

THULAMELA LOCAL MUNICIPALITY



UPGRADING OF MAPATE ACCESS ROAD

BID NUMBER: 10/2024/2025

CIDB GRADING: 8CE OR HIGHER

VOLUME 3

THULAMELA LOCAL MUNICIPALITY		CONSULTANTS PRINCIPAL AGENT	
Contact Person(s): Mr T.P Mudzili Tel: (015) 962 7629 Mr O.J Mugwedi Tel: (015) 962 7714		Contact Person: Ms. S. Souter Tel: (011) 709 8420	
Name of Bidder:			
Bid Amount (VAT Incl.):			
Bidder Address:			
Receipt Number:			
Email Address:			
Contact numbers:	Tel:	Cell:	Fax:
 Municipal Infrastructure Grant		 EXPANDED PUBLIC WORKS PROGRAMME Creating opportunities towards human fulfilment	

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THE TENDER

PART T1: TENDERING PROCEDURES

PART T2: RETURNABLE DOCUMENTS

PART T1: TENDERING PROCEDURES

T1.1	TENDER NOTICE AND INVITATION TO TENDER	T.3
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T1.1 TENDER NOTICE AND INVITATION TO TENDER

Thulamela Local Municipality is inviting capable service providers for UPGRADING OF MAPATE ACCESS ROAD.

Bid number	Project Description	Contact Persons	CIDB Grading	Compulsory Briefing	Evaluation Criteria
10/2024/2025	Upgrading Of Mapate Access Road	Ms S Souter (011) 709 8420 Mr OJ Mugwedi (015) 962 7714 Mr T.P Mudzili (015) 962 7629	8CE or Higher (7CEPE will not be considered)	Location: T Junction of Mohlala RD and Vhulelu St. at Tshisahulu Co-Ordinates (23°00'19"S; 30°24'11"E) Date: 23/10/2024 Time: 11H00	Functionality and 90/10 Preference points system.

Tender documents are obtainable from Procurement Office, Office No. 02 at Thulamela Local Municipality Head Office, during the following times: 08:00 to 15:30 (Monday to Friday) as from **07 October 2024 at a non-refundable bid price of R4.00 per page** or can alternatively be downloaded from Thulamela website (www.thulamela.gov.za) for free. The bidders should also download SCM forms that are found in the SCM-FORMS sub folder on the website and complete as part of the Bid documents.

The service providers must submit the completed Bid documents (in black ink) and hand deliver or courier them to Thulamela Municipality. All completed Bid documents (hand delivered or couriered) must be dropped in the BID BOX before the closing date and time of the Bids closure. The onus is on the service providers to make sure the Bid documents are submitted on time and late submission won't be accepted.

Interested service providers must attend a compulsory briefing session on 23 October 2024 at 11h00. Location: Tshisahulu T-Junction of Mohlala Rd and Vhulelu Street

Co-Ordinates : Latitude (23°00'19" S) Longitude(30°24'11"E)

Interested Contractors and/or service providers will be expected to submit the Bid documents with the following compulsory requirements:

- ❖ **Tax Compliance Status Letter or Tax Compliance Pin Number**
- ❖ **Company registration documents (e.g. CK)**
- ❖ **Company profile**
- ❖ **Valid proof of registration with CIDB**
- ❖ **Proof of registration on CSD**
- ❖ **Compensation fund registration in good standing COIDA**
- ❖ **Curriculum vitae of the proposed project team**
- ❖ **Organogram of the project team indicating project key personnel**
- ❖ **If the company is required by law to be audited, we need audited annual financial statements for the recent past three (3) years or audited financial statements since the establishment of the company if the company was established during the past three (3) years. If the company is not required by law to be audited, please provide us with a letter from a registered accountant stating that you are not required to be audited and the reasons thereof.**
- ❖ **Certified copy of partnership or JV agreement (if tenderer is a partnership or JV)**
- ❖ **Proof of municipal rates and taxes or municipal service charges owed by the bidder and ALL its directors, not in arrears for more than 3 months. (The proof of municipal rates and taxes or municipal service charges to be submitted must not be older than three (3) months from the closing date of the bid. Attach valid lease agreement in case of rental of office facilities and municipal clearance in respect of the areas exempted from billing by municipalities.**
- ❖ **List of Roads and Stormwater projects completed by the contractor in the past 10 years with clients contact details, description, and contract values. NB: Only projects that were completed within the municipal environment (RAL, SANRAL and GOVERNMENT INSTITUTION OR PARASTATALS) (Attach signed appointment letters, completion certificates and reference letters) NB: The municipality reserves the right to conduct verification with the referred clients of the similar completed projects.**

- ❖ All documentation listed in the Tender document under Part T2: Compliance with Tender Conditions and other Requirements under section T2.1 and T2.2 should be submitted as compulsory requirements.
- ❖ All records of any additional information posted should be submitted as compulsory requirements and it is the responsibility of the bidders to check with the respective project engineer or client representatives (contact details as provided above) if there are any additional information before submission of the tender documents.

Tenderers should note the following: Functionality will be scored out of **100%** and the **minimum threshold to qualify is 70%**. Tenderers who fail to meet the minimum threshold will not be considered for further evaluation.

The submitted tender document must contain all pages, as indicated, in specified colour, page sequence (incl. double sided) and binding method. The binding method must be staples plus an adhesive tape binding.

	TARGETED GOALS:	WEIGHT
Points for functionality	Demonstrate company experience / past performance in Road and Stormwater Construction Projects.	40
	Key staff – Demonstrated experience- Qualifications and experience.	20
	Proof of Plant and Equipment owned by the bidder: Details of major equipment owned (please provide proof of ownership). Valid proof of license disk and registration or invoice / bank letter can serve as proof of ownership.	25
	Financial Reference	15
TOTAL		100

Bids will be assessed under the provisions of the following Acts and its Regulations: Municipal Finance Management Act, (Act 56 of 2003); PPPFA, Supply Chain Management Policy of the municipality in accordance with the specifications and in terms of **90/10 preferential points system and functionality as per the advert and bid document.**

Specific Goals Categories (CSD will be used for verification)	Number of Points (90/10 system) 10 Points breakdown
1. 100% Black ownership	4
2. 100% Women ownership	3
3. Youth	2
4. Disability (Medical certificate will be used to verify the disability status of the bidder).	1

Sealed bid documents must be submitted in envelopes clearly indicating ***“BID NUMBER AND DESCRIPTION”*** on the outside and must reach the undersigned by depositing it into the official Bid Box at the front of the main entrance to **Thohoyandou Civic Centre, Old Agriven Building, Thohoyandou, by no later than 11h00 on, 08 November 2024.**

The Municipality is not bound to accept the lowest Bid and reserves the right to accept any part of a Bid. Bids must remain valid for a period of ninety (90) days after closing date of the submission thereof.

Bids may only be submitted on the bid documentation provided by the municipality.

NB: Bids which are late, incomplete, unsigned, completed by pencil, sent by telegraph, facsimile, electronically (Fax), or E- mail and without the compulsory requirements will be disqualified.

MAKUMULE M.T.
MUNICIPAL MANAGER

DATE

T1.2 TENDER DATA

The Conditions of Tender are the Standard Conditions of Tender as contained in Annex F of the CIDB Standard for Uniformity in Construction Procurement, (July 2015) as published in Government Gazette No 38960, Board Notice 136 of 2015 of 10 July 2015. (See www.cidb.org.za).

The Standard Conditions of Tender make several references to the Tender Data for details that apply specifically to this tender. The Tender Data shall have precedence in the interpretation of any ambiguity or inconsistency between it and the Standard Conditions of Tender.

Each item of data given below is cross-referenced to the clause in the Standard Conditions of Tender to which it applies.

Clause Number	Tender Data
2. <u>EMPLOYER</u> Cl. F1.1	The "Employer" is "THULAMELA MUNICIPALITY" The Employer's domicilium citandi et executandi (permanent physical business address) is: Thulamela Municipality, Civic Centre, Old Agriven Building, Thohoyandou. The Employer's address for communication relating to this project is: Private Bag x 5066, Thohoyandou, 0950.
3. <u>TENDER DOCUMENTS</u> Cl. F.1.2	"The following documents form part of this tender: VOLUME 3 THE TENDER Part T1: Tendering procedures: T1.1 Tender notice and invitation to tender T1.2 Tender Data Part T2: Returnable documents T2.1 Returnable Schedules required for Tender Evaluation T2.2 Other Documents required for Tender Evaluation T2.3 Returnable Schedules that will be incorporated into the Contract THE CONTRACT Part C1: Agreements and contract data C1.1 Form of Offer and Acceptance C1.2 Performance Guarantee C1.3 Contract Data C1.4 Performance Guarantee for materials and equipment not yet built into the works

Clause Number	Tender Data
	C1.5 Retention money guarantee C1.6 Agreement in Terms of the Occupational Health and Safety Act 85 of 1993 C1.7 Abstracts of the mine health and safety Act No 29 of 1996 and Amendment act No.72 of 1997 C1.8 Agreement with Adjudicator Part C2: Pricing data C2.1 Pricing instructions C2.2 Bills of quantities Part C3: Scope of work C3.1 Description of Works C3.2 Engineering C3.3 Procurement C3.4 Construction C3.5 Management Part C4: Site information C4.1 Site Information C4.2 Locality Plan Part C5: Annexures C5.1 : Proforma Documents C5.2 : Contract Drawings Register VOLUME 4 - Tender Drawings
4. <u>EMPLOYER'S AGENT</u> Cl. F.1.4	The Employer's agents are: a) Principal Agent Mariswe (Pty) Ltd <u>Physical Address:</u> University House Eton Office Park West Harrison Avenue Bryanston Johannesburg 2191 Tel.: (011) 709 8420 E-mail: bryanston@mariswe.com <u>Postal Address:</u> Private Bag X66 Bryanston Gauteng 2021

Clause Number	Tender Data
<u>5. TENDERER'S OBLIGATIONS</u> 5.1. <u>Eligibility</u> Cl. F.2.1	Only those tenderers who are registered with the CIDB or are capable of being so prior to the evaluation of submissions, in a contractor grading designation equal to or higher than a contractor grading designation determined in accordance with the sum tendered, are eligible to have their tenders evaluated. Joint ventures are eligible to submit tenders provided that: 1. every member of the joint venture is registered with the CIDB; 2. the lead partner has a contractor grading designation of minimum 8CE (or higher) – 7CE PE will not be considered; 3. the combined contractor grading designation calculated in accordance with the Construction Industry Development Regulations is equal to or higher than a contractor grading designation determined in accordance with the sum tendered for an 8CE (or higher) – 7CE PE will not be considered.
5.2. <u>Site Visit and Clarification Meeting</u> Cl. F.2.7	The arrangements for a compulsory pre-tender meeting are: Location: T Junction of Mohlala RD and Vhulelu St. at Tshisahulu Co-Ordinates (23°00'19"S; 30°24'11"E) Date : 23 October 2024 Time : 11H00
5.3. <u>Insurance</u> Cl. F.2.9	No insurance cover will be provided by the Employer.
5.4. <u>Alternative Tender Offers</u> Cl. F. 2.12	No alternative tender offers will be considered

5.1. <u>Submitting a Tender Offer</u> <u>Cl. F2.13</u>	5.1.1. Whole of the Works (Cl. F.2.13.1) Tenderers shall offer to provide for the whole of the Works identified. 5.1.2. Original tender documents (Cl. F2.13.3) The original tender document, issued to the Bidder, shall be submitted in its entirety. No copies are required. 5.1.3. Marking of Tender Submissions (Cl. F2.13.5) The complete tender documents shall be enclosed and sealed in a single envelope, marked:

Clause Number	Tender Data
	“BID No.: 10/2024/2025 UPGRADING OF MAPATE ACCESS ROAD” The Employer’s address for delivery of tender offers to be shown on each tender submission package is the Tender Box located at: The Official Bid Box Main Entrance to Thohoyandou Civic Centre, Old Agriven Building, Thohoyandou 5.1.4 Two envelope system (Cl. F.2.13.6) A two-envelope procedure will not be followed. 5.1.5. Closing time (Cl. F.2.15) The closing time for submission of tender offers is: 11H00 Telegraphic, telephonic, telex, facsimile, e-mail, electronic and late tender offers will not be accepted. 5.1.6. Tender offer validity (Cl. F.2.16) The tender offer validity period is 90 days after tender closing date. 5.1.7. Clarification of tender offer after submission (Cl. F.2.17) Delete the last part of the second sentence, commencing with the word “and”. Furthermore, delete the last two sentences of Cl. F2.17. Add the following sentence: “The rates stated by the Bidder shall be binding”. 5.1.8. Provide other Material (Cl. F.2.18.1) Upon request by the Employer, the Bidder shall promptly supply any other material that has a bearing on the tender offer, the bidder’s commercial position (including, where applicable, notarized joint venture agreements), preferencing arrangements, or samples of materials, considered necessary by the Employer for the purpose of a full and fair assessment. Should the Bidder not provide the information or material called for, by the time for submission stated in the Employer’s request, the Employer will regard the tender offer as being non-responsive.

Clause Number	Tender Data
	5.1.9. Letter of Intent The bidder is required to submit with his tender a letter of intent from an approved financial institution undertaking to provide the Construction Guarantee in the format included in Part C1.2 of this procurement document. 5.1.10 Certificates (Cl. F.2.23) The following certificates are to be provided with this tender: a) Provide a valid Central Supplier Database (CSD) number. b) Compensation Fund registration certificate c) Certificate of Contractor Registration issued by the Construction Industry Development Board or a copy of the application Form for registration in terms of the Construction Industry Development Board Act (Form F006). A minimum grading of 8CE or Higher is required. d) A copy of a valid Tax Compliance Status letter. No tender will be awarded to a bidder whose tax matters are not in order with the South African Revenue Service (SARS) at the time of award. e) An EME must submit a sworn affidavit confirming the following: • Annual Turnover Revenue of R10 million or less; and • Level of Black ownership • Any misrepresentation in terms of the above constitutes a criminal offence as set out in the Preferential Procurement Regulation 2022 as amended. f) Documents and Schedules listed in Part T2. Important Note: Failure to provide the required particulars as per the above-listed certificates implies a non-responsive tender and warrants rejection of the tender on account of non-compliance with the requirements of the Tender Data
<u>EMPLOYER'S UNDERTAKING</u>	
6. <u>Opening of Tender</u>	The time and location for opening of the tender offers are: 11:00 on 08 November 2024

Clause Number	Tender Data
<u>Submissions</u> <u>Cl. F3.4</u>	Location: The Official Bid Box Main entrance to Thohoyondou Civic Centre, Old Agriven Building, Thohoyandou
7. <u>Arithmetical</u> <u>Errors</u> Cl. F.3.9	Delete Clause 3.9.1 Insert the following new clause F.3.9.1 Check responsive bids for discrepancies between amounts in words and amounts in figures. Where there is a discrepancy between the amounts in figures and the amount in words, the amount in words shall govern. F3.9.2 Check the highest ranked bid or bidder with the highest number of bid evaluation points after the evaluation of bid offers in accordance with F.3.11 for: a) the gross misplacement of the decimal point in any unit rate; b) omissions made in completing the pricing schedule or bills of quantities; or c) arithmetic errors in: i) line item totals resulting from the product of a unit rate and a quantity in bills of quantities or schedules of prices; - or ii) the summation of the prices F.3.9.3 Notify the bidder of all errors or omissions that are identified in the bid offer and either confirm the bid offer as bid or accept the corrected total of prices. F.3.9.4 Where the bidder elects to confirm the bid offer as bid, correct the errors as follows: a) If bills of quantities or pricing schedules apply and there is an error in the line item total resulting from the product of the unit rate and the quantity, the line item total shall govern, and the rate shall be corrected. Where there is an obviously gross misplacement of the decimal point in the unit rate, the line item total as quoted shall govern, and the unit rate shall be corrected. b) Where there is an error in the total of the prices either as a result of other corrections required by this checking process or in the tenderer's addition of prices, the total shall govern and the tenderer will be asked to revised selected item prices (and their

Clause Number	Tender Data
	rates if bills of quantities apply) to achieve the tendered total of the prices.
8. <u>EVALUATION OF BIDS</u> Cl. F.3.11	The procedure for the evaluation of responsive tenders is Method 2 (Price and Preferences). No Technical evaluation, only fictional and financial. Only compliance and Price and Preference point system will be applied. The Preference Point System assigns a score to each tenderer based on the tender price and preference points system (specific goals). These scores are combined to determine an overall score for the tender. The tenderer with the highest score will be considered for acceptance. The Preference Point System will be applied as follows. For tenders below R50 million 80 points are assigned to price Up to 20 points are assigned for specific goals For tenders of R50 million and above: • 90 points are assigned to price • Up to 10 points are assigned for specific goals Points scored will be rounded off to the nearest 2 decimal places.
9. <u>ACCEPTANCE OF TENDER OFFER</u> Cl. F3.13	Tender offers will only be accepted if: a) The bidder has in his or her possession an original valid Tax Clearance Certificate issued by the South Africa Revenue Services or in case wherein the Bidder provide the municipality with a printed tax clearance from e-filing, it is compulsory that the bidder provide municipality with tax compliance status pin for verification; b) The bidder is registered with the Construction Industry Development Board in an appropriate contractor grading designation. A minimum grading of 8CE is required for the main contractor. c) The bidder has demonstrated previous experience within the Municipal Environment, RAL, SANRAL, Government Institutions and parastatals with the type of work required under this contract, having successfully completed projects of Roads and Stormwater scope and size. d) The bidder or any of its principals is not listed on the Register of Tender Defaulters in terms of the Prevention and Combating of Corrupt Activities

Clause Number	Tender Data
	Act of 2004 as a person prohibited from doing business with the public sector; and e) The bidder has not abused the Employer's Supply Chain Management System. f) The bidder has not failed to perform on any previous contract. g) Has completed the Compulsory Enterprise Questionnaire and there are no conflicts of interest which may impact on the bidder's ability to perform the contract in the best interests of the employer or potentially compromise the tender process.
10. <u>PROVIDE COPIES OF THE CONTRACT DOCUMENT</u> Cl. F.3.18	The number of paper copies of the signed contract to be provided by the employer is one.
11. <u>COMPLIANCE/ DISQUALIFICATION</u>	BIDDERS WILL BE DISQUALIFIED FOR: • FAILURE TO COMPLETE AND SIGN THE FORM OF OFFER PAGE; • FAILURE TO COMPLETE AND SUBMIT A PRICED BILL OF QUANTITIES IN FULL; • FAILURE TO DULY COMPLETE FORM T 2.2 C (WHERE REQUIRED) THAT INCLUDES FOR ANY ADDENDA THAT MAY HAVE BEEN ISSUED WHERE SUCH ADDENDA HAS A MATERIAL EFFECT ON THE PRICING OF THE TENDER; • FAILURE TO BE REGISTERED AND ACTIVE WITH CIDB ON THE RELEVANT GRADING; • COMPLETING TENDER DOCUMENT IN PENCIL; • IN THE CASE OF A BIDDER WHO DURING THE LAST FIVE YEARS HAS BEEN TERMINATED ON PREVIOUS CONTRACTS WITH THULAMELA MUNICIPALITY • FAILURE TO ATTEND THE COMPULSORY SITE BRIEFING • FAILURE TO DULY COMPLETE ALL MBD FORMS AS ISSUED ON PART T2 OF THE BID DOCUMENT • A TENDER THAT IS RECEIVED AFTER THE CLOSING DATE AND TIME
12. <u>PRICE AND PREFERENCE</u>	Having completed compliance checks, the procedure for the evaluation of compliant tenders is Method 2 (Price and Preferences). The Preference Point System assigns a score to each tenderer based on the tender price and on preference points system (specific goals). These scores are combined to determine an overall score for the tender. The tenderer with the highest score will be considered for acceptance. Points scored will be rounded off to the nearest 2 decimal places.

Clause Number	Tender Data										
	FORMULA FOR SCORING TENDER PRICE The following formula will be used to calculate the points for price. $P_s = X [1 - (P_t - P_{min})]$ P_{min} Where P_s = Points scored for comparative price of tender under consideration P_t = Comparative price of tender under consideration P_{min} = Comparative price of lowest acceptable tender X = Points assigned to price POINTS AWARDED FOR PREFERENCE Bids will be assessed under the provisions of the following Acts and Regulations: Municipal Finance Management Act (Act 56 of 2003); PPPFA, Supply Chain Management policy of the municipality in accordance with the specifications and in terms of 90/10 preferential points system and functionality as per the advert and bid document. The following table is applicable. <table border="1"> <thead> <tr> <th>Specific Goals Categories (CSD will be used for verification)</th><th>Number of Points (90/10 system) 10 Points breakdown</th></tr> </thead> <tbody> <tr> <td>1. 100% Black ownership</td><td>4</td></tr> <tr> <td>2. 100% Women ownership</td><td>3</td></tr> <tr> <td>3. Youth</td><td>2</td></tr> <tr> <td>4. Disability (Medical certificate will be used to verify the disability status of the bidder)</td><td>1</td></tr> </tbody> </table>	Specific Goals Categories (CSD will be used for verification)	Number of Points (90/10 system) 10 Points breakdown	1. 100% Black ownership	4	2. 100% Women ownership	3	3. Youth	2	4. Disability (Medical certificate will be used to verify the disability status of the bidder)	1
Specific Goals Categories (CSD will be used for verification)	Number of Points (90/10 system) 10 Points breakdown										
1. 100% Black ownership	4										
2. 100% Women ownership	3										
3. Youth	2										
4. Disability (Medical certificate will be used to verify the disability status of the bidder)	1										

Clause Number	Tender Data
13. <u>CONDITIONS OF CONTRACT AWARD</u>	Contracts will only be awarded if: a) A copy of a valid Tax Compliance Status letter. No tender will be awarded to a bidder whose tax matters are not in order with the South African Revenue Service (SARS) at the time of award. b) the tenderer submits a letter of intent from an approved financial institution undertaking to provide the Construction Guarantee in the format included in Part C1.3 of this procurement document; c) the tenderer is registered with the Construction Industry Development Board in an appropriate contractor grading designation; d) the tenderer or any of its directors/shareholders is not listed on the Register of Tender Defaulters in terms of the Prevention and Combating of Corrupt Activities Act of 2004 as a person prohibited from doing business with the public sector; e) the tenderer has not: i. abused the Employer's Supply Chain Management System; or ii. failed to perform on any previous contract and has been given a written notice to this effect; f) the tenderer has completed the Declaration of Interest and there are no conflicts of interest which may impact on the tenderer's ability to perform the contract in the best interests of the employer or potentially compromise the tender process. g) the tenderer is registered and in good standing with the compensation fund or with a licensed compensation insurer; h) the employer is reasonably satisfied that the tenderer has in terms of the Construction Regulations, 2014, issued in terms of the Occupational Health and Safety Act, 1993, the necessary competencies and resources to carry out the work safely. i) The tendering entity or the directors/partners of the tendering entity are in good standing with the local authority/municipality. j) No tender will be awarded to a bidder not registered on the National Treasury Central Supplier Database (CSD) k) Contracts Manager & OHS officer must be registered with SACPCMP or ECSA at the time of award l) No tender will be awarded to a bidder who does not have a valid COIDA Letter of Good Standing
14. <u>Proof of</u>	Only those tenderers who can demonstrate that they will have in their employ

Clause Number	Tender Data
<u>Availability of Staff with LI Competencies</u>	management and supervisory staff satisfying the requirement of the scope of work for labor-intensive competencies for supervisory and management staff during the validity of the contract are eligible to submit tenders
15. <u>Requirement for submission of names of LI staff</u>	The tenderer must submit to the Employer, names of all management and supervisory staff that will be employed to supervise the labor-intensive portion of the works together with satisfactory evidence that such staff members satisfy eligibility requirements.

EVALUATION CRITERIA

The bids will be evaluated in two stages. The first stage will check whether the bidders have submitted all documents as requested on the advert. Although functionality does not form part of the final tender points scoring for award purpose, tenderer will be assessed for responsiveness and functionality first and if the tender is not responsive or meet the minimum functionality score, the tenderer will be eliminated and not considered further for second stage of evaluation.

The second stage of the evaluation will be based on Price (90) and preference points system (specific goal) (10). Detailed points scoring for functionality are as follows:

Functional Requirements

A tenderer must score a minimum of **Seventy points (70/100)** to qualify for further evaluation. Tenders will be evaluated individually and scored by an evaluation panel according to the evaluation criteria mentioned below:

Functionality Evaluation Criteria	Sub Criteria	Points Allocation for Sub Criteria	Maximum Points obtainable per main functionality Criteria
Company Experience (Demonstrate company experience (past performance) as <u>main contractor</u> on similar Roads and stormwater construction projects.	Signed Appointment letter indicating the project value and completion certificates and reference letters of completed projects: Roads and Stormwater Construction Completed within the municipality environment, RAL, SANRAL, Government Institutions and parastatals.	30	

NB: Signed Appointment letters, completion certificates and reference letters with contactable references within the Municipal Environment, RAL, SANRAL Government Institutions, and parastatals must be attached.	• Completed works with Minimum CIDB grading of 8CE or higher. • Completed in the past ten (10) years. 6 points will be awarded for each completed project. 5 and above completed projects will be awarded maximum of 30 points. Reference letter from the clients for each of the above-mentioned projects indicating: • The full project description, • Project value; and • Completion date. Each Reference letter must be on the client letterhead, have a client stamp, signed, and contact details (Name, phone, or Email) and <u>two points</u> will be awarded for each completed project. 5 and above completed projects will be awarded <u>maximum of 10 points</u>. Projects that do not meet requirements will be <u>awarded 0 points</u>.	10	40
	Project Programme – Understanding the scope and provide a concise and clear methodology of the tasks as well as adequacy of the programme of work.	2.5	

	Schedule of estimated monthly expenditure – Realistic cash-flow based on estimated construction period and project cost.	2.5	
Key Personnel CVs (Demonstrate Experience and Qualifications)	A. Contract Manager with the following Requirements: • B-Tech/ BSC Eng/ B-Eng Or Higher in Civil Engineering and must be professionally registered with ECSA (Pr Eng. / Pr Tech Eng.) or SACPCMP (Pr.Cpm / Pr.Cm). • Relevant experience • 12 years and above =6 Points • 11 years = 5 Points • 10 years = 4 Points • Less than 10 years =0	06	20
	B. Site Agent with the following requirements: • B-Tech/ BSC Eng/ B-Eng Or Higher in Civil Engineering with minimum Ten (10) years relevant experience in Roads and Stormwater Construction.	06	
	C. General Foreman with the following Requirements: • Minimum 10 years relevant experience as General	04	

	Foreman in Roads and Stormwater projects (4 Points). D. OHS Officer with the following Requirements: - Registered with SACPCMP as Construction Health and Safety Officer (4 Points) 5 years and above = 4 Points 4 years = 3 Points 3 years = 2 Points - Less than 3 years=0 Points NOTE: CVs of the Contract Manager, key personnel must clearly demonstrate Relevant experience (actual duties performed, involvement and responsibility), including locations, dates, and durations of assignments. Full points will be awarded for meeting all the requirements.	04	

Plant and Equipment Proof of plant and equipment owned by the bidder: Details of major equipment owned (please provide proof of ownership). NB: Proof of registration certificate and valid licence disk will serve as a proof of ownership. An Invoice/bank letter will serve as a proof of ownership for plant such as track dozer, track excavator, smooth drum roller and grid roller. NB: Municipality may conduct due diligence on the availability of plant and equipment.	Plant and Equipment for this project. (Tenderer’s own plant)			25	25
	Plant required	Min. Number Required	Weight		
	Dozer	1	1		
	Excavator	2	6		
	TLB	2	4		
	Watercart min.10 000 litres	2	2		
	Grader	2	4		
	10t Smooth drum roller	1	2		
	10t Grid roller	1	2		
	Tipper Truck, min. 6m ³ or 10m ³	4	4		
SUB-TOTAL			25		

Company's Financial Standing	Original stamped bank reference letter indicating the Bank Rating:		15	15
	Bank Rating	Points		
	A	15		
	B	14		
	C	10		
	D	6		
	E	2		
	F-G	0		
TOTAL				100

Note

- ✚ Risk assessment will be conducted with the bidder who scored highest points.
- ✚ The successful bidder (to be later referred to as the contractor) will be subjected to performance scoring at the end of the project.

The following is a statement of Roads and Stormwater (similar) works executed by the company/ies in the last Ten (10) years:

Employer Name, Contact person and telephone number	Description of contract	Value of work inclusive of VAT (Rand) if applicable	Start Date	Date Completed	Project Duration

PART T2: LIST OF RETURNABLE DOCUMENTS

The tenderer must complete the following returnable documents:

T2.1	LIST OF RETURNABLE SCHEDULES	T.27
T2.2	OTHER DOCUMENTS REQUIRED FOR TENDER EVALUATION	T.53
T2.3	RETURNABLE SCHEDULES THAT WILL BE INCORPORATED INTO THE CONTRACT.....	T.77

T2.1 LIST OF RETURNABLE SCHEDULES

T2.1 A	INVITATION TO BID AND TERMS AND CONDITIONS FOR BIDDING-MBD1	T.28
T2.1 B	DECLARATION OF GOOD STANDING REGARDING TAX-MBD 7.2	T.31
T2.1 C	PRICING SCHEDULE : FIRM PRICES -MBD 3.3.....	T.32
T2.1 E	DECLARATION OF INTEREST -MBD 4	T.34
T2.1 F	DECLARATION FOR PROCUREMENT ABOVE R10 MILLION (ALL APPLICABLE TAXES INCLUDED) – MBD 5	T.37
T2.1 G	PREFERENCE POINTS CLAIM FORM IN TERMS OF THE PREFERENTIAL PROCUREMENT REGULATIONS 2022 – MBD 6.1	T.39
T2.1 H	DECLARATION CERTIFICATE FOR LOCAL PRODUCTION AND CONTENT - MBD 6.2	T.44
T2.1 L	DECLARATION OF BIDDER’S PAST SUPPLY CHAIN MANAGEMENT PRACTICES-MBD 8	T.48
T2.1 M	CERTIFICATE OF INDEPENDENT BID DETERMINATION -MBD 9	T.50

T2.1 A INVITATION TO BID AND TERMS AND CONDITIONS FOR BIDDING-MBD1

PART A: INVITATION TO BID

YOU ARE HEREBY INVITED TO BID FOR REQUIREMENTS OF THE THULAMELA LOCAL MUNICIPALITY					
BID NUMBER:	10/2024/2025	CLOSING DATE:	08 November 2024	CLOSING TIME:	11:00HRS
DESCRIPTION	UPGRADING OF MAPATE ACCESS ROAD				
BID RESPONSE DOCUMENTS MAY BE DEPOSITED IN THE BID BOX SITUATED AT (STREET ADDRESS)					
THULAMELA MUNICIPALITY OFFICES					
OLD AGRIVEN BUILDING					
THOHOYANDOU					
0950					
BIDDING PROCEDURE ENQUIRIES MAY BE DIRECTED TO			TECHNICAL ENQUIRIES MAY BE DIRECTED TO:		
CONTACT PERSON	Mr C. Maphagi		CONTACT PERSON	Ms S Souter	
TELEPHONE NUMBER	+27(0)15 962 7500		TELEPHONE NUMBER	+27 (011) 709 8420	
FACSIMILE NUMBER	+27(0)15 962 4020		FACSIMILE NUMBER		
E-MAIL ADDRESS	mphagi@thulamela.gov.za		E-MAIL ADDRESS	shannons@mariswe.com	
SUPPLIER INFORMATION					
NAME OF BIDDER					
POSTAL ADDRESS					
STREET ADDRESS					
TELEPHONE NUMBER	CODE		NUMBER		
CELLPHONE NUMBER					
FACSIMILE NUMBER	CODE		NUMBER		
E-MAIL ADDRESS					
VAT REGISTRATION NUMBER					
SUPPLIER COMPLIANCE STATUS	TAX COMPLIANCE SYSTEM PIN:		OR	CENTRAL SUPPLIER DATABASE No:	MAAA

(a) ARE YOU THE ACCREDITED REPRESENTATIVE IN SOUTH AFRICA FOR THE GOODS /SERVICES /WORKS OFFERED?	Yes No [IF YES ENCLOSE PROOF] ☐ ☐	(b) ARE YOU A FOREIGN BASED SUPPLIER FOR THE GOODS /SERVICES /WORKS OFFERED?	Yes No [IF YES, ANSWER PART B:3] ☐ ☐
QUESTIONNAIRE TO BIDDING FOREIGN SUPPLIERS			
IS THE ENTITY A RESIDENT OF THE REPUBLIC OF SOUTH AFRICA (RSA) YES NO DOES THE ENTITY HAVE A BRANCH IN THE RSA? YES NO DOES THE ENTITY HAVE A PERMANENT ESTABLISHMENT IN THE RSA? YES NO DOES THE ENTITY HAVE ANY SOURCE OF INCOME IN THE RSA ☐ YES ☐ NO IS THE ENTITY LIABLE IN THE RSA FOR ANY FORM OF TAXATI ☐ YES ☐ NO ☐ ☐			
IF THE ANSWER IS "NO" TO ALL OF THE ABOVE, THEN IT IS NOT A REQUIREMENT TO REGISTER FOR A TAX COMPLIANCE STATUS SYSTEM PIN CODE FROM THE SOUTH AFRICAN REVENUE SERVICE (SARS) AND IF NOT REGISTER AS PER 2.3 BELOW.			

PART B: TERMS AND CONDITIONS FOR BIDDING

1. BID SUBMISSION:
1.1. BIDS MUST BE DELIVERED BY THE STIPULATED TIME TO THE CORRECT ADDRESS. LATE BIDS WILL NOT BE ACCEPTED FOR CONSIDERATION. 1.2. ALL BIDS MUST BE SUBMITTED ON THE OFFICIAL FORMS PROVIDED (NOT TO BE RE-TYPED) OR ONLINE 1.3. THIS BID IS SUBJECT TO THE PREFERENTIAL PROCUREMENT POLICY FRAMEWORK ACT 2000 AND THE PREFERENTIAL PROCUREMENT REGULATIONS, 2022, THE GENERAL CONDITIONS OF CONTRACT (GCC) AND, IF APPLICABLE, ANY OTHER LEGISLATION OR SPECIAL CONDITIONS OF CONTRACT. 1.4. THE SUCCESSFUL BIDDER WILL BE REQUIRED TO FILL IN AND SIGN A WRITTEN CONTRACT FORM (SBD7).
2. TAX COMPLIANCE REQUIREMENTS
2.1 BIDDERS MUST ENSURE COMPLIANCE WITH THEIR TAX OBLIGATIONS. 2.2 BIDDERS ARE REQUIRED TO SUBMIT THEIR UNIQUE PERSONAL IDENTIFICATION NUMBER (PIN) ISSUED BY SARS TO ENABLE THE ORGAN OF STATE TO VIEW THE TAXPAYER'S PROFILE AND TAX STATUS. 2.3 APPLICATION FOR TAX COMPLIANCE STATUS (TCS) OR PIN MAY ALSO BE MADE VIA E-FILING. THROUGH THE SARS WEBSITE, WWW.SARS.GOV.ZA.

- 2.4 BIDDERS MAY ALSO SUBMIT A PRINTED TCS TOGETHER WITH THE BID.
- 2.5 IN BIDS WHERE CONSORTIA/Joint VENTURES/SUB-CONTRACTORS ARE INVOLVED; EACH PARTY MUST SUBMIT A SEPARATE TCS/PIN/CSD NUMBER.
- 2.6 WHERE NO TCS IS AVAILABLE BUT THE BIDDER IS REGISTERED ON THE CENTRAL SUPPLIER DATABASE (CSD), A CSD NUMBER MUST BE PROVIDED.
- 2.7 NO BIDS WILL BE CONSIDERED FROM PERSONS IN THE SERVICE OF THE STATE, COMPANIES WITH DIRECTORS WHO ARE PERSONS IN THE SERVICE OF THE STATE, OR CLOSE CORPORATIONS WITH MEMBERS PERSONS IN THE SERVICE OF THE STATE.

NB: FAILURE TO PROVIDE ANY OF THE ABOVE PARTICULARS MAY RENDER THE BID INVALID.

SIGNATURE OF BIDDER:

CAPACITY UNDER WHICH THIS BID IS SIGNED:

(Proof of authority must be submitted, e.g. Company Resolution)

DATE:

T2.1 B TAX CLEARANCE CERTIFICATE REQUIREMENTS

It is a condition of bid that the taxes of the successful bidder must be in order, or that satisfactory arrangements have been made with South African Revenue Service (SARS) to meet the bidder's tax obligations.

1. In order to meet this requirement bidders are required to complete in full the attached form TCC 001 "Application for a Tax Clearance Certificate", and submit it to any SARS branch office nationally. The Tax Clearance Certificate Requirements are also applicable to foreign bidders / individuals who wish to submit bids.
2. SARS will then furnish the bidder with a Tax Clearance Certificate that will be valid for a period of 1 (one) year from the date of approval.
3. **The original Tax Clearance Certificate must be submitted together with the bid.** Failure to submit the **original and valid** Tax Clearance Certificate will result in the invalidation of the bid. Certified copies of the Tax Clearance Certificate will not be acceptable.
4. In bids where Consortia / Joint Ventures / Sub-contractors are involved; each party must submit a separate Tax Clearance Certificate.
5. Copies of the TCC 001 "Application for a Tax Clearance Certificate" form are available from any SARS branch office nationally or on the website www.sars.gov.za.
6. Applications for the Tax Clearance Certificates may also be made via eFiling. In order to use this provision, taxpayers will need to register with SARS as eFilers through the website www.sars.gov.za

T2.1 C PRICING SCHEDULE – FIRM PRICES MBD 3.3

MBD 3.3

PRICING SCHEDULE
(Professional Services)

Name of Bidder:.....	Bid Number:
Closing Time:	Closing Date:

OFFER TO BE VALID FOR.....DAYS FROM THE CLOSING DATE OF BID.

ITEM NO	DESCRIPTION	BID PRICE INRSA CURRENCY **(ALL APPLICABLE TAXES INCLUDED)

1. The accompanying information must be used for the formulation of proposals.
2. Bidders are required to indicate a ceiling price based on the total estimated time for completion of all phases and including all expenses inclusive of all applicable taxes for the project. R.....

3. PERSONS WHO WILL BE INVOLVED IN THE PROJECT AND RATES APPLICABLE (CERTIFIED INVOICES MUST BE RENDERED IN TERMS HEREOF)

4. PERSON AND POSITION

HOURLY RATE DAILY RATE

R.....

R.....

R.....

R.....

R.....

5. PHASES ACCORDING TO WHICH THE PROJECT WILL BE COMPLETED, COST PER PHASE AND MAN-DAYS TO BE SPENT

R..... days

R..... days

R..... days

R..... days

- 5.1 Travel expenses (specify, for example rate/km and total km, class of airtravel, etc). Only actual costs are recoverable. Proof of the expenses incurred must accompany certified invoices.

DESCRIPTION OF EXPENSE TO BE INCURRED	RATE	QUANTITY	AMOUNT

R.....

R.....

R.....

R.....

***"all applicable taxes" includes value-added taxes, pay as you earn, income tax, unemployment insurance fund contributions and skills development levies.

5.2 Other expenses, for example accommodation (specify, e.g. Three star hotel, bed and breakfast, telephone cost, reproduction cost, etc.). On basis of these particulars, certified invoices will be checked for correctness. Proof of the expenses must accompany invoices.

DESCRIPTION OF EXPENSE TO BE INCURRED	RATE	QUANTITY	AMOUNT
.....			R.....
.....			R.....
.....			R.....
.....			R.....
TOTAL: R.....			

6. Period required for commencement with project after acceptance of bid
7. Estimated man-days for completion of project
8. Are the rates quoted firm for the full period of contract? *YES/ NO.
9. If not firm for the full period, provide details of the basis on which adjustments will be applied for, for example consumer price index.....

.....
.....
.....

*Delete if not applicable

MBD 4

T2.1 E DECLARATION OF INTEREST

1. No bid will be accepted from persons in the service of the state*.
2. Any person, having a kinship with persons in the service of the state, including a blood relationship, may make an offer or offers in terms of this invitation to bid. In view of possible allegations of favouritism, should the resulting bid, or part thereof, be awarded to persons connected with or related to persons in service of the state, it is required that the bidder or their authorised representative declare their position in relation to the evaluating/adjudicating authority and/or take an oath declaring his/her interest.

3 In order to give effect to the above, the following questionnaire must be completed and submitted with the bid.

3.1 Full Name:

3.2 Identity Number:

3.3 Company Registration Number:

3.4 Tax Reference Number:

3.5 VAT Registration Number:

3.6 Are you presently in the service of the state* **YES / NO**

3.6.1 If so, furnish particulars.

.....

.....

3.7 Have you been in the service of the state for the past twelve months? **YES / NO**

3.7.1 If so, furnish particulars.

.....

.....

* MSCM Regulations: "in the service of the state" means to be –

- (a) a member of –
 - (i) any municipal council;
 - (ii) any provincial legislature; or
 - (iii) the national Assembly or the national Council of provinces;
- (b) a member of the board of directors of any municipal entity;
- (c) an official of any municipality or municipal entity;
- (d) an employee of any national or provincial department, national or provincial public entity or constitutional institution within the meaning of the Public Finance Management Act, 1999 (Act No.1 of 1999);
- (e) a member of the accounting authority of any national or provincial public entity; or
- (f) an employee of Parliament or a provincial legislature

3.8 Are you, aware of any relationship (family, friend, other) with persons in the service of the state and who may be involved with the evaluation and or adjudication of this bid?

YES / NO

3.8.1 If so, furnish particulars

.....
.....

3.9 Are you aware of any relationship (family, friend, other) between a bidder and any persons in the service of the state who may be involved with the evaluation and or adjudication of this bid?

YES / NO

3.9.1 If so, furnish particulars.

.....
.....

3.10 Are any of the company's directors, managers, principle shareholders or stakeholders in service of the state?

YES / NO

3.10.1 If so, furnish particulars.

.....
.....

3.11 Are any spouse, child or parent of the company's director managers, principle shareholders or stakeholders in service of the state?

**YES /
NO**

3.11.1 If so, furnish particulars.

.....
.....

CERTIFICATION

I, THE UNDERSIGNED (NAME)

CERTIFY THAT THE INFORMATION FURNISHED ON THIS DECLARATION FORM IS CORRECT.

I ACCEPT THAT THE STATE MAY ACT AGAINST ME SHOULD THIS DECLARATION PROVE TO BE FALSE.

.....
Signature

.....
Date

.....
Position

.....
Name of Bidder

T2.1 F DECLARATION FOR PROCUREMENT ABOVE R10 MILLION (ALL APPLICABLE TAXES INCLUDED)

For all procurement expected to exceed R10 million (all applicable taxes included), bidders must complete the following questionnaire:

1. Are you by law required to prepare annual financial statements for auditing? ***YES / NO**

1.1 If yes, submit audited annual financial statements for the past three years or since the date of establishment if established during the past three years.

.....
.....

2. Do you have any outstanding undisputed commitments for municipal services towards any municipality for more than three months or any other service provider in respect of which payment is overdue for more than 30 days? ***YES / NO**

2.1 If no, this serves to certify that the bidder has no undisputed commitments for municipal services towards any municipality for more than three months or other service provider in respect of which payment is overdue for more than 30 days.

2.2 If yes, provide particulars.

.....
.....
.....

3. Has any contract been awarded to you by an organ of state during the past five years, including particulars of any material non-compliance or dispute concerning the execution of such contract? ***YES / NO**

3.1 If yes, furnish particulars

.....
.....
.....

4. Will any portion of goods or services be sourced from outside the Republic, and, if so, what portion and whether any portion of payment from the municipality / municipal entity is expected to be transferred out of the Republic? *YES / NO

4.1. If yes, furnish particulars

.....
.....

CERTIFICATION

I, THE UNDERSIGNED (NAME)

CERTIFY THAT THE INFORMATION FURNISHED ON THIS DECLARATION FORM IS CORRECT.

I ACCEPT THAT THE STATE MAY ACT AGAINST ME SHOULD THIS DECLARATION PROVE TO BE FALSE.

Signature

Date

Position

Name of Bidder

T2.1 G PREFERENCE POINTS CLAIM FORM IN TERMS OF THE PREFERENTIAL PROCUREMENT REGULATIONS 2022

This preference form must form part of all bids invited. It contains general information and serves as a claim form for preference points for specific goals.

NB: BEFORE COMPLETING THIS FORM, TENDERERS MUST STUDY THE GENERAL CONDITIONS, DEFINITIONS AND DIRECTIVES APPLICABLE IN RESPECT OF THE TENDER AND PREFERENTIAL PROCUREMENT REGULATIONS, 2022.

1. GENERAL CONDITIONS

1.1 The following preference point systems are applicable to all bids:

- the 80/20 system for requirements with a Rand value of up to R50 000 000 (all applicable taxes included); and
- the 90/10 system for requirements with a Rand value above R50 000 000 (all applicable taxes included).

1.2 To be completed by the organ of state

(Delete whichever is not applicable for this tender).

- (a) The applicable preference point system for this tender is the 90/10 preference point system.
- (b) The applicable preference point system for this tender is the 80/20 preference point system.
- (c) Either the 90/10 Or 80/20 preference point system will be applicable in this tender. The lowest / highest acceptance tender will be used to determine the accurate system once tenders are received.

1.3 Points for this tender (even in the case of a tender for income-generating contracts) shall be awarded for:

- (a) Price; and
- (b) Specific Goals.

1.4 To be completed by the organ of state:

The maximum points for this tender are allocated as follows:

	POINTS
PRICE	90
SPECIFIC GOALS	10
Total points for Price and SPECIFIC GOALS	100

- 1.5 Failure on the part of a tenderer to submit proof or documentation required in terms of this tender to claim points for specific goals with the tender, will be interpreted to mean that preference points for specific goals are not claimed.
- 1.6 The organ of state reserves the right to require of a tenderer, either before a tender, is adjudicated or at any time subsequently, to substantiate any claim in regard to references, in any manner required by the organ of state.

2. DEFINITIONS

- (a) **“tender”** means a written offer in the form determined by an organ of state in response to an invitation to provide goods or services through price quotations, competitive tendering process or any other method envisaged in legislation;
- (b) **“price”** means an amount of money tendered for goods or services, and includes all applicable taxes less all unconditional discounts;
- (c) **“rand value”** means the total estimated value of a contract in Rand, calculated at the time of bid invitation, and includes all applicable taxes;
- (d) **“tender for income-generating contracts”** means a written offer in the form determined by an organ of state in response to an invitation for the origination of income-generating contracts through any method envisaged in legislation that will result in a legal agreement between the organ of state and a third party that produces revenue for the organ of state, and includes, but is not limited to, leasing and disposal of assets and concession contracts, excluding direct sales and disposal of assets through public auctions; and
- (e) **“the Act”** means the Preferential Procurement Policy Framework Act, 2000 (Act No. 5 Of 2000).

3. FORMULAE FOR PROCUREMENT OF GOODS AND SERVICES

3.1 POINTS AWARDED FOR PRICE

3.1.1 THE 80/20 OR 90/10 PREFERENCE POINT SYSTEM

A maximum of 80 or 90 points is allocated for price on the following basis:

80/20	or	90/10
$P_s = 80 \left(1 - \frac{P_t - P_{\min}}{P_{\min}} \right)$	or	$P_s = 90 \left(1 - \frac{P_t - P_{\min}}{P_{\min}} \right)$

Where

Ps = Points scored for price of bid under consideration

Pt = Price of bid under consideration

Pmin = Price of lowest acceptable bid

4. POINTS AWARDED FOR SPECIFIC GOALS

4.1 In terms of Regulation 4(2); 5(2); 6(2) and 7(2) of the Preferential Procurement Regulations, preference points must be awarded for specific goals stated in the tender. For the purposes of this tender the tenderer will be allocated points based on the goals stated in table 1 below as may be supported by proof / documentation stated in the conditions of this tender.

4.2 In cases where organs of state intend to use Regulation 3(2) of the Regulations, which states that, if it is unclear whether the 80/20 Or 90/10 preference point system applies, an organ of state must, in the tender documents, stipulate in the case of –

- (a) an invitation for tender for income-generating contracts, that either the 80/20 or 90/10 preference point system will apply and that the highest acceptable tender will be used to determine the applicable preference point system; or
- (b) Any other invitation for tender, that either the 80/20 or 90/10 preference point system will apply and that the lowest acceptable tender will be used to determine the applicable preference point system, then the organ of state must indicate the points allocated for specific goals for both the 90/10 and 80/20 preference point system.

Table 1: Specific goals for the tender and points claimed are indicated per the table below.

(Note to organs of state: Where either the 90/10 or 80/20 preference point system is applicable, corresponding points must also be indicated as such.

Note to tenderers: The tenderer must indicate how they claim points for each preference point system).

The specific goals allocated points terms of this tender.	Number of points allocated (90/10 system) (To be completed by the organ of state)	Number of points allocated (80/20 system) (To be completed by the organ of state)	Number of points claimed (90/10 system) To be completed by the tenderer	Number of points claimed (80/20 system) (To be completed by the tenderer

DECLARATION WITH REGARD TO COMPANY/FIRM

4.3 Name of company/firm:

4.4 Company registration number:

4.5 TYPE OF COMPANY/ FIRM

- ☐ Partnership/Joint Venture / Consortium
- ☐ One-person business/sole propriety
- ☐ Close corporation
- ☐ Public Company
- ☐ Personal Liability Company
- ☐ (Pty) Limited
- ☐ Non-Profit Company
- ☐ State Owned Company

[TICK APPLICABLE BOX]

4.6 I, the undersigned, who is duly authorized to do so on behalf of the company/firm, certify that the points

4.7 claimed, based on the specific goals as advised in the tender, qualifies the company/ firm for the preference(s) shown and I acknowledge that:

- (i) The information furnished is true and correct;
- (ii) The preference points claimed are in accordance with the General Conditions as indicated in paragraph 1 of this form;
- (iii) In the event of a contract being awarded as a result of points claimed as shown in paragraphs 1.4 and 4.2, the contractor may be required to furnish documentary proof to the satisfaction of the organ of state that the claims are correct;
- (iv) If the specific goals have been claimed or obtained on a fraudulent basis or any of the conditions of contract have not been fulfilled, the organ of state may, in addition to any other remedy it may have -

- (a) disqualify the person from the tendering process;
- (b) recover costs, losses or damages it has incurred or suffered as a result of that person's conduct;
- (c) cancel the contract and claim any damages which it has suffered as a result of having to make less favourable arrangements due to such cancellation;
- (d) recommend that the tenderer or contractor, its shareholders and directors, or only the shareholders and directors who acted on a fraudulent basis, be restricted from obtaining business from any organ of state for a period not exceeding 10 years, after the audi alteram partem (hear the other side) rule has been applied; and
- (e) forward the matter for criminal prosecution, if deemed necessary.

.....	
SIGNATURE(S) OF TENDERER(S)	
SURNAME AND NAME:	
DATE:	
ADDRESS:	
	
	

MBD 6.2

T2.1 H DECLARATION CERTIFICATE FOR LOCAL PRODUCTION AND CONTENT FOR DESIGNATED SECTORS

This Municipal Bidding Document (MBD) must form part of all bids invited. It contains general information and serves as a declaration form for local content (local production and local content are used interchangeably).

Before completing this declaration, bidders must study the General Conditions, Definitions, Directives applicable in respect of Local Content as prescribed in the Preferential Procurement Regulations, 2022, the South African Bureau of Standards (SABS) approved technical specification number SATS 1286:2011 (Edition 1) and the Guidance on the Calculation of Local Content together with the Local Content Declaration Templates [Annex C (Local Content Declaration: Summary Schedule), D (Imported - Content Declaration: Supporting Schedule to Annex C) and E (Local Content Declaration: Supporting Schedule to Annex C)].

1. General Conditions

- 1.1 Where necessary, for tenders referred to in paragraph 1.2 above, a two-stage bidding process may be followed, where the first stage involves a minimum threshold for local production and content and the second stage price and specific goals.
- 1.2 The local content (LC) expressed as a percentage of the bid price must be calculated in accordance with the SABS approved technical specification number SATS 1286: 2011 as follows:
- 1.3 Regulation 8. (2) prescribes that in the case of designated sectors, organs of state must advertise such tenders with the specific bidding condition that only locally produced or manufactured goods, with a stipulated minimum threshold for local production and content will be considered.
- 1.4 This Bid is subject to the Preferential Procurement Policy Framework Act 2000 and the Preferential Procurement Regulations, 2022, the General Conditions of Contract (GCC) and, if applicable, any other legislation or special conditions of contract.
- 1.5 A person awarded a contract in relation to a designated sector, may not sub-contract in such a manner that the local production and content of the overall value of the contract is reduced to below the stipulated minimum threshold.

$$LC = [1 - x / y] * 100$$

Where

x is the imported content in Rand

y is the bid price in Rand excluding value added tax (VAT)

Prices referred to in the determination of x must be converted to Rand (**ZAR**) by using the exchange rate published by South African Reserve Bank (SARB) at 12:00 on the date of advertisement of the bid as indicated in paragraph 4.1 below.

The SABS approved technical specification number SATS 1286:2011 is accessible on [http://www.thedti.gov.za/industrial development/ip.jsp](http://www.thedti.gov.za/industrial%20development/ip.jsp) at no cost.

1. A bid may be disqualified if this Declaration Certificate and the Annex C (Local Content Declaration: Summary Schedule) are not submitted as part of the bid documentation;

2. The stipulated minimum threshold(s) for local production and content (refer to Annex A of SATS 1286:2011) for this bid is/are as follows:

<u>Description of services, works or goods</u>	<u>Stipulated minimum threshold</u>
	%
	%
	%

3. Does any portion of the goods or services offered have any imported content?
(Tick applicable box)

YES	☐	NO	☐

- 3.1 If yes, the rate(s) of exchange to be used in this bid to calculate the local content as prescribed in paragraph 1.5 of the general conditions must be the rate(s) published by SARB for the specific currency at 12:00 on the date of advertisement of the bid.

The relevant rates of exchange information is accessible on www.reservebank.co.za

Indicate the rate(s) of exchange against the appropriate currency in the table below (refer to Annex A of SATS 1286:2011):

Currency	Rates of exchange
US Dollar	
Pound Sterlina	
Euro	
Yen	
Other	

NB: Bidders must submit proof of the SARB rate (s) of exchange used.

4. Where, after the award of a bid, challenges are experienced in meeting the stipulated minimum threshold for local content the dti must be informed accordingly in order for the dti to verify and in consultation with the AO/AA provide directives in this regard.

MBD 8

LOCAL CONTENT DECLARATION
{REFER TO ANNEX B OF SATS 1286:2011}

**LOCAL CONTENT DECLARATION BY CHIEF FINANCIAL OFFICER OR OTHER
LEGALLY RESPONSIBLE PERSON NOMINATED IN WRITING BY THE CHIEF
EXECUTIVE OR SENIOR MEMBER/PERSON WITH MANAGEMENT RESPONSIBILITY
(CLOSE CORPORATION, PARTNERSHIP OR INDIVIDUAL)**

IN RESPECT OF BID NO.....

ISSUED BY: (Procurement Authority / Name of Institution):
.....

NB

1. The obligation to complete, duly sign and submit this declaration cannot be transferred to an external authorized representative, auditor or any other third party acting on behalf of the bidder.
2. Guidance on the Calculation of Local Content together with Local Content Declaration Templates (Annex C, D and E) is accessible on http://www.thdti.gov.za/industrial_development/ip.jsp. Bidders should first complete Declaration D. After completing Declaration D, bidders should complete Declaration E and then consolidate the information on Declaration C. **Declaration C should be submitted with the bid documentation at the closing date and time of the bid in order to substantiate the declaration made in paragraph (c) below.** Declarations D and E should be kept by the bidders for verification purposes for a period of at least 5 years. The successful bidder is required to continuously update Declarations C, D and E with the actual values for the duration of the contract.

I, the undersigned..... (full names),
do hereby declare, in my capacity as.....
Of (name of bidder entity),
the following:

- (a) The facts contained herein are within my own personal knowledge.
- (b) I have satisfied myself that :
 - (i) the goods/services/works to be delivered in terms of the above specified bid comply with the minimum local content requirements as specified in the bid, and as measured in terms of SATS 1286:2011; and
- (c) The local content percentage (%) indicated below has been calculated using the formula given in clause 3 of SATS 1286:2011, the rates of exchange indicated in paragraph 4.1 above and the information contained in Declaration D and E which has been consolidated in Declaration C:

Bid price, excluding VAT (y)	R
Imported content (x), as calculated in terms of SATS 1286:2011	R
Stipulated minimum threshold for Local content (paragraph 3 above)	
Local content % , as calculated in terms of SATS 1286:2011	

If the bid is for more than one product, the local content percentages for each product contained in Declaration C shall be used instead of the table above. The

~~local content percentages for each product has been calculated using the~~
formula given in clause 3 of SATS 1286:2011, the rates of exchange indicated
in paragraph 4.1 above and the information contained in Declaration D and E.

- (d) I accept that the Procurement Authority / Institution has the right to request that the local content be verified in terms of the requirements of SATS 1286:2011
- (e) I understand that the awarding of the bid is dependent on the accuracy of the information furnished in this application. I also understand that the submission of incorrect data, or data that are not verifiable as described in SATS 1286:2011, may result in the Procurement Authority / Institution imposing any or all of the remedies as provided for in the Preferential Procurement Regulations, 2022 promulgated under the Policy Framework Act (PPFA), 2000 (Act No. 5 of 2000).

SIGNATURE: _____

DATE: _____

WITNESS No. 1 _____

DATE: _____

WITNESS No. 2 _____

DATE: _____

T2.1 L DECLARATION OF BIDDER'S PAST SUPPLY CHAIN MANAGEMENT PRACTICES

- 1 This Municipal Bidding Document must form part of all bids invited.
- 2 It serves as a declaration to be used by municipalities and municipal entities in ensuring that when goods and services are being procured, all reasonable steps are taken to combat the abuse of the supply chain management system.
- 3 The bid of any bidder may be rejected if that bidder, or any of its directors have:
 - a. abused the municipality's / municipal entity's supply chain management system or committed any improper conduct in relation to such system;
 - b. been convicted for fraud or corruption during the past five years;
 - c. willfully neglected, reneged on or failed to comply with any government, municipal or other public sector contract during the past five years; or
 - d. been listed in the Register for Tender Defaulters in terms of section 29 of the Prevention and Combating of Corrupt Activities Act (No 12 of 2004).
- 4 **In order to give effect to the above, the following questionnaire must be completed and submitted with the bid.**

Item	Question	Yes	No
4.1	Is the bidder or any of its directors listed on the National Treasury's Database of Restricted Suppliers as companies or persons prohibited from doing business with the public sector? (Companies or persons who are listed on this Database were informed in writing of this restriction by the Accounting Officer/Authority of the institution that imposed the restriction after the <i>audi alteram partem</i> rule was applied). The Database of Restricted Suppliers now resides on the National Treasury's website (www.treasury.gov.za) and can be accessed by clicking on its link at the bottom of the home page.	Yes ☐ Yes	No ☐ No
4.1.1	If so, furnish particulars:		
4.2	Is the bidder or any of its directors listed on the Register for Tender Defaulters in terms of section 29 of the Prevention and Combating of Corrupt Activities Act (No 12 of 2004)? The Register for Tender Defaulters can be accessed on the National Treasury's website (www.treasury.gov.za) by clicking on its link at the bottom of the home page.	☒ Yes	☒ No
4.2.1	If so, furnish particulars:	☐	☐
4.3	Was the bidder or any of its directors convicted by a court of law (including a court of law outside the Republic of South Africa) for fraud or corruption during the past five years?	Yes	No

4.3.1	If so, furnish particulars:		
4.4	Does the bidder or any of its directors owe any municipal rates and taxes or municipal charges to the municipality / municipal entity, or to any other municipality / municipal entity, that is in arrears for more than three months?	Yes ☐	No ☐
4.4.1	If so, furnish particulars:		
4.5	Was any contract between the bidder and the municipality / municipal entity or any other organ of state terminated during the past five years on account of failure to perform on or comply with the contract?	Yes ☐	No ☐
4.7.1	If so, furnish particulars:		

CERTIFICATION

I, THE UNDERSIGNED (FULL NAME)
CERTIFY THAT THE INFORMATION FURNISHED ON THIS DECLARATION FORM TRUE
AND CORRECT.

I ACCEPT THAT, IN ADDITION TO CANCELLATION OF A CONTRACT, ACTION MAY BE
TAKEN AGAINST ME SHOULD THIS DECLARATION PROVE TO BE FALSE.

.....
Signature

.....
Date

.....
Position

.....
Name of Bidder

T2.1 M CERTIFICATE OF INDEPENDENT BID DETERMINATION

- 1 This Municipal Bidding Document (MBD) must form part of all bids¹ invited.
- 2 Section 4 (1) (b) (iii) of the Competition Act No. 89 of 1998, as amended, prohibits an agreement between, or concerted practice by, firms, or a decision by an association of firms, if it is between parties in a horizontal relationship and if it involves collusive bidding (or bid rigging).² Collusive bidding is a *pe se* prohibition meaning that it cannot be justified under any grounds.
- 3 Municipal Supply Regulation 38 (1) prescribes that a supply chain management policy must provide measures for the combating of abuse of the supply chain management system, and must enable the accounting officer, among others, to:
 - a. take all reasonable steps to prevent such abuse;
 - b. reject the bid of any bidder if that bidder or any of its directors has abused the supply chain management system of the municipality or municipal entity or has committed any improper conduct in relation to such system; and
 - c. cancel a contract awarded to a person if the person committed any corrupt or fraudulent act during the bidding process or the execution of the contract.
- 4 This MBD serves as a certificate of declaration that would be used by institutions to ensure that, when bids are considered, reasonable steps are taken to prevent any form of bid-rigging.
- 5 In order to give effect to the above, the attached Certificate of Bid Determination (MBD 9) must be completed and submitted with the bid:

¹ Includes price quotations, advertised competitive bids, limited bids and proposals.

² Bid rigging (or collusive bidding) occurs when businesses, that would otherwise be expected to compete, secretly conspire to raise prices or lower the quality of goods and / or services for purchasers who wish to acquire goods and / or services through a bidding process. Bid rigging is, therefore, an agreement between competitors not to compete.

³ Joint venture or Consortium means an association of persons for the purpose of combining their expertise, property, capital, efforts, skill and knowledge in an activity for the execution of a contract.

CERTIFICATE OF INDEPENDENT BID DETERMINATION

I, the undersigned, in submitting the accompanying bid:

(Bid Number and Description)

in response to the invitation for the bid made by:

(Name of Municipality / Municipal Entity)

do hereby make the following statements that I certify to be true and complete in every respect:

I certify, on behalf of: _____ that:
(Name of Bidder)

1. I have read and I understand the contents of this Certificate;
2. I understand that the accompanying bid will be disqualified if this Certificate is found not to be true and complete in every respect;
3. I am authorized by the bidder to sign this Certificate, and to submit the accompanying bid, on behalf of the bidder;
4. Each person whose signature appears on the accompanying bid has been authorized by the bidder to determine the terms of, and to sign, the bid, on behalf of the bidder;
5. For the purposes of this Certificate and the accompanying bid, I understand that the word "competitor" shall include any individual or organization, other than the bidder, whether or not affiliated with the bidder, who:
 - (a) has been requested to submit a bid in response to this bid invitation;
 - (b) could potentially submit a bid in response to this bid invitation, based on their qualifications, abilities or experience; and
 - (c) provides the same goods and services as the bidder and/or is in the same line of business as the bidder
6. The bidder has arrived at the accompanying bid independently from, and without consultation, communication, agreement or arrangement with any competitor. However communication between partners in a joint venture or consortium³ will not be construed as collusive bidding.

-
7. In particular, without limiting the generality of paragraphs 6 above, there has been no consultation, communication, agreement or arrangement with any competitor regarding:
- (a) prices;
 - (b) geographical area where product or service will be rendered (market allocation)
 - (c) methods, factors or formulas used to calculate prices;
 - (d) the intention or decision to submit or not to submit, a bid;
 - (e) the submission of a bid which does not meet the specifications and conditions of the bid; or
 - (f) bidding with the intention not to win the bid.
8. In addition, there have been no consultations, communications, agreements or arrangements with any competitor regarding the quality, quantity, specifications and conditions or delivery particulars of the products or services to which this bid invitation relates.
9. The terms of the accompanying bid have not been, and will not be, disclosed by the bidder, directly or indirectly, to any competitor, prior to the date and time of the official bid opening or of the awarding of the contract.
10. I am aware that, in addition and without prejudice to any other remedy provided to combat any restrictive practices related to bids and contracts, bids that are suspicious will be reported to the Competition Commission for investigation and possible imposition of administrative penalties in terms of section 59 of the Competition Act No 89 of 1998 and or may be reported to the National Prosecuting Authority (NPA) for criminal investigation and or may be restricted from conducting business with the public sector for a period not exceeding ten (10) years in terms of the Prevention and Combating of Corrupt Activities Act No 12 of 2004 or any other applicable legislation.

.....
Signature

.....
Date

.....
Position

.....
Name of Bidder

T2.2 OTHER DOCUMENTS REQUIRED FOR TENDER EVALUATION

T2.2 A	CERTIFICATE OF AUTHORITY OF SIGNATORY.....	T.54
T2.2 B	CERTIFICATE OF REGISTRATION WITH THE CONSTRUCTION INDUSTRY DEVELOPMENT BOARD	T.58
T2.2 C	RECORD OF ADDENDA TO BID DOCUMENTS	T.63
T2.2 D	FORM OF INTENT TO PROVIDE A DEMAND GUARANTEE	T.64
T2.2 E	HEALTH AND SAFETY PLAN: DECLARATION BY BIDDER	T.65
T2.2 F	SCHEDULE OF PROPOSED SUB-CONTRACTORS.....	T.66
T2.2 G	QUALITY ASSURANCE PROGRAMME.....	T.69
T2.2 H	INSURANCE STATEMENT	T.70
T2.2 I	FINANCIAL INFORMATION OF BIDDER	T.71
T2.2 J	ALTERATIONS BY BIDDER.....	T.73
T2.2 K	AUDITED ANNUAL FINANCIAL STATEMENT FOR THE PAST THREE YEARS.....	T.74
T2.2 L	MUNICIPAL UTILITY ACCOUNT.....	T.75

T2.2 A CERTIFICATE OF AUTHORITY OF SIGNATORY

Indicate the status of the Bidder by ticking the appropriate box hereunder. The Bidder must complete the certificate set out below for the relevant category.

A Company ☐

B Partnership ☐

C Joint Venture ☐

D Sole Proprietor ☐

E Close Corporation ☐

A. Certificate for company

I, ..., chairperson of the board of directors of
....., hereby confirm that by resolution of the board (copy
attached) taken on 20....., Mr/Ms.....,
acting in the capacity of, was authorized to sign all
documents in connection with this bid and any contract resulting from it on behalf of the company.

As witnesses:

1.
.....
Chairman
.....
Print Name
.....
Print Name
2.
.....
Date
.....
Print Name

B. Certificate of partnership

We, the undersigned, being the key partners in the business trading as
....., hereby authorize Mr/Ms....., acting in
the capacity of....., to sign all documents in connection with
the bid for Contract, and any contract resulting from it on
our behalf.

Name	Address	Signature	Date

NOTE: This certificate is to be completed and **signed by each and all of the key partners** upon
whom rests the direction of the affairs of the Partnership as a whole.

C. Certificate for Joint Venture

We, the undersigned, are submitting this bid offer in Joint Venture and hereby authorize Mr/Ms, authorised signatory of the firm, acting in the capacity of lead partner, to sign all documents in connection with the bid offer for Contract and any contract resulting from it on our behalf.

This authorisation is evidenced by the attached power of attorney signed by legally authorised signatories of all the partners to the Joint Venture.

Name of Firm	Address	Authorising	
		Signature	Name
Lead Partner			

D. Certificate for sole proprietor

I, ..., hereby confirm that I am the sole owner of the business trading as

.....

.....

Signature: Sole Owner

Print Name

As witnesses:-

1.
Print Name

.....
Date

2.
Print Name

.....
Date

E. Certificate for Close Corporation

We, the undersigned, being the key members in the business trading as
..... hereby authorise Mr/Ms, acting in
the capacity of, to sign all documents in connection with the bid
for Contract..... and any contract resulting from it on our behalf.

Name	Address	Signature	Date

Note: This Certificate is to be completed and signed by each and all the key members upon whom rests the direction of the affairs of the Close Corporation as a whole.

T2.2 B CERTIFICATE OF REGISTRATION WITH THE CONSTRUCTION INDUSTRY DEVELOPMENT BOARD

1. General

The Register of Contractors is established by the Construction Industry Development Board in terms of the CIDB Act 38 of 2000 and Construction Industry Development Regulations as published in Government Gazette number 26427 of 2004.

The Act makes it mandatory for public sector clients to apply this register when considering bids. Any enterprise that submits a bid or enters into contract for construction works with the public sector, must be registered.

Once-off joint ventures do not have to register, provided that each partner of the joint venture is separately registered.

2. Status

Bidders shall fill in the following sections of this form, depending on their status:

2.1 Section A

Bidders who have accomplished registration and can provide proof of their grading designation.

2.2 Section B

Bidders who are in the process of registration of an update to an existing registration or a renewal.

2.3 Section C

Bidders who have submitted the first application.

2.4 Section D

Bidders submitting this Bid offer in Joint Venture and can provide proof that each partner of the Joint Venture is separately registered.

Note: Only complete one of Sections A, B, C or D.

SECTION A						
I, ... acting in capacity of was authorised to sign all documents in connection with this bid an any contract resulting from it on behalf of the following entity: hereby declare that the above-mentioned entity has achieved registration with the Construction Industry Development Board on date and declare that the grading designation is reflected in the following symbols on the registration certificate.						
<table border="1"><tr><td></td><td></td></tr></table> Contract Value <table border="1"><tr><td>Type of Work</td><td></td><td></td></tr></table>				Type of Work		
Type of Work						
..... Signature of Bidder	 Signature of Witness					
..... Print Name	 Print Name					

SECTION B

I, ... acting in capacity of was authorised to sign all documents in connection with this bid and any contract resulting from it on behalf of the following entity: hereby declare that the above mentioned entity has achieved registration with the Construction Industry Development Board on date furthermore declare that the existing grading designation is:

Contract Value

Type of Work		

and the following update has been applied for:

Amendment of Category Status	
Change of Particulars	
Annual Confirmation of Particulars	
Renewal of Registration	

mark with a "✓"

.....
Signature of Bidder

.....
Signature of Witness

.....
Print Name

.....
Print Name

SECTION C

I, ... acting in capacity of
was authorised to sign all documents in connection with this bid and any contract resulting from in/on
behalf of the following entity:
hereby declare that the above-mentioned entity has submitted its FIRST APPLICATION FOR
REGISTRATION with the Construction Industry Development Board on date

I furthermore accept that failure to achieve registration with the Construction Industry Development Board in a category stipulated in the Bid Data within 10 days from the date of closing this bid, implies a non-responsive bid and warrants rejection of the Bid on account of non-compliance with the requirements of the Bid Data.

