm or less, and flats of 90mm width or less - Commercial Quality (minimum f_y = 200 MPa)

Test certificates of all steel used for the works shall be submitted to the Employers Agent on request.

Anchor bolts to be installed in accordance with the steel manufacturer's approved anchor bolt layout drawing.

All plates to be 6mm thick unless otherwise specified.

All fillet welds to be 6mm continuous fillet welds unless otherwise specified (use E7018 welding rods or equivalent).

Site welding shall not be permitted without the written consent of the Employers Agent.

All bolted connections to have a minimum of 2 - M16 grade 8.8 bolts, unless otherwise specified. H.D. galvanized bolts are to be used with H.D. galvanized assemblies.

All base plates to be caulked with tightly rammed 1:1 semi-dry sand : cement grout.

Purlins and sheeting rails to be continuous over a minimum of two bays unless otherwise specified.

The purlins are to have 40 mm long (centre to centre) slotted holes at movement joints and the nuts are to be finger tight with lock nuts. The slotted holes are to be positioned on that side of the joint where "Movement Joint" is written on the drawing.

Proposed splice positions must be discussed and agreed with the Employers Agent **during** shop drawing preparation. Shop drawings, complete with all agreed splice positions and details, shall be submitted to the Employers Agent for approval at least 1 week before commencement of fabrication.

Anti-corrosive treatment:

(i) Galvanizing

- All Steelwork to be hot dip galvanising and to be in accordance with SANS 121 (ISO 1461).
- All lipped channels to be hot dip galvanized.
- All gutters to be hot dip galvanized (see below for painting).
- Hot dip galvanized bolts and anchor bolts to be used with hot dip galvanized steelwork.

(ii) Painting of hot dip galvanized gutters (paint only inside of gutters)

- Chemically clean steelwork with Galvanized Iron Cleaner.
- Water rinse and allow to dry.
- Apply two coats of approved bituminous paint (e.g. "Ravenol" from ABE) to a total DFT of 100 Microns.

Note: Welding of gutter joints is to be coated with "Zincfix" or other approved coating prior to painting.

<u>Class C5:</u>

- Chemically clean steelwork with Galvanized Iron Cleaner.
- Water rinse and allow to dry.
- Apply an epoxy primer (compatible with zinc) to a DFT of 50-60 Microns within 4 hours of cleaning.
- Apply an intermediate coat of high build micaceous iron oxide (MIO) epoxy to a DFT of 100-150 Microns, to colour as specified by the Architect.

- Apply a finishing coat of polyurethane to a DFT of 60-90 Microns, to colour as specified by the Architect.

Note: Preparation for a duplex system concerns the preparation of the hot dip galvanized surface suitable to accept the subsequent coatings. Two forms of surface preparation are recommended.

a. Chemical cleaning with Galvanized Iron Cleaner.
b. SWEEP blasting (micro-blast), but not shot blasting.

(iii) All paint to be sourced from an approved paint manufacturer and to be applied in accordance with the manufacturer's specifications.

C3003 ELECTRICAL & ELECTRONIC SERVICES

(a) General

The project is part of the IRT (Integrated Rapid Transport) System Phase 2A which forms part of the construction of the top-structures of the stations for the IRT project. The stations are made up of the following structural elements:

- Access Ramp including Totem Pole with Station Name
- Station Entrance excluding Kiosk
- Kiosk including Ticket Office,
- Staff Toilet and Server Room
- Station Platform
- Station Link
- Exit Ramp
- Generator Slab on top of Server room for Mobile Generator

In this project only works related to the substructure (preparation for top-structure) of the stations is included.

(b) Compliance with Regulations

The installation shall be erected and carried out in compliance with:

- The Occupational Health and Safety Act 85 of 1993 and as amended incorporating SANS 10142.
- The local Municipal by-laws and Regulations as well as the regulations of the local Supply Authority.
- The local Fire Regulations.
- The Electrical Sub-Contractor shall at his cost issue all drawings and notices in respect of modification of the installation to the local authorities, and shall indemnify and exempt the CLIENT from all losses, costs or expenditure which may arise as a result of the Electrical Sub-Contractor's negligence to comply with the requirements of the regulations stipulated above. No work shall commence by the Sub-Contractor prior to the approvals by the local authority of the relevant drawings or applications to perform work.

It shall be assumed that the Sub-Contractor is conversant with the abovementioned requirements. Should any requirement, by-law or regulation, which contradicts the requirements of this Document, apply or become applicable during erection of the installation, such requirement, by-law or regulation shall overrule this Document and the Sub-Contractor shall immediately inform the Employers Agent of such a contradiction.
Under no circumstances shall the Sub-Contractor carry out variations to the installation in terms of such contradictions without obtaining the written permission to do so from the Employers Agent.

(c) Quality of Material

Only material of high quality and suitable for the climatic conditions of the site shall be used and shall be subject to approval of the Employers Agent. All material shall conform in respect of quality, manufacture, tests and performance, with the requirements of the SANS or where no such standards exist, conform to the appropriate current Specification of the British Standards Institution. Materials manufactured in South Africa shall as far as possible be used and where applicable shall bear the SANS mark. Imported materials shall comply with the requirements of the appropriate B.S. or I.E.C. specification. All materials shall be suitable for the conditions under which the materials are installed and used. Should the materials or components not be suitable for temporary use under site conditions, then the Sub-Contractor shall at his own cost provide suitable protection until these unfavourable site conditions cease to exist.

(d) Fixing of Material

Responsibility
It is the responsibility of the Sub-Contractor to position and securely fix conduits, trunking, cables and cable ladders, switchboards, fittings and all other equipment or accessories as required for the installation. The Sub-Contractor shall provide and fix all supports, clamps, brackets, hangers and other fixing materials.

Welding
Supports, brackets, hangers, etc. may only be welded to steel structural members where prior permission has been obtained.

Screws and bolts
Where holes in equipment to be fixed already exist, bolts and fixing screws shall be used.

Anchor bolts
Where the fixing holes are 10mm and larger or where the mass of the equipment is 15 kg or more, equipment shall be fixed by means of expanding anchor bolts.

(e) Trunking Installation

Trunking shall be installed as indicated on the drawings. All trunking and trunking accessories shall be Cape Support Systems or equivalent and shall be galvanised. Trunking shall be installed complete with clip-on galvanised metal covers. Adjoining lengths shall be correctly aligned and securely joined by means of connection pieces that are pop-rivetted to both abutting sections. All adjoining sections shall be of identical rectangular section and shall butt tightly. Covers shall fit tightly across the joint.

Trunking shall be installed open end up wherever possible, but where it is installed on its side or in vertical runs all conductors shall be retained by means of metal clips or metal spacer bars at not less than 1 m centres. All trunking shall be vermin proof after installation. All holes shall be covered by metal plugs or by means of metal strips that are pop-riveted to the channel.

Electrical and mechanical continuity shall be maintained throughout the trunking installation. A tinned copper bonding strip shall be installed across each joint and secured to both adjoining lengths by means of brass bolts, nuts and washers. The trunking shall be bonded to the earth bar of the associated switchboard.

All bends shall be of easy sweep design with 45° cornices. Burrs and sharp edges shall be removed and the inside edges of all joints shall be lined with silicon or other suitable rubberised compound to prevent conductor insulation laceration.

Trunking shall be large enough to ensure that the combined total cross-sectional area (including insulation) of all conductors does not exceed 40% of the cross-sectional area of the trunking.

The Sub-Contractor shall supply and install all hangers, supports or fixings required for the trunking. Trunking up to 127 mm x 75 mm shall be supported at maximum intervals of 1 500 mm and where trunking is suspended from roof structures this shall be done using CS3300 and threaded galvanised rods. Trunking runs shall be carefully planned to avoid clashes with other services and to ensure that all covers can be removed after completion of the entire installation.

All conduit connections shall be terminated by means of a female bush. All holes which conductors pass through shall be equipped with grommets.

(f) Conduit Installation

General

Conduit may be installed as follows:

1. In open roof spaces - PVC conduit
2. surface mounted - Bosal conduit
3. in wall chases -PVC conduit

Where conduits are to be installed in concrete, this shall be done while the building work is still in progress. Surface mounted conduit shall only be installed after the Employers Agent has given his written consent to do so.

Other Services

Conduits shall be installed at least 150mm away from pipes which are intended for gas, steam, hot water or any other material which may affect the conduit. Where doubtful situations of this nature occur or where there are installation incompatibilities the matter shall be reported to the Employers Agent without delay.

Debris
Care shall be taken to prevent any debris or moisture from entering the conduit during and after installation of the conduits. All conduit ends shall be sealed.

Defects
Each length of conduit shall be inspected for defects and all burrs shall be removed. All conduits that are split, dented or otherwise damaged or any conduits with sharp internal edges shall be removed from site. The Sub-Contractor shall ensure that conduits are not blocked.

Continuity
Mechanical and electrical continuity shall be maintained throughout the conduit installation for galvanized steel conduits. Conduits may not be relied upon for earth continuity.

Inspection Type Accessories
Inspection type couplings, elbows and tees shall not be used except with the written consent of the Employers Agent. All outlet boxes and draw boxes shall however be of the inspection type.

Positions of Outlets
All accessories such as socket outlets, switches, lights, etc. shall be accurately positioned. It is the responsibility of the Sub-Contractor to ensure that all accessories are installed level and square at the correct height from the floor, ceiling or roof level as specified. It shall be the responsibility of the Sub-Contractor to determine the correct final floor, ceiling and roof levels in conjunction with the Contractor.

Draw boxes shall not be installed in positions where they will be inaccessible after completion of the installation. Draw boxes shall be installed in inconspicuous positions to the approval of the Employers Agent. All installed draw boxes shall be pointed out to the Employers Agent. The positions of all draw boxes shall be indicated on the "as built" drawings.

Draw Wires
Galvanised steel draw wires shall be installed in all unwired conduits e.g. conduits for future extensions, telephone/data installations and other services.

Bends
A maximum of two 90^0 bends or the equivalent displacement will be allowed between outlets and/or draw boxes. Draw boxes shall be installed at maximum intervals of 9 m in straight conduit runs. All bends shall be made without heating the conduit or without reducing the diameter of the conduit.

Withdrawal of Conductors
To ensure that all electrical conductors shall be easily withdrawable from conduits, the Employers Agent reserves the right to have the conductors of any circuit removed at his discretion and replaced at the cost of the Sub-Contractor. If the conductors are damaged during removal, the damaged conductors shall be replaced and the cost of the replacement shall be borne by the Sub-Contractor.

Flush Mounted Outlet Boxes
The edges of flush mounted outlet boxes shall not be deeper than 10 mm from the final surface. Where this is not the case, an extension box which ends flush with the surface, shall be screwed to the outlet box. This method shall be used in partitions and cladded surfaces.

All excess holes in drawboxes, distribution boxes, switchboards, cable ducts or trunking, power skirting, etc. shall be securely blanked off to render the installation vermin proof. Brass stopping plugs shall be used in accessories.

Installation in Concrete
In order not to delay building operations, the Sub-Contractor shall ensure that all conduits and accessories which are to be cast in concrete are placed in position in good time. The Sub-Contractor or his representative shall be in attendance when the concrete is cast.

(1) Draw Boxes
Draw boxes, expansion joints and round ceiling boxes shall be installed where required and shall be neatly finished to match the finished slab and wall surfaces. Ceiling draw boxes shall be of the deep type. In hollow tile slabs, rear-entry draw boxes shall be used. In columns where flush mounted draw boxes are installed, the conduits shall be offset from the surface of the column immediately after leaving the draw box.

(2) Elbows
Elbows for conduits of 32 mm dia. and smaller and sharp bends will not be allowed in concrete slabs.

(3) Cover Plates
Draw boxes and/or inspection boxes shall where possible, be grouped together under a common approved cover plate. The cover plate shall be secured by means of screws.

(4) Neutral Axis
All conduits shall be installed as close as possible to the neutral axis of concrete beams, slabs and columns. The conduits shall be rigidly secured to the reinforcing to prevent movement towards the surface of the concrete.

(5) Fixing to the Shuttering
All conduits, draw boxes, etc. shall be securely fixed to the shuttering to prevent displacement when concrete is cast. Draw boxes and outlet boxes shall preferably be secured by means of a bolt and nut installed from the back of the box through the shuttering. Fixing lugs may also be used to screw the boxes to the shuttering.
Wire will not be accepted for securing boxes to the shuttering where off-shutter finishes are required. All draw boxes and outlet boxes shall be plugged with wet paper before they are secured to the shuttering.

(6) Expansion Joints
As far as possible, conduits shall not be installed across expansion joints. Where this is unavoidable an expansion joint shall be provided.

(7) Screeds
The installation of conduits in floor screeds shall be kept to a minimum. Where conduits are installed in screeds, the top of the conduit shall be at least 20 mm below the surface of the screed. Where the screed is laid directly on the ground, galvanised conduits shall be used. This ruling will always be applicable to the lowest floor of a building. A minimum distance of twice the outside diameter of the conduit shall be left free between adjoining conduits. Conduits shall be secured to the concrete slab at intervals not exceeding 2.0 metres. The Sub- Contractor shall ensure that conduits are not visible above the screed where the conduits leave the screed.

(8) Structural Steel
Supports, brackets, hangers, etc. may only be welded to structural steel members where prior permission of the Employers Agent has been obtained. “CADDY” or equivalent fasteners may be used to fix equipment to structural steel members.

Surface Conduits

Surface conduits shall only be allowed when authorised in writing by the Employers Agent.

Flexible Conduit

(1) In installations where the equipment has to be moved frequently to enable adjustments during normal operation, for the connection of motors or any other vibrating equipment, for the connection to thermostats and sensors on equipment, for stove connections and where otherwise required by the Employers Agent, flexible conduit shall be used for the final connection to the equipment.

(2) The lengths of flexible conduit shall be as short as possible to comply with the requirements of the particular connection but shall not exceed 600 mm, except when specified or approved by the Employers Agent.

(3) Flexible conduit shall preferably be connected to the remainder of the installation by means of a draw box. The flexible conduit may be connected directly to the end of a conduit if an existing draw box is available within 2 000 mm of the junction and if the flexible conduit can easily be rewired.

(4) Flexible conduit shall consist of metal-reinforced plastic conduit or PVC covered metal conduit with an internal diameter of at least 15mm, unless approved to the contrary. Connectors for coupling to the flexible conduit shall be of the gland or screw-in type, manufactured of either brass of cadmium or zinc plated mild steel.

(5) Where the possibility exists that the conduit can come into contact with moisture, suitable covering and/or packing shall be installed to isolate the conduit from the moisture.

(6) Flexible conduit connections shall be provided with an internal or external earth wire connection as required by the local Supply Authority, with preference given to internal earth wires where no specific local regulations apply.

Expansion Joints

(1) Where conduits cross expansion joints in the structure, approved type draw boxes which provide a flexible connection in the conduit installation shall be installed.

(2) The draw box shall be installed adjacent to the expansion joint of the structure and a conduit sleeve, one size larger than that specified for the circuit, shall be provided on the side of the draw box nearest the joint. The one end of the sleeve shall terminate at the edge of the joint and the other shall be secured to the draw box by means of locknuts.

(3) The circuit conduit passing through the sleeve shall be terminated 40 mm inside the draw box and the conduit end fitted with a brass bush. The gap between the sleeve and the conduit at the joint shall be sealed to prevent the ingress of wet cement. An earth clip shall be fitted to the conduit projection inside the draw box and the conduit bonded to the box by means of 2.5 mm^2 bare copper earth wire and a brass bolt and nut.

(4) The other end of the circuit conduit shall be secured to the draw box by means of locknuts and a brass bush.

(5) In addition to an earth wire which may be specified for the circuit, a 2.5 mm^2 bare copper wire shall be provided between the first conduit box on either side of the joint. The conduit boxes shall be drilled and tapped and the earth wire shall be bonded to the boxes by means of lugs and brass screws.

(6) Draw boxes at the expansion joint shall be provided with a suitable steel cover plate fixed to the box by means of screws. The cover plates shall be installed before the ceilings are painted by others.

(7) Where a number of conduits are installed in parallel they shall cross the expansion joint of the structure via a single draw box. A number of draw boxes adjacent to each other will not be allowed.

Chases and Builder's Work

(1) The Sub-Contractor shall be responsible for the builder's work connected with conduits, outlet boxes, switchboard trays, bonding trays and other wall outlet boxes as well as the necessary chasing and butting of walls and the provision of openings in ceilings and floors for light fittings and other electrical outlets. The Sub-Contractor shall notify the Main Contractor of his requirements and the responsibility lies with the Sub-Contractor to ensure that these requirements are met.

(2) Electrical materials to be built in must be supplied, placed and fixed in position by the Sub-Contractor when required by the Main Contractor. The Sub-Contractor shall also ensure that these materials are installed in the correct positions.

(3) When the Main Contractor is not on site the Sub-Contractor is required to cover conduits installed in chases by a layer of 4:1 mixture of coarse sand and cement, finished 6 mm below the face of the plaster and roughened. In all cases the conduits shall be deep enough to ensure that the top of the conduits are at least 12 mm below the finished plaster surface.

(4) The Electrical Sub-Contractor will be held responsible for all damage as a result of chasing work and will be required to make good to the satisfaction of the Employers Agent. Chases shall be made by means of a cutting machine.

(5) Under no circumstances shall face brick walls or finished surfaces be chased or cut without the written permission of the Employers Agent. Where it is necessary to cut or drill holes in the concrete structure, the prior permission of the Structural Engineer shall be obtained to ensure that he structure is not weakened.

(g) Excavation & Trenching

General

The contractor shall be responsible for all excavations for trenches, poles, stays and strut poles. The contractor shall be responsible to set out the route for the cable trenches and the positions of poles, stays and strut poles. The contractor shall be responsible to ensure that all the excavations meet with the required specifications.

The contractor will also be responsible for the backfilling of the cable trenches, and for the backfilling of holes for poles, stays and strut poles, if applicable.

The contractor shall, before trenching commences, familiarize himself with the routes and site conditions, and the procedure and order of doing the work shall be planned in conjunction with the general construction programme for other services and building requirements.

Existing Services

The contractor shall acquaint himself with the positions of all the existing services such as stormwater pipes, water mains, gas pipes, telephone cables, etc. before any excavations are commenced. For this purpose he shall approach the Employers Agent, the Local Authority, the Local Supply Authority, and any other authority that may be involved, in writing.

In the event of damage to other services or structures during trenching operations the contractor shall immediately notify the Employers Agent and institute repairs. The Contractor will be held responsible for damage to any existing services brought to his attention by the relevant authorities and shall be responsible for the cost of repairs.

Precautions, Warnings and Inconveniences

The contractor shall take all the necessary precautions and provide the necessary warning signs, tapes and/or lights to ensure that the public and/or employees on Site are not endangered. The requirements of the Occupational Health and Safety Act, Act 85 of 1993 (as amended) shall be strictly adhered to.

The contractor shall ensure that the excavations will not endanger existing structures, roads, railways, other Site construction activities, or other property.

Trenches across roads, access ways or footpaths shall not be left open. If trenches cannot be completed and backfilled immediately, the Contractor shall install temporary “bridges” of cover plates of sufficient strength, to provide temporary access as required.

Mechanical Excavators

Power driven mechanical excavators may be used for trenching operations, provided that they are not used in close proximity to other plant, services or other installations likely to be damaged by the use of such machinery.

The use of power driven mechanical excavators shall be subject to the approval of the Employers Agent. Should the excavator produce trenches that exceed the required dimensions, payment based on volumetric excavation rates will be calculated on the required dimension only.

Blasting

No guarantee is given or implied that blasting will not be required.

Should blasting be necessary and approved by the Employers Agent, the Contractor shall obtain all the necessary authority from the relevant Government Departments and Local Authorities. The Contractor shall take full responsibility and observe all conditions and regulations set forth by the above authorities.

Routes

Trenches shall connect the points shown on the drawings in a straight line. Any deviations due to obstructions or existing services shall be approved by the Employers Agent beforehand.

The Employers Agent reserves the right to alter any cable route or portion thereof in advance of cable laying. Payment in respect of any additional or wasted work involved shall be at the documented rates.

The removal of obstructions along the cable routes shall be subject to the approval of the Employers Agent.

Shoring and Waterlogging

The Contractor shall provide shoring for use in locations where there is a danger of the sides of the trench collapsing due to waterlogging or other ground conditions. Refer to the Occupational Health and Safety Act, Act 85 of 1993 (as amended).

The strength of shoring must be adequate for Site conditions prevailing and the shoring must be braced across the trench.

The Contractor shall provide all pumps and equipment required to remove accumulated water from the trenches. Water or any other liquid removed shall be disposed of without any nuisance or hazard.

Trenching
Trenching shall be programmed in advance and the approved programme shall not be departed from, except with the consent of the Employers Agent.

Trenches shall be as straight as possible and shall be excavated to the dimensions indicated in this specification (and on the drawings). The bottom of the trench shall be of smoot contour, and shall have no sharp dips or rises which may cause tensile stress forces in the cable during backfilling.

The excavated material shall be placed adjacent to each trench in such a manner as to prevent nuisance, interference or damage to adjacent drains, gateways, trenches water furrows, other works, properties or traffic. Where this is not possible, the excavated materials shall be removed from site and returned for backfilling on completion of the cable laying. Surplus material shall be removed from site and disposed of at the cost of the Contractor.

Prior to cable laying the trench shall be inspected thoroughly and all objects likely to cause damage to the cables either during or after laying shall be removed. Where ground conditions are likely to reduce maximum current carrying capacities of cables or where cables are likely to be subjected to chemical or electrolytic action, the Employers Agent shall be notified before installing the cables. The Employers Agent will advise on the course of action to be taken.

Surveyor's Pegs (If Applicable)
Extreme care shall be taken not to disturb the surveyor's pegs. These pegs shall not be covered with excavated material. If the surveyor's pegs are disturbed, they shall be replaced by a qualified surveyor only and the Contractor will be liable for the cost involved, which cost the Contractor shall not recover from the Employer.

Dimensions of Trenches
Cable trenches for one or two cables shall not be less than 300 mm wide, and need not be more than 450mm wide. This dimension shall be valid for the total trench depth. The width shall be increased where more cables need to be installed, to allow for adequate spacings between adjacent cables in the same trench.

Where cable joints are required to be made in the course of a cable run, a joint hole shall be excavated of sufficient size to enable the cable jointer to work efficiently and unimpeded. The trench width shall therefore be increased to provide the required joint hole.

Where trenches change direction or where cable slack is to be accommodated, the Contractor shall ensure that the requirements of the relevant SANS specification regarding cable bending radii are met when determining trench widths.

Unless specified otherwise, cable trenches shall be excavated to the following depths:

MV cables (1kV to 11kV)	:	1 150 mm (minimum 1 000 mm cover)
LV cables (<1000Volts)	:	950 mm (minimum 800 cover)
Cable sleeves	:	1 150 mm (minimum 1000mm cover)

Classification of Excavated Materials and Measurement
Payment for excavations will be made on volumetric excavation rates calculated on the basis of the given maximum dimensions or the actual dimensions of the trenches, whichever is the lesser. All measurements for payments shall be made jointly by the representatives of the Employers Agent and the Contractor shall obtain the signature of the Employers Agent's representative including approval of such measurements.

No allowance shall be made for the breaking away or caving in of trench sides, other earth movements or for trenches excavated in excess of the stipulated dimensions.
Volumetric excavation rates will be based on different types of excavated materials. Excavated materials will be classified as follows:

Soft rock and earth shall mean rock and earth that can be loosened and removed by hand-pick and shovel and also by mechanical excavator.

Hard rock shall mean granite, quartzite sandstone, slate and rock of similar or greater hardness, solid shale and boulders in general requiring the use of pneumatic jack hammers to break the material in order

to excavate thereafter by hand or mechanical means.

Very hard rock shall mean rock that can only be broken by means of explosives and thereafter removed by hand or mechanical means.

Wherever soft rock and earth is encountered, the Contractor can proceed to excavate the trenches at his convenience and in accordance with the program. Where hard rock and very hard rock are encountered, the prior approval of the Employers Agent shall be obtained before proceeding with the excavation. This requirement is stipulated in order to afford the Employers Agent the opportunity to determine whether an alternative cable route is justified.

The onus is on the Contractor to have the excavated hard rock and very hard rock classified and the extent thereof measured by the Employers Agent's representative in order to determine applicable rates for payment. Such classification and measurement shall take place prior to the backfilling of the trenches and shall be certified in writing by the Employers Agent's representative.

(h) Bedding Soil

The bottom of the trench shall be filled across the full width with a 150 mm (minimum) layer of suitable soil sifted through a 6 mm mesh and levelled off.

Only sandy clay or loam soil with a satisfactory thermal resistivity (not exceeding 1.5ºC m/W) may be used for this purpose. Sea or river sand, ash, chalk, pet, clinker or clayey soil shall not be used. The use of crusher sand is acceptable.

Where no suitable soil is available on Site, the Contractor shall import fill from elsewhere and make all the necessary arrangements to do so.