.....
Signature of Bidder

.....
Signature of Witness

.....
Print Name

.....
Print Name

SECTION D										
I, ...acting in capacity of the LEAD PARTNER in the Joint Venture was authorised to sign all documents in connection with this bid and any contract resulting from it, hereby declare that each of the Joint Venture is separately registered with the Construction Industry Development Board and declare that the grading designation is reflected in the following symbols on the registration certificates:										
<table border="1" style="width: 100%; border-collapse: collapse;"><tr><td colspan="3" style="padding: 5px;">Name of Lead Partner:</td></tr><tr><td style="width: 60%; padding: 5px;"></td><td style="width: 20%; padding: 5px;">Contract Value</td><td style="width: 20%; padding: 5px;"></td></tr><tr><td style="padding: 5px;"></td><td style="padding: 5px;">Type of Work</td><td style="padding: 5px;"></td></tr></table>		Name of Lead Partner:				Contract Value			Type of Work	
Name of Lead Partner:										
	Contract Value									
	Type of Work									
<table border="1" style="width: 100%; border-collapse: collapse;"><tr><td colspan="3" style="padding: 5px;">Name of 2nd Partner:</td></tr><tr><td style="width: 60%; padding: 5px;"></td><td style="width: 20%; padding: 5px;">Contract Value</td><td style="width: 20%; padding: 5px;"></td></tr><tr><td style="padding: 5px;"></td><td style="padding: 5px;">Type of Work</td><td style="padding: 5px;"></td></tr></table>		Name of 2 nd Partner:				Contract Value			Type of Work	
Name of 2 nd Partner:										
	Contract Value									
	Type of Work									
<table border="1" style="width: 100%; border-collapse: collapse;"><tr><td colspan="3" style="padding: 5px;">Name of 3rd Partner:</td></tr><tr><td style="width: 60%; padding: 5px;"></td><td style="width: 20%; padding: 5px;">Contract Value</td><td style="width: 20%; padding: 5px;"></td></tr><tr><td style="padding: 5px;"></td><td style="padding: 5px;">Type of Work</td><td style="padding: 5px;"></td></tr></table>		Name of 3 rd Partner:				Contract Value			Type of Work	
Name of 3 rd Partner:										
	Contract Value									
	Type of Work									
..... Signature of Bidder Print Name	 Signature of Witness Print Name									

T2.2 C RECORD OF ADDENDA TO BID DOCUMENTS

We confirm that the following communications received from the Procuring Department before the submission of this Bid Offer, amending the Bid Documents, have been taken into account in this Bid Offer:

	Date	Title or Details
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

Attach additional pages if more space is required.

Signed

Date

Print Name

Position

Bidder

T2.2 D FORM OF INTENT TO PROVIDE A DEMAND GUARANTEE

If my/our bid is accepted, I/we will, when required and within the time stipulated, provide a guarantee of Insurance Company (name) (of address)
.....

or

Commercial Bank (Name)
(Branch)
(of address)
.....

to be approved by you, the Employer, for the amount stipulated.

I/we understand that failure to produce an acceptable Demand Guarantee within the stipulated period is a fundamental breach of Contract, entitling the Employer to:

- (i) withhold all payments which may be due to the Contractor pending compliance with the stipulated requirements to produce an acceptable Demand Guarantee.
- (ii) instruct the Contractor to cease all work pending provision of the Demand Guarantee, and
- (iii) cancel the Contract.

Signed		Date	
Print Name		Position	
Bidder			

T2.2 E HEALTH AND SAFETY PLAN: DECLARATION BY BIDDER

I/we declare that we have read and understand the health and safety specifications contained in the Contract Data and undertake to:

- provide and demonstrate to the Employer a suitably and sufficiently documented health and safety plan, which shall be applied from the date of commencement of and for the duration of the construction work,
- appoint a full-time competent employee in writing as the Construction Supervisor from the date of commencement of and for the duration of construction work,
- appoint a full time/part time competent employee in writing as the Construction Safety Officer from the date of commencement of and for the duration of construction work.

I/we undertake to rectify all non-conforming conditions for which we are responsible. I/we accept that, should I/we not rectify these timeously, they will be corrected by the Employer and the cost subtracted from any amounts due to me/us in terms of the Contract Data.

I/we confirm that I/we am/are registered and in good standing with the Compensation Fund and our registration number is:.....,

alternatively, my/our licensed compensation insurer is:

(Name)

(Address)
.....

To this effect, I/we attach proof of registration and good standing.

I/we certify that to the best of my/our knowledge and belief, the curricula vitae of our proposed key health and safety personnel cited hereinafter correctly describe their qualifications and experience.

Signed Date

Print Name Position

Bidder

T2.2 F SCHEDULE OF PROPOSED SUB-CONTRACTORS

We notify you that it is our intention to employ the following Sub-Contractors for work in this contract.

If we are awarded a contract we agree that this notification does not change the requirement for us to submit the names of proposed Sub-Contractors in accordance with requirements in the Contract for such appointments.

	Name and Address of Proposed Sub-Contractor	Nature and Extent of Work	Previous Experience with Sub-Contractor
1			
2			
3			
4			
5			

Signed Date

Print Name Position

Bidder

SUB-CONTRACTING UNDERTAKING

LETTER OF UNDERTAKING TO PERFORM AS A SUB-CONTRACTOR
(Copy as many as necessary)

Contract Number:

From: (Name and address of Sub-contractor)

.....
.....
.....

To: (Name and address of Contractor)

.....
.....
.....

The undersigned undertakes to *perform work/provide services/supply goods in connection with the above Contract as a *close corporation/sole proprietor/partnership/company and is prepared to perform in connection with the above-named Contract as Sub-contractor to the Contractor, the following *work/provide the following services/supply the following goods:

*(delete that which is not applicable)

.....
.....

for an estimated amount of R..... excluding VAT, subject to the terms of any agreement made between us for the purpose of the Contract which agreement shall include the General Conditions of Contract and relevant Special Conditions that govern this Contract.

Signature:

Name:

Designation:

Date:

who duly warrants that he/she is authorized to sign this letter.

SUB-CONTRACTING UNDERTAKING

LETTER OF UNDERTAKING TO PERFORM AS A SUB-CONTRACTOR
(Copy as many as necessary)

Contract Number:

From: (Name and address of Sub-contractor)

.....
.....
.....

To: (Name and address of Contractor)

.....
.....
.....

The undersigned undertakes to *perform work/provide services/supply goods in connection with the above Contract as a *close corporation/sole proprietor/partnership/company and is prepared to perform in connection with the above-named Contract as Sub-contractor to the Contractor, the following *work/provide the following services/supply the following goods:
***(delete that which is not applicable)**

.....
.....

for an estimated amount of R..... excluding VAT, subject to the terms of any agreement made between us for the purpose of the Contract which agreement shall include the General Conditions of Contract and relevant Special Conditions that govern this Contract.

Signature:

Name:

Designation:

Date:

who duly warrants that he/she is authorized to sign this letter.

T2.2 G QUALITY ASSURANCE PROGRAMME

Bidder to submit details here below of his Quality Assurance Policy whereby he shall demonstrate that he has the following:

- (a) An Operating Quality Management System based on SABS/ISO 9001 : 2000 international standards, if not, state alternative.
- (b) Proof of Quality Assurance Co-ordination.
- (c) Proven technical capabilities and resources to ensure Quality Management.
- (d) A recent assessment/audit report on his Quality Management and Quality Control System(s).

Contractor's details with respect to items a), b), c) and d):

SIGNATURE OF BIDDER

DATE

.....
Print Name of Signatory

ON BEHALF OF: (the Bidder)

T2.2 H INSURANCE STATEMENT

BIDDER'S DECLARATION OF INSURANCES

I/We hereby declare that the insurances enumerated below have been effected by me/us.

I/We further declare that all premiums in respect of the insurances are fully paid up to date.

Cover Effected	Insurer and Policy Number	Expiry Date	Limits of Indemnity / Sums Insured	Deductibles
Contractor's All Risks				
Occupational Injuries and Diseases				
Unemployment Insurance				
Motor Vehicle Insurance				
Other:				

We submit herewith a letter of good standing from the Workman's Compensation Commissioner in respect of Occupational Injuries and Diseases Insurance.

Bidder:

.....
Signature of Bidder

.....
Print Name of Signatory

.....
Capacity

T2.2 I FINANCIAL INFORMATION OF BIDDER

This information sheet has to be filled in by the financier of the Bidder, duly signed and stamped on behalf of the financial institution he represents.

Bidder / Bid Details

Bid Description :
Contract Period :
Name of Bidder :
Bank Account Number :
Bidding Amount :

Demand Guarantee will be provided by this Bank: YES ☐ NO ☐

If yes, state amount of Demand Guarantee: R

Financial Institution

Name of Commercial Bank :
Branch :
Name of Bank Manager :
Telephone Number :

I / We acting on behalf of the above Commercial Bank confirm that

..... (Bidder)

has operated an account with us for the last years.

We have been requested to provide a bank rating based in relation to the financial capability of the Bidder, taking into account directives set out in the following two tables.

Financial Capability

Maximum value of contract that the Bidder is considered capable of	Value on which Bank Rating must be used
up to R300 000	R24 000
R1 000 000	R78 000
R3 000 000	R240 000
R5 000 000	R480 000
R10 000 000	R900 000
R30 000 000	R2 400 000
R100 000 000	R7 800 000

BANK RATING	
Bank Code	Description of Bank Code
A	Undoubted for the amount of enquiry
B	Good for the amount of enquiry
C	Good for the amount quoted if strictly in the way of business
D	Fair trade risk for amount of enquiry
E	Figures considered too high
F	Financial position unknown
G	Occasional dishonours
H	Frequent dishonours

The value on which our Bank Rating of the Bidder is based is R.....

(In words..... only)

The Bank Rating is code:

.....
Signature: Manager Financial Institution

.....
Print Name

.....
Date

RUBBER STAMP OF INSTITUTION

T2.2 J ALTERATIONS BY BIDDER

Should the Bidder desire to make any departures from or modifications to the “Bid” or “Contract”, or to qualify his bid in any way, he shall set out his proposals clearly hereunder or alternatively state them in a covering letter attached to his bid and referred to hereunder, failing which the bid will be deemed to be unqualified.

Page	Item of Clause	Details	Cost Involved (R)

Signed

Date

Print Name

Position

Bidder

T2.2 K AUDITED ANNUAL FINANCIAL STATEMENT FOR THE PAST THREE YEARS

ATTACH AUDITED FINANCIAL STATEMENTS

T2.2 L MUNICIPAL UTILITY ACCOUNT

DECLARATION BY THE TENDERER

I the undersigned _____, has
been duly authorized to sign all documents with the Bid Number
_____ on behalf of _____
hereby make a declaration as follows:(referred to herein as “the Bidder”)

1. I declare that the bidder and /or any of its director(s) / member(s) does not owe the municipality, or any other municipality and/or municipal entity any amount which is in arrears in respect of any municipal rates and taxes or municipal service charges.

2. I understand and accept that in the event that this declaration is proved to be false, the bid shall be rejected forthwith. All other rights of the municipality (including but not limited to the right to claim damages where applicable) shall remain reserved in full.

SIGNED ON BEHALF OF THE COMPANY

IN HIS CAPACITY AS

DATE

FULL NAMES OF SIGNATORY

UTILITY ACCOUNT NUMBER	NAME OF MUNICIPALITY	NAME OF OWNER

**ATTACH ORIGINAL OR A CERTIFIED COPY OF A MUNICIPAL
UTILITY ACCOUNT (NOT OLDER THAN THREE (3) MONTHS)**

Important: Note the following

- List Account(s) registered either in the name(s) of the Director(s) or the Company on the declaration form attached hereto.
- Attach Municipal Utility account of Company's registered office (if applicable) and in case of leased premises, attach lease agreement and the services account of leased premises. (Issued in the name of the bidding company)

**T2.3 RETURNABLE SCHEDULES THAT WILL BE INCORPORATED INTO
THE CONTRACT**

T2.3 A	PROJECT PROGRAMME AND METHOD STATEMENT.....	T.78
T2.3 B	SCHEDULE OF ESTIMATED MONTHLY EXPENDITURE.....	T.79
T2.3 C	RATES FOR SPECIAL MATERIALS	T.80

T2.3 A PROJECT PROGRAMME AND METHOD STATEMENT

Tenderer to supply project programme in MS Project software or similar in sufficient detail to cover the various facets of the work.

This programme is to be supported by a method statement indicating the tenderer's proposed work plan for the construction of the works.

SIGNED ON BEHALF OF TENDERER:.....

Note to Tenderer

If a tenderer wishes to submit an alternative tender then this form, appropriately completed, shall be attached to the bill of quantities for the alternative proposal.

T2.3 B SCHEDULE OF ESTIMATED MONTHLY EXPENDITURE

The tenderer shall state his estimated value of the work to be completed every month, based on his preliminary programme and his tendered unit rates, in the table below. The amounts for contingencies and contract price adjustment shall not be included.

MONTH	VALUE (INCLUDING VAT)
1	R
2	R
3	R
4	R
5	R
6	R
7	R
8	R
9	R
10	R
11	R
12	R
13	R
14	R
15 (FINAL)	R
TOTAL: R..... (EXCLUDING CONTINGENCIES AND CONTRACT PRICE ADJUSTMENT) BUT INCLUDING 15% V.A.T	

SIGNED ON BEHALF OF TENDERER:

T2.3 C RATES FOR SPECIAL MATERIALS

Only bitumen products will be dealt with as a special material in terms of subclause 6.8.3 of the General Conditions of Contract. All bitumen products, as indicated in the contract data must be stated in the list below.

The rates and prices for the special materials shall be furnished by the contractor, which rates and prices shall exclude VAT but shall include all other obligatory taxes and levies.

BASE MONTH = SEPTEMBER 2024

SPECIAL MATERIALS	UNIT *	RATE OR PRICE FOR THE BASE MONTH

* Indicate whether the material will be delivered in bulk or in containers.

When called upon to do so, the contractor shall substantiate the above rates or prices with acceptable documentary evidence from the applicable refinery supplying the bitumen.

SIGNED ON BEHALF OF TENDERER:.....

THE CONTRACT

PART C1	AGREEMENT AND CONTRACT DATA
PART C2	PRICING DATA
PART C3	SCOPE OF WORKS
PART C4	SITE INFORMATION

PART C1: AGREEMENT AND CONTRACT DATA

C1.1 FORM OF OFFER AND ACCEPTANCE.....C.3

C1.2 PERFORMANCE GUARANTEE C.8

C1.3 CONTRACT DATA C.11

C1.4 PERFORMANCE GUARANTEE FOR MATERIALS AND EQUIPMENT NOT YET
BUILT INTO THE WORKS.....C.27

C1.5 RETENTION MONEY GUARANTEE C.30

C1.6 AGREEMENT IN TERMS OF THE OCCUPATIONAL HEALTH AND SAFETY ACT
85 OF 1993 AND APPOINTMENT AS MINE MANAGER IN TERMS OF SECTION
3(1)(A) OF MINE HEALTH AND SAFETY ACT 29 OF 1996. C.32

C1.7 ABSTRACTS OF THE MINE HEALTH AND SAFETY ACT NO. 29 OF 1996 AND
AMENDMENT ACT NO. 72 OF 1997.....C.39

C1.8 AGREEMENT WITH ADJUDICATOR C.40

C1.1 FORM OF OFFER AND ACCEPTANCE

Offer

The employer, identified in the acceptance signature block, has solicited offers to enter into a contract in respect of the following works:

BID NO.: 10/2024/2025

For the

UPGRADING OF MAPATE ACCESS 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 tender 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 the 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 PRICE INCLUSIVE OF VALUE ADDED TAX IS
(CONTRACT PRICE)**

.....
.....

Rand (in words); R (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.

For the Tenderer:

Signature(s)

Name(s)

Capacity

Name and address of organization

.....

Signature and Name of Witness:

Signature

Name

Date

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

and drawings and documents or parts thereof, which may be incorporated by reference into Parts C1 to C4 above.

Deviations from and amendments to the documents listed in the tender data and any addenda thereto as listed in the tender 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 agreement. No amendments to or deviations from said documents are valid unless contained in this schedule, which must be signed by the authorised representative(s) of both parties.

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 bonds, guarantees, proof of insurance and any other documentation to be provided in terms of the conditions of contract identified in the contract data at, or just after, the date this agreement comes into effect. 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 tenderer receives one copy of the fully signed original document, including the schedule of deviations (if any). Unless the tenderer (now contractor) within five days of the date of such receipt notifies the employer in writing of any reason why he cannot accept the contents of this agreement, this agreement shall constitute a binding contract between the parties.

For the Employer

Signature
Name
Capacity

Name and address of organization

Thulamela Local Municipality
Private Bag x 5066
Thohoyandou
0950

Signature and Name of Witness

Signature
Name
Capacity

Schedule of Deviations

Notes:

1. The extent of deviations from the tender documents issued by the Employer prior to 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,
 - 4.1 Subject
Details
 - 4.2 Subject
Details

By the duly authorised representatives signing this schedule of deviations, 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 tender 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.

For the Tenderer:

.....

Signature

.....

Name

.....

Capacity

Name and address of organisation:

.....

.....

.....

.....

Witness Signature

.....

Witness Name

.....

Date

For the Employer

.....

.....

.....

Name and address of organisation

THULAMELA LOCAL MUNICIPALITY

Private Bag x 5066

THOHOYANDOU

0950

.....

.....

.....

Confirmation of Receipt

The Tenderer, (now Contractor), identified in the Offer part of this Agreement hereby confirms receipt from the Employer, identified in the Acceptance part of this Agreement, of one fully completed original copy of this Agreement, including the Schedule of Deviations (if any) today:

the (day) of (month) 20.... (year)

at (place)

For the Contractor:

Signature

Name

Capacity

Signature and name of witness:

Signature

Name

C1.2 PERFORMANCE GUARANTEE

(Not to be completed at tender stage)

In accordance with clause 6.2.1 of General Conditions of Contract, 3rd Edition (2015)

“Guarantor” means:

Physical address:

“Employer” means:

“Contractor” means:

“Engineer” means:

“Works” means:

“Site” means:

“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:

CONTRACT DETAILS

Engineer issues: Interim Payment Certificates, Final Payment Certificate and the Certificate 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 issue by the Engineer of the Certificate of Completion of the Works or the date of payment in full of the Guaranteed Sum, whichever occurs first. The Engineer 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 Engineer 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. Payment by the Guarantor in terms of 5 will only be made against the return of the original Performance Guarantee by the Employer.
 10. 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.
 11. The Guarantor chooses the physical address as stated above for the service of all notices for all purposes in connection herewith.
 12. 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.
 13. 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.
 14. 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)

C1.3 CONTRACT DATA

C1.3.1 Conditions of Contract

The Conditions of Contract are:

- the “General Conditions of Contract” as they appear in the commercially available publication “General Conditions of Contract for Construction Works, Third Edition, 2015”, hereinafter referred to as “GCC 2015”; and
- Specific data as contained in this Contract Data.

Each party to the Contract shall purchase its own copy of the GCC 2015 (Third Edition) that applies to this Contract, available from its publisher:

South African Institution of Civil Engineering

Private Bag X200

Halfway House

1685

South Africa

Tel +27 (0)11 805 5947

The following Notes apply:

Note 1

The GCC 2015 makes several references to the Contract Data.

Each item of data below is cross-referenced to the clause in the Conditions of Contract to which it applies. Notwithstanding anything specified to the contrary, the Contract Data shall take precedence in the interpretation of any ambiguity or inconsistency between it and the GCC 2015.

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

- (a) The Form of Offer and Acceptance.
- (b) Amendments to the General Conditions of Contract within the Contract Data.
- (c) Additional conditions to the General Conditions of Contract within the Contract Data.
- (d) corrigenda to the General Conditions of Contract.
- (e) The General Conditions of Contract.
- (f) The Specifications, Drawings, Schedules and other documents forming part of the Contract (in that order) contained in the Scope of Work and the Site Information.

If any ambiguity or discrepancy is found in the documents, the Engineer needs to be contacted to issue any necessary clarification or instruction.

Note 2

Certain pro-forma forms and pro-forma agreements contained in the GCC 2015 have been adapted for this particular contract. Those pro-forma forms and pro-forma agreements contained in the GCC 2015 do not apply where replaced by similar pro-forma forms and pro-forma agreements in this document.

C1.3.2 Contract Specific Data

The following contract-specific data, referring to the General Conditions of Contract, are applicable to this Contract:

Section 1: Data provided by the Employer

Clause	Data
1.1.1.13	The Defects Liability Period is 12 calendar months calculated from the date of the Certificate of Completion.
1.1.1.14	The time for achieving Practical Completion is 14 months calculated from the Commencement Date, excluding special non-working days.
1.1.1.15	The name of the Employer is Thulamela Local Municipality
1.1.1.26	The Pricing Strategy of a Re-measurement Contract shall apply
1.2.1.2	The address of the Employer is: Physical address: Civic Centre Old Agriven Building Thohoyandou Postal address: Private Bag x 5066 Thohoyandou 0950 e-mail address: mphagiac@thulamela.gov.za Contact numbers: Corporate: 015 962 7500 Direct: 015 962 7665 Fax: 015 962 4020

Clause	Data
1.1.1.16	'Employer's Agent' also referred to as 'Engineer' means any Director, Associate or Professional Engineer appointed by a Director of Mariswe (Pty) Ltd to fulfil the functions of the Engineer in terms of the Contract Data.
1.2.1.2	The employer's agent address for receipt of communication is: Mariswe (Pty) Ltd Physical Address: University House Eton Office Park West Harrison Avenue Johannesburg 2191 Postal Address: Private Bax X66 Bryanston Gauteng 2021 Tel.: (011) 709 8420 E-mail: bryanston@mariswe.com Contact numbers: Corporate: 011 709 8420

UPGRADING OF MAPATE ACCESS ROAD

3.2.1	The Employer's Agent is required in terms of his appointment with the Employer to obtain the following specific approvals from the employer: e.g. 1. Approval of extension of time; 2. Approval of additional costs; 3. Approval of variation orders; 4. Approval of penalties; 5. Approval from Thulamela Local Municipality for the utilization of any Contingencies.
4.4	A portion of the works must be sub-contracted to local contractors or suppliers as defined in the Scope of Works.
4.9.1	The Contractor shall deliver to the Employer Agent, on a monthly basis, a detailed inventory of Construction Equipment kept on Site, full particulars given for each day of the month. Distinction shall be made between Owned Equipment and Hired Equipment as well as Equipment in working order and Equipment out of order. Such inventory shall be submitted by the seventh day of the month following the month to be reported.
4.10.2	The Contractor shall deliver to the Employer Agent, on a monthly basis, a return in detail of supervisory staff and the number of categorized classes of labour employed each day for the said period by the Contractor for execution of the Contract. Such return shall be submitted by the seventh day of the month following the month to be reported.

UPGRADING OF MAPATE ACCESS ROAD

5.3.1	The documentation required before commencement with Works execution are: The Contractor shall, within 14 days after signing the Confirmation of Receipt, submit the following documentation to the Employer's Agent for his approval: a) Health and Safety Plan (GCC Clause 4.3) b) An initial programme (GCC Clause 5.6) c) Performance Guarantee (Security – GCC Clause 6.2) d) Insurances (GCC 8.6 - as specified) with proof of validity and premium payment made e) Occupational Health and Safety Agreement f) Approach and methodology document for inclusion of QSE / EME sub-contractors, including detailed breakdown of rates. As described in Section 1.3.2 in Part C3 – Scope of Works. Commencement of the Works shall only be instructed once the Construction Works Permit has been issued to the Employer by the Department of Labour. The Works are to be commenced within fourteen (14) Days of the instruction issued to Commencement with the Works.
5.4.2	The access and possession of Site shall not be exclusive to the Contractor but as set out in the Scope of Work and Site Information, as well as other Municipality appointed contractors, and in terms of all legislation, including the Construction Regulations 2014.
5.6.2	The programme shall contain the following activities and or items as a minimum requirement: a) Testing and acceptance control b) As-built levels and drawings c) Date for Practical Completion d) Date for Completion e) Health & Safety Compliance Audits f) Environmental Compliance Audits
5.8.1	The non-working Days are Sundays. The special non-working Days are: Statutory public holidays; and All annual year-end shutdown periods as recommended by the South African Federation of Civil Engineering Contractors (SAFCEC), and which commence after the Commencement Date, and which commence before the Due Completion Date.

UPGRADING OF MAPATE ACCESS ROAD

5.9.7	All designs, calculations, drawings and operation and maintenance manuals shall be fully endorsed by a third party registered engineer, accomplished in such specific field of practice and the cost thereof shall be borne solely by the Contractor. Once the alternative design has been approved, the Contractor shall indemnify and hold harmless the Engineer, the Employer, their agents and assigns, against all claims howsoever arising out of the said design, whether in contract or delict”.
5.13.1	The penalty for delay is R 7 000.00 per calendar day.
5.16.3	The latent defect period is 10 years, commencing on the Day after the date of certification of Practical Completion.
6.2.1	The type of security required for the due performance of the Contract shall be restricted to one of the following: • Cash deposit of 10 (ten) percent of the Contract Sum, or • Performance Guarantee of 10 (ten) percent of the Contract Sum, issued by a Commercial Bank registered in the Republic of South Africa, or • Performance Guarantee of 10 (Ten) percent of the Contract Sum, issued by an Insurance Company registered in terms of the Short-term Insurance Act (Act 53 of 1998). Whenever a Joint Venture constitutes the contracting party (Contractor) to this Contract, the Performance Guarantee shall be issued on behalf of the Joint Venture.

Clause	Data										
6.2.2	Delete the entire contents of Clause 6.2.2 and replace with: "Failure to deliver an acceptable security as selected in the Contract Data within the stipulated period is a fundamental breach of Contract".										
6.5.1.2.3	The percentage allowance to cover overhead charges is 10 (ten) percent .										
6.8.2	The value of certificates issued shall be adjusted in accordance with the Contract Price Adjustment Schedule with the following values: <table> <tr> <td>x</td><td>= 0.10</td></tr> <tr> <td>Labour</td><td>a = 0.20</td></tr> <tr> <td>Plant</td><td>b = 0.40</td></tr> <tr> <td>Material</td><td>c = 0.25</td></tr> <tr> <td>Fuel</td><td>d = 0.15</td></tr> </table> The applicable area is Limpopo Province. The applicable industry for the Producer Price Index for materials is Civil Engineering Materials Index The applicable area for the Producer Price Index for fuel is Witwatersrand The base month is the month prior to closing date of bid.	x	= 0.10	Labour	a = 0.20	Plant	b = 0.40	Material	c = 0.25	Fuel	d = 0.15
x	= 0.10										
Labour	a = 0.20										
Plant	b = 0.40										
Material	c = 0.25										
Fuel	d = 0.15										
6.8.3	The following are special materials: Bitumen binder extracted from petroleum based products and used on site, including that used in asphalt, irrespective of whether it is produced and/or placed by the Contractor or an approved subcontractor. The rates and prices for the special materials shall be furnished by the contractor, which rates and prices ex refinery with the base date specified under 6.8.2 and shall exclude VAT but shall include all other obligatory taxes and levies on the basis specified in the contract price adjustment schedule (paragraph 4(i) and 4(ii)).										
6.10.1.5	The percentage advance on materials not yet built into the Permanent Works is 80%. Proof of ownership is required and material on site must be utilized within three (3) months after delivery.										

Clause	Data
6.10.3	The percentage retention on amounts due to the Contractor is 10 (ten) percent. The limit of retention money is 10 (ten) percent of the Contract Sum. Add the following sub-clause 6.10.3.1: A Retention Money Guarantee is not permitted.
8.6.1.1.2	The value of Plant and materials supplied by the Employer to be included in the insurance sum is nil .
8.6.1.1.3	The amount to cover professional fees for repairing damage and loss to be included in the insurance sum is a maximum of nil .
8.6.1.3	The Limit of the liability insurance required should not be less than the contract amount.
8.6.1.5	The following additional and varied insurances are required: CAR & SASRIA.
9.2.1.3.2	Clause 9.2.1.3.2 is replaced by the following “Has failed to submit documentation or to commence the Works in terms of Clause 5.3, or has suspended the progress of the Works for fourteen (14) consecutive days after receiving from the Employer’s Agent written notice to proceed,” duplicate to C1.5.2
10.5.2	Dispute resolution shall be referred to ad-hoc adjudication.
10.6.1	Should either of the contracting parties disagree with any decision of the ad-hoc adjudicator, such matter shall be referred to litigation for court judgement.
Special Clause in terms of RDP	Requirements in terms of government’s reconstruction and development programme. Target values: In this project the minimum target values shall be as follows: Labour Maximisation (Wages) :10% of contract value

Clause	Data
	It is a requirement that the Contractor plan for achieving these targets and that a planned programme for achieving each of the targets is submitted at the start of the project together with the clause 12 programme of construction. <u>Penalties:</u> The penalties for not reaching the required labour target values will be calculated at 200% of the difference between the set target values and the actual target values achieved by the contractor at completion of the works. Penalties will be applied monthly, when the actual figures are less than 75% of the planned monthly figures. No bonuses for achieving the set target values are applicable.
Special Clause in terms of EPWP	
Payment for LI Component of Works	Payment for works identified in the Scope of Works as being labour-intensive shall only be made in accordance with the provisions of the Contract if the works are constructed strictly in accordance with the provisions of the Scope of Work. Any payment for such works shall not relieve the Contractor in any way from his obligations either in contract or in delict
Linkage of Payment to Submission of Project Data	The Contractor's payment invoices shall be accompanied by labour information for the corresponding period in a format specified by the employer. If the contractor chooses to delay submitting payment invoices, labour returns shall still be submitted as per frequency and timeframe stipulated by the Employer. The contractor's invoices shall not be paid until all pending labour information has been submitted.
Applicable Labour Laws	The current Ministerial Determination (also downloadable at www.epwp.gov.za), Expanded Public Works Programmes, issued in terms of the Basic Condition of Employment Act of 1997 by the Minister of Labour in Government Notice, shall apply to works described in the scope of work as being labor-intensive and which are undertaken by unskilled workers.

C1.3.4 Section 2: Data provided by the Contractor

Clause	Data
1.1.1.9	The contractor is
1.2.1.2	The contractor's address for receipt of communication is: Telephone: Facsimile: E-mail:..... Address:.....
5.5.1	The Works shall be completed within Months as proposed by the contractor.
6.5.1.2.3	The percentage allowances to cover all charges for the contractor's and subcontractor's profits, timekeeping, clerical work, insurance, establishment, superintendence and the use of hand tools is % (Maximum 10%).
6.8.3	The rate for special materials, exclusive of Value Added Tax is to be completed in Schedule T2.3 C.

PRIORITY OF DOCUMENTS

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

- a) The Form of Offer and Acceptance.
- b) Amplifications of the General Conditions of Contract within the Contract Data.
- c) Additional special conditions or amendments to the General Conditions of Contract within the Contract Data.
- d) The General Conditions of Contract.
- e) The Specifications, Drawings, Schedules and other documents forming part of the Contract (in that order) contained in the Scope of Work and the Site Information.

If any ambiguity or discrepancy is found in the documents, the Engineer shall issue any necessary clarification or instruction.

C1.3.3 Variations to the General Conditions of Contract

The following amendments of the General Conditions of Contract 2015 apply to this contract. The headings in these Special Conditions of Contract shall not be deemed to be part thereof nor be taken into consideration in the interpretation or construction thereof or of the Contract.

1. CONTRACTOR'S GENERAL OBLIGATIONS

1.1 EXTENT OF OBLIGATIONS AND LIABILITY

Add the following sub clause:

4.1.1.1 The Contractor shall, save in so far as it is legally or physically impossible,

- (a) Provide all superintendence, labour, materials, Constructional Plant, Temporary Works, including the design thereof, all requisite transport and all other things, whether of a temporary or permanent nature, required in and for such design, execution and completion of the Works and for the remedying of any defects, so far as the necessity for providing the same is specified in or reasonably to be inferred from the Contract.
- (b) After award of the Contract, the Contractor shall be obligated to ensure that at least the Constructional Plant stated on the prescribed form in the Tender Documents, or Constructional Plant equivalent thereto, are on the site when required."

"4.1.3 Contractor deemed to have inspected the Site

The Contractor shall be deemed to have inspected and examined the Site and its surroundings and information available in connection therewith and to have satisfied himself before submitting his tender (as far as practicable) as to

- (a) the form and nature of the Site and its surroundings, including subsurface conditions,
- (b) the hydrological and climatic conditions.
- (c) the extent and nature of work and materials necessary for the execution and completion of the Works,
- (d) the means of access to the Site and the Accommodation he may require and, in general, shall be deemed to have obtained all information (as far as is practicable) as to risks, contingencies and all other circumstances which may influence or affect his tender.

No subsequent claims by the Contractor arising from his lack of knowledge of perceptible conditions on the site or its surroundings or of information available in connection therewith shall be entertained."

4.3 LEGAL PROVISIONS

Amend sub-sub clause 4.3.1 as follows:

- 4.3.1** The Contractor shall, in fulfilling the Contract, comply with all applicable laws, *with regard to Health, Safety, Wages and Condition of Work*, regulations, statutory provisions and agreements, and shall, at the request to the Employer's Agent, provide proof that he has complied therewith.

Add the following sub-sub clauses

4.3.1.1 Mine Health and Safety Act, number 29 of 1996

The Employer shall obtain the Mining Authorisation for all sites where mining activities, as defined in the Mine Health and Safety Act, number 29 of 1996 as amended, are to be conducted.

4.3.1.2 Mineral Resources Petroleum Development Act, number 28 of 2002

The Contractor shall assume responsibility for the Environmental Management Programme (EMPR) in respect of the sites and shall ensure that the sites are rehabilitated at the conclusion of the contract."

4.4. SUBCONTRACTING

Add the following subclauses:

"4.4.7 Continuing obligation extending beyond date of completion of the work

In the event of a Selected Subcontractor having undertaken to the Contractor, in respect of work executed or goods or materials supplied by such Selected Subcontractor, any continuing obligation extending beyond the date of completion of the work or the end of the Defects Liability Period, and Latent Defect Liability Period as the case may be, the Contractor shall at any time after such date cede to the Employer, at the Employer's request and cost, the benefit of such obligation for the unexpired duration thereof, whereupon the Employer shall have no further claim against the Contractor in respect of the said continuing obligation.

4.4.8 Convert the subcontract

If the contract shall have been cancelled in terms of clause 9.2, the Employer shall have the right, by written notice given to any Selected Subcontractor not later than 28 days after the said cancellation, to convert the subcontract concerned to a direct contract between the Employer and the Subcontractor.

Provided that:

- (a) the terms of the said direct contract shall mutatis mutandis be those of the subcontract concerned, and
- (b) the Employer shall have the said right, notwithstanding any breach of the subcontract by the Contractor, subject to his forthwith paying to the Subcontractor all amounts then owing to the Subcontractor by the Contractor and perform any obligation which the Contractor has failed to perform."

4.9 CONSTRUCTION EQUIPMENT

Add the following sub clauses:

“4.9.2 Preclude seizure of construction equipment

In order to preclude seizure by the owner of any constructional plant being held by the Contractor on a hire or hire-purchase agreement for the purposes of the contract, the Employer shall be entitled to pay any such owner the amount of any outstanding instalment or other sum owing under any hire or hire-purchase agreement and in the event

of his doing so, any amount thus paid by him shall be a debt payable to the Employer by the Contractor and may be deducted by the Employer from any moneys owing or that may become owing to the Contractor in terms of the contract, or be recovered at law from the Contractor by the Employer.

4.9.3 Constructional plant brought to the site by the subcontractor

When entering into any subcontract agreement for the execution of any part of the works, the Contractor shall incorporate in such subcontract agreement, by reference or otherwise, the provisions of this clause in respect of construction equipment brought to the site by the subcontractor.”

5. TIME AND RELATED MATTERS

5.4 ACCESS TO THE SITE

Add the following subclause:

- 5.4.4** “If the site is insufficient for the needs and requirements of the work, the Contractor shall arrange with the owners or tenants for the additional land required and pay all rent and costs in connection therewith. The Contractor shall be responsible for all damage to such land and property, and he shall indemnify the Employer and hold him harmless in respect of all claims, demands proceedings, damages, costs, including attorneys and client costs, charges and expenses arising in respect thereof.”

5.7 PROGRESS OF THE WORKS

Replace the first sentence of the first paragraph of subclause 5.7.1 with the following

“If the rate of progress of the Works, or any part thereof has fallen behind the approved programme **by a period of more than 14 days**, the Employer’s Agent may notify the Contractor in writing, with specific reference to this Clause.”

5.14 COMPLETION

Delete the following:

“5.14.5.3 The retention shall be reduced to half in terms of Clause 6.10.5”

5.16 APPROVAL

5.16.1 Final Approval Certificate

Delete the last sentence of this clause and replace with:

The payment of the retention money or the release of the retention money guarantee shall only be permitted after the Engineer has issued the Final Approval Certificate.

6. PAYMENT AND RELATED MATTERS

6.6 PROVISIONAL SUMS AND PRIME COST SUMS

6.6.1.2.1 In the first line after the word "sums" insert "excluding VAT"

6.6.1.2.2 In the fourth line after the word "amount" insert "excluding VAT"

6.11 VARIATIONS EXCEEDING 15 PER CENT

6.11.1 Second paragraph:

Change "15%" to "20%".

Add the following subclause:

"6.11.2 Variations exceeding 20% per cent

Where the decrease or increase in the quantity of work has not resulted from a written variation order (or an additional agreement) in terms of clause 5.11 but from the fact that the quantities are less or more than those given in the bill of quantities, the tendered rates or sums shall still apply, except in the case of a sub-item (or an item not subdivided into sub-items) in the bill of quantities, which covers work the value of which during the tender stage exceeds 7,5% of the value of the tender sum, and where the quantity of such sub-item or item, upon completion of the contract, deviates by more than 20% from the quantity given in the bill of quantities so that the scale of activities or the method of construction consequently changes to such an extent that the tendered rate or sum no longer applies. In such case the Engineer, should he deem it to be in the interest of the Employer or should the Contractor enter a claim, shall, considering the extent by which the deviation in respect of the quantity of the sub-item or item concerned exceeds 20%, determine a sum which will be equitable in the circumstances, and shall certify that such sum shall be deducted from or added to the sums owing to the Contractor."

8. RISKS AND RELATED MATTERS

8.2 Care of works

Add the following:

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

The cost of replacing all beacons displaced or destroyed during the course of the Contract without the consent of the Employer's Agent shall be borne by the Contractor."

9. TERMINATION OF CONTRACT

9.3 Termination by Contractor

Delete the wording of sub clause 9.3.1.1.2 and replace this clause with the following:

9.3.1.2 "Failing to pay the contractor the amount due in terms of any payment certificate issued by the Employer's Agent, provided that such payment certificate is acceptable to the Employer and further more subject to the provision of sub-clause 3.2.3, within the time of payment provided in the contract, or."

10. CLAIMS AND DISPUTES

Add the following

10.12 Joint ventures

"If the Contractor is in a joint venture of two or more parties or persons, the parties or persons shall be jointly and severally bound to the Employer for fulfilment of the Contractor's obligations and terms of this Contract. The formation and/or conditions of agreement of the joint venture shall not be altered without the consent of the Employers. Should such a change be acceptable to the Employer then two notarially certified copies of the revised Joint Venture Agreement shall be submitted to the Employer's Agent within fourteen (14) days of signature thereof by the parties to the Joint Venture."

(not to be completed at bid stage)

(hereinafter referred to as the Employer)

Contractor :

.....

.....

.....

C.27

address:

.....
.....

and acting on behalf of the Bank have been informed that

(hereinafter called "the Contractor") is your contractor under such Contract and wishes to receive payment in respect of manufacture or partial manufacture of equipment and/or materials brought in a ready state for dispatch to the construction site, whether temporarily stored in the warehouse of the Contractor or on the Construction Site, for which the Contract requires him to obtain a guarantee.

We hereby irrevocably undertake to pay you, the Employer, any sum or sums not exceeding in total the amount of R..... (in words..... only) the "Guaranteed Amount"

upon receipt by us of your demand in writing and your written statement stating:

- that the Contractor has failed to deliver such equipment and/or materials when required or instructed to do so.

The Bank's liability under this guarantee is principal in nature and is not subject to the Contract. The Bank's liability shall not be reduced, or in any way be affected by any alteration of the terms of the Contract, or any other arrangements made between the Employer and Contractor.

The Bank will pay on demand and will not determine the validity of the demand or the correctness of the amount demanded, or become party to any claim or dispute of any nature which any party may allege.

The Bank will pay the amount demanded into the bank account to be notified by the Employer.

This guarantee is neither negotiable nor transferable, is restricted to the payment of a sum of money only and is limited to the Guaranteed Amount.

This guarantee will lapse sixty (60) days after all the said equipment and/or materials have been built into the Works unless the Bank is, before the expiration date, advised in writing by the Employer of his intention to demand payment for such equipment and/or materials.

This original guarantee must be returned to the Bank by the Employer or the Employer's duly authorised agent either:

- on expiry of the guarantee; or
- against payment of the Guaranteed Amount.

This guarantee shall be governed by the law of the Republic of South Africa.

The Bank chooses as its domicilium citandi et executandi for the purpose of the service of all notices and legal processes the following address:

THUS DONE AND SIGNED AT ON 20.....

In the presence of the following:

AS WITNESSES:
thereto

on behalf of the Bank and duly authorized

1.

1.

.....

Print Name

.....

Print Name

and

thereto

on behalf of the Bank and duly authorized

2.

2.

.....

Print Name

.....

Print Name

C1.5 RETENTION MONEY GUARANTEE

(not to be completed at bid stage)

TO:
.....
.....
.....

(whom the Contract defines as “the Employer”)

Re: Retention Money Guarantee in respect of :
Contract Number :
For supply of :
Contractor :

I/We, the undersigned,

.....

and

.....

of

.....

(hereinafter referred to as the “Bank”)

address:

.....

.....

and acting on behalf of the Bank have been informed that..... (hereinafter called the “Contractor”) is your contractor under such Contract and wishes to receive early payment of the retention money, for which the Contract requires him to obtain a guarantee.

We hereby irrevocably undertake to pay you, the Employer, any sum or sums not exceeding in total the amount of R..... (in words.....) (the “guaranteed amount”,

upon receipt by us of your demand in writing and your written statement stating:

- that the Contractor failed to carry out his obligation(s) to rectify defect(s) for which he is responsible under the Contract.

The Bank's liability under this guarantee is principal in nature and is not subject to the Contract. The Bank's liability shall not be reduced, or in any way be affected by any alteration of the terms of the Contract, or any other arrangements made between the Employer and Contractor.

The Bank will pay on demand and will not determine the validity of the demand or the correctness of the amount demanded, or become party to any claim or dispute of any nature which any party may allege.

The Bank will pay the amount demanded into the Bank account to be notified by the Employer.

This guarantee is neither negotiable nor transferable, is restricted to the payment of a sum of money only and is limited to the Guaranteed Amount.

This guarantee shall expire on the date on which the last of the retention monies, which but for this guarantee would have been retained by the Employer, becomes payable to the Contractor.

This original guarantee must be returned to the Bank by the Employer or the Employer's duly authorized agent either:

- on expiry of the guarantee; or
- against payment of the Guaranteed Amount.

This guarantee shall be governed by the law of the Republic of South Africa.

The Bank chooses as its domicilium citandi et executandi for the purpose of the service of all notices and legal processes the following address:

THUS DONE AND SIGNED AT ON 20.....

In the presence of the following:

AS WITNESSES:

on behalf of the Bank and duly authorized thereto

1.

1.

.....

Print Name

.....

Print Name

and

on behalf of the Bank and duly authorized thereto

2.

2.

.....

Print Name

.....

Print Name

C1.6 AGREEMENT IN TERMS OF THE OCCUPATIONAL HEALTH AND SAFETY ACT 85 of 1993 AND APPOINTMENT AS MINE MANAGER IN TERMS OF SECTION 3(1)(a) OF MINE HEALTH AND SAFETY ACT 29 of 1996.

This AGREEMENT made at on this day of in the year between THULAMELA LOCAL MUNICIPALITY (hereinafter called “the Employer” on the one part, herein represented by in his capacity as And delegate of the Employer and (hereinafter called “the Principal Contractor”) of the other part, herein represented by in his capacity as

WHEREAS the Employer is desirous that certain works be constructed, as stated for in Contract No RAL/.....For (description of contract).....
..... in the District of Limpopo Province and has accepted a tender by the Principal Contractor for the construction, completion and maintenance of such works and whereas the Employer and the Principal Contractor have agreed to certain arrangements and procedures to be followed in order to ensure compliance by the Principal Contractor with the provisions of the Occupational Health and Safety Act 1993(Act 85 of 1993 and the Construction Regulation, February 2014):

NOW THEREFORE THIS AGREEMENT WITNESSETH AS FOLLOWS:

1. The Principal Contractor shall execute the work in accordance with the contract documents pertaining to this contract.
2. This Agreement shall hold good from its commencement date, which shall be the date of a written notice from the employer or engineer requiring him to commence the execution of the Works, to either:
 - a) the date of the final certificate issued in terms of clause 5.14 of the General Conditions of Contract for Construction Works 2015 (Third Edition) as issued by the South African Institution of Civil Engineering (hereinafter referred to as “the GCC 2015”), as contained in the contract documents pertaining to this contract, or
 - b) the date of termination of the contract in terms of clause 9.1, 9.2 or 9.3 of the GCC 2015.
3. The Principal Contractor declares himself to be conversant with the following:-
 - a) All requirements, regulations and standards of the Occupational Health and Safety Act (Act 85 of 1993), hereinafter referred to as “The Act”, together with its amendments and with special reference to the following Sections of The Act.
 - i. Section 8: General duties of employers to their employees.
 - ii. Section 9: General duties of employers and self-employed persons to persons other than employees
 - iii. Section 37: Acts or omissions by employees or mandatories and

- iv. Sub-section 37(2) relating to the purpose and meaning of this Agreement.
- v. Construction Regulations 2014, and other safety regulations, as applicable.
- b) The procedures and safety rules of the employer as pertaining to the Principal Contractor and to his subcontractors.
- 4. The Principal Contractor is responsible for the compliance with the Act by his sub-contractors, whether or not selected and/or approved by the employer.
- 5. The Principal Contractor warrants that all his and his sub-contractors' employees (permanent and temporary) are covered in terms of the Compensation for Occupational Injuries and Diseases Act 1993 which cover shall remain in force whilst any such employees are present on site. The Principal Contractor shall submit a written report to this effect at each Progress Site Meeting.
- 6. The Principal Contractor undertakes to ensure that he and/or his sub-contractors and/or their respective employees will at all times comply with the following conditions:
 - a) The Principal Contractor shall assume the responsibility in terms of Section 16.1 of the Occupational Health and Safety Act. The Principal contractor shall not delegate any duty in terms of Section 16.2 of this Act without the prior written approval of the Employer. If the Principal contractor obtains such approval and delegates any duty in terms of Section 16.2 a copy of such written delegation shall immediately be forwarded to the Employer.
 - b) All incidents referred to in the Occupational Health and Safety Act shall be reported by the Principal Contractor to the Department of Labour as well as to the Employer. The Employer will further be provided with copies of all written documentation relating to any incident.
 - c) The Employer hereby obtains an interest in the issues of any formal enquiry conducted in terms of Section 32 of the Occupational Health and Safety Act into any incident involving the Principal Contractor and/or his employees and/or his sub-contractors.

Further to the abovementioned, where contracts involve quarries or borrow pits, the following shall be applicable:-

In terms of Section 3(1)(a) of the Mine Health and Safety Act of 1996, The Roads Agency Limpopo SOC. shall appoint a manager for its mine/s.

You are hereby appointed as the mine manager for, with effect from until further notice.

In terms of this appointment you are charged with the functions, duties and responsibilities imposed by the aforementioned Act and its regulations. Without derogating from the duties, functions and responsibilities imposed by this legislation, you are to:

- i) Control, manage and direct employees at the Mine (borrow pit or quarry).
- ii) Take all reasonable measures to ensure the health and safety of employees and proper discipline at the Mine.

-
- iii) Take all reasonable measures to ensure that the provisions of the Mine Health and Safety Act and its regulations (as may be amended from time to time) are implemented and adhered to at the Mine.
 - iv) Ensure and maintain a healthy and safe mine environment for all persons.
 - v) Ensure an adequate supply of health and safety equipment and facilities.
 - vi) Staff the Mine, with due regard to health and safety.
 - vii) Provide health and safety training as far as reasonably practicable to all employees.
 - viii) Initiate, prepare and implement codes of practice, relating to health and safety.
 - ix) Maintain an effective risk identification and management system.
 - x) Ensure the effective maintenance of hazard identification and medical monitoring records.
 - xi) Prepare and or review the Health and Safety Policy for the Mine.
 - xii) Ensure that an annual medical report is compiled at the Mine, and forwarded to the owner or the appointed owner representative of the Mine.
 - xiii) Ensure compliance with relevant environmental legislation.
 - xiv) Assist with implementation and maintenance of the Road Agency Limpopo SHE Management Standards, the Contractor's Compliance Pack and operational procedures.
 - xv) Enhance a culture of high performance in safety and health.

You are to appoint the prescribed persons to assist you in your duties and functions, and you are hereby authorised and obliged to take all reasonable measures to comply with legislative requirements. You are to ensure that an acting mine manager is appointed when you are to be absent, or on leave for a period longer than five (5) days.

Instructions and procedures are from time to time issued by the board of the Roads Agency Limpopo, and it will be your responsibility to ensure the implementation and adherence to these instructions and procedures at the Mine.

You are further responsible to ensure that relevant environmental legislative requirements are complied with, including the implementation of all internal procedures and systems to ensure compliance with such legislation.

It would be the responsibility of yourself to report any shortcomings, in relation to the implementation of applicable legislation which you are unable to rectify, immediately in writing to the appointed owner representative.

In witness thereof the parties have set their signatures hereon in the presence of the subscribing witnesses:

SIGNED FOR ON BEHALF OF THE EMPLOYER/SECTION 4.1 APPOINTEE

.....

WITNESS: 1..... 2.....

NAME

(IN CAPITALS) 1..... 2.....

DATE:

SIGNED FOR AND ON BEHALF OF THE PRINCIPAL CONTRACTOR/MINE MANAGER

.....

WITNESS: 1..... 2.....

NAME

(IN CAPITALS) 1..... 2.....

DATE:

Copy to: The Chief Inspector - Department of Minerals and Energy

**EXAMPLE FOR USE BY CONTRACTOR WHEN APPOINTING SUB-ORDINATES IN TERMS OF THE MINE HEALTH AND SAFETY ACT (1996) AS AMENDED.
(To be printed on Contractors letter head)**

APPOINTMENT IN TERMS OF SUB-ORDINATE MANAGER: REGULATION 2.6.1 IN FORCE IN TERMS OF SCHEDULE 4 OF THE MINE HEALTH AND SAFETY ACT (ACT NO. 29 OF 1996) AS AMENDED BY THE HEALTH SAFETY AMEUREMENT ACT (ACT NO. 72 OF 1997)

I, ... in my capacity as, having been appointed in terms of **Section 3(1)** of the Act (as amended), by the Executive Manager: Roads Management who is our client, 'Thulamela Local Municipality' and owner of the Mine(s) to be worked under the requirements of the above mentioned Acts hereby, in terms of **Regulation 2.6.1** of the Act as amended, appoint..... as Sub-Ordinate Manager of the Contractor, ... of address, ... and contact number, ... on Bid No.: **10/2024/2025 for the Upgrading of Mapate Access Road.**

In accordance with the provisions of the Mine Health and Safety Act, 1996 (Act 29 of 1996), you are also appointed in terms of Section 7(2) of the Mine Health and Safety Act, 1996 to perform the following functions, assigned to the Mine Manager in terms of Section 7(1), 10(2) (b) and (c) and 11 (1) in so far as your area of responsibilities are concerned:-

1. You must identify the hazards, assess the risk and record the hazards to health and safety to which employees may be exposed while they are at work, and
2. To the extent that is reasonable, you must ensure that every employee is properly trained:
 - a. In the measures necessary to eliminate, control and minimise those risks to health and safety.
 - b. In the procedures to be followed to perform the employee's work.
3. To the extent that is reasonably practical, you must:-

Ensure that every employee becomes familiar with the work-related hazards and risk and the measures that must be taken to eliminate, control and minimise those hazards and risks.
4. To the extent that is reasonably practical, you must:-

Ensure that every employee under your control complies with the requirements of the Act.

Institutes the measures necessary to secure, maintain and enhance health and safety.

Considers and employees training and capabilities in respect of health and safety before assigning a task to that employee.

Ensure that work is performed under the general supervision of a person trained to understand the hazards associated with the work, and who has the authority to ensure that the precautionary measures laid down by the Manager are implemented.

You will be responsible for the control, management and direction of all the activities and employees connected with work and you are required to ensure that all such

activities take place in accordance with the provisions of the Mine Health and Safety Act and the Regulations are complied with.

You are further required to inform the Manager, [REDACTED] as soon as practicable, of any breach of any provision of these Regulation, to enable him to inform the Principal Inspector of Mines, Department of Minerals and Energy, or take such steps as may be necessary.

Please acquaint yourself with the relevant Regulations, Standards and Procedures, which have a bearing on your appointment. You must ensure that you are fully conversant with the requirements of the Procedures for Reporting Accidents.

SIGNED:

DATE:

WITNESS: 1. 2.

NAME(Print):1. 2.

I, ... , having been appointed in terms of Regulation 2.6.1 of the act (as amended) to perform all functions entrusted to.....In terms of the Act (as amended) hereby accept the above appointment.

SIGNED:

DATE:

WITNESS: 1. 2.

NAME(Print):1. 2.

EXAMPLE FOR USE BY CONTRACTOR WHEN APPOINTING SUB-ORDINATES IN TERMS OF THE MINE HEALTH AND SAFETY ACT (1996) AS AMENDED.

(To be printed on Contractors letter head)

APPOINTMENT AS COMPETENT PERSON IN CHARGE OF MACHINERY IN TERMS OF REGULATION 2.13.2 IN FORCE IN TERMS OF SCHEDULE 4 OF THE MINE HEALTH AND SAFETY ACT (ACT NO. 29 OF 1996) AS AMENDED BY THE HEALTH AND SAFETY AMEDEMMENT ACT (ACT NO. 72 OF 1997)

I, ... in my capacity as , having been appointed in terms of **Section 3(1)** of the Act (as amended), by the Executive Manger: Roads Management, who is our client, 'Thulamela Local Municipality' and owner of the Mine(s) to be worked under the requirements of the above mentioned Acts hereby, in terms of **Regulations 2.13.2** of the Act as amended, appoint as Competent Person in charge of machinery for the Contractor, ...of address and contact number, ...on all contracts in the Limpopo Province that are undertaken by the contractor.

You are to report any accident to the mine manager immediately and personally visit the scene of the accident without delay.

You must familiarise yourself with the Mine Health and Safety Act and the Minerals Act and the Regulations and ensure that you have a copy in your possession and you must take all reasonable measures to ensure that the provisions of this Act are complied with.

Your attention are further drawn to Regulation 2.13.4.1 as well as the requirements of Chapter 18,20 and 21.

Please confirm this appointment by signing at the bottom.

SIGNED: DATE:.....

NAME:

SIGNED: DATE:.....

NAME:

C1.7 ABSTRACTS OF THE MINE HEALTH AND SAFETY ACT No. 29 OF 1996 AND AMENDMENT ACT No. 72 OF 1997

DEFINITIONS:

Section 102 of the Mine Health and Safety Act refers.

“mine” means, when –

- (a) “used as a noun-
 - (i) any borehole, or excavation, in any tailing or in the earth, including the portion of the earth that is under the sea or other water, made for the purpose of searching for or winning a mineral, whether is being worked or not, or
 - (ii) any other place where a mineral deposit is being exploited, including the mining area and all buildings, structures, machinery, mine dumps, access roads or objects situated on or in that area that are used or intended to be used in connection with searching, winning, exploiting or processing of a mineral, or for health and safety purposes. But, if two or more excavations, boreholes or places are being worked in conjunction with one another
 - (iii) a works; and
 - b) used as a verb, the making of any excavation or borehole referred to in paragraph (a) (i), or the exploitation of any mineral deposit in any other manner, for the purpose of winning a mineral including prospecting in connection with the winning of a mineral.
 - a) whether that substance is in solid, liquid or gaseous form;
 - b) that occurs naturally in or on the earth, in or under water or in tailings, and
 - c) that has been formed by or subjected to a geological process.
- “processing” means the recovering, extracting, concentrating, refining, calcimining, classifying, crushing, milling, screening, washing, reduction, smelting or gasification or any mineral, and “process” has a similar meaning
- “works” means any place, excluding a mine, where any person carries out-
- a) The transmitting and distributing to another consumer of any form of power from a mine, by the owner thereof, to the terminal point of bulk, to the power supply meter on any such other consumer’s premises, or
 - b) Training at any central rescue station, or
 - c) The making, repairing, re-opening or closing of any subterranean tunnel, or
 - d) Any operations necessary in connection with any of the operational listed in this paragraph.

C1.8 AGREEMENT WITH ADJUDICATOR

This agreement is made on the.....day of 20.....between: the Employer
(name of company / organisation).....
of (address).....
.....and the
Contractor
(name of company / organisation)
of (address).....
.....
(hereinafter called **the Parties**)

and

(name).....
of (address)
.....
.....
(hereinafter called **the Adjudicator**)

Disputes or differences may arise/have arisen* between the Parties under a Contract
dated.....

and known as Contract No.....

(Contract
title).....

and these disputes or differences shall be/have been* referred to adjudication in accordance with
the CIDB Adjudication Procedure, (hereinafter called "**the Procedure**") and the Adjudicator may
be or has been requested to act.

(* Delete as necessary)

IT IS NOW AGREED as follows:

1. The rights and obligations of the Adjudicator and the Parties shall be as set out in the Procedure.
2. The Adjudicator hereby accepts the appointment and agrees to conduct the adjudication in accordance with the Procedure.
3. The Parties bind themselves jointly and severally to pay the Adjudicator's fees and

- expenses in accordance with the Procedure as set out in the Contract Data.
4. The Parties and the Adjudicator shall at all times maintain the confidentiality of the adjudication and shall endeavour to ensure that anyone acting on their behalf or through them will do likewise, save with the consent of the other Parties which consent shall not be unreasonably refused.
 5. The Adjudicator shall inform the Parties if he intends to destroy the documents which have been sent to him in relation to the adjudication and he shall retain documents for a further period at the request of either Party.

SIGNED by:

Signature): *(Signature)*): *(Signature)*):

Name: **Name:** **Name:**

who warrants that he/ she is who warrants that he/ she is the **Adjudicator** in the
duly authorised to sign for and duly authorised to sign for presence of
on behalf of the **First Party** in and on behalf of the **Second**
the presence of **Party** in the presence of

Witness:

Witness:

Witness:

(Signature)..... *(Signature)*..... *(Signature)*.....

Name: **Name:** **Name:**

Address: **Address:** **Address:**

.....

Date:

Date:

Date:

PART C2: PRICING DATA

C2.1	PRICING INSTRUCTIONS	C.43
C2.2	BILL OF QUANTITIES	C.47

C2.1 PRICING INSTRUCTIONS

- 1 For the purposes of this bill of quantities, the following words shall have the meanings hereby assigned to them:

Unit: The unit of measurement for each item of work as defined in the standard specifications or the project specifications.

Quantity: The number of units of work for each item.

Rate: The payment per unit of work for which the tenderer 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 bill of quantities, the specifications or elsewhere, but of which the quantity of work is not measured in units.

- 2 This bill of quantities forms part of the contract documents and must be read in conjunction with all the other documents comprising the contract documents.

- 3 The quantities set out in the bill of quantities are only approximate quantities. The quantities of work finally accepted and certified for payment, and not the quantities given in the bill of quantities, will be used to determine payments to the contractor.

The validity of the contract shall in no way be affected by differences between the quantities in the bill of quantities and the quantities finally certified for payment. Work is valued at the rates or lump sums tendered, subject only to the provisions of sub-clause 1209 (a) of the standard specifications.

- 4 Rates and lump sums shall include full compensation for overheads, profits, incidentals, tax (other than VAT), etc, and for the completed items of work as specified, all in accordance with sub-clause 1209 (b) of the standard specifications. Full compensation for completing and maintaining, during the defects liability period, all the work shown on the drawings and specified in the standard specifications and project specifications and for all the risks, obligations and responsibilities specified in the general conditions of contract, special conditions of contract, standard specifications and project specifications shall be considered as provided for collectively in the items of payment given in the bill of quantities, except in so far as the quantities given in the bill of quantities are only approximate.

- 5 The tenderer shall fill in a rate or a lump sum for each item where provision is made for it even where no quantities are given. Items against which no rate or lump sum has been entered in the tender will not be paid for when the work is executed, as payment for such work will be regarded as being covered by other rates or lump sums in the bill of quantities.

The tenderer shall fill in a rate against all items where the words “rate only” appear in the amount column. Although no work is foreseen under such item and no quantities are

consequently given in the quantity column, the tendered rate shall apply should work under this item actually be required. Tenders should note the provisions of paragraph 12 of this preamble.

If the tender should group a number of items together and tender one lump sum for each group of items, this single tendered lump sum shall apply to that group of items and not to each individual item, or should he indicate that full compensation for any item has been included in the rate for another item, the rate for the item included in another item shall be deemed to be nil.

The tendered lump sums and rates shall be valid irrespective of any change in the quantities during the execution of the contract.

- 6 The works executed are measured for payment in accordance with the methods described in the contract documents under the various payment items, notwithstanding any custom to the contrary. Attention is directed to the provisions of clause 1220 of the standard specifications regarding the measurements of quantities for payment. Except where specified otherwise than in clause 1220, the nett measurement or mass of the finished work in place shall be taken for payment, and any volume or mass of work in excess of that prescribed, shall be excluded.
- 7 The amount of work or the quantities of material stated in the bill of quantities shall not be considered as restricting or extending the amount of work to be done or quantity of material to be supplied by the contractor.
- 8 The statement of quantities of material or the amount of work in the bill of quantities shall not be regarded as authorisation for the contractor to order material or to execute work. The contractor shall obtain the engineer's detailed instructions for all work before ordering any materials or executing work or making arrangements in this regard.
- 9 The short descriptions of the payment items in the bill of quantities are only given to identify the items and to provide specific details. Reference shall, inter alia, be made to the drawings, standard specifications, project specifications, general conditions of contract and special conditions of contract for more detailed information regarding the extent of work entailed under each item.
- 10 The provisions of clause 6.6 of the general conditions of contract shall apply to provisional sums and prime cost sums.
- 11 If a bill of quantities (or schedule of quantities or schedule of rates) applies and there is an error in the line item total resulting from product of unit rate and quantity, the line item total shall govern and the rates shall be corrected. Where there is an obviously gross misplacement of the decimal point in the unit rate, the line item total as quoted shall govern, and the unit rate shall corrected.
- 12 A tender may be rejected if the unit rates or lump sums for some of the items in the bill of quantities are, in the opinion of the employer, unreasonable or out of proportion, and if the

tenderer fails, within a period of seven (7) days of having been notified in writing by the employer to adjust the unit rates or lump sums for such items, to make such adjustments.

- 13 The units of measurement indicated in the bill of quantities are metric units

The following abbreviations are used in the bill of quantities:

mm	=	millimetre
m	=	metre
km	=	kilometre
km-pass	=	kilometre-pass
m ²	=	square metre
m ² -pass	=	square metre pass
ha	=	hectare
m ³	=	cubic metre
m ³ km	=	cubic metre kilometre
l	=	litre
kl	=	kilolitre
kg	=	kilogram
t	=	ton (1000 kg)
No	=	number
mn	=	meganewton
mn-m	=	meganewton-metre
%	=	per cent
kW	=	kilowatt
Kn	=	kilonewton
PC sum	=	prime cost sum
Prov sum	=	provisional sum

- 14 All rates and sums of money quoted in the bill of quantities shall be in rands and whole cents. Fractions of a cent shall be discarded

- 15 The item numbers appearing in the bill of quantities refer to the corresponding item numbers in the standard specifications. Item numbers prefixed by the letter B refer to payment items described under part B of the project specifications, those with C to payment items described under part C, and so on for further parts of the project specifications.

Item numbers in schedule B of the bill of quantities are, in addition, preceded by the number of each separate part of schedule B of the bill of quantities, e.g. payment item 62.02 described in the standard specifications (clause 6210), when used in part 3 of schedule B of the bill of quantities, would be numbered 3/62.02, and if this payment item had been amended in part B of the project specifications, the payment item would be indicated as 3/B62.02.

16. Labour intensive items are highlighted in the bills of quantities for the payment items relating to labour intensive works.

16.1 Those parts of the contract to be constructed using labour intensive methods have been marked in the bills of quantities with the letters LI in a separate column filled in against every item so designated. The works or parts of the works so designated are to be constructed using labour intensive methods only. The use of plant to provide such works, other than plant specifically provided for in the scope of work, is a variation to the contract. The letters marked with LI are **not necessarily an exhaustive list** of all items which must be done by hand, and this clause does not override any of the requirements in the generic labour intensive specification in the Scope of Works.

16.2 Where minimum labour intensity is specified by the design the contractor is expected to use their initiative to identify additional activities that can be done labour-intensively in order to comply with the set minimum labour intensity target

16.3 Payment for items which are designated to be constructed using labour intensively in the schedule of quantities will not be made unless they are constructed using labour intensive methods. Any unauthorised use of plant to carry out work which was to be done labour intensively will not be condoned and any work so constructed will not be certified for payment. If a contractor, through innovation on other activities, achieved the Local labour content target, but he did not perform all LI-marked activities through labour, he will not be penalized. However, if a contractor did not achieve the Local labour content target and constructed a LI-marked activity through other means, he will not be paid for that activity. Any non-payment for such works shall not relieve the Contractor in any way from his obligations either in contract or in delict.

17. All cost for formal training to the targeted workforce (amongst others: allowances, wages, administration, transport, etc) shall be deemed to be included in the rates for Labour Intensive items.
18. No separate payment will be made for working in restricted areas and all rates will accommodate for such work, unless specific payment items have been included for such restricted work in the Bill of Quantities.

C2.2 BILL OF QUANTITIES

SCHEDULE 1: GENERAL

SECTION 1200

Number	Item Description	Unit	Quantity	Rate	Amount R
B1200	GENERAL REQUIREMENTS AND PROVISIONS				
B12.01	Provision for a Community Liaison Officer				
	(a) Community Liaison Officer	Prov Sum	1	84 000.00	84 000.00
	(b) Attending steering Committee meetings	Prov Sum	1	63 000.00	63 000.00
	(c) Handling costs and profit in respect of sub-items B12.01(a) & (b)	%	147 000		
B12.02	Contract notice board				
	(a) Contract notice board as instructed by the Engineer	Prov Sum	1	25 000.00	25 000.00
	(b) Handling costs and profit in respect of sub-items B12.02(a)	%	25 000.00		
B12.03	Accredited Training				
	(a) Accredited Training approved by the Engineer	Prov Sum	1	200 000.00	200 000.00
	(b) Handling costs and profit in respect of sub-items B12.03(a)	%	200 000.00		
B12.04	Work to done by Nominated subcontractor.				
	(a) Relocation of Eskom Power lines				
	(i) Provision for the relocation of Eskom services.	Prov Sum	1	350 000.00	350 000.00
	(ii) Handling cost and profit in respect of subitem B12.04(a)(i) for the relocation of Eskom services	%	350 000		
	(b) Relocation of Telkom underground and overhead cables				
	(i) Provision for the relocation of Telkom services.	Prov Sum	1	350 000.00	350 000.00
	(ii) Handling cost and profit in respect of subitem B12.04(b)(i) for the relocation of Telkom services	%	350 000		
	(c) Relocation of Municipal services				
	(i) Provision for the relocation of Municipal services	Prov Sum	1	150 000.00	150 000.00
	(ii) Handling cost and profit in respect of subitem B12.04(c)(i) for the relocation of Municipal services	%	150 000		
Total Carried Forward					

SCHEDULE 1: GENERAL

SECTION 1200

Number	Item Description	Unit	Quantity	Rate	Amount R
Brought Forward					
12/B1.1	Contractor's initial obligations in respect of the Occupational Health and Safety Act and Construction Regulations	Lump Sum	1		
12/B1.2	Contractor's time related obligations in respect of the Occupational Health and Safety Act and Construction Regulations	Month	14		
12/B1.3	Submission of the Health and Safety File	Lump Sum	1		
12/B100.01	Penalty for unnecessary removal or damage to trees for the following diameter sizes				
	(a) 2600mm girth or less	No		-5 000.00	Rate Only
	(b) Greater than 2600mm, but less than 6180mm girth	No		-10 000.00	Rate Only
	(c) Greater than 6180mm girth	No		-30 000.00	Rate Only
12/B100.02	Penalty for serious violations				
	(a) Hazardous chemical/oil spill and/or dumping in non-approved sites	No		-10 000.00	Rate Only
	(b) General damage to sensitive environments	No		-5 000.00	Rate Only
	(c) Damage to cultural and historical sites	No		-5 000.00	Rate Only
	(d) Pollution of water sources	No		-10 000.00	Rate Only
	(e) Unauthorized blasting activities	No		-5 000.00	Rate Only
	(f) Uncontrolled/unmanaged erosion per incident, depending on environment impacts, plus rehabilitation at contractor's cost)	No		-5 000.00	Rate Only
12/B100.03	Penalty for less serious violations				
	(a) Littering on site	No		-1 000.00	Rate Only
	(b) Lighting of illegal fires on site	No		-1 000.00	Rate Only
Total Carried Forward					

SCHEDULE 1: GENERAL

SECTION 1200

Number	Item Description	Unit	Quantity	Rate	Amount R
Brought Forward					
12/C12.05	(c) Persistent or un-repaired fuel and oil leaks	No		-1 000.00	Rate Only
	(d) Excess dust or excess noise emanating from site	No		-1 000.00	Rate Only
	(e) Dumping of milled material in side drains or on grassed areas	No		-1 000.00	Rate Only
	(f) Possession or use of intoxicating substances on site	No		- 500.00	Rate Only
	(g) Any vehicles being driven in excess of designated speed limits	No		- 500.00	Rate Only
	(h) Removal and/or damage to flora or cultural or heritage objects on site, and/or killing of wildlife	No		-2 000.00	Rate Only
	(i) Illegal hunting	No		-2 000.00	Rate Only
	(j) Urination and defecation anywhere except in designated areas	No		- 500.00	Rate Only
	Provision for accredited training				
	(a) Generic skills	Prov Sum	1	125 000.00	125 000.00
	(b) Entrepreneurial skills	Prov Sum	1	200 000.00	200 000.00
	(c) Handling cost and profit in respect of subitem C12.05(a) & (b) above	%	325 000		
	(d) Training venue (only if required)	Lump Sum	1		
Total Carried Forward To Summary					

SCHEDULE 1: GENERAL

SECTION 1300

Number	Item Description	Unit	Quantity	Rate	Amount R
B1300	CONTRACTOR'S ESTABLISHMENT ON SITE AND GENERAL OBLIGATIONS				
B13.01	Contractor's general obligations				
	(a) Fixed obligations	L/Sum	1		
	(b) Value-related obligations	L/Sum	1		
	(c) Time-related obligations				
	(i) Mobilization Period	month	2		
	(ii) Execution of the works	month	12		
	(d) Health and safety obligation	month	12		
	(e) Provision of a 10-seater mini-bus	day	13		
	(f) Environmental obligation	month	12		
	(g) Monthly reporting cost	month	12		
	(h) Security on site	month	13		
Total Carried Forward To Summary					

SCHEDULE 1: GENERAL

SECTION 1400

Number	Item Description	Unit	Quantity	Rate	Amount R
B1400	HOUSING, OFFICES AND LABORATORY FOR THE ENGINEER'S SITE PERSONNEL				
14.01	Office and laboratory accommodation				
	(a) Offices (interior floor space only)	m²	48		
	(e) Ablution units	m²	6		
14.02	Office and laboratory furniture				
	(a) Chairs	No	14		
	(d) Desks, complete with drawers and locks	No	3		
	(e) Drawing tables	No	2		
	(f) Conference tables	No	1		
B14.03	Office and laboratory fittings Installations and equipment				
	(a) Items measured by number				
	(i) 220/250 volt power points	No	6		
	(iii) Double 80 watt fluorescent light fittings complete with ballast and tubes	No	8		
	(x) Fire extinguishers, 9,0 kg,all purpose dry powder type, complete, mounted on wall with brackets	No	3		
	(xi) Air conditioning units with 2,2 kW minimum capacity, mounted and with own power connection	No	3		
	(xiv) General-purpose steel cupboards with shelves	No	3		
	(xv) Steel filing cabinets with drawers	No	1		
	(xvi) Refrigerators	No	1		
	(xvii) Bookcases	No	2		
	(xviii) Voltage stabilizers	No	1		
	(xix) Plan holder	No	1		
	(xx) Floodlights complete with poles and 500W minimum globes	No	4		
	(b) Prime-cost items and items paid for in a lump sum:				
	(ix) Cellphone costs, including pro-rata rentals, for calls in connection with contract administration	PC Sum	1	63 000.00	63 000.00
Total Carried Forward					

SCHEDULE 1: GENERAL

SECTION 1400

Number	Item Description	Unit	Quantity	Rate	Amount R
Brought Forward					
	(x) Handling costs and profit in respect of subitem 14.03 (b) (ix) above	%	63 000.00		
	(c) Items measured by area				
	(vii) Venetian blinds	m²	20		
14.04	Car ports:				
	(a) Car ports, as specified, at offices and laboratory buildings (Timber structure with shade cloth on top and on three sides)	No	4		
14.07	Rented, hotel and other accommodation				
	(a) Provisional sum for providing rented housing, hotel or other accommodation as described in subsubclause 14.03(c)(ii)	Prov Sum	1	700 000.00	700 000.00
	(b) Handling costs and profit in respect of subitem 14.07(a)	%	700 000.00		
14.08	Services:				
	(a) Services at office and laboratories				
	(i) Fixed costs	L/Sum	1		
	(ii) Running costs	month	12		
	(c) Services for rented houses	month	12		
B14.10	Provision of photostat facilities	month	12		
B14.11	Provision of mobile outdoor weather station	No	1		
Total Carried Forward To Summary					

SCHEDULE 1: GENERAL

SECTION 1800

Number	Item Description	Unit	Quantity	Rate	Amount R
B1800	DAYWORKS				
B18.01	Personnel				
	(a) Unskilled labour	hr	100		
	(b) Semi-skilled labour	hr	80		
	(c) Skilled labour	hr	40		
	(d) Ganger	hr	40		
	(e) Foreman	hr	40		
B18.02	Equipment				
	(a) Front end loader, 2,0 m³ bucket	hr	40		
	(b) Backhoe loader, 0,75 m³ bucket	hr	40		
	(c) Compressor and 2 jackhammer's	hr	60		
	(d) Grader, 14 000 kg/100 kW	hr	20		
	(e) Tipper truck, 6 m³	hr	40		
	(f) Truck with mounted attenuator	hr	20		
	(g) Watertruck, 10 000 L capacity	hr	40		
	(h) Dozer (D7 or similar)	hr	40		
	(i) Padfoot Roller, 13 000 kg (self-propelled)	hr	40		
	(j) Grid Roller, 10 000 kg	hr	40		
B18.03	Materials				
	(a) Procurement of materials	Prov Sum	1	30 000.00	30 000.00
	(b) Contractor's handling costs, profit and all other charges in respect of subitem B18.03 (e)	%	30 000		
B18.04	Transport				
	(a) LDV	km	10 000		
	(b) Dropside truck, minimum 8 Ton with crane	km	5 000		
B18.05	Site Surveyor				
	(a) Site Surveyor and assistants	hr	20		
Total Carried Forward To Summary					

SCHEDULE 1: GENERAL

SECTION 8100

Number	Item Description	Unit	Quantity	Rate	Amount R
B8100	TESTING MATERIALS AND WORKMANSHIP				
B81.02	Other special tests requested by the engineer				
	(a) Employer's contribution to concrete durability tests				
	(i) Test for Water absorptivity	Prov Sum	1	20 000.00	20 000.00
	(ii) Test for oxygen permeability	Prov Sum	1	20 000.00	20 000.00
	(iii) Test for chloride conductivity	Prov Sum	1	20 000.00	20 000.00
	(iv) Test for concrete cover	Prov Sum	1	25 000.00	25 000.00
	(b) Other tests	Prov Sum	1	200 000.00	200 000.00
B81.04	Financial contribution for the independent commercial laboratory	PC Sum	1	-1500 000.00	-1500 000.00
B81.05	Payment of the independent commercial laboratory				
	(a) Direct payment by the contractor	PC Sum	1.0	3000 000.00	3000 000.00
	(b) Handling cost and profit in respect of item B81.05(a)	%	3000 000.00	5.00	150 000.00
Total Carried Forward To Summary					

SCHEDULE 1: GENERAL

SUMMARY OF SECTIONS

SUMMARY OF SECTIONS					
Section	Description				Amount R
1200	GENERAL REQUIREMENTS AND PROVISIONS				
1300	CONTRACTOR'S ESTABLISHMENT ON SITE AND GENERAL OBLIGATIONS				
1400	HOUSING, OFFICES AND LABORATORY FOR THE ENGINEER'S SITE PERSONNEL				
1800	DAYWORKS				
8100	TESTING MATERIALS AND WORKMANSHIP				
Total Carried Forward To Summary Of Schedules					

SCHEDULE 2: ROADWORKS

SECTION 1500

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT R
B1500	ACCOMMODATION OF TRAFFIC				
B15.01	Accommodating traffic and maintaining temporary deviations:				
	(a) On Mapate Road	km	7.6		
	(b) On the ramps and cross roads of the Interchanges	km	1		
15.02	Earthworks for temporary deviations:				
	(a) Shaping of temporary deviations	km	2.8		
	(b) Cut and borrow to fill	m ³	500		
	(c) Cut to spoil	m ³	800		
B15.03	Temporary traffic-control facilities:				
	(a) Flagmen	man-day	2 400		
	(b) Portable stop and go-ry signs	No	6		
	(e) Road signs, R- and TR-series, 1200 mm diameter	No	15		
	(f) Road signs, TW-series, 1500 mm diameter	No	25		
	(g) Road signs, STW-, DTG-, TGS- AND TG-series (excluding delineators and barricades)	m ²	15		
	(h) Delineators (TW401 and TW402) (200 mm x 800mm in frames with self-weighted base stand - no sandbags allowed) placed as directed by the Engineer in accordance with traffic accommodation drawings				
	(i) Single sided, reversible	No	100		
	(ii) Double sided	No	300		
	(j) Traffic cones, minimum 750 mm high	No	50		
	(m) Two-way communication devices	No	10		
	(n) Other traffic control measures ordered by the engineer				
	(i) Provision of other traffic control measures	Prov Sum	1	100 000.00	100 000.00
	(ii) Handling costs and profits in respect of subitem 15.03 (n)(i)	%	100 000		
B15.10	Accommodation of traffic where the road is constructed in half-widths	km	3		
Total Carried Forward					

SCHEDULE 2: ROADWORKS

SECTION 1500

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT R
Brought Forward					
B15.11	Signalised Traffic control devices				
	(a) Providing signalised traffic control devices	No	3		
	(b) Operating signalised traffic control devices	month device	30		
15.12	Temporary Culverts:				
	(a) Provision and laying of temporary prefabricated culverts complete 1200mm diameter class 100D pipes on class B bedding	m	40		
	(c) Eventual removal of prefabricated culverts				
	(i) Metal culverts:				
	(1) Corrugated Steel Structures, 1500mm diameter, round class MP100, bolted nestable pipe, wall thickness 3.0mm	m	60		
	(ii) Prefabricated culverts 1200mm diameter	m	40		
	(d) Overhaul on excavated material carted to spoil, backfill material (but excluding portland sement), prefabricated culverts removed and reinstalled, and prefabricated culverts removed and stacked, for haul in excess of a free-haul distance of 1.0 km	m ³ -km	4 000		
B15.14	Amber flashing lights mounted on signs	No	12		
B15.15	Provision of traffic safety equipment for visitors				
	(a) Safety jackets	No	4		
B15.16	Provision of traffic safety :				
	(a) Traffic Safety Officer	month	12		
	(b) Traffic Safety Vehicle(s)	month	12		
B15.18	Assistance by traffic officer:				
	(a) Provision of traffic officer	PC Sum	1	50 000.00	50 000.00
	(b) Handling costs and profit in respect of sub-item B15.18	%	50 000		
B15.19	Accommodation of traffic as and when required by the engineer	hr/lane-km	4		
B15.20	Flashing Illuminated Arrow Board	No	6		
B15.22	Temporary Barriers:				
Total Carried Forward					

SCHEDULE 2: ROADWORKS

SECTION 1500

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT R
Brought Forward					
15/B22.01	(a) Barrier sections provided and erected	m/mont h	480		
	(b) Moving and re-erecting the vehicle restraint system at another location on site	m	20		
	(c) Terminal attenuator sections	No	4		
	(d) Removable barrier sections	No	4		
15/22.02	Excavation:				
	(a) Excavating soft material situated within the following depth ranges below the surface level:				
	(i) 0 m up to 1,5 m	m ³	150		
15/22.04	Backfilling:				
	(a) Using the excavated material	m ³	70		
15/32.06	Metal culverts:				
	(a) Corrugated Steel Structures:				
	(i) 1500mm diameter, round class MP100, bolted nestable pipe, wall thickness 3.0mm	m	60		
15/33.10	Stockpiling of Material	m ³	3 800		
15/B33.20	Roadbed preparation and the compaction of material:				
	(a) Compaction to 90% of maximum dry density	m ³	2 800		
15/B34.14	Fill constructed with G8 quality material from commercial sources (overhaul not payable):				
	(a) Material in compacted layer thicknesses of 200mm and less				
	(i) Compacted to 90% of maximum dry density	m ³	3 400		
	Pavement layers constructed from gravel obtained from commercial sources (including all overhaul haul):				
	(a) Gravel selected layers:				
	(i) G7 quality material compected to 93% of maximum dry density (150 mm compacted layer thickness)	m ³	2 000		
	(ii) G9 quality material compected to 93% of maximum dry density (150 mm compacted layer thickness)	m ³	1 900		
Total Carried Forward					

SCHEDULE 2: ROADWORKS

SECTION 1500

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT R
Brought Forward					
	(b) Gravel subbase (G5 quality material, unstabilized gravel) compacted to:				
	(i) 95% maximum dry density (150mm compacted layer thickness)	m ³	1 700		
	(d) Gravel wearing course (Type 2) compacted to:				
	(i) 95% of maximum dry density (150 mm compacted layer thickness)	m ³	500		
15/B38.04	Excavating and spoiling/stockpiling material from an existing pavement and/or the underlying fill:				
	(a) Non-cemented material	m ³	9 000		
15/57.02	Retro-reflective road marking paint:				
	(a) White lines (broken or unbroken):				
	(i) 100 mm wide	km	2		
15/58.03	Preparing the areas for grassing:				
	(b) Scarifying for loosening topsoil	ha	2		
15/B16.02	Overhaul on material hauled in excess of 1,0 km (ordinary overhaul) :	m ³ -km	20 000		
Total Carried Forward To Summary					

SCHEDULE 2: ROADWORKS

SECTION 1700

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT R
B1700	CLEARING AND GRUBBING				
17.01	Clearing and grubbing				
	(a) Within the road reserve	ha	9		
17.02	Removal and grubbing of large trees and tree stumps:				
	(a) Girth exceeding 1m up to and including 2m	No	100		
	(b) Girth exceeding 2m up to and including 3m	No	40		
17.04	Clearing and grubbing at inlets and outlets of hydraulic structures	m ²			
B17.07	Removal and temporary stockpiling of topsoil:				
	(a) In windrows alongside the work area	m ³	2 500		
	(b) In temporary stockpiles after loading material into trucks including 1,0km freehaul	m ³	2 500		
17/B16.02	Overhaul of material hauled in excess of 1.0 km	m ³ -km	20 000		
17/22.12	Removing existing concrete:				
	(a) Plain concrete	m ³	20		
	(b) Reinforced concrete	m ³	25		
Total Carried Forward To Summary					

SCHEDULE 2: ROADWORKS

SECTION 2100

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT R
B2100	DRAINS				
B21.01	Excavation for open drains:				
	(a) Excavating soft material situated within the following depth ranges below the surface level:				
	(i) 0 m up to 1,5 m	m ³	2 200		
	(b) Extra over subitem 21.01(a) for excavation in hard material, irrespective of depth	m ³	20		
21.02	Clearing and shaping existing open drains	m ³	500		
B21.03	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	m ³	80		
	(ii) Exceeding 1,5 m and up to 3,0 m	m ³	20		
	(b) Extra over subitem 21.03(a) for excavation in hard material irrespective of depth	m ³	20		
	(c) Extra-over item 21.03 (a) for excavating through stabilised layers of existing pavement	m ³	10		
B21.04	Impermeable backfilling to subsoil drainage systems:				
	(a) Unstabilised natural gravel	m ³	20		
	(b) G5 material stabilised with 4% stabilising agent	m ³	20		
21.05	Banks and dykes	m ³	50		
B21.06	Natural permeable material in subsoil drainage systems (washed crushed stone):				
	(a) Crushed stone obtained from borrow pit crushed by the contractor:				
	(ii) Coarse-Grade - 20mm	m ³	60		
B21.07	Natural permeable material in subsoil drainage system (washed sand)				
	(a) Sand obtained from approved sources on site:	m ³	60		
21.08	Pipes in subsoil drainage systems:				
	(c) High density type polyethylene pressure pipes and fittings complete with couplings:				
Total Carried Forward					

SCHEDULE 2: ROADWORKS

SECTION 2100

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT R
Brought Forward					
	(i) 110mm internal diameter. slotted	m	360		
21.10	Synthetic-fibre filter fabric:				
	(a) Grade 2 (Colto table 2104/2: Grade classifications of geotextiles)	m ²	750		
B21.12	Concrete outlet structures, manhole boxes, junction boxes and cleaning eyes for subsoil drainage systems:				
	(a) Outlet structures	No	10		
	(d) Cleaning eyes	No	10		
21.13	Concrete caps for subsoil drain pipes	No	10		
21.15	Overhaul for material hauled in excess of 1,0 km free-haul (normal overhaul)	m ³ -km	8 500		
21.17	Test flushing of pipe subsoil drains	No	10		
21.18	Excavation for the clearing of existing drainage systems:				
	(b) Culvert barrels	m ³	5		
21.19	Selected backfill material under concrete-lined side drains compacted to 93% of maximum dry density	m ³	5		
B21.21	Clearing of subsoil drains	m	360		
B21.22	Subsoil outlet marker board	No	10		
Total Carried Forward To Summary					

SCHEDULE 2: ROADWORKS

SECTION 2200					
ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT R
B2200	PREFABRICATED CULVERTS				
B22.01	Excavation:				
	(a) Excavating soft material situated within the following depth ranges below the surface level:				
	(i) 0 m up to 1,5 m	m ³	3 800		
	(ii) Exceeding 1,5 m and up to 3,0 m	m ³	1 400		
	(ii) Exceeding 3,0 m	m ³	700		
	(b) Extra over subitem 22.01(a) for excavation in hard material, irrespective of depth	m ³	80		
	(c) Extra-over sub-item 22.01(a) for excavating by hand	m ³	80		
22.02	Backfilling:				
	(a) Using the excavated material	m ³	2 400		
	(b) Using imported selected material	m ³	1 000		
	(c) Extra over subitems 22.02(a) and (b) for soil cement backfilling:				
	(i) with 3% Cement	m ³	2 400		
22.03	Concrete pipe culverts:				
	(b) On class B bedding:				
	(i) 450mm diameter				
	(2) Type Ogee Class 100D	m	240		
	(ii) 600mm diameter				
	(2) Type Ogee Class 100D	m	2 500		
	(iii) 900mm diameter:				
	(2) Type Ogee Class 100D	m	120		
22.07	Cast in situ concrete and formwork:				
	(c) In inlet and outlet structures, skewed ends, catch-pits, manholes, thrust and anchor blocks, cast in-situ box culverts, excluding formwork but including class U2 surface finish:				
	(i) Class 30/20	m ³	60		
Total Carried Forward					

SCHEDULE 2: ROADWORKS

SECTION 2200

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT R
Brought Forward					
22.10	Steel reinforcement:				
	(b) High-tensile steel bars	t	3		
	(c) Welded steel fabric	kg	750		
B22.12	Removing existing concrete:				
	(a) Plain concrete	m ³	5		
	(b) Reinforced concrete	m ³	2		
22.14	Removing and staking existing prefabricated culverts:				
	(a) 450mm diameter concrete pipes	m	15		
	(b) 600mm diameter pipes	m	15		
22.17	Manholes, catch-pits, pre-cast inlet and outlet structures complete:				
	(a) Manholes:				
	(i) In Situ Reinforced concrete manhole for drainage at cutting retaining walls as per the drawings				
	(1) 0 m to 2,0 m deep	No	11		
	(2) 2,0 m to 2,5 m deep	No	3		
	(3) 2,5 m to 3,0 m deep	No	3		
	(b) Catch-pits:				
	(i) Catch pit 2 m long with 2 m upstream transition	No	35		
22.18	Brickwork				
	(b) 230 mm thick	m ²	50		
	(c) 345 mm thick	m ²	35		
22.21	Accessories:				
	(a) Manhole covers including frames:				
	(i) Heavy duty precast concrete cover and frame, 560 mm diam.	No	20		
	(c) Step irons:				
	(i) Galvanised step irons to BS1247	No	120		
B22.23	Service ducts:				
	(a) Ordinary pipes:				
Total Carried Forward					

SCHEDULE 2: ROADWORKS

SECTION 2200

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT R
Brought Forward					
	(ii) uPVC:				
	(1) 110 mm diameter.	m	15		
	(2) 160 mm diameter.	m	800		
B22.24	Service duct markers	No	32		
22.25	Overhaul on excavated material carted to spoil, backfill material (but excluding Portland cement in the case of soil cement), existing structures demolished and removed to spoil, and removing and relaying, and removing and stacking existing prefabricated culverts, for haul in excess of the free-haul distance	m ³ -km	20 000		
22.26	Hand excavation to determine the positions of existing services	m ³	50		
22.27	Reinstating trenches crossing road:				
	(a) Selected layers 150mm	m ²	25		
	(b) Subbase 150mm	m ²	25		
Total Carried Forward To Summary					

SCHEDULE 2: ROADWORKS

SECTION 2300

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT R
B2300	CONCRETE KERBING, CONCRETE CHANNELLING, CHUTES AND DOWNPIPES, AND CONCRETE LININGS FOR OPEN DRAINS				
23.01	Concrete kerbing:				
	(a) Type CK5 mountable kerb with 20/20 concrete joint backing as shown on the drawings	m	2 700		
	(b) Type (Fig 11) mountable kerb with 20/20 concrete joint backing as shown on the drawings	m	2 700		
	(d) Type CK5 mountable kerb 300mm long with 20/20 concrete joint backing as shown on the drawings	m	250		
	(e) Cast in situ 250mm x 300mm concrete edge beam Class 25/20 concrete	m	250		
23.02	Concrete kerbing-channelling combination (class 25/20 concrete):				
	(a) Type CK5 combination kerb with 20/20 concrete joint backing as shown on the drawings	m	2 700		
	(b) Type CK5 combination kerb 300mm long with 20/20 concrete joint backing as shown on the drawings	m	250		
	(c) Type A cast in-situ drain at guardrails as shown on the typical drawings	m ³	850		
23.03	Concrete chutes as shown on the typical drawings:				
	(a) Cast in-situ concrete down chutes with stilling basin or energy breaker syterm (Class 30/20 concrete)	m ³	15		
23.05	Inlet, outlet, transition and similar structures:				
	(a) Cast in-situ concrete inlet structures for chutes (class 25/20 concrete) as shown on the typical drawings	No	8		
	(b) Cast in-situ concrete transition 2m long from a Type CK5 combination precast kerb to side inlet as shown on the typical drawings	No	35		
23.07	Trimming of excavations for concrete-lined open drains (including removal of existing topsoil and grass):				
	(a) In soft material	m ²	1 750		
	(b) In hard material	m ²	30		
23.08	Concrete lining for open drains:				
	(a) Cast in situ class 30/20 concrete lining for open drains as shown on the typical drawings.	m ³	400		
Total Carried Forward					

SCHEDULE 2: ROADWORKS

SECTION 2300

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT R
Brought Forward					
23.09	(b) Class U2 surface finish to cast in situ concrete for side drains Formwork to cast in situ concrete lining for open drains (Class F2 surface finish):	m ²	2 600		
	(a) To sides with formwork on the internal face only	m ²	200		
	(b) To end slabs	m ²	400		
23.10	Sealed joints in concrete linings of open drains as shown on the drawings:				
	(c) Silicone-based sealant (ASTM D5893 compliant)	m	400		
23.11	Concrete screed or backfill below chutes:				
	(b) Class 20/20	m ³	20		
23.12	Steel reinforcement:				
	(c) Welded steel fabric	kg	10 500		
23.13	Polyethylene sheeting (0.15 mm thick) for concrete lined drains	m ²	2 600		
B23.14	Cutting bituminous surfacing and pavement layers for concrete kerbing, channelling or concrete lined drains (saw cut 100mm deep)	m	1 400		
B23.16	Spraying trimmed surfaces of excavations for concrete lined open drains with invert bituminous emulsion MSP1 or approved equivalent	litre	2 000		
B23.17	Demolition and removal of existing kerbs and/or channel, concrete lined drains (maximum size of 300mm)	m	5		
B23.18	Extra over items 23.01 and 23.02 for concrete kerbing or concrete kerbing and channelling on curves:				
	(a) on curves of radii more than or equal to 5.0m but less than 20.0m	m	220		
Total Carried Forward To Summary					

SCHEDULE 2: ROADWORKS

SECTION 3300

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT R
B3300	MASS EARTHWORKS				
33.01	Cut and borrow to fill, including free-haul up to 1 km:				
	(a) Gravel material in compacted layer thickness of 200 mm and less:				
	(i) Compacted to 90% of maximum dry density.	m ³	2 800		
	(c) Rock Fill	m ³	500		
33.03	Extra over item 33.01 for excavating and breaking down material in:				
	(a) Intermediate excavation	m ³	900		
	(b) Hard excavation	m ³	300		
33.04	Cut to spoil, including free-haul up to 1 km. Material obtained from:				
	(a) Soft excavation	m ³	6 300		
	(b) Hard excavation	m ³	300		
33.07	Removal of unsuitable material (including free-haul of 1 km):				
	(b) In layer thickness's exceeding 200mm:				
	(i) Stable material	m ³	500		
33.10	Roadbed preparation and the compaction of material:				
	(a) Compaction to 90% of maximum dry density	m ³	9 500		
33.12	In situ treatment of roadbed:				
	(a) In situ treatment by ripping	m ³	750		
B33.20	Fill constructed with G8 quality material from commercial sources (overhaul not payable):				
	(a) Material in compacted layer thicknesses of 200mm and less				
	(i) Compacted to 90% of maximum dry density	m ³	32 100		
33/B16.02	Overhaul on material hauled in excess of 1,0km	m ³ -km	15 000		
Total Carried Forward To Summary					

SCHEDULE 2: ROADWORKS

SECTION 3400

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT R
B3400	PAVEMENT LAYERS OF GRAVEL MATERIAL				
34.03	Pavement layers constructed from gravel obtained from existing pavement layers: (a) Gravel selected layers compected to 93% of maximum dry density, using: (i) Non-cemented material 150mm layer thickness (G9 material quality) (l) Gravel shoulder wearing course compacted to 93% of maximum dry density, using: (i) Non-cemented material 150mm layer thickness	m³	700		
34.04	In situ reconstruction of existing pavement layer as: (a) Gravel selected layers compected to 93% of maximum dry density, using: (i) Non-cemented material 150mm layer thickness (G9 material quality)	m³	700		
B34.14	Pavement layers constructed from gravel obtained from commercial sources (including all overhaul haul): (a) Gravel selected layers: (i) G7 quality material compected to 93% of maximum dry density (150 mm compacted layer thickness) on lanes (ii) G9 quality material compected to 93% of maximum dry density (150 mm compacted layer thickness) on lanes (b) Gravel subbase (G5 quality material, unstabilized gravel) compacted to: (ii) 93% maximum dry density (150mm compacted layer thickness) on sidewalks (c) Gravel subbase (G5 quality material, cemically stabilized gravel) compacted to: (i) C4 chemically stabilized compacted to 97% of maximum dry density (200 mm compacted layer thickness) (d) Gravel wearing course (Type 2) compacted to: (i) 95% of maximum dry density (150 mm compacted layer thickness) on lanes	m³	9 400		
		m³	9 300		
		m³	2 500		
		m³	9 200		
		m³	200		
Total Carried Forward					

SCHEDULE 2: ROADWORKS

SECTION 3400					
ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT R
Brought Forward					
34/B16.02	Overhaul on material hauled in excess of 1,0 km (ordinary overhaul) :	m ³ -km	10 000		
Total Carried Forward To Summary					

SCHEDULE 2: ROADWORKS

SECTION 3500					
ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT R
B3500	STABILIZATION				
35.01	Chemical stabilization (200mm thick) extra over unstabilized compacted layers	m ³	9 200		
B35.02	Chemical stabilizing agent: (g) Cement complying with SANS 50157-1:2000 (CEM II 32,5)	t	500		
35.04	Provision and application of water for curing	kℓ	2 500		
B35.13	Extra over items 35.01, 35.07 and 35.19 for trial sections	m ³	300		
Total Carried Forward To Summary					

SCHEDULE 2: ROADWORKS

SECTION 3600

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT R
B3600	CRUSHED STONE BASE				
B36.01	Crushed-stone base				
	(c) Constructed from type G2 material obtained from commercial sources and compacted to 98% of apparent relative density (150mm layer thickness)	m ³	6 500		
36.03	Crushed-stone base trial section, 150mm thick, constructed in accordance with the provisions of clause 3603	m ²	1 250		
Total Carried Forward To Summary					

SCHEDULE 2: ROADWORKS

SECTION 4100

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT R
B4100	PRIME COAT				
41.01	Prime coat:				
	(e) Invert bituminous emulsion	litre	40 000		
41.02	Aggregate for blinding	m²	25		
41.03	Extra over item 41.01 fpr applying the prime coat in areas accesssible only to hand held equipment	m²	3 600		
Total Carried Forward To Summary					

SCHEDULE 2: ROADWORKS

SECTION 4200

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT R
B4200	ASPHALT BASE AND SURFACING				
42.02	Asphalt surfacing:				
	(a) Continuously graded:				
	(i) 20mm thickness, using 50/70 penetration grade bitumen and 10mm maximum size aggregate on sidewalks	m ²	4 000		
	(ii) 30mm thickness, using 50/70 penetration grade bitumen and 14mm maximum size aggregate on lanes	m ²	42 000		
42.04	Tack coat of 30% stable-grade emulsion	litre	9 000		
42.05	Binder variations:				
	(a) Penetration grade bitumens	t	25		
42.06	Variations in active filler content:				
	(b) Lime	t	20		
42.07	Trial sections:				
	(b) Asphalt surfacing, 30 mm cont.graded	m ²	200		
B42.08	100 mm cores in asphalt paving	No	60		
42.15	Application of prime coat and/or tack coat to the edges of a layer	litre	200		
B42.21	Aggregate variations	t	20		
B42.22	Traffic calming devices (drawing 10104-204)				
	(a) 80mm high x 3600mm wide asphalt speed control humps	m	50		
	(b) 100mm high x 6000mm wide raised asphalt pedestrian crossing	m	7		
Total Carried Forward To Summary					

SCHEDULE 2: ROADWORKS

SECTION 4600

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT R
B4600	BITUMINOUS SINGLE SEAL WITH SLURRY (CAPE SEAL)				
46.01	Bituminous single seal with 19mm aggregate and slurry:				
	(a) Single 20,0mm seal with first (coarse to medium grade) slurry layer with a tack coat comprising aggregate Grade 1				
	(i) Binder: 70% polymer modified cationic spray-guide emulsion of Class SC-E2 (65-68)	m ²	1 000		
	(b) Extra over (a) for 2nd (fine) slurry layer	m ²	1 000		
B46.03	Bituminous binder variations:				
	l) Modified spray grade emulsion of Class SC-E2 (65-68)	litre			
46.04	Aggregate variations:				
	b) 20 mm aggregate - Grade 1	m ³	20		
46.05	Variation in the rate of application of the slurry	m ³	45		
B46.09	Extra over 46.01 for the addition of natural sand from commercial sources or approved quarries to the aggregate of the slurry	ton	15		
B46.10	Second application of binder consisting of 35% spray grade cationic emulsion	ℓ	10 000		
Total Carried Forward To Summary					

SCHEDULE 2: ROADWORKS

SECTION 5100					
ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT R
B5100	PITCHING, STONework AND PROTECTION AGAINST EROSION				
51.01	Stone pitching				
	(b) Grouted stone pitching	m ²	200		
51.02	Riprap:				
	(a) Packed Riprap - 30 kg stone	m ³	50		
51.04	Concrete pitching and block paving:				
	(d) Prefabricated concrete paving blocks for side walk pavements (60mm) - W block, stretcher bond	m ²	4 100		
51.05	Concrete edge beams:				
	(a) Class 25/20 concrete	m ³	125		
Total Carried Forward To Summary					

SCHEDULE 2: ROADWORKS

SECTION 5200					
ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT R
5200	GABIONS				
52.01	Foundation trench excavation and backfilling:				
	(a) In all other classes of materials	m ³	330		
52.02	Surface preparation for bedding the gabions	m ²	660		
52.03	Gabions				
	(b) Galvanised gabion boxes 1,0m wide by 1,0m deep by 2,0m long using mesh 80mm x 80mm x 2,7mm	m ³	1 350		
	(c) Galvanised gabion mattresses with 1,0m diaphragm spacing, 6,0m long by 2,0m wide by 0,3m deep using 80mm x 80mm x 2,7mm	m ³	250		
52.04	Filter fabric				
	(a) Geofabric Grade 2	m ²	2 000		
Total Carried Forward To Summary					

SCHEDULE 2: ROADWORKS

SECTION 5400					
ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT R
B5400	GUARDRAILS				
B54.01	Guardrails on 3.81m apaced posts:				
	(a) Complete galvanised system on:				
	(i)Tiber posts	m	1 400		
	(b) Extra over 54.01(a) for the following:				
	(ii) End treatments where single guardrail sections are used (including additional posts) as per drawing RAL/T625/008	No	12		
54.05	Additional guardrail posts:				
	(a) Timber	No	20		
54.06	Reflective plates	No	220		
54.12	Extra over items 54.01 and 54.02 for drilling and blasting holes for guardrail posts :				
	(a) Drilling of holes	No	380		
Total Carried Forward To Summary					

SCHEDULE 2: ROADWORKS

SECTION 5500

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT R
B5500	FENCING				
55.01	Clearing the fence line, 2m wide strip	km	3		
55.02	Supply and erect new fencing material for new fences and for supplementing material in existing fences which are being repaired or removed:				
	(a) Fully galvanized high tensile grade single strand (SABS 675) barbed wire:				
	(i) 3,2mm x 2,5mm oval-shaped wire	km	10		
	(b) Fully galvanized high tensile grade single strand (SANS 675) fully galvanized smooth wire				
	(i) 3,0mm diameter smooth wire	km	5		
	(d) Wire netting, welded mesh 100 x 50 x 2,5 mm diameter, 1,0 m high fully galvanized	m²	500		
	(g) Standards:				
	(i) 2000mm long x 100mm diameter treated timber posts as per the drawings	No	100		
	(h) Droppers				
	(i) 1400mm longs x 36mm diameter treated timber droppers as per the drawings	No	450		
	(i) Straining posts, stays and anchors:				
	(i) Vertical:				
	(1) 2100mm long x 125mm diameter treated timber posts as per the drawings	No	25		
	(iii) Horizontal:				
	(1) 2000mm long x 100mm diameter treated timber posts as per the drawings	No	20		
55.03	New gates				
	(a) Single leaf, W-type gate as shown on the drawings				
	(i) 3,6,m 'W' pattern	No	12		
55.04	Moving existing fences and gates:				
	(a) Fences:				
	(i) Stock-proof fences	km	1		
Total Carried Forward					

SCHEDULE 2: ROADWORKS

SECTION 5500

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT R
Brought Forward					
55.05	(b) Gates	No	5		
	Dismantling existing fences:				
	(a) Fences:				
	(i) Stock-proof fences	km	2		
	(b) Gates	No	10		
B55.10	Repairing existing fences	km	1		
Total Carried Forward To Summary					

SCHEDULE 2: ROADWORKS

SECTION 5600

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT R
B5600	ROAD SIGNS				
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:				
	(d) Pre painted galvanized steel profiles (200 mm high chromadek or approved equivalent):				
	(i) Area not exceeding 2 m²	m²	40		
	(ii) Area exceeding 2 m² but not 10 m²	m²	50		
	(iii) Area exceeding 10 m²	m²	45		
	(e) Pre painted galvanized steel plate regulatory warning and information signs (chromadek 1,6 mm thick or approved equivalent):				
	(i) Octagonal:				
	(1) 900 mm	No	10		
	(ii) Triangular:				
	(1) 900 mm	No	20		
	(2) 1200 mm	No	2		
	(iii) Round:				
	(1) 900 mm	No	5		
	(2) 1200 mm	No	2		
	(iv) Rectangular:				
	(1) 200 mm x 800 mm	No	50		
	(2) 450 mm x 450 mm	No	15		
	(3) 450 mm x 900 mm	No	10		
	(4) 600 mm x 600 mm	No	10		
	(5) 1200 mm x 400 mm	No.	10		
56.02	Extra over item 56.01 for using:				
	(a) Background of retro-reflective material of:				
	(iii) Retro Reflective Class III	m²	135		
Total Carried Forward					

SCHEDULE 2: ROADWORKS

SECTION 5600

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT R
Brought Forward					
	(b) Lettering, symbols, numbers, arrows, emblems and borders of retro-reflective material:				
	(ii) Retro Reflective Class III	m ²	135		
56.03	Road sign supports (overhead road sign structures excluded):				
	(c) Timber:				
	(iii) 150 mm top diameter.	m	180		
56.05	Excavation and backfilling for road sign supports (not applicable to kilometre posts) refer to drawings	m ³	50		
56.06	Extra over item 56.05 for cement-treated soil backfill	m ³	35		
56.07	Extra over item 56.05 for rock excavation	m ³	10		
56.08	Dismantling, storing and re-erecting road signs with a surface area of:				
	(a) Up to 2 m ²	No	5		
	(b) Exceeding 2 m ² but not 10 m ²	No	2		
	(c) Exceeding 10 m ²	No	2		
B56.10	Danger plates at culverts/structures:				
	(a) 600 mm x 150 mm	No	50		
B56.11	Replace kilometre markers as per drawings	No	6		
Total Carried Forward To Summary					

SCHEDULE 2: ROADWORKS

SECTION 5700

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT R
B5700	ROAD MARKINGS				
57.02	Retro-reflective road marking paint:				
	(a) White lines (broken or unbroken):				
	(i) 100 mm wide	km	22		
	(ii) 150 mm wide	km	1		
	(iv) 300 mm wide	km	0.5		
	(b) Yellow lines (broken or unbroken):				
	(i) 100 mm wide	km	2		
	(ii) 150 mm wide	km	0.5		
	(d) White lettering and symbols	m ²	50		
B57.05	Road-studs Installation and maintenance)				
	(a) RSA-1	No	320		
	(d) RSA-T	No.	150		
B57.06	Setting out and pre-marking the lines (Excluding traffic-island markings, lettering and symbols):	km	25		
B57.07	Re-establishing the painting unit at the end of the defect notification period	L/Sum	1		
B57.11	Re-establishing the painting unit on instruction of the Engineer during the construction period	No	1		
Total Carried Forward To Summary					

SCHEDULE 2: ROADWORKS

SECTION 5800

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT R
B5800	LANDSCAPING AND PLANTING PLANTS				
58.01	Trimming:				
	(a) Machine trimming	m ²	8 500		
	(b) Hand trimming	m ²	3 000		
B58.03	Preparing the areas for grassing:				
	(c) Top soiling within the road reserve, where the following material are used:				
	(i) Topsoil obtained from within the road reserve or borrow areas (free haul 1,0 km)	m ³	800		
	(ii) Topsoil obtained from other sources by the contractor (including all haul)	m ³	200		
	(f) Stockpiling of topsoil (free-haul 1,0 km) where the following applies:				
	(i) Topsoil stored at a stockpile site agreed with the engineer	m ³	400		
58/B16.02	Overhaul on material hauled in excess of 1,0 km (ordinary overhaul)	m ³ -km	10 000		
B58.12	Removal of undesirable vegetation	km	7		
Total Carried Forward To Summary					

SCHEDULE 2: ROADWORKS

SECTION 5900

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT R
B5900	FINISHING THE ROAD AND ROAD RESERVE AND TREATING OLD ROADS				
59.01	Finishing the road and road reserve:				
	(b) Single carriageway road	km	7		
Total Carried Forward To Summary					

SCHEDULE 2: ROADWORKS

SUMMARY OF SECTIONS					
SECTION	DESCRIPTION				AMOUNT R
1500	ACCOMODATION OF TRAFFIC				
1700	CLEARING AND GRUBBING				
2100	DRAINS				
2200	PREFABRICATED CULVERTS				
2300	CONCRETE KERBING, CONCRETE CHANNELING, CHUTES AND DOWNPIPES, AND CONCRETE LININGS OF OPEN				
3300	MASS EARTWORKS				
3400	PAVEMENT LAYERS OF GRAVEL MATERIAL				
3500	STABILIZATION				
3600	CRUSHED STONE BASE				
4100	PRIME COAT				
4200	ASPHALT BASE AND SURFACING				
4200	BITUMINOUS SINGLE SEAL WITH SLURRY (CAPE SEAL)				
5100	PITCHING, STONEMWORK AND PROTECTION AGAINST				
5200	GABIONS				
5400	GUARDRAILS				
5500	FENCING				
5600	ROAD SIGNS				
5700	ROAD MARKINGS				
5800	LANDSCAPING AND PLANTING PLANTS				
5900	FINISHING THE ROAD AND ROAD RESERVE AND TREATING OLD ROADS				
Total Carried Forward To Summary Of Schedules					

SCHEDULE 3A: CULVERT 1 AT KM 0.834

SECTION 6100

Number	Item Description	Unit	Quantity	Rate	Amount R
B6100	FOUNDATIONS FOR STRUCTURES				
61.02	Excavation:				
	(a) Excavating soft material situated within the following successive depth ranges:				
	(1) 0 m up to 2 m	m ³	5 700		
	(2) Exceeding 2 m and up to 4 m	m ³	2 750		
	(b) Extra over sub-item 61.02(a) for excavation in hard material irrespective of depth	m ³	60		
	(c) Extra over subitem 61.02(a) for additional excavation required by the engineer after the excavation has been completed	m ³	10		
	(d) Extra over subitem 61.02(a) for excavation by hand	m ³	10		
61.03	Access and drainage:				
	(a) Access	L/Sum	1		
61.04	Backfill to excavations utilising:				
	(a) Material from the excavation	m ³	650		
	(b) Imported material	m ³	10		
61.05	Fill within a restricted area (extra over item 33.01)	m ³	700		
61.06	Overhaul in excess of 1,0 km on excavated material and on material imported for backfill, foundation fill and fill for caissons	m ³ -km	15 000		
61.07	Overbreak in excavation in hard material	m ²	20		
61.08	Foundation fill consisting of:				
	(a) Rock fill	m ³	1 000		
	(c) Compacted granular material	m ³	350		
	(d) Mass concrete Class 15/38	m ³	5		
	(e) Concrete screed class 15/19, 75mm thickness	m ³	60		
B61.51	Lateral support to excavations				
	(a) Foundation excavation				
	(i) 0 to 5m depth	L/Sum	1		
B61.52	Foundation lining				
Total Carried Forward					

SCHEDULE 3A: CULVERT 1 AT KM 0.834

SECTION 6100					
Number	Item Description	Unit	Quantity	Rate	Amount R
Brought Forward					
	(a) Rock grid PC 100/100 geofabric to rockfill as per detail	m²	2 200		
Total Carried Forward To Summary					

SCHEDULE 3A: CULVERT 1 AT KM 0.834

SECTION 6200

Number	Item Description	Unit	Quantity	Rate	Amount R
B6200	FALSEWORK, FORMWORK AND CONCRETE FINISH				
62.02	Vertical formwork to provide				
	a) Class F1 surface finish to:				
	(i) Barrel footing	m ²	70		
	(ii) Barrel walls	m ²	170		
	(iii) Apron slabs and cut off wall	m ²	160		
	(iv) Wing wall footings	m ²	50		
	(v) Wing walls	m ²	115		
	b) Class F2 surface finish to:				
	(i) Barrel walls	m ²	750		
	(ii) Headwalls	m ²	75		
	(iii) Wingwalls	m ²	120		
62.03	Horizontal formwork to provide				
	a) Class F2 surface finish to:				
	(i) Deck	m ²	250		
B62.04	Inclined formwork to provide				
	a) Class F2 surface finish to:				
	(i) Barrel walls haunches	m ²	100		
Total Carried Forward To Summary					

SCHEDULE 3A: CULVERT 1 AT KM 0.834

SECTION 6300

Number	Item Description	Unit	Quantity	Rate	Amount R
B6300	STEEL REINFORCEMENT FOR STRUCTURES				
63.01	Steel reinforcement for:				
	(a) Barrel foundation, walls and deck				
	(1) Mild steel bars	t	0.5		
	(2) High yield stress steel bars	t	53		
	(b) Wingwall footings and walls				
	(1) Mild steel bars	t	0.1		
	(2) High yield stress steel bars	t	8		
	(c) Apron slab and cut off walls				
	(2) High yield stress steel bars	t	1.1		
	(3) Welded steel fabric	kg	2 200		
Total Carried Forward To Summary					

SCHEDULE 3A: CULVERT 1 AT KM 0.834

SECTION 6400

Number	Item Description	Unit	Quantity	Rate	Amount R
B6400	CONCRETE FOR STRUCTURES				
B64.01	Cast in situ concrete:				
	(a) Durability Concrete				
	(i) Barrel foundation, walls and deck (W30/20)	m ³	420		
	(ii) Wingwall footings and walls (W30/20)	m ³	80		
	(iii) Apron slab and cut off walls (W30/20)	m ³	75		
B64.02	Manufacturing precast concrete members (Mounting block for Culvert number complete as shown on drawings)	No	2		
64.03	Transporting and erecting precast concrete members (Mounting block for Culvert number complete as shown on drawings)	No	2		
B64.06	Demolishing existing concrete				
	b) Reinforced concrete in:				
	(i) Existing drainage structure	m ³	40		
B64.07	Curing of Concrete				
	a) Curing membranes (vertical faces)				
	(i) Barrel walls	m ²	920		
	(ii) Head walls	m ²	75		
	(iii) Wing walls	m ²	230		
	b) Moisture curing (horizontal faces/top surface)				
	(i) Barrel base	m ²	400		
	(ii) Barrel deck	m ²	400		
	(iii) Apron slab	m ²	350		
	(iv) Wing wall footings	m ²	90		
B64.08	Hot weather concreting	L/Sum	1		
Total Carried Forward To Summary					

SCHEDULE 3A: CULVERT 1 AT KM 0.834

SECTION 6600

Number	Item Description	Unit	Quantity	Rate	Amount R
B6600	NO-FINES CONCRETE, JOINTS, BEARINGS, BOLT GROUPS FOR ELECTRIFICATION, PARAPETS AND DRAINAGE FOR STRUCTURES				
B66.06	Filled joints:				
	(b) Joint Type:				
	(i) J1 complete as shown on drawings	m	60		
	(ii) J2 complete as shown on drawings	m	60		
	(iii) J3 complete as shown on drawings	m	100		
	(iv) J4 complete as shown on drawings	m	130		
	(v) J8 complete as shown on drawings	m	35		
	(vi) J9 complete as shown on drawings	m	20		
	(vii) J12 complete as shown on drawings	m	30		
	(viii) J13 complete as shown on drawings	m	16		
66.08	Sealing joints with:				
	(a) Sealant :				
	(i) 10mm x 10mm Silicon sealant	m	530		
	(ii) 15mm Deep x 15mm Silicon sealant	m	20		
66.14	Dowels/Guides				
	(a) R20 galvanised steel dowels, 1600mm long with one half encased in uPVC pipewith ends closed with petrolatum tape	No	95		
	(b) R16 galvanised steel dowels, 1200mm long with one half encased in uPVC pipewith ends closed with petrolatum tape	No	95		
	(c) R16 galvanised steel dowels, 400mm long with one half encased in uPVC pipewith ends closed with petrolatum tape	No	210		
66.18	Numbers for structures:				
	(a) Number plates	No	4		
66.19	Drainage pipes and weepholes:				
	(b) Weep holes:				
	(2) 50mm dia. uPVC pipes in Barrel walls and wingwalls	No	35		
Total Carried Forward					

SCHEDULE 3A: CULVERT 1 AT KM 0.834

SECTION 6600					
Number	Item Description	Unit	Quantity	Rate	Amount R
Brought Forward					
B66.28	Drainage strips	m	310		
B66.29	Perforated drainage pipes, 65mm internal diameter with 70 % perforated / open area, HDPE with 5mm wall thickness, wrapped in Grade 2 filter-fabric	m	60		
B66.31	Additional water tests for joints ordered by the engineer	No	1		
Total Carried Forward To Summary					

SCHEDULE 3A: CULVERT 1 AT KM 0.834

SECTION 6700					
Number	Item Description	Unit	Quantity	Rate	Amount R
6700	STRUCTURAL STEELWORK				
67.01	Structural steel:				
	(c) Guardrail posts as per detail on the drawings	No	30		
67.02	Anchor bolts:				
	(b) M20 adhesive grade 8.8, galvanized	No	105		
67.03	Corrosion protection:				
	(b) Hot-dip galvanizing:				
	(iii) Minimum 200 micron thickness zinc coating to guardrail posts	No	30		
Total Carried Forward To Summary					

SCHEDULE 3A: CULVERT 1 AT KM 0.834

SUMMARY OF SECTIONS					
Section	Description				Amount R
6100	FOUNDATIONS FOR STRUCTURES				
6200	FALSEWORK, FORMWORK AND CONCRETE FINISH				
6300	STEEL REINFORCEMENT FOR STRUCTURES				
6400	CONCRETE FOR STRUCTURES				
6600	NO-FINES CONCRETE, JOINTS, BEARINGS, PARAPETS AND DRAINAGE FOR STRUCTURES				
6700	STRUCTURAL STEELWORK				

SCHEDULE 3B: CULVERT 2 AT KM 3.720

SECTION 6100

Number	Item Description	Unit	Quantity	Rate	Amount R
B6100	FOUNDATIONS FOR STRUCTURES				
61.02	Excavation:				
	(a) Excavating soft material situated within the following successive depth ranges:				
	(1) 0 m up to 2 m	m ³	5 700		
	(2) Exceeding 2 m and up to 4 m	m ³	4 000		
	(3) Exceeding 4 m and up to 6 m	m ³	5		
	(b) Extra over sub-item 61.02(a) for excavation in hard material irrespective of depth	m ³	10		
	(c) Extra over subitem 61.02(a) for additional excavation required by the engineer after the excavation has been completed	m ³	10		
	(d) Extra over subitem 61.02(a) for excavation by hand	m ³	10		
61.03	Access and drainage:				
	(a) Access	L/Sum	1		
61.04	Backfill to excavations utilising:				
	(a) Material from the excavation	m ³	580		
	(b) Imported material	m ³	10		
61.05	Fill within a restricted area (extra over item 33.01)	m ³	650		
61.06	Overhaul in excess of 1,0 km on excavated material and on material imported for backfill, foundation fill and fill for caissons	m ³ -km	15 000		
61.07	Overbreak in excavation in hard material	m ²	20		
61.08	Foundation fill consisting of:				
	(a) Rock fill	m ³	900		
	(c) Compacted granular material	m ³	320		
	(d) Mass concrete Class 15/38	m ³	5		
	(e) Concrete screed class 15/19, 75mm thickness	m ³	60		
B61.51	Lateral support to excavations				
	(a) Foundation excavation				
	(i) 0 to 5m depth	L/Sum	1		
Total Carried Forward					

SCHEDULE 3B: CULVERT 2 AT KM 3.720

SECTION 6100					
Number	Item Description	Unit	Quantity	Rate	Amount R
Brought Forward					
B61.52	Foundation lining				
	(a) Rock grid PC 100/100 geofabric to rockfill as per detail	m²	2 100		
Total Carried Forward To Summary					

SCHEDULE 3B: CULVERT 2 AT KM 3.720

					SECTION 6200
Number	Item Description	Unit	Quantity	Rate	Amount R
B6200	FALSEWORK, FORMWORK AND CONCRETE FINISH				
62.02	Vertical formwork to provide				
	a) Class F1 surface finish to:				
	(i) Barrel footing	m²	70		
	(ii) Barrel walls	m²	160		
	(iii) Apron slabs and cut off wall	m²	160		
	(iv) Wing wall footings	m²	45		
	(v) Wing walls	m²	110		
	b) Class F2 surface finish to:				
	(i) Barrel walls	m²	710		
	(ii) Headwalls	m²	75		
	(iii) Wingwalls	m²	120		
62.03	Horizontal formwork to provide				
	a) Class F2 surface finish to:				
	(i) Deck	m²	220		
B62.04	Inclined formwork to provide				
	a) Class F2 surface finish to:				
	(i) Barrel walls haunches	m²	90		
Total Carried Forward To Summary					

SCHEDULE 3B: CULVERT 2 AT KM 3.720

SECTION 6300

Number	Item Description	Unit	Quantity	Rate	Amount R
B6300	STEEL REINFORCEMENT FOR STRUCTURES				
63.01	Steel reinforcement for:				
	(a) Barrel foundation, walls and deck				
	(1) Mild steel bars	t	0.4		
	(2) High yield stress steel bars	t	50		
	(b) Wingwall footings and walls				
	(1) Mild steel bars	t	0.1		
	(2) High yield stress steel bars	t	8		
	(c) Apron slab and cut off walls				
	(2) High yield stress steel bars	t	1.1		
	(3) Welded steel fabric	kg	2 200		
Total Carried Forward To Summary					

SCHEDULE 3B: CULVERT 2 AT KM 3.720

					SECTION 6400
Number	Item Description	Unit	Quantity	Rate	Amount R
B6400	CONCRETE FOR STRUCTURES				
B64.01	Cast in situ concrete:				
	(a) Durability Concrete				
	(i) Barrel foundation, walls and deck (W30/20)	m³	370		
	(ii) Wingwall footings and walls (W30/20)	m³	80		
	(iii) Apron slab and cut off walls (W30/20)	m³	75		
B64.02	Manufacturing precast concrete members (Mounting block for Culvert number complete as shown on drawings)	No	2		
64.03	Transporting and erecting precast concrete members (Mounting block for Culvert number complete as shown on drawings)	No	2		
B64.06	Demolishing existing concrete				
	b) Reinforced concrete in:				
	(i) Existing drainage structure	m³	40		
B64.07	Curing of Concrete				
	a) Curing membranes (vertical faces)				
	(i) Barrel walls	m²	900		
	(ii) Head walls	m²	75		
	(iii) Wing walls	m²	230		
	b) Moisture curing (horizontal faces/top surface)				
	(i) Barrel base	m²	350		
	(ii) Barrel deck	m²	350		
	(iii) Apron slab	m²	350		
	(iv) Wing wall footings	m²	90		
B64.08	Hot weather concreting	L/Sum	1		
Total Carried Forward To Summary					

SCHEDULE 3B: CULVERT 2 AT KM 3.720

SECTION 6600

Number	Item Description	Unit	Quantity	Rate	Amount R
B6600	NO-FINES CONCRETE, JOINTS, BEARINGS, BOLT GROUPS FOR ELECTRIFICATION, PARAPETS AND DRAINAGE FOR STRUCTURES				
B66.06	Filled joints:				
	(b) Joint Type:				
	(i) J1 complete as shown on drawings	m	60		
	(ii) J2 complete as shown on drawings	m	60		
	(iii) J3 complete as shown on drawings	m	100		
	(iv) J4 complete as shown on drawings	m	130		
	(v) J8 complete as shown on drawings	m	35		
	(vi) J9 complete as shown on drawings	m	20		
	(vii) J12 complete as shown on drawings	m	25		
	(viii) J13 complete as shown on drawings	m	16		
66.08	Sealing joints with:				
	(a) Sealant :				
	(i) 10mm x 10mm Silicon sealant	m	525		
	(ii) 15mm Deep x 15mm Silicon sealant	m	20		
66.14	Dowels/Guides				
	(a) R20 galvanised steel dowels, 1600mm long with one half encased in uPVC pipewith ends closed with petrolatum tape	No	95		
	(b) R16 galvanised steel dowels, 1200mm long with one half encased in uPVC pipewith ends closed with petrolatum tape	No	95		
	(c) R16 galvanised steel dowels, 400mm long with one half encased in uPVC pipewith ends closed with petrolatum tape	No	210		
66.18	Numbers for structures:				
	(a) Number plates	No	4		
66.19	Drainage pipes and weepholes:				
	(b) Weep holes:				
	(2) 50mm dia. uPVC pipes in Barrel walls and wingwalls	No	30		
Total Carried Forward					

SCHEDULE 3B: CULVERT 2 AT KM 3.720

					SECTION 6600
Number	Item Description	Unit	Quantity	Rate	Amount R
Brought Forward					
B66.28	Drainage strips	m	310		
B66.29	Perforated drainage pipes, 65mm internal diameter with 70% perforated / open area, HDPE with 5mm wall thickness, wrapped in Grade 2 filter-fabric	m	60		
B66.31	Additional water tests for joints ordered by the engineer	No	1		
Total Carried Forward To Summary					

SCHEDULE 3B: CULVERT 2 AT KM 3.720

					SECTION 6700
Number	Item Description	Unit	Quantity	Rate	Amount R
6700	STRUCTURAL STEELWORK				
67.01	Structural steel:				
	(c) Guardrail posts as per detail on the drawings	No	30		
67.02	Anchor bolts:				
	(b) M20 adhesive grade 8.8, galvanized	No	105		
67.03	Corrosion protection:				
	(b) Hot-dip galvanizing:				
	(iii) Minimum 200 micron thickness zinc coating to guardrail posts	No	30		
Total Carried Forward To Summary					

SCHEDULE 3B: CULVERT 2 AT KM 3.720

SUMMARY OF SECTIONS					
Section	Description				Amount R
6100	FOUNDATIONS FOR STRUCTURES				
6200	FALSEWORK, FORMWORK AND CONCRETE FINISH				
6300	STEEL REINFORCEMENT FOR STRUCTURES				
6400	CONCRETE FOR STRUCTURES				
6600	NO-FINES CONCRETE, JOINTS, BEARINGS, PARAPETS AND DRAINAGE FOR STRUCTURES				
6700	STRUCTURAL STEELWORK				

SUMMARY OF SCHEDULES		
SCHEDULE	DESCRIPTION	Amount R
1	SCHEDULE 1: GENERAL	R
2	SCHEDULE 2: ROADWORKS	R
3A	SCHEDULE 3A: CULVERT 1 AT KM 0.834	R
3B	SCHEDULE 3B: CULVERT 2 AT KM 3.720	R
SUB-TOTAL (1) FOR SCHEDULES		R
CONTINGENCIES (10%)		R
CONTRACT PRICE ADJUSTMENT (5%)		R
SUB-TOTAL (2)		R
VALUE-ADDED TAX (VAT)		R
TENDER SUM CARRIED TO FORM OF TENDER		R

THE CONTRACT

PART C3 SCOPE OF WORKS

PART C4 SITE INFORMATION

PART C3: SCOPE OF WORK

C3.1 DESCRIPTION OF WORKS.....C.109

C3.2 ENGINEERING.....C.115

C3.3 PROCUREMENT POLICY.....C.116

C3.4 CONSTRUCTION C.122

C3.5 MANAGEMENT C.353

C3.1 DESCRIPTION OF WORKS

C3.1.1 Employer's Objectives

The primary objective of the project is to upgrade Mapate Access road between Tshisahulu and Mapate from gravel to surfaced standards. The project aims to improve the level of service of the route joining the two communities whilst also providing the capacity for future development in the area.

C3.1.2 Overview and Location of Works

The project is located in the town of Thohoyandou in the Vhembe District Municipality of the Limpopo Province. Mapate access road is situated between Tshisaulu and Mapate in the Thulamela Local Municipality. The project begins at the Mohlahla Road intersection and traverses westwardly crossing two streams and ends in the town of Mapate. The total project length, including the intersecting side road bellmouths is approximately 6.5km long.

C3.1.3 Extent of Works

The project comprises the construction and upgrade of approximately 6.5km of Mapate Access road and associated stormwater infrastructure:

Roadworks

- Accommodation of traffic during construction;
- Clearing and Grubbing of Road Reserve;
- Earthworks comprising cut & borrow to fill & Construction of temporary bypasses where required;
- Construction of pavement layers:
 - Road Bed
 - Selected Layer/s
 - Stabilised Subbase
 - Crushed Stone Base
- Construction of an appropriate surfacing (as specified):
 - Surfacing using a 30mm Asphalt;
 - 20mm Cape Seal and
 - Segmented Block Paving
- Construction of surfaced and gravel sidewalks
- Construction of concrete lined and unlined side drains
- Stone pitching and Protection against erosion
- Construction of sub soil drains
- Construction of concrete kerbing/ edge beams at accesses;
- Construction of stormwater pipes, 450mm, 600 mm & 900 mm with inlet & outlet structures;
- Erection of road signs;
- Erection of fencing;
- Installation of guard rails;
- Provision of road markings;
- Provision of traffic calming measures;
- Finishing of the road and road reserve.

Structures

Two new major culverts will be constructed on the Dzindi River at km 0.84 and km 3.72 both consisting of 7 portals of 3.4 m wide x 3.9 m high, which will replace the existing low level causeways which will be demolished after the new major culverts have been constructed.

River training will be required at both new major culverts to control, direct and manage the river flow.

Widening of Servitude

- Communication and negotiation with residents - this will be done together with the Public Participation Unit of TLM and Project Steering Committee;
- Removal of obstructions (fencing; small structures; etc.);
- Replace fences in new position and finish off.

C3.1.4 Location of the Works

The following details provide the key elements of the project area.

- Municipal Area: Thulamela Local Municipality
- Central Co-ordinates:
 - **Start:** **23° 00'18.88"S** **30°24'12.52"E**
 - **End:** **22°59'12.79"S** **30°21'20.36"E**

C3.1.5 Temporary Works

Temporary deviations will comprise:

- Sections of existing side roads used as temporary deviations;
- Sections of existing road where realignment of the road is required;
- Sections of new temporary bypass roads to accommodate traffic where required.

The contractor is to program the works in order to optimize for the reuse of all material utilized to construct temporary works in order to minimize the quantity of material to be spoilt upon completion of the works requiring the bypass.

C3.1.6 Existing Services

During the visual assessment of the road, an extensive number of services were identified, and these will require to be protected or relocated. Some of the services that have been identified include but are not limited to:

- Electrical overhead and underground cables along the streets;
- Telkom overhead cables;
- Water Reticulation and Bulk line
- Electrical poles and streetlights in all road reserves;
- Cables and pipelines at road crossings; and

The exact location of some services is not known, and the Contractor will always be required to be in contact with the relevant service owners/providers. The positions and relocations of services shown on the drawings are based on the information available at the time and the Contractor is required to exercise extreme caution in his construction activities until the exact positions of all services have been established.

C3.1.7 Access

Furthermore, this Contract requires that the Contractor ensures that all residents have access to their properties after hours and on weekends; all businesses are to have access during business hours. The Contractor is to implement temporary measures/deviations as required in order to achieve this outcome. Prior to the implementation of any deviation, written permission for such deviations shall be obtained from the Employer's Agent.

The Contractor shall advise all residents, community leaders and other stakeholders at least 2 weeks prior to the commencement of construction activities in an area. The Contractor is to employ a Community Liaison Officer in conjunction with the community structures in the area in order to achieve this outcome.

The construction camp and works area must be watered during dry and windy conditions to control dust fallout. Dust production must be controlled by regular watering of roads and the works area. Contractors are to ensure that dust production at the site camp as well as the works area is controlled during working hours as well as during weekends.

C3.1.8 Accommodation of Traffic

The Contractor shall ensure the safe accommodation of traffic at all areas where the work may impact traffic and shall provide all delineators, watching, lighting, signs and barricades required by the road authorities, and in accordance with the South African Road Traffic Signs Manual.

C3.1.9 Planning / Programming Conditions

The Contractor must consider with the programming of the works the following conditions:

- All traffic accommodation requirements.
- After exposing existing services for pipe trenches and/or kerb-inlets/manholes the position, size and levels of interfering services must be provided to the Engineer.
- A maximum of 5 days need to be allowed in case design changes are required for the installation of new services.

C3.1.10 General Information

C3.1.10.1 Drawings

The reduced drawings contained in book 2 of 2 that form part of the tender document shall be used for tender purposes only. Further drawings are to be provided on an on-going basis by the engineer.

The contractor will be supplied with an unreduced 0,05 mm thick transparent polyester print of each of the drawings. These polyester prints are issued free of charge and the contractor shall make any additional prints he may require at his own cost.

Any information in the possession of the contractor, which the resident engineer requires to complete the as-built drawings, shall be supplied to the resident engineer before a certificate of completion will be issued.

Only figured dimensions shall be used and drawings shall not be scaled unless so instructed by the engineer. The engineer will supply all figured dimensions omitted from the drawings.

C3.1.10.2 Power, Water Supply and Other Services

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

C3.1.10.3 Contractor's Camp Site and Security

The contractor shall make his own arrangements regarding the establishment of a camp site and housing for his construction personnel and all regulations stipulated by the local authority shall be adhered to.

It is anticipated that the contractor's choice of a camp site will be influenced by the availability of telephone and electrical connections as well as the supply of potable water. Provision is made in these specifications for the erection of a security fence around the site offices. The contractor shall be responsible for the security of his personnel and constructional plant on and around the site of the works and for the security of his camp, and the employer will consider no claims in this regard.

C3.1.10.4 Additional Requirements for Construction Activities

C3.1.10.4.1 The contractor may not commence constructional activities before adequate provision has been made to accommodate traffic in accordance with the requirements of this document and the South African Road Traffic Signs Manual.

C3.1.10.4.2 The contractor shall submit proposals in connection with directional signs to the engineer for approval.

C3.1.10.5 Programme Requirements for Construction Activities

The contractor shall programme his activities to be suitable in terms of his resources to complete the contract inside the stipulated time period.

C3.1.10.6 Construction in Confined Areas

It may be necessary for the contractor to work in confined areas. In certain areas the width of the fill material and pavement layers may reduce to zero and the working space may be confined. The method of construction in these confined areas depends on the contractor's construction plant. However, the contractor must note that measurement and payment will be in accordance with the specified cross-sections and dimensions, irrespective of the method used to achieve these cross-sections and dimensions, and that the rates and amounts tendered will be deemed to include full compensation for any special equipment or construction methods or for any difficulty encountered in working in confined areas and narrow widths, and at or around obstructions, and that no extra payment will be made nor will any claim for payment be considered on account of these difficulties.

C3.1.11 Labour Regulations

C3.1.11.1 EPWP Requirements

Labour-intensive works shall be constructed/maintained using local workers who are temporarily employed in terms of this Scope of Work

Competencies of LI Management and Supervisory staff

Contractors shall engage supervisory and management staff in labour-intensive works that have completed the skills programme including Foremen/Supervisors at NQF "National Certificate: Supervision of Civil Engineering Construction Processes" and Site Agent/Manager at NQF level 4 "Manage labour-intensive Construction Processes" or equivalent QCTO qualifications.

Wage Dispute (Contractor default to pay beneficiaries)

Any dispute between the Contractor and labourers, regarding delayed payment or default in payment of fair wages, if not resolved immediately may compel the Employer to intervene.

The Employer may, upon the Contractor defaulting payment, pay the moneys due to the workers not honoured in time, out of any moneys due or which may become due to the Contractor under the Contract.

Provision of Hand tools

The Contractor shall provide his labour force with hand tools of adequate quality, sufficient in numbers and make the necessary provisions to maintain the tools in good and safe working conditions

Reporting Requirements

The Contractor should submit the following at the beginning of the Contract:

- (a) Contracts of all the workers employed on the contracts including their

certified identity documents;

- (b) Proof of Registration for COIDA and UIF;
- (c) OHS Files

The Contractor shall submit monthly returns/reports as specified below:

- (a) Signed Muster rolls/pay sheets of temporary workers and permanent staff detailing the number, category, gender, rate of pay and daily attendance.
- (b) Copies of certified identity documents of workers
- (c) Number of persons who have attended training including nature and duration of training provided
- (d) Assets created, rehabilitated or maintained in accordance with indicators in the EPWP M&E framework
- (e) Plant utilization returns
- (f) Progress report detailing production output compared to the programme of works

C3.1.11.2 Payment for the labour-intensive component of the works

Payment for works identified in clause 2.3 “the Extent of the Project” in the Project Specifications as being labour-intensive shall only be made in accordance with the provisions of the Contract if the works are constructed strictly in accordance with the provisions of the scope of work. Any non-payment for such works shall not relieve the Contractor in any way from his obligations either in contract or in delict.

C3.1.11.3 Applicable labour laws

Ministerial determination 4:

1. Special Public Works Programs Government Gazette no. 34310-3 of 4 May 2012.
2. Code of Good Practice for Employment and Conditions of works of Expanded Public Works Programs – Government Gazette no. 34032 of 18 February 2011.

C3.2 ENGINEERING

C3.2.1 Design

- (a) The **Employer** is responsible for the design of the permanent Works as reflected in these Contract Documents unless otherwise stated.
- (b) The **Contractor** is responsible for the design of the temporary Works and their compatibility with the permanent Works.
- (c) The **Contractor** shall supply all details necessary to assist the engineer in the compilation of the as-built drawings.

C3.2.2 Employer's Design

- (a) Detail description of Works
- (b) General Works
- (c) Sign Gantries. E.g.

C3.2.3 Contractor's Design

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

C3.2.4 Design procedures

All designs and modifications thereto shall be communicated in writing and the contractor and engineer shall maintain master lists to record and track all transactions.

C3.3 PROCUREMENT POLICY

C3.3.1 REQUIREMENTS

The Contractor shall be required to adopt labour-based techniques through the full spectrum of the works with the proviso that the Clients' specific objectives regarding time and quality are not compromised. **Maximisation of employment** shall be of the essence on this contract.

Together with their tenders, all Tenderers are required to submit a comprehensive **implementation plan** clearly stating the labour content and number of jobs that shall be created. The employment of labour shall be reflected in a programme in sufficient details to enable the Project Manager to monitor and compare it with the implementation plan. The Contractor shall be required to submit employment data on a monthly basis to the Project Manager.

The Contractor and all sub-contractors will be required to pay labour rates which are in accordance with SAFCEC rates for the civil construction industry for unskilled workers.

Should the contractor, at Works Completion, be in default by non-attainment of the abovementioned labour-intensive targets, the Employer shall have the right to, without prejudice of any other rights, apply a penalty of not exceeding 5% of the contract sum.

Tenderers are to also note that it is an explicit condition of this tender that all unskilled labourers on the project are to be employed from the local community. The Contractor shall in general, maximise the involvement of the local community.

C3.3.2 SUBCONTRACTING – SPECIAL CONDITIONS OF CONTRACT

Participation and Advancement of Start-Up, Small and Micro Enterprises

The Municipality has identified job creation and access to procurement opportunities by Start-ups, Small and Micro Enterprises (QSE / EMEs) as an essential requirement towards building an economically viable Municipality. In this regard the following definitions are applicable:

“Start-up Enterprises” means an enterprise that has been in existence and operating for less than two years.

“Micro Enterprises” means an enterprise that has a CIDB grading designation of or 2.

“Small Enterprises” means an enterprise that has a CIDB grading designation of 3.

“Locally based QSE / EMEs” means enterprises that have their operational base in the ward in which the project is to be executed or, alternatively, the members of the enterprise are resident in the particular ward. Should suitable locally based QSE / EME Contractors as defined above not be available in the particular ward, then they shall be sourced from adjacent wards.

The successful contractor is expected to subcontract work which can be executed by local sub-contractors. If it is established that the QSE / EMEs are sufficiently resourced to execute the proposed works as a complete package the Contractor may conclude full sub-contract agreements with locally based QSE / EMEs as per their capabilities with proven track record and availability of the activities which they could execute.

The following activities are intended to be carried out by QSE / EME's:

- Section 1600: Overhaul
- Section 2300: Concrete Kerbing and Channelling
- Section 5100: Pitching, Stonework and Protection Against Erosion
- Section 5200: Gabions
- Section 5400: Guardrails
- Section 5500: Fencing
- Section 5600: Road Signs
- Section 5700: Road Markings

It is a condition of this tender that the successful Contractor is required to take full responsibility for managing all appointed sub-contractors and the quality of their works. The Contractor will be expected to pay QSE / EMEs full rates as submitted by the Contractor to the Municipality.

Above this, it is a condition of this contract that should the contractor fail to pay the QSE / EME's with no valid reason/s, the Municipality reserves the right to pay the QSE/ EME's directly and deduct same from any amount paid to the contractor.

The form of contract to be used with QSE / EMEs is the GCC sub-contract agreement. The Contract Data must record the specific requirements in respect of

penalties, retention and payment. With regard to the latter, the Contractor is to allow for fortnightly certificates from the QSE / EMEs and for payment to the QSE / EMEs to be effected within 7 days of certification.

In order to achieve the goals of this policy and to ensure that the QSE / EMEs are treated fairly and given every opportunity to advance their business whilst delivering a successful project, the Contractor is to note the following and provide for any cost that may be associated therewith:

1. If appropriate, the QSE / EME bill of quantities is to provide for market related P&G items in order that the QSE / EME may be compensated for any unforeseen delays or events that impact on his ability to complete his works. **It is to be specifically noted that the rates for items of work to be executed by QSE / EME's must be market related. Tenderers are to ensure that rates tendered for this portion of the works is to take into account all items that the main contractor would have allowed for in his normal course of pricing, i.e. materials, labour, wastage, profit, attendance, etc. all at applicable productivity rates.**
2. The Contractor will be expected to have clearly specified the programme dates to the QSE / EME Contractors and these dates are to be included in the contract of agreement between the two parties. The Managing Contractor is to monitor the QSE / EME Contractor's progress against the programme and hold progress meetings with the QSE / EME Contractors where minutes are to be kept and signed off by both parties.
3. The Contractor is to assess the skills of the QSE / EME Contractor and provide the relevant support and training where it is necessary in order for the QSE / EME Contractor to complete the works to programme, budget and specification. The Managing Contractor will be expected to provide on site training to the QSE / EME Contractors that will ensure that the QSE / EME Contractor's staff is suitably trained to execute the works and that they receive sufficient relevant experience on the project.
4. The Contractor is responsible for safety compliance on the project and will assist the QSE / EME Contractors in all aspects to achieve safety compliance, that will include:
 - a) Assisting the QSE / EME Contractors with developing their safety files, legal appointments, etc
 - b) Assisting the QSE / EME Contractors with achieving safety on site.
 - c) Having tool box talks with the QSE / EME Contractor's employees on a daily basis.
 - d) Providing all safety equipment and signage.