After cable laying is completed, a further layer of bedding shall be provided to extend to 150 mm (minimum) above the cables.

(i) Cable Sleeves

Where cables cross under roads, other services areas, etc., cables shall be installed in PVC, or earthenware pipes as cable sleeves. Pitch fibre pipes are not acceptable because of adhesion that occurs after a period of time between the pipe and the sheathing or outer serving of the cables.

Cable sleeves for road crossings will be supplied and installed by the principal contractor. The Contractor shall supply and install all other cable sleeves required for the Contract Works.

Sleeves shall be joined in accordance with the manufacturer's specification to ensure a smooth inner surface along the full length of the sleeves. Sleeves shall cross roadways and railway tracks at right angles. All sleeves shall be graded 1:400 for water drainage.

Sleeves shall have a minimum diameter of 110 mm for LV cables and 160 mm for MV cables. They shall extend at least 1m beyond the outer road/kerb edge on both sides of the road.

Cable sleeves shall be installed to the spacings and depths required for the cables as specified for trenching above, or as follows:

Under roads:

All cable sleeves : 1 200 mm (Minimum 1 000 mm covering)

Other locations:

MV cable sleeves : 1 000 mm (Minimum 800 mm covering)
LV cable sleeves : 800 mm (Minimum 600 mm covering)

Prior to the installation of cable sleeves and pipes, the ends thereof shall be sealed to prevent the insides from being soiled during the installation process. PVC or other suitable wrapping shall be wrapped around the ends and secured by means of galvanized steel binding wire.

The wrapping shall only be removed when the cables are being installed. During the installation of cables, care shall be taken to prevent soil from being dragged into the sleeves and pipes by the cables. Upon completion of the installation of the cables, the ends of all sleeves and pipes shall be sealed with a non-hardening watertight compound. Sleeves and pipes intended for future use, shall retain the wrapping around the ends, or alternatively, be sealed with the same non-hardening watertight compound.

All sleeves intended for future use, shall be provided with 2 mm diameter non-corrosive draw-wires which shall extend at least 1m on both ends of the sleeves. The excess lengths in the draw-wires shall be coiled and buried at the sleeve ends.

(j) Backfilling

The Contractor shall not commence with the backfilling of trenches without prior notification to the Employers Agent, so that the cable installation may be inspected. Should the Contractor fail to give a timeous notification, the trenches shall have to be re-opened at the Contractor's cost. An inspection of a completed cable installation will not be unreasonably delayed by the Employers Agent.

For MV cables, a protective row of clay stock bricks shall be laid directly above the cable, after an initial 100 mm layer of backfill.
The Contractor shall supply and install the required danger tape for all cable trenches. For MV cables (1kV to 11kV), a coloured plastic marking tape shall be installed 450mm above the cable. The tape shall be 300 mm wide and shall be yellow, with a red skull and crossbones with the words "ELECTRIC CABLE / ELEKTRIESE KABEL". These markings shall not be more than 1m apart, from centre to centre.

Backfilling shall be undertaken with soil suitable to ensure settling without voids. The maximum allowable diameter of stones present in the backfill material, is 75 mm. The backfill shall be compacted by hand in layers of 150 mm and sufficient allowance shall be made for final settlement.

In addition, 300 mm wide danger tape shall be installed above the LV connection cable between the streetlight kiosk and the connection point.

(k) Cable Trenches and Laying of Cables

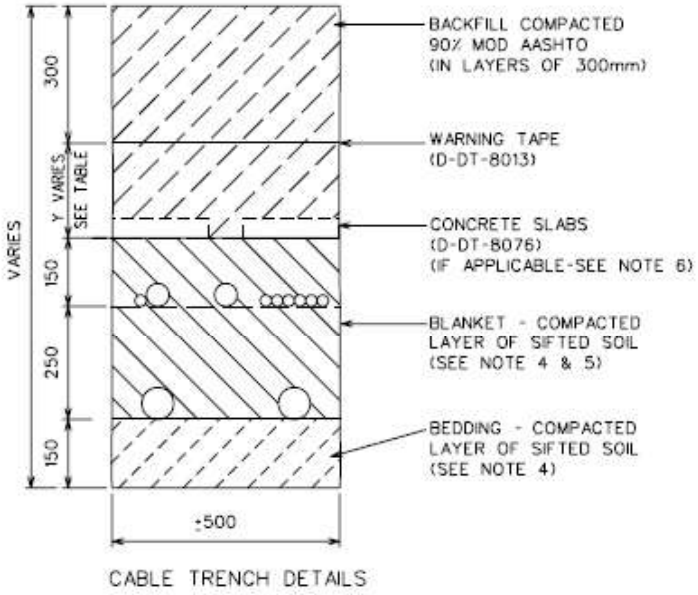
All cables are to be laid in accordance with SANS 0198 (contractors must be in possession of all parts)

Install additional ducts and 110 mm diameter for LV, within development.

Additional information of importance:

- Where more than one cable s installed in the same trench, a minimum of 300 mm spacing between cables should be maintained.
- When trenching in rocky ground, a minimum of 150 mm must be maintained between the cable and the trench wall.
- Cables must not be over bent.
- Outer sheaths of cables must not be damaged or scratched.
- Cable kinks and twists must be prevented.
- Cables crossing roads or railways must be installed in pipe ducts.
- Prior to cable pulling, pipe ducts must be fitted with bell-mouths at both ends to prevent damage to the cable and a suitable lubricant shall be applied to the inside of the pipe.
- Prior to cable pulling, the cable must be inspected for damage and both ends checked to verify that the cable ends were suitably capped. Damaged or uncapped cables must not be installed.
- Prior to cable pulling, the cable inner end must be cut free from the cable drum flange.
- The cable outer end must be fitted with a cable pulling sock.
- A swivel (with bearing) must be used between the pulling rope and the cable pulling sock.
- When nose pulling the cable, the pulling tension must not exceed the manufacturers recommendations.
- Cables should be pulled by either hand or winch.
- When using a winch, it must be fitted with a reliable and accurate dynamometer whether the cable is nose pulled or bond pulled and it must be monitored throughout the pull.
- Cable rollers must be carefully positioned in the trench in the line that the cable is to follow. A spacing of not more than 2 m apart should be used, depending on the sag. Where appropriate, corner rollers or skid plates must be used.
- Laid cable that is mot jointed or terminated immediately must be sealed with cable end caps.
- End caps must be inspected for damage prior to and after cable laying. Damaged end caps must be removed and replaced.
- Cable outer sheaths damaged during installation must be repaired immediately using a cable repair sleeve.
- Cables must be transported according to SANS 10198-6.

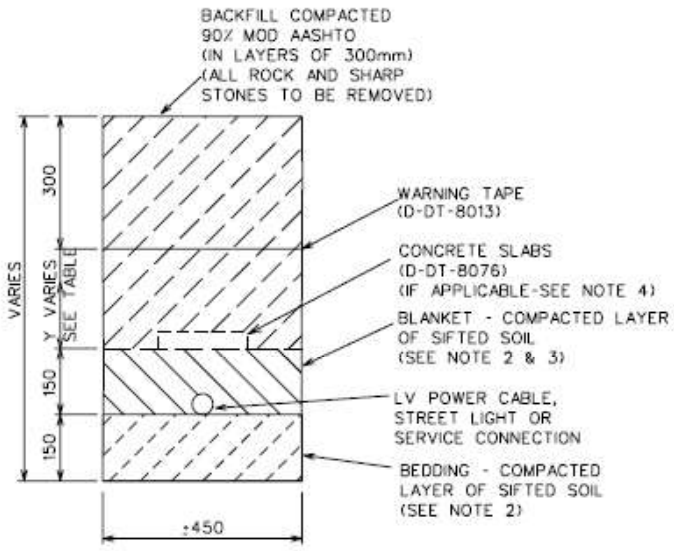
The typical trench for MV & LV power cable configuration will be:



CABLE TRENCH DETAILS

1. When trenching in soil free of stones, rocks etc., cable may be laid directly without bedding. Backfill to be increased accordingly.
2. A minimum spacing of 300 mm between MV cables to be maintained where possible.
3. When trenching in rocky ground, a minimum of 150 mm to be kept between cable and trench wall.
4. A sieve of 12 mm mesh size may be used to sift soil.
5. Blanket soil to be compacted with hand compacting tools only.
6. Where the cable trench runs parallel to and under the road surface, it shall be positioned at least 200 mm from the edge of the kerbing/road tarred surface – only in this case shall concrete slabs be installed above the cable (tar cutting machine to be used) - backfill to relevant road agency specification.

The typical trench for LV power cable, streetlight or service connection configuration will be:



1. When trenching in soil free of stones, rocks etc., cable may be laid directly into 600 mm deep trench.
2. A sieve of 12 mm mesh size may be used to sift soil.
3. Blanket soil to be compacted with hand compacting tools only.
4. Where the cable trench runs parallel to and under the road surface, it shall be positioned at least

200 mm from the edge of the kerbing/road tarred surface – only in this case shall concrete slabs be installed above the cable (tar cutting machine to be used) - backfill to relevant road agency specification.

C3004 FIRE SERVICES

(a) Scope of Work

The Contractor shall provide the necessary services, material and labour for the workshop design (as may be applicable), supply, delivery, installation, commissioning, testing, hand over instructions and maintenance of the installations as detailed as detailed in this specification and on the supporting drawings.

Tenderers are required to acquaint themselves with all conditions relating to the contract. The successful tenderer shall be deemed to have satisfied himself as to the nature and extent of the works and no claim for extra expense or for extension of time under this contract will be allowed on the grounds of insufficient information given in this tender.

The scope of works covered by this specification includes, but is not limited to, the following:

- New fire hose reel installations in accordance with the requirements of the SANS 10400 as well as the Local Municipal By-Laws, as well as relocation of existing fire hose reels.
- New handheld fire extinguishers and relocation of existing extinguishers.
- New connections to the mains as required for fire water reticulation systems.
- New photo-luminescent and internally illuminated markings and signposting.
- Fire sealing and –proofing on all levels for services shafts, penetrations, etc.
- All scaffolding, rigging and builders work to carry out the installations
- The Sub-Contractor shall be responsible for the final testing and commissioning of the entire installation to the approval of the Employers Agent, Employer, the Local Municipal- and Fire Authorities.

In this project only works related to the substructure (preparation for top-structure) of the stations is included.

(b) Drawings

Working Drawings – Fixed Fire Protection Installations

Tenderers are to note that drawings supplied with this specification are conceptual and have been prepared to enable all tenders to be submitted on equal basis.

The successful Contractor shall provide a full set of working drawings ("workshop drawings") detailing all proposed pipework, fittings and sprinkler head positions for the scrutiny of the Employers Agent prior to any manufacture or installation. The scrutiny of these drawings by the Employers Agent does not reduce the responsibility of the Contractor for complying with statutory regulations as well as good design and installation practices. These drawings shall include all builders work, working weights, movement requirements, hanger details, electrical load requirements and -details. The approximate return date for submission of drawings to the Employers Agent for approval shall be less than 14 days from the date of contract appointment.

All documentation provided by the Contractor shall be in the English Language.

(c) Operation Instructions and Maintenance Manuals

On completion of the works, the Contractor shall provide three (3) sets of operating and maintenance manuals which shall be handed over to the Employers Agent for approval.

The manuals shall contain as a minimum the following:

- General system description
- Operating instructions
- Trouble-shooting analyses procedures, incl. emergency contact numbers and persons
- Preventative maintenance schedules
- Detailed equipment descriptions
- Recommended spare parts lists

- As-built drawings in paper format as well as on compact disk in PDF and AutoCAD 2008 format
- Certified copy of ASIB certificate (in event of sprinkler installations)
- Certified copy of electrical COC's (as applicable)

(d) Water Supply

Water for the fixed fire protection services installations shall be provided from the respective existing supplies at the site.

All works relating to connecting from any site mains supplies to new communication pipes and/or to new sprinkler control valve cabinets shall form part of this installation.

Note that a proving pressure at flow test forms part of this contract.

(e) Fixings

Method of fixing shall be submitted to the Structural Engineer for approval.

Where floor slabs have been cast with stressed cables, no drilling for fixing brackets shall be permitted within 200 mm of the cable and without approval from the Structural Engineer. Should this restriction be contravened, the Sub-Contractor shall be held liable for all costs associated with investigatory and remedial work that may be required.

Special fixing brackets shall be allowed for: i.e. saddle brackets, Unistrut (etc.), as may be required.

(f) Regulations and By-Laws

- The local Municipal By-Laws and Regulations as well as the regulations of the Local Supply Authority.
- The local Fire Regulations.
- The Automatic Sprinkler Inspection Bureau (ASIB)
- The latest revision of the South African National Building Regulations, SANS 10400: South African Standard Code of Practice for The Application of the National Building Regulations.

(g) Workmanship and Quality of Materials

The Sub-Contractor shall employ only competent artisans to perform construction and installation work on site. Supervision of the works and workmen is the responsibility of the Sub-Contractor.

The contract shall be executed with the best workmanship in a workmanlike manner to the satisfaction of the Employer and Employers Agent. Should any workmanship not be to the satisfaction of the Employer and Employers Agent, it shall be rectified at the cost of the Sub-Contractor.

The Sub-Contractor shall remain responsible for the correct and complete delivery of the installation.

Inspection by the Employer or Employers Agent shall not release Sub-Contractor from his responsibility.

Only material of high quality and suitable for the climatic conditions of the site shall be used and shall be subject to approval of the Employers Agent. All material shall conform in respect of quality, manufacture, tests and performance, with the requirements of the applicable South African National Regulations, SANS 10142 or appropriate current Specifications of the British Standards Institution. Local materials shall as far as possible be used and bear the SANS/SANS mark. Other imported materials shall comply with the requirements of the appropriate B.S. or I.E.C. specification. All materials shall be suitable for the conditions under which the materials are installed and used.

Should the materials or components not be suitable for temporary use under site conditions, then the Sub- Contractor shall provide suitable protection at his own cost until these unfavourable site conditions cease to exist.

(h) Pipes

All pipework above ground shall be Black SANS. 62/BS 1387 Medium Quality.

All pipework laid below ground shall be Black SANS 62/BS 1387 Heavy Quality, HDPE or uPVC, the latter two in accordance with ASIB stipulations.

High pressure piping shall be provided where pressure exceeds medium quality pipe pressure requirements.

Pipework passing through wet trade walls/floors etc., shall be wrapped with denso tape to 50 mm on either side of wall/floor.

(i) Pipe Fittings

Screwed pipe fittings up to 150 mm are to be cast iron or malleable cast iron and will be threaded in accordance with SANS. 1109/BS 21 so as to make a metal joint where jointing material is used.

Welded sections of pipe will have flange/coupling joints at suitable intervals to facilitate removal.

Navy unions will only be allowed in special circumstances only and with written approval of the Employers Agent.

All piping shall be non-galvanized mild steel (black iron pipe) manufactured in accordance with SANS 62 (medium grade). All piping shall be painted as described later in this specification.

All piping shall be free of rust flakes or other faults.

All pipe joints and fittings shall either be threaded or flanged depending on the pipe diameter and installation. All pipe joints and fittings shall comply with the ASIB latest edition rules. All threaded pipe joints shall be made with an approved cold-water pipe jointing compound and flanges when used shall be bolted together with approved gaskets. Pipe threads shall be standard right-hand Whitworth. Mechanical pipe-joints i.e. "Klambon" or other pipe-joints may be used provided they have been approved by the Automatic Sprinkler Inspection Bureau (ASIB) or Local Fire Authorities and shall be installed strictly in accordance with the instructions of the manufacturer.

All elbows, tees, flanges and special fittings shall be of wrought steel, malleable or cast steel tapped with a taper thread to match the pipe threads, so that a watertight joint can be made with an approved joint compound.

Welded pipework shall only be permitted if fabricated and installed in strict accordance with the ASIB latest edition rules or local Fire Authorities.

All mains, distribution pipes and sprinkler range pipes shall be securely fixed with approved galvanized pipe supports. No drilling is allowed in structural steel members and all such fittings shall be clamped. The Sub- Contractor shall design and include for the necessary flexible bellows to allow for expansion and contraction of piping. No stresses due to expansion/contraction or operation shall be transmitted to the building or roof structure.

Where sprinkler piping passes through brick walls, fire or fire/smoke barriers etc., the necessary sleeving shall be built-in by the Sub-Contractor. These sleeves shall be supplied and positioned by the Sub-Contractor as part of this installation. Sleeves shall be of a material compatible to the pipe it protects and of a minimum bore to allow such movement and of a length to finish flush with the finished wall. The making good and fire proofing of all openings shall be done as part of this contract after installation and pressure tests are complete.

In order to avoid air locks and facilitate draining an inclination in the pipework shall be maintained towards the controlling valves. Where this is not possible, suitable auxiliary drain valves shall be provided. Drain valves are not shown on the drawings and their position must be confirmed with the Employers Agent on site.

Provision shall be made for all drainage of water from the installation to be led off to a suitable disposal point.

The completed installation shall be hydraulically pressure tested by the Sub-Contractor to 1,5 times the operating pressure and proved to be watertight. The Employers Agent may witness this test, but confirmation of same shall be delivered in writing to the Employers Agent.

All piping, fittings and valves used in the installation shall be of an approved type capable of withstanding a test pressure of 1 500 kPa.

(j) Painting and Protective Coat Fittings

Painting of all portions of the fixed fire protection installations, including all hangers, valves and hydraulic alarm motor and gong, shall be carried out by the Sub-Contractor as part of this installation.

Before painting is undertaken, the work is to be thoroughly cleaned of all rust, scale, etc. by brushing with a stiff wire brush wherever necessary. The pipework is to be given an undercoat of first quality chromate primer followed, when thoroughly dry, by two (2) coats of approved high-quality high gloss paint colour coded Signal Red to suit the specified hazard protection.

External pipework may require an additional corrosion resistant primer and is to be assessed on site subject to local site- and expected environmental conditions. The Sub-Contractor shall bring any such instances to the attention of the Employers Agent.

C3005 MECHANICAL SERVICES

(a) General

This specification is for the detail design, engineering, supply, installation, guarantee and maintenance of the air-conditioning and ventilation systems for the IRT MyCiti stations.

Only the substructure of the stations is to be completed under this contract,

(b) Compliance with Regulations

The installation shall be erected and carried out in compliance with:

- The SANS Code of Practice for the Wiring of Premises No. 10142, as amended.
- The local Municipal by-laws and regulations as well as the regulations of the local Supply Authority.
- The local Fire Regulations.
- The Standard Regulations of any Government Department or public service company where applicable.
- The latest revision of the Building Regulations and SANS 10400: South African Standard Code of Practice for The Application of the National Building Regulations.
- Other relevant SANS regulations pertaining to air-conditioning & ventilation and electrical installations, including the Machineries Act.

The air-conditioning systems subcontractor shall at his cost issue all drawings and notices in respect of the installation to the local authorities and shall indemnify and exempt the Employer from all losses, costs or expenditure which may arise as a result of the subcontractor's negligence to comply with the requirements of the regulations stipulated above. No work shall be commenced by the subcontractor prior to the approvals by the local authority of the relevant drawings or applications to perform work.

It shall be assumed that the subcontractor is conversant with the abovementioned requirements. Should any requirement, by-law or regulation, which contradicts the requirements of this document, apply or become applicable during erection of the installation, such requirement, by-law or regulation shall overrule this document and the subcontractor shall immediately inform the Employer of such a contradiction. Under no circumstances shall the subcontractor carry out variations to the installation in terms of such contradictions without obtaining the written permission to do so from the Employers Agent or Employer.

Also, refer to the Standard Specification, available from the Consulting Engineer on request.

(c) Quality of Material

Only material of high quality and suitable for the climatic conditions of the site shall be used and shall be subject to approval of the Employer. All material shall conform in respect of quality, manufacture, tests and performance, with the requirements of the SANS or where no such standards exist, conform to the appropriate current Specifications of the British Standards Institution. Materials manufactured in South Africa shall as far as possible be used and where applicable shall bear the SANS mark. Imported materials shall comply with the requirements of the appropriate B.S. or E.U. specification. All materials shall be suitable for the conditions under which the materials are installed and used.

Should the materials or components not be suitable for temporary use under site conditions, then the A/C Contractor shall at his own cost provide suitable protection until these unfavourable site conditions cease to exist.

(d) Service Conditions

All equipment and capacities specified herein shall be rated at the following conditions:

Altitude	:	1400m above sea level	
Temperature	:	Summer / Cooling	Winter / Heating
Ambient Air	:	32°C (DB), 22°C (WB)	4°C (DB)
Ventilation rates	:	Per SANS 10400	
Noise Levels	:	Office space Outdoor units	NC 35-40 NC 45-50

(e) Installation of Equipment

Also refer to the Standard specifications

The installation shall in the first instance be carried out in terms of the requirements of the original equipment suppliers. All installation, testing, witnessing, maintenance, recording, logging, verification activities, etc. and other activities required for and by the original equipment suppliers to provide and honour the equipment guarantees shall be carried out to the letter. This shall include recordkeeping and sign-off activities as required.

Refrigerant and Condensate Piping

General good practice requirements such as the following may also apply (OEM requirements take preference):

- Refrigeration pipe routes shall be coordinated to minimize the length of the routes. Route lengths must remain within the recommended equivalent lengths as specified by the manufacturer of the air-conditioning equipment. A record must be kept of exact pipe lengths installed in order to facilitate the calculation of additional charge.

- Pipe work shall be run plumb and parallel to the structure. The piping shall in all cases in the roof space be run within a rectangular sheet metal tray equal to the heavy-duty cable tray and supports by Cape Support Systems. The tray will be supported at not more than 1m intervals. The refrigerant piping shall run in galvanised trunking on the outside of the building and shall be painted to the colour of the walls.

- Both suction and liquid lines are to be insulated with closed-cell insulation, Armaflex AF of 19 mm thickness or equal.

- Refrigeration piping shall be oxidized phosphorous seamless copper tube. All piping shall be new, and the ends plugged. Whenever pipe work is opened for jointing nitrogen gas shall be passed through the piping to prevent oxidation. No aluminium piping shall be accepted for this project.

- Joints in pipe work are to be hard soldered capillary joints utilizing either phosphor-copper or silver solder with suitable flux. Pipe work must be annealed prior to flaring. Once all jointing work is complete, the pipe work must be flushed with nitrogen to remove oxidation, dirt and moisture and to check connections.

- Pipe work shall be pressure tested with nitrogen in the following stages:

  i. 300 kPa for 3 minutes
  ii. 1500 kPa for 3 minutes
  iii. 2800 kPa for 24 hours

Pipe work will only be accepted if stage (iii) is accomplished.

- After pressure testing the pipe work shall be vacuum dried in accordance with the manufacturer's specifications.

- After vacuum drying the system must be charged with additional refrigerant as calculated in accordance with the length and gauge of piping installed. Charging must be done to the liquid line with equipment that will meter the charged refrigerant mass exactly. The volume of basic and additional charge must be recorded on the outdoor unit name plate.

- Drain pipe work shall be copper with a nominal bore of not less than 32 mm or as indicated on the drawings. The piping shall be supported at 600mm intervals and be run at a continuous fall of at least 1:50 to the nearest drain point. The pipes shall be wrapped in drip tape to prevent

condensation to form on the outside of the pipe. uPVC plastic piping may be used in lieu of copper, however sufficient support in the form of holder bats and supporting trays shall be provided to ensure even falls on the piping. The use of uPVC vs. copper shall be qualified and the cost difference quantified in writing as part of the tender submission.

(f) Detail Engineering and Workshop Drawings

Ductwork fabrication and installation drawings
The subcontractor shall, prior to the commencement of any ductwork manufacture, submit to the Employers Agent for technical appraisal and approval the fabrication 'Shop Drawings' and 'Installation Drawings' of the ductwork demonstrating the proposed final details of the manufacturing and erection methods of the ductwork.

Generally, the drawings shall be drawn to a scale of not less than 1:50 but subject to the Employers Agents approval a scale of 1:100 may be adopted where the installation is a simple one.

Ductwork drawings shall indicate: the length of each ductwork section; the internal dimensions of the galvanised sheet steel or other materials to be used as specified; dimensions of bends and fittings; thickness of metal; sizes and positions of all stiffeners; angles flanges, etc. including the methods of fixing and bolting; location of all supports; outline of all insulation; position and sizes of all access doors; test points; location & fixings for all thermometers and other devices including withdrawal clearances; working pressures where applicable (e.g. for medium and high pressure systems), etc.

The details shown shall cover the provision of internal air flow equalizing ductwork bends, splitters and any other air flow control devices such as dampers, control mechanisms, acoustic treatment measures, flexible joints, air diffusion devices proposed complete with inlet or extracted airflow volumes and velocities.

Pipe work installation drawings
Prior to the commencement of any manufacture, fabrication, or installation, the subcontractor shall submit to the Employers Agent for technical appraisal installation drawings for the pipe work installation. Generally, the drawings shall be drawn to a scale of not less than 1:50. Subject to the Employers Agents approval a scale of 1:100 may be adopted where the installation is a simple one.