- e) Providing safety training where necessary.
- 5. The Contractor is to provide all the necessary equipment for the timeous monitoring and the checking of the quality of works as carried out by the QSE / EME Contractors. The Managing Contractor will be expected to monitor the QSE / EME Contractor's works for quality compliance and provide all the necessary support to the QSE / EME Contractors in order to achieve quality requirements. The Managing Contractor is to ensure that if the QSE / EME Contractor's quality of works does not achieve specification the Managing Contractor will assist the QSE / EME Contractors to achieve specification and not allow the works to continue until the quality requirements are achieved.
- 6. The Main Contractor is to generate monthly reports for the Municipality that includes the following:
 - a) QSE / EME Contractor resources on the site, i.e. supervisors, labour, plant tools and equipment
 - b) QSE / EME Contractor progress of works on site.
 - c) QSE / EME Contractor quality control on site.
 - d) QSE / EME Contractor expenditure on the project versus target expenditure.
 - e) Copies of minutes of the QSE / EME Contractor and Managing Contractor progress meetings. Concerns and improvements to be made.

The tenderers are to price the works to achieve full compliance with the above requirements. Failure of the Contractor to achieve these requirements may result in the Municipality enforcing compliance by appointing 3rd parties if necessary to assist and deducting all reasonable costs for achieving compliance from money due to the Contractor.

Following from the above, the QSE / EME's to be contracted on the project must be selected from the provided database which will be given to the successful bidder. The database will include QSE / EME that are youth, women owned, disabled and ex-combatants. The Contractor will be expected to give preference to QSE / EME's that comply with all/most of these groups. The following information must be provided by said Contractor within 14 days of the commencement date of the contract.

- 7. Detailed approach and methodology on the employment of local QSE / EME's, including:
 - a. QSE / EME/s company name/s to be employed on the project;
 - b. QSE / EME contact persons;
 - c. Works to be executed by QSE / EME/s;
 - d. Programme (anticipated start, duration and end dates) applicable to the works defined in item above;

- e. Estimated value of the works identified in item C3.3.2 above.
8. A detailed breakdown of tendered rates for QSE / EME activities, including:
 - a. Labour portion of the activity;
 - b. Equipment portion of the activity;
 - c. Materials portion of the activity;
 - d. Planned percentage of profit.

The Tenderers are to price the works to achieve full compliance with the above requirements. Tenderers are to ensure that they allocate a dedicated individual to manage the QSE / EME's and fulfil the requirements stated above.

The QSE / EME supervisor will be required to conclude a scorecard with the Municipality. The scorecard will encompass four key performance areas and several key performance indicators as outlined overleaf. The QSE / EME supervisor will be required to score a minimum of 80%. The scorecard review will take place monthly.

Key Performance Areas	Key Performance Indicators
1) Safety	a) Be familiar with and ensures QSE / EME Contractor enforces the safety specs and relevant OHSA b) Reporting of incidents and accidents • Ensures QSE / EME Contractor Reports incidents and accidents to the Contractor on the day they occur
2) Quality Control	a) Setting out of the Works • Ensures that the Works have been set-out correctly prior to construction commencing b) Monitoring of Construction • Examine the Works daily and pre-empt unnecessary work by the QSE / EME Contractor by warning him of incorrect workmanship as soon as it is identified. c) Approval of the Works • Assist QSE / EME Contractor in the works approval process. d) Read Drawings • Assist QSE / EME Contractor in reading and interpreting construction drawings
3) Financial	a) Daily Costing b) Ensures that QSE / EME Contractors do daily costing c) Variances to Scope • Assist QSE / EME Contractors identify and claim for additional works d) Standing Time Costs

	Assist QSE / EME Contractors compute and Claim standing time costs
4) Site Administration and Progress Monitoring	a) Communication - Ensures that QSE / EME Contractors communicate with the Contractor in writing on site related issues b) Reporting - Ensures that the Main Contractor's progress report is communicated with the QSE / EME Contractors and that contingency plans are followed through c) Site diary - Ensures QSE / EME Contractors maintain a site diary d) Claims - Assist QSE / EME Contractors draft claims for Extension of Time where applicable e) Quantities - Assist QSE / EME Contractors in the measurement of the works

The Municipality reserves the right to withdraw its acceptance of the offer, should the appointed contractor fail to satisfactorily address the above requirements within 14 days of the commencement date of the contract. Approved documentation will form part of the contract. Failure of the Contractor to achieve the requirements set-out in this tender document during construction may result in the Municipality enforcing compliance by appointing 3rd parties if necessary to assist and deducting all reasonable costs for achieving compliance from money due to the Contractor.

Should the contractor, at Practical Completion, be in default by non-attainment of the above-mentioned labour intensive targets and QSE / EME requirements, the Employer shall have the right to, without prejudice of any other rights, apply a penalty not exceeding 5% of the contract sum.

C3.3.3 RESOURCE STANDARD PERTAINING TO TARGETED PROCUREMENT

The Resource Specification is for SANS 1914-4: Participation of targeted enterprises and targeted labour (local resources). Targeted enterprises and targeted labour groups will be identified by the Community Liaison Officer, in consultation with the local Ward Councillor.

C3.4 CONSTRUCTION

C3.4.1 STANDARD SPECIFICATIONS

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

The tenderer shall obtain / purchase it from the South African Institution of Civil Engineering (SAICE), Private Bag X200, Halfway House 1685, Tel: (011) 805 5947, Fax: (011) 805 5971, e-mail: civilinfo@saice.org.za. This document may also be inspected, by appointment, at the offices of the employer and the consulting engineers during normal office hours.

C3.4.2 PROJECT SPECIFICATIONS RELATING TO STANDARD SPECIFICATIONS

Amendments to the standard specifications are included in this Part B: Project Specifications referring to the Standard Specifications.

- (i) The project specifications form an integral part of the contract documents and supplement the standard specifications.
- (ii) In the event of any discrepancy between the project specifications and a part of the standard specifications, the bill of quantities, or the drawings with regard to the scope or quality of the works, the project specifications shall take precedence.
- (iii) The standard specifications, which form part of this contract, have been written to cover all phases of work normally required for road contracts, and they may therefore cover items not applicable to this particular contract.

In certain clauses the standard specifications allow a choice to be specified in the project specifications between alternative materials or methods of construction and for additional requirements to be specified to suit a particular contract. Details of such alternatives or additional requirements applicable to this contract are contained in this part of the project specifications. It also contains some additional specifications required for this particular contract.

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

SECTION 1100: 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 (GCC 2015) published by the South African Institute of Civil Engineering, together with the special conditions of contract forming part of the contract.

UPGRADING OF MAPATE ACCESS ROAD

All general conditions of contract 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
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)	1300-1	53	Variations exceeding 20%	6.11	Variations exceeding 15%
1303(iii)	1300-2	53	Variations exceeding 20%		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
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	Employer's Agent's decisions, with reference to materials classification	3.2	Employer's Agent's decisions, with reference to materials classification

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
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

- Add the following new clauses:

“B1156 OTHER DEFINITIONS

The COLTO Standard Specification for Roads and Bridges has been written for all contractors, Employers and Employer’s Agents. Similarly, the works and the site are not defined and the general nature of the entities and elements that collectively constitute construction under a contract are characterized by the use of lower case letters throughout.

These project specifications continue to use lowercase spellings in order to avoid the appearance of the upper case and lower-case words to describe or prescribe the same elements of work required on this project. However, for the purposes of this contract the following definitions shall apply:

- Contractor:** The Contractor and the contractor is the same persona defined under clause 1.1.1.9 of the general conditions of contract, but who will only be formally identified by the completed form of Acceptance C1.1.2 in this document and which will be bound into the final contract document.
- Employer:** The Employer and employer is the same persona, and is defined in C1.2.3 Contract Specific Data, and clause 1.1.1.15 of the general conditions of contract.
- Employer’s Agent:** The Employer’s Agent and engineer is the same persona, and is defined in the C1.2.3 Contract Specific Data, and clause 1.1.1.16 of the general conditions of contract.
- Schedule of quantities:** The terms “Schedule of Quantities”, (used throughout the standard specifications) and “Bill of Quantities”, (used in all other documents forming part of this contract), are synonymous.
- Specifications:** All specifications forming part of the contract whether they appear in the standard specifications, the project specifications or on the drawings, or any other specifications referred to in the said specifications, or be they written instructions given to the contractor.
- Standard specifications:** The standard specifications for road and bridge works prescribed by the employer and forming part of the contract.

B1157 PROCESS CONTROL

Process controls is the responsibility of the contractor and refers to all testing requirements to be executed during the Works to ensure that the completed permanent works comply with the specifications and drawings prior to proceeding with the following task or activity.

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 AGGREGATE SIZE

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

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

B1160 COMPACTION

The standard for compaction efforts 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 compaction or of 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.

B1161 SANS BITUMEN SPECIFICATIONS

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

- SANS 4001-BT1:2016 - 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

On this contract where a SANS specification exists, all products shall conform to the specification and shall bear the inspection seal or brand mark of the SABS (South African Bureau of Standards)."

C3.4.2.4 Project Specifications Relating to EPWP

EPWP Special Project Specification

As much as is economically feasible all work shall be implemented by employing Labour Intensive Construction methods. Over and above the normal Building and Allied works to be implemented by employing skilled and unskilled labour the works specified in the “Guidelines for the Implementation of Labour-Intensive Infrastructure Projects under the Expanded Public Works Programme (EPWP)” shall be undertaken using Labour Intensive Construction methods

Requirement for Sourcing and engagement of Labour

Unskilled and semi-skilled labour required for the execution of all labour intensive works shall be engaged strictly in accordance with prevailing legislation and SANS 1914-5, Participation of Targeted Labour.

The minimum rate of pay set for the EPWP is as per the DPW rates.

Tasks established by the contractor must be such that:

- a) the average worker completes 5 tasks per week in 40 hours or less; and
- b) the weakest worker completes 5 tasks per week in 55 hours or less.
- (d) The contractor must revise the time taken to complete a task whenever it is established that the time taken to complete a weekly task is not within the requirements of 1.1.3.
- (e) The Contractor shall, through all available community structures, inform the local community of the labour intensive works and the employment opportunities presented thereby. Preference must be given to people with previous practical experience in construction and / or who come from households:
 - a) where the head of the household has less than a primary school education;
 - b) that have less than one full time person earning an income;
 - c) where subsistence agriculture is the source of income.
 - d) those who are not in receipt of any social security pension income

Employment demographics

The Contractor shall ensure that the expenditure on the employment of temporary workers is in the following proportions:

- a) 60 % women;

- b) 55% youth who are between the ages of 18 and 35; and
- c) 2% on persons with disabilities.

SECTION 1200 : GENERAL REQUIREMENTS AND PROVISIONS

B1202 SERVICES

Add the following:

"Prior to commencing with the Works, as instructed by the employers agent, the contractor shall confer with all authorities and departments concerned and obtain the necessary permissions required for work over, under, adjacent to or near both overhead and underground services affected by the works and shall satisfy himself that he has obtained all the relevant information required to complete the contract. The contractor shall carry out the works with the minimum interference to existing services. He shall co-operate with all authorities and departments concerned and he shall be solely responsible for carrying out the following operations and checks:

- (i) He shall inform all relevant service owners, authorities and departments in writing and in good time before the correct stage of the construction is reached for the laying and/or relaying of any particular services.
- (ii) He shall set out the lines and levels of kerbs, pipes, culverts and any other necessary features of the contract in order that authorities and departments are able to lay and/or relay services correctly.

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

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

TABLE B1202/1: LIST OF KNOWN SERVICES

Distance (m)		Length (m)	Location	Type	Action	Comment
From	To					
60	115	55	LHS	Eskom Overhead Line	To be relocated	From Pole at km 0.060
115	115	0	Crossing	Eskom Overhead Line	Lift Cable	As per Eskom requirement clearance
115	240	125	LHS	Eskom Overhead Line	No Action	As per Eskom requirement clearance
240	240	0	Crossing	Eskom Overhead Line	Lift Cable	As per Eskom requirement clearance
240	360	120	LHS	Eskom Overhead Line	No Action	
360	380	20	LHS	Eskom Overhead Line	Check Clearance	To be confirmed by contractor prior the start of construction
360	380	20	RHS	Eskom Overhead Line	Check Clearance	To be confirmed by contractor prior the start of construction
360	360	0	Crossing	Eskom Overhead Line	Check Clearance	To be confirmed by contractor prior the start of construction

UPGRADING OF MAPATE ACCESS ROAD

Distance (m)		Length (m)	Location	Type	Action	Comment
380	380	0	Crossing	Eskom Overhead Line	Check Clearance	To be confirmed by contractor prior the start of construction
380	480	100	LHS	Eskom Overhead Line	No Action	
2000	2320	320	LHS	Eskom Overhead Line	No Action	
2320	2320	0	Crossing	Eskom Overhead Line	Check Clearance	To be confirmed by contractor prior the start of construction
2320	2570	250	RHS	Eskom Overhead Line	To be relocated	Relocate Pole at km 2.570
2570	2840	270	RHS	Eskom Overhead Line	To be relocated	Relocate Pole at km 2.640
2820	2820	0	Crossing	Eskom Overhead Line	Check Clearance	To be confirmed by contractor prior the start of construction
2840	2840	0	Crossing	Eskom Overhead Line	Check Clearance	To be confirmed by contractor prior the start of construction
4300	4485	185	RHS	Eskom Overhead Line	To be relocated	Relocate Pole at km 4.315
4450	4450	0	Crossing	Eskom Overhead Line	Check Clearance	To be confirmed by contractor prior the start of construction
4485	4485	0	Crossing	Eskom Overhead Line	Check Clearance	To be confirmed by contractor prior the start of construction
4695	4860	165	RHS	Eskom Overhead Line	No Action	
4890	4890	0	Crossing	Eskom Overhead Line	Check Clearance	To be confirmed by contractor prior the start of construction
4940	4940	0	Crossing	Eskom Overhead Line	Check Clearance	To be confirmed by contractor prior the start of construction
4940	5060	120	LHS	Eskom Overhead Line	Check Clearance	To be confirmed by contractor prior the start of construction
4940	4960	20	RHS	Eskom Overhead Line	No Action	
5020	5020	0	Crossing	Eskom Overhead Line	Check Clearance	To be confirmed by contractor prior the start of construction
5060	5160	100	LHS	Eskom Overhead Line	No Action	
5160	5160	0	Crossing	Eskom Overhead Line	Check Clearance	To be confirmed by contractor prior the start of construction

Distance (m)		Length (m)	Location	Type	Action	Comment
5210	5210	0	Crossing	Eskom Overhead Line	Check Clearance	To be confirmed by contractor prior the start of construction
5210	5280	70	LHS	Eskom Overhead Line	Check Clearance	To be confirmed by contractor prior the start of construction
5210	5320	110	RHS	Eskom Overhead Line	No Action	
5310	5310	0	Crossing	Eskom Overhead Line	Check Clearance	To be confirmed by contractor prior the start of construction
5330	5330	0	Crossing	Eskom Overhead Line	Check Clearance	To be confirmed by contractor prior the start of construction
5330	5695	365	RHS	Eskom Overhead Line	No Action	
5360	5360	0	Crossing	Eskom Overhead Line	Check Clearance	To be confirmed by contractor prior the start of construction
5380	5380	0	Crossing	Eskom Overhead Line	Check Clearance	To be confirmed by contractor prior the start of construction
5695	5695	0	Crossing	Eskom Overhead Line	Check Clearance	To be confirmed by contractor prior the start of construction
5695	5908	213	RHS	Eskom Overhead Line	No Action	
5908	5908	0	Crossing	Eskom Overhead Line	Check Clearance	To be confirmed by contractor prior the start of construction

(a) Protection of overhead and underground services

Services and sub-surface obstructions likely to be affected by the work, based on available records and surveys, have been detailed elsewhere in this document. Although every care has been exercised in the presentation of the available data, the employer cannot and does not vouch for the accuracy or completeness of the information shown. Whenever the contractor deems it necessary to determine the exact location of an existing service or obstruction, he shall, at his own cost, make any examination that may be considered desirable in advance of the work. The employer does not accept any liability for loss, damage or delay to the contractor as a result of the non-location or inaccurate location of services or obstructions.

Where no underground services are indicated in the documents, but the possibility of their presence can be reasonably inferred, the contractor shall in collaboration with the employer's agent, search for such services to establish their positions well in advance of the work. A full report shall then be submitted in good time to the employer's agent, to enable the necessary arrangements for the protection, removal or diversion of the services before work is commenced in their vicinity.

In the event of damage to existing services, the contractor shall take such immediate action as is necessary to prevent further damage or danger to life or property and shall immediately notify the employer's agent who will issue instructions as to the necessary repairs or protective measures to be taken. The cost thereof shall be borne by the contractor irrespective of whether the repairs or protective measures were carried out by him or by or on behalf of the service authority or department concerned.

As soon as an existing service not indicated in the document is discovered, it shall be deemed to be a known service and the contractor will be held responsible for any subsequent damage to it. If such service is damaged during the course of its discovery, the contractor will be reimbursed for the cost of making good such damage, unless it is established by the employer's agent that the contractor did not exercise reasonable diligence and care and that the damage was avoidable.

As soon as a service or portion thereof has been uncovered as part of the Works, the contractor shall be held liable for the reinstatement and costs thereof for any theft or vandalism of the service, including any portions of the service which have not been uncovered but are connected to or are part of the uncovered portion, until such time as it has been fully reinstated.

(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

Prior to the commencement of any works activities in the vicinity of all known existing services, the contractor shall inspect and examine them and submit a written report to the Employer's Agent outlining any concerns regarding the condition of such services.

Similarly, within seven days of discovery of an existing service as contemplated in (a) above, the contractor shall submit a written report to the Employer's Agent outlining any concerns regarding the condition of such additional existing service/s. In the event that the contractor fails to submit such report within the period stipulated, the condition of the existing service shall be deemed to have been acceptable.

(d) Maintenance, protection and relocation of existing services

During the course of the works, all existing services including street lighting and traffic signal poles, cables and conduits, water mains, sewers and stormwater reticulation, electricity transmission and telephone lines, cables, poles and conduits whether in service or not shall be protected, supported and maintained to the satisfaction of the service authority or department concerned and the employer's agent. The contractor shall bear all costs in this regard.

All services located by the contractor must be clearly demarcated on site.

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

(e) Work in close proximity to existing services

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

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

The contractor shall allow all reasonable access to the representatives of any authority or department for the purpose of maintaining, laying and/or relaying any services, cables or mains during the period of the contract.

Permanent alterations to existing services ordered in writing by the employer's agent, and for which no separate provision has been made in the bill of quantities, will be paid for under dayworks if required."

B1204 PROGRAMME OF WORK

(a) General requirements

Delete the first paragraph and replace with the following:

"The contractor shall submit his programme to the Employer's Agent for approval within the time stated in the contract data. The programme shall be in provided in MS Project 2007 (.mpp format) 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 Employer's 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) A work breakdown structure that identifies all major work activities, scheduled start and end dates for each activity, the linkage of activities and any dependencies (time or resource related) between them.
- (iii) The sequence of activities clearly identifying floats and critical path activities.

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- (iv) Key dates in respect of work to be carried out, information required or due delivery,
 - (v) The anticipated value of work to be done during each month,
 - (vi) The allowance for normal inclement weather, as indicated in table B1215 shall be clearly indicated and shown on the project calendar, and
 - (vii) Other information specifically required by the Employer's Agent in order for him to ascertain the suitability of the proposed programme.

In the event that the contractor wishes to submit a programme in a format other than MS Project 2007, the contractor shall provide and maintain two licenced copies of the appropriate software to the Employer's Agent for the duration of the contract. The costs of complying with this requirement will be deemed to be covered under the rates for general obligations.

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

- All special non-working days, shut-down periods and breaks defined in the contract data.
- Expected weather conditions and their effects and restrictions
- Known physical conditions and artificial obstructions.
- The design, submission and review of temporary works.
- The preparation and approval of method statements.
- The time required for training.
- The accommodation and safeguarding of public traffic.
- Dealing with, altering and installing services.
- The importation of material from commercial sources.
- Inspection, testing and specialised testing of construction equipment.
- Restrictions with regard to trafficking of repaired and treated sections of the road surface, before the application of the final surfacing.
- Temporary stockpiling and the re-use of excavated and milled materials.
- All other actions and restrictions required in terms of this contract.
- Numerous designs require inputs from the Contractor in the form of appropriate quantities of samples of commercial source materials intended for use in the various laboratory designs. The minimum time required to carry out various designs are indicated below, which the contractor shall take into account in planning his works and he shall also indicate these on his tender and construction programme as follows;
 - Supply of samples of commercial source pavement material for use in the pavement structure of the widening of ramps and lengthening of turning lanes and gravel shoulders / bellmouths **at least 6 weeks before commencement of the pavement layer works;**
 - Supply of proposed asphalt designs and current Marshall data **at least 10 weeks prior to commencement of any asphalt work;**
 - Submission of proposed concrete designs by Contractor and samples of all commercial source materials intended for use therein (if concrete is to be batched on site) **at least 4 weeks prior to commencement of any concrete work.**

- No asphalt overlay works shall be permitted when rain is forecast or during rainy period or within 24 hours following rain on site to allow drying out of the pre-treatment works.

The following details shall be submitted together with the programme:

- a) The number of working hours per day, working days per week, assumed holiday or shut down periods on which the programme is based.
- b) The overall labour and major plant resource levels on which the programme is based.
- c) The detailed traffic accommodation proposals on which the programme is based.

The contractor shall base his initial programme of work on the scope of the work as described in the project specification and the schedule of quantities. This programme shall be reviewed on a regular basis by the contractor in accordance with changing circumstances, delays and amendments to the work ordered by the Employer's Agent as a result of further examinations made by him.

Should the contractor fall more than 14 calendar days behind schedule on an activity that is included on the critical path, or should the programmed sequence of major activities not accurately reflect the actual sequence of major activities, then the Employer's Agent shall, in terms of clause 5.7.1 of the general conditions of contract, instruct the contractor to submit a revised programme for approval within seven days. Whenever an extension of time is granted in terms of the provisions of this contract, the contractor shall submit a revised programme to the Employer's Agent for approval within seven days of receiving the Employer's Agent's ruling. Notwithstanding that various other minor revisions of the programme may be submitted by the contractor during the execution of the Works, only those revisions approved based on an instruction or ruling from the Employer's Agent shall be considered to be approved programme's in terms of clause 5.6.3 of the general conditions of contract.

It should be noted that it is in the contractor's best interest to provide a comprehensive programme giving as much information as possible about the times allowed for the various activities as well as resource or other limitations affecting the programme, since the approved programme may be used to evaluate any claims in terms of the general conditions of contract for extensions of time.

The contractor shall submit to the Employer's Agent, at least two working day before each monthly site meeting copies of the following:

- d) A list of all delays to scheduled work activities over the reporting period, indicating the date and time that each delay commenced and ended and the activities directly affected by such delays;
- e) A list of the actual dates and times that all scheduled work activities either started or ended over the reporting period;
- f) A list of the actual progress on all scheduled work activities that neither started nor ended over the reporting period;
- g) Details of activities running late, indicating what steps have been or will be taken to ensure that the work is completed within the specified time.
- h) A report on all labour, plant and materials on site.
- i) The Employer's Agent shall then use this information into the approved programme software to determine actual progress of the Works to date.

B1205 WORKMANSHIP AND QUALITY CONTROL

- Add the following to the second paragraph:

"The contractor's attention is also drawn to the requirements in section 8100 for the submission to the Employer's Agent for prior approval of certain materials and mix designs accompanied by the relevant test results."

- *Replace the third paragraph with the following:*

"The intensity of control and of tests to be conducted by the contractor in terms of these obligations shall meet but, not be limited to, that specified in clause B8209 and shall be adequate to ensure that proper control is being exercised."

- *Insert the following paragraph between the third and fourth paragraph:*

"Within two weeks of the site handover, the contractor shall submit to the Employer's Agent for his approval, a detailed quality assurance plan he proposes using. The plan shall record the lines and levels of responsibility and indicate the method by which testing procedures will be conducted. The quality assurance system and the methods used to implement it shall be described in a quality plan and should replicate the applicable ISO system as far as possible. The contractor shall appoint a quality manager who shall be resident on site full time and who responsible for ensuring that members of the contractor's staff comply with the requirements of the quality plan at all times.

The system shall provide for a method statement for each construction activity for which a pay item is provided in the Pricing Schedule. Each method statement shall be submitted to the Employer's Agent for his approval two weeks prior to commencement of the activity. Where appropriate the contractor shall make use of the employer's manuals in preparing his method statements. No construction activity shall commence before the Employer's Agent has approved the contractor's quality assurance system. The quality plan shall be monitored and reviewed, and its effectiveness reported at each site meeting. Where necessary, the contractor shall amend the plan and methods to ensure that the quality of the Works is not compromised. All changes to the quality plan shall be discussed and agreed with the Employers Agent before being implemented."

- *Add the following at the end of this clause:*

"Except where otherwise specified in this document, the Employer's Agent shall, for the purpose of acceptance of materials and workmanship, assess test results and measurements in accordance with the provisions of section 8200 of the standard specifications (Quality Control Scheme 1, Judgement Plan B). Where small quantities of work are involved, a lot shall mean a full day's production for a specific item of work subject to acceptance control testing."

B1206 THE SETTING-OUT OF THE WORK AND PROTECTION OF BEACONS

- *Replace the first paragraph with the following:*

"It is a specific requirement of this contract that the contractor will have to establish his own reference and control beacons for the setting-out and control of the works. The position of the works shall generally be as indicated on the drawings but shall be confirmed on site by the Employer's Agent."

- *Add the following at the end of the fourth paragraph:*

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

- *Add the following at the end of the fifth paragraph:*

“Property beacons and trigonometrical survey beacons that have been displaced or destroyed without the consent of the Employer’s Agent, shall be replaced by a registered land surveyor, who shall certify such replacement, and the cost thereof shall be borne by the contractor.”

B1207 NOTICES, SIGNS AND ADVERTISEMENTS

Replace the second paragraph with the following:

“At each end of the works at locations determined by the Employer’s Agent, the contractor shall provide and erect contract signboards of sound, weatherproof construction, painted by an approved firm of sign writers in accordance with the details shown on the drawings.”

Delete the final paragraph and replace with the following:

“All signboards erected in accordance with the drawings or as approved advertisements for the contractor’s establishment, shall be removed at the same time as the contractor’s disestablishment. The completion certificate shall not be issued and payment under subitem 13.01(a) for the final instalment of 15% of the tendered lump sum shall not be made unless all the contract signboards, advertisements, notices and temporary signs have been removed.”

B1209 PAYMENT

(b) Rates to be inclusive

Add the following:

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

(c) The meanings of certain phrases in payment clauses

(i) Procuring and furnishing (material)

Add the following:

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

Add the following new subclauses:

“(g) Work in confined areas

Except where provided for in the specifications and the bill of quantities in the pricing data no extra payment shall be made nor shall any claim for additional payment be considered for construction in confined areas. The omission of standard pay items from the bill of quantities shall be taken to be deliberate and any additional costs incurred shall be included in the bulk rate.

(h) Rates to remain unchanged when scope of work changes

Dependent on the rates and prices offered in the bill of quantities in the pricing data, the Employer intends to increase or reduce the scope of work to match the budget allowed for this project. To this end the contractor has been provided the opportunity to price separately for unit rates of work and the establishment of major plant. The value of such increase or reduction in the scope of works shall not give cause for the contractor to vary the offered rates and prices, which shall remain final and binding for the duration of the contract, provided that:

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

(i) Trade names

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

(j) Payment certificates

With reference to clause 6.10.1 of the general conditions of contract, the contractor shall, at his own expense, submit to the Employer's Agent one set of A4-sized paper copies of the monthly statement for payment."

B1210 CERTIFICATE OF PRACTICAL COMPLETION OF THE WORKS

- *Replace subclause (a) with the following:*

- “(a) The gravel wearing course, seals, asphalt, concrete or block or brick pavement (including sidewalks, cycle paths, paved islands and barriers, rest areas, lay byes and parking areas);”

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

“(including road studs)”

- *Add the following to subclause (g) before the semicolon:*

“(including gabion structures, proprietary earth retaining structures and all stormwater and subsoil drainage culvert inlet, outlet, access, and cleaning structures and erosion protection measures)”

- *Add the following paragraphs after item (h):*

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

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

- (i) Permanent road markings completed and road studs installed.
- (ii) The works to be completed do not require traffic control measures that involve preventing two-way flow of traffic on any road affected by the Works.
- (iii) 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.
- (iv) Any information in the contractor's possession, which is required by the Employer's Agent and has been requested in writing, has been supplied.
- (v) The Regional Manager of the Department of Mineral and Energy Affairs has issued written confirmation to the contractor that they are satisfied with the final shaping to all quarries, borrow pits, stockpile areas, and spoil sites used or intended to be used under this contract. Alternatively, the contractor can provide proof that such application has been submitted in writing and in the required format to the Regional Manager of the Department of Mineral and Energy Affairs and that an independent professional, approved by the Employer's Agent, has provided written confirmation that they are satisfied with the final shaping of the quarries, borrow pits, stockpile areas and spoil sites used under this contract."

**B1214
RESERVE**

**CONTRACTOR'S ACTIVITIES IN RESPECT OF PROPERTY OUTSIDE THE ROAD
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's offices and laboratory, or storing of equipment or materials required for construction or disposal, it shall be subject to the following:"

- *and add the following 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 the employer or a succeeding contractor. The lease agreements shall also include a waiver of lien by the land owner against any material and Plant which has been bought on to Site and has vested with the Employer in terms of GCC 6.9.1, or Plant, equipment and materials bought on to site by others. No payment for materials or plant not incorporated in the Works shall be made where such plant or materials are stored on a property where such a waiver is not included in the lease.
- (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.

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

B1215 EXTENSION OF TIME RESULTING FROM ABNORMAL RAINFALL

- *In the heading of this clause replace the word “RAINFALL” with “CLIMATIC CONDITIONS”*
- *Delete the entire clause and replace with the following:*

“The contractor shall notify the Employer’s Agent in writing, of delays due to climatic conditions within 1 working day of the day on which the delay occurred. Such notice shall clearly indicate which activities were delayed as a result of the inclement weather. The Employer’s Agent shall review such notice and advise the contractor of whether the delay is accepted or rejected within seven days of receipt, failing which it will be deemed that the delay is accepted. Delays caused by climatic conditions may be considered only if the Employer’s Agent agrees that the event (and not the consequence of the event) occurred during the working hours of a working day within the contract period and resulted in less than half of the progress on an item or items of work on the critical path of the contractor’s approved programme for the period of the delay, being completed.

Normal climatic conditions shall be deemed to include normal rainfall, strong winds and extremes of temperature which create unsafe working conditions. The contractor shall make provision in the approved programme of work for an expected delay of “ n_{total} ” working days caused by normal inclement weather. The allowances for normal climatic conditions for six-day working weeks and parts of a month shall be calculated pro rata using a five-day working week and/or 22.5-day working month as the basis. In addition, the contractor shall allow and make provision in the approved programme, for an additional full working day delay over and above each day allowed for rainfall (n_{rain}) in Table B1215/1, for drying out and making good work affected by the rainfall.

A record of climatic conditions shall be kept by the contractor and recorded at site meetings and the onus will be on the contractor to claim for any extensions of time that may be due for each reporting period, in accordance with the provisions of GCC 10.1. No extension of time will be granted in respect of any delays attributed to normal climatic or normal drying out and making good wet conditions as required. The extension of time as a result of climatic conditions will be calculated monthly as being equal to the number of days certified by the Employer’s Agent as lost due to climatic conditions, less the number of days in table B1215/1 as amended where necessary, provided the resultant value is a positive number otherwise the extension of time is taken to be nought.

Delays as a result of abnormal wet conditions shall not be considered as abnormal climatic conditions.

The contractor shall be deemed to have included delays as a result of unfavourable site conditions, including but not limited to low or high road temperatures, prolonged curing or drying periods despite the absence of rain, restricted visibility, freezing of fuel and water, in the approved programme. Such delays shall not be considered as climatic conditions.

The number of days quoted in table B1215/1 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.”

Table B1215/1

TABLE B1215/1: ANTICIPATED DAYS LOST DUE TO NORMAL CLIMATIC CONDITIONS (“N” working days)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
n _{rain}	2	4	4	2	1	1	1	0	1	3	5	2
n _{other}	1	2	1	0	0	0	0	0	2	3	3	1
n _{total}	3	6	5	2	1	1	1	0	3	6	8	3

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

- *Renumber the existing paragraph (g) to become paragraph (h) and insert the following new paragraph (g):*

“(g) Concrete elements adjoining a surface which is to receive a sprayed bituminous application or slurry application shall be covered with protective material prior to such operations to prevent the concrete from being stained with bituminous binder.”

B1219 WATER

- *Add the following:*

“The contractor shall make the necessary arrangements and connections for the provision of water required by him for the execution of the works. The cost of providing water for construction to be included in the tendered rates shall make provision for the water supply constraints outlined in Part C4 Site Information, as well as all other legislated water supply restrictions specified in the Governing law of the Contract, in particular the “National Water Act, 1998: Breede-Gouritz and Berg-Olifants Water Management Areas: Limiting the use of water in terms of item 6 of Schedule 6 of the Act, for urban irrigation and industrial (including mining) purposes”.

B1224 THE HANDING-OVER OF THE ROAD RESERVE

- *Amend the heading to read: “THE HANDING-OVER AND OCCUPATION OF THE SITE”*
- *Add the following:*

“The site of the works shall consist of the entire road reserve inclusive of road junctions and farm accesses required for construction of the works as defined by the limits of construction shown on the drawings. It shall also include any additional lengths of road required for the placement of advanced warning road signs and/or traffic accommodation measures beyond the limits of construction as shown on the drawings. Where consistent with the context, the site shall also include areas outside of the road reserve required for construction camps, borrow areas, spoil areas and stockpile areas. The exact extent of the site and its boundaries will be verified once the site is handed over to the contractor.

Upon being given access to the site the contractor shall immediately assume responsibility for the entire site as defined in the specifications and verified. Personnel and plant shall not enter property beyond the boundary of the site irrespective of whether or not the boundary is fenced.

Prior to the commencement of work the contractor, routine maintenance contractor, where applicable 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:

- (i) The limits, lengths, widths and areas of construction.
- (ii) The location of kilometre markers and reference beacons
- (iii) The scope of remedial / repair or preparatory work measures (patching, crack sealing, etc.) to be executed by the contractor
- (iv) The location of stockpile areas and the responsibilities of the contractor with regard to the road reserve area and the stockpile sites (fencing, re-establishment, height of stockpile, etc.)
- (v) 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.
- (vi) The method of construction and supervisory control measures
- (vii) The protection of existing bridge joints, concrete kerbs/channels, rumble strips and road studs where necessary.

The contractor shall obtain all necessary permissions, approvals or authorisations from, and comply with the reasonable requirements with, the relevant road authorities identified under C3.1.7 for all traffic accommodation measures that will take place on roads or sections of roads for which the employer is not the statutory road authority. Proof of such permissions, authorisations and approvals shall be available on site at all times for inspection by the Employer's Agent, who may prevent or suspend all activities taking place or scheduled to take place on affected roads until such permissions, approvals and authorisations, as necessary, are provided. Any costs, delays or claims for damages arising from the prevention or suspension of any activity as a result of the contractor's failure to provide such proof for traffic accommodation measures on roads of which the employer is not the road authority, shall be borne by the contractor.”

B1229 SABS CEMENT SPECIFICATIONS

- *Add the following:*

“All cement used during construction shall comply with SANS 50197-1 for common cements and SANS 50413-1:2004 for masonry cement. Any reference to SABS 471 in the standard specifications shall be replaced with the new specification SANS 50197-1: Cement compositions, specifications and conformity criteria: Part 1: Common cements.

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

- *Add the following new clauses:*

“B1230 MATERIALS

(a) General

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

Where proprietary products have been specified, similar products may be used subject to the prior written approval of the Employer’s Agent.

Unless otherwise specified in the prior written approval of the Employer’s Agent, all proprietary materials shall be used and placed in strict accordance with the relevant manufacturer’s current published instructions.

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

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

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

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

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

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

(c) Mix design

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

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

B1231 SAFETY

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

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

Where adequate safety precautions are not being observed, the Employer's Agent may order the contractor to comply with minimum safety requirements at the latter's expense, which may include the suspension of all activities affected by the contractor's failure to implement adequate safety precautions until such time that necessary compliance has been achieved. Compliance with such an order will not absolve the contractor from any of his responsibilities and obligations under the contract."

B1232 SITE SECURITY

The contractor shall carefully assess the security measures of whatever nature that may be required at the location of the site offices and the site of the works. A payment items for security on site has been included in the Bill of Quantities to cover the Contractor's obligations regarding security, including insurances, deemed necessary by him to safeguard his staff and that of the Employer's Agent, his plant, materials and equipment, the offices of the Employer's Agent complete with furniture, equipment and personal belongings, and to prevent disruption of the works by criminals. No claims in this regard will be entertained.

B1233 IN-SERVICE AND STRUCTURED TRAINING

The contractor shall in addition to the structured (accredited) training as provided for in Part C of this document implement an in-service training programme, from the commencement of the contract, in which the various skills required for the execution and completion of the works are imparted to the labourers engaged thereon, in a programmed and progressive manner. Labourers shall be trained progressively throughout the duration of the contract, in the various stages of a particular type of work.

(a) Details of in-service and structured training

- (i) The contractor shall attach to form RDP 1(E) basic details of his proposed in-service training programme, which details shall inter alia include the following:
 - the details of training to be provided
 - the manner in which the training is to be delivered
 - the number and details of trainers to be utilised.
- (ii) The in-service training programme shall be submitted with the initial works programme. The progress in relation to this programme will be recorded monthly and attached to the site meeting minutes and payment certificate.

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- (iii) The contractor shall provide on site, sufficient skilled and competent trainers to train all labourers engaged on the contract, in the various skills required for the execution and completion of the works.
- (iv) All labourers shall be remunerated in respect of all time spent undergoing training.
- (v) Every worker engaged on the contract shall on the termination of his participation on the contract, be entitled to receive from the contractor, a certificate of service in which the following information shall be recorded:
- the name of the contractor
 - the name of the employee
 - the name of the project/contract
 - the nature of the work satisfactorily executed by the worker and the time spent thereon
 - the nature and extent of training provided to the worker
 - the dates of service.

The cost of the above obligations shall be deemed to be covered by the sums and rates tendered for items B13.01(a), (b) and (c) in the bill of quantities. The performance of the contractor in providing in-service training, shall be taken into consideration should the contractor fail to reach his CPG at the completion of the project.

(b) Lead time for training

The training of labour as specified shall, as far as possible, take place before commencement of each activity and the contractor shall take into account in his programme the lead-time he requires for such training. All training herein specified shall be deemed to be a construction activity and a non-negotiable condition of the contract”.

B1234 COMMUNITY LIAISON OFFICER (CLO)

The contractor or his appointed agent will appoint a Community Liaison Officer (CLO) after consultation with the local communities, the engineer and the employer. The contractor shall direct all his liaison efforts with the local communities through the appointed officer. The contractor shall, however, accept the appointed as part of his management personnel.

(a) Duties of the Community Liaison Officer

The Community Liaison Officer’s duties will be:

- (i) To be available on site daily between the hours of 07:00 and 17:00 and at other times as the need arises. His normal working day will extend from 07:00 in the morning until 16:00 in the afternoon.
- (ii) To determine, in consultation with the contractor, the needs of the temporary labour for relevant skills training. He will be responsible for the identification of suitable trainees and will attend one of each of the training sessions.
- (iii) To communicate daily with the contractor and the engineer to determine the labour requirements with regard to numbers and skill, to facilitate in labour disputes and to assist in their resolution.
- (iv) To assist in and facilitate in the recruitment of suitable temporary labour and the establishment of a “labour desk”.
- (v) To attend all meetings in which the community and/or labour are present or are

required to be represented.

- (vi) To assist in the identification, and screening of labourers from the community in accordance with the contractor's requirements.
- (vii) To inform temporary labour of their conditions of temporary employment and to inform temporary labourers as early as possible when their period of employment will be terminated.
- (viii) To attend disciplinary proceedings to ensure that hearings are fair and reasonable.
- (ix) To keep a daily written record of his interviews and community liaison.
- (x) To attend monthly site meetings to report on labour and RDP matters.
- (xi) All such other duties as agreed upon between all parties concerned.
- (xii) To submit monthly returns regarding community liaison as illustrated in Part C5.1 of this document (form RDP 12(E)).

(b) Payment for the community liaison officer

A special pay item is incorporated in section 1200 of the bill of quantities relating to payment of the liaison officer on a prime cost sum basis. This payment shall only be made for the period for which the duties of the liaison officer are required. The remuneration of the CLO shall be determined by the Employer in terms of the Sectorial determination 2: Civil Engineering Sector (Task grade 3).

(c) Period of employment of the community liaison officer

The period of employment of the community liaison officer shall be as decided upon jointly by the contractor, engineer and employer at a maximum period of eight months basis, but with the option of renewal.

B1235 SUBCONTRACTORS

Over and above the stipulations of clause 4.4 of the General Conditions of Contract 2010, regarding subletting of part of the works, it is a condition of the contract that an approved subcontractor shall not sublet part of his work, covered in his appointment by the main contractor, to another subcontractor without the consent and approval of the engineer. Subletting shall in all cases be critically considered by the engineer.

In addition to the provisions of clause 4.4 of the general conditions of contract regarding subcontracting of the works, it is a requirement of this contract that an approved subcontractor shall not further subcontract work subcontracted to him by the main contractor, to another subcontractor without the consent and approval of the engineer. Subcontracting shall in all cases be critically considered by the engineer. The engineer reserves the right to limit the extent or the volume of work subcontracted by the contractor, should he deem it necessary in terms of progress or quality of workmanship.

B1236 WORKMEN'S COMPENSATION ACT

All labour employed on the site shall be covered by the Compensation for Occupational Injuries and Deceases Act (COIDA). The contractor shall pay in full, including the payment of the necessary levies, such amounts, as are due in terms of the Act. The contractor at the commencement of the contract shall resolve the manner in which Workmen's Compensation will be handled. Amounts paid by the contractor shall not be included in the wage rates but shall be covered by the Contractor to be deemed as included in his General Obligations rates in Section 1300 of the Bill of Quantities.

Add the following clause:

B1237 MINE HEALTH AND SAFETY ACT 1996, ACT 29 OF 1996

(a) Introduction

The main objective of this Act is to protect the health and safety of persons at mines. This specification is therefore aimed at promoting health and safety specifically at borrow pits. Borrow pits are classified as mines.

(b) General Provisions

The contractor shall be responsible for controlling his operations at every borrow pit where material is being excavated to ensure compliance with all the requirements of the Mine Health and Safety Act, 1996. The contractor shall also ensure that the works, shaping and finishing off of the borrow pit are done in accordance with the provisions as specified in section 3100 of the COLTO Standard Specifications and this Act. The contractor shall also comply to the requirements as set out in C3.4.3.2 Environmental Management Plan.

The minimum requirements for operations at borrow pits are:

- Borrow pits are worked in such a way that the health and safety of employees and the public will not be endangered.
- A monthly report shall be submitted to the engineer on health and safety aspects at the borrow pits.
- The contractor shall appoint a manager to manage the borrow pits in accordance with the Mine Health and Safety Act.
- The contractor shall take the necessary steps to ensure that the work area of the borrow pits are safe at all times. This shall include items such as the provision of fencing and security guards.

(c) Duties of the Manager

The minimum duties of the manager supervising the activities at borrow pits shall be:

- Maintain a healthy and safe borrow pit environment.
- Identify hazards and related risks to which persons and employees are exposed.
- Establish a health and safety policy that
 - Describes the organisation of work.
 - Contains aspects concerning the protection of the employees and other persons' health and safety.
 - Contains a risk analysis.
- Supply and erect the necessary safety and warning signs.

Add the following pay items and change the clause number.

B1238 MEASUREMENT AND PAYMENT

Add the following items:

"ITEM

UNIT

B12.01 Provision for a Community Liaison Officer

(a)	Community Liaison Officer.....	Provisional Sum
(b)	Attending steering Committee meetings.....	Provisional Sum

-
- (c) Handling costs and profit in respect of sub-items B12.01(a) & (b).....percentage (%)

The provisional sums under items B12.01(a) & (b) shall be expended in accordance with the general conditions of the contract.

The tendered percentage under item B12.01(c) is a percentage of the amount actually spent under the items B12.01(a) & (b), which shall include full compensation for the handling costs of the contractor, and the profit.

ITEM

UNIT

B12.02 Contract notice board

- (a) Contract notice board as instructed by the Engineer.....Provisional Sum
- (b) Handling costs and profit in respect of sub-items B12.02(a).....percentage (%)

The provisional sums under items B12.02(a) shall be expended in accordance with the general conditions of the contract.

The tendered percentage under item B12.02(b) is a percentage of the amount actually spent under the items B12.02(a), which shall include full compensation for the handling costs of the contractor, and the profit.

ITEM

UNIT

B12.03 Accredited Training

- (a) Accredited Training approved by the Engineer.....Provisional Sum
- (b) Handling costs and profit in respect of sub-items B12.03(a).....percentage (%)

The provisional sums under items B12.03(a) shall be expended in accordance with the general conditions of the contract.

The tendered percentage under item B12.03(b) is a percentage of the amount actually spent under the items B12.03(a), which shall include full compensation for the handling costs of the contractor, and the profit.

B12.04 Work to be done by nominated subcontractors

- (a) Relocation of Eskom Powerlines:
- (i) Provision for the relocation of Eskom underground and overhead power lines Works.....Provisional Sum
- (ii) Handling cost and profit in respect of subitem B12.04 (a)(i).....Percentage (%)
- (b) Relocation of Telkom Services:
- (i) Provision for the relocation of telecommunication underground and overhead services.....Provisional Sum
- (ii) Handling cost and profit in respect of subitem B12.04 (b)(i).....Percentage (%)
- (c) Relocation of Municipal Services:
- (i) Provision for the relocation of Municipal Services.....Provisional Sum
- (ii) Handling cost and profit in respect of subitem B12.04 (c)(i)..... Percentage (%)

The provisional sums under sub-items (a)(i), (b)(i) and (c)(i) provide for the provision of Relocation of Eskom, Telkom and Municipal Services. The provisional sums shall be expended in accordance with the general conditions of the contract.

The tendered percentage of subitems (a)(ii), (b)(ii) and (c)(ii) is a percentage of the amount actually spent under the provisional sum, which shall include full compensation for all handling costs and profit in connection with providing Relocation of Eskom, Telkom and Municipal Services.”

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

B1302 GENERAL REQUIREMENTS

(a) Camps, constructional plant and testing facilities

Add the following:

"The contractor shall, at each area where work is being undertaken, provide on a daily basis at least one (1) portable chemical latrine unit per thirty (30) workers for use by construction workers employed on the project. The latrine units shall be serviced daily and kept in a hygienic and orderly state to the satisfaction of the engineer. No separate payment shall be made for this requirement and shall be deemed to be included in the rates tendered for the contractor's time-related obligations."

B1303 PAYMENT

Item	Unit

B13.01 The contractor's general obligations

Delete subitem (c) and replace with the following:

"(c) Time related obligations:	
(i) Mobilisation period	month
(ii) Execution of the works	month"

Add the following pay subitems:

"(d) Health and safety obligation	month
(e) Provision of a 10 seater mini-bus	day
(f) Environmental obligation	month
(g) Monthly reporting	month
(h) Security on site	month
(j) Suspension Cost	
(i) De-establishment	Number
(ii) Re-establishment	Number
(ii) Suspension period	month
(iii) Engineer's cost	prime cost sum (PC) sum"

Add the following sub-sub-clauses defining 'the contractor's general obligations in the first paragraph:

- "(iv) Complying with the requirements and conditions of the additional specifications relating to Small Contractor Development, Training and Community Liaison.
- (v) The provision of a 10 seater mini-bus for inspecting the works during monthly site meetings, which is generally one day per month. This vehicle shall be in a neat and roadworthy condition and the contractor will be responsible for the insurance of such a

vehicle.”

In the 11th paragraph, the following amendments apply:

- *Insert as a new 2nd sentence “Hire costs or minimum hourly charges (standing time costs) per month for construction equipment shall be deemed to be included in the rate tendered for item 13.01(c): time related payments”.*
- *Delete “from the date on which the contractor has received the letter of acceptance in terms of clause 12 of the general conditions of contract” and replace with “for subitem 13.01(c)(i) from the Commencement Date in terms of of the general conditions of contract, until the end of the Mobilisation Period and for subitem 13.01(c)(ii) from the end of the Mobilisation Period”.*
- *In the last line, change “clause 45” to read “clause 10.1”.*

Add the following at the end of the second last paragraph at the end of paragraph (b) of the payment clause:

“... Such limitations to payments shall occur whenever the contractor falls behind by more than 3 month(s) on his initial approved programme, in which case the total price offered for 13.01(c) is converted to a lump sum and payable monthly in instalments in relation to the value of work done (excluding the value of any price adjustments in terms of of the conditions of contract). If the calculated instalment is a negative amount, the Engineer will fairly determine an appropriate instalment amount.”

Add the following paragraphs:

“Should the combined total tendered for subitems (a), (b), and (c) exceed 20% of the tender sum (excluding CPA, contingencies and VAT), the tenderer shall state his reasons in writing for tendering in this manner.

Payment of the rate per month for subitems B13.01(d), (f), (g) and (h) shall include full compensation for all the contractor’s obligations relevant to health and safety legislation (including mine health and safety, where applicable), environmental compliance, monthly reporting, security on site.

The tendered rates for subitems 13.01(d), (f), (g), and (h) shall apply in the same manner as pay subitem B13.01(c).

The tendered rate for subitem B13.01(e) shall be for a day, or part thereof, for which the vehicle was hired and used for its intended purpose. The rate tendered shall include full compensation for the hire of the vehicle including cost of insurances, fuel, wear and tear and any other incidentals.

The rate tendered for subitem B13.01(g) shall include full compensation for registering on the Employer’s project information module, compiling and capturing, monthly for the full duration of the Contract, the required information regarding training, empowerment, capacity building, targeted enterprise development, labour and staff returns, and attaching proof of monthly capturing to monthly payment certificates. It shall further include for all personnel and other costs, disbursements, overheads and profit.

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

The rates tendered under subitem 13.01(j) shall represent full compensation for Cost for Suspension of Work as per Condition of Contract clause 5.11.2.

Payment of subitems 13.01(j)(i) and 13.01(j)(ii) shall be made for the number of de-establishments and re-establishments of all Personnel and Goods (Contractor's Equipment, Materials, Plant and Temporary Works) as instructed by the Engineer.

Payment of subitem 13.01(j)(iii) shall be made monthly, pro rata for parts of a month, from the date on which the Contractor has suspended progress of all of the Works in terms of Conditions of Contract clause 5.11 and commenced with de-establishment of the site, until permission or instruction to proceed in terms of Conditions of Contract is given.

The Prime Sum in subitem 13.01(j)(iv) is provided to cover the cost of the Engineer during the period of suspension of the works. The amounts certified by the Employer shall be made to the Engineer, within 30 days of it being certified by the Employer."

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

B1402 OFFICES AND LABORATORIES

b) Offices

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

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

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

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

Add the following sub-clauses:

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

- (xix) An electric refrigerator of specified capacity.

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

c) Laboratories

In the second paragraph, second line substitute “drawings” with “figures included in the project document”

B1404 SERVICES

b) Water electricity and gas

Add the following to the end of the third paragraph:

“The power supply shall be regulated by a suitable voltage regulator in order to maintain a constant current and voltage level at all times to prevent damage to the office and laboratory equipment and related machinery during power surges. In the event of damage to the office and laboratory equipment and related machinery because of a faulty voltage regulator, the contractor shall be liable for payment of all repair or replacement costs of such damaged items.”

Add the following to the end of the fourth paragraph:

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

B1405 GENERAL

Add the following to paragraph (e):

“In addition, the offices and laboratories shall be supplied with approved burglar proofing and the

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

Add the following to paragraph (f):

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

B1406 MEASUREMENT AND PAYMENT

Item	Unit

B14.03 Office and laboratory fittings, installations and equipment

a) Items measured by number

Add the following subitems:

”(xix) Plan holder number (No)

(xx) Floodlights complete with poles and 500Watt
minimum globes number (No)

The tendered rate for subitem B14.03(a)(xx) shall include for the operation of the lights from sunset to sunrise for the full duration of the contract.”

b) Prime cost items and items measured and paid for in a lump sum

Add the following subitems:

“(ix) Cell phones 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
subitem 14.03(b)(ix) above percentage (%)

Payment of B14.03(b)(ix) shall include for the cost of all cellular telephone calls in connection with contract administration, as well as pro rata fixed costs.

The tendered percentage for pay item B14.03(b)(x) shall be a percentage of the amount actually spent under subitem B14.03(b)(ix) which shall include full compensation for the profit and handling costs incurred in managing provision of the cellular phones and monthly billings.”

Item	Unit

B14.10 Provision of photostat facilities

Amend this pay item description to read “Provision of copying facilities” and in the payment prescription, amend “photocopier” to read “combination colour printer/copier/scanner/facsimile machine”.

Add the following pay item:

“Item	Unit

B14.11 **Provision of mobile outdoor weather station** number (No)

The unit of measurement shall be the number of units supplied and operated.

The tendered rate shall include full compensation to procure, erect, operate and maintain, for the duration of the contract, a number of weather stations capable of measuring temperature, wind, chill, barometric pressure, UV levels, rainfall, wind direction and speed. The device should also have on-board storage capabilities for at least 7 (seven) days and it should include a USB PC connection with software, allowing data to be downloaded to a PC and uploaded to SANRAL via SARDS Quality Assurance module.”

SECTION B1500: ACCOMMODATION OF TRAFFIC

B1501 SCOPE

Add the following:

"It is a requirement of this specification that traffic is accommodated taking into account the provisions of the latest edition of the South African Road Traffic Signs Manual (SARTSM). The latest version for use in the accommodation of traffic is volume 2, chapter 13 of the June 1999 edition. Copies of this publication are available from Government Printers –Tel: (012) 334 4507/8/9 or (012) 334 4510 Fax: (012) 323 9574.

This section also covers the provision of additional information signs for motorists and the release of any notices to the media and public."

B1502 GENERAL REQUIREMENTS

Insert the following:

"The whole of the site will be handed over to the contractor at the beginning of the contract. The sequence in which various parts of the site may be occupied by the contractor for the execution of the different items of work shall be subject to the requirements of the contract documents regarding, inter alia, working hours and the number, spacing and length of the work areas which may be occupied at any particular time.

The contractor shall programme his work taking due cognizance of restrictive conditions indicated in Clause B1204. The contractor's tendered rates shall include full compensation for all possible additional costs which may arise from the above and no claims for extra payment as a result of this *modus operandi* will be considered. The contractor shall in particular note that no additional compensation shall be made for work that could be considered as half-width construction."

a) Safety

Replace the full stop at the end of the first paragraph and continue with the following:

"... flow of traffic, including the prohibition of his, and his subcontractor's, construction plant from disregarding the stop/go accommodation of traffic control facilities. Failure to comply with this requirement shall be taken as a penalty event in terms of B1502(l)."

Add the following paragraphs:

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

The contractor shall within 7 (seven) working days after receipt of a 3rd party claim acknowledge receipt to the claimant. The engineer shall be copied on all correspondence regarding 3rd party claims. The contractor shall at the monthly site meeting report on the status and outcome of the 3rd party claims.

The contractor shall be fully responsible for all the traffic accommodation on site, including for work undertaken by sub-contractors, e.g. at bridges etc.

Traffic shall be accommodated as indicated on the drawings unless an alternative tender incorporating an amended method of traffic accommodation has been accepted.

The contractor may amend the agreed traffic accommodation scheme but only with the approval of the engineer in consultation with the provincial and municipal traffic authorities.

During the non-working hours, or when construction is not taking place on a certain section of road all obstructions to the traffic shall be removed and all signs no longer applicable to the situation shall be removed to an approved safe location or effectively covered.

No equipment or vehicles shall be stored or parked in the median or on the road side during non-working hours except if protected or demarcated and only if approved by the engineer.

When requested by the engineer, the contractor shall provide lane closures for the purpose of road inspection. This must be done in advance of the actual programmed time for the work."

f) Approval of temporary deviations

Add the following:

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

i) Traffic Safety Officer

Add the following to the end of the second paragraph:

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

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

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

Delete sub-sub-clauses (ii) and (iii) and replace with the following:

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

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

The records shall similarly account for whatever changes are made in the field. Such changes shall record the position of flagmen and stop/go control men and their associated traffic accommodation equipment wherever they are used.

- (iii) Personally inspect the position and condition of each traffic accommodation feature on the whole site of works twice per workshift, whether daytime or nightwork, and at least twice a day/night during non-working hours, to record all irregularities discovered and the remedial action taken, and to sign off as correct and submit to the engineer such record sheets by middle of the next working shift. The above inspections must at least take place before the commencement of peak traffic

periods. The traffic safety officer shall keep a duplicate book for this specific purpose.

The traffic safety officer shall also submit with this report the daily labour returns of flagmen, stop/go, traffic signal control personnel employed and the traffic data recorded at each traffic control point."

Add the following sub-sub-clauses:

- "(ix) The traffic safety officer shall be equipped with a cellular telephone and shall have a traffic safety vehicle and sufficient labour at his disposal 24 hours a day, including all prescribed non-working days, and shall not be utilised for other duties. He shall be directly answerable to the contractor's site agent. The traffic safety officer shall have his own vehicle to carry out inspections and at least one assistant to accompany him full time. Furthermore the traffic safety vehicle shall be a truck with a capacity of at least 3 tons and shall be equipped with a high visibility rear panel in accordance with the requirements of the SARTSM as well as a truck mounted impact attenuator complying with TL-2 criteria when tested in accordance with NCHRP 350 or N1 criteria when tested in accordance with EN 1317. (Certification of compliance must be on site at all times). The attenuator shall be used when the vehicle is utilized to close traffic lanes or when attending to stationary or broken down vehicles or accident scenes. 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 both the traffic safety officer's vehicle and the traffic safety vehicle at least 1,5 m above ground level. The proposed sign and letter dimensions shall be submitted to the engineer for his approval.

The vehicles shall also be equipped with flashing amber LED lights or with flashing amber LED light bars of an approved design. The warning light shall be switched on at all times and the sign shall be displayed when the vehicle is used on site.

The traffic safety officer 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.

- (x) Ensure that all obstructions related to the contractor's activities be removed at the end of each work shift where applicable as instructed by the engineer and that the roads are safe for the travelling public.
- (xi) The traffic safety officer shall, in addition to the duties listed in paragraph 1502 (i), also be responsible to arrange for the removal of stationary or broken down vehicles off the roadway in conjunction with the routine maintenance contractor and/or traffic authorities and implementing actions requested by the traffic authorities with regard to the work to be carried out and 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 traffic officer shall record in a written report the details of the accident, record the position of all temporary road signs, barricades, delineators, flagmen and any other devices used for traffic accommodation. In addition the report shall include a neat dimensional sketch, photographs, identifiable permanent features, and any other relevant information.
- (xiii) At least two separate traffic safety officers and teams shall be employed when construction is carried out during the day and night."

Add the following sub-clauses:

“j) Crossing the median or carriageway centreline

No vehicle or item of equipment shall be allowed to cross the median of a dual carriageway road or the centreline of a single carriageway unless the traffic accommodation and signage specifically allows for this and is approved by the engineer as safe.

k) Site personnel

The contractor shall ensure that all his personnel, excluding those who are permanently office bound, are equipped with reflective safety jackets and that these are worn at all times when working on or near to the travelled way. Any person found not wearing a reflective jacket under these circumstances shall be removed from the site until such time as he is in possession of and wearing a reflective jacket. Reflective safety jackets shall be kept in good condition and any jackets that are, in the opinion of the engineer, ineffective shall be immediately replaced by the contractor.

l) Penalty events

Whenever the following events occur, the contractor shall be subjected to penalty conditions expressed in the Appendix to Tender.

(i) Non-compliance with accommodation of traffic specifications

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 engineer, shall be sufficient cause for the engineer to apply penalties as follows:

A fixed penalty per occurrence at the rate provided in the Appendix to Tender, shall be deducted for each and every occurrence of non-compliance with any of the requirements of section 1500 of the standard specifications and section B1500 of the project specifications.

In addition a time-related penalty per hour at the rate provided in the Appendix to Tender, over and above the fixed penalty, shall be deducted for non-compliance to rectify any defects in the accommodation of traffic within the allowable time after the engineer has given an instruction to this effect. The engineer's instruction shall state the allowable time, which shall be the time in hours for reinstatement of the defects. Should the contractor fail to adhere to this instruction, the time-related penalty shall be applied from the time the instruction was given.

(ii) Late occupation of lanes, ramps and/or crossroads

The contractor shall be charged a lane occupation levy if he continues to occupy interchange ramps, crossroads and/or carriageway lanes beyond programmed completion dates. The levy shall be deducted from payments due on the relevant interim payment certificates at the rates provided in the Appendix to Tender and the pricing schedule.”

m) Liaison with relevant Authorities

Where applicable, the contractor shall liaise on a daily basis with the Employer's relevant i-traffic Management Centre (TMC), informing their operations manager about the expected works and lane closures for the next day, inclusive of all work shifts, in order for the operational manager to take into account the accommodation of traffic impacts in the TMC's operations. The daily report shall be submitted to the TMC operations manager not later than 10h00.

For exceptional traffic accommodation impacts, such as lane closures in peak hours, short term contra flow conditions, lane closures over weekend peak periods etc., the TMC operational manager shall be informed seven days prior to the event.

The contractor shall inform the TMC about all traffic related incidents, as soon as he becomes aware of the incident.

Where required the contractor shall be responsible for acquiring the services of a municipal traffic officer and traffic vehicle (equipped with a blue light) to assist in the accommodation of traffic. The traffic officer and vehicle will be required when lanes are to be closed and/or where directed by the Engineer.

If the road under construction forms part of an abnormal load route the contractor shall liaise with the relevant provincial abnormal load office that issues permits to ensure that permits are not issued when construction restrictions do not allow passage of the abnormal load.

n) Other requirements

The following other requirements must be adhered to for the entire contract period:

- i) 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 his equipment and vehicles so as not to constitute a hazard on the road.
- ii) The contractor's tendered rates for the relevant items in the schedule of quantities shall include full compensation for all possible additional costs which may arise from the above and no claims for extra payment due to inconvenience as a result of the modus operandi will be considered."

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 abovementioned traffic-control devices are present where required at all times and are functioning properly."

Replace the last sentence of the second paragraph with the following:

"Traffic-control facilities no longer required at the site of a deviation or a lane closure shall be moved for re-use. Traffic-control facilities lost or damaged by the contractor shall be replaced at his own cost. Where it can be proved that loss of or damage to such facilities is beyond the contractor's control and not the result of his actions or omissions, the engineer may order the

facilities to be replaced and paid for at scheduled rates."

Replace the third paragraph with the following:

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

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

a) Traffic control devices

Add the following at the end of the last paragraph:

"At each signalized traffic control point, an all-weather shelter of at least three (3) square metres capable of accommodating two operators, with a clear window, a stable door, two chairs and a portable chemical toilet that shall be regularly maintained, shall be provided. Each control point shall have a 2 (two) phased signal system mounted on 3m high steel poles complete with all electrical wiring, a floodlight system of at least 2x400W metal halide or equivalent LED floodlights mounted onto a 9m high pole to light up the traffic control point and lighting along the road where the traffic will queue. The provision shall include for a sufficient continuous power supply to operate each traffic control point. Included in the establishment and operation of the traffic control devices shall be a communication system that allows the operators to communicate with each other.

At each traffic control point, plastic moveable barriers, fitted with STOP signs to both sides, shall be provided to prevent vehicles from utilising the closed road lanes. These barriers shall be moved to open and close the relevant lanes for road users.

Records of opening and closing of closures and traffic counts shall be kept and submitted daily to the traffic safety officer."

b) Road signs and barricades

Add the following:

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

All temporary road signs required to remain in position for some time shall be pole mounted as shown on the drawings. All temporary road signs required to be moved more often shall be mounted on portable supports for the easy moving of signs to temporary positions. The only permitted method of ballasting the sign supports shall consist of durable sandbags filled with sand of adequate mass to prevent signs from being blown over by wind. The cost of the sandbags shall be included in the tendered rates for the various types of temporary road signs.

The covering of permanent road signs, if applicable, shall be by utilizing a suitable and durable covering that shall be pulled over the sign in the form of a hood and fastened to the signposts. Plastic bags or other materials and fastened by means of adhesive tape shall not be permitted. The cost of covering of permanent road signs shall be included in the tendered rates of items B15.01 and B15.10."

c) Channelization devices and barricades

Add the following:

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

Delineators shall:

- (i) comply with the manufacturing and reflective requirements of the SARTSM and the blades shall be reversible with dimensions as indicated on the drawings;
- (ii) have smooth and round edges and be mounted on a post and base. All components shall be of durable plastic material;
- (iii) have the lower edge of the reflective part of the delineator mounted not lower than 250mm above the road surface;
- (iv) be capable of withstanding the movement of passing vehicles and gusting winds up to 60km/h in typical working conditions without falling over. To achieve this, the base shall be at least 0,18m² and ballasted by its own weight or with 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 at short term lane deviations during daylight. Cones shall not be used on their own, but shall be interspersed with delineators at a ratio not exceeding 3:1. Cones used on all deviations shall be 750mm high. Lane closures which continue into the night time shall be demarcated by delineators only.

On section of road where the centreline has been obliterated, delineators shall be provided on both road edges at minimum 200m spacing on straight sections and at least 3 (three) visible on all curves.”

d) Barriers

Add the following:

“Vehicle restraining systems which are erected for the purpose of preventing vehicles from leaving the permitted lanes or deviations shall be movable barriers manufactured from steel or concrete with an approved safety shape design (e.g. New Jersey, F-shape or single slope). The movable barriers shall be obtained from approved suppliers and placed between the trafficked lane/s and/or 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 the barrier's working width. The vehicle restraint system selected shall have a working width rating to suit the available clear space behind the barrier to the nearest edge of the construction

area or opposing traffic lane (in contraflow situations). No excavation, scaffolding, plant, material, equipment or personnel shall be permitted to be found, either temporarily or permanently, in the clear space behind a barrier if such space is within the barrier's working width. This space shall be clearly demarcated and kept clear at all times.

Before ordering and erecting any vehicle restraint systems the Contractor shall note his liabilities relating to the installation of temporary Works to provide protection to the permanent Works and safety to his personnel before he selects a vehicle restraint system appropriate to his chosen work methodology. All vehicle restraint systems shall be installed and connected in accordance with the manufacturer's instructions and shall be submitted to the Engineer for review and comment. Where proprietary systems are used, the contractor's staff shall be trained in the installation, removal and maintenance of the barrier system.

The terminal sections of moveable barriers shall be appropriate to and fully integrate with the vehicle restraint system selected and shall be able to attenuate head-on impacts of at least NCHRP Test Level 1 (50 km/h, 2 000 kg) or EN1317 Containment Level H1 (80 km/h, 1 500 kg).

Where specified, the vehicle restraint system selected shall have removable sections to permit crossing points for emergency vehicles. These sections must be fully integrated with the barrier system and provide a continuous safety restraint without compromising on the specified containment level or working width when closed. In the event of an emergency, these sections shall be easy to open with minimal personnel in under 10 minutes without the need for special tools and plant. The traffic safety officer and his staff shall be trained in opening and closing of the removable sections and shall be available to act when called upon. Removable barrier sections shall be located at a maximum spacing of 2km."

e) Warning devices

Add the following:

"All construction vehicles and plant used on the works shall be equipped with flashing amber LED lights or with flashing amber LED light bars and warning boards as specified. All vehicles and plant before being allowed onto the site shall obtain a clearance permit from the engineer.

(i) Vehicle mounted flashing lights

Flashing lights shall be amber LED lights or amber LED light bars of an approved design 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 within the work areas.

All LDVs and cars operating on site shall also be equipped with flashing amber lights which shall be placed so as to be highly visible from all directions and operated continuously while the vehicles are maneuvering in or out of traffic or are travelling or parked alongside roads open to public traffic within the work areas.

Flashing lights and the "construction vehicle" signs on the contractor's vehicles and plant shall not be paid for separately but shall be included in the rates covering the use of the vehicles.

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

(ii) Sign mounted flashing lights

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

(iii) Flashing Illuminated Arrow Board

The arrow board shall be made up of light sources mounted on a backing board. A single shaft arrow will be required that can be used for both left and right directions. The light sources must be of LED type to improve visibility if used also during daytime. The arrow board shall be used at lane drops as described B1502.

(iv) Mobile Variable Message Sign (VMS)

The VMS shall be mobile and located in a safe position to convey to the travelling public of traffic conditions ahead and/or inform a motorist of his actual travelling speed.

The mobile VMS system must be equipped with solar panels to provide an output of 400 Watt. It shall be stable for shocks up to 3G and wind speeds up to 120 km/h.

The sign face shall not be less than 3m wide by 1.5m high to provide a full matrix LED with at least 50 and 27 pixels for the width and height respectively. Each pixel shall have 4 LED's and the pixel spacing shall not be less than 60mm. An LED mask for contrast and shading shall be provided. The sign shall be able to display 3 lines by 10 characters. The cone of vision is to be 30°.

The information displayed on each individual sign shall be controlled by a computer with internet connection operated by the contractor."

f) Road Markings

Add the following new paragraphs:

"Temporary road marking shall be reinstated before the road is opened to full width traffic. Temporary road marking shall consist of heavy pre-marking, and/or retro-reflective road marking paint, and/or temporary road studs, as directed by the engineer.

Temporary road studs shall be installed at double the spacing and shall be fixed to the road surface with the bitumen rubber crack sealant to allow for easy removal by application of gentle heat.

Temporary road marking lines for demarcation of temporary traffic lanes, on the final road surface shall not be allowed, except if approved by the engineer. Should temporary road marking lines be approved, it shall consist of one of the following as directed by the Engineer:

-
- (i) Construction grade tape for temporary road marking which can be removed by applying gentle heat. The tape shall be foil backed, adhesive, reflective tape. The tape shall be capable of being easily removed from the road surface by the application of gentle heat.
 - (ii) Removable road marking paint.”

Add the following sub-clauses:

“g) Other traffic control measures ordered by the engineer

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

h) Flagmen

Flagmen shall be provided where shown on the drawings or required by the specification. During the daytime, at least two flagmen shall be provided at each traffic control point in addition to the STOP/GO sign operator, one flagman at the first speed reduction sign and a second roving flagman at least a 100m behind the last vehicle in the queue to indicate to the traffic to stop. At night time all flagmen shall be equipped with a suitably visible strobe, and a torch at each traffic control point as well as the traffic light operator. Where the shoulder of the road is closed to traffic, flagmen shall be provided at the leading ends of closures during daytime. These flagmen shall be provided at the first speed reduction sign to warn the traffic about the closure. No flagmen shall be on duty for a period of more than 10 hours per day.

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

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

Flags shall be made from bright red or red-orange material and shall be square with a minimum side length of 600mm. The flag shall be attached to a staff at least 1,0m 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.”

B1504 WIDTH AND LENGTH OF TEMPORARY DEVIATIONS

Add the following paragraph:

Traffic will be accommodated on the existing pavement by reducing lanes widths to a minimum of 3,3m width and use of the surfaced shoulder to accommodate traffic. Temporary deviations shall only be constructed where bridges, major culverts and at livestock crossing. For traffic

accommodation details refer to the typical drawings as included in Volume 4 “Road Work Drawings”. The approximate positions of required deviations are contained in the table below:

Temporary Deviation: approximate lengths			
Start km	End km	Approximate Length (m)	Structure
0,880	1,320	440	Major Culvert 1
3,540	3,840	300	Major Culvert 2

B1510 EXISTING ROADS USED AS DIVERSIONS

Add the following:

"The contractor shall indemnify the employer against all proceedings, claims, actions, damages and costs which may arise from or be related to damage to vehicles or property or injury to persons as a result of loose stones or aggregates on the road surface or as a result of bituminous applications during the construction of the works.