The drawings shall indicate the location, with dimensions given, of all pipework in relation to the building structure and other pipework and equipment. The position of all ancillaries such as valves, strainers, oil traps, filters and filter driers, etc. shall be shown together with clearances necessary for removal of strainer baskets, internal parts of all valves, motors for motorized valves, solenoids, etc. Positions and details of all hangers and supports shall be shown and the positions dimensioned.

Positions of control equipment, test pockets and similar devices shall be shown and dimensioned including clearances required for their removal. Details and outline of insulation and insulation boxes shall be shown including clearances required for removal of the boxes.

As Built Drawings

The Contractor shall submit to the Employers Agent a complete set of accurately marked-up, CAD drawings of all services installed at completion.

The drawings shall be on CAD, a hard copy of each drawing shall be submitted as well as a compact disk containing relevant drawing titles.

(g) Operating and Maintenance Manuals

The Contractor shall submit to the Employers Agent 3 sets of complete operating and maintenance manuals at completion of the project.

This set shall include the following:

1. CAD copy of all drawings marked up "as built".
2. Completed set of workshop drawings.
3. Completed set of test and commissioning sheets.
4. Set of schematic wiring and function diagrams.
5. File of distribution board legends.
6. Operating and maintenance instructions on all electrical equipment.
7. The above set shall also be presented on a CD in PDF and scanned format as appropriate.

SECTION C4000 : TRAFFIC SIGNALS

CONTENTS

C4001 SCOPE
C4002 GENERAL NOTES
C4003 EXCAVATION AND TRENCHING
C4004 TRAFFIC SIGNAL EQUIPMENT AND INSTALLATION
C4005 TESTING AND COMMISSIONING OF THE INSTALLATION
C4006 MEASUREMENT AND PAYMENT

C4001 SCOPE

This section covers the installation/amendments of traffic signal infrastructure.
The Contractor shall note that only City of Cape Town approved traffic signal contractors are to be used.

C4002 GENERAL NOTES

Work shall be in accordance with the following standards where applicable:

- Traffic control devices shall comply in all respects with the requirements of the National Road Traffic Act 1996 (Act No. 93 of 1996) and the National Road Traffic Regulations 2000, promulgated in terms of the Act.
- For all forms of traffic control devices reference should be made to the latest editions of the South African Development Community Road Traffic Signs Manual (SADC–RTSM)
    - Volume 1: Uniform Traffic Control Devices (SADC-RTSM) detailing signing policies and design principles together with specific information on the meaning and application of all traffic control devices
    - Volume 2: Traffic Control Device Applications (SARTSM. This volume covers the use of signs, markings and signals for specific applications
    - Volume 3: Traffic Signal Design (SARTSM) detailing in-depth, requirements for the selection and installation of traffic signals and their methods of control
    - Volume 4: Traffic Signs Design (SADC-RTSM). Dimensional details for all road traffic signs and sign face components.
- SANS 0198 – The selection, handling and installation of electric cables
- All construction must comply with SANS 10142 standards
- A certificate of compliance must be issued after any electrical work
- COLTO or SANS 1200 as may be applicable.

The specifications contained in subclauses B2803 are provided as additional guidance to the above specification requirements. Where any ambiguity exists between the requirements of B2703 clarification shall be sort from the Employers Agent who shall then also consult with the City of Cape Town's Traffic Signal Co-ordinator.

C4003 EXCAVATION AND TRENCHING

a) Excavation material classification

Excavation shall be classified into the following categories:

(i) Normal Material: Material that can be loosened and removed using pick and shovel (such as grass covered sand, soft clay, dry earth, small stones in sand which can be removed by hand, or thin layers of "koffiklip")

(ii) Difficult Material: Material that is difficult to loosen and remove using pick and shovel such as large layers of "koffiklip", hard dry clay, ground containing boulders and layers of tar or where progress is slow and other services are affected. Mechanical plant is required to assist in loosening the material.

b) Trenching

Trenching must be professionally and neatly carried out and shall be 700 mm deep (minimum) and 500 mm wide (minimum) or as indicated by the City of Cape Town's Traffic Signal Co-ordinator.

Where existing services are present all excavation and backfilling must be undertaken by careful hand excavation using picks and shovels.

The trench shall be positioned between the even boundaries of kerb lines, where applicable.

No excavations shall be positioned to install proposed services on top of existing services. Where proposed services cross existing services, a minimum clearance of 300 mm shall be ensured.

Crossing of roads / driveways will be the responsibility of the main contractor. The traffic signal contractor will only be responsible for laying the relevant cabling in the trench / duct provided by the main contractor.

The bottom of the cable trench shall be even and free of stones and sharp objects. Should the base of the trench consist of rocks or sharp objects, a bedding layer of approximately 100 mm of soft stone-free sand shall be installed prior to cable installation.

The contractor is not permitted to cut off any roots from protected vegetation or tree roots which may cause the trees to become unstable, before consulting the local Parks and Forests authority.

No excavated trenches or holes shall be left open for longer than 3 days or over a weekend.

The contractor may not dump or store excavated material against boundary walls or on landscaped gardens before consulting owners of properties. Restoration of defaced property will be the responsibility of the contractor. Where excavated material is placed on road surfaces care should be taken not to block stormwater drains or open channels.

Any water accumulating in excavated trenches or holes, either as a result of rain or due to the level of the water table, shall be pumped out by the main contractor to make work inside the trench or hole possible.

Particular care must be taken to ensure that effective barriers are erected around all trenches and excavations to ensure the safety of the general public. In this regard the contractor is required to install an orange meshed barrier screen (or other type of barrier deemed by the contractor to be more effective) up to at least a metre in height along the entire length of the trench or excavation. The barrier is to be secured in such a way that it will not be disturbed by adverse weather conditions. Where the general public requires access across the excavation, suitable, safe crossings must be provided.

Any liabilities arising out of the activities of the traffic signal contractor shall be their responsibility. This includes the safety of the public while the trenches are open.

The contractor will be required to consult with owners of properties that will be burdened by the activities of the contractor, e.g. driveways, well maintained verges or gardens.

c) Backfilling

Immediately following cable installation and inspection by the City of Cape Town's Traffic Signal Project Co-ordinator, the contractor shall complete the reinstatement of the trench.

The trench shall be backfilled and mechanically compacted to a depth of approximately 250 mm after which a layer of danger tape must be installed. The remaining backfilling shall be mechanically compacted in 150 mm layers and completed no later than one day after cable installation.

The backfilled trench shall be level with the surrounding terrain and all excess backfilling material shall be removed from the gutters and road surfaces using brooms and/or shovels on a daily basis. On completion of the work the site shall be inspected by the City of Cape Town's Traffic Signal Project Co-ordinator.

The contractor shall be responsible for the proper reinstatement of the trench for a period of one year after completion of the work.

The main contractor will be responsible for the reinstatement of roads and sidewalks after backfilling of trenches.

C4004 TRAFFIC SIGNAL EQUIPMENT AND INSTALLATION

a) Controller, UPS and connection pillars

The contractor must ensure that connection pillars and controllers are positioned in the correct position, at the correct depth and with the correct side facing the street or as indicated by the City of Cape Town's Traffic Signal Project Co-ordinator. The controller and UPS cabinets shall be installed neatly and professionally at the required depth, location and manner. The configuration for the respective sites (intersections) shall be provided by the City of Cape Town. The controller shall be trialled and approved by the City of Cape Town prior to installation on site. The location will indicated on site by the City of Cape Town's Traffic Signal Project Co-ordinator (based on indicative locations on the drawings).The contractor will be liable for all costs incurred if the connection pillar or controller has to be moved or turned around after being installed.
The contractor must ensure that connection pillars are positioned in the correct position, at the correct depth (at least 200 mm) and with the correct side facing the street as indicated by the City of Cape Town's Traffic Signal Project Co-ordinator. The contractor will be liable for all costs incurred if the connection pillar has to be moved or turned around after being installed. Power cables (37 core, 19 core, etc. and earth wire) and demand cables to be secured to rail in connection pillar using K-clamps. All cables to be terminated and connected to connector strips in numbering order with sound earth continuity to be ensured. Traffic signal cores to be terminated and connected onto connector strips and connected onto correct cores for traffic signals. Relevant cables to be connected as per the phase diagram and configuration documents. All cables to be properly identified, permanently labelled and records to be submitted to the City of Cape Town's Traffic Signal Project Co-ordinator. Secure connection pillar rod using supplied locks.

The plinth must be a concrete slab of which the size will be determined on site by the City of Cape Town's Traffic Signal Project Co-ordinator.

The slab must be level and smooth, but not slippery, and must taper outwards to enable water to run off. The slab must be 50 mm thick and the ratio of stone, sand and cement must be 4-4-1.

Where a controller + UPS + connection pillar are located next to each other, the plinths should all be neatly merged together. On completion there shall be no gaps between the plinth and the controller / UPS cabinet / connection pillar. Horizontal and vertical alignments shall be ensured.

The controller shall comply or exceed the specifications outlined in SANS 1547: Traffic Signal Controllers.

An earth spike shall be installed beneath or next to the controller in an approved manner as directed by the City of Cape Town's Traffic Signal Project Co-ordinator. One length of 1.8 m copper weld earth rods, or two joined together to form a 3.6m earth spike, shall be driven into the ground. The top of the earth spike shall be connected to the earth terminal of the controller using a spike clamp and at least 10 mm^2 bare copper wire.

b) Cabling

Cables (including power supply cable and communication cable) to be installed, terminated and connected neatly and professionally. Relevant cables to be connected as per the phase diagram.

All cables to be properly identified, permanently labelled and records to be submitted to the City of Cape Town's Traffic Signal Project Co-ordinator.

Cables to be inserted into poles and terminated using the correct applicable cable gland size. Cores to be terminated onto connector strip in numbering order as well as the earthing. Cradle to be secured to the pole mechanically and cap to cradle to be secured using a wing nut.

Allow at least 3m cable slack at the pole base for future use.

c) Audio tactile pedestrian push buttons

City of Cape Town approved audio tactile pedestrian push buttons or vandal proof pedestrian push buttons to be mounted at 1.1 m (button height) above ground level. Connect push button assembly and to the correct cores in the pole cap. Test and ensure correct operation of the push button.

d) Detection equipment

Flush mounted magnetometer detection units are to be installed in the manner and at the location to be indicated by the City of Cape Town (based on indicative locations on the drawings).

The magnetometer system shall be approved by the City of Cape Town. The magnetometer system shall connect to the City of Cape Town's existing Magnetometer Monitoring Server. The magnetometer system shall be compatible with the City of Cape Town's Bluetooth Journey Time system. The magnetometer system shall communicate with the installed controller. The magnetometer detection units shall be covered with fast-drying epoxy after placement in the plastic shells.

The flush mounted magnetometer detection units shall be installed flush with the road surface in plastic shells. Plastic shells for the installation of magnetometer detection units are to be placed in a 102 mm diameter core drilled hole of maximum 178 m deep.

The repeater shall be pole mounted and positioned such that both the sensors and the tandem repeater or access point are within view and within range. The repeater shall be mounted in such a way so as to receive the maximum amount of sunlight for the mounted solar panels.

e) Signage

The ST signs and "Bus only" information signs shall be in accordance with the requirements set out in the latest editions of the South African Development Community Road Traffic Signs Manual (SADC–RTSM) and the drawings provided.

The "Bus only" information signs shall be approved by the City of Cape Town.

f) Poles

Poles are to be installed neatly and professionally at the location and in the manner as indicated on site on the drawing or by the City of Cape Town's Traffic Signal Project Co-ordinator (based on indicative locations on the drawings).

Poles shall be planted as follows:

- Standard 4 m poles must be planted at a depth of 750 mm unless otherwise directed by the City of Cape Town's Traffic Signal Project Co-ordinator.
- 5, 6 and 8 m poles must be planted at 1m deep unless otherwise directed by the City of Cape Town's Traffic Signal Project Co-ordinator.
- Top of standard 4 m pole to be at least 3.25 m above ground level.
- Top of 5, 6 and 8 m poles to be at least 4 m, 5 m, and 7m respective above ground level.

For cantilever poles, the follow shall be complied with:

- top of the bolt group must be 50 mm under final surface.
- cantilever poles must be installed in such a manner that the hatch cover must be easily accessible and facing the sidewalk.
- cast foundation and bolt group and insert duct with a slow bend (for cable entry).
- bolt group to be inserted level and in the centre of the foundation base.
- the top of the bolt group shall be at least 50 mm under the pavement surface.
- allow for the concrete of the cantilever foundation to cure for at least 5 days and 26 Mpa before erecting the pole.
- Pre-paint cantilever pole.
- the area between the top and bottom bracket of the lantern must be painted black.

General requirements for the installation and completion of the poles:

- Secure poles with concrete block (about 20 litres for 4 to 8 m poles and one cubic metre for cantilever poles)
- Fit upright section of pole and fasten using 3 sets of nuts supplied and ensure vertical alignment.
- Backfill and compact the soil around the pole properly (stabilise soil with G5 natural gravel approved by the City of Cape Town's Traffic Signal Project Coordinator).
- Vertical alignment of the pole to be done properly by using a spirit level.

- Area surrounding the pole to be levelled.
- Paint poles. The tendered rate for the supply and installation of poles shall include all material such as paint, etch primer and galvanize wash as well as labour, plant, tools, equipment and consumables to perform this task.
- Preparation and galvanize wash to be done as per manufacturer's specification.
- Etch primer to be applied as per manufacturer's specification.
- Two final coats of alkyd enamel (golden yellow) to be applied from the bottom lantern bracket downwards.
- Top section of the pole, from bottom of bracket upwards, to be painted black.
- All brackets and strappings must be painted to match the colour of the poles.
- Contractor to provide and use drop sheets to prevent messing on sidewalks.
- Ensure the areas around the poles are clean before leaving the site.
- Apply 2 x vinyl numbers to the pole 250 mm below backing board, with at least one in the direction of travel.

g) LED signal face modules

LED signal face modules and related equipment must be mounted according to SARTSM specifications. The contractor shall comply with the following general requirements:

- Assemble lantern and fit backing board using extension brackets, etscrews, washer and PVC flaps.
- Inverse and use the plate used to attach the individual parts of the lantern head to support backing board.
- Perform this task on a flat surface to prevent backing board from warping and then fit the hoods.
- Fit LED signal face module to pole using lantern bracket kit and install the lamps.
- Fix lantern hoses to pole top and terminate wires onto the correct cores in the pole cap.
- Lantern hoses to be routed through bracket slots and secured to pole by means of cable ties.
- All cables to be properly identified, permanently labelled and records to be submitted to the City of Cape Town's Traffic Signal Project Coordinator.
- Ensure LED signal face module is secured and aligned properly (horizontally and vertically).
- LED signal face module to be mounted with the pole in the center of the backing board unless otherwise agreed with the City of Cape Town's Traffic Signal Project Coordinator
- The centre of the green aspect to be at least 2.3m above the road surface (and not to exceed 3.0 m).
- Lenses and backing board to be cleaned on completion and signals masked by means of black bags until pre-commissioning.
- No light must be visible between the signal face module and the backing screen.

C4005 TESTING AND COMMISSIONING OF THE INSTALLATION

For each section of the work, the traffic signal contractor shall notify the City of Cape Town's Traffic Signal Project Coordinator when his work is ready for inspection and testing at the following stages:

- Upon commencement and completion of cable installation, prior to backfilling, i.e. no backfilling before acceptance of cable installation work
- Upon completion of backfilling and compaction, prior to reinstatement, i.e. no reinstatement before testing and acceptance of backfilled and compacted trench
- Upon completion of all work on site, prior to hand-over, i.e. no hand-over before acceptance of completed work.

Arrange with power supply authority (through City of Cape Town's Traffic Signal Project Coordinator) to terminate and connect other end of the cable and switch on.

For work requiring earth spikes, the traffic signal contractor will perform earth resistance measurements on each installation. Test results must have an earth reading of less than 20 ohms.

If the reading exceeds 20 ohms the earth spike must be extended until an acceptable reading is obtained. Power supply cable and all earthing to be tested and written results and certificate of compliance (as specified in SANS 10142) to be issued.

Test the installation and ensure that the phasing is correct.

Check and verify with in-station that that the communication is up and running and the controller is fully functional.

Arrange for the pre-commissioning of the installation with the City of Cape Town's Traffic Signal Project Coordinator and ATC (Area Traffic Control) in-station. The "Index Forms" and Certificate of Compliance must be produced at pre-commissioning inspection. Commissioning will only be allowed once all conditions of pre-commissioning have been met by the traffic signals contractor.

C4006 MEASUREMENT AND PAYMENT

Item	**Unit**
C40.01 Testing and commissioning of installation	Number (No.)

The unit of measurement shall be the number of intersections tested and commissioned on final completion.

The tendered rate per intersection shall cover the costs of testing and correcting, if required, the traffic signal installation at an intersection in preparation for final commissioning and handing over per site (intersection) to the City of Cape Town.

Item	**Unit**
C40.02 Controller (including all inserts, software and earthing)	
(a) MXPlus (18 phases)	number (No)
(b) MX (8 phases)	number (No)
(c) Uninterrupted power supply (UPS) (titanium)	number (No)

The unit of measurement shall be the number of each item supplied and installed.

The tendered rate for the supply and installation of a controller shall include all required equipment, software and cabling to interface and communicate with the traffic signal equipment on site as well as the City of Cape Town traffic signal systems off site.

The tendered rate for the supply and installation of a controller and / or UPS shall include excavation, the installation of the earth spike (controller), backfilling and compaction related to the two payment items.

Item	**Unit**
C40.03 Audio Tactile Pedestrian Push Buttons	
(a) Audio tactile push buttons	number (No)
(b) Vandal proof pedestrian push buttons (CCT approved)	number (No)

The unit of measurement shall be the number of each item supplied and installed.

The tendered rate shall allow for all equipment and cabling required for the installation of the pedestrian push buttons.

The tendered rate for vandal proof pedestrian push buttons shall also allow for the installation of buzzers associated with the specific crossing.

Item	**Unit**
C40.04 Detection Equipment	
(a) Flush mounted magnetometer, including shell (as per CCT requirement)	number (No)
(b) Repeater, including mounting kit (as per CCT requirement)	number (No)

(c) Extra over (a) and (b) for supply and install detection equipment hardware software (incl access point (SPP0 & SPP1) and controller connection) ……number (No)
(d) Extra over (a) and (b) for setting up and programming of magnetometers……number (No)
(e) Supply and install 2 pair cable ……metre (m)
(f) Extra over (e) for laying cable in trench ……metre (m)
(g) Extra over (e) for supplying and laying cable in trunking ……metre (m)
(h) Extra over (e) for connecting to controller ……number (No)
(i) Extra over (e) for connecting to distribution pillar ……number (No)
(j) Extra over (e) for supply and install of emergency call button……number (No)

The unit of measurement for (a) & (b) shall be the number of each item supplied and installed. The unit of measurement for (c) & (d) shall be the number of intersections completed. The unit of measurement for (e) shall be the metre of cable supplied and installed to detect the demand for a signal stage in the case of an emergency response from the adjacent fire station. The unit of measurement for (f) & (g) shall be metre and shall be extra over item (e). The unit of measurement for (h) & (i) shall be extra over (e) and shall be the number of connections completed. The unit of measurement for (j) shall be extra over (e) and shall be the number of emergency demand signal points for detection.

The tendered rates include full compensation for furnishing all materials and labour necessary to execute the work as specified. The tendered rates shall also allow for any traffic accommodation that may be required during installation and / or testing of the magnetometers.

Item **Unit**

C40.05 Signage

(a) Standard ST signs ……number (No)
(b) 'BUS' ST accompanying sign (*drawing reference*) ……number (No)
(c) 'Bus only' information sign (*drawing reference*) ……number (No)
(d) 'Right Turn on Green Arrow Only' information sign (*drawing reference*)……number (No)

The unit of measurement shall be the number of each sign supplied and installed.

The tendered rates include full compensation for furnishing all materials and labour necessary to execute the work as specified.

Item **Unit**

C40.06 Poles

(a) Relocate standard 4 m poles into permanent position…… number (No)
(b) Standard pole, length not exceeding 4 m……number (No)
(c) Short pole, for pedestrian push button…… number (No)
(d) Cantilever (overhang 5 m)……number (No)
(e) 5 m extended poles…… number (No)
(f) 6 m extended poles…… number (No)
(g) 8 m poles for repeaters…… number (No)

The unit of measurement for (a) shall be the number of poles relocated to the permanent position. The unit of measurement for (b) - (g) shall be the number of poles or cantilever supplied and installed.

The tendered rates include full compensation for furnishing all materials and labour necessary to execute the work as specified, e.g includes excavation, backfilling, compaction, pole caps etc.

Item **Unit**

C40.07 LED Signal face modules (includes connection to supply cable)

(a) Relocation of existing
  (i) 3 aspect signal lanterns into permanent positions…… number (No)
  (ii) 5 aspect signal lanterns into permanent positions…… number (No)
  (iii) 2 aspect signal lanterns into permanent positions…… number (No)

(b) Supply & Install new
  (i) S1 with background screen…… number (No)
  (ii) S2/S3/S4 with background screen…… number (No)
  (iii) S5/S6/S7 with background screen…… number (No)
  (iv) S8/S9 with background screen…… number (No)

(v) S10R/S10L with background screen……number (No)
(vi) S11P/S11C with background screen……. number (No)
(vii) S1B with background screen…… number (No)
(viii) S11B with background screen…… number (No)

The unit of measurement for (a) shall be the number relocated to the permanent position. The unit of measurement for (b) shall be the number of new LED signal face modules supplied and installed completed.

The tendered rates include full compensation for furnishing all materials and labour necessary to execute the work as specified.

Item **Unit**

C40.08 Connection pillars

(a) Relocate connection pillar into permanent position……number (No)
(b) Supply and install connection pillars…… number (No)

The unit of measurement for (a) shall be the number of connection pillars relocated to the permanent position. The unit of measurement for (b) shall be the number of connection pillars supplied and installed completed.

The tendered rates include full compensation for furnishing all materials and labour necessary to execute the work as specified e.g. includes excavation, backfilling and compaction.

Item **Unit**

C40.09 Ring circuit cable (37 + 19 cores)

(a) Supply and install ring-circuit cable (37 + 19 cores)…….. metre (m)
(b) Extra over (a) for laying the cable in the trench…….. metre (m)
(c) Extra over (a) for laying the cable in the duct……..metre (m)
(d) Extra over (a) for connecting to the controller…….number (No)
(e) Extra over (a) for connecting to the distribution pillar…… number (No)

The unit of measurement for (a) shall be the metre of cable supplied and installed. The unit of measurement for (b) & (c) shall be metre and shall be extra over item (a). The unit of measurement for (d) & (e) shall extra over (a) and shall be the number of connections completed.

The tendered rates include full compensation for furnishing all materials and labour necessary to execute the work as specified. The length of cable shall be measured horizontally in plan.

Item **Unit**

C40.10 Signal pole supply cable (19 core)

(a) Supply and install signal pole supply cable (19 cores)……..metre (m)
(b) Extra over (a) for laying the cable in the trench…….. metre (m)
(c) Extra over (a) for laying the cable in the duct……..metre (m)
(d) Extra over (a) for connecting to the distribution pillar…….number (No)

The unit of measurement for (a) shall be the metre of cable supplied and installed. The unit of measurement for (b) & (c) shall be metre and shall be extra over item (a). The unit of measurement for (d) shall extra over (a) and shall be the number of connections completed.

The tendered rates include full compensation for furnishing all materials and labour necessary to execute the work as specified. The length of cable shall be measured horizontally in plan.

Item **Unit**

C40.11 Bare copper earth wire

(a) Supply and install bare copper earth wire of minimum cross-sectional area 10 mm^2……..metre (m)
(b) Extra over (a) for laying the cable in the trench…….. metre (m)
(c) Extra over (a) for laying the cable in the duct……..metre (m)

The unit of measurement for (a) shall be the metre of cable supplied and installed. The unit of measurement for (b) & (c) shall be metre and shall be extra over item (a).

The tendered rates include full compensation for furnishing all materials and labour necessary to execute the work as specified. The length of cable shall be measured horizontally in plan.

Item **Unit**

C40.12 Main supply cable

(a) Supply and install mains supply cable of minimum cross-sectional area 16 mm^2 ……metre (m)
(b) Extra over (a) for laying the cable in the trench ……..metre (m)
(c) Extra over (a) for laying the cable in the duct……..metre (m)
(d) Extra over (a) for connecting to the controller……number (No)
(e) Extra over (a) for connecting to the power supply ……number (No)

The unit of measurement for (a) shall be the metre of cable supplied and installed. The unit of measurement for (b) & (c) shall be metre and shall be extra over item (a). The unit of measurement for (d) & (e) shall extra over (a) and shall be the number of connections completed.

The tendered rates include full compensation for furnishing all materials and labour necessary to execute the work as specified. The length of cable shall be measured horizontally in plan.

Item **Unit**

C40.13 Excavation

(a) Normal material…….. cubic metre (m^3)
(b) Difficult material ……cubic metre (m^3)
(c) Installation of ducting for cables under surfaced areas (excluding roads)……. metre (m)

The unit of measurement for (a) & (b) shall be the cubic metre of material excavated of the type indicated. The tendered rates include full compensation for furnishing all materials and labour necessary to execute the work as specified. The cost of any mechanical plant needed to assist in loosening the material for (b) is to be included in the given rate. The unit of measurement for (c) shall be the metre of ducting installed for cables.

Item **Unit**

C40.14 Temporary Works

(a) Relocate standard 4m poles into temporary positions……..number (No)
(b) Install standard 4m poles into temporary positions…….. number (No)
(c) Relocate standard 2 aspect signal lanterns into temporary positions…… number (No)
(d) Relocate standard 3 aspect signal lanterns into temporary positions…… number (No)
(e) Relocate standard 5 aspect signal lanterns into temporary positions…… number (No)
(f) Relocate connection pillar into temporary position…… number (No)
(g) Temporary cable joint……number (No)
(h) Other temporary works……Provisional Sum (Prov Sum)

The unit of measurement for (a), (c), (d), (e) & (f) shall be the number of each item temporarily relocated to new temporary positions as is required during the construction phase. Relocation plans shall be submitted and approved by the Employers Agent prior to the work being undertaken.

The unit of measurement for (b) shall be the number item of new 4m poles installed in new temporary positions as is required during the construction phase.
The tendered rates include full compensation for furnishing all materials and labour necessary to execute the work as specified.

Expenditure under items (f) shall be made in accordance with the general conditions of contract.

Item **Unit**

C40.15 Remove and return to City of Cape Town

(a) Standard 4 m poles …….. number (No)
(b) Cantilever poles ……..…….. number (No)

(c) 2 aspect signal lanterns ..... number (No)
(d) 3 aspect signal lanterns ..... number (No)
(e) 5 aspect signal lanterns ..... number (No)
(f) Pedestrian push buttons ..... number (No)
(g) Connection pillars ..... number (No)
(h) Controller ..... number (No)
(i) UPS ..... number (No)

The unit of measurement shall be the number of each item removed and returned to the City of Cape Town.

The tendered rates include full compensation for furnishing all materials and labour necessary to execute the work as specified. The tendered rate shall also include for the delivery of removed equipment/street furniture to the relevant City of Cape Town traffic signal depot. The tendered rate includes backfilling, disconnections and cable removal (where applicable).

Item **Unit**

C40.16 Traffic camera's

(a) Removal & reinstatement of traffic speed camera's..... Provisional Sum (Prov Sum)

Expenditure under this shall be made in accordance with the general conditions of contract. Where existing rates within this document may be applicable then the Employers Agent may select to use these rates tendered rates.

Item **Unit**

C40.17 Allowance for additional costs due to design changes due to changes in CCT Standards..... Provisional Sum (Prov Sum)

Expenditure under this shall be made in accordance with the general conditions of contract. Where existing rates within this document may be applicable then the Employers Agent may select to use these rates tendered rates.

C3.5. Management

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3.5.5. ENVIRONMENTAL MANAGEMENT PROGRAMME
3.5.6. HEALTH AND SAFETY

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

In support of the National Department of Public Works' Expanded Public Works Programme which is aimed at alleviating poverty through the creation of temporary employment opportunities using labour intensive methodologies and practices where possible, the Employer is seeking to increase the intensity of labour, as appropriate, in all of its infrastructure sector projects.

It is a requirement of this contract, therefore, that the work be executed in such a manner so as to maximise the use of labour intensive construction methods in order to provide low and semi-skilled temporary employment opportunities.

To this end, a minimum targeted labour contract participation goal is specified below, which shall be achieved by the Contractor in the performance of the contract, failing which, penalties as described will be applied. The Contractor is required to provide all skills training where necessary, so as to ensure that a minimum level of competence is achieved and maintained, such that the various activities are carried out safely and to the required standard. The cost of training shall be included in the rates for the various work activities.

The specified minimum targeted labour contract participation goal (CPG_L) is | **3.5 %**

The minimum CPG_L is such that the Contractor will have to carry out some of the work that would normally have been undertaken using mechanised construction methods, by using labour intensive construction methods instead. It is left to the discretion of the Contractor to identify suitable work activities for the intensification of labour. The Contractor shall, within 5 working days of being requested in writing by the Employer's Agent to do so, submit details of his/her plan to achieve the minimum CPG_L.

3.5.2.2 Definitions

For the purposes of the requirements in respect of the participation of targeted labour, the following definitions shall apply:

"**Target area**" means the geographical area shown on plan in Part C4: Site Information

"**Targeted labour contract participation goal (CPG_L)**" means the sum of the wages (excluding any benefits), for which the Contractor, or any of his/her sub-contractors contracts targeted labour in the performance of the contract, expressed as a percentage of the value of the contract.

"**Targeted labour**" means low and semi-skilled individuals, whose wages (excluding any benefits) do not exceed the threshold value, who reside in the target area, that are employed by the Contractor, or any of his/her sub-contractors, in the performance of the contract.

"**Threshold value**" is **R450.00** per day as adjusted from time to time (excluding any benefits). The threshold value is not to be confused with any industry sector minimum wage determined in accordance with the Basic Conditions of Employment Act, 75 of 1977.

"**Value of the contract**" means the contract sum (accepted contract amount) less provisional sums, contingencies and VAT.

3.5.2.3 The selection and recruitment of targeted labour

Where targeted labour is to be drawn from specific local communities (defined in terms of the target area), such labour shall be identified using the relevant Sub-Council Job-Seekers Database. The Contractor shall request, via a Community Liaison Officer (if required in terms of the contract), a list of suitable candidates from the database, from which the Contractor shall make his/her final selection. The contractor shall enter into written contracts of temporary employment with all targeted labour.

Any difficulty experienced by the Contractor in identifying candidates though the Job-Seekers Database, or as regards any matter relating to the employment of targeted labour, shall be immediately referred to the Employer's Agent.

3.5.2.4 Contract participation goal credits

Credits towards the achieving the minimum CPG_L shall be granted by converting the total monetary value of wages paid to targeted labour (including that of sub-contractors) to a percentage of the value of the contract. No credits shall be accorded should the contractor/sub-contractor fail to enter into written contracts with the targeted labour. Furthermore, no credits shall be accorded in respect of targeted labour employed on work in respect of provisional sums or prime cost items. Such labour shall nevertheless be recorded on the Project Labour Report which is required to be furnished by the Contractor.

3.5.2.5 Training of targeted labour

The Contractor is required to provide all informal (on-the-job) skills training so as to ensure that a minimum level of competence is achieved and maintained, such that the various activities are carried out safely and to the required standard. The cost of informal training shall be included in the rates for the various work activities.

3.5.2.6 Penalties

The financial penalty to be applied for failing to meet the specified minimum targeted labour contract participation goal in the performance of the contract (unless proven to be beyond the control of the Contractor), is as follows:

$$\text{Penalty} = (CPG_L{}^S - CPG_L{}^A) \times P^*$$

Where $CPG_L{}^S$ = the specified minimum targeted labour contract participation goal (expressed as a percentage).

$CPG_L{}^A$ = the targeted labour contract participation goal achieved (expressed as a percentage).

P^* = the value of the contract.

3.5.3. COMMUNITY LIAISON OFFICER

It is a requirement of this Contract that a Community Liaison Officer (CLO) shall be appointed by the Contractor. The primary functions of the CLO shall be to assist the Contractor with the selection and recruitment of targeted labour, to represent the local community in matters concerning the use of targeted labour (and/or enterprises) on the works, and to assist with and facilitate communication between the Contractor, the Employer's Agent and the local communities.

The identification of suitable candidates (maximum 5; minimum 3) for the CLO position shall be resolved by the relevant Sub-council Manager through a process of advertising and shortlisting. Should suitable candidates not be identified through this process, the Contractor shall be allowed to seek candidates from the relevant Sub-Council Job-Seekers Database. The final selection and appointment of the CLO in terms of the contract shall be the responsibility of the Contractor.

The period of appointment of the CLO shall be as stated in the Contract for Temporary Employment as a Community Liaison Officer referred to below. The date of commencement of temporary employment of the CLO shall be as agreed with the Employer's Agent.

It is required, therefore, that the Contractor enter into a contract of temporary employment with the selected CLO, the contracting parties being the Contractor and the CLO. To this end, a specimen Form of Contract of Temporary Employment as Community Liaison Officer is included in this document (Part C1.7: Agreement and Contract Data). This Form of Contract sets out, inter alia, the agreement between the parties, the duties and conditions of employment of the CLO. The rate of remuneration for the CLO, payable by the Contractor, is currently **R462.00** per day. As said contract will be between the Contractor and the CLO, all costs involved shall be borne by the Contractor and the tender shall be deemed to include for this.

3.5.4. PARTICIPATION OF TARGETED ENTERPRISES

3.5.4.1 Minimum targeted enterprises contract participation goal

It is a requirement of this contract that enterprises located within the target area, as defined, be engaged by the Contractor for the provision of supplies, services or works necessary for the performance of this contract.

To this end, a minimum targeted enterprises contract participation goal is specified below, which shall be achieved by the Contractor in the performance of the contract, failing which, penalties as described will be applied.

The specified minimum targeted enterprises contract participation goal (CPG_E) is | **4.5%**

The Contractor shall engage targeted enterprises directly or indirectly in the performance of the contract to the extent that the total monetary value of such engagements (exclusive of VAT), expressed as a percentage of the value of the contract, is sufficient to achieve the specified minimum CPG_E.

3.5.4.2 Definitions

For the purposes of the requirements in respect of the participation of targeted enterprises, the following definitions shall apply:

"Target area" means the geographical area shown on plan in Part C4: Site Information

"Targeted enterprises contract participation goal (CPG_E)" means the value of supplies, services or works (exclusive of VAT), for which the Contractor contracts targeted enterprises, either directly or indirectly, in the performance of the contract, expressed as a percentage of the value of the contract.

"Targeted enterprises" means any sole trader, partnership or legal entity that acts as a supplier, manufacturer, service provider or sub-contractor, and which has its base of operations in the target area.

"Value of the contract" means the contract sum (accepted contract amount) less provisional sums, contingencies and VAT.

3.5.4.3 Achieving the contract participation goal

The contractor may achieve the specified minimum CPG_E as follows:

a) by engaging one or more targeted enterprises to perform commercially useful functions in the performance of the contract;

b) by engaging non-targeted enterprises, who in turn engage one or more targeted enterprises to perform commercially useful functions in the performance of the contract;

c) by a combination of the above.

The Contractor shall, within 5 working days of being requested by the Employer's Agent to do so, submit details of his/her plan to achieve the minimum CPG_E.

3.5.4.4 Contract participation goal credits

Credits towards achieving the minimum CPG_E shall be granted by converting the total monetary value (exclusive of VAT) of the agreements between the Contractor, or Contractor's sub-contractors, and targeted enterprises, to a percentage of the value of the contract.

No credits shall be accorded should the Contractor (or sub-contractors):

a) make direct payment to third parties in connection with the contract on behalf of targeted enterprises, when such payment is recovered by making deductions from payments due to the targeted enterprise;

b) fail to enter into written contractual agreements with the relevant targeted enterprises.

Credits claimed towards the contract participation goal shall be denied where such written contractual agreements contain any of the following:

c) conditions which are more onerous than those that exist in the prime contract (this contract);

d) payment procedures based on a pay when paid system;

e) authoritarian rights given to the employing contractor, with no recourse to independent adjudication in the event of a dispute arising.

No credits may be claimed in respect of targeted enterprises that that do not adhere to statutory labour practices.

No credits shall be accorded in respect of targeted enterprises engaged on work in respect of provisional sums or prime cost items.

In the event that a targeted enterprise sub-contracts to another targeted enterprise, only the value of the higher level sub-contract shall be granted as credit towards achieving the specified minimum CPG_E.

In addition to the form required for contract administration (the Targeted Enterprises Contract Participation Expenditure Report), the Contractor shall furnish the Employer's Agent, upon written request, with documentary evidence that the targeted enterprises have their base of operations in the target area, copies of the contractual agreements with the various targeted enterprises, as well as documentary proof of payments made to the various targeted enterprises.

3.5.4.5 Penalties

The financial penalty to be applied for failing to meet the specified minimum targeted enterprises contract participation goal in the performance of the contract (unless proven to be beyond the control of the Contractor), is as follows:

$$\text{Penalty} = (CPG_E^S - CPG_E^A) \times P^*$$

Where CPG_E^S = the specified minimum targeted enterprises contract participation goal (expressed as a percentage).

CPG_E^A = the targeted enterprises contract participation goal achieved (expressed as a percentage).

P^* = the value of the contract.

3.5.5. ENVIRONMENTAL MANAGEMENT PROGRAMME

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

3.5.6. HEALTH AND SAFETY

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

E: ENVIRONMENTAL MANAGEMENT SPECIFICATION

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E: ENVIRONMENTAL MANAGEMENT SPECIFICATION

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

FOR PROJECT SPECIFIC AMENDMENTS REFER TO APPENDIX E

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 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.

E2.4.7 Contaminated water

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

E2.4.8 Working area

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

E2.4.9 Contractor's camp or construction camp

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

E2.4.10 Employer's Agent

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

E2.4.11 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.

E2.4.12 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.

E2.4.13 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.

E2.4.14 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).

E2.4.15 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 COLTO 1300 or 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.

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.

E5.6 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.

E5.7 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.

E5.8 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.

E5.9 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.

E5.10 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.

E5.11 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.

E5.12 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.

E5.13 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.

E5.14 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.

E5.15 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

E5.16 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.

E5.17 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

E5.18 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.

E5.19 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:

E5.19.1 Clause E3.1

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

E5.19.2 Clause E4.1.3

Remediation of hydrocarbon spill and leak areas.

E5.19.3 Clause E4.4

Disposal of litter, refuse and Contractor's waste.

E5.19.4 Clause E5.4

Removal of temporary fences and Contractor's camp.

E5.19.5 Clause E5.5

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

E5.19.6 Clause E5.7

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

E5.19.7 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.

E5.19.8 Clause E5.14

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

E5.19.9 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.

E8.2 Payment Items

Item **Unit**

E8.2 Contractor's obligations in respect of Environmental Management

(a) Fixed obligations in respect of Environmental Management Plan……..…lump sum

(b) Time-related obligations in respect of Environmental Management Plan……...week

(c) Provision of environmental emergency measures ……prime cost (PC) sum

(d) Contractor's charge to allow for handling costs and profit in respect of subitem C10.01(c) ……..percentage (%)

(i) Payment of the tendered rate in subitem E8.2(a) shall include full compensation for the fixed part of the environmental obligations and shall also cover full compensation for complying with the initial requirements in respect of the environmental management plan prior to Commencement of Work, as specified. Payment of the lump sum shall be made in three installaments on the same basis as the payments for pay item 13.01(a).

(ii) Payment of the tendered rate for subitem E8.2(b) shall include full compensation for all time related environmental obligations. The tendered rates for (b) shall be paid weekly, pro rata for parts of a week, from Commencement of Work until Due Completion.

(iii) Payment under the PC sum provided in subitem E8.2(c) to cover costs incurred in complying with the requirements in respect of the provision of environmental emergency measures effected in accordance with the provisions of Clause 6.6 (GCC 2015) of the General Conditions of Contract.

(iv) The tendered percentage in subitem E8.2(d) is the percentage of the amount actually spent under subitem C10.01(c) that will be paid to the Contractor in full compensation for the Contractor's handling costs and profit in respect of the provision of environmental emergency measures.

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: _____

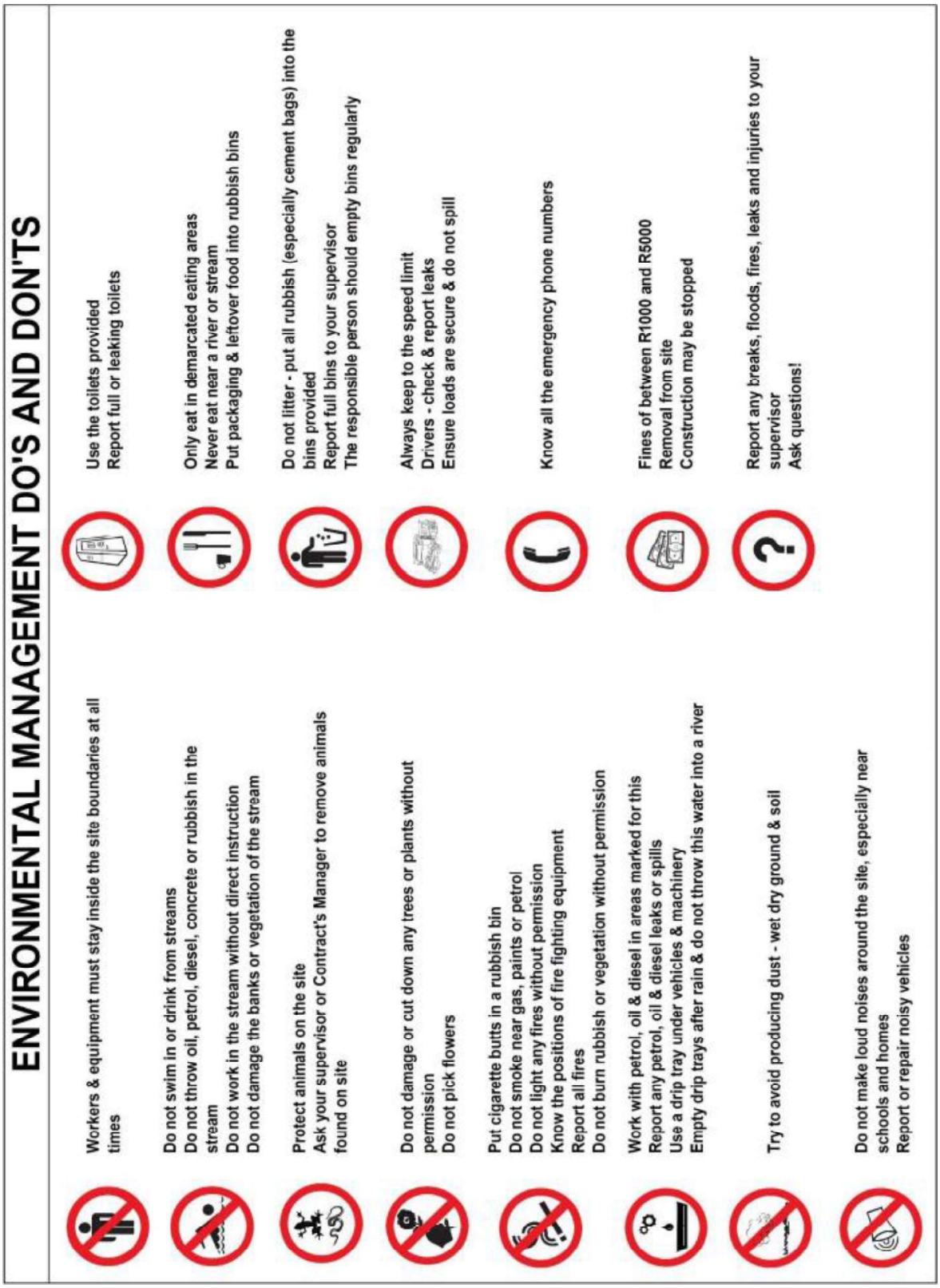
ANNEXURE B: ENVIRONMENTAL SITE INSPECTION CHECKLIST
TO BE SUBMITTED TO THE EMPLOYER'S AGENT ONCE A WEEK

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:……..…….....……

ANNEXURE C: CONSTRUCTION PERSONNEL INFORMATION POSTER



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.

   COLTO 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.

   COLTO 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. Although SANS 1200A is not specifically referenced, this requirement will still be applicable to this contract.

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. Although SANS 1200A is not specifically referenced, this requirement will still be applicable to this contract.

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

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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:

-"Construction Regulations, 2014" means the Construction Regulations (GNR. 84 of 7 February 2014) published in terms of the OHS Act.
-"Contractor" means the Principal Contractor as defined in the Construction Regulations, 2014.
-"Employer" means the Client or his agent as defined in the Construction Regulations, 2014.
-"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.
-"OHS Act" means the Occupational Health and Safety Act, 85 of 1993.
-"subcontractor" means any contractor employed by the Contractor to perform construction work.

- CHSA = Construction Health & Safety Agent.
- Contractor includes a Principal Contractor / Direct Contractor / Sub-contractor.
- Contractor's Construction Manager as defined in the Construction Regulations 2014 [CR 8(1)] as the Construction Manager.
- Directs – Any Contractor appointed directly by the construction Client.
- Principal Agent = P/Agent = Client Representative.
- Principal Contractor will include any Contractor appointed directly by the Client on the project.
- Where the term Principal Contractors (plural) is used this refers to all Directs appointed on the project, which Directs are all deemed to be Principal Contractors in their own right.

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.

These Specifications cover the requirements for eliminating and mitigating incidents and injuries during the **construction of the IRT Phase 2A truck and feeders' infrastructure corridor. The work will include but not necessarily be limited to: the construction of concrete roads, asphalt roads, pedestrian walkways, relocation of existing services, the installation of new services, traffic intersection upgrades, bus station concrete sub-structures, landscaping, and associated works.**

The health & safety specifications document includes an identification of hazards by the appointed H&S Agent and ****Designers* **as well as public protection protocols and specific construction related minimum safety and health requirements, control measures and procedures which need to be taken into account when: pricing the project; programming your activities and trades; compiling your project-specific health & safety plan; compiling your preliminary risk assessment document; your preliminary fall protection plan; traffic and pedestrian accommodation plans; and producing activity-specific health & safety risk assessment documentation.

The Health & Safety Specifications document must also be taken into account by the various *Designers* including *Temporary Works Designers* as defined in the Construction Regulations 2014.

The scope also addresses legal compliance, hazard identification and risk assessment, risk control, and promoting a health and safety culture amongst those working on the project. The health & safety specifications also make provision for the protection of those persons other than employees.

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.

This specifications document is a legal compliance document compiled in terms of the OHS Act and is therefore binding. The document must be read in conjunction with other relevant legislation including: **The Occupational Health & Safety Act 85/1993; Construction Regulations 2014 and the Guidelines to the Construction Regulations 2017; SANS 1200; all other Regulations and Codes incorporated into the OHS Act; Contract documentation; all relevant Codes specific to the operations/activities to be undertaken on this project; ****Designers* **specifications, drawings, methods, documentation; any and all City of Cape Town specific rules/procedures/protocols/specifications.**

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.

Pricing for Health & Safety.
All parties bidding for work on this construction project must ensure that they have made sufficient provision for the cost of complying with this Specifications document as well as with the OHS Act and incorporated Regulations as a minimum requirement in their tender documentation. It must also be taken into consideration that time is money, which implies that sufficient time must be allowed for the implementation of the minimum OHS standards. No additional claims will be entertained at a later stage should a compliance requirement be prescribed in the OHS Act, incorporated regulations or in this Specifications document unless due to design changes which would require additional resources.
The professional quantity surveyors should develop a strategy in this regard to ensure that H&S costs have received sufficient consideration. Health & safety costs must be clearly set out in the tender submission by each and every contractor.

Designers **are also required to issue written reports setting out the health and safety information about the design of the relevant structure that may affect the pricing of the construction work (including any demolition or stripping out works which would need input from the structural, mechanical and electrical engineers). Such reports must be issued before tender and included in such tender document(s).**

ADMINISTRATION

H4.2 Application for construction work permit

The requirement for a construction work permit will be applicable where a contract value exceeds R60 mil (the current figure) or where such works runs for longer than 365 days (construction stage – calendar days).

Where a construction permit is not triggered by a particular contract, the relevant contractor will need to notify the Provincial Director of the Department of Employment & Labour in writing of their intention to undertake construction work, at least **seven days** prior to commencement. A copy of this notification (Annexure 2) must be held in such **Direct Contractor's** health & safety file on site. The notification of construction work must be e-mailed to: fezeka.ngalo@labour.gov.za. Contractors must ensure that a reference number or similar confirmation of receipt is available as proof of notification.

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.

H4.3 Notification of intention to commence construction work

Where a construction permit is not triggered by a particular contract, the relevant contractor will need to notify the Provincial Director of the Department of Employment & Labour in writing of their intention to undertake construction work, at least seven days prior to commencement. A copy of this notification (Annexure 2) must be held in such Direct Contractor's health & safety file on site. The notification of construction work must be e-mailed to: fezeka.ngalo@labour.gov.za. Contractors must ensure that a reference number or similar confirmation of receipt is available as proof of notification.

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.

H4.4 Occupational Health and Safety Agreement

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

H4.5 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.

H4.6 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.