The contractor shall arrange his activities so that construction traffic and equipment do not unnecessarily obstruct public traffic or force it to a complete standstill. The flow of public traffic shall always take precedence and the contractor shall not stop or delay public traffic to make way for construction traffic."

B1513 ACCOMMODATION OF TRAFFIC WHERE THE ROAD IS CONSTRUCTED IN HALF-WIDTHS

Add the following as a final paragraph to this clause:

"The contractor shall programme the works in such a way to maintain two-way traffic within the contract limits during the contractor's annual shutdown period between December and January. The contractor shall further ensure that there is no vertical step between two opposing traffic lanes. Failure to comply with these specifications will entitle the Engineer to apply a lane occupation levy."

B1517 MEASUREMENT AND PAYMENT

Insert the following paragraph after the heading:

"It is not envisaged that half-width construction would be required as traffic will be accommodated on the existing pavement by reducing lanes widths to minimum 3,3m width and use of the surfaced shoulder to accommodate traffic while widening the road to 13.4m. The contractor's tendered rates for the relevant items in the schedule of quantities shall include full compensation for all possible additional costs which may arise from the above and no claims for extra payment due to inconvenience as a result of the modus operandi will be considered."

Amend item 15.01 to read as follows:

"Item	Unit

B15.01 Accommodating traffic and maintaining temporary deviations:

- (a) On the national route kilometre (km)
- (b) On the ramps and cross roads of the Interchanges kilometre (km)"

Replace the first paragraph with the following:

“The unit of measurement shall be the kilometre, measured along the centre lines of the road, the ramps from the noses and the cross roads where construction work is carried out. Accommodation of traffic shall be measured once only, that is no separate payments shall be made for lane and shoulder rehabilitation, slurry, reseal, asphalt overlay, side drains, etc. Only the net distance of the road shall be measured and overlapping distances during staged construction shall not be measured. A distinction shall be made between accommodation of traffic on the through road and accommodation of traffic on the ramps and cross roads of interchanges.

In the second paragraph, replace the comma after “deviations” at the start of the third line with a full stop and delete the remainder of this first sentence. Also delete the whole of the second sentence, which refers to compensation for the traffic safety officer.

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

Item	Unit

B15.03 Temporary traffic control facilities

(a) Flagmen

Replace the 1st paragraph of the payment description to the following:

“The unit of measurement shall be a full day and night worked by flagmen. A man-day shall be deemed to comprise of a number of shifts within a twenty four hour period. Shifts of 12 hours and less shall be measured as half of a man-day.”

Amend sub-item (h) to read as follows:

(h) Delineators (TW401 and TW402) (200 mm x 800mm in frames with self-weighted base stand - no sandbags allowed) placed as directed by the Engineer in accordance with traffic accommodation drawings

(i)	Single sided, reversible.....	number (No)
(ii)	Double sided	number (No)

Add the following sub-item:

- “n) Other traffic control measures ordered by the engineer
- | | | |
|------|---|------------------------|
| (i) | Provision of other traffic control measures | provisional (Prov) sum |
| (ii) | Handling costs and profit in respect of sub-item B15.03(n)(i) | percentage (%) |

Expenditure under this payment item, (e.g. media releases or other signs to deliver information to the public) shall be made in accordance with sub-clause 13.5 of FIDIC Conditions of Contract for the supply and installation of any additional signs or other traffic control measure ordered by the engineer in accordance with clause B1503(g).

The tendered percentage is a percentage of the actual amount spent under subitem B15.03(n)(i), which shall include full compensation for the handling costs of the contractor, and the profit in connection with providing other signs and traffic control measures ordered by the engineer.”

Add the following at the end of the last paragraph of the payment description:

“However, allowance has been made in sub-item (h) Delineators for double the quantity of delineators required to execute the works. Payment under this item will be made up to the maximum quantity scheduled.”

Delete payment items 15.08 and 15.09 as maintenance of the road and/or bypasses are paid under 15/39.01, 15/39.02, 15/39.04 and 15/42.20.

Item	Unit

B15.04 Relocation of traffic control facilities:

Replace the first paragraph with the following:

“Except for the movement of barriers no payment for this item shall be made under this contract. All costs related to relocation of traffic control facilities shall be deemed to be included in the other pay items in this section.”

Item	Unit

B15.10 Accommodation of traffic where the road is constructed in half-widths kilometre (km)

In the second paragraph delete from the third line the expressions “flagmen”, “guards”, and “lights”.

Add the following paragraphs:

“Half-width construction is defined as construction work on the shoulder and one lane and only where 2-way traffic cannot be accommodated. Also, no slurry, seal and asphalt overlay works shall in any circumstances be measured under this item and shall be included in item B15.01 for the payment thereof. Cognizance should be taken that for the specified construction sections controlled by temporary traffic signals for half-width construction, payment shall be made once only and payment for the changeover of the trafficked lanes shall not be made.

Where payment is made for a section of road in item B15.10, payment shall not be made under item B15.01.”

Amend item 15.11 to read as follows:

“B15.11 Signalised Traffic control devices

- (a) Providing signalised traffic control devices number (No)

The unit of measurement shall be the number of traffic control devices provided (as described under clause B1503(a)) where a traffic control device is deemed to be 2 (two) signalised points, one at each end of a closure. The tendered rate shall include full compensation for the provision of complete sets of signalised traffic control devices as specified.

75% of the rate offered will be payable when the traffic control devices have been provided on site ready for use and 25% when finally removed from the site.

- (b) Operating signalised traffic control devices month device

The unit of measurement shall be the month device or part thereof that the signalised traffic

control device is operated.

The tendered rate shall include full compensation for all costs necessary to operate and maintain the signalised traffic control devices in full working order for 24 hours per day in compliance with the specification and shall include for 2 (two) operators per shift. Also included in the tendered rate shall be the cost of operation of the communication system between the traffic control devices.”

Add the following pay items:

“Item	Unit
“B15.14 Amber flashing lights mounted on signs	number (No)

The unit of measurement shall be the number of sets provided.

The tendered rate shall include full compensation to provide, erect, operate and maintain a set of 2 (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.

Item	Unit
B15.15 Provision of traffic safety equipment for visitors	

(a) Safety jackets	number (No)
(b) Hard hats	number (No)

The unit of measurement shall be the number of each item provided as specified, and approved by the engineer.

The tendered rates for the various safety items shall include full compensation for provision thereof and maintenance in good working order.

Item	Unit
B15.16 Provision of traffic safety	

(a) Traffic safety officer	month

The unit of measurement shall be the month (or part thereof) that the specified duties of the traffic safety officer are performed, irrespective of the number of traffic safety officers employed in any 24 hour day.

The tendered rate shall include full compensation for the cost of the traffic safety officer(s) to conduct the duties as specified in sub-clause B1502(i) and includes the provision of his own vehicle, fuel, vehicle maintenance and insurance and the cost of the cellular telephone and all other incidentals related to the performance of his duties.

(b) Traffic safety vehicle(s).....	month

The unit of measurement shall be the month (or part thereof) that the safety vehicle is on site and in continuous use in the performance of traffic safety.

The rate tendered shall include the provision of the traffic safety vehicle, fuel, vehicle maintenance and insurance costs, drivers, labourers and all other incidentals related to the

performance of the traffic safety duties.

Item	Unit

B15.17 Provision of tow trucks:

(a) For heavy vehicles (over 2 tons) month

(b) For light vehicles (under 2 tons) month

The unit of measurement shall be the months that the tow trucks are utilised on the site.

The tendered rate shall include full compensation to provide the tow trucks full time for 24 hours per day for the duration of the contract as specified, and to maintain the truck. Payment for towing trucks off the road will not be made separately as this cost is to be recouped from the owner of the broken down vehicle.

Item	Unit

B15.18 Assistance by traffic officer

(a) Provision of traffic officer Prime Cost(PC) Sum

(b) Handling costs and profit in respect of sub-item B15.18 Percentage (%)

The provisional sum provided to cover the cost of acquiring the assistance of a traffic officer and traffic vehicle (equipped with a blue light) to assist in closing of lanes or any other accommodation of traffic as ordered by the engineer in terms of the specifications shall be expended in accordance with the provisions of sub-clause 13.5 of the FIDIC Conditions of Contract. The tendered percentage is a percentage of the actual amount spent under subitem B15.18, which shall include full compensation for the cost of acquiring the assistance of a traffic officer and traffic vehicle.”

Item	Unit

B15.19 Accommodation of traffic as and when required by the engineer lane kilometre hour (lane.km.hr)

The unit of measurement shall be the number of hours (or any portion of an hour) for each lane kilometre that special accommodation of traffic is required by the Engineer.

The tendered rate shall include full compensation for providing all plant, equipment, tools, transport, labour, supervision, flagmen, road signs, lights, barricades and all other incidentals necessary for the proper and safe handling of traffic as specified when required by the engineer.”

Item	Unit

B15.20 Flashing Illuminated Arrow Board number (No)

The unit of measurement shall be the number of flashing arrow boards provided and completely erected.

The tendered rate shall include full compensation for providing, erecting, maintaining, relocating and re-erecting the flashing illuminated arrow board around the boundaries of the site, including the power supply for functioning of the lights. The lights shall be of the new LED type lights and shall be available for the entire period of the contract.

Item	Unit
B15.21 Variable Message Signs mounted on trailers	number.month (No.month)

The unit of measurement shall be the number of signs provided for the time in months that the Variable Message Sign (VMS) is operative on site.

The tendered rate shall include full compensation for the provision of the VMS mounted on the trailer, the operation and maintenance thereof including frequent day and night inspections, protection against and repairs due to vandalism.

Item	Unit
B15.22 Temporary Barriers	

(a)	Barrier sections provided and erected	metre/month
(b)	Moving and re-erecting the vehicle restraint system at another location on site	metre (m)
(c)	Terminal attenuator sections	number (No.)
(d)	Removable barrier sections	number (No.)

The unit of measurement for subitem (a) shall be the linear metre of barrier provided by the Contractor per month and erected on site to make up vehicle restraining systems. The tendered rate shall include full compensation for providing the barrier sections on site, placing them and fastening them together as specified to form a vehicle restraint system of the required length. The rate shall also include for full compensation for the cost of general maintenance of the barriers including resetting of the barriers in the event of displacement, cost of insurance to replace structurally damaged barriers and other overhead costs. The quantity measured will be the product of the number of metres erected on site and the number of months that the barrier sections are used on site for the approved duration of the contract. Any units stored on site and not being used on site for traffic accommodation purposes shall not be measured for payment.

The unit of measurement for subitem (b) shall be the linear metre of barrier already placed on the road which is dismantled, moved and re-erected to form a vehicle restraining system in another location on site. The tendered rate shall include full compensation for dismantling and moving the barrier sections, including any associated terminal and removable sections, placing them in a new position and fastening them together as specified to form a vehicle restraint system of the required length in the new location as approved by the Engineer.

The unit of measurement for subitem (c) shall be the number of terminal attenuator sections erected at the ends of vehicle restraint systems. The tendered rate shall include full compensation for the provision and erection of each terminal attenuator section in accordance with the manufacturer's specifications.

The unit of measurement for subitem (d) shall be the number of removable barrier sections erected in the vehicle restraint system at locations approved by the Engineer. The tendered rate shall include full compensation for the provision and erection of each removable barrier section in accordance with the manufacturer's specifications including for the cost of general maintenance of the removable barriers, opening and closing of the barriers when required, cost of insurance to replace structurally damaged sections and other overhead costs."

Add the following new sections:

"B1518 TOW TRUCKS

A heavy duty tow truck capable of moving heavy vehicles over 2 tons and a light duty tow truck for light vehicles under 2 tons shall be available when called upon for assistance with a reaction time not exceeding 15 minutes. Failure to react within the specified time shall result in the application of penalties under Clause B1502(l).

The heavy duty tow truck shall be able to remove broken down heavy vehicles off the roadway or to locations as directed by the traffic authorities. In the event of a truck breakdown, the Traffic Safety Officer shall contact the provincial traffic inspector who will then issue an instruction/permit for the tow truck operator to remove the stationary vehicle. It will be the Traffic Safety Officer's duty to administer the process so that the stationary vehicle is removed in the shortest time.

Both tow trucks must be branded with SANRAL insignia on the front, back and sides of each vehicle."

Add the following:

"B1519 ACCOMMODATION OF PEDESTRIAN TRAFFIC

The contractor shall pay specific attention to the accommodation of pedestrian traffic along the cross roads where the safety of pedestrians could be compromised as a result of the works.

Where pedestrians have to cross the site, the contractor shall ensure that the pedestrians are safeguarded and shall be able to cross the site without being endangered. The pedestrians should not be able to enter areas where works are taking place.

Should a walkway be required, it shall have a clear opening of at least 1,2 m wide and 2,1 m high and shall be uniformly illuminated at all times. The surface of the walkway shall be free from obstructions and shall be clearly signposted to guide the pedestrians towards the walkway. If steps are required to reach the level of the walkway, these shall comply with the OHS act and have proper handrails. No ramps shall be steeper than 1 in 8.

Payment for compliance to this requirement shall be deemed to be included in the rates tendered for accommodation of traffic."

a) Works on/outside the shoulders for the widenings

During this stage of construction, no slow lane may be closed for purpose of providing working space and the contractor shall strive to provide the existing number of through lanes at all times. The following conditions must be adhered to:

- i) Temporary barriers are to be used on the widening of the national road between the existing road and new construction and reflectors shall be fixed to the sides to increase visibility during night.
- ii) The number of entrances that may be provided into the working space shall be restricted to a maximum of two.
- iii) Construction vehicles will only be allowed to exit the construction area at the end of the section under construction.
- iv) Flicker lights shall be erected at the start of the closure for the entire construction period of each section during night time.

-
- v) The speed must be reduced to 80 km/h.
 - vi) Alternating flicker lights shall be used on the first pair of road signs at any set of traffic accommodation.

e) Short term lane closure

Short term lane closures shall typically be required during the surfacing overlay of the existing national road, application of lane markings and road studs, parking of concrete trucks during the pour of the road concrete pavement, etc. The following conditions must be adhered to:

- i) The approximate time periods for short term lane closures and construction of the works shall be as follows:
 - a) Day shifts: 08:30 – 15:30.
 - b) Night shifts: 19:00 – 05:30.

The above-mentioned time periods, especially the start of the lane closure, shall be determined at the start of each shift by the engineer and may vary slightly from the times indicated. Different time periods shall be applicable for each of the carriageways, the individual ramps and cross roads.

- ii) The day prior to a long weekend the full road width shall be re-opened not later than 14:00.
- iii) For night shifts, the maximum reflection shall be used on road signs and LED lights shall be used with reflective lighting.
- iv) A minimum of 2 lanes with 3,3m lane widths shall be provided at all times.
- v) Flashing illuminated arrow boards must be placed at the start of the closure.
- vi) Delineators shall be used to demarcate the construction area.
- vii) Lane closure may only be done between the hours specified in this clause and the full road shall be opened at the end of the shift. Consequently the penalty for late opening of a lane to traffic shall be applicable to this type of closure.
- viii) The maximum length of lane closure is 2,0 km.
- ix) The maximum number of closures is one per direction of traffic flow.
- x) Information signs as detailed with variable dates and times of a lane closure shall be erected at positions as directed by the engineer. The travelling public shall be informed of the lane closure at least 7 days in advance by displaying the information on the sign.

f) Very short term full closure of a carriageway

Full closure of a carriageway will typically be required for the time of blasting, for heavy rigs to cross over to the median and back, etc. The following conditions must be adhered to:

g) Permission must be given by the engineer

- i) The public must be informed through the radio the day preceding and the day of the closure.
- ii) Information of the closure must be displayed on the Variable Message Signs 7 days in advance.
- iii) Full closure will only be permitted during day time between peak hours.
- iv) Closure must not occur on a Friday or the day preceding a long weekend.
- v) The assistance of the traffic authorities shall be acquired.
- vi) The time of closure must be limited not to exceed 15 minutes.

A possible procedure for halting the traffic is:

- Close the slow lane to reduce the speed of the traffic.
- For the remaining lanes, vehicles of the contractor with high visibility signs are to drive side by side in each lane and reduce speed until a stand still.

- vii) The carriageway shall be opened only after declared safe by the contractor.

h) Works on cross roads and ramps

Whilst construction work on ramps and cross roads is conducted the following conditions shall be adhered to:

- i) All road signs used shall be high visibility rectangular signs.
- ii) Excavations shall be demarcated with temporary steel and/or concrete barriers at areas causing a safety hazard, else delineators can be used.
- iii) At least half of the road or ramp shall be open to accommodate traffic."

SECTION B1600: OVERHAUL

B1601 SCOPE

Insert in the second line between "excavation" and "or stockpile" the following:

" ..., crushing and screening,"

B1602 DEFINITIONS

(a) Overhaul material

(iv) *Insert "selected layers" before "subbase" in the first line.*

Insert the following as a final paragraph

"Material procured from commercial sources shall not be regarded as overhaul material."

b) Overhaul

Replace the sub-clause with:

"Regardless that the Standard Specification makes allowance for payment of restricted overhaul payment shall only be made for material hauled in excess of 1 kilometre. Overhaul shall be measured as the product of the volume of material hauled and the overhauled distance.

c) Haul distance

Add the following paragraph:

"Where material from one carriageway of a road is to be used on the opposite carriageway, the haul route shall be on the national route and crossing over at the nearest interchange or approved median crossing point. For this situation, the haul distance shall be measured from the position of obtaining the material, along the carriageway until centre point of the next interchange or approved median crossing point, and then back along the other carriageway. Only the distance on the national road will be measured and additional distances for travelling on the ramps, loops and cross roads will not be considered.

Return travel may have to be along other roads but will not be measured separately. Existing municipal streets can be used for haul of material.

d) Free-haul distance

Replace the last sentence with:

"This distance shall be 1 kilometre in the case of all overhaul materials and this specification shall be deemed to have replaced the 'free-haul' distance in all other sections of the standard specifications."

B1603 MEASUREMENT AND PAYMENT

Amend item 16.02 as follows:

"Item	Unit
B16.02 Overhaul on material hauled in excess of 1 km	cubic metre - kilometre (m³km)"

Delete the first paragraph of the first set of notes and replace it with the following:

"Only ordinary overhaul for haul in excess of 1.0 km will apply to all types of fill and layerwork materials. No restricted overhaul will be applicable on this contract."

SECTION B1700: CLEARING AND GRUBBING

B1701 SCOPE

Add the following as a final paragraph:

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

B1702 DESCRIPTION OF WORK

c) Conservation of topsoil

Add to the end of the 1st paragraph:

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

Replace the second paragraph of this clause with the following:

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

B1704 MEASUREMENT AND PAYMENT

Add the following payment item:

“Item	Unit
B17.07 Removal and temporary stockpiling of topsoil:	
(a) In windrows alongside the work area	cubic metre (m ³)
(b) In temporary stockpiles after loading material into trucks including 1,0km freehaul	cubic metre (m ³)
(c) In windrows on the edges of borrowpits or spoil areas	cubic metre (m ³)

The unit of measurement for items (a) to (c) shall be the cubic metre of topsoil removed to windrow or temporary stockpile. The volume of topsoil removed shall be measured in cut, calculated from the difference in cross-sections of the natural ground level before the commencement of clearing to cross-sections taken after the removal of the topsoil.

The contractor shall constantly liaise and agree with the engineer as to the depth of topsoil to be removed. Where, in the opinion of the engineer, material that would normally be classed as topsoil has also been excavated, the excavation shall be backfilled and compacted with selected material at the contractor’ expense. Should material that is deemed by the engineer not to be

topsoil, be removed and stockpiled together with material classed as topsoil, the contractor shall be responsible for the removal of this unsuitable soil from the stockpile and the replacement of the quantity of topsoil contaminated by the unsuitable material at his cost. The quantity of topsoil to be replaced shall be determined by the engineer.

The rates tendered shall include for the excavation of the topsoil and where required, the loading and hauling thereof to temporary stockpile as well as the maintenance of the stockpile until re-use of the material. The rates tendered shall also include for all supervision required to ensure that only topsoil is removed.”

SECTION B1800: DAYWORKS

B1801 SCOPE

This section covers the listing of daywork items in accordance with sub-clause 13.6 of the FIDIC Conditions of Contract, for the use in determining payment for work which cannot be quantified in specific units in the Pricing Schedule, or work ordered by the engineer during the construction period which was not foreseen at tender stage and for which no applicable rate exists in the Pricing Schedule.

B1802 ORDERING OF DAYWORK

No daywork shall be undertaken unless written authorisation has been obtained from the engineer.

B1803 MEASUREMENT AND PAYMENT

Item	Unit

B18.01 Personnel

(a) Unskilled labour	hour (h)
(b) Semi-skilled labour	hour (h)
(c) Skilled labour	hour (h)
(d) Ganger... ..	hour (h)
(e) Foreman	hour (h)

Item	Unit

B18.02 Equipment

(a) Front end loader, 2,0 m ³ bucket	hour (h)
(b) Backhoe loader, 0,75 m ³ bucket	hour (h)
(c) Compressor and 2 jackhammer's	hour (h)
(d) Grader, 14 000 kg/100 kW	hour (h)
(e) Tipper truck, 6 m ³	hour (h)
(f) Truck with mounted attenuator	hour (h)
(g) Watertruck, 10 000 L capacity	hour (h)
(h) Dozer (D7 or similar)	hour (h)
(i) Padfoot Roller, 13 000 kg (self-propelled)	hour (h)
(j) Grid Roller, 10 000 kg	hour (h)

Item	Unit

B18.03 Materials

(a) Procurement of materials	provisional (Prov) sum
(b) Contractor's handling costs, profit and all other charges in respect of sub-item B1803(a)	percentage (%)

Item	Unit

B18.04 Transport

-
(a) LDV	kilometre (km)
(b) Dropside truck, minimum 8 Ton with crane	kilometre (km)
(c) Bus for transporting local labour, 45 seater minimum	kilometre (km)
(d) Mini-bus for transporting local labour, 16 seater minimum	kilometre (km)

The unit of measurement for items B18.01 and B18.02 shall be the hour for the item of equipment or personnel. Non-working hours for transport breakdown, lack of operator of any other reason shall not be measured. The time shall be taken from the time that the personnel and/or equipment depart until return.

Measurement shall only be for work instructed and directed by the engineer, where the engineer considers no other appropriate rate is applicable in the Pricing Schedule. Prior to the commencement of any work by the personnel described under item B18.01 the contractor must obtain written consent from the engineer regarding their classification in terms of "unskilled", semi-skilled" and "skilled" personnel.

The tendered rates for labour under B18.01 shall include full compensation to cover overhead charges and profit, leave pay, bonuses, subsistence, allowances, Employer's contributions, additional payment for overtime where applicable, insurances, housing, site supervision, use of small hand tools and appliances, non -mechanical plant and equipment and consumable stores, for all administrative, supervisory, operative and contingent costs, relating to the supply of personnel.

The tendered rates for plant for item B18.02 shall be an all-inclusive hire charge for the use of the vehicle and driver or plant/equipment and operator and shall apply only to vehicles plant and equipment nominated in writing by the engineer, for all administrative, supervisory, operative and contingent cost, and profit relating to the running of the plant.

The unit of measurement for subitem B18.03(a) shall be the amounts actually paid for the procurement of materials to be purchased and shall be made in accordance with the provision of the FIDIC Conditions of Contract. Only the actual quantities of materials used, as verified by the engineer, shall be paid for.

The percentage tendered for subitem B18.03(b) shall be the percentage of the amounts actually paid for the procurement of materials as ordered under subitem B18.03(a) and shall be in full and final compensation in respect of the contractor's handling costs, profit and all other charges in connection with the procurement and supply of the materials to the point of usage.

The unit of measurement for item B18.04 shall be the kilometre distance that the vehicle travelled for transporting personnel and/or plant. All travelling shall be approved by the engineer.

The tendered rate for item B18.04 shall include full compensation for the cost of the vehicle including fuel, maintenance depreciation and running costs.

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

B18.05 Site Surveyor

(a) Site Surveyor and assistants	hour (h)

The unit of measurement shall be hour of for the personnel and equipment utilized on the instruction of the Engineer.

The tendered rate shall include all costs for the professionally registered Surveyor and two survey assistants, including all equipment and transports required to carry out the topographical survey to the latest standards.

COLTO SERIES 2000: DRAINAGE

SECTION B2100: DRAINS

B2101 SCOPE

Amend the first paragraph to read:

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

B2104 SUBSOIL DRAINAGE

a) Materials

(i) Pipes

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

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

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

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

(ii) Natural permeable material

Add the following to the 3rd paragraph:

“The crushed stone shall be coarse (20mm nominal) and shall be washed clean of all fines”

(iii) Synthetic-fibre filter fabric

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

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

Add the following item:

“(5) Testing

General:

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

the employer.

b) Construction of subsoil drainage systems

Add the following sub-clause:

“(v) Proving of pipes in subsoil drainage systems

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

B2106 MANHOLES, OUTLET STRUCTURES AND CLEANING EYES

Insert the following paragraph after the last paragraph:

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

B2107 MEASUREMENT AND PAYMENT

Item	Unit

B21.01 Excavation for open drains

Add the following to the penultimate paragraph:

“The tendered rate shall also include full compensation for trimming the open drains”

Item	Unit

B21.03 Excavation for subsoil drainage systems

Add the following subitem:

“(c) Extra-over item 21.03(a) for excavating through stabilised layers of existing pavement cubic metre (m³)”

Add the following to the second paragraph:

“Excavation in stabilised pavement material shall be paid only in subitem (c) and shall not be paid as an extra over for hard material in subitem (b). For subitem (c), the tendered rate shall also include full compensation for backfill with soilcrete.”

Item	Unit

B21.04 Impermeable backfilling to subsoil drainage systems

Add the following sub-items:

“(a) Unstabilised natural gravel cubic metre (m³)”

(b) G5 material stabilised with 4% stabilising agent cubic metre (m³)”

Amend pay items B21.06 and B21.07 to read as follows:

“B21.06 Natural permeable material in subsoil drainage systems (washed crushed stone):

B21.07 Natural permeable material in subsoil drainage systems (washed sand):”

Item	Unit

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

Add the following:

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

Add the following payment items:

“Item	Unit

B21.20 Exposing of existing subsoil drains	cubic metre (m ³)

The unit of measurement shall be the cubic metre of material removed by hand to expose the drain.

The tendered rate shall include full compensation for all labour and tools required for removing the material. The re-instatement of the drain shall be paid for under the relevant items for constructing a new drain.

Item	Unit

B21.21 Clearing of subsoil drains	metre (m)

The unit of measurement shall be the metre of drain cleared with a sewer cleaning rod and thorough flushing on the instruction of the engineer.

The tendered rate shall include full compensation for all labour, equipment, tools and transport required for clearing subsoil drains and for disposal of the cleared material to approved sites.”

Item	Unit

B21.22 Subsoil outlet marker board	number (No)

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

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

Item	Unit
B21.23 Break into existing drainage structures and install subsoil drain pipe	number (No)

The unit of measurement is the number of subsoil drain pipes built into existing drainage structures in accordance with the details on the drawings or as instructed by the engineer.

The tendered rates shall include full compensation for supplying all labour, constructional plant and materials required, for all excavation, breaking into existing drainage structures, building pipes into the newly formed accesses, sealing around the pipes and making the joints watertight, breaking out existing benching and channelling where required and reconstructing them complete with granolithic rendering to suit the new pipe arrangement, backfilling and compacting to 90% of modified AASHTO density, transporting (including all haul) and disposing of all surplus excavated material and debris to approved dumping sites provided by the contractor, and dealing with the flows in the existing structures.

No distinction will be made between different types of structures, or diameters of subsoil drain pipes.”

SECTION B2200: PREFABRICATED CULVERTS

B2201: SCOPE

Add the following:

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

B2202 TYPES OF CULVERTS

No prefabricated culverts greater than 1.8m is allowed on this contract For cast in situ culvert details greater than 1.8m refer to Volume 5 Structural Drawings.

B2203 MATERIALS

b) Portal and rectangular prefabricated concrete culvert units

Replace this sub-clause with the following:

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

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

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

B2204: CONSTRUCTION METHODS

Replace the 2nd paragraph with the following:

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

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

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

least 93% Mod. AASHTO density.

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

B2215 SERVICE DUCTS

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

"(v) HDPE Sleeve Pipes

HDPE sleeve pipes shall be:

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

Insert the following as a new 4th paragraph

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

Add the following at the end of the penultimate paragraph

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

B2218 MEASUREMENT AND PAYMENT

Item	Unit

B22.01 Excavation

Add the following sub-item:

"Item	Unit

B22.01 (c) Extra-over sub-item 22.01(a) for excavation by hand ... cubic metre (m³)

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

The tendered extra-over rate shall include full compensation for all additional costs in excavating

the material using hand held tools.”

Item	Unit

B22.12 Removing existing concrete

Insert the following after the word “demolition” in the 2nd paragraph of the payment description:

“... to a specified maximum size 300 mm maximum dimension”

Item	Unit

B22.23 Service ducts

Add the following sub payment item:

“(c) Installation by drilling (type and diameter indicated) metre (m)

The tendered rate for (c) shall be as for (a) or (b) and shall also include full compensation for all labour and equipment for the complete drilling process. Any requirement for shoring shall be paid under payment item B61.51.”

Amend pay items B22.24 to read as follows:

“B22.24 Service duct markers”

In the payment description replace “marker block” with “service duct markers”.

Add the following new payment item

Item	Unit

B22.29 Breaking into existing drainage structures and building in pipes or culverts of the following size (pipe diameter and/or culvert size to be stated) number

The unit of measurement is the number of each type and size of existing drainage structure that is being modified as shown on the drawings or as instructed by the engineer.

The tendered rates shall include full compensation for providing all labour, constructional plant and materials required, for all excavation, breaking into existing drainage structures, building into the newly formed accesses, sealing around the edges and making the joints watertight, breaking out existing benching and channelling where required and reconstructing them complete with granolithic rendering to suit the new drainage arrangement, backfilling and compacting to at least 93% of modified AASHTO density and dealing with the flows in the existing structures.”

SECTION B2300: CONCRETE KERBING, CONCRETE CHANNELLING, CHUTES AND DOWNPIPES AND CONCRETE LINING FOR OPEN DRAINS

B2301 SCOPE

Add the following to this clause:

"This section also covers the replacement of damaged concrete kerbing, channelling and lining."

B2304 CONSTRUCTION

b) Prefabricated concrete kerbing and channelling

Amend the end of the 2nd paragraph to read as follows:

"... road junctions, where the kerb units shall be 0,5 m in length for curve radii between 5,0 m and 20,0 m and 0,3 m in length for curve radii between 1,0 m and 5,0 m. For curves with a radius less than one metre the kerbs shall be cast in situ. Any associated prefabricated concrete channelling units shall also comply with the above requirements."

g) Concrete-lined open drains

Add the following to the last paragraph:

"Alternatively the surface could be sprayed with invert bituminous emulsion as soon as possible after the excavations have been trimmed and compacted. The sprayed surfaces shall be maintained until the concrete lining is cast. The nominal rate of application of the emulsion shall be 0.5 litre/m² unless otherwise instructed by the engineer."

Add the following sub-clause:

(l) Demolition of existing kerb and channel and concrete lined drains

Where shown on the drawings and/or indicated by the engineer, the existing kerb and channel and concrete lined drains shall be demolished to a specified maximum size, removed and transported to an approved spoil site as provided by the contractor..."

B2307 MEASUREMENT AND PAYMENT

Amend item B23.14 as follows:

"Item	Unit
B23.14 Cutting bituminous surfacing and pavement layers for concrete kerbing, channelling or concrete-lined drains (specify type and depth)"	

Delete in line 3 of the 1st paragraph of the payment item description:

"irrespective of the depth cut".

Add the following payment items:

**"Item
Unit**

B23.16 Spraying trimmed surfaces of excavations for concrete-lined open drains with invert bituminous emulsion (MSP 1 or approved equivalent) litre (l)

The unit of measurement is the litre of approved emulsion applied to the trimmed surfaces of excavations, calculated in accordance with the required application rate and the net area to be sprayed as instructed by the engineer.

The tendered rate shall include full compensation for procuring, furnishing and spraying the emulsion and maintaining the sprayed surface until the concrete is placed. No payment will be made for emulsion applied in excess of the rate of application ordered plus the tolerance allowed.

Item	Unit

B23.17 Demolition and removal of existing kerbs and/or channel, concrete lined drains (specify maximum size) cubic metre (m³)

The unit of measurement shall be the cubic metre (m³) of material measured in situ before demolition or excavation.

The tendered rate shall include full compensation for breaking up the existing concrete or reinforced concrete to a specified maximum size, removal from site to an approved spoil site, clearing the excavation of all loose debris and to backfill the excavation where new concrete is not required. Overhaul will be paid under item B16.02.

Item	Unit

B23.18 Extra over items 23.01 and 23.02 for concrete kerbing or concrete kerbing and channelling on curves

- (a) on curves of radii more than or equal to 5,0 m but less than 20,0 m metre (m)
- (b) on curves with radii more than or equal to 1,0 m but less than 5,0 m metre (m)
- (c) on curves with radii less than 1,0 m metre (m)

The unit of measurement shall be the metre of concrete kerbing or kerbing and channelling combination complete as constructed, measured along the front face of the kerb.

The tendered rate shall include full compensation for the additional costs involved in setting out, preparing and constructing as specified on curves with radii less than 20 m.

Item	Unit

B23.19 Precast Pedestrian ramps at intersections number (No)

The unit of measurement is the number of pedestrian ramps.

The tendered rate shall include full compensation for removing existing kerbing if required, for procuring and placing the precast concrete blocks, placing with finishing and contraction joints in the concrete surround and all other incidentals to complete the construction all in accordance with the drawings."

SECTION B3300: MASS EARTHWORKS

B3302 MATERIALS

b) Fill

Add the following under item (iv):

"The maximum swell at 100% Mod AASHTO compaction shall not be more than 2%."

B3303 CLASSIFICATION OF CUT AND BORROW EXCAVATION

Classification of cut and borrow excavation shall be revised as follows:

"a) Classes of excavation

(ii) Intermediate excavation

No distinction shall be made between soft and intermediate excavation, and all intermediate excavation shall be classified and measured as soft excavation."

B3305 TREATING THE ROADBED

a) Removing unsuitable material

Replace "or" in the eight line of the third paragraph with "and"

d) In situ treatment of roadbed

Add the following after the second paragraph:

"Shales and mudstone shall be treated as directed by the engineer."

B3306 CUT AND BORROW

e) The temporary stockpiling of materials

Replace the contents of this subclause with the following:

"The contractor shall plan his activities in such a manner so that materials excavated from borrow areas and cuttings can be directly transported to and placed at the designated points.

The temporary stockpiling of material will not be paid for separately unless instructed by the engineer, and full compensation will be deemed to have been included in the rates tendered for the various payment items for work for which the stockpiled material is to be used."

g) General

Add the following after the first sentence of the second paragraph:

"The final cut surface in hard excavation shall not be more than 0,5 m below the specified slope face, measured at right angles to the strike and dip directions of the slope face."

B3307 FILLS

a) General

Add the following:

"Where existing embankments are to be widened, or where new embankments are to be constructed adjacent to existing embankments, the existing side slopes shall be benched as specified in subclause 3307(d) and in accordance with the details on the drawings.

In addition the material in the fill widening shall, unless otherwise instructed by the engineer, be compacted as follows:

- (i) where the thickness exceeds 1,5 m, it shall be compacted to a minimum of 93% modified AASHTO density to a depth of at least 1,5 m below the final road level; or
- (ii) where the thickness is less than 1,5 m, the in situ roadbed and fill material shall be compacted to 93% modified AASHTO density."

d) Benching

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

"The dimensions of benches as well as the extent to which existing fills have to be cut back to form benches shall be as indicated on the drawings or indicated by the engineer."

Add the following after the second paragraph:

"In order to obtain sufficient working width for road-building equipment when the existing road fill is widened, it may be necessary to form benches that extend beyond the normal road prism or to cut back into the existing road fill or both. The contractor shall submit his proposals in this regard to the engineer for approval before proceeding with such work. The contractor will be paid in accordance with the relevant payment items for work required to obtain a working width of up to 4 m. Additional work required to provide a working width in excess of 4 m shall be at the contractor's expense."

B3312 MEASUREMENT AND PAYMENT

Add the following items:

"Item	Unit
B33.20 Fill constructed with material obtained from commercial sources or sources provided by the contractor, including all haul	
(a) Gravel material in compacted layer thicknesses of 200 mm and less:	
(i) Compacted to 90% of maximum dry density	cubic metre (m ³)
(ii) Compacted to 93% of maximum dry density	cubic metre (m ³)
(iii) Eight-roller-passes compaction.....	cubic metre (m ³)
(b) Rock fill (as specified in subclause 3209(c))	cubic metre (m ³)
(c) Rock protection at the toes of fills.....	cubic metre (m ³)
(d) Pioneer layer (as specified in subclause 3307(c)).....	cubic metre (m ³)

The unit of measurement is the cubic metre of material measured in the compacted fill. The quantity measured shall be calculated by the method of average end areas from levelled cross-sections prepared from the ground line after clearing and grubbing and the removal of topsoil and the completion of any preparatory roadbed treatment which may have been ordered by the engineer, but prior to the construction of the fill, and the final specified or authorised fill cross-section superimposed at 20 m intervals along the centre line of the road. All measurement shall be neat and no payment will be made for that part of the fill placed in excess of the authorised cross-section shown on the drawings or instructed by the engineer, irrespective of the tolerances in workmanship allowed under the contract. Where the roadbed has subsided under the fills, the quantities shall be adjusted to make allowance for such subsidence, as set out in the note at the beginning of clause 3312. Measurement of fill shall distinguish between the alternative methods of processing and compacting.

Where measurement by cross-sections is considered by the engineer to be impractical, the compacted volume of the material may be taken as equal to 70% of the loose volume of material in the hauling vehicles as an alternative method of measurement.

The tendered rates shall include full compensation for the costs of negotiations and payment of royalties, for procuring, furnishing and transporting the materials over an unlimited free-haul distance from the sources to the site, for placing, preparing, processing, shaping, watering, mixing and compacting the materials to the densities or in the manner specified, and for removing and disposing of all oversize material from the road after processing, including transport for the haul distance to approved dumping sites provided by the contractor.

Payment shall distinguish between the various methods of processing and compacting specified, as itemised above.

Item	Unit
B33.21	Fill constructed with material from temporary (not designated) stockpiles or directly from existing pavement layers and existing road prisms, irrespective of material type, including all haul:
(a)	Gravel material in compacted layer thicknesses of 200 mm and less on the road:
(i)	Compacted to 90% of maximum dry density cubic metre (m ³)
(ii)	Compacted to 93% of maximum dry density cubic metre (m ³)
(iii)	Eight-roller-passes compaction cubic metre (m ³)
(b)	Gravel material in compacted layer thicknesses of 200 mm and less at community facilities, school sport fields:
(i)	Compacted to 90% of maximum dry density cubic metre (m ³)

The unit of measurement is the cubic metre of material measured in the compacted fill. The quantity measured shall be calculated by the method of average end areas from levelled cross-sections prepared from the ground line after clearing and grubbing and the removal of topsoil and the completion of any preparatory roadbed treatment which may have been ordered by the engineer, but prior to the construction of the fill, and the final specified or authorised fill cross-section superimposed at 20 m intervals along the centre line of the road. All measurement shall be neat and no payment will be made for that part of the fill placed in excess of the authorised cross-section shown on the drawings or instructed by the engineer, irrespective of the tolerances in workmanship allowed under the contract. Where the roadbed has subsided under the fills, the quantities shall be adjusted to make allowance for such subsidence, as set out in the note at the beginning of clause 3312. Measurement of fill shall distinguish between the alternative methods of processing and compacting.

The sources shall be points where existing pavement layers have been excavated or milled out or stockpiled and deemed to be acceptable for their use in the new fills elsewhere within the project boundaries. Fill and pavement layers from existing ramps or materials to be excavated or milled out from the existing pavements on sections that require repair or rehabilitation shall be included in this item.

Where measurement by cross-sections is considered by the engineer to be impractical, the compacted volume of the material may be taken as equal to 70% of the loose volume of material in the hauling vehicles as an alternative method of measurement.

The tendered rates shall include full compensation for the costs of procuring, furnishing and transporting the materials over an unlimited free-haul distance from the sources to the site, for placing, breaking down if required, preparing, processing, shaping, watering, mixing and compacting the materials to the densities or in the manner specified, and for removing and disposing of all oversize material from the road after processing, including transport for an unlimited haul distance to approved dumping sites provided by the contractor.

Item	Unit

B33.22	Fill constructed with gravel hauled from designated borrow pits or from designated stockpiles (not made with material excavated on this project), including free haul up to 1 km

(a)	Gravel material in compacted layer thicknesses of 200 mm and less:
(i)	Compacted to 90% of maximum dry density cubic metre (m ³)
(ii)	Compacted to 93% of maximum dry density cubic metre (m ³)
(iii)	Eight-roller-passes compaction cubic metre (m ³)

The unit of measurement is the cubic metre of material measured in the compacted fill. The quantity measured shall be calculated by the method of average end areas from levelled cross-sections prepared from the ground line after clearing and grubbing and the removal of topsoil and the completion of any preparatory roadbed treatment which may have been ordered by the engineer, but prior to the construction of the fill, and the final specified or authorised fill cross-section superimposed at 20 m intervals along the centre line of the road. All measurement shall be neat and no payment will be made for that part of the fill placed in excess of the authorised cross-section shown on the drawings or instructed by the engineer, irrespective of the tolerances in workmanship allowed under the contract. Where the roadbed has subsided under the fills, the quantities shall be adjusted to make allowance for such subsidence, as set out in the note at the beginning of clause 3312. Measurement of fill shall distinguish between the alternative methods of processing and compacting.

Where measurement by cross-sections is considered by the engineer to be impractical, the compacted volume of the material may be taken as equal to 70% of the loose volume of material in the hauling vehicles as an alternative method of measurement.

The tendered rates shall include full compensation for the costs of negotiations and payment of royalties, for procuring, furnishing and transporting the materials over an a free-haul distance of 1 km from the sources to the site, for placing, preparing, processing, shaping, watering, mixing and compacting the materials to the densities or in the manner specified, and for removing and disposing of all oversize material from the road after processing, including transport for the free haul distance to approved dumping sites provided by the contractor."

SECTION B3400: PAVEMENT LAYERS OF GRAVEL MATERIAL

B3402 MATERIALS

a) General

Add the following at the end of the second paragraph:

"For chemically stabilised layers the material shall conform to the requirements in table B3402/5.

For bitumen stabilised layers the material shall conform to the requirements in table B3402/6.

For cold in situ recycled layers the target grading shall be as indicated in table B3402/7"

Add the following after the second paragraph:

"Distinction shall be made between crushed and natural G4, G5 and G6 materials. Where the crushing and/or screening of these materials has been specified, the combined grading shall conform to the grading limits specified for G4 class material in Table B3402/1.

The same shall apply for all materials obtained from commercial sources."

Replace the grading and grading modulus sections in Table 3402/1 with:

Property		TYPE OF MATERIAL		
		G4	G5	G6
GRADING G	Nominal aperture size of sieve (mm)	Percentage passing through sieve by mass		The percentage by mass passing the 2,00mm sieve shall not be less than 20% nor more than 70%
		Crushed material produced by multi-stage crushing and screening	Uncrushed material or material produced by single stage crushing	
	53		100	
	50		95 - 100	
	37,5	100	85 - 100	
	28	86 - 95		
	20	73 - 86	65- 86	
	14	61 - 76		
	5	37 - 54	35 - 54	
	2	29 - 40	25 - 40	
	0,425	15 - 24	14 - 24	
	0,075	6 - 12	8 - 12	
GRADING MODULUS (GM)		-		2,5 ≥ GM ≥ 1,5
				2,6 ≥ GM ≥ 1,2

Note:

Refer to standard COLTO table for COLTO grading if required

Replace Table 3402/5 with:

"TABLE B3402/5: REQUIREMENTS FOR CHEMICALLY STABILISED LAYERS

Classification	C1	C2	C3	C4
Material before treatment	At least G2 quality	At least G4 quality	At least G5 quality	At least G6 quality
PI after treatment	Non-plastic	Non-plastic	6 max. *(1)	6 max. *(1)
UCS (MPa) *(2)	6 min.	4 min.	1,5 min	0,75 min.
ITS (kPa) *(3)	-	-	250 min.	200 min.
WDD (% loss) *(4)	5 max.	10 max.	20 max.	30 max.

Note:

- * (1) For materials derived from the basic crystalline rock group, the Plasticity Index after stabilisation shall be non-plastic.
- * (2) Unconfined Compressive Strength @ 100% Mod. AASHTO density
- * (3) Indirect tensile Strength @ 100% Mod. AASHTO density (Rapid Curing)
- * (4) Wet/Dry Durability according to Method B 8110"

Add the following tables after table B3402/5:

"TABLE B3402/6: REQUIREMENTS FOR BITUMEN STABILISED LAYERS (BSM)

Test	Specimen Diameter (1)	Classification (2)		
		BSM1	BSM2	BSM3
ITS _{dry}	100mm	>225 kPa	175 – 225 kPa	125 – 175 kPa
ITS _{wet}	100mm	>100 kPa	75 – 100 kPa	50 – 75 kPa
ITS _{equil}	150mm	>175 kPa	135 – 175 kPa	95 – 135 kPa
ITS _{soaked}	150mm.	>150 kPa	100 – 150 kPa	60 – 100 kPa

Note:

- * (1) Specimen diameter appropriate to design level as per TG2 shall apply. In the case of constructed layers only 150mm diameter specimens shall be used.
- * (2) Classification of bitumen stabilised material in terms of the latest TG2 guidelines.

TABLE B3402/7: TARGET GRADING ENVELOPE FOR COLD IN SITU RECYCLED PAVEMENT LAYERS

Sieve Size (mm)	Percent Passing		
	Cement / Lime	BSM-Emulsion	BSM-Foam
50	100	100	100
37.5	87 – 100	87 – 100	87 – 100
28	82 – 100	82 -100	82 – 100
20	72 - 100	72 - 100	72 - 100
14	60 -90	60 -90	60 -90
10	51 - 77	51 - 77	51 - 77
7	42 -65	42 -65	42 -65
5	36 - 57	36 - 57	36 - 57
0.425	12 – 26	10- 24	12 – 26
0.075	4 - 10	2 - 9	4 - 10

b) Compaction requirements

Amend the compaction requirements as follows:

“Lower selected layer: 93% of M.D.D (SANS-3001-GR30) density
Upper selected layer: 93% of M.D.D (SANS-3001-GR30) density

Subbase: 97% of M.D.D (SANS-3001-GR30) density for chemically stabilized
Base: 88% of apparent relative density for G1 material
Shoulder & wearing course: 95% of M.D.D (SANS-3001-GR30) density"

B3403 CONSTRUCTION

Add the following subparagraph:

“(f) Cold in situ recycling and mixing

Where the in situ layer consisting of granular or cemented layers, which may include asphalt or bituminous surfacing above granular or cemented support layer is to be recycled, with or without any make-up material, the layer must be constructed according to the method described in B3512.”

B3405 CONSTRUCTION TOLERANCES

(a) Level

Replace the table in the sub-sub-clause with the following:

“	H_{90}	H_{max}
<i>Selected layers</i>	<i>25 mm</i>	<i>33 mm</i>
<i>Sub-base layers</i>	<i>15 mm</i>	<i>20 mm</i>
<i>Base layers</i>	<i>12 mm</i>	<i>15 mm</i>
<i>Shoulders</i>		<i>25 mm"</i>

Add the following:

"Level control for the various pavement layers shall be done at least at the following intervals in the longitudinal direction:

Layer	Interval
Selected layer, sub-base, shoulders and wearing course	20 m
Base	10 m

(b) Layer thicknesses

Replace the table in the sub-sub-clause with the following:

“	D_{90}	D_{max}	D_{ave}
<i>Selected layers</i>	<i>25 mm</i>	<i>35 mm</i>	<i>8 mm</i>
<i>Sub-base layers</i>	<i>18 mm</i>	<i>24 mm</i>	<i>5 mm</i>
<i>Base layers</i>	<i>15 mm</i>	<i>22 mm</i>	<i>5 mm</i>
<i>Shoulders</i>		<i>30 mm</i>	<i>0 mm"</i>

B3406 QUALITY OF MATERIALS AND WORKMANSHIP

Replace the second paragraph with the following:

"Test results and measurements will be assessed in accordance with the provisions of Section

8200."

B3407 MEASUREMENT AND PAYMENT

"Item	Unit
B34.01 Pavement layers constructed from gravel obtained from cut or borrow (including haul up to 1,0km)	
(d) Gravel subbase C3 chemically stabilized material (using G5 quality material) compacted to:	
(iii) 97% of maximum dry density (150mm compacted layer thickness)	
cubic metre (m ³)	

Payment conditions remain unchanged.

Item	Unit
B34.14 Pavement layers constructed from gravel obtained from commercial course (including all overhaul):	
(a) Gravel selected layer (G7 quality material) compacted to:	
(i) 93% of maximum dry density (150mm compacted layer thickness)	
cubic metre (m ³)	
(b) Gravel subbase C3 chemically stabilized material (using G5 quality material) compacted to:	
(i) 97% of maximum dry density (150mm compacted layer thickness)	
cubic metre (m ³)	
(c) Gravel shoulder wearing course (Type 2) compacted to:	
(i) 95% of maximum dry density (150mm compacted layer thickness)	
cubic metre (m ³)	
(d) Gravel wearing course (Type 2) compacted to:	
(i) 95% of maximum dry density (150mm compacted layer thickness)	
cubic metre (m ³)	

The unit of measurement shall be the cubic metre of compacted pavement layer, the quantity of which shall be calculated in accordance with the authorized dimensions of the completed layer.

The tendered rate shall include full compensation for sourcing and procuring the material from commercial sources, loading and transporting for the full distance between the source and place of use, offloading, breaking down, placing and compacting the material, and for the protection and maintenance of the layer as well as for the performance of control tests. Overhaul will not be payable for material from commercial sources."

SECTION B3500: STABILIZATION

B3501 SCOPE

Add the following as a 3rd paragraph:

"The use of recyclers for cold in situ recycling purposes is also covered in this section, which includes cement, lime, emulsion and foam stabilisation of base and subbase layers consisting of gravel and/or crushed stone material as described in sections 3400 and 3600."

B3502 MATERIALS

a) Chemical stabilizing agents

Delete sub-clauses (ii) Ordinary Portland cement and (iii) Portland blast-furnace cement and replace with the following:

"Cement shall comply with the relevant requirements of SANS 50197-1:2000. The use of strength classes greater than 32,5 shall not be permitted.

On this contract CEM II 32,5 shall be used for stabilization purposes."

B3503 CHEMICAL STABILIZATION

a) Preparing the layer

Insert the following before the first paragraph:

"Moisture content tests shall not be undertaken more than one day in advance of in situ stabilization operations. Care shall be taken to ensure that samples are representative of the in situ material. Checks shall be conducted when wet weather occurs between initial testing and work commencing on any section."

b) Applying the stabilizing agent

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

"Spreading shall only commence when the engineer is satisfied that the correct quantity of stabilizing agent has been placed on the layer and has given permission that the stabilizing agent may be spread uniformly over the entire surface to be treated."

h) Curing the stabilized work

Add the following to method (ii):

"The covering material shall be placed by end-tipping, spread, and not compacted until the underlaying layer has cured for at least 7 days."

Add the following to paragraph:

"Method (iii) and (iv) shall not be applicable."

i) Construction limitations

Replace the fourth paragraph starting with “No stabilization ...” with the following:

“No stabilization shall be done during windy conditions, wet weather or with falling air temperatures (7°C and dropping), or during rising air temperatures (when the air temperature is below 3°C).

The surface temperature of a compacted stabilized layer shall not be allowed to fall below 1°C during the first three (3) days after stabilization. The contractor shall be responsible for taking the necessary precautions to prevent the layer from freezing.

All stabilized layers damaged by rain, frost or by the formation of ice in the layer shall be removed and replaced by the contractor at his own expense.

The contractor shall make allowance for these requirements in his construction programme.”

In Table 3503/1, delete “8 hours” for Ordinary portland cements and cement blends and replace with “6 hours”.

B3506 TOLERANCES

b) Uniformity of mix (chemical stabilisation)

Test method (ii) shall apply.

Replace the full stop at the end of paragraph (i) with the following:

“using the formula (S_n / X_n)

where:

S_n is the standard deviation of stabilizer
 X_n is the average stabilizer content.”

B3507 CONSTRUCTION OF TRIAL SECTION

Insert the following before the second paragraph:

“Prior to carrying out the trial section for cold in situ recycling, the contractor shall assemble all items of plant and equipment that he proposes to use for the recycling operation. Only those machines he intends using for production work shall be used to construct the trial section and under no circumstances shall he be permitted to use any substitutes. The first section of pavement to be recycled shall be regarded as a trial section with the objective of:

- demonstrating that the equipment and processes he proposes to employ are capable of constructing the recycled layer in accordance with the specified requirements;
- determining the effect on the grading of the recycled material by varying the forward speed of the recycling machine and the rate of rotation of the milling drum; and
- determining the amount of rolling necessary to achieve the compaction requirements.

The trial section shall be at least 200m in length and shall cover the full lane-width or half-road width in accordance with the geometry of the road and the accepted work plan.

To allow the engineer sufficient time to assess all aspects of quality of the completed trial section and contingent on the results being satisfactory, the contractor shall programme to start

production recycling work no sooner than one week after constructing the trial section.

Should the contractor make any alterations in the methods, processes, equipment or materials used, or if he is unable to comply consistently with the specifications due to variations in the in situ material, or for any other reason, he may be required to undertake further trial sections before continuing with the permanent work.”

Insert the following new paragraph after the third paragraph:

“For cold in situ recycling provision is made for payment for the first approved trial section. Such payment will be made as an extra-over to the various payment items for recycling work together with all additives that will be measured and paid as normal production work. Any further trial sections ordered by the engineer shall likewise be paid provided they are approved.”

B3509 QUALITY OF MATERIALS AND WORKMANSHIP

Add the following after the second paragraph:

“The test results and measurements will be judged in accordance with the provisions of Section 8200. Bitumen stabilised layers shall be judged on the same criteria as chemically stabilised layers.”

Add the following paragraphs:

"The engineer shall be notified in good time to enable him to conduct tests himself.

Sample preparation and testing for cement stabilization testing shall be done by means of the Rapid Cure Method as described in clause B8110 while bitumen stabilisation sampling and testing shall be in accordance with the latest edition of the TG2.

The stabilized material sampled from the layer for the compaction of modified AASHTO briquettes, shall be prepared according to SANS 3001; GR54; i.e. discard material coarser than a 37,5 mm test sieve, and compacted according to SANS 3001; GR31.

Any delamination of the completed layer (biscuiting), identified by the hollow sound caused when a chain is dragged over the stabilized layer, shall be removed and repaired prior to the construction of subsequent layers. The repair method shall be approved by the engineer. No payment will be made for repairs.

(a) Process control for cold in situ recycling

The contractor shall establish a comprehensive process control system for the recycling work.

The following daily reports shall be submitted as a minimum:

- The production plan;
- The completed pre-start check list;
- Weather conditions and temperature measurements;
- Details of the recycling work completed during the day with the following information for each cut that was made:
 - start and end chainage;
 - depth of cut (including a schedule of dip measurements);
 - width of application of stabilising agent(s);
 - nozzle settings (closures) for each spraybar (where relevant);
 - computer data input;

- cement/lime spreading check measurements (where relevant);and
- compaction data in electronic format from the integrated compactometer device fitted to the primary roller (if applicable);
- Where the material is treated with a bitumen stabilising agent, the following shall be included:
 - bitumen emulsion or Pen-grade bitumen consumption;
 - average temperature and pressure measured at the spraybar; and
 - all other details shown in the sample report included in the Appendices of the latest edition of SAPEM and TG2:
- Relevant comments/information concerning the recycling operation. These shall include but shall not be limited to:
 - standing time and the reason(s);
 - sections where in situ pavement conditions changed together with a description of the change (e.g. thick asphalt between km 1+200 and km 1+230 in Cut #2);
 - details of any non-routine tests that were undertaken;
 - any changes in the weather during the day (e.g. strong wind from 13:00); and
 - relevant instructions received and from whom; and
- The location where the daily sample of pulverised material was taken."

B3510 MEASUREMENT AND PAYMENT

Item	Unit

B35.02 Chemical stabilizing agent

Replace the full stop at the end of the third paragraph with the following:

" and layer dimensions."

Item	Unit

B35.08 Bituminous stabilizing agent

Replace the 2nd payment paragraph with the following:

"The tendered rate for bituminous stabilising agents shall include full compensation for procuring and transporting the bituminous stabilising agent to site, for transfer into storage tanks, storage, heating and transfer into tankers for coupling to the recycling train, for all transport on site, for issuing the required assized weighbridge ticket showing the mass of bitumen contained in the tanker, for any re-heating required, for all wastage and for strict adherence to all safety measures required when handling warm or hot bitumen . The rate shall further include full compensation for diluting and applying the stabilising agent, irrespective of the prescribed rated of application. For foamed bitumen, the rate shall include for foaming the bitumen on the recycler, including the water and any other additive that may be required to achieve the minimum foaming characteristics and for injecting the foamed bitumen into the recycled material."

Item	Unit

B35.13 Extra over Items 35.01 and 35.07 for trial sections	cubic metre (m ³)

Amend the payment item as follows:

"B35.13 Extra over Items 35.01, 35.07 and B35.19 for trial sections	cubic metre (m ³)"

Add the following new payment items:

Item	Unit
B35.14 Sampling of in situ material for mix design procedure	Number (No)

The unit of measurement shall be the number of positions for sampling of in situ material for the mix design procedure.

The tendered rate shall include full compensation for all costs to make available, operate and to transport the recycling machine and other equipment to the sampling position. To provide the required traffic accommodation in terms of section B1500. The tendered rate shall further include full compensation for breaking up the pavement for sampling and temporary patching the disturbed road way by adding make-up material, watering, compacting and surfacing with a cold asphalt material. The tendered rate shall also include full compensation for all transport, labour and other incidentals required for the sampling process.

Item	Unit
B35.15 Pre-milling existing bituminous material:	

- (a) Material intended for recycling with the average depth of excavation:
 - (i) Not exceeding 30 mm square metre (m²)
 - (ii) Exceeding 30 mm but not exceeding 60 mm square metre (m²)
 - (iii) Exceeding 60 mm square metre (m²)
- (b) Material to be disposed of with the average depth of excavation:
 - (i) Not exceeding 30 mm square metre (m²)
 - (ii) Exceeding 30 mm but not exceeding 60 mm square metre (m²)
 - (iii) Exceeding 60 mm square metre (m²)

The unit of measurement shall be a square metre layer of bituminous material milled from existing pavements separately from the underlying material on the instruction of the engineer, irrespective of the required number of passes by the plant.

The tendered rate shall include full compensation for determining the average thickness of the layer of bituminous material to be milled, including the excavation of holes or the drilling of cores, if so instructed. It shall further include full compensation for providing the milling equipment and milling out the material to the specified depth as well as all transport, labour, supervision and incidentals.

The tendered rate for (a) shall also include for the spreading and compaction of the milled material including all plant and equipment.

The tendered rate for (b) shall also include for the excavating, loading and transporting the material to approved stockpile or spoil sites for a free- haul distance of 1,0 km 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.

Item	Unit
B35.16 Pre-pulverising material in the existing pavement	
.....	cubic metre (m ³)

The unit of measurement shall be the cubic metre of in situ measured pavement layer that is

pre-pulverised in situ, as instructed by the engineer, regardless of the hardness or type of material encountered in the existing pavement. The quantity shall be calculated from measurements of the actual width and depth of the pre-pulverised section and shall not be increased to include any allowance for overlaps between adjacent cuts, nor for the number of cuts required to cover the width of pre-pulverising.

The tendered rate shall include full compensation for setting out the works, for pre-pulverising all types of material in the existing pavement structure, for controlling the depth of pre-pulverising, for the addition of water whilst pre-pulverising, for mixing, placing, shaping, cutting levels and compacting the material to a nominal density of 95% of the modified AASHTO density. It shall further include for all transport, labour, plant, equipment and incidentals required to pre-pulverise material as specified.

Item	Unit
B35.17 Removal from site of surplus material	cubic metre (m ³)

The unit of measurement shall be the cubic metre of surplus material removed from site. The quantity shall be taken as 70% of the loose volume measured in trucks. Accurate load records shall be kept on site and submitted to the engineer on a daily basis.

The tendered rate shall include full compensation for gathering the surplus material by windrowing or pushing it into heaps, for loading and transporting to a designated spoil or stockpile site including haul for a free haul distance of 1km, for offloading and either spreading the material or placing in neat stockpiles. It shall further include for all labour, plant, equipment and incidentals required to remove the material as specified.

Item	Unit
B35.18 Extra over item B35.16 for cross mixing of material	square metre (m ²)

The unit of measurement shall be the square metre of road surface where material that was pre-pulverised, is to be cross mixed, on instruction of the engineer, to ensure lateral mixing of the material. The quantity shall be calculated from measurements of the actual width and length of the section requiring cross mixing.

The tendered rate shall include full compensation for cross mixing, adding water and spreading the material. It shall further include for all labour, plant, equipment and incidentals required to do the cross mixing as specified.

Item	Unit
B35.19 In situ recycling	

- (a) Chemically stabilised subbase layer compacted to 97% of maximum dry density, using:
 - (i) Non-cemented material (specify compacted layer thickness) cubic metre (m³)
 - (ii) Cemented material (specify compacted layer thickness) cubic metre (m³)
 - (iii) Combination of non-cemented and cemented material (specify compacted layer thickness) cubic metre (m³)
 - (iv) Pre-pulverised material (specify compacted layer thickness) cubic metre (m³)

The unit of measurement shall be the cubic metre of in situ recycled pavement layer, the quantity of which shall be calculated in accordance with the authorized dimensions of the completed layer.

The tendered rate shall include full compensation for setting out the works, preparing and providing the production plan, preparing the existing road surface where required, breaking up the existing pavement layer to the specified depth, breaking down and preparing the material utilising a in situ recycling machine, spreading and mixing the stabilizing agent but excluding the cost of supplying the stabilizing agent, any extra water required, placing and compacting (primary and secondary) the material, cutting final levels as well as the protection and maintenance of the layer, conducting process control and daily monitoring, measuring and demarcating the work where layers are reprocessed partly, protecting the adjacent pavement and its repair should it be damaged.

It shall further include for all labour, plant, equipment and incidentals required to in situ recycle the layer as specified.

The engineer reserves to himself the right to vary the thickness of the layer to be stabilized by up to 20 mm, and the contract rate for this work shall not be amended by such change.

Material which is temporarily bladed to windrow for the removal of an underlying layer and then bladed back and compacted, will be classed as in situ recycling and paid for under this item. The temporary blading of the material to windrow will be paid for under item B35.22.

The tendered rate shall include full compensation for breaking down the material to comply with the specified grading requirements.

Item	Unit

B35.20 Extra over item 35.19 for adding extra material:

(a) Selected layer (Specify material type and quality).....	cubic metre (m ³)
(b) Subbase layer (Specify material type and quality).....	cubic metre (m ³)
(c) Base layer (Specify material type and quality).....	cubic metre (m ³)

The unit of measurement shall be a cubic metre of material added on the instruction of the engineer, which quantity shall be taken as 70% of the loose volume measured in trucks, unless instructed by the engineer that the quantity be determined by way of cross-sections.

The tendered rate shall include full compensation for procuring, adding and spreading the material to the existing pavement layer to be in situ recycled, and for haul over a free haul distance of 1,0 km except for material obtained from commercial sources where all haul will be deemed to be included. It shall further include for levelling and compacting the material to a nominal density of 95% of the modified AASHTO density.

Item	Unit

B35.21 Finishing off of the stabilised layer

(a) Slushing with:	
(i) Water	square metre (m ²)
(ii) diluted emulsion	square metre (m ²)
(b) Application of a fog spray	litre (ℓ)

The unit of measurement for (a) (i) and (ii) shall be the square metre of stabilised layer finished

off through slushing with water or diluted emulsion. The quantity shall be calculated from measurements of the actual width and length of the stabilised layer.

The tendered rate shall include full compensation for provision of all plant, equipment, materials, labour and all other incidentals to slush the layer as specified.

The unit of measurement for (b) shall be the litre of diluted emulsion measured at spraying temperature.

The payment description for payment item 45.04 shall apply mutates mutandis for this item.

Item	Unit
B35.22 Extra over item B35.19 for temporarily blading the material to windrow	cubic metre (m³)

The unit of measurement shall be a cubic metre of material from an existing pavement layer, temporarily bladed to windrow and measured in its original position before removal.

The tendered rate shall include full compensation for all additional costs involved in temporarily blading the material to windrow and later blading back and also for all clearing-up work which may be necessary after the material has been bladed back.

Only material bladed to windrow on the instruction of the engineer in order to expose the underlaying layer shall be measured and paid for.

Material bladed or cut from restricted areas to windrow and material temporarily stockpiled, will not be paid for under this item."

Add the following new clauses:

"B3511 PLANT AND EQUIPMENT FOR COLD IN SITU RECYCLING

All cold in situ recycling shall be done utilising purpose-built wheel-mounted in situ recycling machines. The following specifications are applicable to such machines. Where the contractor intends using any other type of machine to recycle (e.g. a modified track-mounted milling machine) he shall submit for the approval of the engineer a full motivation for using such a machine, including a detailed work plan describing the recycling/mixing process and subsequent compaction/levelling processes that will produce a layer that meets the specified end product requirements.

(a) In situ recycling machines

In situ recycling shall be carried out using a special-purpose recycling machine to break down and recover material from the prescribed horizon in the upper layers of the existing pavement, blended together with any imported material, stabilising agent(s), water and any other specified additives. The machine employed shall be capable of achieving the required grading and consistency of mix in a single pass.

In addition, the recycling machine shall meet the following requirements:

- (i) Be factory-built by a proprietary manufacturer having a demonstrable track record and manufacturing history in producing such equipment;
- (ii) If older than 10 years, the machine shall be certified by the manufacturer or manufacturer's authorised agent to confirm operational fitness-for-purpose dated not more than 3 months earlier than the date on which it commences work on the contract;

-
- (iii) Have a level-control system to maintain the cut depth within a tolerance of ± 10 millimetres of the required depth during continuous operation;
 - (iv) The milling/mixing drum (the “cutter”) shall have a minimum cut width of 2 metres with a facility to change the speed of rotation. The machine shall be capable of recycling to the maximum depth specified in a single pass;
 - (v) The cutter shall rotate within an enclosed chamber (the mixing chamber) into which water and any liquid stabilising agents are injected under pressure at the specified application rate relative to the mass of material in the mixing chamber.
 - (vi) The cutter shall be mounted on a swing arm that is separate from the housing of the mixing chamber, thereby allowing the volume of the mixing chamber to increase as the depth of cut increases.
 - (vii) Have a liquid application system dedicated to adding water to the material in the mixing chamber;
 - (viii) Where a bitumen stabilising agent is to be applied, a second separate liquid application system shall be fitted to the mixing chamber. Such system shall be appropriate for the addition of either bitumen emulsion or foamed bitumen;
 - (ix) All liquid application systems shall be controlled by a micro-processor/flow meter combination that accurately regulates pump delivery (flow rate) with the speed of advance.
 - (x) All liquid application systems shall include a dedicated spraybar that spans the full width of the mixing chamber. Each spraybar shall be equipped with multiple injection nozzles mounted equidistant along the length of the bar at a maximum interval of 200mm with the ability to close off selected nozzles, thereby allowing the width of application to be preset;
 - (xi) Where two liquid application systems are used, the water application spraybar shall be mounted below the other spraybar (relative to the direction of rotation of the cutter) such that the recycled material encounters the water spray before the stabilising agent; and
 - (xii) The recycler shall have sufficient power to recover and mix the existing pavement material together with all additives to produce a homogenously mixed material whilst pushing (or pulling) bulk supply tanker(s).
 - (xiii) For foamed bitumen the liquid application system mounted on the recycler shall have the following additional features:
 - Each injection nozzle on the spraybar shall be fitted with an expansion chamber (the so-called “Mobil system”) for foaming the bitumen;
 - Functioning gauges on the bitumen supply line for monitoring temperature and pressure;
 - The ability to demonstrate that all expansion chambers are free of blockages in both the water and bitumen feed lines;
 - A means of producing a representative sample of foamed bitumen at any stage during normal operations (i.e. a “test nozzle”); and
 - The micro-processor shall continuously monitor the actual bitumen consumption whilst working and provide a running total that allows immediate reconciliation with theoretical (calculated) consumption.

Before any recycling work commences, the contractor shall submit a specification sheet (obtained from the manufacturer) stating the capacity, pressure and temperature limits for each liquid application system that will be used to treat the recycled material.

The recycling machine that the contractor intends deploying shall be subject to the engineer’s approval and he shall be entitled to reject a machine which, in his opinion, may not be capable of producing a consistent product when recycling to the specified depth(s).

(b) Plant for compacting and finishing the treated layer

The treated material exiting from the rear of the recycler shall be processed using suitable compaction equipment and graders to achieve a layer that meets the specified requirements. Sufficient plant and equipment shall be deployed to enable the treated material to be processed and finished off within the time limitations specified below.

(i) Primary compaction

Initial compaction shall be undertaken immediately behind the recycling machine using a vibrating single-drum padfoot roller selected in accordance with the following guidelines:

TABLE B3511/1 GUIDELINES FOR SELECTION OF PRIMARY ROLLERS

Minimum static mass of roller (tons)	Final layer thickness			
	< 150mm	150 – 200mm	200 – 250mm	> 250mm
	12	14	16	20
Minimum amplitude at frequency range	1.8mm @ 30 – 35Hz			

It will be advantageous if the roller is equipped with an integrated compactometer device to indicate and record the level of density that is achieved with each successive pass of the roller. These records can be used by the contractor for process control to indicate that the maximum density has been achieved.

(ii) Secondary compaction

After primary compaction and shaping of the layer a smooth drum vibrating roller with a static mass not less than 10 tons and not more than 14 tons shall be used to compact the upper portion of the layer.

(iii) Finishing of the layer

After the final level of the layer has been obtained a pneumatic-tyred roller (PTR) with a minimum static mass of 18 tons and mounted on at least seven (7) tyres shall be used to finish off the layer.

(c) Bulk tankers

Only tankers with a capacity exceeding ten thousand (10 000) litres shall be deployed to supply the recycling machine with water and/or liquid stabilising agents. Tankers containing a bitumen stabilising agent shall be fitted with appropriate tow hitches, one in front and one at the rear, thereby allowing the tanker to be pushed from behind by the recycling machine, and to push a water tanker in front. No leaking tanker will be permitted on the site.

Where a bituminous stabilising agent is added, each tanker shall be equipped with:

- (i) A thermometer reflecting the temperature of the contents in the bottom half of the tank; and
- (ii) A rear feed valve (minimum internal diameter of 75mm when fully opened) that is capable of draining the contents of the tank.