The P/Contractor will need to prepare a station specific Emergency Procedure before taking site. The procedure/plan must take into consideration the risks and potential incidents posed by the work to be carried out.
The procedure must detail the response plan including the following key elements:

- List of key competent personnel;
- Details of the closest emergency services;
- Actions or steps to be taken in the event of the specific types of emergencies e.g. worker injury, traffic or pedestrian incident (member of the public); fire incident; bomb threat; crime related security incident.
- Rescue plans including access of emergency personnel to the injured person **which might be from within an excavation for instance.**

A contact list of all service providers (Fire Department, Ambulance, Police, Medical and Hospital, etc.) must be maintained and made available to site personnel. The emergency plan may need to be reviewed from time to time as conditions/environment changes.

H4.7 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.

Note that although a main safety file could be located in a central site office location, each separate work area, if divorced from each other, would need its own safety file, consisting of the H&S documentation specific to that work area.

Such Files should contain at least the following documentation / records:

- H&S Plan, risk assessments, HIRA look-ahead programs, fall protection plan;
- Notification of Construction work proof and copy of construction permit when applicable;
- Copy of the OHS Act and relevant Regulations;
- Emergency plan and telephone numbers;
- H&S inductions records, HIRA training, H&S information session records (toolbox talks);
- Management appointments and management organogram for the project;
- Proof of competence – various personnel and operators;
- Inspection registers – various project-specific planned maintenance inspections, load test certificates, service records, etc;
- Injury and incident investigation reports and first aid dressing book;
- **Safety officer inspection reports – weekly reports and planned job observations**;
- Audit reports – monthly subbie audits;
- Contractor H&S Plan assessments and approvals;
- Material safety data sheets – haz chem.;
- Safety meeting minutes and attendance registers;
- Medical assessment certificates – workers;
- **Traffic management plan specific to the site/area in question.**
- **Public related complaints and the like.**
- Welfare and hygiene section in the H&S file dealing with communicable diseases.

The Consolidated H&S File:
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.

It is the duty of the principal contractor to ensure that all documentation required to be kept or generated during the construction phase is consolidated into one set of files that must be handed over to the Client **(CoCT)** upon completion of the construction work package in question.

These consolidated safety file(s) should include all instructions/guidelines/specifications/information from the ***design team*** that will be required for the continued safe **operation and maintenance of the infrastructure.**

It is requested that such consolidated health & safety documentation be handed over in an electronic format.

H4.8 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.

At least one health & safety representative is required by every Contractor who has more than 20 employees **assigned to the project (bus station contract) in question**. **Where the total workforce on site is more than 20, the P/Contractor will need to appoint an H&S representative to represent the workforce as a whole.** The Principal Contractor must ensure that Health and Safety Representative(s) are appointed under consultation with the employees. The H&S representatives must be competent to carry out their functions. The appointments must be in writing. The Health and Safety Representatives should carry out monthly inspections, keep records of the inspections and report all findings to the Responsible Person or Safety Officer forthwith and at monthly health & safety meetings.

The Principal Contractor must ensure that project health and safety meetings are held monthly with minutes kept. **Meetings must be chaired by the Principal Contractor's Responsible Person [CR 8(1) person] or suitable CR 8(2) Person if the CR 8(1) is not available. Further, CR 8(2) and CR 8(7) appointees must attend such monthly meetings. Project H&S meetings will be required as soon as the site team exceeds 20 persons.**
All sub-contractors' Responsible Persons [CR 8(1) or 8(7)'s] and Health & Safety Representatives must attend the Principal Contractor's monthly health & safety meetings.
The following topics must be tabled at meetings: management appointments and risk management portfolios; sub-contractor legal compliance issues; injuries and incidents; hazards and risk assessments (present and foreseen); health & safety procedures; method statements for upcoming activities; planned inspections and registers/record keeping, etc.
The meeting chairperson must sign off and date the minutes.
Where more than one P/Contractor is involved on the project or in the same/associated work area, they must co-ordinate health & safety in such a way that all personnel and the public are protected at all times. They should thus all be in attendance at safety meetings. It is advised that the P/Contractor with the works contract of the largest value chairs and runs the safety meetings.

H4.9 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.

Injuries are to be categorised into: first aid; medical; disabling (lost shift/s); and reportable (Section 24). When reporting injuries to the Client/H&S Agent, these categories must be used. The Principal Contractor must

investigate all injuries, with an annexure 1 investigation report being completed and filed for all injuries requiring treatment over and above first aid. **The Principal Contractor must report on the four categories of injuries at monthly project progress meetings with the P/Agent.** Contractors must investigate injuries and incidents involving their employees and forward a copy of the 'annexure 1' investigation report to the Principal Contractor concerned forthwith. The Principal Contractor must report all injuries to the Client/Safety Agent in the form of an injury report, at least monthly (at audits).

Note that the P/Contractor must conduct its own independent incident investigation where a sub-contractor or other person is involved – a detailed investigation report must be compiled and made available to the H&S Agent.
All incidents reportable in terms of the provisions of Section 24 of the OHS Act must be reported to the local Dept. of Labour in the prescribed manner **(Dept. of Labour contact number: Cape Town 021 441 8000 / 021 441 5500 or fezeka.ngalo@labour.gov.za).**

H5.9 Personal protective equipment and clothing

The Contractor shall ensure that all workers are issued with the necessary personal protective clothing.

The Principal Contractor must ensure that all site personnel and visitors are issued with and wear the appropriate PPE as indicated in its risk assessment documentation. The Contractors must make provision and keep adequate quantities of SANS approved PPE on site at all times according to their risk assessments.
Eye protection must be worn by those working grinders, skill saws, high pressure water cleaners and the like. Even those workers in close proximity to these operations will also be required to wear such eye protection.
Hard hats will be required by those working in areas where there is a risk of head injury due to falling/striking objects. Wherever scaffolding is in use, hard hats must be worn. **It is foreseen that hard hats will be necessary at work sites where there is any risk of injury due to overhead work.**
Adequate footwear will be required as decided upon after a risk assessment has been carried out by the respective contractor.
Hand protection must be taken into consideration when assessing the risks associated with certain activities with the aim of minimising the risk of hand injuries.
Hearing protection is required where noise zones are envisaged and/or where activities emit noise higher than 85dB(A).
Reflective vests will be compulsory due to the work being adjacent/between busy roadways.
Personal fall protection equipment will be required when other forms of fall prevention are not possible **e.g. when working on station roofs.** Such equipment must include full body harnesses and lifeline systems to the approval of the CHSA. **Safety belts as a method of fall arrest are prohibited. Full body harnesses must be worn. Where lifelines or other devices are required, such devices must be detailed in the fall protection plan of the Contractor concerned and approved by the P/Contractor before such work begins. All lifeline systems must be installed and signed off by a registered rope access technician. Lifeline inspections will need to be carried out daily with records kept as proof thereof. Workers must have the opportunity to be secured from falling at all times, ensuring 100% fall protection on this project is a minimum requirement.**
Respiratory protection will be required by personnel exposed to hazards such as: cement dust, wood dust, vapours, fumes, etc.
COVID-19 PPE – The requirements for COVID-19 PPE have been relaxed until further notice. It is however advised that persons showing COVID-19 symptoms wear a face mask at work and during travel for five days from the onset of such symptomssymptoms.
Visitor PPE must be available before any visitor is exposed to overhead hazards and other hazards such as construction mobile plant, unsafe ground conditions, etc. The P/Contractor will need to make the necessary arrangements to ensure this. **Hard hats and reflective vests will be required for visitors. These will need to be available at each work area/site e.g. held in the foreman's site vehicle together with the fire extinguisher and first aid box.**

Input from ****Designers* **wrt the need for personal protective equipment and clothing. ****Designers* **need to as far as possible 'design out' the need for personal protective equipment and to 'design in' engineering controls and the substitution of hazardous activities. This needs to be central to the design process and should be taken into account when deciding what materials will be incorporated into the design of the building/structure, and when deciding what construction methods will most likely be adopted by the contractors on site.

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 Principal Contractor must make supervisory appointments as well as other relevant health & safety management portfolio appointments in writing (as stipulated by the OHS Act and **Construction Regulations 2014**). See attached **Annexure 'B'** for more detail on which health & safety management appointments are foreseen to be relevant.

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 Principal Contractor will have to appoint a full-time H&S Officer on this contract [Construction Regulation 8(5)].

Sub-contractors will need to appoint part-time safety officers as per the requirements of the Construction Regulations 2014. The frequency of site visits by such part-time safety officers will need to be agreed upon between the P/Contractor, Contractor, and CHSA, but is envisaged to be at least once per week depending on their scope of work, the number of personnel associated with their work and the risks involved, and the number of station sites involved with their appointment as a sub-contractor.

The following health & safety officer related duties will have to be carried out:

a) Health & safety audits and inspections including administrative and physical audits of all Contractors' health & safety plans, files and activities, and record findings in the form of audit reports to be kept in the health & safety file;
b) Compile weekly site inspection reports.
c) Assess, and finally approving contractor health & safety plans;
d) Maintain and co-ordinate the principal contractor's health & safety management programme;
e) Investigate near misses, incidents and injuries;
f) Co-ordinate the function of reviewing the hazard identifications and risk assessments and ensuring that up-coming activities are assessed for risk;
g) Assisting with method statements and safe work procedures and checking whether the responsible persons on site follow these safe work procedures;
h) Enforcing discipline on site and checking on compliance with health & safety procedures, standards and rules;
i) Co-ordinating health & safety induction training and safety awareness sessions;
j) Co-ordinating the H&S induction programme on site;
k) Hot work permit system management and co-ordination;

The appointed H&S Officer will need to be competent in terms of training, experience, knowledge of construction and health & safety and will need to be registered as a safety officer in terms of the SACPCMP requirements.

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 Principal Contractor must make supervisory appointments as well as other relevant health & safety management portfolio appointments in writing (as stipulated by the OHS Act and **Construction Regulations**

2014). See attached **Annexure 'B'** for more detail on which health & safety management appointments are foreseen to be relevant.

H6.4 Health and safety representative(s)

At least one health & safety representative is required by every Contractor who has more than 20 employees **assigned to the project (bus station contract) in question**. **Where the total workforce on site is more than 20, the P/Contractor will need to appoint an H&S representative to represent the workforce as a whole.** The Principal Contractor must ensure that Health and Safety Representative(s) are appointed under consultation with the employees. The H&S representatives must be competent to carry out their functions. The appointments must be in writing. The Health and Safety Representatives should carry out monthly inspections, keep records of the inspections and report all findings to the Responsible Person or Safety Officer forthwith and at monthly health & safety meetings.

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.

Designers **have the express duty to inform the client of any known or anticipated dangers or hazards relating to the construction work**, and to then make available all relevant information required for the safe execution of the work upon being designed or when the design is subsequently altered. ***Designers*** also need to take into account the **hazards relating to any subsequent maintenance** of the relevant structure and must make provision in the design for that work to be performed to minimise the risk.

The Principal Contractor must cause preliminary hazard identification and risk assessments (baseline HIRA) to be performed under the leadership of a competent person as part of its project H&S Plan, **which risk assessment must cover the activities foreseen during the first month of construction**. The hazards/ hazardous activities/operations foreseen, together with written safe work procedures must form part of the construction-phase health and safety plan submitted for assessment, comment, and approval to the Client. An assessment of the risks associated with each hazardous activity must also be conducted by making use of a **recognised risk rating system/program/matrix**. These risk assessments must include:

a) A list of hazards identified as well as potentially hazardous tasks and situations;
b) The risks (probability of injury / damage), based on the list of hazards and tasks;
c) A set of safe work procedures to be implemented with the aim of eliminating or if this is not possible, reducing and/or controlling the risks as far as reasonably practicable;
d) A monitoring and review procedure of the risk assessments as they change i.e. how will the risk assessments be reviewed, when will they be reviewed and by whom.

The Client has included an assessment of the baseline health & safety risks for the construction work foreseen. See below. The baseline risk assessment must be utilised by the P/Contractor and Contractors when compiling their own preliminary risk assessment document as part of their H&S Plan submissions.

The Principal Contractor must ensure that contractors inform, instruct and train their workers regarding any hazards, the associated risks and the related safe work procedures to be implemented **before** any work commences and thereafter at regular intervals as the risks change and as new risks develop. This training should be carried out in the form of toolbox health & safety talks. **Contractors must conduct their own toolbox talks (training on activities and risk assessments) and submit proof of these talks in the form of attendance registers to the Principal Contractor at least weekly or before new activities begin.** Every worker on site must undergo such toolbox health & safety talks with the attendance registers kept in the Contractor's health & safety file.

Contractors must conduct their own hazard identifications and risk assessments specific to their operations and forward a copy to the Principal Contractor. The Principal Contractor when required must report on the status of its Contractors' risk assessments to the Client/H&S Agent at monthly audits.

The implementation of a hazard identification risk assessment (HIRA) look-ahead program is required on this project with the aim of identifying hazards and hazardous activities well before they are undertaken.

Such programme should serve to ensure that safe work procedures are planned and implemented and that workers are properly informed of the hazards and safe work procedures before they are exposed to the risks.

It is also required that the site health & safety officer carries out regular planned task/job observations (PTOs) with the aim of ensuring that activities are being carried out as per the documented risk assessments and method statements. It is advised that at least two PTOs are carried out and documented per week.

It must also be emphasized that Designers as defined in the Construction Regulations have the duty of identifying design related hazards, assessing the risks, eliminating such risks by means of substitution of similar measures, or clearly alerting Contractors at tender stage where design related hazards cannot be eliminated.

Any design related hazards perceived by the Designer to have an impact on construction health & safety must be brought to the attention of P/Contractor with the aim of ensuring that all necessary health & safety measures can be priced and properly implemented thus minimising the chance of injury and property damage.

The following activities have been identified by the H&S Agent as potential hazards associated with this construction work and must be incorporated in the Principal Contractors' and Contractors' health & safety plans where applicable to that contractor's operations. ***Designers*** and Contractors should pay special attention to this section which take into account the inherent hazards, the foreseen construction related hazards, as well as the operational/maintenance/repair hazards which need to be taken into account by both ***Designers*** and **Contractors**.

Inherent situations and hazards identified specific to the IRT Phase 2A infrastructure (trunk and feeders) construction potentially impacting on this project:

1. Existing communities and the associated criminal/security risks. **[H]**
2. Busy traffic and pedestrian routes surrounding the infrastructure build. **[H]**
3. 3. Water environments – Bulk water pipeline. **[M]**Poor lighting along work areas e.g. inadequate street lighting. **[M]**
4. Underground and overhead electrical installations (existing)**[H]**
5. Existing underground asbestos cement pipes. **[M]**
6. Strong winds from the NW and SE and the resultant impact on external works and work close to traffic and pedestrians. **[M]**
7. Heavy rains during the winter months. **[M]**
8. The presence of social diseases such as the currently experienced COVID-19 and similar communicable diseases. **[M]**

Construction related situations and hazards to be taken into account by the Contractors when undertaking their respective works:

1. The demolition of existing buildings and structures including the identification of services and the making safe of these services before demolition commences. **[H]**
2. Delivery of materials and equipment to the particular work site noting that the work areas/sites will be located at various locations along particular traffic corridors, in the medians and along busy roadways. **[H]**
3. The location of the site offices – main site office and satellite offices. **[M]**
4. Movement of construction vehicles, personnel and site visitors to the work areas in question i.e. across a busy roadways, into road medians and the like. **[H]**
5. The demarcation and fencing of construction work areas. **[M]**
6. Stacking and storage of materials and equipment taking into account the busy roadways and pedestrian walkways bounding the construction work areas in question. Such stacking and storage areas may need to be 'off-site' but in close proximity. **[M]**
7. Traffic and pedestrian accommodation and the placement of signs, new jersey barriers and cones/delineators in high volume traffic and pedestrian locations. **[H]**
8. Traffic flagging and the interaction with live traffic. **[H]**
9. Detection, identification and location of existing underground electrical services before any work begins at a particular work area. **[H]**
10. Excavation work – deep trenches and excavations for services and for station sub-structures. **[H]**
11. Temporary works in the form of excavation shoring and bracing. **[H]**

12. Concrete work and the associated temporary works i.e. support work and formwork, concrete sub-structures, and the like. **[H]**
13. Work in confined spaces e.g. service spaces within the station sub-structures and work in deep excavations (bulk water pipeline relocation +- 4m depths) **[H]**
14. Work in excavations where burst/damaged bulk waterpipe could lead to drowning and/or excavation collapse. **[H]**
15. Working in fall risk positions where safe platforms cannot be provided. **[H]**
16. Work at fall risk positions e.g. edges of excavations, the edges of the concrete sub-structure platforms as well as openings into substructure service chambers. **[H]**
17. Step ladders and extension ladder use. **[M]**
18. Fire hazards due to welding, use of petrol (mobile generators), oxy-acetylene cutting, electrical installations and electrical tools, hot asphalt, close proximity of dry vegetation to work areas, strong winds, etc. **[M]**
19. Ergonomic hazards such as: work above shoulders; repetitive work; manual lifting; etc. **[M]**
20. Noise and dust. Note that noise and dust could also emanate from the civils contract which could be taking place adjacent to the station top-structure contract. **[M]**
21. Lifting operations – lifting machines, equipment, and tackle e.g. mobile crane, truck-mounted cranes, chains, nylon slings, and the like. **[M]**
22. Scaffolding as well as support work structures – erection, dismantling, work thereon in close proximity to busy roadways. **[M]**
23. Portable electrical tools and extension leads, as well as the use of petrol generators on site to produce the necessary electrical power. **[M]**
24. Chasing into concrete, asphalt, and other surfaces using concrete cutters and angle grinders. **[M]**
25. Core drilling through concrete – station sub-structures. **[M]**
26. Hazardous chemicals such as solvents, cleaning agents, cement, grouts, fuels, oils, epoxies, etc. **[M]**
27. Flammable substances such as petrol, solvents, shutter oil, etc. **[M]**
28. Asphalting and the associated hazards. **[M]**
29. Landscaping and planting of large trees. **[M]**
30. Construction of concrete sub-structures where this has not been provided as part of the civils contract. **[M]**
31. Interaction with other Principal Contractor work packages such as the station construction packages and with potential Direct Contractors (specialist trades) taking place within the same time frames and locations. **[M]**

Repair, maintenance, and future inspection related situations and hazards to be taken into account:

1. Bulk waterpipe maintenance. **[M]**
2. Maintenance of landscaping associated with the IRT routes. **[M]**
3. Watering of landscaping. **[M]**
4. Maintenance of the road surfaces, kerbs, sub-structures, underground services, streetlights, and the like. **[M]**
5. Road signs and traffic signal repairs and maintenance. **[M]**
6. Road lines painting. **[M]**

These hazards should be used as a starting point by the Principal Contractors and their Contractors so as to elaborate on their own hazard identifications and risk assessments in terms of Section 8 of the OHS Act and General Safety Regulations 2(1).

Unforeseen Hazards:

A Principal Contractor must immediately notify Contractors as well as the relevant ***Designer(s)*** and the Safety Agent, in writing of any hazardous or potentially hazardous situations that may arise during the performance of construction activities so that the necessary precautions may be taken or alternative designs approved before such work begins.

H8.3 Contractor 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) Induction and training;
h) Arrangements for monitoring and control to ensure compliance with the safety plan; and
i) 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.

Apart from the above some specifics wrt the H&S Plan are set out hereunder.

The health & safety plan should set out:

- The project-specific baseline risk assessments taking into account the Client's baseline HIRA;
- The arrangements and procedures for managing health and safety of the construction work including supervision and safety officer involvement.
- The monitoring systems for checking that the Health & Safety Plan and H&S procedures are being properly followed by the P/Contractor and Contractors.
- The Health and Safety Risk Assessment strategy and rating system to be used on this project including the activity look-ahead strategy.
- The **safety officer duties and time** to be dedicated to this project based on the assessment of project complexity.
- Safe work procedures for minimising the risks posed by the hazards identified.
- Special attention must be given to: **public protection health & safety measures; traffic and pedestrian management around/adjacent to the construction work areas in question; hoarding/fencing of work areas; existing services including underground and overhead; demolition of existing structures; excavation work; road works and associated activities; work in fall risk positions; work on existing electrical installations and the provision of temporary electrical installations; hazardous chemicals substances and flammables; noise; dust; mechanical lifting; hot works; fire prevention and fire-fighting; emergency evacuations from specific work areas; COVID-19 and similar communicable diseases; work in close proximity to other construction contracts e.g. civil/roads vs. top-structures.**
- The H&S Plan must include a **fall protection plan** detailing the specific fall related hazards and safety measures that will be implemented.
- **The requirements for a COVID workplace plan by the Principal Contractor for the project will be valid until such requirement lapses, noting that the COVID-19 Code of Practise remains in forceforce.**
- Regular liaison between parties on site i.e. meetings; information sessions.
- Consultation with the work force i.e. toolbox talks; risk assessment training.
- The exchange of design information between the Client, Designers, and Contractors on site.
- Selection and control of Contractors i.e. selection criteria; inspections; audits, etc.

- Site health & safety induction and on-site training i.e. inductions; toolbox talks.
- Welfare facilities, first aid, emergency planning and fire prevention strategies.
- The reporting and investigation of injuries and incidents including near misses i.e. what the intended system will be.
- Site specific rules and procedures including the company disciplinary code – enforcement of discipline on site (P/Contractor personnel and contractor personnel).

The Health and Safety Plan will then need to be reviewed and updated as the project develops, as information becomes available pertaining to new activities and risks and as information becomes available from the contractors carrying out specific activities on site. Unforeseen circumstances or variations to the planned work may also arise and must be dealt with by reviewing the health & safety plan (and activity-specific risk assessments) and updating the health & safety procedures set out in the plan (and risk assessments).

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 Principal Contractor must ensure that, on-site, periodic toolbox health & safety talks take place at least once every week or more often depending on the particular contractor's risk assessment programme requirements. All site personnel including all sub-contractors must attend health & safety talks at such intervals and keep proof thereof. These talks should deal with risks relevant to the construction work at hand i.e. they should be based on the job-specific risk assessments and safe work procedures. Records of attendance must be kept in the health & safety file. All contractors' employees must attend health & safety awareness toolbox talks carried out by their own supervisors. The attendance registers must be copied to the Principal Contractor together with information on the topics/risks discussed at the session.

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.

Public walkways and roadways must be kept clean and free of construction materials so as to prevent any negative impact on the public. Public roadways and walkways will have to be cleaned on a regular basis – daily

inspections will need to be conducted by the **principal contractor to ensure that all public areas are clean and free of hazards.**

Site visitors must be briefed on the hazards they may be exposed to as well as what measures are in place or should be taken to control these hazards. The Construction Regulations require that a record of these 'inductions' be kept on site. **It is advised that a visitor book with site rules leaflet** be kept at the **principal contractor's** site office **or in a particular site foreman's vehicle at each work area/site** and all visitors are to be directed to such point where they **must read through the site safety information, and be briefed by the area/section supervisor, and sign the visitor book**. **Each station site foreman could be issued with a clip board which could be strategically placed at the station site for consultation by visitors on entry.**

Visitor hard hats and reflective vests should be kept in the **site office or foreman's site vehicle**, made available by the principal contractor.

Open manholes need to be eliminated at all costs and must be adequately and properly covered to eliminate the chance of falls into such openings by members of the public.

Any work involving *'hot works' i.e. grinding, cutting, welding, soldering must be suitably hoarded off, screened and enclosed so as to eliminate any risk to the public. Fire-fighting equipment must always be on hand during 'hot works'. A hot work permit system will have to be implemented and managed by the P/Contractor in an effort to minimise the risk of fire and injury.

*'**Hot work'** includes all work that generates a spark or flame, and which may result in a fire.

Medical fitness of employees and contractors:

Contractors must ensure that **all** construction personnel (Construction Regulations 2014) undergo medical fitness assessments. Such assessments must be conducted by a **certified occupational health practitioner** as required by the Construction Regulations. Should a questionnaire be used as an assessment tool then such questionnaire must be administered by a **certified occupational health practitioner**.
Proof of these medical fitness assessments must be available on site in the site H&S file in the form of an Annexure 3 certificate as set out in the Construction Regulations.
Note that the CR's 2014 will require all Contractor personnel to undergo medical assessments based on the work they undertake (not merely work in fall risk positions or plant operators).
The P/Contractor may also require *_Designers_ and other persons to be declared medically fit to undertake their tasks on site e.g. inspections in fall risk locations, driving vehicles on site, etc.

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.

The Principal Contractor must ensure that all Contractors appointed comply with these Specifications as well as with the OHS Act, the Construction Regulations, and other relevant legislation including project-specific rules and guidelines documentation that may relate to the activities directly or indirectly. A Contractor when appointing other Contractors as 'Sub-contractors', shall mutatis mutandis ensure compliance as if it was the Principal Contractor.

The Principal Contractor may only allow a Contractor to begin work on site after receiving a suitable health & safety plan which must include a project-specific baseline hazard identification, risk assessments and health & safety procedures. The Principal Contractor must audit each of its contractors on a monthly basis, with audit reports kept on site. **Such Contractor monthly audits must include an administrative documentation assessment as well as a physical inspection of the contractor's site activities and working conditions.**

A Principal Contractor must stop any Contractor from carrying out construction work that is not in accordance with the Principal Contractor's and/or its Contractor's health & safety plan or if there is an immediate threat to the health and safety of persons.

- A Principal Contractor shall take all reasonable steps necessary to ensure co-operation between all contractors including other Principal Contractors to enable each of those contractors to comply with the provisions of the Construction Regulations. **This will be relevant where the civils contract (roads**

and sub-structures) and the top-structures contract are active at the same time at the same station.

- A Principal Contractor shall take all reasonable steps to ensure that each contractor's health and safety plan is implemented and maintained on the construction site: Provided that the steps taken shall include periodic audits at intervals mutually agreed upon between the Principal Contractor and contractors, but at least once every 30 days.
- A Principal Contractor must ensure that where changes are brought about to the design and construction, that sufficient health and safety information and appropriate resources are made available to contractors so as to allow them to execute their work safely.
- A Principal Contractor must ensure that every contractor is registered and in good standing with a recognised compensation fund or with a licensed compensation insurer prior to work commencing on site.
- A Principal Contractor must ensure that potential contractors submitting tenders have made provision for the cost of health and safety measures during the construction process.
- A Principal Contractor shall discuss and negotiate with the contractor the contents of the health and safety plan and shall finally approve (in writing) that plan for implementation.
- A Principal Contractor shall hand over a consolidated health and safety file to the client upon completion of the construction work and shall include a record of all drawings, designs, materials used and other similar information concerning the completed structure. An electronic format is requested.
- A Principal Contractor may only appoint a contractor to perform construction work when such Principal Contractor is reasonably satisfied that the contractor he or she intends to appoint, has the necessary competencies and resources to perform the construction work safely. Such resources would need to include competent site management and supervision, as well as a safety officer resource.

Please note that a **labour broker** is **not** deemed to be an Employer in terms of the Occupational Health and Safety Act, and workers supplied by these entities must be treated as if they are employees of the contractor concerned. So called “Labour Only” Contractors will be deemed to be employees of the Principal Contractor and all aspects pertaining to their activities in relation to the OHS Act must be managed by the Principal Contractor concerned. No Mandatary Agreements may be entered into with such Labour Only Contractors unless all legal requirements have been met by the Labour Only Contractor concerned.

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.

Permits may include the following and must be co-ordinated by the P/Contractor or other responsible authority:

- **Demolition permit from the CoCT.**
- **Hoarding permit from the CoCT.**
- **Construction Work Permit – will be applied for by the CHSA where necessary.**
- **Trenching where there is a risk of finding electrical and other underground services. Wayleaves will need to be applied for.**
- Work in confined spaces i.e. **in sub-structure service spaces, in existing manholes and the like, etc.**
- Closing of public and private roadways and pedestrian walkways.
- Hot work permits.
- Work on existing **electrical equipment and installations.**

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.

Contractor access to **station sites** will be limited to the specified access routes as defined by the P/Contractor and must be strictly enforced. Contractor employees will be required to carry **access tags (or a similar form of identification)** indicating their authority to enter the respective construction zones. Such access tags must also serve as proof of H&S induction attendance **–** no tag, no entry.

All **roadways and pedestrian walkways** must remain in a clean state, free of construction related materials and equipment.

All access points to site must carry the necessary signage and site manager's contact number.

Notices and signs must also be posted up warning persons of any dangers which may be encountered.

The City of Cape Town and its agents reserve the right to search and scrutinise all persons, bags, toolboxes, vehicles at any time.

All construction work must be adequately enclosed preventing access to unauthorised persons **– such external fencing must be at least 1.8m high Ready-fence panels of similar**. The BoQ will make provision for the specific type of fencing and hoarding required.

H&S Induction training/information sessions:

The Principal Contractor must ensure that its personnel including any sub-contractors and all site visitors undergo a project-specific health & safety induction training session held and managed by the P/Contractor before any worker starts work on the project (termed a 'site-wide' H&S induction session). A record of attendance must be kept in each contractor's health & safety file. Contractor employees will be required to carry **access tags (or a similar form of identification)** indicating their authority to enter the respective construction zones. Such access tags must also serve as proof of H&S induction attendance – no tag, no entry. **A designated person assigned to the project would need to co-ordinate and carry out the site wide H&S inductions when new employees start at a particular station site. Due to the contract having more than one work area/site, a central H&S induction training room needs to be located at the centralised site office compound at which all new workers and site visitors need to report before they proceed to their respective work areas.** Note that all contractors need to induct their own personnel as to their own activity-specific hazards, risks and safe work procedures.

H8.8 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:

Telephone numbers of emergency services;
The names of all safety representatives and safety officers; and
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.
Apart from the general requirements set out above, the specifics below need to be adhered to.
All Contractors with more than 5 employees shall supply their own first aid box. Contractors with more than 10 employees must have their own trained, certified first aider on site at all times. Copies of valid certificates are to be kept on site. **The Principal Contractor will need to have a first aid box together with splints, eye wash, a burn kit, and surgical masks available at each bus station site from the outset.** The Principal Contractor must ensure that any contractor working after hours has the necessary first aid equipment and first aider on duty. **Contractors with less than 5 workers must consult with the P/Contractor to ensure that first aid equipment is available. Note that this contract will require various work areas/sites to be on the go at the same time. Each site needs to have its own dedicated first aid box filled with the required contents. The first aider would also need to be within close proximity to the work are/site in question i.e. it is advised that first aid be administered by a certified first aider within 5 minutes.**

H8.9 Housekeeping

The Contractor shall ensure, *inter alia*, that suitable housekeeping is continuously implemented on the Site, including provision for the:

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 proper stacking and storage of materials and equipment (in accordance with Construction Regulations 27 and 28).

Deliveries, Waste Removal, Stacking/Storage of Materials:
Construction materials and equipment may only be stacked/stored in designated areas as identified and agreed with the P/Agent.

The Principal Contractor must ensure that there is an appointed stacking supervisor, and all materials are stacked and stored safely, on level, compact ground and out of pedestrian walkways or roadway. **Pallets of kerbs** for instance may not be stacked more than two above each other, on level, compact ground and must be on timber pallets. **Pipes and the like must be adequately chocked and stored in demarcated areas out of the reach of children.** No construction materials or equipment may be stacked or stored in public areas unless authorised by the client and must fenced off as per the client's requirements. Waste materials must be kept within designated construction zones and disposed of regularly. A system of separation is required in the interest of good environmental management practise.

H8.10 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.

The Principal Contractor and its Contractors must provide adequate, regularly serviced fire-fighting equipment located at strategic positions **on the work sites** and at **each site camp (could be various infrastructure sites as part of this contract)**, specific to the classes of fire likely to occur and in accordance with a site-specific fire risk assessment to be conducted by the P/Contractor during site establishment. The appropriate notices and signs must be posted up as required. **Wherever *'hot work' is taking place, additional fire extinguishers must be on hand. Contractors are responsible for ensuring compliance with the agreed site hot work procedures and must be in possession of a hot works permit issued by the P/Contractor. The P/Contractor will need to designate a site person as the hot work permit co-ordinator, which person will need to be trained on the procedure and implement and enforce it accordingly. This person could be the specific work area/site/section supervisor/foreman and doesn't need to be an additional, 'stand-alone' employee.**

*'**Hot work'** includes all work that generates a spark or flame and may therefore result in a fire.

The Principal Contractor will need to do the necessary fire risk assessments specific to its works and ensure that sufficient fire-fighting equipment is available in case of emergency.

Should the P/Contractor be unsure of the fire-fighting equipment required on this project or if a dispute arises as to the adequacy of the site fire arrangements and procedures, the local fire chief of local authority must be contacted and must pronounce on the matter.

Wherever hot work activities can be designed out, this option must be investigated and considered by *Designers*.

H8.11 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.

The Principal Contractor must ensure that sufficient toilets (1 toilet per 30 workers), hand washing facilities, soap, toilet paper, and hand drying material are made available at the site in accordance with the Construction Regulations. **Dedicated toilets and hand washing facilities must be supplied by the P/Contractor at each station site.**

Workers must not be exposed to hazardous materials/substances while eating and must be provided with adequate, sheltered eating and changing areas complete with sufficient numbers of benches and tables. Stores may not double up a change rooms or mess areas.

Note that eating and changing areas need to be sufficiently large enough and must be protected from the natural elements i.e. wind, sun and rain.

H9 GENERAL HAZARDS AND RISKS APPLICABLE TO WORK REQUIRED IN TERMS OF THIS TENDER

Pay attention to the information provided in section 8.2 herein above, namely information relating to the assessment of risks and in particular the assessment of the baseline H&S risks.

H9.1 Existing Site conditions

Inherent situations and hazards identified specific to the IRT Phase 2A infrastructure (trunk and feeders) construction potentially impacting on this project:

1. Existing communities and the associated criminal/security risks. **[H]**
2. Busy traffic and pedestrian routes surrounding the infrastructure build. **[H]**
3. **Water environments – Bulk waterpipe. [M]**
4. Poor lighting along work areas e.g. inadequate street lighting. **[M]**
5. Underground and overhead electrical installations (existing). **[H]**
6. Existing underground asbestos cement pipes. **[M]**
7. Strong winds from the NW and SE and the resultant impact on external works and work close to traffic and pedestrians. **[M]**
8. Heavy rains during the winter months. **[M]**
9. The presence of social diseases such as COVID-19 and similar communicable diseases and similar communicable diseases. **[M]**

H9.2 Information provided by the designer (CR 6(1))

A *Designer* must ensure that he/she complies with the requirements of the Construction Regulations 2014. Designers have a duty both to assist in health and safety during construction as well as post construction to ensure safe occupation of the structures concerned. This will include informing the Principal Contractor in writing of any known or anticipated dangers or hazards relating to the construction work and making available all relevant information required for the safe execution of the work upon being designed or when the design is subsequently altered.

The Health & Safety Specifications document must be taken into account by the various *Designers* including *Temporary Works Designers* as defined in the Construction Regulations 2014.

Designers must ensure that the following information is included in a report and made available to the Principal Contractor:

i) The relevant health & safety information about the design of the relevant structure that may affect the **pricing** of the construction work;
ii) The **loading** that any structure is designed to withstand.
iii) The **geotechnical science aspects** where appropriate.

A written report will be required from each Designer addressing the information set out above and below (in terms of **Construction Regulation 6, 2014**). The Construction Regulations (CRs) requires Designers (see definition of Designer in CR 1) to make certain information available to the Client (H&S Agent) and Contractors with the aim of 'designing out hazards' as far as possible. The aim of the report(s) would be to address the various headings (set out below) as best possible in an effort to make as much information available to the contractors so that they can improve their H&S management on the actual site.

Items to be addressed by Designers in terms of CR 6:

1. Anticipated or known dangers or hazards (known at this stage) relating to the construction work, foreseen by the Designer, including the relevant information required for the safe execution of the work. This must also **include health & safety information about the design which could have an influence on the pricing of the work**.
2. Dangerous substances/materials foreseen **which cannot be avoided** during this particular type of construction.
3. Dangerous procedures foreseen **which cannot be avoided**.
4. Hazards and risks relating to the subsequent maintenance of the structure/building foreseen and resulting safe work procedures advised.

5. Site inspections to verify whether construction of the relevant structures are being carried out in accordance with the designs. How will this be handled by you and your team on the project?
6. The stoppage of contractors where required (by the Designer) - the envisaged protocol to be followed to stop an activity or process on site. How will this be handled by you and your team on the project?
7. The application of ergonomic principles during design - how has and will this be implemented by the respective Designers?
8. Design of temporary works if applicable on this project e.g. formwork and support work, back propping, lateral support, shoring and bracing of excavations, etc. You may merely need to refer to the temporary works designer as being a separate entity, appointed by the Contractor.
9. The loading that a structure can withstand and/or is designed to withstand - details on this must be included. Please pay special attention to the definition of 'structure' in Construction Regulation 1.
10 Geotechnical-science aspects. You may merely have to refer to the geo-tech report and make this available to the Contractors. This information would assist the contractor with determining the ground conditions and associated **safe angles of repose** when pricing for excavation work.

Note that no guidance notes have yet been made available from the Department of Labour and the above list therefore represents the Agent's interpretation of the Regulations.

H9.3 Environmental hazards

The Environmental scientist assigned to this project must make the necessary inputs in this regard.

H9.4 Traffic & pedestrian hazards

The Principal Contractor must ensure that all the necessary traffic/vehicle and pedestrian accommodation safety measures are implemented to ensure the safety of personnel and members of the public (including site visitors) **at the various work areas/sites.** Such measures must be in accordance with recognised practises and to the approval of the Client, CHSA and the relevant authorities.
The P/Contractor must place the necessary emphasis on safe pedestrian walkways and routings throughout the construction stage. The construction work will be located at busy roadways and walkways and must be treated as such, with the necessary priority and planning put in place so as to prevent unnecessary impact on members of the public. The health & safety of such persons must be a priority at all times.
A detailed traffic and pedestrian management plan will need to be compiled by the P/Contractor at each work area/site based on the requirements of a *traffic engineer,* including drawings and procedures documents and the sequencing/phasing thereof.
The P/Contractor would need to appoint a competent person (traffic safety officer) to ensure that the traffic and pedestrian accommodation plans are implemented and enforced at the specific work areas.

H9.5 Construction materials (hazardous chemical agents)

The Principal Contractor must provide the necessary training and information as far as the use, transport, and storage of HCAs. The Principal Contractor and contractors must ensure that the use, transport, and storage of HCAs are carried out as prescribed in the HCAs Regulations. The Principal Contractor and contractors must ensure that all hazardous chemicals on site have been assessed for risk (written risk assessments for each hazardous chemical) and have Material Safety Data Sheets (MSDSs) available and the users are made aware of the hazards and precautions that need to be taken when using the chemicals. The First Aiders must be made aware of the MSDSs and how to treat HCAHCAs incidents appropriately. Copies of the MSDSs must be kept in the first aid box and in the store. All containers must be clearly labelled.

Flammable substances must be stored separately, away from other materials, and in a well-ventilated area (appropriate cross ventilation). A competent person should be appointed to be in control of this portfolio.

Stores must be well ventilated, preventing the build-up of flammable and toxic gases/vapours.
Plant and machinery may only be serviced and repaired in designated areas where control measures can be effectively implemented to prevent spills, leaks and other environmental contamination. Drip trays must be used.

Note that the Client must be made aware of all hazardous chemical agents. The P/Contractor must compile an inventory of all such substances including capacities (including those being used and stored by sub-contractors). Such inventory lists need to be reviewed monthly, after a new product is purchased, after an incident involving a hazardous chemical substance.

***Designers* also have a role to play wrt designing out the need for materials, methods and activities which have the potential of exposing personnel to hazardous chemical substances, by substituting such products for something less hazardous.**

Inhalation of dust (silica, etc.), fumes, vapours, and other hazardous chemicals/particulates. Chemical stressors identified by the Contractors on this project must be managed by the respective contractors who must also prevent exposure to workers/visitors other than their own employees. ***Designers* also have a role to play wrt designing out the need for materials, methods and activities which have the potential of exposing personnel to hazardous chemical substances, by substituting such products for something less hazardous.**

The presence of asbestos-containing materials cannot be discounted. The presence of underground asbestos cement pipes is quite common. Any asbestos materials which could be disturbed during construction/excavation activities must be worked on or removed as per the requirements of the Asbestos Abatement Regulations 2020.

Any products identified by the Contractors as possibly containing asbestos, not identified in the Inventory report must be reported to the **P/Agent** forthwith so that the necessary safety/health measures can be prescribed before such products are cleaned, worked on or removed. Any asbestos work must be carried out as per the requirements as set out in the Asbestos Regulations (no. R155, 2002). Regulations 15 and 20 must receive special attention.

When asbestos work needs to be carried out (in the case of this project, the presence of underground asbestos pipes cannot be discounted), an **asbestos plan of work** will be required from the appointed **Asbestos Contractor (registered with the Dept. of Employment & Labour)** and approved by the appointed Approved Inspection Authority for Asbestos (AAIA).

H9.6 Fall protection (working at fall risksrisk positions) (CR 10)

Working in a fall risk position includes any work where there is a risk of a person falling. The Principal Contractor must submit a risk-specific fall protection plan in accordance with the Construction Regulations before this work is undertaken. Note that work will involve the relocation of a bulk water pipe among other structures presenting fall related hazards.

All scaffolding must comply with the requirements of SANS 10085-2004. Scaffolding must be declared safe for use by a competent scaffold inspector who must complete the scaffold register and tag the scaffold accordingly. All scaffolds must be tagged either 'safe' or 'unsafe'. Inspections must then be carried out weekly, after bad weather, after any alterations, after an incident, and before dismantling. The Principal Contractor must keep all scaffold inspection registers on site.

Working in elevated positions requires the preparation of a fall protection plan (FPP). Contractor FPP's must be compiled and submitted to the P/Contractor for assessment and final approval well before any elevated work may be undertaken by such contractor. The plan must include all relevant fall related risk assessments and safe work procedures. **All persons working at fall risk positions must be evaluated for physical fitness – such evaluation may only be performed by a certified occupational health practitioner. The Principal Contractor and Contractors must explain their methodologies in this regard in their H&S Plans.** All persons working in elevated positions must be informed of the risks and safety measures (in other words all workers must be trained on the fall protection plan, in the form of a toolbox safety talk) and records of this training/information session must be kept on site.

Work at fall risk positions may only be conducted as if it were being conducted from a safe ladder or safe scaffold. All openings, edges, and the like must be adequately guarded .
The Principal Contractor must ensure that any exposed drop-off edges and openings are adequately guarded and demarcated to prevent the risk of a person falling from/through such edge or opening. Service duct/shaft openings would need to be adequately covered or guarded at all times.

Contractors have the following options when contemplating the protection of openings, and edges:

1. A **physical barrier** at the edge of the opening/slab, which must be strong enough to carry the weight of a person in the process of falling (wire will not be deemed sufficient). Barriers must be of timber or scaffold tubes at a height of one meter above the floor or platform and must be designed and approved by a temporary works (formwork and support work) designer;
2. An **external façade scaffold** complete with a fully boarded platform at the same level as the **concrete slab** with a double handrail and toe board, could serve as a fall protection safety measure;

3. **Personal fall prevention equipment** in the form of safety harnesses and lifeline systems (**retractable lifelines)** to prevent persons from reaching a fall risk position but still able to carry out their work. Lastly, the provision of personal fall arrest equipment which would arrest a person should they fall off an edge or through an opening, or through a fragile covering.

A Principal Contractor's and all Contractors' fall protection plans must detail the following safety measures: Protection of decking edges and openings, and areas from where a person can fall, as well as the safe means of access provided to these work areas.

Designers need to as far as possible take into account fall related dangers and hazards and design out such exposures wherever possible. Where such hazards cannot be eliminated, reasonable detail should be provided wrt the identification of the fall hazards, as well as the associated safety measures to be priced by the contractors.

Input from ****Designers* **wrt the need for personal fall prevention equipment. ***Designers*** **need to as far as possible 'design out' the need for personal protective equipment and 'design in' engineering controls and the substitution of such fall risk related activities. This needs to be central to the design process and should be taken into account when deciding what materials will be incorporated into the design of the structures in question, as well as when deciding what construction methods will most likely be adopted by the contractors on site.**

Where fall prevention or fall arrest devices are being used, the correct devices must be used for the intended purpose and they must be properly inspected and maintained. Workers must be trained in the use and maintenance of the fall prevention and arrest equipment/devices. Safety belts as a method of fall arrest are prohibited. Full body harnesses must be worn. **Where lifelines or other devices are required, such devices must be detailed in the fall protection plan of the Contractor concerned and installed by a registered rope access company/person. Workers must have the opportunity to be secured from falling at all times, ensuring <u>100% fall protection on this project is a minimum requirement.</u>**

All scaffolding platforms above 2m from the ground must be complete with guardrails and toe boards and must be fully boarded as per the requirements of general-purpose scaffold platforms (5-board platforms). Mobile or static tower scaffolds may not exceed 3 x their minimum base width in height and must be adequately boarded as per their loading requirement. Mobile scaffolds and static frame towers must be erected as per the manufacturers' requirements (copies of these erection specifications/data sheets must be available to the scaffold erectors and scaffold supervisor on site).

H9.7 Structures (CR 11)

Any existing structures that may be affected by demolition and/or building work must be deemed safe by means of a structural engineering survey and report compiled by a competent person (consulting civil or structural engineer) and forwarded to the Client and Principal Contractor concerned before any persons are exposed to any risks. Inspections of these existing structures must be conducted from time to time by the consulting structural engineer to ensure compliance with the recommendations and procedures of the same competent person. All relevant health & safety information must be brought to the attention of the Principal Contractor and contractors by the relevant parties forthwith.

H9.8 Temporary works (CR 12)

The Principal Contractor must ensure that the provisions of Construction Regulation 12 are adhered to. **The appointments of a temporary works designer as well as a temporary works supervisor are critical**.
These provisions must include but not be limited to ensuring that all design drawings are available on site, that all formwork and support work equipment (including back-propping) used is examined for suitability before use (by the supplier) with proof of these inspections forwarded to the hirer/user, that all formwork and support work (including propping and back-propping) **is inspected by a competent person appointed in writing, immediately before loading any structure with materials, equipment or any other imposed load e.g. reinforcing steel, compressor plant, I-beams, etc., Inspections must also be carried out before, during and after the placement of concrete and thereafter on a daily basis until the support work (including back-propping) has been removed. Records of all inspections must be kept in a register on site held by the Principal Contractor.** The inspection records must be suitably sequenced and filed for easy reference by the H&S Agent and other interested parties.

H9.9 Excavation work (CR 13)

Detection and Location of Existing and Underground Services/Utilities:
The P/Contractor must ensure that all **underground and internal services (within the station sub-structure** are known before starting any work. Where **Way Leaves are required, they must be applied for by the P/Contractor and will serve as indications of the relevant services.** Should the location of services (electrical, water, gas, etc.) not be known or if it is suspected that services might be present, the Client must mandate the Contractor to make use of the necessary detection equipment in order to accurately identify services before starting with trenching or demolition work. **The relevant ****Designers* **should assist the P/Contractor with the location of underground services specific to their discipline in an effort to protect personnel from potential injury and protecting existing services from avoidable damage.**

Excavations:

The Principal Contractor and relevant Contractors must make provision in their tender for the shoring of excavations where the soil conditions warrant it or if this is not possible batter back such excavations to a safe angle, termed the safe angle of repose. **Note that the Geotech investigation results were not available at the time of the drafting of these H&S Specifications. Should there be any question as to the safety/stability of any excavation, the consulting civil engineer concerned needs to be consulted, taking into consideration that every excavation needs to be shored and braced or battered back to a safe angle. Vertical excavations are prohibited unless with the written approval of a civil or geo-tech engineer.**

The Principal Contractor has the following options: first option is to shore or brace the excavation, should this not be practical then such excavation must be battered back to the safe angle of repose (second option), should the first two options not be deemed necessary by the contractor, then permission must be given in writing by the appointed competent excavation supervisor (third option). Where uncertainty pertaining to the stability of the soil exists, the decision of a professional engineer or professional technologist competent in excavations shall be decisive. Such permission must be in writing.

- Excavations/trenches need to be inspected before every shift and a record of these inspections is kept.
- **All excavations where there is a risk posed to pedestrians (foot traffic), must be fenced off.**
- Safe work procedures need to be communicated to the workers at inductions and at regular safety awareness sessions;
- The safe work procedures need to be enforced and maintained by the Principal Contractor's and Contractors' responsible persons at all times;
- Excavations next to roadways (public or site roadways) - ensure that no load, material, plant or equipment is placed or moved near the edge of any excavation where it is likely to cause its collapse and thereby endangering the safety of any person, unless precautions such as the provision of sufficient and suitable shoring or bracing are taken to prevent the sides from collapsing. **The excavations need to be barricaded with New Jersey barriers to guard against vehicles driving into the excavation.** The Geotech report should detail the requirements in this regard and guide the Contractor.
- Cause convenient and safe means of access to be provided into every excavation in which persons are required to work and such access shall not be further than 6m from the point where any worker within the excavation is working;
- Ascertain as far as is reasonably practicable, the location and nature of electricity, water, or other similar services which may in any way be affected by the work to be performed. **Way Leaves will need to be applied for and will serve as indications of services adjacent to the site. Should you as the contractor be unsure of the exact location of electrical services, detection equipment must be used as well as a system of hand excavation as per a written risk assessment and method statement approved by the consulting engineer;**
- Cause every excavation which is accessible to the public or which is adjacent to public roads or thoroughfares, or where the safety of persons may be endangered, to be -
  (i) adequately protected by a solid barrier (**New Jersey barriers**) where adjacent to road traffic and/or by a fence of at least one meter in height in all other situations (all excavations must be fenced off from the public), which fence needs to be secured in a vertical position; and
  (ii) provided with warning illuminants or any other clearly visible boundary indicators at night or when visibility is poor;
- Cause warning signs to be positioned next to an excavation within which persons are working or carrying out inspections or tests.