B3512 CONSTRUCTION OF LAYERS BY MEANS OF COLD IN SITU RECYCLING

(a) Requirements before recycling commences

(i) Stabilisation mix design procedure for cold in situ recycling

The following mix design procedure shall be followed as a minimum requirement for each stabilisation type:

Within 30 days of the contractor taking possession of the site, the contractor shall commence with the mix design process. This process shall be carried out on samples of neat materials extracted from the full depth of the recycling horizon. Bulk samples shall be extracted by means of the recycling machine proposed for the stabilisation work. For each material uniform section identified, two separate bulk samples shall be extracted from the recycling horizon and used in the stabilisation mix design process. The location at which such samples are taken shall be indicated by the engineer.

Stabilisation mix designs shall be undertaken by the engineer to determine:

- details for blending the recycled material with imported material (where necessary);
- application rates for stabilising agent(s);
- target strengths achieved from such application rates; and
- impact of material variations (sensitivity analysis)

Stabilisation mix designs shall be carried out in accordance with the latest edition of the following best practice guideline publications:

- Cementitious stabilisation: SAPEM, SANRAL M5 manual and TRH 13
- Bituminous stabilisation: SAPEM and TG2

The contractor shall construct a trial section for the approved mix design developed for the first uniform section. Recycling work may only commence once the trial section has been approved by the engineer. Thereafter, it will be incumbent on the contractor to obtain the necessary approval for the relevant mix design for each uniform section ahead of the recycling work. Should the situation arise where the contractor has not followed the mix design procedure to obtain the required approval of the engineer recycling work shall cease until such time as the prescribed process for approval has been followed. The contractor shall have no recourse for costs incurred as a consequence of such a delay.

(ii) Setting out and control of the work for cold in situ recycling

Unless otherwise stated in the specifications, the contractor shall establish his own reference and level beacons for the setting-out and control of the works.

(1) Layers constructed utilising existing levels

The existing horizontal alignment shall be retained and only minor modifications made to the vertical alignment, as described below.

The contractor shall establish a series of level control poles placed at a constant offset on both sides of the road at a maximum interval length indicated in clause B3405(a). At each level control location, the contractor shall record the existing road surface levels at the centre-line and at the outer limits of each lane and

prepare a series of graphs (for sections not less than 2.0km in length) with the recorded levels plotted at an exaggerated scale against the km distance. Final levels for the new stabilised layer shall be selected in accordance with a “best-fit” principle, taking into account the following:

- the required camber or super elevation details at each location;
- the minimum requirements governing changes in grade (longitudinal grade line);
- the thickness of the existing base layer; and
- minimising the amount of pre-work required (pre-treatment and/or importing new material) before recycling can commence.

At least two weeks before recycling work is scheduled to commence on any specific section, the contractor shall select the best-fit design levels and submit these proposals to the engineer (both as a schedule of longitudinal grade, cross-fall and final surface levels, as well as a drawing with the design lines superimposed on the existing levels) for approval or amendment.

The engineer will take control measurements to determine the accuracy and adequacy of the reference beacons/control poles and may instruct the contractor to correct any faulty work and to take and provide such additional measurements and details as may be deemed necessary.

Survey work will not be measured and paid for separately and compensation for any work involved in staking, setting out, taking levels, determining the final surface elevations and transferring these design levels on to the level control poles (including the cost of all labour materials and reinstatement if required for any reason) will be deemed to be included in the rates for the relevant payment items for cold in situ recycling. No payment will be made for any inconvenience or delay caused by compliance with these requirements.

(2) Layers constructed utilising new levels

Layers shall be constructed according to new design levels as indicated on the drawings.

(iii) Production Plan

Prior to the start of a shift, the contractor shall prepare a production plan detailing his proposals for the forthcoming shift's work. As a minimum, this plan shall include a sketch showing:

- the overall layout of the length and width of road intended to be recycled during the day, broken into the number of parallel cuts required to achieve the specified width of treatment;
- the location of and overlap width (minimum 150mm) at each longitudinal joint between adjacent cuts, together with the location of the inner and outer wheel paths of each lane affected by recycling;
- the sequence and length of each cut to be recycled before starting on the adjacent or following cut; and
- an estimate of the time required for recycling each cut and for finishing off the work.

(iv) Preparing the surface

Before any recycling work commences, the surface of the existing road shall be prepared by:

- cleaning all vegetation, garbage and other foreign matter including road studs from the full road width, including any adjacent lanes or shoulders that are not to be recycled;
- removing any standing water;
- pre-milling to remove high-spots and/or pre-pulverising where ordered;
- providing a reference line to assist the operator to accurately steer the recycling machine, and
- record the location of all road marking features (e.g. extent of barrier lines) that will be obliterated by recycling.

(v) Surface shape and level requirements

Where surface defects are to be corrected and/or modifications made to the grade line, instructions will be issued detailing the new surface level requirements. These may be achieved prior to recycling by either pre-milling to remove in situ material, by pre-pulverising, pre-shaping and pre-compacting the pulverised material, or by importing material and accurately spreading on the existing road surface, as described below.

(vi) Pre-milling

Where instructed, pre-milling shall be undertaken using a milling machine (not a recycling machine) to:

- Remove isolated high spots and/or make minor modifications to crest vertical curves by accurate milling. The material resulting from such milling operations shall remain on the road, behind the milling machine, where it shall be spread across the width of recycling and rolled with a smooth-drum roller or loaded onto trucks and disposed of as directed; OR
- Break down (pulverise) badly cracked asphalt layers, and/or sections where thin asphalt overlays are delaminating. To ensure that the milling operation achieves the required degree of pulverisation, the depth of milling shall be constantly monitored and adjusted so that the bottom of the milling drum remains within the lower half of the cracked/delaminating asphalt layer. Where an acceptable degree of pulverisation cannot be achieved, the machine shall be operated in reverse (i.e. down-cutting) with the same controls applied to the depth of milling. If such reverse milling fails to produce an acceptable degree of pulverisation, the asphalt layer shall be milled off and removed. The pulverised asphalt material generated from such pre-milling shall remain on the road, behind the milling machine, where it shall be spread across the width of recycling and rolled with a smooth-drum roller.

(vii) Pre-pulverising existing pavement material

Pre-pulverising shall only be undertaken on instruction from the engineer for the purpose of:

- breaking down excessively hard material;
- loosening the material across the road width so that it can be cross-mixed by grader;
- exposing the loosened (fluffed-up) material to the atmosphere to promote drying; or
- loosening the material in the existing pavement so that it can be loaded and removed from site.

The depth of pre-pulverising shall be carefully controlled throughout the operation to ensure that the cut horizon always remains at least 25mm above the bottom of the subsequent recycling/stabilisation horizon.

Unless the objective of pre-pulverising is to dry the material, a water tanker shall be coupled to the recycling machine and sufficient water added to allow the material to be compacted to a minimum density of 95% of the mod AASHTO density. Except where the material is to be cross-mixed, it shall be compacted immediately behind the recycler before using a grader to pre-shape the material in accordance with final level requirements.

(viii) Cross-mixing

Where cross-mixing is ordered, the material shall be bladed by grader or utilising other mixing equipment to achieve a uniform blend of material throughout the layer. The layer shall be compacted and shaped before being in situ recycled,

(ix) Addition of imported material

Where instructed to import material for blending and/or as make-up material for the purpose of shape, level or material grading correction, the prescribed material shall be imported and spread on the existing road surface prior to recycling. The method of placing and spreading the imported material shall be such as to achieve the required surface levels and will require the use of a paver, motor grader or other such plant. All imported material shall be pre-compacted to a minimum of 95% of the mod AASHTO density.

Nowhere shall the thickness of imported material exceed the recycling depth.

(b) The recycling process

(i) Before starting

Prior to starting to recycle, the production planned for the day shall be approved by the engineer and the following checks carried out:

- All relevant temperatures shall be measured and recorded, including:
 - air temperature;
 - the material in the recycling horizon; and
 - the contents of all bulk supply tankers (including water).
- All plant and equipment is on site and the operators of the different machines are adequately trained and briefed on their particular tasks.
- The recycling machine has been prepared and set up for the first cut. Such preparations shall include:
 - checking that the mixing chamber is free of any material build-up that may affect the functioning of the application nozzles on all relevant spraybars;
 - the cutting tools have sufficient remaining life to complete the first cut without stopping;
 - all relevant liquid application systems are functioning, free of blockages and the in-line filters are clean. Where a bitumen stabilising agent is applied, a relevant check-sheet (similar to the example forms included in the Appendices of SAPEM and TG2) shall be diligently followed, signed off and submitted to the engineer;

- the on-board computer has been correctly set up and the input data verified;
- the spraybar is set up with the correct nozzles selected to achieve the required width of application;
- Bulk supply tanker(s) are coupled correctly to the recycling machine, all feed pipes are properly connected, bled of air and free of leaks. Where a bitumen stabilising agent is applied, the feed pipe shall only be connected immediately before work is about to start. Where the stabilising agent is foamed bitumen, the outlet plumbing on the tanker shall be checked and any "cold plug" of bitumen removed before attaching the feed pipe.
- Where cement or lime is spread by hand on the road surface ahead of the recycling machine, the bag spacing shall be checked at random intervals and recorded.
- A clear guideline is in place for the recycling machine to follow and is correctly aligned relative to the road geometry.
- The integrated compactometer system on the primary roller properly functioning and has been set up to record the correct relevant data.

(ii) Recycling

The recycling machine shall be set up and operated to ensure that:

- The speed of advance is regulated (below the maximum allowable of 10m/min) to achieve;
 - adequate pulverisation of all bound materials in the existing pavement to produce a material that meets the grading requirements;
 - operating pressures and flow rates in all liquid application systems that remain within the limits prescribed by the manufacturer of the machine.
- The depth of recycling coincides with the line and level specified for the bottom horizon of the new stabilised layer. The bottom of cut horizon shall be checked at least once every 100m of cut using a suitable T-bar to dip from a stringline pulled between the relevant final level reference marks on the level control poles.
- The planned width of overlap along all longitudinal joints is maintained and the line of cut does not deviate laterally by more than 50mm from that required (measured from the operator's guideline that shall be positioned for each and every cut).
- The process is continuous with a minimum number of stops. Transverse joints that occur every time the recycling machine stops are properly treated to achieve continuity of stabilisation and moisture across the resulting joint.
- The application rate of liquid stabilising agent(s) and water is uniformly continuous across the required width of treatment, including all longitudinal joints.
- The temperature across the width of material exiting the mixing chamber shall be checked at least once every 100m using a digital thermometer with a laser beam target held no more than 100mm above the material. Where the temperature varies consistently by more than 3°C along a particular longitudinal strip ± 200 mm wide, the recycling machine shall be stopped and the relevant application nozzles on all spraybars that coincide with the offending strip shall be checked for blockages.
- The moisture content of the treated material is continuously monitored and the application of water adjusted to achieve a uniform moisture content as specified.
- The mixed material exiting from behind the recycling machine is struck off by the rear door of the mixing chamber with sufficient pressure applied to obtain

a uniform surface that is free of valley lines, empty pockets and particle segregation.

The advance speed of the recycling machine and the speed of rotation of the recycling drum shall be set to obtain the required grading and sufficient mixing of all components (recycled material and additives) so that a homogeneous material is produced.

(c) Primary compaction

Recycling machines are configured such that their rear wheels run on top of the treated material towards the outer extremities of the cut. To prevent introducing a density differential across the width of cut, primary compaction shall be completed prior to any grader work commencing. If the treated material is pre-shaped by grader prior to being compacted, the work shall be summarily rejected.

A single-drum vibrating roller shall be deployed to compact the recycled material immediately behind the recycling machine. This roller shall travel forwards and backwards at a constant speed (maximum 3km/hr (50m/min)), remaining within the confines of the recycled cut. Recycled material covering the outer extremities of cut shall be moved at regular intervals (± 5 m) to expose the cut line, thereby allowing the operator to remain within the cut width.

Successive lengths of recycled/treated material shall be compacted (each approximately 50m in length).

Rolling shall continue on each section until the maximum achievable density has been reached. Where an integrated compactometer device is utilised normally rolling have to continue until the device indicates that no further density is being achieved over at least 80% of the length of the section (i.e. maximum achievable density has been reached). Should the device indicate a consistent loss of density at any point during primary compaction (as indicated over two successive recording passes), rolling on that section normally has to be terminated and the roller moved forward to start compacting the next section.

After each day's production, the contractor shall provide the engineer with his process control records of the densities achieved for primary compaction. Where a compactometer device was used an electronic copy of the data file containing detailed compaction records for the day's work shall be provided to the engineer. As a minimum, the records shall include the number of passes made on each section of every cut made by the recycling machine, the compaction achieved on every cut as well as the following data for each 2m interval along the length of each cut:

- the compactometer reading (where applicable);
- the amplitude of vibration; and
- the advance speed of the roller.

These records will constitute the contractor's Process Control for primary compaction.

A "roller pass" shall be defined as a single unidirectional pass made by the roller. Where the roller travels forwards and backwards over the same point, it would have made "2 passes".

A "recording pass" is a roller pass where the compactometer readings are stored (recorded) and used for comparison purposes. Recording passes are always in one direction of travel only. Recordings shall be made commencing with the first pass and every alternative subsequent pass that is made (i.e. 1, 3, 5, 7, etc.)

The primary compaction process shall follow at the same rate as the recycling operation. The contractor shall ensure that a sufficient number of rollers are available to achieve this.

(d) Final levels and secondary compaction

- (i) After completing the primary compaction on all adjacent cuts that make up the width of pavement that is recycled in one shift, the surface shall be pre-shaped and final levels cut before final compaction is applied. Pre-shaping shall address the lateral shift of material resulting from the surface inclination (cross-fall). The moisture in the layer shall be controlled during this process. No roller will be allowed onto the layer during the pre-shaping process to prevent the lamination phenomenon (biscuiting) occurring,

Secondary compaction shall then be applied using the smooth-drum vibrating roller operating in low amplitude vibration mode. The outer cut extremities shall be exposed as a guide for the roller operator to ensure that the compaction effort is directed only on to the recycled material (thereby preventing any “bridging across” from the unrecycled pavement).

(e) Finishing off of the layer

When the grader work and secondary compaction of the recycled base is complete, the surface will be sprayed with an appropriate amount of water or diluted emulsion and a pneumatic tyred roller (PTR) applied. Such slushing shall be undertaken in short sections ($\pm 40 - 60\text{m}$) over the full width of the recycled layer. The PTR shall make sufficient passes and the surface must be sufficiently wet to generate a “mild” slush and close up voids in the surface together with any other grader-induced defects and achieve a tightly-knit surface finish. Rolling with the PTR must continue until no free water is visible and a uniform appearance, from a visual perspective, is achieved. Personnel equipped with squeegees shall be deployed to move the slush over areas showing signs of roughness and/or segregation. Squeegees shall be used to remove any surplus slush to the side of the road. Whilst still damp, the slush shall be broomed off the road using hand brooms. If a mechanical powered broom is used care shall be taken not to damage or loosen the surface. The final surface shall have a smooth, tightly-knit finish with no “biscuit” layers. Brooming of the surface is not required if the road is opened to traffic. The slushing process must be completed on the same day that stabilisation work is completed. The slushing process is dependent on the material properties and therefore the desired finish must be determined through trial sections.

Where the recycled material is treated with a bitumen stabilising agent and the intention is to open the finished layer to early trafficking, a diluted emulsion (15% residual bitumen) applied at between 0.5 and 0.75 litres/ m^2 depending on the material type may be substituted for water in the slushing process. A water tanker fitted with an appropriate spraying system (or binder distributor) shall be used to spray a uniform amount of dilute emulsion on the surface before applying the PTR. Additional dilute emulsion may be applied where the first application failed to generate sufficient slush under the wheels of the PTR. Rolling with a PTR should continue until a uniform appearance, from a visual perspective, is achieved and should stop before when the emulsion shows signs of breaking and becoming sticky/tacky.

Once slushing is complete, the entire area may, on instruction of the engineer, receive a fog spray application using the same dilute emulsion (applied at a nominal rate of 0.75 litres/ m^2) and left to dry back before opening the road to traffic.

Dilute emulsion for slushing and fog spraying shall only be applied using an appropriate

water tanker or binder distributor.

B3513 PROTECTION AND MAINTENANCE

(a) Trafficking the completed layer

(i) Cementitious stabilisation

Under no circumstance shall traffic be allowed to travel on layers of cement stabilised material.

(ii) Bituminous stabilisation

i. Where bitumen emulsion is applied as the stabilising agent

Traffic shall not be allowed to travel on the completed layer for a period of 24 hours. The moisture content of the layer shall then be checked and, provided it is below 80% of OMC, the new layer may be opened to traffic.

ii. Where foamed bitumen is applied as the stabilising agent

The moisture content of the layer shall be checked and, provided it is below 80% of OMC, the new layer may be opened to traffic. As soon as the surface of the layer has dried (normally within 24 hours under favourable weather condition), the section shall be closed to traffic to allow for the application of a fog spray. The section shall be reopened to traffic after two hours or as soon as the emulsion has broken.

Where the surface was slushed with a diluted emulsion and a fog spray applied as part of the finishing process, the section shall remain closed to traffic for a minimum of two hours after completion or until the emulsion at the surface has broken.

(b) Maintenance of the stabilised layer

Until the surfacing is applied, the contractor shall maintain the surface integrity of the new layer by deploying staff on a daily basis to visually monitor all sections under traffic and take immediate action as soon as signs of ravelling are detected. Such action shall include the local application of dilute emulsion (applied by hand using a large paint brush) or the application of a further fog spray.

Where damage occurs as a consequence of the surfacing not being applied within the time limits specified in clause B3513 (c) below, the engineer shall have the right to summarily reject the affected layer and the contractor will have no recourse for the costs he incurs in removing the layer and replacing it with fresh stabilised material.

(c) Application of surfacing

To prevent environmental degradation and/or abrasion damage, new base layers shall be surfaced as soon as the moisture content at all positions within the layer is below 50% of optimum moisture content according to SANS 3001-GR30 (replaced TMH 1, Method A7).

The maximum time delay between completing a new base layer and applying the surfacing shall be 14 days (with due allowance made for inclement weather)."

SECTION B3600: CRUSHED-STONE BASE

B3602 MATERIALS

a) Requirements for crushed aggregate

After the first sentence delete the remainder of the paragraph and replace with the following:

"The aggregate shall not contain more than 0,1% by mass of unwanted material such as wood, coal or similar organic material.

Aggregates containing mica, such as granite, gneiss, mica schist, pegmatite, sandstone shall not contain more than 2% by mass of free mica, especially muscovite, when assessed by visually separating the particles, or more than 4% by volume when assessed by means of microscopic slides. Aggregate containing easily detectable quantities (more than 1%) of olivine, serpentine and sulphide minerals such as pyrites and marcasite, must be considered with caution, and may warrant additional evaluation to the satisfaction of the engineer. Argillaceous rocks may only be used if specified in the project specifications, or with the engineer's written approval.

Soft or weathered particles shall be controlled by the Durability Mill Index values specified in B3602(e) Durability.

Provision has been made in clause B8108(b)(iii), calculation, for the determination and calculation of the Apparent Density for aggregates with a total water absorption greater than 1,5%, when total water absorption is determined according to SANS 3001-AG20 (replacing TMH1 method B14) and SANS 3001-AG21 (replacing TMH1 method B15)."

c) Grading requirements

Replace entire clause with the following:

"The target grading, after compaction, shall be as near as possible to the mean of the specified grading envelope listed in table B3602/1 and shall be continuous with no marked gaps or excessive quantities of any particular size. The mean grading of each lot (minimum of 4 but preferably 6 test points per lot) shall conform to the approved target grading plus or minus the tolerances specified in table B3602/4. However, no target grading plus tolerance can be set outside the original grading envelope in table B3602/1."

Table 3602/1

In table 3602/1 delete "85% of bulk relative density" and replace with:

"88% of Apparent Relative Density".

Replace the grading section in Table 3602/1 with:

Grading	Nominal aperture size of sieve (mm)	Percentage passing through sieve by mass			
		Nominal max size			
		G1	G2	G3	
		37.5mm	37.5mm	37,5 mm	28 mm
	37,5	100	100	100	

	28	86 - 95	86 - 95	86 - 95	
	20	73 - 86	73 - 86	73 - 86	87 - 96
	14	61 - 76	61 - 76	61 - 76	73 - 86
	5	37 - 54	37 - 54	37 - 54	43 - 61
	2	23 - 40	23 - 40	23 - 40	27 - 45
	0,425	11 - 24	11 - 24	11 - 24	13 - 27
	0,075	6 - 10	6 - 10	6 - 10	5 - 12

Note:

Refer to standard COLTO table for COLTO grading if required

Replace Table 3602/4 with:

TABLE B3602/4

Sieve size (mm)	Permissible deviations by mean values (% by mass)		Permissible deviations by individual values (% by mass)	
	Nominal maximum size (mm)			
	37,5	28	37,5	28
28	± 5		± 5	
20	± 5	± 5	± 7	± 7
14	± 5	± 5	± 7	± 7
5	± 5	± 5	± 7	± 7
2	± 4	± 4	± 5	± 5
0,425	± 3	± 3	± 5	± 5
0,075	± 2	± 2	± 3	± 3

Note:

Refer to standard COLTO table for COLTO grading if required

Add the following sub-clause:

“e) Durability

The durability property of aggregates derived from the basic crystalline group shall be assessed by means of the Ethylene Glycol Durability Index. When tested in accordance with the method prescribed in B 8105(g) the Durability Index shall not exceed four. In addition, the 10% FACT value obtained after soaking in ethylene glycol for four days shall not be less than 50% of that obtained on the unsoaked sample. Where any values are obtained that fall outside the above requirements, a detailed assessment of the quarry shall be undertaken together with a specialist mineralogical evaluation of both the coarse as well as fine fractions in order to assess the long-term durability properties of the material.

For Basic crystalline rocks, Arenaceous rocks, Argillaceous rocks and Diamictites the Durability Mill Index (DMI) shall be less than 125. For all other rock types the Durability Mill Index (DMI) shall not be more than 420, subject to the % passing the 0,425mm sieve not increasing by more than 8 percentage points during the Durability Mill test.”

B3604 CONSTRUCTION

b) Compaction

Replace that last sentence of the first paragraph with:

“The density of the layer shall be tested at each third of the layer thickness.”

c) Surfacing preparation of the base

Replace the final paragraph in subsubclause 3604(c)(i) with:

“Slushing of the base, is compulsory and shall be carried out within 48 hours after completion of the compaction. Even if the specified density is achieved without slushing or before completion of the slushing process, the full slushing process must still be completed.”

Delete sub-sub-clause (ii) Multi-stage process (water or slurry rolling).

B3605 PROTECTION AND MAINTENANCE

Replace “moisture content of the layer” in the first paragraph with “moisture content of the upper 50mm of the layer.”

Add the following to the end of the second sentence:

“as determined according to SANS 3001-GR30 (replacing TMH 1 method A7).”

B3607 QUALITY AND WORKMANSHIP

Delete “or 8300” in the second paragraph.

B3608 MEASUREMENT AND PAYMENT

Delete the first paragraph and replace it with the following:

“Note: No additional or extra over payment shall be made for work in restricted or confined areas.”

SECTION B3800: BREAKING UP EXISTING PAVEMENT LAYERS

B3804 PLANT AND EQUIPMENT

a) Milling equipment

Add the following:

“No payment shall be made for moving the milling machine onto or within the site.”

B3805 CONSTRUCTION

b) Milling

(vi) General

Add the following:

“The exposed floor of the excavation shall be lightly sprayed with water to identify cracks. The engineer shall be given the opportunity to inspect the milled surface for cracks and loose patches and any cracks or loose patches shall be repaired in accordance with the relevant sections of the specification.

The floor of the milled excavation shall, before the application of the tack coat, be cleaned of all loose material by brooming, blowing with compressed air or vacuuming or any other method that will produce an exposed surface that is closely-knit, firm and stable, free of nests of segregated materials, laminations or corrugations.

Where milling is to be done at existing structures, care shall be exercised to avoid damage to concrete elements, expansion joints, nosings to expansion joints, manholes, catch pits etc. Damage caused to any element forming part of the permanent works shall be repaired at the contractor's cost.

Milled excavations shall not be left open to traffic unless longitudinal and transverse joints have been treated. Where the difference in level between the floor of the milled excavation and the existing road surface exceeds 25mm, joints shall be treated as follows:

Transverse steps shall be tapered off at a slope of 1 vertical to 20 horizontal (1:20) and longitudinal joints exposed to traffic shall be tapered to a slope of 1 vertical to 5 horizontal (1:5). An alternative method using a compacted asphalt wedge of the same dimensions is acceptable.”

B3807 MEASUREMENT AND PAYMENT

Item	Unit
B38.02 Milling out existing bituminous material with an average milling depth:	cubic metre (m³)”

Insert as a new fourth paragraph the following:

“The rates shall also include for transverse saw-cutting at the start and end of sections prior to the commencement of the milling operations.”

Amend payment item 38.02 as follows:

Item	Unit
B38.02 Excavating and spoiling/stockpiling material from an existing pavement and/or the underlying fill:	cubic metre (m³)

Add the following at the end of the last sentence of the first and second paragraphs after the word 'dumps':

"and / or stockpile areas as directed by the Engineer."

Item	Unit
B38.07 Extra over items 38.02 and 38.03 for tapering the milled excavation, edges or ends:	cubic metre (m³)

Delete "to the satisfaction of the engineer" at the end of the first sentence of the second paragraph.

Add the following at the end of this clause:

"Note: Where material under this section requires haulage in excess of 1km, item 16.02 shall be included in this section of the schedule of quantities to make provision for overhaul except where the material is specified for re-use in which case overhaul shall be paid under the relevant construction payment section(s)."

Item	Unit
B38.14 Providing the milling machine on site	

Add the following after the second paragraph:

"The unit of measurement shall be the number of days that the milling machine is required on site to mill samples of existing surfacing and payment layers for design purposes.

The tendered rate shall include for providing the milling machine on site, all costs involved in milling and moving (irrespective of the distance over which the milling machine is moved or the number of times the milling machine is moved) the milling machine on site. In accordance with Clause B3804 no payment shall be made for moving the milling machine on site."

Item	Unit
B38.15 Moving the milling machine on the site	

Replace the first paragraph with the following:

"No payment for this item shall be made under this contract. All costs related to the moving of the milling machine on site shall be deemed to be included in the other pay items in this section."

COLTO SERIES 4000: ASPHALT PAVEMENTS AND SEALS

SECTION B4100: PRIME COAT

B4102 MATERIALS

b) Aggregate for blinding

Add the following sentence:

“Blinding of the primed surface with aggregate shall only be permitted to facilitate vehicular access to adjoining properties”

B4104 WEATHER AND OTHER LIMITATIONS

Replace paragraph (g) with the following:

“(g) When at any position within the layer the moisture content of a granular base layer is more than 50% of the optimum moisture content determined according to SANS 3001-GR30 (replacing TMH 1, Method A7). In the event of rain after priming, the base shall be allowed to dry out to meet the above moisture content requirement prior to surfacing.”

B4106 APPLICATION OF THE PRIME COAT

Replace paragraph (c) with the following:

“The type of prime and application rate best suited for the base shall be determined during construction. The Contractor shall provide about 20ℓ of each prime and apply it at different application rates with a brush on the base. Then engineer will then instruct the type of prime and application rate to be used. No payment shall be made for tests to determine the type of prime.

Unless directed otherwise by the engineer or indicated on the drawings, the edges of the primed surface shall be 150mm wider than the edges of the surfacing.”

Add the following sub-clause:

“(j) Application in areas treated by reworking and construction of a new base shall be primed using a mechanical distributor complying with sub-clause 4103(a). The edges of the previously constructed or existing surfacing shall be adequately protected by approved means to ensure that an overlap of prime not exceeding 50mm is sprayed onto the previously constructed or existing surfacing.”

B4108 TOLERANCES

Replace the first paragraph with the following:

“The actual spray rates measured at spraying temperature shall not deviate by more than 8.0% from that ordered by the engineer. The engineer may, at his discretion, conditionally accept application rates falling outside this tolerance at reduced payment in accordance with Table B4108/1.

TABLE B4108/1: PAYMENT REDUCTION FACTORS FOR CONDITIONALLY ACCEPTED PRIME COAT

Deviation specified spray rate at spraying temperature. (%)	Payment reduction factor of tendered rate.
±8,0	1.00
±9,0	0.97
±10,0	0.95
±11,0	0.90
±12,0	0.85
±13,0	0.80

Any deviation outside these limits shall not be paid for, however, the engineer shall have the right to instruct the contractor to make up any deficiency, or blind excessive prime without additional payment. Where so instructed, the material for blinding shall consist of approved, but shall consist of screened 5mm nominal single size aggregate. The use of crusher dust for blinding shall not be permitted. If under-spraying occurs, and it is accepted by the engineer, only the actual quantities applied shall be paid for."

B4109 TESTING

Add the following:

"No payment will be made if this condition is not adhered to. The contractor shall provide, at his cost, representative samples of every batch of prime delivered onto site."

SECTION B4200: ASPHALT BASE AND SURFACING

B4202 MATERIALS

a) Bituminous binders

(i) Conventional binders

Add the following:

“The binders to be used shall be as follows:

- (a) Continuously graded surfacing course: 50/70 penetration grade bitumen
- (b) Continuously graded base: 30/50 penetration grade bitumen”.

b) Aggregates

Add the following paragraph to the introductory description:

“Asphalt mixes shall be manufactures using different individual single size coarse aggregates fractions and crushed fine aggregates blended to conform to the specified grading requirements. The use of natural sands shall only be permitted if approved by the engineer and shall be limited to a maximum of 5% for continuously graded mixes. All aggregate in excess of 5mm shall consist of individual nominal single sized aggregate. For stone mastic asphalt mixes all aggregate fractions in excess of 2mm shall consist of individual single size fractions. The Contractor shall note that commercial suppliers may not be able to supply all the required single size aggregates, in which instance arrangements will have to be made for additional on site screening. No additional payment shall be made for screening aggregate. The use of run of crusher type materials shall not be permitted.”

(v) Absorption

Add the following sentence:

“In addition, the total binder absorption of the combined coarse and fine aggregate blend shall not exceed 0,5%”

(viii) Grading

Delete the second paragraph commencing with "The target grading..." and add the following paragraphs:

“The grading limits for the combined aggregate grading for the asphalt base shall be as specified in table 4202/6: Continuously graded 28m maximum.

The grading limits for the combined aggregate grading for the asphalt surfacing shall be as specified in table 4202/7: Continuously graded medium grade.

Add the following new sub-item:

“(xi) Moisture content

The moisture content of aggregates, sampled from the cold feed belt, shall not exceed the following limits at the time that it is introduced into the mix:

- Coarse aggregate 2%
- Fine aggregate 4%”

c) Fillers

Delete the second last sentence of the first paragraph and replace with:

“With the exception of stone mastic asphalt, in no instance shall more than 2% by mass of active filler be used in the mixes.”

Add the following after the last paragraph:

“For tender purposes the active filler shall be hydrated lime”

h) General

Add the following after the second paragraph:

“Sufficient aggregate for a minimum of 3 days production shall be separately stockpiled and tested for conformance and uniformity prior to use. The test results shall be presented to the engineer”

B4203 COMPOSITION OF ASPHALT BASE AND SURFACING MIXTURES

In the first paragraph, third last line, after “or active filler content” add:

“or aggregate content”

Replace the fifth paragraph with the following:

“The design of the asphalt mixes shall be in accordance with “Interim Guidelines For The Design Of Hot-Mix Asphalt In South Africa (June 2001)”, and appropriate research results. The mix properties and requirements shall be as specified in the project specifications”

The relevant asphalt mixes for the base and surfacing layers shall comply with the requirements in table B4203/1.

Replace Table 4202/6 with:

TABLE B4202/6: GRADING LIMITS FOR COMBINED AGGREGATE FOR ASPHALT BASE

	Sieve size (mm)	Maximum nominal size (mm)			
		Semi-gap		Continuously graded	
		37,5	28	37,5	28
		Percentage passing sieve by mass			
	37,5	100		100	
	28	87 – 100	100	86 – 95	100
	20	77 – 96	93 – 100	73 – 86	87 - 96
	14		83 – 94	61 – 76	73 - 85
	10	61 – 81	73 – 88	52 - 68	64 - 79
	7		62 – 77		
	5	46 – 61	51 – 65	37 – 54	43 – 61
	2	39 – 51	39 – 51	23 - 40	28 - 44
	1	35 - 46	35 – 46	17 - 32	20 - 35
	0,600	32 – 42	32 – 42		15 – 30
	0,300	22 – 35	22 – 35	9 – 21	11 – 24
	0,150	10 – 20	10 – 20	6 – 17	8 – 19
	0,075	4 - 10	4 – 10	4 - 12	5 - 12
Nominal Mix Proportions by Mass when Bitumen is Used	Aggregate	93,5%		95%	94,5%
	Bitumen (grade according to project specifications)	5,5%		4%	4,5%
	Active filler*	1,0%		1,0%	1,0%

* Active filler for tender purposes to be hydrated lime.

Notes:

- For recycled asphalt the nominal mix ratios of recovered asphalt, new aggregate, new bituminous binders, and active mineral filler to be used for tender purposes, shall be as specified in Table B4202/16.
- Refer to standard COLTO table for COLTO grading if required

TABLE B4202/7 PART 2: GRADING LIMITS FOR COMBINED AGGREGATE FOR ASPHALT SURFACING

	Sieve size (mm)	Continuously graded			Semi-open graded
		Coarse	Medium	Fine	
PERCENTAGE THROUGH SIEVE BY MASS	28	100			
	20	88 – 100			100
	14	73 – 86	100		75 – 100
	10	64 – 77	85 – 100	100	53 – 85
	5	44 – 62	56 – 77	66 – 89	20 – 41
	2	27 – 45	33 – 48	42 – 59	7 – 20
	1	21 - 35	25 - 40	31 - 51	4 - 13
	0,600	16 – 28	18 – 32	24 – 40	3 – 10
	0,300	12 – 20	11 – 23	16 – 28	3 – 8
	0,150	8 – 15	7 – 16	10 – 20	2 – 6
	0,075	4 - 10	4 - 10	4 - 12	1 - 4
NOMINAL PROPORTIONS BY MASS	AGGREGATE	93,5%	93,5%	93,0%	90,5%
	BITUMEN (GRADE ACCORDING TO PROJECT SPECIFICATIONS)	5,5%	5,5%	6,0%	8,5%
	ACTIVE FILLER	1,0%	1,0%	1,0%	1,0%

Notes:

- For recycled asphalt the nominal mix ratios of recovered asphalt, new aggregate, new bituminous binders, and active mineral filler to be used for tender purposes, shall be as specified in Table B4202/16
- Refer to standard COLTO table for COLTO grading if required

Replace Table 4203/1 with:

TABLE B4203/1: ASPHALT MIX REQUIREMENTS: BASE AND SURFACING

Property	Continuously graded base mixes	Continuously graded surfacing mixes	Stone mastic asphalt mixes	Semi-gap graded surfacing mixes
Marshall Stability (kn)	8 – 18	8 – 18	-	8-18
Marshall Flow (mm)	2 – 6	2 – 6	-	2-6
Stability /Flow (kN/mm)	>2,5	> 2,5	-	>2,5
VMA (%)	> 14	> 15	> 17	>15
VFB (%)	65 – 75	65 – 75		65-75
Air voids (%)	4 – 6	4 – 6	3 – 5	4-7
Indirect tensile strength @ 25°C (kPa)	> 1000	> 1000	> 400	>800
Dynamic Creep Modulus @ 40°C (MPa)	> 20	> 20	-	>15
Modified Lottmann @ 7% voids (TSR)	> 0,7	> 0, 8	> 0,7	>0,8
Air permeability @ 7% voids (cm ²)	< 1 x 10 ⁻⁸	< 1 x 10 ⁻⁸	<1 x 10 ⁻⁸	<1x10 ⁻⁸
Binder film thickness (microns)	5,5 – 8,0	5,5 – 8,0	-	5.5 – 8,0
Filler bitumen ratio	1 – 1,5	1 – 1,5	-	1-1,5
Immersion index (%)	-	-	-	>75

B4204 PLANT AND EQUIPMENT

(f) Vehicles

Replace the second paragraph with the following:

“To minimize temperature loss all vehicles used for transporting asphalt to the site shall be fitted with thermal asphalt covers (canvas covers not acceptable) irrespective of the prevailing climatic conditions or distance of transport.”

Add the following subclause:

“(h) Transfer of mix to paver

Asphalt shall be transferred from the haul trucks to the paver by means of a materials storage and transfer vehicle and no material shall be transferred directly from the haul vehicle into the paver.

The material storage and transfer vehicle must be able to store and transfer hot-mixed asphalt material from a truck to a paver to ensure continuous paving. It must contain an anti-segregation auger which remixes materials just before they are delivered to the asphalt paver.”

B4205 GENERAL LIMITATIONS AND REQUIREMENTS AND THE STOCKPILING OF MIXED MATERIAL

b) Moisture

Amend the last paragraph as follows:

Insert “and/or primed base” after “surfacing” in the third line of the first sentence.

Replace the last sentence with “In such case the base shall be allowed to dry out to meet the above moisture content requirement prior to placing the surface layer.”

c) Surface Requirements

(iii) Tack Coat

Add the following paragraph:

“Hand spraying shall only be permitted on areas approved by the engineer. The binder distributor shall be capable to apply the binder evenly over the full area. The equipment shall comply with clause 4103. Tack coat shall be applied to all transverse and longitudinal joints by hand utilizing a paint brush.”

B4206 PRODUCING AND TRANSPORTING THE MIXTURE

b) Production of the mixture

(ii) Using drum-type mixer plants

Add the following:

“Pre-blending of aggregate fractions shall not be permitted and the contractor shall ensure that sufficient cold-feed bins are installed to accommodate each individual aggregate fraction, including the filler.”

c) Transporting the mixture

Delete the second sentence in this paragraph.

Add the following sub-clause:

“f) Approval of asphalt mixture

Before any asphalt is placed on the road, the engineer shall approve the mix design. The approval process shall be as follows:

The contractor shall prepare and submit a laboratory design mix with test results at four different bitumen contents. The design mix shall be submitted on the prescribed form D3 of TMH 10: “Instruction for the Completion of As-Built Materials Data Sheets” with all the necessary test results completed. In addition, the proposed asphalt mixture shall be subjected to gyratory testing. All the expenses in preparing and submitting the laboratory design mix shall be to the contractor’s cost.

Samples of all aggregate and bitumen shall be submitted with the laboratory design mix to enable the engineer to carry out check design testing as necessary. The above design and aggregate shall be submitted to the engineer at least six weeks before it is intended to commence with any asphalt production.

After approval is obtained for the laboratory design mix, a plant mix at varying binder contents of approximately 5 to 10 tons each shall be produced. The purpose of the plant mix is for the contractor to prove that the laboratory design mix can be produced successfully. The engineer shall conduct the necessary testing on the plant mix. The plant mix shall not be placed on the road. During the production of the plant mix, the engineer shall be afforded the opportunity to inspect the asphalt plant.

After the plant mix is approved, permission shall be given for laying a trial section at varying binder contents in accordance with the requirements of section 4211 of the specifications.

The engineer may require that the mix be further assessed by means of CSIR Wheel Tracking or MMLS testing, the cost of which will be borne by the Employer. Mass production of asphalt shall only commence after approval of the trial section, which should be given within a maximum of ten days.

The engineer may instruct the contractor at any time to halt his paving process and to review the whole or part of the above process should a change of aggregate properties occur, the specified asphalt requirements not being met and/or a consistent asphalt mixture not be produced.”

B4208 JOINTS

Add the following to this clause:

“Where the difference in level between the new work and the existing road surface exceeds 25mm, joints shall be treated as follows:

Transverse steps at the end of a day’s work shall be tapered off at a slope of 1 vertical to 20 horizontal (1:20) to tie in with the existing surface. The tapered section shall be removed before surfacing is recommenced and a joint formed in accordance with clause 4208 of the specification.

Longitudinal joints exposed to traffic shall be provided with a taper of compacted asphalt material over the full length of the exposed joint. The width of the taper shall be at least 5 times the difference in level between the old and new work.

All costs involved in the provision and removal of these temporary ramps shall be deemed to have been included in the rates tendered for the relevant asphalt pay item.”

B4211 LAYING OF TRIAL SECTION

Add the following to the end of the first paragraph:

“As the purpose is not to calibrate any equipment, etc., the contractor shall calibrate the equipment and refine the mix design at his own cost.”

(c) Gradings

Replace Table 4213/1 with:

TABLE B4213/1: AGGREGATE GRADING TOLERANCES

Size of aggregate passing Sieve size (mm)	Permissible deviation from target grading (%)
28	± 5
20	± 5
14	± 5
10	± 5
7	± 5
5	± 4
2	± 4
1	± 4
0,600	± 4
0,300	± 3
0,150	± 2
0,075	± 1*

* When statistical methods are applied the permissible deviation for the 0,075 fraction is ± 2%.

B4214 QUALITY OF MATERIAL AND WORKMANSHIP

b) Coring of asphalt layers

Add the following:

“A suitable coring machine shall be available on a daily basis when asphalt paving is taking place. Cores shall only be drilled, when the road temperature is 20°C or less. Core holes shall be filled with hot mix asphalt and compacted, all within 24 hours of the core being drilled. Coring shall be carried out within 48 hours after the paving has been completed and supplied to the engineer. The test results of cores shall be submitted to the engineer within 24 hours after coring.”

c) Routine inspection and tests

Add the following paragraphs:

“The contractor shall keep accurate records of:

- (i) The position where every truckload of asphalt is paved (chainage, lane, time and date).
- (ii) The temperatures of the asphalt in the trucks both at the mixing plant and at the paving equipment immediately prior to discharging the load.
- (iii) The truck and load number from which control samples are taken. All samples taken shall be appropriately numbered.

Test results and measurements will be assessed in accordance with the provisions of section 8200.”

Add the following sub-clause:

d) Special tests

n-Heptane-Xylene Equivalent (Spot test) (AASHTO-T102)

If the engineer suspects that bitumen or asphalt has been overheated, he may order that the bitumen, or the bitumen recovered from the asphalt, be subjected to the Spot Test.

Recovery of binder for use in the Spot Test shall be carried out according to an approved method.

Any bitumen having an n-Heptane-Xylene equivalent in excess of 36, or in excess of the manufacturers test result on the dispatched stock, shall be considered to have been overheated and shall be deemed to be rejected unless proven otherwise."

B4215 MEASUREMENT AND PAYMENT

Amend the following payment item:

Item	Unit
B42.08 100mm cores in asphalt paving	number (no)

Amend the 1st sentence by adding the following after the word "drilled....":

"irrespective of depth of core."

Add the following payment items:

"Item	Unit
B42.21 Aggregate variations	ton (t)

The unit of measurement in respect of increases or decreases in the aggregate content from that specified in the nominal mix shall be the ton.

Payment for variations shall be made as specified for clause 1213.

Item	Unit
B42.22 Traffic calming devices	

(a) 80mm high x 3600mm wide asphalt speed control humps.....metre (m)

(b) 100mm high x 6000mm wide raised asphalt pedestrian crossing.....metre (m)

The unit of measurement for items B42.22(a) & (b) shall be the metre of speed control hump or raised pedestrian crossing installed on the road. The contract rates shall include full compensation for the provision and construction of the traffic calming devices as shown on the standard drawings. "

SECTION B4300: SEALS: MATERIALS AND GENERAL REQUIREMENTS

B4301 SCOPE

Add the following paragraph:

"The contractor shall take and submit samples of materials and/or mixtures to the engineer who must approve designs before construction work can commence."

B4302 MATERIALS

b) Aggregates

(i) Aggregates for seals

Add the following at the end of the sentence:

"and durability."

(1) *Grading*

Replace Table 4302/9 with:

TABLE B4302/9

Sieve sizes (mm)	Percentage passing by mass
5	95 minimum
0,425	50 minimum
0,075	20 maximum
Plasticity index = Non-plastic	

Note:

Refer to standard COLTO table for COLTO grading if required

(3) *Shape*

Replace Table 4302/10 with:

TABLE B4302/10

Nominal size of aggregate (mm)	Maximum flakiness index (%)	
	Grade 1	Grade 2
20	25	30
14	25	30
10	30	35
7	30	35

Note:

Refer to standard COLTO table for COLTO grading if required

Add the following sub-sub-clause:

"(4) *Durability*

Aggregate used in seals and asphalt shall show a durability index of less than 4 as determined by the test method specified in Clause B8105 paragraph (g)."

(ii) Aggregate for slurry seals

In the first paragraph, add the following after the first sentence:

“The engineer may order the addition of an approved natural sand or additional cement to improve either the permeability or workability of the slurry.”

Replace Table 4302/11 with:

TABLE B4302/11

Note:
Refer

Sieve size (mm)	Percentage passing sieve by mass				
	Fine slurry			Coarse slurry	
	Fine grade	Medium grade	Coarse grade	Type 1	Type 2
14					100
10				100	86 – 100
7		100	100	87 – 100	71 – 91
5	100	84 – 100	72 – 91	72 – 91	62 – 82
2	84 – 99	51 - 90	40 – 64	40 - 63	36 – 56
1	60 - 90	33 – 68	25 - 46	22 – 41	22 - 41
0,600	42 – 72	22 – 50	19 – 34	15 – 30	15 – 30
0,300	23 – 48	15 – 37	12 – 25	10 – 20	10 – 20
0,150	10 – 27	7 – 20	7 – 18	6 – 15	6 – 15
0,075	4 - 12	4 - 12	2 - 8	4 - 10	4 - 10

to

standard COLTO table for COLTO grading if required

Delete Table 4302/12 without replacement.

B4306 STOCKPILING OF AGGREGATE

a) General

Add the following:

"The contractor shall heed the environmental requirements of Part C of this volume in the preparation, operation and closure of stockpile sites. The positions for stockpiling of aggregate and the proposed operation methods shall be approved by the engineer before delivery of the aggregate can commence.

After application of the seal all loose stones swept off the road surface are to be heaped either in the drain or gravel shoulder, whichever is applicable, and removed in one operation. No sweepings are to be left on site for more than 24 hours. No sweepings are to be heaped or stored on the vegetated areas of the road reserve. No loose stone is to be spoiled in the road reserve."

COLTO SERIES 5000: ANCILLARY ROADWORKS

SECTION B5100: PITCHING, STONEMWORK AND PROTECTION AGAINST EROSION

B5102 MATERIALS

a) Stone

Replace the 2nd paragraph with the following:

“Unless suitable stone can be located on site, the stone for pitching shall come from commercial sources but, from whatever source, its use shall be subject to the prior approval of the engineer.”

c) Sand

(ii) Sand for bedding

Replace this sub-sub-clause with the following:

Sand for bedding used for paving blocks shall not contain any deleterious impurities and shall comply with the requirements given in table B5102/1.

TABLE B5102/1

Sieve size (mm)	Percentage passing
10	100
5	95 – 100
2	73 – 86
1	43 - 78
0,600	25 – 60
0,300	10 - 30
0,150	5 – 15
0,075	5 - 10

Note:

Refer to standard COLTO table for COLTO grading if required

B5106 SEGMENTAL BLOCK PAVING

d) Edge beams

Add the following paragraph:

“Where concrete edge beams are constructed the relevant specifications under section 2300 shall apply.”

SECTION B5400: GUARDRAILS

B5402 MATERIALS

a) Guardrails

At the end of the 1st sentence delete the full stop and add “or SANS 1350 and carry the SABS mark or a mark by any other SANAS approved certification body for the applicable SANS specification.”

b) Guardrail posts

(ii) Steel posts

Replace the paragraph with the following:

“Where offered or instructed to be used, steel posts shall be part of an approved guardrail system as tested and complying with EN 1317 (Part 1 and 2) and/or AASHTO MASH, and galvanized in compliance with the requirements of SANS 121, shall be used.

Where guardrails are placed on concrete retaining walls or concrete structures, the steel posts shall be of the type and size shown on the drawings or described in the project specifications.”

B5403 CONSTRUCTION

a) Erection

Replace the 7th paragraph with the following:

“Steel posts placed on concrete retaining walls or concrete structures shall be erected and fixed as shown on the drawings. For all other applications, steel posts shall be erected and fixed in compliance with the approved guardrail system as tested and approved in terms of EN 1317 (Part 1 and 2) and/or AASHTO MASH.”

B5405 REMOVING, RENOVATING AND RE-ERECTING GUARDRAILS

a) Removing the guardrails

In the 3rd line of the 1st paragraph, after “150mm layers,” delete the full stop and add “of suitable material (than less than G7 quality material).”

B5406 MEASUREMENT AND PAYMENT

Replace item 54.01 with the following:

“Item	Unit

B54.01	Guardrails on 3.81m spaced posts

Note to Tenderer: Select and price either the timber post or steel post system – not both

(a)	Complete galvanised system on:	
(i)	Timber posts.....	metre (m)
(ii)	Steel posts.....	metre (m)

- (b) Extra over 54.01(a) for the following
- (i) Flared ends (including end wing) number (No)
 - (ii) End treatments where single guardrail sections are used (including additional posts) number (No)
 - (iii) End treatments where double guardrail sections are used (including additional posts) number (No)
 - (iv) Bridge adaptors (including extra rail and posts) number (No)
 - (v) Horizontally curved guardrails factory bent to a radius of less than 45m metre (m)

The unit of measurement for (a) and (b)(v) shall be the metre of guardrail as erected, (including length of end treatments and curved guardrails).

The unit of measurement for (b)(i) to (b)(iv) shall be the number of end treatments of each type installed.

The tendered rates shall include full compensation for furnishing all materials and labour for erecting and galvanizing the guardrails, complete with posts, spacer blocks, bolts, nuts, washers and reinforcing plates, and excavating holes in all classes of material, concrete, backfilling and removing any surplus material. It shall also include full compensation for incidentals in respect of supplying and erecting curved guardrails, end treatments, and turned down sections.

Reflective plates and drilling and blasting will be paid for separately under items 54.06 and 54.12 respectively.”

Replace item 54.02 with the following:

“Item	Unit
B54.02 Guardrails on 4.0m spaced posts	

Note to Tenderer: Select and price either the timber post or steel post system – not both.

- (a) Complete galvanised system on:
- (i) Timber posts..... metre (m)
 - (ii) Steel posts..... metre (m)
- (b) Extra over 54.02(a) for the following
- (i) Flared ends (including end wing) number (No)
 - (ii) End treatments where single guardrail sections are used (including additional posts) number (No)
 - (iii) End treatments where double guardrail sections are used (including additional posts) number (No)
 - (iv) Bridge adaptors (including extra rail and posts) number (No)
 - (v) Horizontally curved guardrails factory bent to a radius of less than 45m metre (m)

The unit of measurement for (a) and (b)(v) shall be the metre of guardrail system (complying with EN 1317 (Part 1 and 2) and/or AASHTO MASH) as erected (including length of end treatments and curved guardrails).

The unit of measurement for (b)(i) to (b)(iv) shall be the number of end treatments of each type installed.

The tendered rates shall include full compensation for furnishing all materials and labour for erecting and galvanizing the guardrails, complete with posts, spacer blocks, bolts, nuts, washers

Reflective plates and drilling and blasting will be paid for separately under items 54.06 and 54.12 respectively.”

Item	Unit
B54.07 Removing existing guardrails	metre (m)

"The tendered rate shall also include for the backfill of the holes with suitable G7 quality material."

Item	Unit
B54.14 Nailing of gang nail plates on top of timber guardrail posts	number (No)

The tendered rate shall include full compensation for supplying all materials and labour and for fixing to the top of the sealed guardrail post.

The provisional sums under sub-item (a) provide for the provision of a wire rope safety barrier. The provisional sums shall be expended in accordance with the provisions of the General Conditions of Contract Subclause 13.5 as amended by particular Conditions of Contract.

C.236

SECTION B5500: FENCING

B5501 SCOPE

Add the following:

“This section also covers the repairing of existing fences that form part of the permanent work and/or routine maintenance.

This section also covers the erecting of new high security proprietary fences or the repair or removal of high security fences.”

B5502 MATERIALS

Add the following:

k) High security fence

(i) Steel mesh panel

All steel mesh panel material shall be toughened high tensile steel of minimum Grade SAE1020 with tensility of 750 to 1100 MPA. The high tensile steel mesh wire shall have a diameter of not less than 3.5mm. The spacing of the finished mesh wire shall be such to ensure a mesh aperture opening of less than 770mm². To ensure a rigid panel, the mesh aperture opening shall either be reduced and/or additional bars added and/or recesses added. The finished mesh fence shall be hot dip galvanised in accordance with SABS 763 for class B1 articles. All hot dip galvanised surfaces shall be smooth and free from lumps or irregular shapes.

The galvanised mesh panel shall be coated with a fusion bond coating of 80 to 120 g/m², or a polyethylene coating of minimum 0.4mm thickness. Prior to application of the coating, all organic material shall be removed from the surface by either alkaline or acid washing and thereafter thoroughly washed to remove the alkaline or acid solution.

The panel shall be designed to ensure rigid tamper-proof connections to the posts with anti-vandal proof connectors such as anti-vandal bolts or bolt and sheer nut connections. All elements of the connection system shall be hot dip galvanised.

(ii) Steel posts

The steel posts shall be high tensile steel min Grade S335J with minimum wall thickness of 2.0mm. The finished post shall be hot dip galvanised in accordance with SABS 763 for class B1 articles. All hot dip galvanised surfaces shall be smooth and free from lumps or irregular shapes.

The galvanised posts shall be coated with a fusion bond coating of 80 to 120 g/m², or a polyethylene coating of minimum 0.4mm thickness. Prior to application of the coating, all organic material shall be removed from the surface by either alkaline or acid washing and thereafter thoroughly washed to remove the alkaline or acid solution.

The width and shape shall be designed to provide a robust locking mechanism to secure the steel mesh panel edge. All posts shall have a flush face with no serrations, notches or other climbing aids. The tops of all posts shall be sealed with a UV resistant polymer cap for weatherproofing. All pipes and posts shall be one piece without joints.

(iii) Security spikes

The security spikes shall have a minimum height of 100mm and spaced at a minimum of 50mm intervals apart. The security spikes shall be constructed from 2mm thick toughened steel of a minimum thickness of 2mm. The finished post shall be hot dip galvanised in accordance with SABS 763 for class B1 articles. All hot dip galvanised surfaces shall be smooth and free from lumps or irregular shapes.

The galvanised posts shall be coated with a fusion bond coating of 80 to 120 g/m², or a polyethylene coating of minimum 0.4mm thickness. Prior to application of the coating, all organic material shall be removed from the surface by either alkaline or acid washing and thereafter thoroughly washed to remove the alkaline or acid solution.

(iv) Foundations

All posts shall be cast in class 25/19 concrete in holes that are a minimum dimension of 400mm x 400mm and 600mm deep."

B5514 MEASUREMENT AND PAYMENT

Add the following pay items:

Item	Unit
B55.10 Repairing existing fences	kilometre (km)

The unit of measurement for repairing existing fences shall be the kilometre of existing fence repaired on the instruction of the engineer.

The tendered rate shall include full compensation for untying the existing fence (where necessary) and reinstating it, tying of droppers and repairing and re-aligning of standards to the satisfaction of the engineer as well as for coiling and stacking material unsuitable for re-use. Fencing material replaced shall be paid for under items 55.02 and 55.03.

If the existing fence is damaged by the contractor's construction activities, the contractor shall repair the fence at his own cost.

Item	Unit
B55.11 Supply and install cattle grids at community roads complete as shown on the drawings.....	number (No)

The unit of measurement for supplying and installing the cattle grids shall the complete unit as shown on the drawings, including all concrete, brickwork, covers, frames, grids, guardrails, posts, bolts and other accessories.

The tendered rate shall include full compensation for procuring, furnishing and installing all material, including posts, panels, bolts, concrete, formwork, guardrails, covers, frames, grids, transport and all other incidentals, and for erecting the guardrails in accordance with the specifications, drawings and manufacturer's requirements. The tendered rate shall also include for excavations, backfilling and the clearing of the site upon completion."

SECTION B5600: ROAD SIGNS

B5601 SCOPE

Replace “South African Road Traffic Signs Manual” in the second paragraph with:

“SADC Road Traffic Signs Manual”

B5603 MANUFACTURING OF ROAD SIGN BOARDS AND SUPPORTS

a) Road signboards

Add the following:

“The contractor shall make every effort to ensure that signboards are correct in all respect and before dispatching the boards from the manufacturer’s factory shall provide the engineer with a 100mm x 150mm colour photograph of each sign face for approval of the correctness of the legend. Such approval will not imply final acceptance of the board. If the contractor is in any doubt as to the correctness of the sign detail, the sign designer shall be contacted for verification.”

(ii) Steel profile road signboards

Add the following:

“Chromadek section shall be assembled in accordance with the details of Typical Drawings TD-R-RS-1100 and TD-R-RS-1100.

Where the letter or legends cross the horizontal joints of the sign panels, the letter shall be cut on the joint and both ends folded around the radius.

Retro-reflective material to adjoining Chromadek panels on a sign shall be practical visual match of the specified colour.”

B5604 ROAD SIGN FACES AND PAINTING

Add the following sub-clause:

“e) Application of retro-reflective material

All sign faces shall be faced with retro-reflective material. Painted front sign faces shall not be used.

Where applied to Chromadek sections, retro-reflective material shall be applied as specified for aluminium section in Clause 5603(d) of the Standard Specification, and of Clause B5603(a)(ii) of this Project Specification.”

B5605 STORAGE AND HANDLING

Add the following:

“The following shall not be allowed on the sign face:

- Drilling of holes, except for the fastening of overlays
- Application of any form of adhesive
- Cleaning with any chemicals that are not specifically approved by the manufacturer of the retro-reflective material.

- Covering the sign face with an impermeable material that does not allow free circulation of air.”

B5606 ERECTING ROAD SIGNS

c) Erection

Add the following:

“After erection the signboard shall be thoroughly cleaned with a cleaning agent approved by the retro-reflective material’s manufacturer.

All vegetation obstructing the new or replaced sign board shall be removed and disposed of as instructed by the engineer.”

B5608 DISMANTLING, STORING AND RE-ERECTING EXISTING ROAD SIGNS

Add the following:

“Existing overhead and ground mounted road signs that are being replaced by new signs shall be dismantled and disposed of by the Contractor. Where possible the dismantling of the signs shall not be before the replacement sign is erected and displayed. Where dismantling of the sign is required before erection of the replacement sign, the dismantling shall not take place until immediately before work is to commence on the replacement, and the replacement shall be completed and the new sign displayed as soon as possible thereafter (within 72 hours).

Dismantling shall include sign panels and ground mounted sign supports.

Ground mounted sign supports shall be cut off just below ground level. Material excavated for removal of buried poles shall be replaced, and any depression made good using excess material from excavation for new signs.

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-mattbackground. 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.”

Add the following payment items:

Item	Unit

B56.10	Danger plates at culverts/structures..... number (No)

The unit of measurement shall be the number of danger plates provided and erected in

accordance with the drawings.

The tendered rate shall include full compensation for all labour and material, painting, posts, excavation, backfilling with soil etc., as may be necessary for completing the work in accordance with the details shown on the drawings.

Item

Unit

B56.11 Replace kilometre markers as per drawings number (No)

The unit of measurement shall be the number of reference markers provided and installed in accordance with the drawings.

The tendered rate shall include full compensation for the manufacturing and supplying of the completed markers, for installation of the markers along the route and for all materials, equipment, labour necessary for the installation of the markers as specified.”

SECTION B5700: ROAD MARKINGS

B5701 SCOPE

Replace “South African Road Traffic Signs Manual” in the second paragraph with:

“SADC Road Traffic Signs Manual”

Replace the words “ordinary road marking paint” with “solvent borne road marking paint”.

Replace “BS 3262” with “EN 1436”.

Replace “Hot melt plastic road marking” with “thermoplastic road marking”.

B5702 MATERIALS

Insert the following before subclause (a) Paint:

“The selection of the appropriate road marking paint and materials for permanent road markings to ensure conformance with the requirements of this specification rests with the contractor. Such paint and material shall have technical characteristics (brightness, luminance, skid resistance, durability) equal to or greater than road marking paint and materials specified in subclauses 5702(a), (b) and B5702(c).

Where plastic road-marking material (hot-melt plastic (also known as thermoplastic) and two-component (also known as cold plastic)) is used, the contractor shall obtain an approved guarantee from the manufacturer that the paint complies with the specification. This shall be submitted to the Engineer on request.”

Replace sub-subclause B5702(a)(i) with the following:

“(i) Road marking paint

Road marking paint shall be Type 1 as specified in SANS 731-1. Only paint, manufactured in a SANS approved and accredited facility shall be accepted. The no-pick-up time of road-marking paint shall comply with the Class 1 requirement in accordance with SANS 731-1.

The paint shall be delivered at the site in sealed containers marked in accordance with SANS 731-1.

The viscosity of the paint shall be such that it can be applied without being thinned down.”

Replace sub-subclause B5702(a)(iii) with the following:

“(iii) Thermoplastic road marking material

Thermoplastic road marking material shall comply with the requirements of EN 1436, and EN 1423: 1998 for drop-on glass beads for road marking and anti-skid aggregates and mixtures thereof. Blending of thermoplastic road marking material and glass beads shall comply with EN 1424: 1998.

The binder shall be an elasticized synthetic resin and the material shall be reflectorized by mixing in 25% by mass Class A glass beads in accordance with EN 1424: 1998. An additional topping of glass beads shall be applied to the hot surface of the material for instant retro-reflectivity.

The white road marking material shall contain 6% by mass minimum titanium dioxide content and shall have a skid resistance of 45 S.R.T. – units or higher. SABS Method 1248: 1995 shall be used for determination of traffic wear index; indication of durability.

The following minimum lumination values are required for the completed product:

- 250 mcd/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 and the required adjustment can be made to the tendered rate (if required).

Two-component cold plastic road marking material shall be used for symbols, arrows and letters (hand painted markings) unless otherwise instructed by the Engineer.”

Add the following sub-subclause:

“(v) Cold plastic road marking material

Cold plastic road marking material shall be used for symbols, arrows and letters (hand painted markings) and shall consist of a solvent-free reactive acrylic resin, stuffing, beads and pigment to which a hardener shall be added. Application is carried out using a trowel. Material applied by paint brush shall not be used.

Cold plastic road marking material shall be reflectorized by mixing in 25% by mass (or 400g/m²) Class A glass beads in accordance with EN 1424: 1998. An additional topping of glass beads is applied to the wet surface of the material after application and will comply with EN 1423: 1997.”

b) Roadstuds

Replace the clause with the following:

“Permanent and temporary road studs shall comply with the requirements of the European Standard for road studs IS EN 1463.

The road studs to be used on this contract shall be RSA-1, RSA-2, RSA-3 and RSA-T.”

Road studs for the areas of application shall be supplied and installed in accordance with the requirements set out in Table B5702/1 with reference to IS EN 1463.

TABLE B5702/1

Classification	Area of Application			
	RSA-1	RSA-2	RSA-3	RSA-T
Description	Bi-directional	Bi-directional	Circular Cats-Eye	Bi-directional
Material	Galvanized Cast Iron	Plastic	Glass	Plastic
Design	Type A	Type A	Type A	Type A
Use	Type P	Type P	Type P	Type T
Reflector	Type 1	Type 1	Type 1	Type 2
Reflectivity	R1	R1	R1	Not Specified
Installation System	Anchored	Bonded	Embedded	Self Adhesive or Bonded
Height above Road	H3	H3	H3	H1
Dimensions (min-footprint)	100mmx80mm	100mmx100mm	100mm dia	100mmx100mm
Colours	W – R - Y	W – R -Y	W	W – R - Y
Road Trials	S1	S1	S1	Not Applicable

Add the following sub-item:

“c) Retro-reflective beads

Retro-reflective glass beads shall be applied to the wet paint, thermoplastic and cold plastic.

The beads shall comply with Class A beads in accordance with EN 1424: 1998, with the following requirements or as approved by the Engineer:

- colour : crystal clear
- roundness : > 80%
- size range of : 14 – 200 US Mesh (75 – 1400 Microns)
- refractive index : > 1.5
- specific gravity : ± 2.5
- granulometry :

CUMULATIVE RETAINED MASS		
SIEVE	MINIMUM	MAXIMUM
1700	0	2
1400	0	10
1180	5	30
850	40	80
600	70	100
425	80	100
355	90	100
212	95	100

PAN	100	100

The beads shall be delivered to the site in sealed bags, marked with the name of the manufacturer, the batch number and an inspection seal of SANS, confirming that the beads form part of a lot tested by SANS and comply with the requirements of EN 1424: 1998. Alternatively, the Contractor shall at all times have a SANS certificate on the site, identifying the batches to which the inspection seals apply and certifying that they have been tested by SANS, and comply with the requirement of EN 1424: 1998.”

B5704 MECHANICAL EQUIPMENT FOR PAINTING

Add the following sentence at the end of the first paragraph:

”The road-marking machine shall be fitted with a device to guide the operator to the centre of the line to be painted. This device shall be used at all times of operation.”

B5705 SURFACE PREPARATION

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

Insert the following before the first paragraph:

“Where road markings are to be replaced after any construction activity, it is essential that all existing road marking be accurately surveyed and referenced before commencement of such construction activities which will obliterate the existing road markings. The position of barrier lines shall be re-assessed on site by the engineer before the contractor commences with the road marking.”

B5707 APPLYING THE PAINT

Insert the following before the first paragraph:

“The Contractor’s establishment on site and general obligation shall be deemed to fully include the establishment of the road-marking team, irrespective of the number of times the road-marking team is required to be on site or is required to move within the site.

Provision is also made under item B57.07 for de-establishment and re-establishment in the contract or defects notification period if such action is required by delays not attributable to the contractor and/or ordered by the Engineer.”

Replace the sixth paragraph with the following:

“Solvent borne road marking paint shall be applied at a nominal rate of 0,42l/m² or as directed by the Engineer. Thermoplastic road marking shall be applied at a nominal rate of 2,5 kg/m² to achieve a minimum thickness of 1,25mm to 1,5mm or as directed by the Engineer. The two-component road marking material shall be applied by hand by means of a trowel. The desired symbol or line shall be marked with a tape or a template on the road surface. Thereafter apply the required volume of material and spread uniformly over the entire area. When dry/set, remove the tape or template. A spreading rate of 4,5kg/m² is estimated to achieve a 2,0mm material

thickness.

In order to ensure proper coverage on all types of surfaces the Engineer may order an increase in the above nominal application rates. Payment for these variations in application rates shall be made under item 57.04.

A daily log-sheet, provided by the Employer, shall be completed and signed by the Contractor and the Engineer's representative, recording the quantities of paint and glass beads used on that day and shall be available for inspection at all times. The completed and signed log-sheet for the period covered by a payment certificate shall be attached to the payment certificate."

Replace the last paragraph with the following:

"Solvent-based road marking as specified by the Engineer shall be carried out within 14 days of opening the road full width to traffic after the completion of the surfacing.

If in the in the opinion of the Engineer, conditions are unsafe, the centre-line shall be painted immediately after 2,0 km of continuous road has received a new asphalt layer, or 4,0 km of continuous road has received a new seal surfacing."

B5708 APPLYING THE RETRO-REFLECTIVE BEADS

In the first paragraph, replace the nominal application rate of 0,8kg/litre with "400gm/m²".

Replace the second paragraph with the following:

"The thermoplastic road marking material and two-component road marking material shall contain 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/m² to obtain immediate reflectivity. The beads shall be sprayed onto the road marking layer by means of a pressure sprayer. Where letter, symbol, traverse line and island road marking is undertaken by hand, the glass beads may be applied by hand if approved by the Engineer. Prior to any hand application work, the contractor shall first request approval from the Engineer."

Add the following:

"Beads shall be applied in accordance with EN 1424."

B5710 TOLERANCES

Add the following paragraphs to subclause (c) Alignment of markings:

"When an unbroken line and a broken line are painted alongside each other, the beginning and the end of the unbroken line shall coincide with the beginning of one broken line and the end of another broken line. When existing lines are repainted, the new markings shall not deviate more than 100mm in the longitudinal direction nor 10 mm in the transverse direction from the existing marking.

The alignment of the road studs shall not deviate from the true alignment by more than 10mm and shall be positioned so that the reflective faces are within 5° of a right angle to the centre line of the road."

Add the following subclause:

“e) Testing

(1) Plant

Before painting any permanent road markings, the Contractor shall satisfy himself and the Engineer, by painting test lines on a section of pavement other than the section required to be marked:

- (i) that the painting machine is in good working order and properly adjusted;
- (ii) that the operator is fully experienced; and
- (iii) that the machine sprays at the specified rate of paint application.

The Contractor shall bear the cost of all materials and workmanship required for the above plant tests.

In addition, the Contractor shall conduct random paint thickness tests and dip/spread tests as required by the Engineer.”

B5711 GENERAL

Insert the following into the last sentence of the last paragraph between “black paint” and “or chemical paint remover”:

“, bituminous emulsion, slurry”

Add the following to the last paragraph:

“Where black paint is used, it shall be matt.”

Add the following clause:

“The Contractor shall provide temporary traffic control facilities in accordance with Section 1500 of the COLTO’s standard specifications for road and bridge works to ensure traffic safety where work is being executed.

Property and/or road signs damaged by the Contractor, his personnel, his agents or sub-contractors shall be repaired or restored to their condition prior to the damage at his own cost.”

B5712 FAULTY WORKMANSHIP OR MATERIAL

Add the following paragraphs to this item:

“The Contractor shall rectify in an acceptable manner and at his own costs; all marking that do not comply with the specified requirements.

While work is in progress, tests shall be carried out on materials and/or the quality of work to ensure compliance with the specified requirements. The sampling methods are specified in SANS 731-1. The sampling methods described in TMH5 shall be followed where applicable.”

B5713 PROTECTION

Add the following paragraph

“Traffic cones shall not be smaller than 750mm in height and shall be placed on the road not further than 48m apart. Cones shall not be removed before the paint on the road has hardened to such an extent that it will not be damaged by traffic and the adhesive of the road studs has

hardened to such an extent that the studs will not turn or become loose. All marks on the road caused by traffic driving over wet paint shall be removed by the Contractor at his own cost.”

B5714 MEASUREMENT AND PAYMENT

Amend pay item 57.05 by replacing the pay item heading with the following:

“Item	Unit
B57.05 Roadstuds (installation and maintenance) ”	
(a) RSA-1	number (No)
(b) RSA-2	number (No)
(c) RSA-3	number (No)
(d) RSA-T	number (No)

Add the following after the first sentence of the second paragraph of pay item 57.05:

“No additional payment will be made should temporary or permanent road studs be replaced if lost or broken during the construction period or during the Defects Notification Period.”

Item	Unit
B57.06 Setting out and pre-marking the lines (excluding traffic island markings, lettering and symbols)	kilometre (km)

Add the following:

“Referencing of existing barrier lines and other road marking lines prior to milling and other operations, shall be included in the tendered rate for setting out and pre-marking.”

Amend pay item 57.07 by replacing the pay item heading with the following:

“Item	Unit
B57.07 Re-establishing the painting unit at the end of the defects notification period	lump sum”

In the 4th line of the 1st paragraph delete the word “maintenance” and replace with “defects notification”

Add the following 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 roadmarking material for the lettering, symbols, transverse lines, islands and arrestor bed markings shall be the square metre, and the quantity to be paid for shall be the actual surface area of the lettering, symbols, transverse lines, islands and arrestor bed markings, completed in accordance with the instructions of the Engineer.

The tendered rate per square metre for applying the road marking material shall include full compensation for procuring and furnishing all material, including the retro-reflective beads and all necessary equipment, and for applying, protecting and maintenance as specified, including the setting out of lettering, symbols, transverse lines, islands and arrestor bed markings.

Item	Unit
B57.11 Re-establishing the painting unit on instruction of the Engineer during the construction period	number (No)

The unit of measurement shall be the number of times the painting unit is re-established on site on instruction of the Engineer.

The Contractor's establishment on site and general obligation shall be deemed to fully include the establishment of the road-marking team, irrespective of the number of times the road-marking team is required to be on site or is required to move within the site.

Provision is made under payment item 57.07 for de-establishment and re-establishment in the contract or maintenance period if such action is required by delays not attributable to the contractor and/or ordered by the Engineer.

The tendered rate shall include full compensation for re-establishing the complete painting unit on the site and the subsequent removal of all special equipment, personnel, etc., for painting the road-traffic markings during the construction period."

SECTION B5800: LANDSCAPING AND PLANTING PLANTS

B5801 SCOPE AND DEFINITION

- a) *Delete this paragraph and replace with*

“This section includes all areas affected by construction activities. It includes landscaping, grassing, rehabilitation, erosion protections and planting trees and shrubs.

- b) **Definition**

WEEDS

Delete the following:

“(as listed in bulletin 413 issued by the Department of Agriculture, Directorate of Agricultural Information)”

and replace it with:

“(as listed in the Conservation of Agricultural Resources Act)”

B5802 MATERIALS

- c) **Grass seeds**

Add the following:

“The grass seed mixture shall be as follows:

- i) (specify type) (specify kg/ha)
- ii) (specify type) (specify kg/ha)
- iii) (specify type) (specify kg/ha)
- iv) etc.
Total (specify kg/ha)”

- e) **Grass sods**

Delete “until they are placed” and add “once placed for planting”.

- (i) Nursery-grown sods

Add the following:

“The sods shall be free of weeds, weed seeds, insects and fungal diseases.”

- (ii) Veld sods

Add the following:

“The sods shall be free of weeds, weed seeds, insects and fungal diseases.”

- g) **Topsoil**

Add the following at the end of the first paragraph:

“The contractor shall be responsible for the control of any germination of weed seeds within topsoil used on site.”

Add the following at the end of the second paragraph:

“Areas such as stockpiles, borrow pits and spoil sites shall be stripped of all topsoil before work may commence within the area. Should a larger site for any of the above be required during construction, the contractor shall refer to the DEO for best practice methods on ensuring the preservation of the additional stripped topsoil.”

Add the following paragraph:

“The topsoil shall be kept free of all foreign material generated during construction. This shall include all stone and bituminous products. Topsoiling shall not be accepted should it contain any of the above material.”

B5804 PREPARING THE AREAS FOR PLANTS

b) Areas which do not require topsoil

Replace:

“50mm” with “20mm” and “150mm” with “20mm”

Add the following:

“In areas with large natural rock, i.e. not blasted or excavated rock, these rocks may be placed so as to look like a natural part of the landscape”

Add the following sub-clause:

“g) Removal of undesirable vegetation

During the course of the Contract the engineer may instruct the contractor to physically remove undesirable vegetation from within the road reserve. Such an operation will take place before the flowering stage of the undesirable vegetation upon written instruction from the engineer but shall not relieve the contractor of his obligation towards weeding sodded, grassed areas as described under 5806(a) and any area directly affected by any construction activity. Should the contractor fail to respond to the written instruction from the engineer for the removal of the aforementioned undesirable vegetation before flowering, the contractor shall be held contractually responsible for any growth or seeding of said vegetation for a period of not less than twenty four (24) months in the affected area.”

B5805 GRASSING

a) Planting grass cuttings

2nd paragraph – remove “be covered with 30mm of approved soil”. Replace with:

“have the root system of the grass cuttings thoroughly planted within the topsoil layer to ensure good growth. No part of the grass root system shall be left protruding from the topsoil”.

Remove “and, when sufficiently dry, shall be rolled with a light agricultural roller”

b) Sodding

Add the following:

“Grass sods obtained from a commercial grass farm shall be used for the following:

- A 1m wide strip shall be placed next to the road edge where no gravel shoulder exists.
- A 0,5m wide strip shall be placed adjacent to all concrete-lined drains. Full sodding must be used for grass-lined drains. This sodding shall extend over the entire drainage channel, including the tops of the sides. The use of grass sods will commence from the point of acceptance of water, up to the safe discharge of water. No area shall be left without grass sods within the drainage channel should it provide a risk of erosion.
- A minimum of a 1m wide strip shall be placed over the shoulder breakpoint for all fill slopes.
- Full sodding to be used for all slopes steeper than 1:2. Any slope that exceeds 3m in width shall be sodded, the type of which shall be determined by the slope.”

f) Sowing by hand

Delete the following:

“If approved by the engineer,”

Replace the second sentence with:

“The top 20mm of prepared topsoil shall be raked away in sections, the seed shall then be spread uniformly within the prepared area. The top 20mm topsoil shall then be raked over the seedbed, ensuring an even thickness. This method is to be systematic, and where applicable, follow the contours of any slopes.”

Add the following:

“The thickness of the topsoil layer shall be as specified by the engineer. The preparation of the soil of the soil for areas to be grassed is to include scarifying just before sowing the grass seed. Should erosion of any kind (by animal, wind or rain) have occurred before the contractor applies the grass seed, the slope shall be re-instated, at the contractor’s cost, to its original, erosion free state before seeding.

The types and mixtures of seeds to be used shall be as specified in the project specifications. The contractor shall be solely responsible for establishing an acceptable grass cover, and any approval by the engineer of seed mixtures intended for use by the contractor shall not relieve him of his responsibility”.

B5807 TREES AND SHRUBS

a) Positions of trees and shrubs

Add the following:

- “(x) No median shall be planted with shrubs, should the median width be less than 10m wide.”

B5808 GENERAL

Add the following subitems:

“f) Weeding

The contractor shall maintain all areas affected by construction activities free of all undesirable plant species. They shall be removed before the flowering stage of each species. Should the contractor fail to remove the alien plant species before flowering he shall be held responsible for alien plant removal within the affected area, for an additional period of one year, over and above the contractual one year defects liability period.

The method for the removal of undesirable plant species shall be either by hand, which shall include the removal of the complete root system, or by chemical means, through the use of a registered selective herbicide. A registered, licensed pest control operator, licensed for the industrial application of herbicides, shall only administer the application of the herbicide.

g) Establishment of vegetation within areas disturbed by construction activities

The engineer shall assess any area within the construction boundaries that has been disturbed by construction activities, but which is not scheduled for formal revegetation within the contract. The assessment shall include whether re-vegetation is required. These disturbed areas, none the less remain the contractor's responsibility for the removal of alien vegetation (see 5807(e)).”

B5809 MEASUREMENT AND PAYMENT

Item	Unit

B58.03 Preparing the areas for grassing

(f) Stockpiling topsoil (free haul 1,0km) where the following applies:

i)	topsoil stored at a stockpile site agreed with by the engineer	cubic metre (m ³)
ii)	topsoil pushed or bladed into heaps next to area from which it was taken	cubic metre (m ³)

f) Stockpiling the topsoil

Delete from the first paragraph, the last sentence: “Only material loaded approved area”.

Add the following pay item:

Item	Unit

B58.12 Removal of undesirable vegetation kilometre (km)

The unit of measurement shall be the linear kilometre measured along the road centerline and within the road reserve, and measured each time the contractor has been instructed by the engineer to remove the undesirable vegetation under this pay item. This item shall not include areas of undesirable vegetation that have occurred within areas affected by construction activities, which are considered a contractual obligation (5807(e)).

The tendered rate shall include full compensation for all plant, equipment, labour and consumables required to effectively remove the undesirable vegetation, including the entire root system, and disposing by approved means.”

SECTION B5900: FINISHING THE ROAD AND ROAD RESERVE AND TREATING OLD ROADS

B5901 SCOPE

In the first line of the second paragraph, insert the following after 'this section'

"... distinguishes between new construction and renewal construction. When construction is new, as in the case of new alignments for example, then this section "

B5902 FINISHING THE ROAD AND ROAD RESERVE

Retain the existing paragraphs as sub-clause:

"a) New construction"

Replace the sixth paragraph with:

"All materials resulting from the finishing operations shall be disposed of at approved spoil sites."

Add the following:

"b) Renewal construction"

After completing construction work within the site, the contractor shall ensure that all construction generated or related material that may have been swept, windrowed, stockpiled, stored or spread beyond the road surface is removed. This shall be done before any other rehabilitation work is undertaken, including shaping, topsoiling and grassing. Should, during the removal of construction generated or related material, existing vegetation or topsoil be disturbed or destroyed, the contractor shall, at his own cost, re-instate the road reserve to its original state. This shall include ripping, should the construction material have compacted the existing surface.

Culvert inlets and outlets, culvert barrels, and open drains shall be cleared of debris, soil, silt and other material generated from the construction activities.

The surfacing shall be cleared of all dirt, mud and foreign objects. Dragging, pushing or scraping material across the finished surfacing shall not be permitted.

All junctions, intersections, islands, kerbing and other elements making up the completed works shall be neatly finished off.

The contractor shall ensure that all undesirable plants have been removed from the road reserve and borrow pit areas.

All materials resulting from the finishing operations shall be disposed of at approved spoil sites."

COLTO SERIES 6000: 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 13 of the FIDIC Conditions of Contract subject always to a founding depth variation not exceeding 2.5m 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

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 5.0m of concrete structures shall be measured and paid for under item 61.02. Excavations beyond the 5.0m limit shall be measured and paid for under the appropriate items in Sections 2100 and 3300."

c) Excavation

Add the following paragraphs:

"Where excavation is in soft material, the final 0.75m and in the case of hard material, the final 0.25m of material shall be removed using suitable hand tools such as pick and shovel or pneumatic tools.

During construction of the river bridges the Contractor will only be permitted to construct, subject to the approval of the Directorate of Water Affairs, low level causeways access the rivers that cause negligible backing up and cofferdams around the piers and abutments for the construction of the foundations using material excavated in the road prism consisting of natural alluvial deposits of sand boulders, etc. These obstructions must be removed at the end of the contract and the river and banks restored to their original condition.

g) The safety of excavations

Add the following paragraph:

“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 undertaken shall comply with the relevant sections of the Occupational Health and Safety Act and the Construction Regulations”.

B6106 FOUNDING

Add the following clause at the end of the last paragraph:

“Where foundation slabs or pile caps 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 100mm 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 100mm all round beyond the horizontal dimensions of all formed footings to facilitate placing of the formwork, unless otherwise directed by the engineer.

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.”

B6113 FOUNDATION PILING

j) Precast concrete piles

(i) Manufacture

Add the following:

“The contractor shall check the design of the piles to accommodate the external loads and applied bending moments as a result of handling, transportation storing and driving. All pile designs shall comply with the requirements of BS 8004 and TMH 7, Part 3 as applicable, and shall contain at least the minimum steel as shown on the drawings.

The piles are designed to transmit the total load imposed upon them.

The contractor shall submit details of the pile driving criteria and the design sent to the engineer for approval at least 4 weeks before driving any piles”

l) Driving the piles

Add the following:

“Based on the information furnished on the drawing, the contractor shall submit details to the engineer at least 2 weeks before driving any piles, the methods he proposes to use to drive each pile to its full depth in one continuous operation (with due allowance for coupling time). Partially driven piles shall not be permitted to stand overnight due to the dissipation of pore water pressure.”

p) Determining pile lengths

Add the following:

“It is required that the top section of each pile has a minimum length of 2,5m below the pile cap before the coupler or such greater length as specified by the engineer. The contractor shall submit to the engineer for approval the minimum length he proposes to use.”

u) Load test

(iv) General

Insert the following as a first paragraph at the beginning of this clause:

“The engineer may require that a trial pile(s) be installed and load tested **prior** to the commencement of the piling works proper. The engineer may require that the installation of such trial pile(s) be measured and paid for separately, thus not forming part of the working piles installed later on.”

Insert the word “working” between the words “selected” and “piles” in the first sentence of the next paragraph.

Insert the following after “subclause 8112 (c)”:

“**All** types of **load tests on piles** shall be classified as **special tests** in accordance with clause 8115. The normal compression type of load test procedure on a pile is covered under clause 8112(c). Other types of pile load tests (e.g. internally jacked systems) may however be required. Clear provision is to be made in the project specifications (under a clause B8112(c)) and on the drawings, and in the schedule of quantities under a clause B8117 item B81.02, for such alternative types of pile load tests classified as special tests.”

x) Nuclear integrity testing

Delete this subclause and replace it with the following:

“(x) Pile integrity testing (PIT)

(i) Calibration piles

Before piling on any site is commenced with, the contractor shall (per pile construction site) construct a 5.0m long calibration pile of the same pile type, same method of construction as the piles in the bridge or structure or wall, same diameter, and same concrete mix and reinforcing. The location of this calibration pile (at any particular site) will be selected in agreement with the engineer.

(ii) Provisions with regard to pile cap construction

Results from integrity tests on the piles for each pile cap must be evaluated and submitted to the engineer for approval, before any work on the pile cap itself may commence. Tests on the calibration pile must be done at the same time or before tests on the first working pile are undertaken.

(iii) Pile integrity test method

The purpose of integrity testing is to prove that the construction techniques employed to create a bored or augured pile is satisfactory in terms of quality assurance with respect to aspects such as necking of concrete in the pile shafts, checking concrete cover to reinforcement, checking for honeycombing or grout loss, segregation of aggregate inclusion and for large cracks or voids.

(1) Cross-Hole Sonic Logging (CSL) and optional Base Integrity Test

(aa) Overview

This method is used to verify the integrity of the pile shaft particularly in the case of larger diameter piles.

By sending ultrasonic pulses through concrete from one probe to another (probes located in parallel tubes), the CSL procedure inspects the drilled shaft structural integrity and extent and location of defects, if any. At the receiver probe, pulse arrival-time and signal strength are both affected by the concrete. For equidistant tubes, uniform concrete yields consistent arrival times with reasonable pulse wave speed and signal strengths. Non-uniformities such as contamination, soft concrete, honeycombing, voids, or inclusion exhibit delayed arrival times with reduced signal strength.

An optional Base Integrity Test (in order to establish the quality of the pile base/end bearing contact via the CSL tubes) specification is included at the end of this section.

(bb) Personnel Requirements

The CSL consultant shall have a registered professional engineer supervising the testing and interpretation of results. The CSL consultant shall be an independent testing agency with at least 3 years' experience in CSL testing. The consultant's qualifications and the specifications for the equipment used shall be submitted to the engineer for approval prior to beginning bored or augured pile shaft installation.

(cc) Equipment requirements

A Cross Hole Analyser (CHA) that meets the following minimum requirements:

- (1) Computer based CSL data acquisition system for display of signals during data acquisition, with a minimum 12 bit A/D converter with a sampling frequency of at least 500 000Hz, and recording of all pulse signals for full analysis and individual inspection.

Note: Converting signals with low noise using high A/D resolution and sampling rates is important to obtain quality data and allow proper full data interpretation.

- (2) Ultrasonic transmitter and receiver probes capable of producing records at a minimum frequency of 50 000Hz with good signal amplitude and energy through good quality concrete. The probes shall be less than 28mm in diameter and shall freely descend through the full depth of properly installed access tubes in the drilled shafts.
- (3) Two depth sensors to independently determine transmitter and receiver probe depths.
- (4) Triggering of the recording system time base with transmitted ultrasonic pulse.

(dd) Access tube preparation

The access tubes in each drilled shaft are indicated on the drawings. Every drilled shaft shall be equipped with access tubes to permit inspection by CSL. All permanent drilled shafts are to be tested by CSL. 50mm (minimum) nominal diameter 3mm wall thickness mild steel tubes are specified for access for the probes in each drilled shaft. Typically 3 to 4 tubes are used, although up to 6 may be used in larger piles. Round tubes with regular internal diameter free of defects and obstructions, including any tubes joints, to permit the free, unobstructed passage of the probes shall be used. Tubes shall be watertight and free from corrosion with clean internal and external faces to ensure a good bond between the concrete and tubes. Tubes may be extended with mechanical couplings. Duct tape or other wrapping materials to seal the joints and butt welding of joints are prohibited. Tubes shall be installed by the contractor such that the CSL probes will pass through the entire length of the tube without binding. Ensure that the access tubes are plumb and verify that unobstructed passage of the probes is achievable before the CSL consultant arrives.

Note: If an existing pile does not contain access tubes, access holes can be installed by coring a borehole in the concrete. Locate cored holes about 150mm inside the reinforcement cage. Log core holes and include descriptions of any inclusions or voids. For pile drilled shafts with access tubes that do not allow the probe to pass through the entire length of the tube due to poor workmanship, replacement access holes may be provided by core drilling.

Fit the tubes with watertight shoe in the bottom and a removable cap on the top. Secure the tubes at regular intervals not to exceed 1,0m to the interior of the reinforcement cage. Install the tubes uniformly and equidistantly around the circumference such that each tube is spaced parallel for the full length and at the maximum distance possible from each adjacent tube. Tubes should be spaced as far as possible from the main axial reinforcing steel. Extend the tubes to within 300mm of the bottom of the pile, and at least 1,0m above the drilled shaft tops, and at least 0,6m, but no more than 1,5m above the ground surface. Do not damage the tubes during installation of the reinforcement cage.

Note: Do not allow the tube to rest on the bottom of the drilled shaft excavation.

After placement of the reinforcement cage, fill the access tubes with clean fresh water as soon as possible but within at the latest one hour of concrete placement. Cap the tube tops to prevent debris from entering the access tubes. Do not apply excessive torque, hammering or other stresses that could break the bond between the tube and concrete when removing caps from the tubes.

Note: The tubes should preferably be filled with water prior to concrete placement, but MUST be filled with water within at most 4 hours after placing concrete to prevent debonding of the access tubes due to differential temperatures.

(ee) Test sequence

Test the drilled shaft no sooner than 3 calendar days after placement of all concrete in any drilled shaft, but within 10 days after placement and prior to loading for test drilled shafts, or within 45 days after placement on production drilled shafts.

Note: CSL testing can be performed any time after concrete installation, although 2 days is usually the minimum acceptable wait. Because the concrete strength and quality generally increases as the concrete cures, longer wait times are usually desirable, particularly if minimum pulse wave speeds are specified or to reduce result variability between drilled shafts or even as a function of depth in a single drilled shaft. However, if PVC tubes are used, long wait times increase the tube debonding, which is detrimental to the test. Production of drilled shaft installation and subsequent construction influence the dates of CSL testing.

After all CSL testing has been completed, and after acceptance of the drilled shaft by the engineer, the contractor shall remove the water in the tubes, place grout tubes extending to the bottom of the access tube, and fill all access tubes in the drilled shafts with grout.

(ff) Test procedures

Prior to CSL testing, the contractor shall provide the engineer and CSL consultant with a record of all drilled shaft lengths with elevations of the top and bottom, and installation dates of all drilled shafts. The access tubes shall be clearly labelled for identification by the CSL consultant.

The CSL testing shall be performed with the transmitter and receiver probes in the same horizontal plane in parallel tubes unless test results indicate potential defects, in which case the questionable zone may be further evaluated with angled tests (source and receiver vertically offset in the tubes). Using the labelling established for the tubes, perform CSL testing between all adjacent perimeter access tube pairs and across at least two major diagonals within the drilled shafts with more than four tubes, additional logs in other diagonal tube pairs may be required to estimate the extent of the defect.

Lower the probes from the top, effectively measuring the access tube lengths. Pull the probes simultaneously, taking CSL measurements at intervals of 50mm or less from the bottom to the top of the drilled shaft. Defects indicated by late pulse arrival times and significantly lower amplitude/energy signals shall be immediately reported to the engineer. Additional tests such as the offset elevation CSL testing may be required by the engineer to further evaluate the extent of such defects. If debonding between the access tube and the concrete is indicated by the CSL results, an alternative test method will be required to determine the integrity of the concrete in the debonded region.

Note: In case defects are detected, additional tests or analysis options may include CSL tomography, Gamma-gamma nuclear density logging, sonic echo or impact response tests, high strain dynamic pile testing, static load testing, or concrete coring. If the drilled shaft is cored, an accurate log of the cores that include depth and core recovery shall be kept, and core and coring logs shall be properly identified and given to the engineer.

(gg) Results

Present the results of the CSL in a written report within five (5) working days of completion of testing. The report shall include presentation of CSL logs for all tested tube pairs including:

- (1) Presentation of the traditional signal peak diagram as a function of time plotted versus depth.
- (2) Computed initial pulse arrival time or pulse wave speed versus depth.
- (3) Computed relative pulse energy or amplitude versus depth.

A CSL log shall be presented for each tube pair. Defect zones, if any, shall be indicated on the logs and their extent and location discussed in the report text. Defect zones are normally (see Note

below also) defined by an increase in arrival time of more than 20% relative to the arrival time in a nearby zone of good concrete, indicating a slower pulse velocity.

Note: Because the tubes might not be perfectly straight or even parallel, a fixed absolute limit of a wave speed value cannot be used for evaluation. It should also be noted that if the referenced good concrete exceeds the specifications, then a concrete with a local 20% wave speed reduction might still exceed the specifications.

The log for each tube pair shall be clearly identified and oriented relative to the structure. The engineer shall have five (5) working days to evaluate the results and determine whether the drilled shaft construction is acceptable or not. The contractor shall not perform any load testing or other construction associated with these drilled shafts until after acceptance by the engineer. If the drilled shaft is accepted by the engineer, the contractor may then proceed with construction. If the engineer determines the drilled shaft is not acceptable, the drilled shaft must be cored, repaired or replaced by the contractor at the contractor's expense and with no increase in contract time.

(hh) Base integrity test

In order to establish the quality of the pile/base rock contact, a base integrity test shall be performed. This shall be accomplished in the following manner:

- (1) The 85mm diameter tubes for the "Cross Hole Sonic Logging" shall be installed to within 300mm of the base pile of the pile. The base of the tubes shall be sealed square with a water tight seal.
- (2) NX (55mm) diameter cores shall be drilled within 85mm diameter tubes, through the remaining 300mm of pile concrete and for a distance of 1200mm into the rock at the toe of the pile. The core shall be carefully retrieved with drill string lengths and datums noted. This core shall be marked and carefully placed inside a plastic sheath such that the actual condition of the interface between pile and rock is not disturbed. The core shall be temporarily stored in a core box for later inspection.

At the completion of the test, and when instructed by the engineer, the complete assembly to the top of the pile shall be filled with non-shrink grout of at least 30MPa strength. The hole shall be filled from the bottom up.

The basis of payment shall be in accordance with pay items 61.37, 61.38 and 61.39.

(2) Impulse or Impact Frequency Response (IFR) or “Tapping” Method

(aa) Overview

These tests have a depth limitation with respect to checking the pile shaft quality, this being typically 20 to 30 pile diameters. The pile head is struck with a hand held hammer, which sends low strain stress waves down the pile shaft. The pile concrete shall have attained an age of at least 3 days. This induced stress wave is reflected off the pile toe, as well as off any other discontinuities along the pile shaft. This reflected wave gets recorded by a hand held accelerometer pressed against the top of the pile, and converted into a velocity-time trace presented on-screen as velocity versus pile depth. This is non-intrusive test and can be implemented on all types of cast in situ or grouted in situ piles of 250mm diameter and upwards.

Interpretation of the resulting graph will typically yield the following:

- (1) Significant inclusions (5-10 % of pile shaft area).
- (2) Horizontal cracks (or joints).
- (3) Pile necking.
- (4) Changes in surrounding soil layers.

(bb) Personnel requirements

The IFR consultant shall have a registered professional engineer supervising the testing and interpretation of results. The IFR consultant shall be an independent testing agency with at least 3 years’ experience in IFR testing. The consultant’s qualifications and the specifications for the equipment used shall be submitted to the engineer for approval prior to testing.

(cc) Pile head preparation

Piles shall be tested from the cut-off level in sound concrete (about 50mm above pile cap soffit level). Helical shear links shall be removed to allow ample swing area for the hammer. A level hammer area of about 100mm diameter shall be prepared in the pile centre by using scabblers, scutch hammer or hammer and chisel. For the geophone, an area of about 80mm diameter shall be similarly prepared close to the pile perimeter.

(dd) Results

Written report in an easy to read and understand format, shall be submitted within five (5) working days of completion of the testing. The report shall include all IFR logs, as well as interpretation of the data.

B6115 MEASUREMENT AND PAYMENT

Delete pay item 61.50 and replace it with the following items for Pile Integrity Testing (PIT):-

“Item

Unit

B61.50 Pile Integrity Testing on bored/augured piles

- (a) Constructing 4.0m long reinforced concrete/
grout calibration bored piles of (indicate
diameter(s)) inclusive of the required number
of 85mm diameter mild steel tubes number (No)
- (b) Providing and installing 85mm diameter
mild steel tubes used for “Cross Hole Sonic
Logging” in all designated piles (per pile
construction site) metre (m)
- (c) Impact Frequency Response (IFR) tests
and interpreted results (per pile diameter
and per pile construction site) number (No)
- (d) Cross-Hole Sonic Logging tests and
interpreted results (per pile diameter and
per pile construction site) metre of pile (m)
- (e) Base integrity tests (per designated pile,
per pile construction site):
 - (i) Establishment on the site for core
Drilling (as per COLTO pay item
61.37)..... lump sum (LS)
 - (ii) Moving equipment and assembling
it at each location/pile position
where cores are to be drilled (as per
COLTO pay item 61.38)..... number (No)
 - (iii) Drilling the cores (diameter indicated) in:
 - (aa) Concrete metre (m)
 - (bb) Founding formation:
 - (1) Irrespective of hardness metre (m)
 - (2) With a hardness of (hardness
indicated) metre (m)
 - (iv) Log of cored data number (No)

The unit of measurement shall be the number of cores logged. The
tendered rate shall include full compensation for the log of the core data
by a qualified person, who shall be approved by the engineer. The core
logging shall be done in general accordance with the “Guidelines for soil
and rock logging” compiled by the Geotechnology Workshop and
published by SAICE in 1990.
 - (v) Grouting up all CSL tubes after successful
testing cubic metre (m³)

The unit of measurement shall be the volume of grout used to fill all the tubes used
for sonic testing and the cores.

The tendered rate shall include full compensation for the grout, equipment and all
labour used to fill the tubes and cores. The grout shall have a compressive strength

of at least 30MPa.

The unit of measurement for subitem (a) shall be the number of 4.0m long calibration reinforced concrete bored piles provided complete with the required number (and length) of 85mm mild steel tubes to facilitate CSL testing and constructed similarly to the proposed working piles.

The unit of measurement for subitem (b) for the 85mm nominal diameter mild steel tubes shall be the metre of approved 3mm thick tubes provided and installed into all designated piles of various diameters in accordance with the specification.

The unit of measurement for subitem (c), viz for the Impact Frequency Response tests shall be the number of designated piles tested by the IFR method as compensation for establishment on site, procurement, preparation, conducting and supervising the tests and full compensation for the proper evaluation and reporting of the results and findings to the engineer, by the IFR consultant.

The unit of measurement for subitem d), i.e. the CSL tests, shall be the metre of pile shaft fully tested (for all designated piles) using the Cross-Hole Sonic Logging method, and shall include full compensation for establishment and removal of all specialised equipment and expert personnel as well as for all materials, for the preparation and conducting and supervising the tests as well as full compensation for the proper evaluation and reporting of the results as well as the interpreted findings/conclusions/recommendations to the engineer by the CSL consultant".

Item	Unit

B61.51 Lateral support to excavations

(a) Location 1:

(i) 0 to 5m depth lump sum (LS)

(ii) 5 to 10m depth lump sum (LS)

(b) Other locations

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 by way of a lump sum, 50% of which 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% of the lump sum shall become payable after the excavation platform has been completed, and the final 10% of the lump sum 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(a).

Item

Unit

B61.52 Foundation lining

- (a) Rock grid PC 100/100 geofabric to rockfill as per detail...square metre (m²)

The unit of measurement shall be the square metre of area covered with the specified geofabric placed in position.

The tendered rate shall include full compensation for the supplying the geofabric, cutting, waste, placing, joining, overlapping, and securing the material in position.”

SECTION B6200: FALSEWORK, FORMWORK AND CONCRETE FINISH

B6204 DESIGN

a) General

Add the following:

“The Contractor shall submit to the Engineer 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 prestressing, 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 Engineer has given his written approval.”

b) Falsework

“Unless instructed otherwise by the Engineer, the Contractor shall submit his design criteria and detailed drawings of the staging to the formwork. 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) General

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 25mm x 25mm neatly butted and set at the position of the construction joint”.

(vi) Permanent formwork

Add the following paragraph:

“Anchor ties shall be designed to resist full buoyancy forces and details of such shall be submitted to the engineer for approval. Void formers shall be held in position in order that no movement exceeding 1% of the deck thickness takes place during concreting.”

d) Class F3 surface finish

Replace the second paragraph with the following:

“The use of steel forms shall be permitted to form surfaces for which Class F3 surface finish has been specified, provided that only undamaged forms shall be used for such work and that the forms shall be subject to the approval of the engineer.”

B6210 MEASUREMENT AND PAYMENT

Item

Unit

B62.04 Inclined Formwork to provide (class of finish indicated as F1, F2, F3 or board) surface finish to (description of member to which applicable)

Delete the entire note at the end of this pay item.

B62.05 PERMANENT FORMWORK

Add the following to the second paragraph:

“The tendered rates shall include for the installation of permanent drainage holes within the void formers at the low points of each void. “

SECTION B6300: STEEL REINFORCEMENT FOR STRUCTURES

B6306 PLACING AND FIXING

Replace the second and third paragraphs with the following:

“The concrete cover for all structural concrete shall be within the acceptance ranges shown in Table B6404/6. Prior to fixing the steel, samples of the proposed cover and spacer blocks shall be submitted to the engineer along with a written statement for in situ manufacture, if applicable, for approval.

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

B6307 COVER AND SUPPORT

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 engineer 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 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.

Add the following paragraph:

“Where the concrete cover specified has not been achieved after cover tests have been carried out in accordance with clause B8106(j), reduced payment as determined under clause B8212 shall be applied to all the relevant pay items under section 6300.”

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 engineer 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.cnci.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 engineer.

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 engineer on the basis of an acceptable quality assurance procedure.

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”

Delete the entire last paragraph of sub-sub-sub-clause (i)(3) commencing with “The drying shrinkage of concrete...”

Add the following sub-sub-clause:

“(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%."

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 (3000ppm) nor sulphates, calculated as sodium sulphate, in excess of two thousand parts per million (2000ppm).

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.

No water shall be added on site to ready mix concrete prior to placing to improve workability. All concrete delivered to site shall be checked for workability using the slump cone test and slump measured outside of the limit set from the design mix shall be rejected."

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 Engineer. In addition, no admixtures shall be added on site to ready mix concrete prior to placing to improve workability."

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 6404(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 specifications."

b) Strength concrete

Replace the sixth paragraph with the following:

"Where concrete is designated by the prefix "W", e.g. class W30/19, such designations

shall denote concrete achieving the durability criteria specified in the relevant tables under sub-clause B6404(h)."

Add the following sub-clauses:

"h) Concrete durability

(i) General

Concrete designated by the prefix 'W' shall, in addition to the requirements of sub-clause 6404(b) comply with the durability parameters described below. Durability is influenced by the materials used in the concrete, their mix proportions, transporting, placing, compacting and, in particular, curing of the finished cover concrete (concrete layer between the outermost layer of steel reinforcement and the exposed outer surface of the concrete element). The tests required to prove durability performance of the placed concrete are given under sub-clause B8106(i).

It is the engineer'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 to the specifications. It is the contractor's responsibility to design and blend materials to produce concrete of the specified quality

(ii) Durability parameters

Water sorptivity: Sorptivity is sensitive to surface effects and may be used to assess the effectiveness of initial curing.

Oxygen permeability: Permeability is sensitive to changes in the coarse pore fraction and thus a means of assessing compaction of concrete. It is used to quantify the microstructure of the concrete and sensitive to macro-defects such as voids and cracking.

Chloride conductivity: Chloride conductivity provides a method of characterisation of concretes in the marine environment and is used to assess the chloride resistance of concrete.

Cover concrete: Cover concrete is the outer concrete layer that protects reinforcing steel. Concrete cover is a requirement for all concrete whether specified as durability concrete (Class "W") or normal reinforced concrete.

Individual Cover Depth Measurement (CDM): Individual cover depth measurement determined by an electromagnetic cover meter, complying with BS 1881, Part 204.

Average Cover: The average of at least 30 individual CDM's per m² determined on a clearly identified area.

Overall Cover: The mean average cover determined for the scanned area per structure.

Scan Area: Areas of approximately 1m², randomly distributed over the entire structure, representing at least 5% of total surface area for that structure.

Individual bar reading: A minimum of 3 linear CDM's, spaced at 100mm intervals, representing a single bar of reinforcement.

Capped CDM: The value applied to all CDM's in excess of the maximum allowed CDM, determined by the engineer (e.g. 40mm (specified cover) + 15mm (upper limit) = 55mm) or

Capped Value: A value in mm, assigned to a cover reading where the raw reading exceeds the specified cover, plus a value (mm) specified by the engineer.

Quick/Linear Scan: For evaluation of cover depth measurements taken perpendicular to closest rebar in a line covering required area to be scanned.

Image/Block/Grid Scan: Provides an overview of rebar layout. Measurements taken over a square meter clearly indicating position of first and second layer of rebar.

Notes:

1. Water sorptivity and Oxygen Permeability tests are required to assess carbonation resistance
2. Water sorptivity, permeability and chloride conductivity tests are required to assess chloride resistance

Concrete cover: Concrete cover is a dimensional indicator of cover concrete depth and it varies according to the requirements of the different environmental exposure classes.

When tested in accordance with the test protocols described in B8106 for each potential durability parameter, the concrete shall meet the limits listed in tables B6404/4 and B6404/6.

(iii) Cement content

In order to meet the durability criteria, the proportions of cementitious binder used shall be determined to suit the fine and coarse aggregate and cement type used in order to achieve the durability limits specified in tables B6404/4 and B6404/6 under the Acceptance Category of "Concrete made, cured and tested in the laboratory."

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 350kg/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 350kg/m^3 , the maximum equivalent sodium monoxide content permitted shall be 2.1kg/m^3 of concrete.
3. Where potentially reactive aggregate is used, the maximum cement content shall be 400kg/m^3 and the equivalent sodium oxide (Na_2O) content permitted shall be 2.4kg/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 oxide (Na_2O) content of the batch of cement to be used.

5. Special literature should be consulted e.g. Fulton's Concrete Technology.

(iv) Environmental Classes of Exposure

For this project, the environmental classes for carbonation and chloride exposure for the different structural elements are as shown below in Table B6404/3.

TABLE B6404/3: ENVIRONMENTAL CLASSES OF EXPOSURE FOR ELEMENTS OF STRUCTURE

Element	Carbonation Environment (OPI)	Chloride Environment (Chloride Conductivity)
Foundations	n/a	n/a
Substructures	XC4	n/a
Superstructures	XC4	n/a

(v) Acceptance ranges

TABLE B6404/4: DURABILITY PARAMETERS ACCEPTANCE RANGES

Acceptance Category	Test No./ Description/ Unit				
	Water Sorptivity (mm/ h)	Oxygen Permeability (log scale)			
		Parapets	Sub-structures	Super-structure	Etc for other members
Concrete made, cured and tested in the laboratory using Trial Panels	<10.0	>9,3	>9,3	>9,3	>9,3
Full acceptance of in situ using Test Panels	<10.0	>9,3	>9,3	>9,3	>9,3
Conditional acceptance of in situ concrete based on results of Test Panels	Not applicable ₂	9 – 9,3	9 – 9,3	9 – 9,3	9 – 9,3
Rejection based on results of Test Panels	Not applicable ₂	<9	<9	<9	<9

Notes:

1. A value has been given, but the value to be adopted shall be based on the results from design mixes.
2. Although no value has been given due to ongoing research, values above 12 are regarded as poor quality concrete.
3. For purposes of interpretation, substructure is deemed to be all supporting elements below the deck (superstructure), including buried lengths of columns, etc, but excluding foundation elements like bases and spread footings.

TABLE B6404/6: DURABILITY PARAMETERS ACCEPTANCE RANGES: COVER FOR ALL CONCRETE TYPES

Test No.	Description of Test	Specified Cover (mm)	Acceptance Range	
			Min	Max
			Overall cover	Overall cover
B8106(g) (iv)	Concrete cover to reinforcement (mm)	30 to 80	85% of specified cover – 5mm	Specified cover + 15mm or where member depth is less than 300mm the limit accepted in writing by Design Engineer.

(v) Site Testing

To ensure that the concrete has been placed, compacted and cured correctly, a number of tests shall be carried out on the concrete by an approved laboratory.

(vi) Non-compliance with specified criteria

The Contractor should also note that there is specific provision made for curing of concrete under payment item B64.07 of the project specification. The amount priced under this item will be subject to reduced payments should the durability tests indicated under B8106(h) fail to meet the required targets. Similarly, failure to achieve the required durability test results will be sufficient cause to apply partial payment factors for all the pay items of the elements of the structure under sections 6300 and 6400 of the standard and project specifications or in some cases the removal of the rejected concrete.

Add the following sub-clauses:

“i) Mix design approval procedures

(i) General

The compressive strength achieved on ‘W’ class concrete shall generally exceed the characteristic strength class structurally required. The contractor shall note that the process of finalising ‘W’ class mix designs could take up to two months. In order to expedite the process, the contractor must submit samples of aggregate and cement to an approved laboratory within seven days of the Commencement Date. Should ‘W’ class concrete be required before the mix design is finalised, the engineer will approve a preliminary mix design in consultation with the contractor.

(ii) Laboratory designs and site tests based on Trial Panels

Good mix design practice is essential and the following criteria shall be taken into consideration when pricing and determination of the mix design:

1. Selection of sands and aggregates to achieve a good grading is important if the desirable concrete density and durability have to be achieved.
2. The selection and use of the correct cement grade and type for the environmental conditions (and not based solely on costs) is fundamental
3. Water: cement ratios are critical, dictating both the structural strength and the durability requirements

Mix proportions for the concrete to be used on site need to be determined by an

approved laboratory, Cylindrical specimens, 70 ± 2 mm in diameter shall be made or cored from a trial panel during the laboratory trial mix for performance of tests B8106(g)(i), (ii) (if required).

Note that concrete cubes are not cored for durability testing during design trial mix stage or during the construction stage.

Testing for approval purposes shall be carried out by an accredited laboratory approved by the engineer, the costs of which are deemed to be included in the contractor's rates for structural concrete. Concrete as designed shall satisfy the limits set out in Table B6404/4 under the heading "Concrete made, cured and tested in the laboratory, using Trial Panels". It is therefore a requirement that the trial panels be cast on the site and the cores extracted and tested in the laboratory as part of the mix design approval process. Where the site is remote from the laboratory, the Trial Panels may be cast at the laboratory in accordance with the requirements of sub-clause B8106(g).

It will be necessary for the contractor to establish a target mean strength with a margin above the minimum requirement so that small fluctuations due to material changes or workmanship can be accommodated. In general, mean target strength = characteristic strength + $1,645 \times S_n$.

Once the mix is approved, the target mean compressive strength for quality control purposes for durability class concrete shall be the mean compressive strength obtained from the mix that satisfies the durability requirements."

B6407 PLACING AND COMPACTION

Add the following:

"b) Placing

Casting of the in situ parapets or placing of precast parapets shall only commence after removal of the deck staging, and in addition, in the case of prestressed decks, the stressing must be complete. Where specified on the drawings the top of the parapets after placing shall follow the pre-camber levels specified on the drawings to allow for future creep effects. This is of particular importance on the edges of very long skew decks and prestressed simply supported decks. The levels of the top rail of each panel of the balustrades/parapets shall be confirmed in writing by the design engineer"

B6408 CONSTRUCTION JOINTS

a) General

Add the following:

"No construction joints other than those indicated on the drawings will be permitted without the written approval of the engineer. In all cases the proposed method of forming the joint shall be discussed and agreed with the engineer."

B6409 CURING AND PROTECTION

Add the following to the end of sub-clause 6409(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 engineer.

If impermeable curing membranes are to be used as a curing method, they shall be installed at the same time as formwork is removed and no portion of a concrete surface may be left unprotected for a period in excess of 2 hours. If the surface is an unformed finish e.g. top of deck slab, then the surface must be protected immediately by appropriate methods approved by the engineer after it is finished, without damage to that surface, since it is vulnerable to plastic shrinkage cracking due to high rates of evaporation while the concrete is still in a plastic state. Plastic shrinkage and settlement shall not be permitted on any of the structural elements since it compromises the durability of the concrete. 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 engineer. On bridge decks, the top surface shall be cured using the method described in clause 6409(d) i.e. "Constantly spraying the entire area of exposed surfaces with water".

For all concrete curing shall be excluded from the make-up of rates for measurement under items B64.01 and B64.02 and will be 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 engineer 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. Also if after addition of allowed water the concrete begins to stiffen again such as to place in doubt that full compaction and finishing can be achieved, 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 engineer. The quality plan must incorporate all requirements and frequency for durability index testing i.e. Sorptivity, Oxygen Permeability, Chloride Conductivity (if required) and Cover Testing. As part of the Quality Plan submitted for approval, copies of calibration certificates of both gauges used for proof loads and cover meters used at the factory shall be supplied to the engineer. The originals of these certificates shall at all stages also be available for inspection at the factory premises. The manufacturer shall check each precast unit for cover compliance, and random checking of units shall not be permitted. The engineer's representative may visit the factory at any stage to ascertain adherence to the quality plan including test results from the durability index testing as well as to check covers before delivery to site. Any substandard cover shall result in the applicable structural element or part thereof being rejected. Should the manufacturer not be adhering to their Quality Plan the engineer may exercise the right to reject the use of products from the manufacturer concerned. The Employer shall also be informed in all such cases.

For durability requirements due to the reduced cover provided for precast culverts, all such durability testing shall be done in accordance with clause B6404(h). "

B6414 QUALITY OF MATERIALS AND WORKMANSHIP

a) Criteria for compliance with the requirements

Add the following paragraphs after the first paragraph:

"The cores shall be taken from the Trial Panels cast using the design mixes made in the laboratory. Where the site is remote from the laboratory, the Trial Panels may be cast at the laboratory in accordance with the requirements of sub-clause B8106(g).

In the event that for 'W' classed concrete strength requirements the actual achieved average cube strengths of an element are less than 85% of the target mean strength needed to meet durability requirements or less than 100% of the target mean strength to meet strength requirements, it may result in the durability parameters not meeting the prescribed targets and the engineer will instruct the taking of cores from the test panel and structure for additional testing. The cost of these in situ tests shall be borne by the contractor.

The approved quality control criteria for process control testing for durability concrete shall be coring and testing of test panels. The frequency of manufacture and coring of test panels shall be as ordered by the engineer and indicated in Tables B8106/1 and B8106/2.

Tests B8106(g)(i), (ii) and (iii) (when required), shall be conducted on cores extracted from the test panels when the concrete reaches the age of at least 28 days. To allow for variability in the material potential, the type of chloride conductivity values shall be limited to 90% of the values indicated in table B6404/5. Test no. B8106(g)(iv) shall be conducted to confirm that the specified depth of concrete cover has been achieved. The frequency of these tests shall be as described under item B8106(g). The test results shall be accepted or rejected on the criteria set out in Table B6404/4 and B6404/5 based on the following categories:

(i) Full acceptance

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

(ii) Conditional acceptance

Concrete may be accepted, based on the cube strength and durability index results with a warning that construction methods be examined to improve the durability criteria. A reduced payment shall be applied to all the relevant pay items of the specific element under B6300 where the cover requirements are not achieved and B6400 where the oxygen permeability and strength requirements are not achieved for the non-conforming element or concrete pour as set out in Tables B8212/1 and B8212/2. The decision to accept the substandard concrete at reduced payment shall rest solely with the Employer.

Should the test result(s) indicate conditional acceptance of the element tested, the Contractor shall have the option of carrying out additional tests (on 4 extracted cores) on that element of the structure, at his own expense to confirm or disapprove the original test result(s). These cores shall be extracted within 56 days from the date of the element being cast.

Should the additional test confirm the original test result, then the original test result shall serve to determine payment in accordance with Tables B8212/1 and B8212/2.

Should the additional test show that the structure meets the targets, the penalty shall be halved."

(iii) Rejection

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

B6416 MEASUREMENT AND PAYMENT

Add the following at the beginning of clause 6416:

"Note that pay items B64.01, B64.02 and B64.07 below are only applicable to durability concrete prefixed 'W'."

Item	Unit

B64.01 Cast in situ concrete

Amend the descriptions of subitems 64.01(a) and (b) to read as:

"(a) Durability Concrete (Class W) cubic metre (m³)

- (i) Indicate part of structure and strength e.g. Piers (W30/19))
- (ii) Etc for other parts of structure

(b) Normal Concrete cubic metre (m³)

- (i) Indicate part of structure and strength e.g. Blinding (15/19)
- (ii) Etc for other parts of structure

In the case of cast in situ concrete, delete "curing and protecting the concrete," in the sixth line of the description of the tendered rate for item 64.01.

Add the following after the second paragraph in the rate make-up:

"The Contractor shall note that the strengths indicated above are to meet structural requirements only. In order for the durability criteria to be achieved, it may result in higher strengths being required. Target mean strengths to be achieved for durability purposes may therefore be higher than those shown above, as discussed under sub-clauses B6406(b) and B6404(h)(ii). All durability testing costs required for process control testing shall be included in the rate make-up for durability class concrete."

Item	Unit
B64.02 Manufacturing precast concrete members (description of member with reference to drawing) ... number (No)	

In the case of precast concrete, delete "curing and" in the second line of the description of the tendered rate for item 64.02.

Item	Unit
B64.06 Demolishing existing concrete	

Amend the payment paragraph as follows:

"The tendered rate shall include full compensation for all labour, plant (including access and craneage) and equipment (including concrete cutters) required to demolish the existing concrete (irrespective of strength) and the disposal of the product of the demolishing to a borrow pit within a free-haul distance of 15km. The tendered rate shall also include full compensation for any necessary measures to ensure no debris falls into rivers or surfaces where damage is possible and for any debris that has fallen into rivers to be recovered.

Payment shall distinguish between plain and reinforced concrete. For the purposes of this item, reinforced concrete is defined as concrete containing at least 0,2% of steel reinforcement measured by volume."

Add the following payment items at the end of clause B6416:

"Item	Unit
B64.07 Curing of concrete:	
(a) (Indicate structural element and surface to be cured) (Tenderer to specify method of curing) square metre (m ²)	
(b) Etc. for various elements (Tenderer to specify method of curing) square metre (m ²)	

The unit of measurement shall be the square metre of completed concrete element cured using an approved method as described in clause B6409 of these Project Specifications.

The tendered rates shall include full compensation for providing the curing agent and applying it to the fresh concrete surface by means of an approved pressure distributor (or other approved methods of application) in accordance with the manufacturer's specified nominal rates of

application. Wet fine mist spray curing is also permitted providing it is done for 7 days. Payment will also be made under this item if this is the preferred method to be used. Should no curing method be specified at time of tender then it will be assumed wet fine mist spray curing is to be done. Partial payment shall be applied in the event that the engineer allows conditional acceptance.

Item

Unit

B64.08 Hot weather concreting lump Sum (LS)

The tendered Lump sum shall include full compensation for all measures specified in clause B6410(d) required to ensure that the temperature of the concrete placed will not exceed the temperature specified under clause B6410(f) of these specifications.

Payment will be made pro-rata to the quantity of al structural concrete, which is placed on the contract. Payment will only be made if all the necessary measures required to ensure that the concrete is placed at the temperature specified are implemented”.

SECTION B6600: NO-FINES CONCRETE, JOINTS, BEARINGS, PARAPETS AND DRAINAGE FOR STRUCTURES

B6603 JOINTS IN STRUCTURE

a) Materials

(i) General

Add the following after the last paragraph:

“It is a firm requirement that all contracts have full Agrément certification for bridge deck joints, with the target date for new applications for Agrément assessment one year from receipt and acceptance by Agrément South Africa of each application. Proof of original acceptance of application by Agrément is required in such a case.

(1) current Agrément assessments: 1 September 2010.

(2) new applications for Agrément assessment one year from receipt and acceptance by Agrément South Africa of each application. Proof of original acceptance of application by Agrément is required in such a case.”

(g) Installing the expansion joints

Delete the first paragraph and replace with the following:

“All deck expansion joints shall be installed by approved specialist subcontractors only. Installed deck expansion joints shall have the following guarantees:

Proprietary joints - 15 years

Asphalt plug type joints - 10 years

Concrete nosings (replacement) - 10 years

Joint sealant - 5 years

All deck expansion joints will only be considered for use on this contract if the manufacturer has obtained Agrément certification. New applications for Agrément assessment takes up to one year from receipt to acceptance by Agrément South Africa.”

B6604 BEARINGS FOR STRUCTURES

(e) Proprietary Bearings

(v) Construction

Delete the final three (3) paragraphs of subclause (e)(v)(7) and replace with the following:

“Applying two coats of epoxy MIO paint, with each coat a minimum of 75 micrometers of dry-film thickness and of a dark grey colour.

Applying a semi-gloss, acrylic polyurethane (2 pack) finish with a minimum of 50 micrometers of dry-film thickness and of light grey colour.

Surfaces in contact with concrete shall be sprayed with zinc, but not painted, so that it complies with the requirements of SABS 1391 part 1 for type Zn 150 surfacing.”

B6608 MEASUREMENT AND PAYMENT

Item	Unit
B66.04 Installation of proprietary expansion joints	metre (m)

Add the following to the end of the second paragraph:

“The tendered rate for subitems (a) and (b) shall also include for water test required to prove the joint. The water shall be ponded and maintained to a minimum depth of 150mm above the top of the joint for a period of one hour each. Testing should follow the installation of the various sections of joints to take advantage of the existing traffic accommodation and each test shall cover the length of each joint installed (generally half width of bridge)”.

Item	Unit
B66.05 Expansion Joints	metre (m)

Add the following to the measurement clause of subitem (b):

“The joint measured shall be the complete joint shown on the drawings including termination details and recesses at balustrades and cover plates and fixings.”

Add the following to the end of the second paragraph:

“The tendered rate for subitems (a) and (b) shall also include for water test required to prove the joint. The water shall be ponded and maintained to a minimum depth of 150mm above the top of the joint for a period of one hour each. Testing should follow the installation of the various sections of joints to take advantage of the existing traffic accommodation and each test shall cover the length of each joint installed (generally half width of bridge)”.

Item	Unit
B66.06 Filled Joints	metre (m)

Add the following to the end of the second paragraph:

“The tendered rate for subitems (a) and (b) shall also include for water test required to prove the joint. The water shall be ponded and maintained to a minimum depth of 150mm above the top of the joint for a period of one hour each. Testing should follow the installation of the various sections of joints to take advantage of the existing traffic accommodation and each test shall cover the length of each joint installed (generally half width of bridge)”.

Item	Unit
B66.15 Concrete parapets	metre (m)

Add the following to this clause:

“The tendered rate shall include for sealing of joints between balustrade units as shown on the drawings.

Add the following payment items:

Item	Unit
B66.27 Concrete pedestrian railings	metre (m)

The unit of measurement shall be the metre of railing complete in accordance with the drawings. The concrete railing shall include the concrete upstand for fixing the concrete railing and all work above the concrete upstand and for any kerbing and coping forming an integral part of the railing.

The tendered rate shall include full compensation for all labour, plant and materials (including reinforcing steel and prestressing requirements) for the manufacture and erection of the precast concrete railings.

Item	Unit
B66.28 Drainage strips	metre (m)

The unit of measurement shall be the linear metre of drainage strips laced behind the earth faces as shown on the drawing.

The tendered rate shall include full compensation for all material, labour, and equipment to supply and install the strips as shown.

Item	Unit
B66.29 Perforated drainage pipes, 65mm internal diameter with 70% perforated / open area, HDPE with 5mm wall thickness, wrapped in Grade 2 filter-fabric	metre (m)

The unit of measurement shall be the linear metre of perforated drainage pipes placed behind the earth faces as shown on the drawing.

The tendered rate shall include full compensation for all material, labour, and equipment to supply and install the perforated pipes as shown including the 300mm wide by 50mm thick mortar bed under the core.

Item	Unit
B66.30 Joint protection plates	metre (m)

The unit of measurement shall be the linear metre of specified width installed. The tendered rate shall include full compensation for supplying all materials, including fastening or adhesives, for galvanizing and installation, including all labour and equipment, and for any wasted material.

Item	Unit
B66.31 Additional water tests for joints ordered by the engineer.....	number (No)

The unit of measurement shall be the number of additional water tests for proving the expansion joints, as ordered by the engineer. The test shall be executed by ponding water to a minimum depth of 150mm deep above the top of the joint for a period of one hour each. Testing should follow the installation of the various sections of joints to take advantage of the existing traffic accommodation and each test shall cover the length of each joint installed (generally half width of bridge).

The tendered rate shall include full compensation for providing the pond of water and maintaining

its minimum depth of 150mm for the full one hour period, and clearing away the ponding materials on completion.”

COLTO SERIES 8000: SUNDRIES

SECTION B8100: TESTING MATERIALS AND WORKMANSHIP

B8102: TESTING METHODS

Insert the following as a new first paragraph:

“Where reference is made to TMH test methods in this specification or the standard specifications, it shall be replaced with the relevant current published SANS test method.”

B8103: THE COSTS OF TESTING

(a) Process Control

Rename the heading as “Materials Quality Control” and replace the contents with the following:

“Testing shall be undertaken by a combined laboratory facility for process control (where the process control testing can be utilised as acceptance control), acceptance control and correlation testing subject to the following requirements laid down by the Employer:

- (i) The contractor accepts the test results of the combined laboratory. Should there be any doubts with regard to certain test results, this will be settled by an independent laboratory mutually agreed upon. The cost in such cases will be to the account of the party at fault. The contractor shall apply in writing, quoting this clause, as to which specific tests are in doubt, providing test reference numbers and details as to the reasons why the test result is in doubt.
- (ii) The contractor accepts that the engineer will be in charge of the combined laboratory.
- (iii) The contractor will be allowed to place a permanent representative in the combined laboratory to observe the laboratory operations. The cost of such representation cannot be claimed as a payment contribution towards payment item B81.04, but will be for the account of the contractor. The contractor shall indicate in writing within 14 days of the commencement date if such representation will be required or declined.

The total cost of the combined laboratory for the 28 month contract period has been estimated at R13 500 000.00.

The estimated cost per month to establish and operate the combined laboratory for the contract period as listed above, allows for the following items:

- (i) Establishment of laboratory buildings
- (ii) Salaries and labour for all laboratory staff members
- (iii) Housing for all laboratory staff members
- (iv) Transport requirements (based on distance) for staff and material testing
- (v) Provision of laboratory equipment (as required for the contract)

A pay item for the monthly contribution from the contractor’s interim payment certificates has been provided under payment item B81.04.”

B8105 TESTING OF AGGREGATES

Add the following sub-clause:

“g) Determination of Ethylene Glycol Durability Index

The Ethylene Glycol Durability Index shall be determined as follows:

(i) Apparatus

Suitable pans or basins

Ethylene Glycol solution

Stirring rod

(ii) Method

Obtain three or more representative samples from the source to be evaluated.

If not already crushed, crush the material in order to obtain sufficient minus 19mm plus 13mm sized aggregate in order to totally cover the bottom of the basin or pan with a single layer of stone. Add sufficient ethylene glycol to each basin ensuring that every aggregate particle is completely submerged.

After soaking for 24 hours, gently stir the aggregate and allow to settle. Observe and record the response of the aggregate to the ethylene glycol according to the criteria listed in (iii) below. Continue the above cycle at intervals of 24 hours for a further 4 days, in each case recording the observed response. After 5 days allow the samples to remain submerged in the solution and observe and record the disintegration response after a total period of 15, 30 and 60 days have elapsed.

(iii) Classification of response

After each cycle, classify and record the response of the aggregate as follows:

DISINTEGRATION CLASS

Class 1: No obvious effects, or only very minor spalling of sand sized particles or very small flakes.

Class 2: Splitting of rock, accompanied by any other disintegrative effects.

Class 3: Fracturing (spheroidal and/ or internal) without extensive spalling or distortion.

Class 4: Fracturing (spheroidal and/or internal) with extensive spalling or distortion.

Class 5: Complete disintegration.

TIME CLASS

The time factor in the above disintegrative process is classified according to the time taken for the most serious effect of the expansive stresses to occur i.e.

Class 4: 0 - 5 days

Class 3: 6 - 15 days

Class 2: 16 - 30 days

Class 1: 31 - 60 days

Class 0: Over 60 days

(iv) Determination of Glycol Durability Index

The Ethylene Durability Index is determined by adding the class number as assigned for the specific disintegrative response observed to the class number as assigned for the period for this response to occur. A durability index ranging from 1 (no response) to 9 (rapid and complete disintegration) is thus determined."

Amend the heading of B8106 to read as follows:

"B8106 TESTING THE CONCRETE AND COVER TO STEEL REINFORCEMENT"

Add the following sub-clauses under B8106:

"g) Trial panels for durability concrete (W class concrete)

As part of the durability class concrete mix design approval process, trial panels shall be constructed on the site (or at the laboratory) before construction of structural elements commences, to ensure that the contractor can successfully achieve the oxygen permeability and sorptivity targets set for the in situ concrete with method of construction to be adopted. Each trial panel shall be constructed using the same type of concrete mix, shuttering type, placing and curing methods (including application rates of curing compounds if applicable) as to be used on the final structural element to be constructed. The dimensions of such a trial panel shall be 0.40m wide, 0.60m high and 150mm thick. The panel shall be constructed vertically. It is suggested that 2 lifting hooks be cast into the panel to facilitate lifting, moving or disposal of panel. It most likely will be that one trial panel will be required for substructures (piers, abutments, retaining walls, etc.) if the same grade concrete is specified for all substructures and another for the decks due to type of casting and curing methods.

The test area for taking of cores (taken in horizontal direction) shall not be less than 100mm from all horizontal and vertical edges. The number of cores to be extracted and tested is described under B8106(i).

h) Test panels for durability concrete (W class concrete)

During casting of concrete on site, test panels shall be constructed on the site adjacent to where the concrete element is being placed. Each test panel shall be constructed with the same concrete, shutter type, compaction and curing methods being used in the element being cast (including same vibrator frequency and curing compound application rates), and be left to cure for 28 days adjacent to the concrete element. Thereafter it shall either be cored on site or transported to the laboratory for testing of the required durability parameters. The dimensions of the test panels shall be 0,4m wide, 0,6m high and 150mm thick and be cast vertically to simulate vertical casts of the substructures and vertical faces of bridge decks. It is suggested that 2 lifting hooks be installed at both top ends of the test panel to assist with transport. For precast concrete, test panels will not be constructed, as cores will be drilled from the concrete elements at the Precast yard before being placed at its final location. For the horizontal faces of in situ bridge decks and culverts, test panels will also not be constructed. Instead cores will be extracted from the top surface of the decks.

The frequency of the testing and number of cores to be extracted is described under B8106(i).

The test area for the taking of cores (taken in a horizontal direction) shall not be less than

100mm all horizontal and vertical edges.

The costs for construction of the test panels shall be deemed to be included under rates for pay item B64.01."

i) Testing for concrete durability

Durability predictions for durability concrete prefixed 'W' will be based on the following tests that shall be carried out by an accredited laboratory approved by the Engineer:

- (i) Oxygen permeability
- (ii) Water sorptivity
- (iii) Chloride conductivity (if specified)

Notes: The test methods shall be as described below.

For test no's (i) and (ii) (and (iii) when required), cores of 70 ± 2 mm diameter shall be extracted from the test panels when the concrete reaches the age of at least 28 days and tested for the durability criteria set out in clause B6404(h) and used to determine the payment as per Table B8212/1. Test No. (iii) may only be required where specified (e.g. within a chloride environment along the coast or where chlorides are present in ground water).

A sample for the purposes of durability testing is as defined in Table B8106/1. The cores for durability testing shall be extracted from the test panels for process and acceptance control (at the frequency as shown in Table B8106/2). Durability testing shall only be required for concrete specified as durability concrete with the prefix "W". The number of samples to be taken shall be as shown in Table B8106/2.

TABLE B8106/1: NUMBER OF CORE RESULTS REQUIRED FOR A SINGLE SAMPLE FOR DURABILITY TESTING

Durability Parameter	No. of Core Results
a. Sorptivity	2
b. Oxygen Permeability	4
c. Chloride Conductivity	4

* Test undertaken only if specified and within a chloride environment.

TABLE B8106/2: NUMBER OF TEST PANELS REQUIRED FOR DURABILITY TESTING

Element	No. of Test Panels to be taken (see Table B8106/1 for number of core results required for a single sample)
In situ Bridge Decks	1 (per pour) ¹
Bridge Piers/Abutments	1 (per element) ²
Precast Elements	1 (per element) ^{2, 3}
Bridge / Culvert Parapets	1 (per element) ²
Culvert walls / wingwalls / slabs	1 (per wall section) ^{1, 2}
Retaining walls	1 (per wall section) ²
All bases	1 (per element/pour) ²

Notes:

- Test panels required to be cast vertically. Additional cores required to be extracted from top of deck/major culvert slabs, i.e. in situ cores.
- Note that where group of elements are cast on the same day, only one test panel will be required, but only if the same grade concrete is used.

-
3. Sample required to be taken from Precast element in casting yard. For edge beams, inner face to be cored.

For cores to be extracted from precast elements and top of bridge decks, the engineer will indicate the positions at which the cores will be extracted. Filling of the holes left by the drilling of the cores shall be the responsibility of the contractor and shall be carried out using an approved proprietary non-shrink repair mortar so as to restore structural integrity and durability of the structural element tested.

If the test results indicate that the durability requirement has not been achieved, then the structural element shall be cored and tested for the durability criteria. The engineer will indicate the positions at which the cores will be extracted. The costs for testing of the structure shall be borne by the contractor. Filling of the holes left by the drilling of the cores shall be the responsibility of the contractor and shall be carried out with material as described in the paragraph above.

Note that if testing has to be undertaken on sides of decks and walls, the cores shall be taken on the exposed faces of the concrete i.e. the sidewall face taking care not to cut the reinforcing bars. Where the cores do contain pieces of reinforcing steel, they shall not be used for the tests. The cores shall be extracted through the cover concrete from the Test Panels or constructed concrete element as applicable. The outer 5mm of the exposed surface of the core shall be cut off and then a slice (30 ± 2 mm thick) shall then be cut and prepared for testing. The engineer will indicate the positions at which the cores will be extracted.

The methodology and latest revisions for the durability index tests are available at the University of Cape Town's web address at www.civil.uct.ac.za.

j) Testing for concrete cover

Concrete cover testing shall be conducted using an approved calibrated electromagnetic cover meter, able to comply to requirements as defined in linear and block scans and has the ability to save and calculate data measured.

The testing (non-destructive) shall be conducted to confirm that the specified depth of concrete cover has been achieved. The cover meter tests shall cover at least 1m^2 for every 20m^2 surface area of concrete placed. Readings shall be taken to identify individual bars, with at least 3 readings at 100mm spacing on every single bar within 1m^2 . The average cover of the 1m^2 subjected to the test shall be used to determine the payment as per Table B8212/2 unless the Contractor chooses to carry out additional tests as detailed in the final paragraph of clause B6414(a). The cover meter must be calibrated whenever being used to test for cover on each project. Standard Calibration block must be used on each project, and where substantial testing is required, the calibration block shall be kept on site. Cover meters shall comply with the relevant modern standards (e.g. EN55011, 50082-1, 6100-6-1, 6100-6-2, 6100-6-3, 6100-6-4 and BS18881 Part 204).

Critical elements for cover surveys are parapets, deck edges including underside of cantilevers, lower portions of columns and abutments and walls. Soffits should be excluded from measurements. All parapets (F-shaped) including the parapet beam shall be fully tested for cover compliance. In addition, the entire area up to 1,5m high on piers, walls and abutments, including the rear of abutments and wingwalls, shall be fully tested before being backfilled. The engineer will identify other critical areas required to be surveyed. Should any of these areas shows deficiencies, the engineer may order additional cover tests on other areas at the contractors costs.

The procedure for testing for depth of reinforcement from concrete surface shall be in accordance with the manufacturer's requirements for the relevant electromagnetic cover

meter, but further requirements are set out in clause B8119. All cover meters shall be calibrated on site under the control of the engineer. The number of readings taken of the layer of rebar closest to the concrete surface to each 1m² to be tested shall be such that an accurate average cover can be determined for the tested area. For the purposes of calculating the average depth of cover bars that have covers 15mm or greater than what is specified shall be capped at specified cover plus 15mm in the calculations. For calculation of payment, specified cover to be reduced by 5mm (allowance for variation of equipment) before apply criteria as defined in Table B8212/2.

Example, where Specified cover = 40mm, test as 35mm, then apply limits, 85% * 35 = 30mm.

Quick Scan readings are to be taken perpendicular to the layer of rebar closest to the concrete surface for each scan area (± 30 per m²), so that an *average cover* to reinforcement can be determined for the tested area.

Readings are to be taken to identify individual bars within each 1m². At least three cover readings, at 150mm spacing, per an individual bar shall be shown in the test results but only overall cover measurement would be used for payment purposes. Reports generated by the equipment shall be used for determining payment. Where more than 10% of readings are below specified lower limit, the area shall be re-scanned, by *Image, Block or Grid scan* method, to verify the average cover. For calculation refer to specific worksheet (attached)

Cognizance to be taken of the effect to cover depth measured, where spliced bars are measured in same area as single bars. The size of rebar shall be corrected manually on the device by means of applying the following formula (approximately 1.41 x diameter of rebar as shown in design).

Where insufficient cover are established before placing of concrete, e.g. Starter bars from base not correct position, remedial action to be performed before continuing with next concreting – these actions to be clearly recorded and area identified.

B8108 DETERMINING THE TOTAL APPROXIMATE DRY BULK RELATIVE DENSITY AND THE APPARENT DENSITY

Add the following at the end of this clause:

“For materials where the total water absorption, when determined according to SANS 3001-AG20 (replacing TMH1 Method B14) and SANS 3001-AG21 (replacing TMH1 Method B15), is in excess of 1,5%, the Apparent Density shall be calculated in accordance to the following formula:

$$\frac{(b - a)}{(d - a) + \{ (w - 1.0)/100 \times (b - a) \} - (c - b)}$$

This formula shall be used as an alternative to note (5) regarding soaking period, when so instructed by the engineer.”

B8110 TESTS RELATING TO CHEMICAL STABILISATION

Add the following sub-clause:

“d) **The Wet-Dry Durability Test for cement and/or lime-treated materials using the hand-**

brush method (SANRAL METHOD)

1. Scope

This method covers the procedure for determining the soil-cement losses obtained by repeated wetting, drying and hand brushing of hardened soil-cement specimens (see 5.4).

2. Apparatus

- 2.1 A moisture curing room capable of maintaining a relative humidity of 95 to 100 percent and a temperature of 22 to 25°C, or suitable plastic bags capable of holding specimens and carriers in an air tight condition in a water bath as described in 2.2 below.
- 2.2 A suitable water bath with thermostatic control capable of maintaining a temperature of 22 to 25°C.
- 2.3 A balance to weigh up to 10kg, accurate to 0.5g.
- 2.4 A drying oven capable of maintaining temperatures of $71 \pm 3^\circ\text{C}$ and $110 \pm 5^\circ\text{C}$.
- 2.5 A wire scratch brush made of 50mm by 1.6mm flat 26 gauge wire bristles assembled in 50 groups of 10 bristles and mounted to form five longitudinal rows and 10 transverse rows on a 200 by 65mm wooden block.

3. Method

3.1 *Preparation of specimens*

Prepare specimens in accordance with the procedure described in the Appendix to method A19 in the TMH 1 with the following exceptions:

Use the material passing the 37.5mm sieve and discard the material remaining on the sieve.

Use the apparatus and compaction method as described in SANS 3001-GR30 (replacing TMH 1 method A7) (100% Modified AASHTO at predetermined OMC).

3.2 *Curing of specimens*

Rapid cure the specimens (see 5.6). Alternatively, and where instructed by the engineer, the specimens may be cured for seven days at a relative humidity of 95% to 100% and a temperature of 22°C to 25°C in a suitable curing room or in plastic bags and a suitable water bath.

3.3 *Wetting, drying and brushing*

After curing, remove the specimens from the curing room or plastic bags, allow to cool and submerge them in water at room temperature for a period of five hours. Remove the specimens from the water and place them in an oven at 71°C for 42 hours.

Remove the specimens from the oven. Give each specimen two firm strokes over the full surface area with the wire scratch brush. The brush must be held

parallel to the long axis of the specimen or parallel to the ends as required to cover all areas of the specimen. Apply these strokes to the full height and width of each specimen with a firm stroke corresponding to approximately 13.5 kN force (see note 5.5).

3.4 *Determination of soil-cement losses*

After 12 cycles, dry the specimens to constant mass at 100°C and determine the oven dry mass of the specimens. The data collected will permit the calculation of the soil-cement losses of the specimens after the prescribed 12-cycle test.

4. Calculations

- 4.1 Calculate the soil-cement loss of the specimens as a percentage of the original oven-dry mass of the specimens as follows:

$$L = \frac{W - N}{W} \times 100$$

Where

L = soil-cement loss (%)

W = original calculated oven-dry mass (g) (calculated according to paragraph 3.5 in the Appendix to method A19 in the TMH 1).

N = final oven-dry mass (g).

- 4.2 The percentage loss shall be calculated and reported to the nearest 0.1 percent. The results are normally required for stabilisation design purposes and should be reported graphically against relevant cement contents.

5. Notes

- 5.1 Mass determinations of the specimens before and after brushing are usually made at the end of each cycle during research or special investigations.
- 5.2 Care is required when assessing results obtained on very coarse graded materials as "plucking" out of the aggregate pieces during the brushing process could result in very high losses of material, which may however not be truly indicative of its potential erosion resistance.
- 5.3 If it not possible to run the cycle continuously because of Sundays or holidays, or for any other reason, the specimens should be held in the oven during the layover period.
- 5.4 The test was originally developed to determine wet-dry durability of cement-treated material. It can, however, be used with equal success on material tested with other chemical stabilizers, for example lime, or mixes of lime and milled blast furnace slag, or cement and milled blast furnace slag.
- 5.5 The pressure of the brushing stroke is determined as follows:

Clamp a specimen in a vertical position on the edge of a platform scale and zero the scale. Apply vertical brushing strokes to the specimen and note the

force necessary to register approximately 1.36kg.

5.6 Rapid curing:

Seal each specimen airtight in a suitable container or plastic bag. Carefully place the briquettes on suitable holders or in pans and place in the oven at the relevant temperature and period given below:

Stabilizing agent	Temp (°C)	Time (Hours)
Cement	70 – 75	24 ±0.5
PBFC	70 - 75	24 ±0.5
Lime	60 ±2	45 ±1
Lime / FA	60 ±2	45 ±1
Lime / MBFS	60 ±2	45 ±1

B8114 GEOTEXTILE AND GEOTEXTILE – SOIL COMPATIBILITY TESTS

Add the following new sub-clause:

“c) Other Tests:

- i. Thickness (mm):
The thickness of the material shall be specified by the contractor (or supplier). Thickness and compressibility tests shall be carried out in accordance with Code of Practice SABS 0221:1988. The Testing of Geo-textile, to check that the material supplied conforms to the thickness specified by the contractor.
- ii. Mass per unit area (g/m²):
Testing shall be carried out in accordance with Code of Practice SABS 0221.
- iii. Tensile strength (kN/m):
Testing shall be carried out in accordance with Code of Practice SABS 0221.
- iv. Penetration load (kN):
Testing shall be carried out in accordance with Code of Practice SABS 0221.
- v. Puncture resistance (mm):
Testing shall be done in accordance with test procedures laid down by CSIR, Pretoria.
- vi. Permeability (l/s/m²):
Testing shall be carried out in accordance with Code of Practice SABS 0221.”