Shoring and bracing of excavations:

The Principal Contractor must ensure that the provisions of **Construction Regulation 12** are adhered to.

The appointments of a *temporary works designer (shoring/bracing/lateral support of excavations) as well as a temporary works supervisor will be required especially pertinent where sloping of excavations is not possible and where shoring and bracing is required This may be required during the relocation of the existing bulk waterpipe specific to this project, requiring depths of 4m to be worked in.

These provisions must include but not be limited to ensuring that all design drawings are available on site, that all **shoring and bracing** equipment used is examined for suitability before use (by the supplier) with proof of these inspections forwarded to the hirer/user, that all **shoring and bracing is inspected by a competent person appointed in writing on a daily basis until the equipment has been removed. Records of all inspections must be kept in a register on site held by the Principal Contractor. The**

designer of temporary works needs to inspect the temporary works structures and deem them to be as per design and then sign them off. The daily inspection records wrt the temporary works must be suitably sequenced and filed for easy reference by the H&S Agent and other interested party.

H9.10 Demolition work (CR 14)

Any Contractor carrying out demolition work must ensure that prior to any such work being carried out, and in order also to ascertain the method of demolition to be used, that a structural engineering survey of the structure to be demolished is carried out by a competent person and that a method statement on the procedure to be followed in demolishing the structure is developed and accepted by the consulting engineer.

The following measures must also be adhered to:

- The Contractor must appoint a competent person in writing to supervise and control all demolition work on site;
- The Contractor must ascertain the location and nature of electricity, water, telecoms, or other similar services, which may be affected by the work being performed. A safe method of removal, relocation or work around these services must be drawn up and accepted by the ***consulting engineer**;
- The Contractor must ensure that any partly demolished structure does not pose a safety risk to workers or other persons;
- Should the Contractor be in doubt as to the safety of a partly standing structure, the structure must be;
  demarcated at a reasonable distance and sign posted, warning persons of the risk until such structureis made safe;
- The Contractor must ensure that no persons may work, move or stand under any partly demolished overhanging material, which has not been adequately shored, braced or supported;
- While demolition is taking place, all unauthorised persons must be kept well away from the operation;
- The demolition safety plan must include the applicable personal protective equipment and clothing that are required. The minimum being leather gloves; steel toecap boots; eye protection where the risk of eye injury exists i.e. cutting, grinding, hot work, impact work; hearing protection for operators and other workers exposed to noise over 85dB(A); and fall prevention and/or arrest equipment when the risk of falling exists and where safety rails or safe work platforms cannot be provided.

H9.11 Tunneling (CR 15)

N/A wrt this project.

H9.12 Scaffolding (CR 16)

All scaffolding must comply with the requirements of SANS 10085-2004. Scaffolding must be declared safe for use by a competent scaffold inspector who must complete the scaffold register and tag the scaffold accordingly. All scaffolds must be tagged either ‘safe’ or ‘unsafe’. Inspections must then be carried out weekly, after bad weather, after any alterations, after an incident, and before dismantling. The Principal Contractor must keep all scaffold inspection registers on site. See also section 9.6 above.

H9.13 Suspended platforms (CR 17)

N/A wrt this project.

H9.14 Rope access work (CR 18)

N/A wrt this project

H9.15 Material hoists (CR 19)

N/A wrt this project

H9.16 Bulk mixing plant (CR 20)

N/A wrt this project

H9.17 Explosive actuated fastening device (CR 21)

N/A wrt this project

H9.18 Cranes (Lifting Machines, Tackle and Lifting Operations) (CR 22)

The Principal Contractor must ensure that lifting machinery and tackle are inspected before use and thereafter in accordance with the Driven Machinery Regulations and the Construction Regulations (Regulation 22). The P/Contractor must ensure that any lifting machines utilised on site has been load tested and inspected by a **competent lifting machine inspector (registered with the Department of Labour, Gazette number 27305)** and that a competent lifting tackle inspector has inspected the lifting tackle within the prescribed time frames taking into account that:

- All lifting machinery and tackle have a safe working load clearly indicated;
- Regular inspections and servicing are carried out (3-monthly inspections and records for tackle and 6-monthly inspections and records for lifting machines);
- There is proper supervision in terms of supervising and co-ordinating lifting operations on site;
- Rigging of loads is done in accordance with acceptable safe work practices;
- **Guy ropes (tag lines) are connected to every load due to the restricted nature of the station sites within busy roadways and walkways;**
- Annual load test certificates for lifting machines are in place;
- Load test institutions are registered with the Department of Labour;
- Any and all repairs, maintenance and services are recorded, and the results logged in the crane book/register and kept on site;
- Lifting machine inspectors are certified by the Engineering Council of South Africa;
- The operators are certified to operate the specific machine (valid certificate to be on site);
- The operators are physically fit to work and in possession of a medical certificate of fitness to be available on site;
- Load tests will also be required for cherry pickers and man cages/cradles.

H9.19 Construction vehicles and mobile plant (equipment) (CR 23)

"Construction Plant" includes all types of plant including but not limited to, lifting machines, equipment and tackle, construction vehicles, small plant such as petrol generators and cement/concrete mixers, etc.

The Principal Contractor must ensure that such plant complies with the requirements of the OHS Act, Construction Regulations and any manufacturers' specifications. The Principal Contractor must inspect and keep records of inspections on construction vehicles and mobile plant used on site. Only authorised/competent persons in the possession of the necessary **training certificates** and in possession of a **certificate of medical fitness may operate construction vehicles and mobile plant.** Appropriate PPE and clothing must be provided and maintained in good condition at all times.
Reverse alarms and reverse lights must be installed on construction vehicles i.e. **trucks, delivery vehicles, etc. Especially due to work within a 'live' traffic and pedestrian environment.**

H9.20 Electrical installations and machinery (CR 24)

The ***Consulting Electrical Engineers*** will need to ensure as far as possible that Contractors are made aware of the positions of all electrical installations and service lines. The Principal Contractor must notify the Client should they not be sure of the location of any electrical installations.

The Principal Contractor must comply with the Electrical Installation Regulations, the Electrical Machinery Regulations and the Construction Regulations (CR 22).

The Principal Contractor responsible for the installation of temporary electrics must keep a copy of the Certificate of Compliance (CoC) for its temporary electrical power supply and installation. A revised CoC is required whenever the installation is altered or changed in any way. All temporary electrical installations must be inspected at least weekly by a competent person appointed in writing with records kept.

The ****Consulting Electrical Engineer* **will need to carry out regular inspections to ensure that all specifications are being adhered to and that installations are being installed correctly and are

inspected and commissioned by a registered installation electrician, with Certificates of Compliance issued to the P/Contractor and Client.

Portable electrical tools and equipment, including electrical extension leads must be visually inspected daily before use with records kept. **Petrol generators** should also be inspected daily to ensure that they remain safe for use. Such inspections must be carried out by persons competent to do so and records must be kept.

Overhead Electrical Power Lines and Associated Equipment:

The Principal Contractor must comply with the Electrical Installation Regulations and the Electrical Machinery Regulations in this regard, **as well as with all Eskom requirements and clearances prescribed specific to this project**.

Overhead high voltage electrical power lines may need to be relocated as part of this project. A detailed method statement will need to be agreed with the P/Agent and electrical engineer appointed to oversee this work before commencing with such work. All the necessary public protection procedures will also need to be adhered to.

H9.21 Flammable liquids (CR 25)

The Principal Contractor must provide the necessary training and information as far as the use, transport, and storage of HCS. The Principal Contractor and contractors must ensure that the use, transport, and storage of HCS are carried out as prescribed in the HCS Regulations. The Principal Contractor and contractors must ensure that all hazardous chemicals on site have been assessed for risk (written risk assessments for each hazardous chemical) and have Material Safety Data Sheets (MSDS) available and the users are made aware of the hazards and precautions that need to be taken when using the chemicals. The First Aiders must be made aware of the MSDS's and how to treat HCS incidents appropriately. Copies of the MSDS's must be kept in the first aid box and in the store. All containers must be clearly labelled.

Flammable substances must be stored separately, away from other materials, and in a well-ventilated area (appropriate cross ventilation). A competent person should be appointed to be in control of this portfolio.

Stores must be well ventilated, preventing the build-up of flammable and toxic gases/vapours.

Plant and machinery may only be serviced and repaired in designated areas where control measures can be effectively implemented to prevent spills, leaks and other environmental contamination. Drip trays must be used.

Note that the Client must be made aware of all hazardous chemical substances. The P/Contractor must compile an inventory of all such substances including capacities (including those being used and stored by sub-contractors). Such inventory lists need to be reviewed monthly, after a new product is purchased, after an incident involving a hazardous chemical substance.

H9.22 Water environments (CR 26)

Although not foreseen, theThe following would apply:
When construction work is carried out over or in close proximity to water e.g. the relocation of an existing bulk waterpipe where there is a risk of water filling an excavation, the following must be considered:

- Prevent persons from falling into the water i.e. body harnesses, edge protection or catch nets;
- Rescuing persons in danger of drowning;
- Should there be a danger of persons drowning when falling into the water, they must be provided with and wear life jackets.

H9.23 Overhead Work (CR 27(g))

Refer to 9.18 above.

H9.24 Confined spaces

When any work is planned in a confined space, the Principal Contractor must ensure that a risk assessment of the conditions be undertaken and then test the confined space (if necessary) to determine whether the atmosphere is safe and will remain safe for the duration of the work period. The P/Contractor must take into account the type of work and equipment that will be used in the process and whether these could impact on

the air quality. Further to the above the contractor must ensure compliance with the options set out in terms of the provisions of General Safety Regulation 5, 'Work in Confined Spaces'.
The P/Contractor must designate a competent person to supervise all confined space work and must ensure that the written confined space risk assessment is implemented and enforced on site. **This confined space co-ordinator would more than likely be the station foreman.**
The specific confined spaces foreseen would be the sub-structure service spaces at each station or any manholes and the associated chambers.
Note that work in a trench where there is a risk of oxygen deficiency and/or the infiltration of dangerous gases such as methane, sulphur dioxide, etc. is deemed to be work in a confined space.

H9.25 Other hazards

Guarding of Exposed Edges, Holes, and Penetrations:

The Principal Contractor must ensure that any exposed drop-off edges and openings are adequately guarded and demarcated to prevent the risk of a person falling from/through such edge or opening. The concrete sub-structure would need to be assessed for such risks by the P/Contractor before commencing work in these areas and made safe. Service space floor openings would need to be adequately covered with temporary hinged covers while the sub-structure edges would need to be guarded based on an assessment of such fall risks.

Tree felling:

As soon as the Contractor has established the tree felling method, a suitable method statement (safe work procedure) must be submitted to the Client for approval i.e. heavy duty earthmoving machinery, chain saws, hand saws, etc.
When these safe work procedures are drafted the following best practices must be considered:
The chainsaw operator must comply with all in-house safety policies and regulations.
The chainsaw operator must have the necessary safety equipment and complete the chainsaw safety checklist prior to the commencement of each shift.
The chainsaw operator must be issued with the following SABS approved protective equipment:
- Approved hardhat, earmuffs and appropriate eye protection
- Approved chainsaw operator's gloves.
- Approved sprocket-clogging leggings.
- Approved steel toecap boots.
- Brightly coloured shirt.

The chainsaw operator must ensure that the following:

- A chain brake that automatically engages on kick-back.
- A chain catcher pin that shortens the reach of the whip-back of a broken chain.
- A throttle lock to prevent accidental throttle engagement.
- A rear hand guard to supplement protection offered by the chain catcher.
- Anti-vibration rubbers.
- An exhaust muffler directed away from the operator.
- An anti-kickback chain.
- A chain and bar cover to be used during the transportation of the saw.

COVID-19:

Due to the current situation wrt COVID-19 and the State of Disaster legislation having been repealed, the Principal Contractor and Contractors will have to manage the transmission of the virus on site by assessing the risk of transmission, and then implementing a set of health and hygiene protocols commensurate with the risk. **A COVID-19 risk assessment document will need to be available for scrutiny in this regard and will drive the COVID-19 control measures to be implemented and enforced on site.**

PRIMARY HEALTH AND SAFETY COMPLIANCE

CITY OF CAPE TOWN

DIRECTOR: TRANSPORT INFRASTRUCTURE IMPLEMENTATION URBAN MOBILITY DIRECTORATE

CONTRACT NO. 412Q/2022/23

CONSTRUCTION OF THE PHASE 2A IRT INFRASTRUCTURE: WORK PACKAGE E2 ALONG GOVAN MBEKI ROAD (M9) FROM WEST OF NY72 ROAD TO EAST OF KLIPFONTEIN ROAD

ANNEXURE A

The Principal Contractor and its Contractors must submit compliance with Annexure 'A' before commencing work on site. **Compliance with Annexure 'A' must be maintained and proven to the Client at audits.**

HSS Item No.	Requirement	Legal Reference	Compliance required:
A1	Health & Safety Plan (H&S plan)	Constructions Regs.	H&S Plan to be sent to the Client for assessment two weeks before start of construction work. Comment and final approval to be in place before construction work may commence.
A2	Notification of Intention to Commence Construction / Building Work	Complete Schedule 1 (Construction Regs)	Notification to be made by each **P/Contractor** (where a permit is not triggered) at least seven days before commencement of construction work.
A3	Application for Construction Permit	Construction Regs	**Required for each contract where the value exceeds R60 mil or where the duration of the construction stage will exceed 365 days.**
A4	Assignment of Responsible Persons to manage and supervise Construction Work	OHS Act ~ Section 16(2) appointee ~ Construction Manager, Alternate Manager; Assistants, Activity, and Section Supervisors.	Construction Manager and Alternate required before commencement of construction work.
A5	Appointment of Construction Safety Officers	Construction Regs	**P/Contractor and Contractor safety officers** have been specified based on the number of stations awarded. See the specific section herein above dealing with safety officers.
A6	Compensation for Occupational Injuries and Diseases – proof of registration	COIDA	Before commencement on site.
A7	Occupational Health and Safety policy	OHS Act	To be held in safety file in site office and posted up on site.
A8	Health and Safety Organogram showing all H&S management portfolios and positions	Client Requirement	Together with H&S plan.

HSS Item No.	Requirement	Legal Reference	Compliance required:
A9	Preliminary Hazard Identification Risk Assessment and safe work procedures	Construction Regs.	Together with H&S plan.
A10	Fall protection plan (first draft) as defined in the Construction Regulations **– pay special attention to the FPP criteria as set out in CR 10(2).**	Construction Regs.	Together with H&S plan
A11	Provide the criteria you intend to use when assessing Contractor H&S Plans as well as when conducting monthly audits on your Contractors	Construction Regs.	Together with H&S plan
A12	Provide the methodology that you will be using when it comes to the stopping of dangerous activities on site	Construction Regs.	Together with H&S plan
A13	Provide the criteria that you will be using to assess the competence of Contractors in terms of H&S	Construction Regs.	Together with H&S plan

HSS = Health & Safety Specifications

OHS Act = Occupational Health & Safety Act 1993

CR = Construction Regulations 2014

COID Act = Compensation for Occupational Injuries and Diseases Act 1993

ASSIGNMENT OF PRINCIPAL CONTRACTOR'S AND CONTRACTORS' RESPONSIBLE PERSONS

CITY OF CAPE TOWN
DIRECTOR: TRANSPORT INFRASTRUCTURE IMPLEMENTATION URBAN MOBILITY DIRECTORATE

CONTRACT NO. 412Q/2022/23

CONSTRUCTION OF THE PHASE 2A IRT INFRASTRUCTURE: WORK PACKAGE E2 ALONG GOVAN MBEKI ROAD (M9) FROM WEST OF NY72 ROAD TO EAST OF KLIPFONTEIN ROAD

ANNEXURE B

The Principal Contractor must make all the management appointments as set out below. Compliance with annexure 'B' to be maintained and proven to the safety agent at audits (Further appointments could become necessary as the project progresses).

Item	Appointment	Legal Reference	Requirement
B1	CEO Assignee	OHA Act, Section 16(2)	A competent person to assist the CEO in achieving compliance with the OHS Act – P/Contractor's / Contractor's Responsible Person.
B2	Construction Manager	CR 8	A fulltime competent person to supervise and be responsible for all site matters including health & safety on site. The person is appointed by the Section 16(2) assignee.
B3	Alternate Construction Manager and Assistant Construction Manager(s)	CR 8	A fulltime competent person(s) to take control when the CR 8(1) appointee is not on site.
B4	Section and Activity Supervisors	CR 8(7) and 8(8)	The appointment of supervisors specific to trades, activities, sections, areas on site. The various risk assessments must detail the supervision requirements.
B5	Incident Investigator	GAR 9	A competent person to head up the investigation team and co-ordinate incident/injury investigations on site.
B6	Risk assessment co-ordinator	CR 9	A competent person to co-ordinate the drafting/ reviewing/distribution of risk assessments on behalf of the Principal Contractor. The same applies to Contractors.
B7	Fall protection plan co-ordinator	CR 10	A competent person to co-ordinate the drafting/ reviewing/distribution the fall protection plan. The same applies to Contractors.
B8	First Aider(s)	GSR 3	A certificated person to address first aid situations and take charge of injuries. **Where there are various work areas/sites, more than one first aider will be required.**

Item	Appointment	Legal Reference	Requirement
B9	Construction Vehicle and Mobile Plant Inspectors	CR 23	A competent person to inspect construction vehicles and mobile plant daily and ensure they are safe for use, keeping daily records.

B10	Portable Electrical Tool Inspector	CR 24	A competent person to co-ordinate / inspect portable electrical tools, leads and plugs.
B11	Scaffolding inspector	SANS 10085 – 2004; CR 16	A competent person to inspect scaffolding before use and every time after bad weather, etc.
B12	Scaffold supervisor (P/Contractor employee)	SANS 10085 – 2004; CR 16	A competent P/Contractor employee to supervise all scaffolding on site, ensuring that scaffolds are safe for use, inspected, extended/altered, repaired when required and that all trades are co-ordinated and authorised to work on such scaffolds.
B13	Scaffolding erector	SANS 10085 – 2004; CR 16	A competent person(s) to erect scaffolding – leader of the scaffold team.
B14	Ladder inspector	GSR 13A	A competent person to inspect ladders daily and ensure they are safe for use, keeping monthly record.
B15	Temporary electrical installations inspector and supervisor	CR 24	A competent person to inspect all temporary electrical installations. Including weekly inspections and record keeping. A person to supervise the use thereof.
B16	Fire-fighting equipment inspector	CR 29	A competent person to co-ordinate & inspect fire-fighting equipment. Including ad-hoc checks and monthly inspections with records kept.
B17	Lifting machine and lifting tackle supervisor Lifting tackle inspector	DMR 18	A competent P/Contractor employee to co-ordinate the management of lifting machines and tackle, ensuring that such equipment is safe for use at all times, inspected when necessary and repaired when required. The operators, banks men and contractors to liaise with this person. A competent inspector (company) to be sourced, to undertake the 3-monthly legal compliance safety inspections of all lifting tackle.
B18	Stacking supervisor	CR 28	A competent person to supervise all stacking and storage operations.
B19	Construction safety officer (P/Contractor and sub-contractors)	CR 8(5)	P/Contractor – A competent person to fulfil the functions as set out in these HSS. **Fulltime for the P/Contractor.** **Note that sub-contractors need to appoint at least part-time safety officers. Frequency of site visits to be agreed upon between the P/Contractor, Contractors, and the CHSA but are deemed to be at least weekly visits to site.**

Item	Appointment	Legal Reference	Requirement
B20	**Traffic and pedestrian accommodation safety officer**	H&S Spec	A competent person to be designated with the role of ensuring compliance with the agreed traffic and pedestrian accommodation plans for each station.
B21	**H&S Induction Officer**	H&S Spec and C-19 Regs	A competent person to fulfil the functions as set out in these HSS.

GENERAL COMPLIANCE REQUIREMENTS

CITY OF CAPE TOWN
DIRECTOR: TRANSPORT INFRASTRUCTURE IMPLEMENTATION URBAN MOBILITY DIRECTORATE

CONTRACT NO. 412Q/2022/23

CONSTRUCTION OF THE PHASE 2A IRT INFRASTRUCTURE: WORK PACKAGE E2 ALONG GOVAN MBEKI ROAD (M9) FROM WEST OF NY72 ROAD TO EAST OF KLIPFONTEIN ROAD

ANNEXURE C

The Principal Contractor and Contractors must comply with but not be limited to the requirements tabled below: Prove compliance with annexure 'C' at audits conducted by the safety agent.

Item	What	When	Output	Reviewed by Client Date:
C1	Construction-phase Health & Safety Plan	Monthly review	Principal Contractor to indicate the status of Contractors' health & safety plans.	
C2	Health & Safety File(s)	Open file when construction begins and maintain throughout.	Have files on hand at audits. Contractors to report on their file at monthly health & safety audits by the Principal Contractor.	
C3	OHS Act and relevant Regulations / Codes	Monthly review	To be kept in the health & safety file on site.	
C4	Health & Safety Induction training **incl. COVID-19**	Every worker before he/she starts work.	Attendance registers to be kept.	
C5	H&S Awareness Training (Tool Box Talks)	At least every week.	Attendance registers to be kept.	
C6	Health & Safety Meetings	Monthly	Meeting minutes to be kept.	
C7	Health & Safety Reports **(safety officer)**	Weekly	Report covering: – Incidents / injuries and investigations – Non-conformances by employees & Contractors - reports – **Site H&S inspection findings of the week.**	

C8	Audits on sub-contractors	Monthly	Report covering at least: – H&S File/Plan – WCA status – Management appointments – Contractor management – Risk assessment & safe work procedures – Physical site inspection findings	
C9	Emergency procedures	Monthly evaluation of procedure	Compile written procedure as well as tel. numbers.	

Item	**What**	**When**	**Output**	**Reviewed by Client Date:**
C10	Risk assessments & fall protection plan	Updated and signed off at least monthly.	Documented activity-specific risk assessments to be available. 14-day look-ahead programme to be implemented. **Planned Task Observations** to be carried out by the P/Contractor safety officer (**two per week**) and logged.	
C11	Activity risk assessments	Drawn up and distributed before workers are exposed to the activity risks.	Documented set of activity risk assessments downloaded to the relevant personnel before they start activities. These also need to be reviewed from time to time to ensure that they are specific and adequate based on the site conditions.	
C12	General Inspections	Daily	Report OHS Act compliance: • Portable electrical tools and extension leads. • Construction vehicles and mobile plant. • Small plant including petrol generators. • Stacking and storage. • Excavations as well as shoring and bracing. • Support work including back-propping. • Public protection safety measures. • Traffic and pedestrian accommodation. • Hot work permits **–** valid for a single shift, activity and location.	
C13	General Inspections	Weekly	• Temporary electrical installations. • Scaffolding (also before use, after any alterations, after bad weather, before dismantling, after a scaffold incident).	
C14	General Inspections	Monthly	• Fire-fighting equipment. • First aid equipment. • Hazardous chemical substances **–** inventory. • Ladders. • Personal fall prevention equipment. • Oxy-acetylene gas cutting/ welding equipment and torch-on water proofing equipment.	

Item	What	When	Output	Reviewed by Client Date:
C15	General Inspections	3-monthly	• Lifting tackle – certificates to be available together with a list of tackle on site and the dates of certification and dates due for next inspections.	
C16	General Inspections	6-monthly	• Lifting machines – certificates of inspections to be available.	
C17	Annual load test	Once a year	• Lifting machines – certificates of load test to be available.	
C18	List of Contractors	List to be updated weekly	Compile a list of Contractors: Name, supervisor, company tel. numbers and trade for inclusion in the consolidated safety files at the end of the construction stage.	
C19	Workman's Compensation	Ongoing	Compile a list of Contractors' workman's compensation proof of good standing.	
C20	Construction site rules & Section 37(2) Mandatary Agreements	Ongoing	Compile a list of all signed up Mandataries. Proof of agreement documents to be kept in H&S file.	
C21	Medical assessments or as otherwise prescribed. Competence of personnel and operators.	Annual assessments	Proof to be available in the form of certificates of fitness. Certificates of competence required for various operators and personnel as per the CR's and Codes.	

ANNEXURE D: CONSTRUCTION CONTRACT H&S COMPLEXITY PROFILE

CITY OF CAPE TOWN

DIRECTOR: TRANSPORT INFRASTRUCTURE IMPLEMENTATION URBAN MOBILITY DIRECTORATE

CONTRACT NO. 412Q/2022/23

CONSTRUCTION OF THE PHASE 2A IRT INFRASTRUCTURE: WORK PACKAGE E2 ALONG GOVAN MBEKI ROAD (M9) FROM WEST OF NY72 ROAD TO EAST OF KLIPFONTEIN ROAD

1. Number of Principal Contractors, including Direct Contractors? **[Weighted] 20**	2. Number of Trades? **[Weighted] 20**	3. Number of structures and/or buildings (this includes civil structures)? **10**	4. Multi-level/Height of structure(s) and/or buildings? **[Weighted] 20**	5. Bulk Earthworks? **10**	6. Deep Trenches? **10**
A	A	A	A/NA	A/NA	A/NA
i) 1 x = Low	i) < 10 = Low	i) 1 x = Low	i) Ground floor structure (up to 3 meters) = Low	i) Bulk earthworks – one level or less = Low	i) Up to one meter = Low
ii) 2 x = Medium	ii) 11 – 20 = Medium	ii) 2 x = Medium	ii) Double storey up to 5 levels (3 to 15 meters) = Medium	ii) Bulk earthworks >1 level = Medium	ii) From 1 meter to 2.0 meters = Medium
iii) > 2 = High	iii) > 20 = High	iii) >2 = High	iii) Above 5 levels, from 5th floor including ground (>15 meters) = High	iii) Bulk earthworks – piling and/or lateral support = High	iii) Deeper than 2.0 meters = High
RATING: **L = 6.6**	RATING: **L = 6.6**	RATING: **H = 10**	RATING: **L = 6.6**	RATING: **N/A**	RATING: **H = 10**

7. Demolition work required? **10**	8. Are the following applicable? • Asbestos work required • Blasting • Diving or water environments **10**	9. Government Interventions/Stipulations e.g. local labour CPG, emerging contractor targets? **10**	10. Project Environment/ Location/Surroundings? **10**	11. Tenants/Persons occupying premises during construction? **10**	12. Size of the project? • Notification of DoL only • CHSA appointed • Permit Required **10**
A/NA	A/NA	A/NA	A	A/NA	A
i) Internal soft demolitions = Low	i) Asbestos work (lagging) = High	i) Interventions/ stipulations = High	i) Urban interface: site not adjacent to public walkways, roadway and/or settlements = Low	i) Tenants/Persons occupying premises during construction period = High	i) Notification of DoL = Low
ii) Ground floor only) = Low	ii) Diving or water environments = High	-	ii) Site immediately adjacent to public walkways, roadway and/or settlements = High	ii) Other construction work taking place adjacent to project = High	ii) Permit required = Med (Construction work value exceeding value of R60 mil or longer than 365 days).
iii) Double story to 5 levels (3-15 meters) = Medium	iii) Blasting = High (blasting is possible)	-	-	-	iii) Over R130 mil or two years = High
iv) Above 5 levels including ground (>15 meters) = High	iv) Asbestos removal (asbestos-containing cement materials) = Medium	-	-	-	-
RATING: **N/A**	RATING: **M = 6.6**	RATING: **H = 10**	RATING: **H = 10**	RATING: **H = 10**	RATING: **M = 6.6**

13. Has a CIDB rating been specified? **10**	14. Will any of the following be required? • Tower Crane(s) or mobile crane • Fall protection Plan/Roof plan • Temporary works/ scaffolding **[Weighted] 20**	15. Will any of the following be required? • Confined space work • Hot works **10**	16. Will any of the following be required? • High voltage electrical work **10**	17. Will any of the following be required? • Rope access work **10**	18. Road works? • Public road • Private road **10**
A/NA	A/NA	A/NA	A/NA	A/NA	A/NA
i) Level 1 - 3 = Low	i) 1 x = Low	i) 1 x = Med	i) 1 x = High	i) 1 x = High	i) Private = Med
ii) 4 - 6 = Medium	ii) 2 x = Med	ii) 2 x = High			ii) Public = High
iii) >6 – High	iii) All 3 – High				
RATING: **H = 10**	RATING: **M = 13.2**	RATING: **H = 10**	RATING: **H = 10**	RATING: **N/A**	RATING: **H = 10**

A = Always applicable;
A / NA = Applicable or not applicable.

OVERALL RATING SCALE:
LOW = 0 to 44.9%
MED = 45% to 74.9%
HIGH = 75% to 100%

CALCULATED AS FOLLOWS:
Score achieved divided by max. possible score for the categories rated = %

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Risk rating achieved = 136.2/ 190 = 71.7%

OVERALL PROJECT RISK RATING:
IRT Phase 2A – East Bound
Infrastructure (trunk and feeders)
71.7% = MEDIUM RISK

C3.6 Annexes

CONTENTS

Annex 1: Monthly Project Labour Report

Annex 2: B-BBEE Sub-contract Expenditure Report

Annex 3: Joint Venture Expenditure Report

Annex 4: Targeted Labour Contract Participation Expenditure Report

Annex 5: Targeted Enterprises Contract Participation Expenditure Report

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

CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

BENEFICIARY DETAILS AND WORK INFORMATION

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

[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:** _____

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

C4 Site Information

CONTENTS

4.1 GENERAL
4.2 THE SITE
4.3 EXISTING TRAFFIC
4.4 AS-BUILT
4.5 MATERIALS INVESTIGATION DATA
4.6 SERVICE AUTHORITY CONTACT DETAILS
4.7 CLIMATE AND WEATHER RECORDS
4.8 TARGET AREA FOR CONTRACT PARTICIPATION GOALS
4.9 LOCALITY MAP

4.1 GENERAL

This part of the specifications describes the existing layout, features and conditions of the site which are the subject of this contract. It is based on surveys, visual observations, trial pit testing, and data provided by local authorities and other affected parties at time of the design. All data and descriptions are given for information purposes only and in good faith. The Contractor shall verify all details provided and the Employer will not accept responsibility for any omissions, inaccuracies or misrepresentations that may come to light.

4.2 THE SITE

The project is located on Govan Mbeki Road (M9) starting just west of NY72 and ending just east of Klipfontein Road. This section of Govan Mbeki Road is approximaetly 4.3 km long. The project also includes a section of Emms Drive (approx. 1.0 km) and New Eisleben Road (approx. 0.6 km)

Various types of services exist within the boundaries of the site. It will be necessary for the Contractor to arrange for the removal, relocation or protection of some existing services. Should any work become necessary, then all work shall be done strictly in accordance with the requirements of the relevant service owner and in accordance with the requirements of the drawings and works specifications.

4.3 EXISTING TRAFFIC

Traffic counts were conducted in 2016 by GIBB for the City of Cape Town. Table 1 summarises the existing traffic count data for the trunk busway during the morning and afternoon peak periods.

Table 1: Existing traffic data (AM peak hour traffic)

Link Sections (Govan Mbeki Road)	Towards Wynberg			Towards Khayelitsha		
	All	HV	Bus	All	HV	Bus
Duinefontein to NY72	1122	12	63	738	19	25
NY72 to Monwood	1392	15	55	1030	14	25
Monwood to Link	1068	14	54	780	10	23
Link to Emms	1040	3	67	536	10	22
Emms to New Eisleben	1002	2	72	646	24	22
New Eisleben to Intsikize	891	23	102	665	22	22
Intsikize to Sonwabile	963	23	100	667	22	23
Sonwabile to Stock	1212	24	96	818	21	21
Stock to Klipfontein	855	20	81	518	17	17
Klipfontein to Diaiza	1105	19	72	576	14	22

Link Sections (Emms Drive)	Towards Nyanga			Towards Browns Farm		
	All	HV	Bus	All	HV	Bus
Govan Mbeki to Second Avenue	656	3	13	478	3	8

4.4 AS-BUILT

No as-built data on existing pavement layerworks was available from the City of Cape Town.

4.5 MATERIAL INVESTIGATION DATA

Govan Mbeki Road

Roadlab undertook the materials investigation during the period September 2016 to February 2017. Numerous test-holes were excavated, profiles and sampled in Sections 1 to 6 as part of the investigation. The positions of the test-holes as well as the layerworks profiles and tested material properties as well as the full investigation report are included in **Attachment A**.

The existing surfacing for the road sections along Govan Mbeki is comprised of a medium asphalt surfacing varying in thickness between 40 mm and 70 mm.

Three base types are evident along the route, namely a granular Hornfels base, and in isolated cases, an asphalt (BTB) base or ferricrete base. The granular Hornfels base varies in thickness between 150 mm and 250 mm. The base quality is classified as G4 based on COLTO classification. There are expected to be isolated areas constructed/repaired with a BTB along the route, most likely resulting from a medium-term maintenance action for the section.

The subbase along the route is generally comprised of a granular Hornfels material, with isolated calcrete, laterite and ferricrete also noted. The subbase thickness ranges in thickness from 110 mm to 250 mm and classifies as G4 to G6 in quality based on COLTO classification.

The in-situ subgrade is comprised of an imported sand material generally classified as G8 / G9 in quality based on COLTO classification, with isolated sections with G10 quality is noted.

The existing pavement structure along the investigated sections can best be represented by the following profiles:

Table 2: Govan Mbeki Road (E02) - existing pavement profile summary

E02: Link Road – Klipfontein Road			
EBC		**WBC**	
40-60 mm	AC Surfacing	40-60 mm	AC Surfacing
160-240 mm	WBM Base	190-250 mm	WBM Base
150-250 mm	G4 / G5	180-240mm	G4 / G5
-	G8 / G9	-	G8 / G9

Emms Drive

The existing surfacing layer is comprised of an asphalt surfacing, varying in thickness between 45 mm and 75 mm.

Two base types are evident along the investigated road section. Between Govan Mbeki Road and Second Avenue the base material is comprised of a weakly cemented granular Crushed Hornfels material that has a layer thickness of 95 mm. From Second Avenue to Fourth Avenue the base material is comprised of a dense granular Crushed Hornfels material that varies in thickness between 165 mm to 295 mm and is classified as a G5 quality based on COLTO classification.

Two subbase types are evident along the investigated road section. Between Govan Mbeki Road and Second Avenue the subbase material is comprised of a C3 quality cemented Crushed Hornfels material that has a layer thickness of 175 mm. From Second Avenue to Fourth Avenue the subbase material is comprised of a dense recycled building rubble material that varies in thickness between 130 mm to 160 mm and satisfies the standards for a G6 in quality based on COLTO classification.

The founding pavement structure for both uniform pavement types is comprised of a sand subgrade, overlain by varying subbase material as described, varying in thickness between 150 mm and 230 mm. The existing pavement structure along the investigated sections can best be represented by the following profiles:

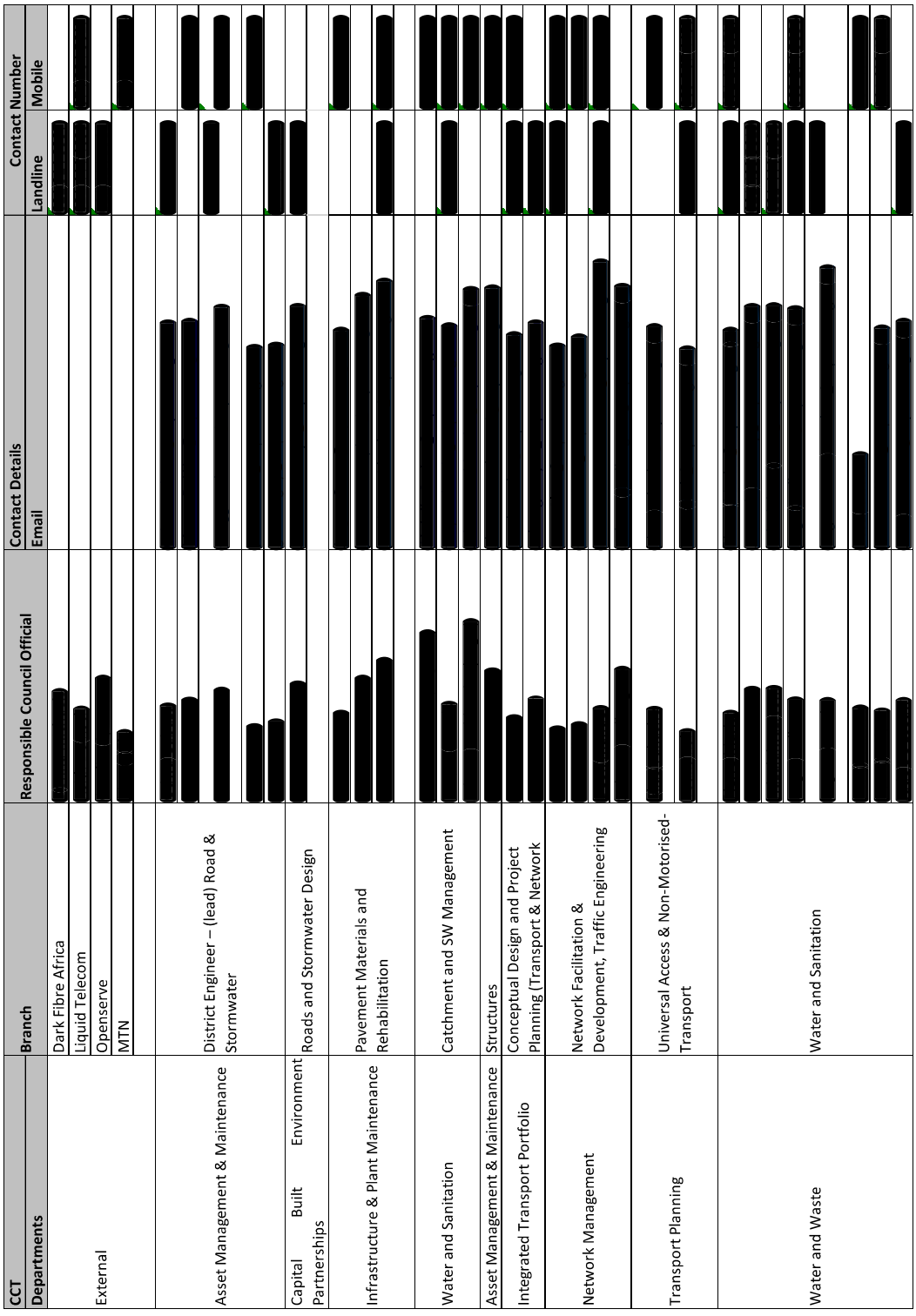
Table 3: Emms Drive (Part of E02 package) - existing pavement profile summary

E02: Emms Drive : Govan Mbeki Road – Fourth Avenue			
Govan Mbeki Road – Second Avenue		**Second Avenue – Fourth Avenue**	
70-120 mm	AC Surfacing	50-120 mm	AC Surfacing
130-220 mm	Hornfels (G4 / G5)	150-220 mm	Hornfels (G4 / G5)
150-270 mm	G5 / G6	150-320mm	G4 - G6
-	Sand (G8 / G9)	-	Sand (G8 / G9)

Note: The material investigation was completed in August 2015 and investigation results were supplied by SMEC SA.

4.7 SERVICE AUTHORITY CONTACT DETAILS

The contact details provided below are preliminary and final contact details shall be established by the Contractor during the wayleave application process.



CCT Departments	Branch	Responsible Council Official	Contact Details Email	Contact Number Landline	Contact Number Mobile
External	Dark Fibre Africa				
	Liquid Telecom				
	Openserve				
	MTN				
Asset Management & Maintenance	District Engineer – (lead) Road & Stormwater				
Capital Built Environment Partnerships	Roads and Stormwater Design				
Infrastructure & Plant Maintenance	Pavement Materials and Rehabilitation				
Water and Sanitation	Catchment and SW Management				
Asset Management & Maintenance	Structures				
Integrated Transport Portfolio	Conceptual Design and Project Planning (Transport & Network				
Network Management	Network Facilitation & Development, Traffic Engineering				
Transport Planning	Universal Access & Non-Motorised-Transport				
Water and Waste	Water and Sanitation				

CCT	Branch	Responsible Council Official	Contact Details	Contact Number	
Departments			**Email**	**Landline**	**Mobile**
Metropolitan Police	Safety and Security				
Traffic Services	Traffic Services				
Electrical	Services: Electrical distribution & street lighting				
Information Technology	Systems and Telecommunications				
Recreation and Parks	Parks and Recreation(Soft Landscaping)				
Spatial Planning and Environment – Urban Planning and Design	Urban Design				
Spatial Planning and Environment – Urban Planning and Design	Environmental & Heritage resource management				
Spatial Planning and Environment – Urban Planning and Design	Landscaping (hard)				

4.8 CLIMATE AND WEATHER RECORDS

The project is situated within the temperate Mediterranean climatic zone of the western coastal region of the country and falls within Thornthwaite's sub-humid warm climatic region. However, the generally mountainous nature of the Cape Fold Belt results in the entire region having sharp changes in climate.

Climatic conditions can be described as being moderate to hot during summer, whilst cold and wet conditions prevail during winter.

A mean daily temperature of 21.9 °C and a mean daily minimum temperature of 11.2 °C have been recorded at the weather station at Cape Town International Airport over the period 1956 to 1984. The extreme maximum and minimum temperatures recorded are 40.7 °C and -1.3 °C, respectively.

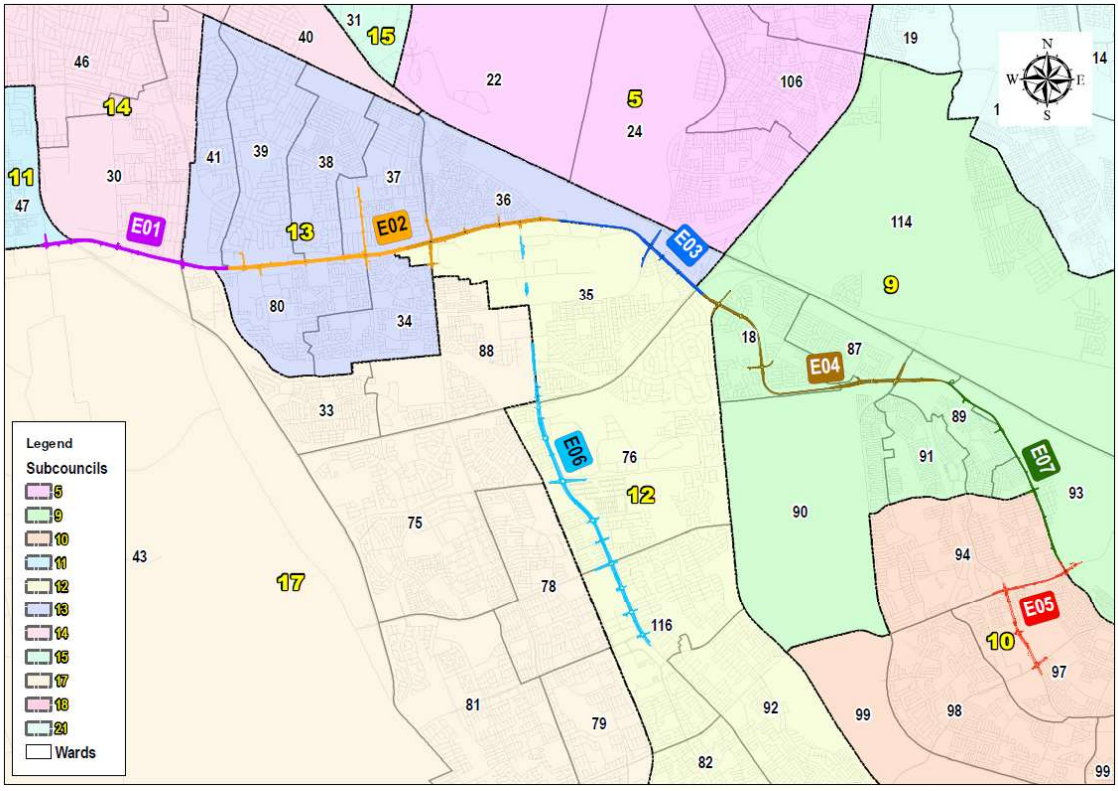
Rainfall in the area is mainly during the colder winter months and heavy downpours are common during this period. The highest precipitation usually occurs during June. A minimum average annual rainfall of 322 mm and a maximum annual rainfall of 750 mm with a mean of 508 mm have been recorded at the Cape Town International Airport over the period 1956 to 1984.

4.9 TARGET AREA FOR CONTRACT PARTICIPATION GOALS

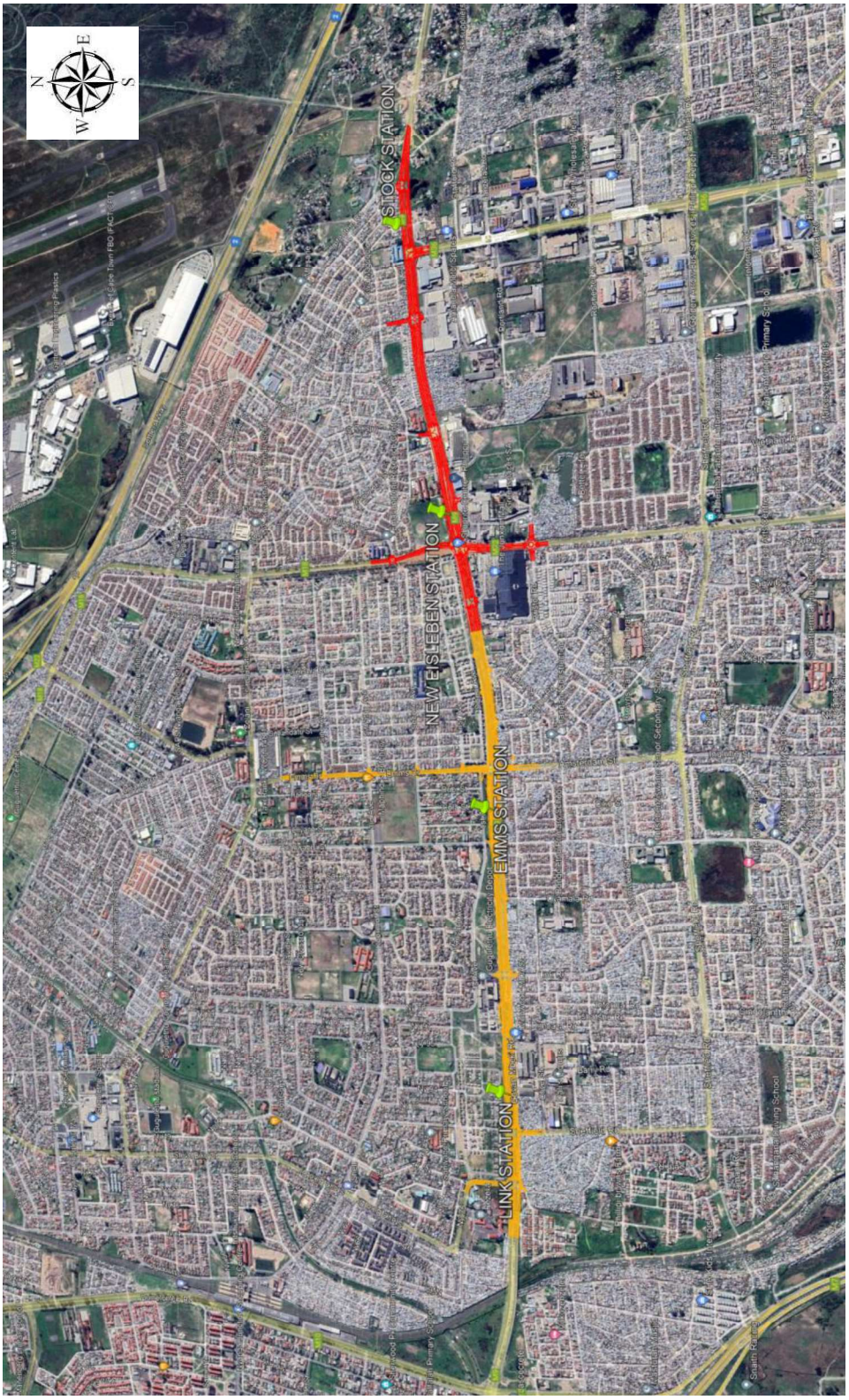
The target area for the contract participation goals shall be, in order of sourcing, the:
1. Wards adjacent to the project (Wards 41, 39, 38, 37, 36, 35, 34 and 80) , then the
2. Wards adjacent to the wards mentioned in 1 above; then the
3. Subcouncils adjacent to the project (including Subcouncils 5, 9, 12, 13, 14, 15 and 17), then the
4. Subcouncils adjacent to the subcouncils mentioned in 3 above; then the
5. Extent of the City Boundary.

Only where measures have been exhausted to obtain the necessary targeted enterprises from the adjacent wards and subcouncils then, with approval from the Employer, the target area may be widened to include other areas.

For the labour goals cognisance shall be taken of the extent of the road that is located in each subcouncil and labour shall as far as is possible be sourced from the affected subcouncils.



4.10 LOCALITY MAP



PART C5: INFORMATION/DOCUMENTATION PROVIDED BY CONTRACTOR

All of the aforementioned information, as submitted/provided by the Contractor for **TENDER NO. 412Q/2022/23: CONSTRUCTION OF THE PHASE 2A IRT INFRASTRUCTURE: WORK PACKAGE E2 ALONG GOVAN MBEKI ROAD (M9) FROM WEST OF NY72 ROAD TO EAST OF KLIPFONTEIN ROAD** , are incorporated into this Memorandum of agreement by the mere reference thereof