B8117 MEASUREMENT AND PAYMENT

Amend pay item 81.02 as follows:

Item	Unit

B81.02 Other special tests requested by the engineer

“(a) Employer’s contribution to concrete durability tests

- (i) Tests for water sorptivity..... (Provisional sum)

- (ii) Tests for oxygen permeability (Provisional sum)
- (iii) Tests for chloride conductivity (Provisional sum)
- (iv) Tests for concrete cover (Provisional sum)
- (b) Other tests (Provisional sum)

The provisional sum provided to cover the cost of special tests as requested by the engineer in terms of clause 8115 shall be expended in accordance with the provisions of the FIDIC Conditions of Contract. Payment will not be made for any special tests should the result indicate that the specifications have not been complied with."

Add the following payment items before the "Note:"

"Item	Unit
B81.04 Financial contribution for the independent commercial laboratory	prime cost (PC) sum

The unit of measurement shall be the prime cost sum.

The Contractor's contribution shall a negative amount which shall be 50% of the monthly amount certified for the appointed site laboratory by the Engineer in terms of item B81.05(a).

This shall cover the Contractor's contribution towards the establishment and operation of services provided by an independent laboratory over the contract period including any approved extension of time and shall be deducted from the Contractor's interim payment certificates. However, excluded from the tendered contribution shall be the cost of all other special tests requested by the Engineer.

Item	Unit
B81.05 Payment of independent site laboratory	

- (a) Direct payment by contractor prime cost (PC) sum
- (b) Handling cost and profit in respect of item B81.05(a) percentage (%)

The contractor shall pay the appointed site laboratory monthly for the amount as certified by the Engineer.

The charge or mark-up tendered or allowed for is a percentage of the amount actually paid under the prime cost item. The percentage shall cover all the Contractors' sourcing, handling, profit, and payment of the service provider in providing the services. The Contractor shall forfeit his mark-up when the service provider is not paid in time."

Insert "(a) & (b)" after "81.03" in the 1st line of the 2nd paragraph of the Note

B81.06 Surface regularity tests as described in subclauses B3405(f) and B4213(a)(v)

- (a) Establishment of equipment:
 - (i) Inertial Laser Profilometer number (No)
 - (ii) Walking Profiler: (Make and Model) number (No)
- (b) Profiler surveys on:

-
- (i) Base layers using:
 - (1) Profilometer, e.g. Inertial Laser, Walking Profiler kilometre (km)
 - (ii) Asphalt surfacing using:
 - (1) Inertial Laser Profilometer or Walking Profiler kilometre (km)

The unit of measurement for sub-item B81.05(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 engineer.

The tendered rates for sub-item B81.05(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 B81.05(b) shall be the kilometre of road surveyed in accordance with, and as specified in, sub-clauses B3405(f) and B4213(a)(v) respectively.

The tendered rates for sub-item B81.05(b) shall include full compensation for surveying the specified layer, and for analyzing and determining the longitudinal profiles and 100m International Roughness Index (IRI), all as specified in sub-clauses B3405(f) and B4213(a)(v) of the specifications. The tendered rates must also include full compensation for the number of runs per lane as specified."

Add the following clauses:

"B8119 CONCRETE COVER TESTING PROCEDURE

1. Scope

This procedure covers all measurements to be done on concrete structures to establish conformance to specified concrete cover requirements.

2. Guidelines and Preparation

- a. The contractor is to complete a cover survey request and forward it to the engineer.
- b. The selected area for cover measurement is to be indicated on a sketch (see example attached).
- c. The responsible person must identify the area to be scanned, take measurements on the required date and calculate the results in terms of project specification.
- d. The cover meter is to be checked against a calibration box/block constructed with typical reinforcement of known parameters, on each day of use. Any deviations from actual measurement must be recorded on a Cover Survey Request.
- e. Cognizance shall be taken of the effect to cover depth measured, where spliced bars are measured in the same area as single bars (typically, the rebar diameter is increased by a factor of 1.44).
- f. The depth of cover shall be determined with equipment, complying with BS 1881, Part 204 and capable of identifying the location and depth of reinforcement on a scanned area. The results shall be recorded electronically by the equipment software.
- g. Measurements are to be taken in accordance with cover meter manufacturer's guidelines.

- h. The person responsible for measurements must indicate the position, dimension, type and splicing of reinforcement on the sketch for each scanned area.

3. Method of Measurement

Two methods of measurement are proposed as follows:

a. Quick/Linear Scan Method

- (i) Readings are to be taken perpendicular to the layer of rebar closest to the concrete surface for each scan area (+/- 30 per m²), so that an *average cover* to reinforcement can be determined for the tested area.
- (ii) Readings are to be taken to identify individual bars within each 1m². At least three cover readings, at 150mm spacing, per individual bar shall be shown in the test results but only the overall cover measurement would be used for payment purposes. Reports generated by the equipment shall be used for determining payment. Further specified cover to be reduced by 5mm (allowance for variation of equipment), before applying criteria as defined in table B8212/2a.

e.g. If specified cover is 40mm, the lower limit for full acceptance is:

$$(40 \text{ mm} - 5 \text{ mm}) \times 85\% = 30 \text{ mm}.$$

- (iii) Where more than 10% of readings are below specified lower limit, the area shall be re-scanned, by *Image, Block or Grid scan method*, to verify the average cover. Refer to item 3.2 below.

An example of Quick Scan information and presentation is shown in Figure B8119-1 below.

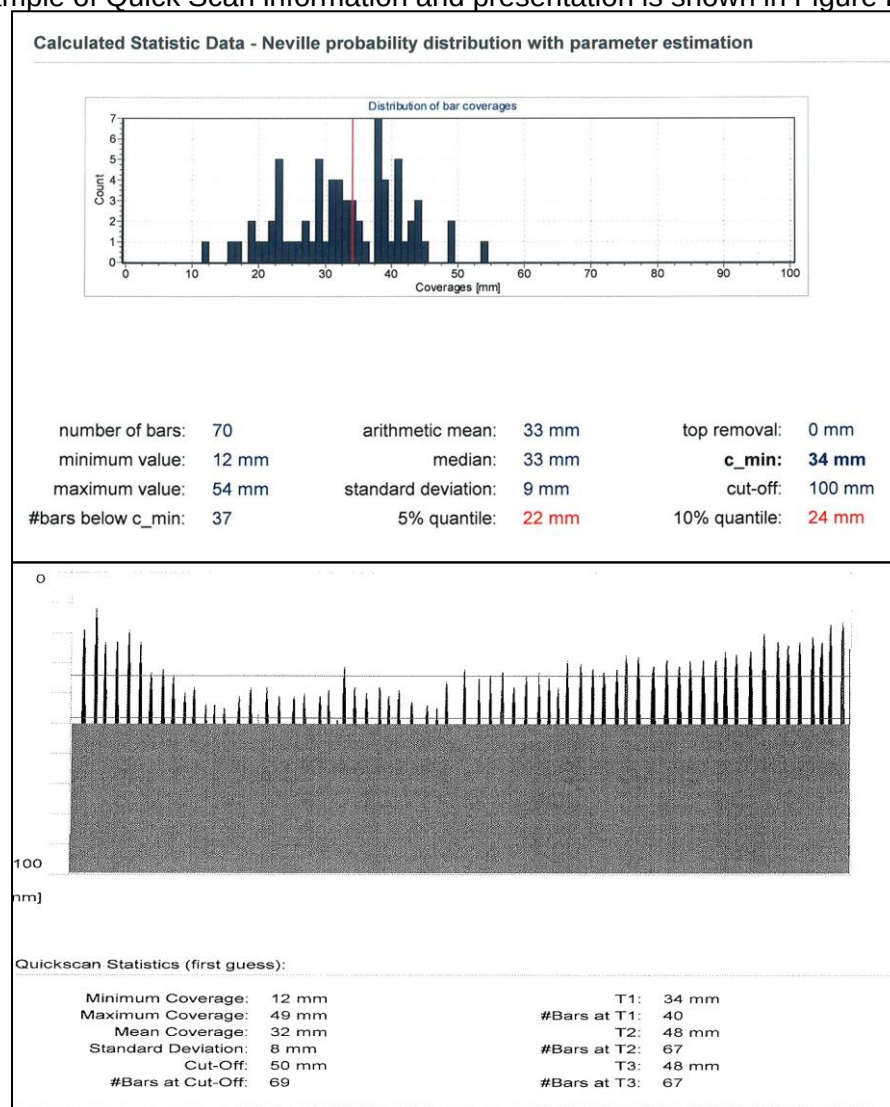


Figure B8119-1 : Example of a Quickscan output

b. Image/Block/Grid Scan Method

- (i) Readings are to be taken in both directions of a marked grid as per the equipment manufacturer's recommendations.
- (ii) This method shall be used to determine the average cover to reinforcement when more than 10% of the Quick/Linear Scan results do not meet the specified lower limit for overall cover.
- (iii) For purposes of calculation of the averages for cover of a rebar layer, readings exceeding upper limit (cover + 15mm) to be capped on upper limit. Further specified cover to be reduced by 5mm (allowance for variation of equipment), before applying criteria as defined in Table B8212/2a.

e.g. If specified cover is 40mm, the lower limit for full acceptance is:

$$(40 \text{ mm} - 5 \text{ mm}) \times 85\% = 30 \text{ mm}.$$

An example of Image Scan information and presentation is shown in Figure B8119-2 below:

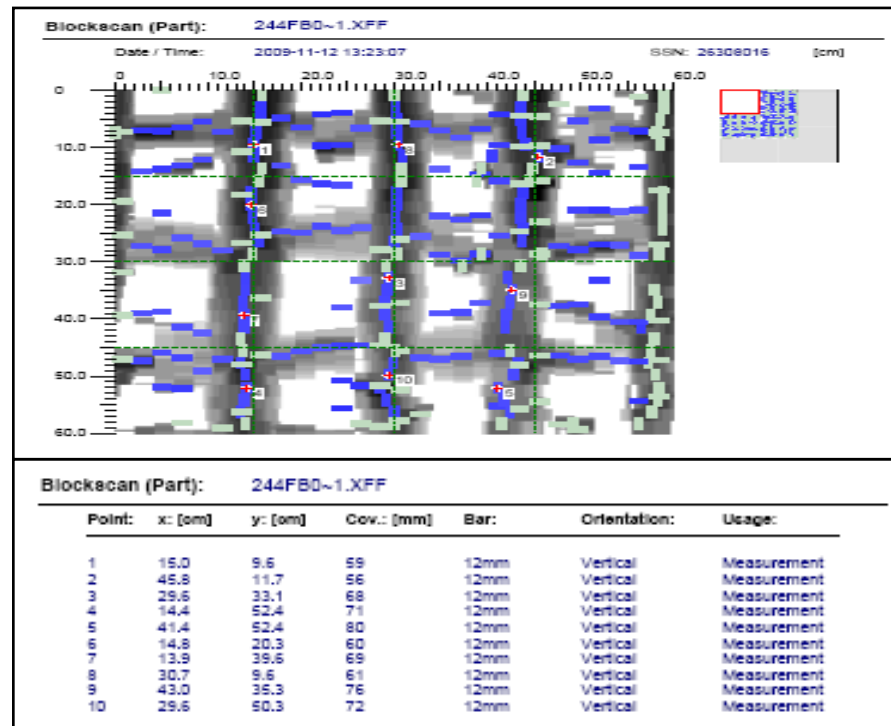


Figure B8119-2 : Example of a Imagescan output

If the equipment used is not able to provide the above presentation it has to be done manually by determining the grid of rebar, first and second layer closest to surface, and manually record readings in order to establish the depth of rebar, as shown in Figure B8119-3 below.

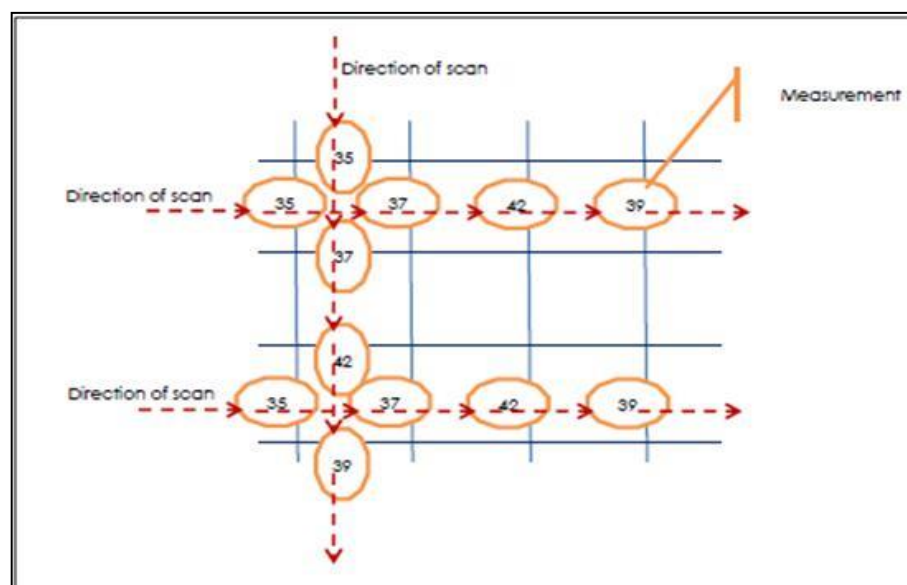


Figure B8119-3 : Manual recording of readings"

SECTION B8200: QUALITY CONTROL

B8206 JUDGEMENT PLAN B

Notes (Table 8206/3)

(1) Asphalt base or surfacing: Specification limits for-

(c) Voids

Delete and replace the contents of this subitem with the following:

$L_s =$ specified values -1,0% points
 $L'_s =$ specified values +1,0% points"

Add the following clause:

"B8212 DETERMINING BOTH REDUCED PAYMENTS FOR 'W' CLASS CONCRETE AND COVER METER TESTING

Payments for all durability concrete prefixed 'W' shall be based on the test results of the compressive strengths and of the durability parameters, i.e. oxygen permeability (from test panels) and for both durability and non-durability class concrete, cover meter testing as indicated in Tables B8212/1 and B8212/2 a and b.

General note:

The percentage payment shall be applied to a specific concrete member and shall apply to the relevant pay items of sections 6300 (based on concrete cover test) and 6400 (based on the worst results from the oxygen permeability and compressive strength tests.

TABLE B8212/1: TABLE OF REDUCED PAYMENTS FOR OXYGEN PERMEABILITY INDEX - 'W' CLASS CONCRETE

Description of test	Oxygen permeability index (log scale)	Percentage (%) payment
Full acceptance	See Table B6404/4 for limit	100%
Conditional acceptance (with reduced payment)	See Table B6404/4 for limit	80%
Rejection	See Table B6404/4 for limit	Not Applicable

TABLE B8212/2: TABLE OF REDUCED PAYMENTS FOR CONCRETE COVER

Concrete cover (mm)	% of specified cover	Percentage (%) payment
	Overall cover	
Full acceptance	$\geq 85\% < (100\% + 15\text{mm})$	100%
Conditional acceptance (with reduced payment)	$< 85\% \geq 75\%$	85%

UPGRADING OF MAPATE ACCESS ROAD

Conditional acceptance (with remedial measures as approved by the Engineer and reduced payment)	<75% ≥65%	70%
Non-conforming (non-conformance raised with remedial measures as approved by the Engineer)	<65%	Agreed by Engineer (Note: remedial measures at the contractor's costs should restore full payment)

The following notes shall apply to Table B8212/2:

1. Specified cover to be reduced by 5mm (allowance for variation of equipment) before applying criteria as defined in Table B8212/2, e.g. where specified cover = 40mm, test as 35mm, apply limits, $85\% \times 35 = 30\text{mm}$.
2. For cantilevers, the cover shall in no instance be greater than 10mm of the specified cover for the top reinforcement.
3. Percentage payment for concrete cover shall be based on the average number of cover meter tests performed on a particular concrete element.

In addition, the engineer shall confirm to the Employer whether substandard cover at a reduced payment shall be acceptable by agreement with the contractor.”

C3.4.3 PROJECT SPECIFICATIONS: ADDITIONAL SPECIFICATIONS

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- C3.4.3.1 REQUIREMENTS OF THE OCCUPATIONAL HEALTH AND SAFETY ACT REGULATIONS
- C3.4.3.2 ENVIRONMENTAL MANAGEMENT PLAN
- C3.4.3.3 PROVISION OF STRUCTURED TRAINING
- C3.4.3.4 PROVISION OF THE TEMPORARY WORKFORCE

C3.4.3.1 OCCUPATIONAL HEALTH AND SAFETY ACT 1993 : HEALTH AND SAFETY SPECIFICATION

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C3.4.3.1.2 SCOPE

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ANNEXURE 1: MEASURING INJURY EXPERIENCE

ANNEXURE 2: EXECUTIVE SHE RISK MANAGEMENT REPORT

ANNEXURE 3: LIST OF RISK ASSESSMENTS

C3.4.3.1.1 Introduction

In terms of the Construction Regulation 4(1) (a) of the Occupational Health and Safety Act, No. 85 of 1993, Thulamela Local Municipality, as the Client, is required to compile a Health & Safety Specification for any intended project and provide such specification to any prospective tenderer.

The Client's further duties are as in C3.5.1.3.1.1. below and in the Construction Regulations, 2003.

This specification has as objective to ensure that Principal Contractors entering into a Contract with the Thulamela Local Municipality achieve an acceptable level of OH&S performance. This document forms an integral part of the Contract and Principal and other Contractors should make it part of any Contracts that they may have with Contractors and/or Suppliers.

Compliance with this document does not absolve the Principal Contractor from complying with minimum legal requirements and the Principal Contractor remains responsible for the health & safety of his employees and those of his Mandataries.

C3.4.3.1.2 Scope

Development of a health & safety specification that addresses all aspects of occupational health and safety as affected by the abovementioned contract work.

The specification will provide the requirements that Principal Contractors and other Contractors will have to comply with in order to reduce the risks associated with the abovementioned contract work that may lead to incidents causing injury and/or ill health, to a level as low as reasonably practicable.

C3.4.3.1.3 General Occupational Health & Safety Provisions

(a) Hazard Identification & Risk Assessment (Construction Regulation 7)

(i) Risk Assessments

Annexure 3 contains a list of Risk Assessment headings that have been identified by Thulamela Local Municipality as possibly applicable to the abovementioned contract work. It is, by no means, exhaustive and is offered as an assistance to Contractors intending to tender.

Based on the Risk Assessments, the Principal Contractor must develop a set of site-specific OH&S rules that will be applied to regulate the OH&S aspects of the construction.

The Risk Assessments, together with the site-specific OH&S rules must be submitted to the Thulamela Local Municipality before mobilisation on site commences.

Despite the Risk Assessments listed in Annexure 3, the Principal Contractor is required to conduct a baseline Risk Assessment and the aforesaid listed Risk Assessments must be incorporated into the base-line Risk Assessment. The baseline Risk Assessment must further include the Standard Working procedures (SWP) and the applicable Method Statements based on the Risk Assessments

All out-of-scope work must be associated with a Risk Assessment.

(ii) Review of Risk Assessments

The Principal Contractor is to review the Hazard Identification, Risk Assessments and SWP's at each Production Planning and Progress Report meeting as the Contract work develops and progresses and each time changes are made to the designs, plans and construction methods and processes.

The Principal Contractor must provide the Client, other Contractors and all other concerned-parties with copies of any changes, alterations or amendments as contemplated in above.

(b) Legal Requirements

All Contractors entering into a Contract with the Thulamela Local Municipality shall, as a minimum, comply with the

- Occupational Health & Safety Act and Regulations (Act 85 of 1993). A current, up-to-date copy of the OHS Act must be available on site at all times
- Compensation for Occupational Injuries & Diseases Act (Act 130 of 1993). The principal Contractor will be required to submit a letter of Registration and "good-standing" from the Compensation Insurer before being awarded the Contract. A current, up-to-date copy of the COID Act must be available on site at all times.
- Where work is being carried out on mines' premises the Contractor will have to comply with the Mine Health & Safety Act and Regulations (Act. 29 of 1996) and any other OH&S requirements that the mine may specify. A current, up-to-date copy of the OHS Act must be available on site at all times.

(c) Structure and Responsibilities

(i) Overall Supervision and Responsibility for OH&S

- * It is a requirement that the Principal Contractor, when he appoints Contractors (Sub-contractors) in terms of Construction Regulations 5(3), (5), (9), (10) and (12)

he includes an OHS Act Section 37(2) agreement: "Agreement with Mandatary" in his agreement with such Contractors.

- * Any OH&S Act (85/1993), Section 16(2) appointee/s as detailed in his/her/their respective appointment forms

(ii) Further (Specific) Supervision Responsibilities for OH&S

The Contractor shall appoint designated competent employees and/or other competent persons as required by the Act and Regulations. Below is a list of identified appointments and may be used to select the appropriate appointments for the current contract:

	Ref. Section/Regulation in OHSAct
Batch Plant Supervisor	(Construction Regulation 6(1))
Construction Vehicles/Mobile Plant/Machinery Supervisor	(Construction Regulation 21)
Demolition Supervisor	(Construction Regulation 12)
Drivers/Operators of Construction Vehicles/Plant	(Construction Regulation 21)
Electrical Installation and Appliances Inspector	(Construction Regulation 22)
Emergency/Security/Fire Coordinator	(Construction Regulation 27)
Excavation Supervisor	(Construction Regulation 11)
Explosive Powered Tool Supervisor	(Construction Regulation 19)
Fall Protection Supervisor	(Construction Regulation 8)
First Aider	(General Safety Regulation 3)
Fire Equipment Inspector	(Construction Regulation 27)
Formwork & Support work Supervisor	(Construction Regulation 10)
Hazardous Chemical Substances Supervisor	(HCS Regulations)
Incident Investigator	(General Admin Regulation 29)
Ladder Inspector	(General Safety Regulation 13A)
Lifting Equipment Inspector	(Construction Regulation 20)
Materials Hoist Inspector	(Construction Regulation 17)
OH&S Committee	(OHS Act Section 19)
OH&S Officer	(Construction Regulation 6(6))
OH&S Representatives	(OHS Act Section 17)
Person Responsible for Machinery	(General Machinery Regulation 2)
Scaffolding Supervisor	(Construction Regulation 14)
Stacking & Storage Supervisor	(Construction Regulation 26)
Structures Supervisor	(Construction Regulation 9)
Suspended Platform Supervisor	(Construction Regulation 15)
Tunneling Supervisor	(Construction Regulation 13)
Vessels under Pressure Supervisor	(Vessels under Pressure Regulations)
Working on/next to Water Supervisor	(Construction Regulation 24)
Welding Supervisor	(General Safety Regulation 9)

The appointments must be in writing and the responsibilities clearly stated together with the period for which the appointment is made. This information must be communicated and agreed with the appointees.

Copies of appointments must be submitted to the Thulamela Local Municipality together with concise CV's of the appointees. All appointments must be officially approved by Thulamela Local Municipality. Any changes in appointees or appointments must be communicated to Thulamela Local Municipality forthwith.

The Principal Contractor must, furthermore, provide Thulamela Local Municipality with an organogram of all Contractors that he/she has appointed or intends to appoint and keep this list updated on a weekly basis.

In addition Thulamela Local Municipality may require that a Traffic Safety Officer be appointed for any project.

(iii) Designation of OH&S Representatives (Section 18 of the OHS Act)

OH&S Representatives have to be designated in writing and the designation must include the area of responsibility of the person and term of the designation.

(iv) Duties and Functions of the OH&S Representatives (Section 19 of the OHS Act)

The Principal Contractor must ensure that the designated OH&S Representatives conduct a minimum monthly inspection of their respective areas of responsibility using a checklist and report thereon to the Principal Contractor

OH&S representatives must be included in accident/incident investigations

OH&S representatives must attend all OH&S committee meetings.

(v) Appointment of OH&S Committee (Section 20 of the OHS Act)

The Principal Contractor must establish an OH&S Committee consisting of all the designated OH&S Representatives together with a number of management representatives that are not allowed to exceed the number of OH&S representatives on the committee and a representative of the Client who shall act as the chairman without a vote. The members of the OH&S committee must be appointed in writing.

The OH&S Committee must meet minimum monthly and consider, at least, the following Agenda:

1. Opening & Welcome
2. Present/Apologies/Absent
3. Minutes of previous Meeting
4. Matters Arising from the previous Minutes
5. OH&S Reps Reports
6. Incident Reports & Investigations
7. Incident/Injury Statistics
8. Other Matters
9. Endorsement of Registers and other statutory documents by a representative of the Principal Contractor
10. Close/Next Meeting

(d) Administrative Controls and the Occupational Health & Safety File

(i) The OH&S File (Construction Regulation 5 (7))

As required by Construction Regulation 5(7), the Principal Contractor and other Contractors will each keep an OH&S File on site containing the following documents as a minimum:

-
- * Notification of Construction Work (Construction Regulation 3.)
 - * Copy of OH&S Act (updated) (General Administrative Regulation 4.)
 - * Proof of Registration and good standing with a COID Insurer (Construction Regulation 4 (g))
 - * OH&S Programme agreed with the Client including the underpinning Risk Assessment/s & Method Statements (Construction regulation 5 (1))
 - * Copies of OH&S Committee and other relevant Minutes
 - * Designs/drawings (Construction Regulation 5 (8))
 - * A list of Contractors (Sub-Contractors) including copies of the agreements between the parties and the type of work being done by each Contractor (Construction Regulation 9)
 - * Appointment/Designation forms as per (a)(i) & (ii) above.
 - * Registers as follows:
 - * Accident/Incident Register (Annexure 1 of the General Administrative Regulations)
 - * OH&S Representatives Inspection Register
 - * Asbestos Demolition & Stripping Register
 - * Batch Plant Inspections
 - * Construction Vehicles & Mobile Plant Inspections by Controller
 - * Daily Inspection of Vehicles. Plant and other Equipment by the Operator/ Driver/User
 - * Demolition Inspection Register
 - * Designer's Inspection of Structures Record
 - * Electrical Installations, -Equipment & -Appliances (including Portable Electrical Tools)
 - * Excavations Inspection
 - * Explosive Powered Tool Inspection, Maintenance, Issue & Returns Register (incl. cartridges & nails)
 - * Fall Protection Inspection Register
 - * First Aid Box Contents
 - * Fire Equipment Inspection & Maintenance
 - * Formwork & Support work Inspections
 - * Hazardous Chemical Substances Record
 - * Ladder Inspections
 - * Lifting Equipment Register
 - * Materials Hoist Inspection Register
 - * Machinery Safety Inspection Register (incl. machine guards, lock-outs etc.)

-
- * Scaffolding Inspections
 - * Stacking & Storage Inspection
 - * Inspection of Structures
 - * Inspection of Suspended Platforms
 - * Inspection of Tunnelling Operations
 - * Inspection of Vessels under Pressure
 - * Welding Equipment Inspections
 - * Inspection of Work conducted on or Near Water
 - * All other applicable records

Thulamela Local Municipality will conduct an audit on the OH&S file of the Principal Contractor from time-to-time.

- (e) OH&S Goals & Objectives & Arrangements for Monitoring & Review of OH&S Performance

The Principal Contractor is required to maintain a CIFR of at least 8 (See Annexure 1. to this document: "Measuring Injury Experience) and report on this to Thulamela Local Municipality on a monthly basis

- (f) Notification of Construction Work (Construction Regulation 3.)

The Principal Contractor must, where the Contract meets the requirements laid down in Construction Regulation 3, within 5 working days, notify the Department of Labour of the intention to carry out construction work and use the form (Annexure A in the Construction Regulations) for the purpose. A copy must be held on the OH&S File and a copy must be forwarded to Thulamela Local Municipality for record keeping purposes.

- (g) Training, Awareness and Competence

The contents and syllabi of all training required by the Act and Regulations are to be included in the Principal Contractor's OH&S Plan.

- (i) General Induction Training

All members of Contractor's Site management as well as all the persons appointed as responsible for OH&S in terms of the Construction and other Regulations will be required to attend a general induction session by the Client

All employees of the Principal and other Contractors to be in possession of proof of General Induction training.

- (ii) Site Specific Induction Training

The Principal Contractor will be required to develop Contract work project specific induction training based on the Risk Assessments for the Contract work and train all employees and other Contractors and their employees in this.

All employees of the Principal and other Contractors to be in possession of proof of Site Specific OH&S Induction training at all times.

(iii) Other Training

All operators, drivers and users of construction vehicles, mobile plant and other equipment to be in possession of valid proof of training.

All employees in jobs requiring training in terms of the Act and Regulations to be in possession of valid proof of training as follows:

OH&S Training Requirements: (as required by the Construction Regulations and as indicated by the OH&S Specification & the Risk Assessment/s):

- * General Induction (Section 8 of the Act)
- * Site/Job Specific Induction (also visitors) (Sections 8 & 9 of the Act)
- * Site/Project Manager
- * Construction Supervisor
- * OH&S Representatives (Section 18 (3) of the Act)
- * Training of the Appointees indicated above
- * Operators & Drivers of Construction Vehicles & Mobile Plant (Construction Regulation 21)
- * Basic Fire Prevention & Protection (Environmental Regulations 9 and Construction regulation 27)
- * Basic First Aid (General Safety Regulations 3)
- * Storekeeping Methods & Safe Stacking (Construction Regulation 26)
- * Emergency, Security and Fire Co-coordinator

(iv) Awareness & Promotion

The Principal Contractor is required to have a promotion and awareness scheme in place to create an OH&S culture in employees. The following are some of the methods that may be used:

- Toolbox Talks
- OH&S Posters
- Videos
- Competitions
- Suggestion schemes
- Participative activities such as OH&S Safety circles.

(v) Competence

The Principal Contractor shall ensure that his and other Contractors personnel appointed are competent and that all training required to do the work safely and without risk to health, has been completed before work commences

The Principal Contractor shall ensure that follow-up and refresher training is conducted as the contract work progresses and the work situation changes.

Records of all training must be kept on the OH&S File for auditing purposes.

(h) Consultation, Communication and Liaison

OH&S Liaison between the Client, the principal Contractor, the other Contractors, the Designer and other concerned parties will be through the OH&S committee as contemplated in above.

In addition to the above, communication may be directly to the Client or his appointed Agent, verbally or in writing, as and when the need arises.

Consultation with the workforce on OH&S matters will be through their Supervisors, OH&S Representatives, the OH&S committee and their elected Trade Union Representatives, if any.

The Principal Contractor will be responsible for the dissemination of all relevant OH&S information to the other Contractors e.g. design changes agreed with the Client and the Designer, instructions by the Client and/or his/her agent, exchange of information between Contractors, the reporting of hazardous/dangerous conditions/ situations etc.

The Principal Contractor will be required to do Site Safety Walks with Thulamela Local Municipality **at least on a basis to be determined between the two parties.**

The Principal and other Contractors will be required to conduct Toolbox Talks with their employees on a weekly basis and records of these must be kept on the OH&S File. Employees must acknowledge the receipt of Toolbox Talks which record must, likewise be kept on the OH&S File.

The Principal Contractors most senior manager on site will be required to attend all Thulamela Local Municipality OH&S meetings and

a list of dates, times and venues will be provided to the Principal Contractor by Thulamela Local Municipality.

(i) Checking, Reporting and Corrective Actions

(i) Monthly Audit by Client (Construction Regulation 1(d))

Thulamela Local Municipality will be conducting a Monthly Audit to comply with Construction Regulation 4(1)(d) to ensure that the principal Contractor has implemented and is maintaining the agreed and approved OH&S Plan.

(ii) Other Audits and Inspections by Thulamela Local Municipality:

Thulamela Local Municipality reserves the right to conduct other ad hoc audits and inspections as deemed necessary. This will include Site Safety Walks.

(iii) Conducting an Audit

A representative of the Principal Contractor must accompany Thulamela Local Municipality on all Audits and Inspections and may conduct his/her own audit/inspection at the same time. Each party will, however, take responsibility for the results of his/her own audit/inspection results.

(iv) Contractor's Audits and Inspections

The Principal Contractor is to conduct his own monthly internal audits to verify compliance with his own OH&S Management system as well as of with this specification.

(v) Inspections by OH&S Representative's and other Appointees

OH&S Representatives must conduct weekly inspections of their areas of responsibility and report thereon to their foreman or supervisor whilst other appointees must conduct inspections and report thereon as specified in their appointments e.g. vehicle, plant and machinery drivers, operators and users must conduct daily inspections before start-up.

(vi) Recording and Review of Inspection Results

All the results of the abovementioned inspections to be in writing, reviewed at OH&S committee meetings, endorsed by the chairman of the meeting and placed on the OH&S File.

(vii) Reporting of Inspection Results

The Principal Contractor is required to provide the Client with a monthly report in the format as per the attached Annexure 2: "SHE Risk Management Report"

(j) Incident Reporting and Investigation

Reporting of Accidents and Incidents (Section 24 and General Administrative Regulation 8 of the OHS Act)

The Principal Contractor must report all incidents where an employee is injured on duty to the extent that he/she:

- * dies
- * becomes unconscious
- * loses a limb or part of a limb
- * is injured or becomes ill to such a degree that he/she is likely either to die or to suffer a permanent physical defect or likely to be unable for a period of at least 14 days either to work or continue with the activity for which he/she was usually employed

OR where:

- * a major incident occurred
- * the health or safety of any person was endangered
- * where a dangerous substance was spilled
- * the uncontrolled release of any substance under pressure took place
- * machinery or any part of machinery fractured or failed resulting in flying, falling or uncontrolled moving objects
- * machinery ran out of control

to Thulamela Local Municipality within two days and to the Provincial Director of the Department of Labour within seven days (Section 24 of the Act & General Administrative Regulation 8.) EXCEPT that, where a person has died, has become unconscious for any reason or has lost a limb or part of a limb or may die or suffer a permanent physical defect, the incident must be reported to both Thulamela Local Municipality and the Provincial Director of the Department of Labour forthwith by telephone, telefax or E-mail.

The Principal Contractor is required to provide Thulamela Local Municipality with copies of all statutory reports required in terms of the Act within 7 days of the incident occurring.

The Principal Contractor is required to provide Thulamela Local Municipality with copies of all internal and external accident/incident investigation reports including the reports contemplated below within 7 days of the incident occurring.

Accident and Incident Investigation (General Administrative Regulation 9)

The Principal Contractor is responsible for the investigation of all accidents/incidents where employees and non-employees were injured to the extent that he/she/they had to be referred for medical treatment by a doctor, hospital or clinic

The results of the investigation to be entered into the Accident/Incident Register listed in above.

The Principal Contractor is responsible for the investigation of all minor and non-injury incidents as described in Section 24 (1) (b) & (c) of the Act and keeping a record of the results of such investigations including the steps taken to prevent similar accidents in future.

The Principal Contractor is responsible for the investigation of all road traffic accidents and keeping a record of the results of such investigations including the steps taken to prevent similar accidents in future.

The Thulamela Local Municipality reserves the right to hold its own investigation into an incident or call for an independent external investigation.

C3.4.3.1.4 Operational Control

(a) Emergency Preparedness, Contingency Planning and Response

The Principal Contractor must appoint a competent person to act as Emergency Controller/Coordinator.

The Principal Contractor must conduct an emergency identification exercise and establish what emergencies could possibly develop. He/she must then develop detailed contingency plans and emergency procedures, taking into account any emergency plan that Thulamela Local Municipality may have in place.

The Principal Contractor and the other Contractors must hold regular practice drills of contingency plans and emergency procedures to test them and familiarise employees with them.

(b) First Aid (General Safety Regulation 3)

The Principal Contractor must provide First Aid equipment (including a stretcher) and have qualified First Aider/s as required by General Safety Regulation 3 of the OHS Act.

The Contingency Plan of the Principal Contractor must include the arrangements for speedily and timeously transporting injured/ill person/s to a medical facility or of getting emergency medical aid to person/s that may require it.

The Principal Contractor must have firm arrangements with his other Contractors in place regarding the responsibility of the other Contractors injured/ill employees

(c) Security

The Principal Contractor must establish site access rules and implement and maintain these throughout the construction period. Access control must include the rule that non-employees will not be allowed on site unaccompanied.

The Principal Contractor must develop a set of Security rules and procedures and maintain these throughout the construction period

(d) Fall Protection (Working in Elevated Positions (Construction regulation 8.)

A pre-emptive Risk Assessment will be required for any work to be carried out above two metres from the ground or any floor level and will be classified as "Work in Elevated Positions".

As far as is practicable, any person working in an elevated position will work from a platform, ladder or other device that is at least as safe as if he/she is working at ground level and whilst working in this position be wearing a single belt with lanyard that will be worn to prevent the person falling from the platform, ladder or other device utilised. This safety belt will be, as far as is possible, secured to a point away from the edge over which the person might fall and the lanyard must be of such a length that the person will not be able to move over the edge.

Alternatively any platform, slab, deck or surface forming an edge over which a person may fall may be fitted with guard rails at two different heights as prescribed in SABS 085: Code of Practice for the Design, Erection, Use and Inspection of Access Scaffolding.

Where the requirement in is not practicable, the person will be provided with a full body harness that will be worn and attached above the wearer's head at all times and the lanyard must be fitted with a shock absorbing device OR the person must be attached to an approved, by Thulamela Local Municipality, fall arrest system.

Where the requirements are not practicable, a suitable catch net must be erected.

Workers working in elevated positions must be trained to do this safely and without risk to health

Where work on roofs is carried out, the Risk Assessment must take into account the possibility of persons falling through fragile material. Skylights and openings in the roof.

C3.4.3.1.5 Measurement and Payment

Payment for the contractor's obligations in respect of the Occupational Health and Safety act and Construction Regulations shall be made through three payment items described below. The three payment items together shall include full compensation for all personnel (including a dedicated full time Construction Safety Officer), cost and incidentals in respect of compliance with the enforcement of the Health and Safety Specifications, which shall include for the compilation, presentation, implementation and maintenance of the Health and Safety Plan as contemplated. In tendering rates for the three items the contractor shall ensure that the sum of the amounts for the three items shall not be less than one percent (1%) of the Tender Amount.

Item	Unit
B1.1 Contractor's initial obligations in respect of the Occupational Health and Safety Act and Construction Regulations	Lump Sum

The full amount will be paid in one instalment only once:-

- The contractor has notified the Provincial Director of the Department of Labour in writing of the project.
- The contractor has made the required initial appointments of employees and sub-contractors.
- The client has approved the contractor's Health and Safety Plan.

- (d) The contractor has set up his Health and Safety File.

Item	Unit
B1.2 Contractor's time related obligations in respect of the Occupational Health and Safety Act and Construction Regulations	Month

The tendered monthly amount shall represent full compensation for that part of the contractor's general obligations in terms of the Occupational Health and Safety Act and the Construction Regulations which are mainly a function of time. This includes inter alia payment of all costs for the appointment of all staff contemplated in the construction regulations and the transport of employees on site. Payment will be monthly only after payment for Item **B1.1** has been made.

Item	Unit
B1.3 Submission of the Health and Safety File	Lump Sum

The tendered lump sum shall represent full compensation for the contractor meeting all his obligations in respect of the Occupational Health and Safety Act and the Construction Regulations and for the preparation and submission of his Health and Safety File complete as envisaged on this specification to the Client's satisfaction.

This amount will be paid only once the contractor has met all his obligations in respect of the Occupational Health and Safety Act and the Construction Regulations and has submitted his Health and Safety File complete as envisaged on this specification to the Client's satisfaction.

C3.4.3.1.6 Project/Site Specific Requirements

Annexure 1: Measuring Injury Experience

Annexure 2: SHE Risk Management Report

Annexure 3. List of Risk Assessments

NOTE: The Project Baseline Risk Assessment is included under C5.1.4.

ANNEXURE 1: MEASURING INJURY EXPERIENCE

Injury experience has traditionally been measured by the use of a disabling injury frequency rate, the so-called “DIFR”. The DIFR is calculated by multiplying the number of disabling injuries by 1 million and dividing by the number of man-hours worked.

Lately the DIFR has been replaced internationally with a DIIR: disabling injury incidence rate. The only difference between the two rates are that the 10 million in the calculation is replaced with 200 000. (200 000 purported to be the number of hours and average person works in a lifetime.)

The use of the two rates above has proved to be somewhat problematical as they are open to manipulation and disabling injuries are often “hidden” by returning the injured employee to the workplace so as not to lose a shift and therefore having to register a disabling injury.

The Construction Industry recently decided to promote the use of a new frequency rate based on the number of compensation injury claims as these are more difficult to hide or manipulate because the reporting of compensable injuries is a legal requirement.

The industry is hoping that adoption of this new measurement of injury experience will enable the industry to monitor itself as far as work related injuries are concerned.

Below follows an explanation of this new rating system.

COMPENSATION INCIDENCE FREQUENCY RATE (CIFR)

FORMULA

No. of Compensation Claims X 200 000 /

*220 man hours X No. of Employees

DEFINITIONS

No. of Compensation

Claims: **The number of claims lodged with the COID insurer for the period under review**

200 000: The fixed factor to align the rate with other rates used internationally

Manhours Worked

Include: * Hourly Paid Employees
 * Sub-contactors (No. of Employees X *220 each)
 * Staff (No. of Employees X *220 hours each)

220 manhours: The *average number of hours worked by one employee in one month in the Construction industry.

* Overtime, absence on leave or sick leave, unrecorded after hours time worked by senior and middle management factored into this average.

No. of Employees: The actual or average number of employees employed
for the period under review.

2002/03CIFRSystem

ANNEXURE 2: EXECUTIVE SHE RISK MANAGEMENT REPORT

The SAFCEC OH&S committee recently developed the following report in an attempt to standardise on reporting and assist contractors in obtaining a clear picture of their SHE Risk Management performance. It is hoped that clients will also accept this standardised report. Your comments/suggestions for improvement is invited.

EXAMPLE ONLY: ALL INFORMATION IS FICTITIOUS

XYZ construction

*SHE RISK MANAGEMENT REPORT

PERIOD JANUARY TO MARCH 2002

*(SHE = Safety, Health & Environment)

1. Introduction

We hope that this new format of quarterly SHE Risk Management reporting will provide a clear picture of the company's performance as far as occupational health & safety is concerned.

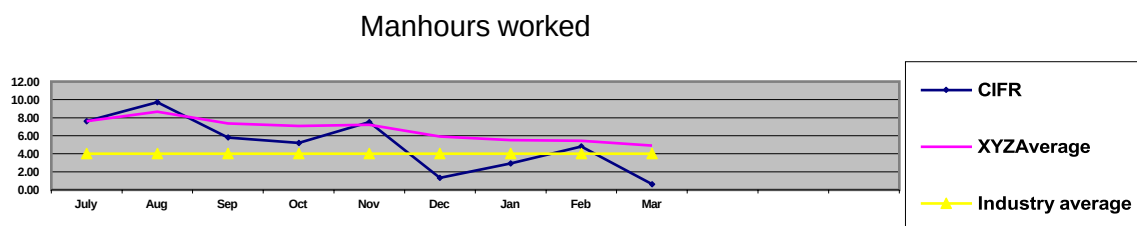
The first quarter of 2002 generally reflected an improvement in injury experience and shows a decline in the number of injuries. Although Building was the only division where there was an increase in compensation claims, figures are still well down from the average 2001 figures. A sub-contractor experienced one fatality.

All divisions are eagerly awaiting the final implementation in May of the new electronic SHE Management system that will make the tools to implement the SHE programme available to all management and supervisory staff.

2. Incident Statistics

Compensation Incident Frequency Rate (CIFR)

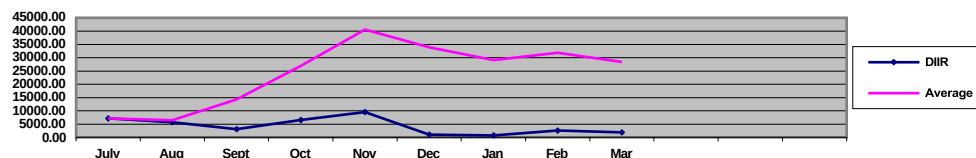
$\text{CIFR} = \frac{\text{Total No. of Claims against the Workmen's Compensation Fund}}{\text{Manhours worked}} \times 200\,000$



2.2.

Disabling Injury Incidence Rate (DIIR)

DIIR =
$$\frac{\text{No. Disabling Injuries} \times 200\,000}{\text{Manhours worked}}$$



2.3. Other Major Incidents

Three other major incidents were experienced in the period under review:

- 2.3.1. A major trench collapsed at Job. 00123: XYZ Head Office, Bochum: No personnel injured, extensive damage to foundations: 3 days delay.
- 2.3.2. A concrete dumper ran away when its brakes failed. It smashed into the glass façade of the building on Job 00332: McDonalds, Polokwane. The driver jumped off and was not injured. Cost of damage to façade: R45 000.
- 2.3.3. A storage hut on Job 00567: BP Petrol Station, Swartruggens was demolished by fire when the night watchman made a fire inside the storage hut which contained concrete vibrators and levelling machines. Cost of replacing the hut and machines: R30 000

3. RISK AREAS

The following items of concern need priority consideration by management:

- 3.1. New employees must undergo pre-employment medical examinations to:
 - protect XYZ from claims at a later stage
 - ensure that only healthy persons are employed
 - prevent injuries and illness in the workplace
 - enhance XYZ image
- 3.2. Vehicle drivers and plant operators must be instructed to inspect their vehicles daily before start-up using the prescribed checklists to ensure that these are safe to operate and in good condition.

4. AUDITS

Three SHE audits were conducted in February and March:

4.1.	Job 00432:	Gillooly's Mall	Compliance: 56%(*)
	Job 00786:	Cullinan Head Office	Compliance: 83%(****)
	Job 00589:	Cleveland Station	Compliance: 76%(***)

5. TRAINING

One hundred and forty two employees, representing 7% of employees, attended nine training courses. *Our objective is to train 5,5% of employees quarterly.

Month	No. of Employees Trained	Course	Source
January	26 15 3	Induction OH&S Reps Crane Drivers	Internal Consultant External
February	23 17	Induction OH&S Reps	Internal Consultant
March	43 9 3 3	Induction OH&S Reps Bomag Rollers First Aiders	Internal Consultant Supplier St. John's

6. LEGAL ISSUES

- 6.1. An inspector of the Department of Labour issued an improvement notice on Job 00987: Gillooly's Mall. The notice requires that all scaffolding comply with the SABS standards for the Erection and Maintenance of Access Scaffolding (SABS 085). This is currently being attended to and the inspector will return on 15 April 2002 to ascertain if the notice has been complied with.

8. OCCUPATIONAL AIND OTHER HEALTH MATTERS

8.1. HIV Aids

The proposed SAFCEC clinic will soon be operational and we will then be able to send our employees who have tested positive to the clinic for counselling and eventual treatment when necessary

The mobile clinic saw and tested fifty employee volunteers at 3 sites this month. Eighteen of them tested positive.

8.2. Tuberculosis

The mobile clinic will be calling at Gillooly's Mall and Cleveland Station on 15 and 16 October respectively to screen employees for TB.

8.3. Noise

All suspected noise pollution areas have been tested and the results are awaited. Employees working in areas testing over 85dBa will be issued with suitable hearing protectors.

9. ENVIRONMENTAL MEASURES

Inspectors from the Botswana Department of the Environment visited Djwaneng and inspected the site and yard. They gave it a "clean bill of health" and advised that we should increase the dust control measures by spraying roads three times per day instead of the present twice per day.

10. ACHIEVEMENTS/AWARDS

- 10.1. The client at Djwaneng (Job 00786) awarded the XYZ site first position in the housekeeping competition conducted bi-monthly by the client's SHE managers. The project manager and his team are to be congratulated for this sterling effort.

10.2. Job 0987: Refurbishment of Pretoria Main Railway Station has just completed 1million compensation claim free days. This was no easy achievement if we consider the conditions being worked under after the extensive fire that caused major damage.

SHE Risk Manager

2002.09.27

ANNEXURE 3: LIST OF RISK ASSESSMENTS

- * Clearing & Grubbing of the Area/Site
- * Site Establishment including:
 - Office/s
 - Secure/safe storage for materials, plant & equipment
 - Ablutions
 - Sheltered eating area
 - Maintenance workshop
 - Vehicle access to the site
- * Dealing with existing structures
- * Location of existing services
- * Installation and maintenance of temporary construction electrical supply, lighting and equipment
- * Adjacent land uses/surrounding property exposures
- * Boundary and access control/Public Liability Exposures (NB: the Employer is also responsible for the OH&S of non-employees affected by his/her work activities.)
- * Health risks arising from neighbouring as well as own activities and from the environment e.g. threats by dogs, bees, snakes, lightning etc.
- * Exposure to noise
- * Exposure to vibration
- * Protection against dehydration and heat exhaustion
- * Protection from wet & cold conditions
- * Dealing with HIV/Aids and other diseases
- * Use of Portable Electrical Equipment including
 - Angle grinder
 - Electrical drilling machine
 - Skill saw
- * Excavations including
 - Ground/soil conditions
 - Trenching
 - Shoring
 - Drainage of trench
- * Welding including
 - Arc Welding
 - Gas welding
 - Flame cutting
 - Use of LP gas torches and appliances
- * Loading & offloading of trucks
- * Aggregate/sand and other materials delivery
- * Manual and mechanical handling
- * Lifting and lowering operations
- * Driving & operation of construction vehicles and mobile plant including
 - Trenching machine
 - Excavator
 - Bomag roller
 - Plate compactor
 - Front end loader
 - Mobile cranes and the ancillary lifting tackle
 - Parking of vehicles & mobile plant

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- Towing of vehicles & mobile plant
 - * Use and storage of flammable liquids and other hazardous substances
 - * Layering and bedding
 - * Installation of pipes in trenches
 - * Pressure testing of pipelines
 - * Backfilling of trenches
 - * Protection against flooding
 - * Gabion work
 - * Use of explosives
 - * Protection from overhead power lines
 - * As discovered by the Principal Contractor's hazard identification exercise
 - * As discovered from any inspections and audits conducted by the Client or by the Principal Contractor or any other Contractor on site
 - * As discovered from any accident/incident investigation.

C3.4.3.2 ENVIRONMENTAL MANAGEMENT PLAN

CONTENTS

C3.4.3.2.1	SCOPE
C3.4.3.2.2	DEFINITIONS
C3.4.3.2.3	IDENTIFICATION OF ENVIRONMENTAL ASPECTS AND IMPACTS
C3.4.3.2.4	LEGAL REQUIREMENTS
C3.4.3.2.5	ADMINISTRATION OF ENVIRONMENTAL OBLIGATIONS
C3.4.3.2.6	TRAINING
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C3.4.3.2.8	ENVIRONMENTAL MANAGEMENT OF CONSTRUCTION ACTIVITIES
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C3.4.3.2.1. SCOPE

This environmental management programme (EMP) sets out the methods by which proper environmental controls are to be implemented by the contractor. The duration over which the contractor's controls shall be in place cover the construction period of the project as well as the limited time after contract completion defined by the General Conditions of Contract, and the project specifications, as the defects notification period (maintenance period).

The provisions of this EMP are binding on the contractor during the life of the contract. They are to be read in conjunction with all the documents that comprise the suite of documents for this contract. In the event that any conflict occurs between the terms of the EMP and the project specifications or Record of Decision, the terms herein shall be subordinate.

The EMP is a dynamic document subject to similar influences and changes as are brought by variations to the provisions of the project specification. Any substantial changes shall be submitted to the Thulamela Local Municipality in writing for approval.

The EMP identifies the following:

Construction activities that will impact on the environment.

Specifications with which the contractor shall comply in order to protect the environment from the identified impacts.

Actions that shall be taken in the event of non-compliance.

C3.4.3.2.2. DEFINITIONS

Alien Vegetation: alien vegetation is defined as undesirable plant growth which shall include, but not be limited to, all declared category 1 and 2 listed invader species as set out in the Conservation of Agricultural Resources Act (CARA) regulations. Other vegetation deemed to be alien shall be those plant species that show the potential to occupy in number, any area within the defined construction area and which are declared to be undesirable.

Construction Activity: a construction activity is any action taken by the contractor, his subcontractors, suppliers or personnel during the construction process as defined in the South African National Roads Agency Limited and National Roads Act, 1998 (Act No. 7, 1998)

Environment: environment means the surroundings within which humans exist and that could be made up of -

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

Environmental Aspect: an environmental aspect is any component of a contractor's construction activity that is likely to interact with the environment.

Environmental Impact: an impact or environmental impact is the change to the environment, whether desirable or undesirable, that will result from the effect of a construction activity. An impact may be the direct or indirect consequence of a construction activity.

Record of Decision: a record of decision is a written statement from the Limpopo Department of Economic Development, Environment and Tourism, that records its approval of a planned undertaking to improve, upgrade or rehabilitate a section of road and the mitigating measures required to prevent or reduce the effects of environmental impacts during the life of a contract.

Road Reserve: the road reserve is a corridor of land, defined by co-ordinates and proclamation, within which the road, including access intersections or interchanges, is situated. A road reserve may, or may not, be bounded by a fence.

Road Width: for the purposes of the EMP, the road width is defined as the area within the road reserve i.e. fence line to fence line, but also includes all areas beyond the road reserve that are affected by the continuous presence of the road, e.g. a reach of a water course.

C3.4.3.2.3. IDENTIFICATION OF ENVIRONMENTAL ASPECTS AND IMPACTS

The contractor shall identify likely aspects before commencing with any construction activity. Examples of environment aspects include:

- waste generation
- stormwater discharge
- emission of pollutants into the atmosphere
- chemical use operations
- energy use operations
- water use operations
- use of natural resources

- noise generation

Thereafter the contractor shall programme his work in such a way that each cause and effect of a construction activity is also identified and the activity planned so as to prevent any impact from happening. If prevention is not practicable, or in the event of mishap or misapplication, the contractor shall provide plans and measures for the engineer's approval, which will limit and contain the magnitude, duration and intensity of the impact. The contractor shall demonstrate that he/she is capable of carrying out any repair and reinstatement of the damaged environment. These requirements shall be concurrent with the time constraints to produce an approved construction programme according to subclause 8.3 as amended by Particular Condition of the general conditions of contract and clause B1204 of these project specifications.

Listed below are some environmental impacts that could adversely alter an aspect of the environment through usual construction activities:

Pollution of atmosphere, soil or water
Destruction or removal of fauna and flora and effect on biological diversity
Deformation of the landscape
Soil erosion
Destruction of historical/heritage sites
Effect on the built environment
Effect on agricultural land and wetlands

General good construction practice will play an important role in avoiding the occurrence of an Impact. The contractor's attention is drawn, in this regard, to C1008. Environmental Management of Construction Activities

C3.4.3.2.4. LEGAL REQUIREMENTS

a) General

Construction will be according to the best industry practices, as identified in the project documents. This EMP, which forms an integral part of the contract documents, informs the contractor as to his duties in the fulfilment of the project objectives, with particular reference to the prevention and mitigation of environmental impacts caused by construction activities associated with the project. The contractor should note that obligations imposed by the EMP are legally binding in terms of environmental statutory legislation and in terms of the additional conditions to the general conditions of contract that pertain to this project. In the event that any rights and obligations contained in this document contradict those specified in the standard or project specifications then the latter shall prevail.

b) Statutory and other applicable legislation

The contractor is deemed to have made himself conversant with all legislation pertaining to the environment, including provincial and local government ordinances, which may be applicable to the contract.

C3.4.3.2.5. ADMINISTRATION OF ENVIRONMENTAL OBLIGATIONS

a) Appointment of a Designated Environmental Officer (DEO)

For the purposes of implementing the conditions contained herein, the contractor shall submit to the engineer for approval the appointment of a nominated representative of the contractor as the DEO for the contract. The request shall be given, in writing, at least fourteen days before the start of any work clearly setting out reasons for the nomination, and with sufficient detail to enable the engineer to make a decision. The engineer will, within seven days of receiving the request, approve, reject or call for more information on the nomination. Once a nominated representative of the contractor has been approved he/she shall be the DEO and shall be the responsible person for ensuring that the provisions of the EMP are complied with during the life of the contract. The engineer will be responsible for issuing instructions to the contractor where environmental

considerations call for action to be taken. The DEO shall submit regular written reports to the engineer, but not less frequently than once a month.

The engineer shall have the authority to instruct the contractor to replace the DEO if, in the engineer's opinion, the appointed officer is not fulfilling his/her duties in terms of the requirements of the EMP or this specification. Such instruction will be in writing and shall clearly set out the reasons why a replacement is required.

There shall be an approved DEO on the site at all times.

b) Administration

Before the contractor begins each construction activity the DEO shall give to the engineer a written statement setting out the following:

The type of construction activity.

Locality where the activity will take place.

Identification of the environmental aspects and impacts that might result from the activity.

Methodology for impact prevention for each activity or aspect.

Methodology for impact containment for each activity or aspect.

Emergency/disaster incident and reaction procedures.

Treatment and continued maintenance of impacted environment.

The contractor may provide such information in advance of any or all construction activities provided that new submissions shall be given to the engineer whenever there is a change or variation to the original.

The engineer may provide comment on the methodology and procedures proposed by the DEO, but he shall not be responsible for the contractor's chosen measures of impact mitigation and emergency/disaster management systems. However, the contractor shall demonstrate at inception and at least once during the contract that the approved measures and procedures function properly.

c) Good Housekeeping

The Contractor shall undertake "good housekeeping" practices during construction as stated in clause 1217 of the COLTO Standard Specifications for Roads and Bridges and subclauses 4.3.1 and 4.3.2 of the General Conditions of Contract. This will help avoid disputes on responsibility and allow for the smooth running of the contract as a whole. Good housekeeping extends beyond the wise practice of construction methods that leaves production in a safe state from the ravages of weather to include the care for and preservation of the environment within which the site is situated.

C3.4.3.2.6. TRAINING

The designated environmental officer (DEO) must be conversant with all legislation pertaining to the environment applicable to this contract and must be appropriately trained in environmental management and must possess the skills necessary to impart environmental management skills to all personnel involved in the contract.

The contractor shall ensure that adequate environmental training takes place. All employees shall have been given an induction presentation on environmental awareness. Where possible, the presentation needs to be conducted in the language of the employees. The environmental training should, as a minimum, include the following:

- The importance of conformance with all environmental policies
- The environmental impacts, actual or potential, of their work activities;

-
- The environmental benefits of improved personal performance;
 - Their roles and responsibilities in achieving conformance with the environmental policy and procedures and with the requirement of the Agency's environmental management systems, including emergency preparedness and response requirements;
 - The potential consequences of departure from specified operating procedures;
 - The mitigation measures required to be implemented when carrying out their work activities.

In the case of permanent staff the contractor shall provide evidence that such induction courses have been presented. In the case of new staff (including contract labour) the contractor shall inform the engineer when and how he/she intends concluding his environmental training obligations.

C3.4.3.2.7. ACTIVITIES/ASPECTS CAUSING IMPACTS

A list of possible causes of environmental impacts that occur during construction activities is given in Table 7/1: Aspects or Activities that Cause Environmental Impacts during Construction Activities, which is to be found at the end of this part. This list is not exhaustive, and shall be used for guideline purposes only.

C3.4.3.2.8. ENVIRONMENTAL MANAGEMENT OF CONSTRUCTION ACTIVITIES

a) Site Establishment

i) Site Plan

The contractor shall establish his construction camps, offices, workshops, staff accommodation and testing facilities on the site in a manner that does not adversely affect the environment. However, before construction can begin, the contractor shall submit to the engineer for his approval, plans of the exact location, extent and construction details of these facilities and the impact mitigation measures the contractor proposes to put in place.

The plans shall detail the locality as well as the layout of the waste treatment facilities for litter, kitchen refuse, sewage and workshop-derived effluents. The site offices should not be sited in close proximity to steep areas, as this will increase soil erosion. Preferred locations would be flat areas along the route. If the route traverses water courses, streams and rivers, it is recommended that the offices, and in particular the ablution facilities, aggregate stockpiles, spoil areas and hazardous material stockpiles are located as far away as possible from any water course as possible. Regardless of the chosen site, the contractor's intended mitigation measures shall be indicated on the plan. The site plan shall be submitted not later than the first site meeting. Detailed, electronic colour photographs shall be taken of the proposed site before any clearing may commence. These records are to be kept by the engineer for consultation during rehabilitation of the site. Read with COLTO Specification 1302(a), 1402 (e).

ii) Vegetation

The contractor has a responsibility to inform his staff of the need to be vigilant against any practice that will have a harmful effect on vegetation.

The natural vegetation encountered on the site is to be conserved and left as intact as possible. Vegetation planted at the site shall be indigenous and in accordance with instructions issued by the engineer. Only trees and shrubs directly affected by the works, and such others as may be indicated by the engineer in writing, may be felled or cleared. In wooded areas where natural vegetation has been cleared out of necessity, the same species of indigenous trees as were occurring, shall be re-established.

The project specification for the rehabilitation of the grass cover shall be strictly adhered to. Any proclaimed weed or alien species that propagates during the contract period shall be cleared by hand before seeding. (Read in conjunction with COLTO Specification 5801(b), 5802(b), (c), (d) and (e), 5804, 5805, 5806 and 5807). Fires shall only be allowed in facilities or equipment specially constructed for this purpose. A firebreak shall be cleared and maintained around the perimeter of the camp and office sites.

iii) Rehabilitation

The area where the site offices were erected will require rehabilitation at the end of the contract. All construction material, including concrete slabs and braai areas shall be removed from the site on completion of the contract.

iv) Water for human consumption

Water for human consumption shall be available at the site offices and at other convenient locations on site.

All effluent water from the camp / office sites shall be disposed of in a properly designed and constructed system, situated so as not to adversely affect water sources (streams, rivers, pans dams etc). Only domestic type wastewater shall be allowed to enter this drain.

v) Heating and Cooking fuel

The contractor shall provide adequate facilities for his staff so that they are not encouraged to supplement their comforts on site by accessing what can be taken from the natural surroundings. The contractor shall ensure that energy sources are available at all times for construction and supervision personnel for heating and cooking purposes.

b) Sewage treatment

Particular reference in the site establishment plan shall be given to the treatment of sewage generated at the site offices, site laboratory and staff accommodation and at all localities on the site where there will be a concentration of labour. Sanitary arrangements should be to the satisfaction of project management, the local authorities and legal requirements.

Safe and effective sewage treatment will require one of the following sewage handling methods: septic tanks and soak-aways, dry-composting toilets such as “enviro loos”, or the use of chemical toilets which are supplied and maintained by a subcontractor. The type of sewage treatment will depend on the geology of the area selected, the duration of the contract and proximity (availability) of providers of chemical toilets. Should a soak-away system be used, it shall not be closer than 800 metres from any natural water course or water retention system. The waste material generated from these facilities shall be serviced on a regular basis. The positioning of the chemical toilets shall be done in consultation with the engineer. Read with COLTO Specifications 1402(g) and 1404(a).

Toilets and latrines shall be easily accessible and shall be positioned within walking distance from wherever employees are employed on the works. Use of the veld for this purpose shall not, under any circumstances, be allowed.

Outside toilets shall be provided with locks and doors and shall be secured to prevent them from blowing over. The toilets shall also be placed outside areas susceptible to flooding. The contractor shall arrange for regular emptying of toilets and shall be entirely responsible for enforcing their use and for maintaining such latrines in a clean, orderly and sanitary condition to the satisfaction of the engineer.

c) Waste Management

The contractor's intended methods for waste management and waste minimisation shall be implemented at the outset of the contract. All personnel shall be instructed to dispose of all waste in the proper manner.

i) Solid Waste

Solid waste shall be stored in an appointed area in covered, tip proof metal drums for collection and disposal. A refuse control system shall be established for the collection and removal of refuse to the satisfaction of the engineer. Disposal of solid waste shall be at a Department of Water Affairs and Forestry (DWAF) licensed landfill site or at a site approved by DWAF in the event that an existing operating landfill site is not within reasonable distance from the site offices and staff accommodation. No waste shall be burned or buried at or near the site offices, nor anywhere else

on the site, including the approved solid waste disposal site. Read with COLTO Specification 1404(a).

ii) Litter

No littering by construction workers shall be allowed. During the construction period, the facilities shall be maintained in a neat and tidy condition and the site shall be kept free of litter.

Measures shall be taken to reduce the potential for litter and negligent behaviour with regard to the disposal of all refuse. At all places of work the contractor shall provide litter collection facilities for later safe disposal at approved sites. (Read with COLTO Specification 1302(b)).

iii) Hazardous waste

Hazardous waste such as bitumen, tar, oils etc. shall be disposed of in a Department of Water Affairs and Forestry approved landfill site. Special care shall be taken to avoid spillage of tar or bitumen products such as binders or pre-coating fluid to avoid water-soluble phenols from entering the ground or contaminating water.

Under no circumstances shall the spoiling of tar or bituminous products on the site, over embankments, in borrow pits or any burying, be allowed. Unused or rejected tar or bituminous products shall be returned to the supplier's production plant. Any spillage of tar or bituminous products shall be attended to immediately and affected areas shall be promptly reinstated to the satisfaction of the engineer.

d) Control at the workshop

The contractor's management and maintenance of his plant and machinery will be strictly monitored according to the criteria given below, regardless whether it is serviced on the site (i.e. at the place of construction activity or at a formalised workshop).

i) Safety

All the necessary handling and safety equipment required for the safe use of petrochemicals and oils shall be provided by the contractor to, and used or worn by, the staff whose duty it is to manage and maintain the contractor's and his subcontractor's and supplier's plant, machinery and equipment.

ii) Hazardous Material Storage

Petrochemicals, oils and identified hazardous substances shall only be stored under controlled conditions. All hazardous materials e.g. tar or bitumen binders shall be stored in a secured, appointed area that is fenced and has restricted entry. Storage of tar or bituminous products shall only take place using suitable containers to the approval of the engineer.

The contractor shall provide proof to the engineer that relevant authorisation to store such substances has been obtained from the relevant authority. In addition, hazard signs indicating the nature of the stored materials shall be displayed on the storage facility or containment structure. Before containment or storage facilities can be erected the contractor shall furnish the engineer with details of the preventative measures he proposes to install in order to mitigate against pollution of the surrounding environment from leaks or spillage. The preferred method shall be a concrete floor that is bunded. Any deviation from the method will require proof from the relevant authority that the alternative method proposed is acceptable to that authority. The proposals shall also indicate the emergency procedures in the event of misuse or spillage that will negatively affect an individual or the environment.

iii) Fuel and Gas Storage

Fuel shall be stored in a secure area in a steel tank supplied and maintained by the fuel suppliers.. An adequate bund wall, 110% of volume, shall be provided for fuel and diesel areas to accommodate any leakage spillage or overflow of these substances. The area inside the bund wall shall be lined with an impervious lining to prevent infiltration of the fuel into the soil. Any leakage, spillage or overflow of fuel shall be attended to without delay.

Gas welding cylinders and LPG cylinders shall be stored in a secure, well-ventilated area.

iv) Oil and Lubricant Waste

Used oil, lubricants and cleaning materials from the maintenance of vehicles and machinery shall be collected in a holding tank and sent back to the supplier. Water and oil should be separated in an oil trap. Oils collected in this manner, shall be retained in a safe holding tank and removed from site by a specialist oil recycling company for disposal at approved waste disposal sites for toxic/hazardous materials. Oil collected by a mobile servicing unit shall be stored in the service unit's sludge tank and discharged into the safe holding tank for collection by the specialist oil recycling company.

All used filter materials shall be stored in a secure bin for disposal off site. Any contaminated soil shall be removed and replaced. Soils contaminated by oils and lubricants shall be collected and disposed of at a facility designated by the local authority to accept contaminated materials.

e) Clearing the Site

In all areas where the contractor intends to, or is required to clear the natural vegetation and soil, either within the road reserve, or at designated or instructed areas outside the road reserve, a plan of action shall first be submitted to the engineer for his approval.

The plan shall contain a photographic record and chainage/land reference of the areas to be disturbed. This shall be submitted to the engineer for his records before any disturbance/stockpiling may occur. The record shall be comprehensive and clear, allowing for easy identification during subsequent inspections.

The contractor shall be responsible for the re-establishment of grass within the road reserve boundaries for all areas disturbed during road construction. This includes, for example, service roads, stockpile areas, stop/go facilities, windrows and wherever material generated for, or from, road construction has to be stored temporarily or otherwise within the road reserve, or at designated or instructed areas outside the road reserve. This responsibility shall extend until expiry of the defects notification period.

f) Soil Management

i) Topsoil

Topsoil shall be removed from all areas where physical disturbance of the surface will occur and shall be stored and adequately protected. The contract will provide for the stripping and stockpiling of topsoil from the site for later re-use. Topsoil is considered to be the natural soil covering, including all the vegetation and organic matter. Depth may vary at each site. The areas to be cleared of topsoil shall include the storage areas. All topsoil stockpiles and windrows shall be maintained throughout the contract period in a weed-free condition. Weeds appearing on the stockpiled or windrowed topsoil shall be removed by hand. Soils contaminated by hazardous substances shall be disposed of at an approved Department of Water Affairs and Forestry waste disposal site. (Read with COLTO Specifications 3104(a), 5802(a), (g), 5804(a), (b) and (c)). The topsoil stockpiles shall be stored, shaped and sited in such a way that they do not interfere with the flow of water to cause damming or erosion, or itself be eroded by the action of water. Stockpiles of topsoil shall not exceed a height of 2m, and if they are to be left for longer than 6

months, shall be analysed, and if necessary, upgraded before replacement. Stockpiles shall be protected against infestation by weeds.

The contractor shall ensure that no topsoil is lost due to erosion – either by wind or water. Areas to be topsoiled and grassed shall be done so systematically to allow for quick cover and reduction in the chance of heavy topsoil losses due to unusual weather patterns. The contractor's programme shall clearly show the proposed rate of progress of the application of topsoil and grassing. The contractor shall be held responsible for the replacement, at his own cost, for any unnecessary loss of topsoil due to his failure to work according to the progress plan approved by the engineer. The contractor's responsibility shall also extend to the clearing of drainage or water systems within and beyond the boundaries of the road reserve that may have been affected by such negligence.

ii) Subsoil

The subsoil is the layer of soil immediately beneath the topsoil. It shall be removed, to a depth instructed by the engineer, and stored separately from the topsoil if not used for road building. This soil shall be replaced in the excavation in the original order it was removed for rehabilitation purposes.

g) Drainage

The quality, quantity and flow direction of any surface water runoff shall be established prior to disturbing any area for construction purposes. Cognisance shall be taken of these aspects and incorporated into the planning of all construction activities. Before a site is developed or expanded, it shall be established how this development or expansion will affect the drainage pattern. Recognised water users / receivers shall not be adversely affected by the expansion or re-development. No water source shall be polluted in any way due to proposed changes.

Streams, rivers, pans, wetlands, dams, and their catchments shall be protected from erosion and from direct or indirect spillage of pollutants such as refuse, garbage, cement, concrete, sewage, chemicals, fuels, oils, aggregate, tailings, wash water, organic materials and bituminous or tar products.

The contractor shall submit to the engineer his proposals for prevention, containment and rehabilitation measures against environmental damage of the identified water and drainage systems that occur on the site. Consideration shall be given to the placement of sedimentation ponds or barriers where the soils are of a dispersive nature or where toxic fluids are used in the construction process. The sedimentation ponds must be large enough to contain runoff so that they function properly under heavy rain conditions.

h) Earthworks and Layerworks

This section includes all construction activities that involve the mining of all materials, and their subsequent placement, stockpile, spoil, treatment or batching, for use in the permanent works, or temporary works in the case of deviations. Before any stripping prior to the commencement of construction, the contractor shall have complied with the requirements of sections C1008 (e) and C1008 (g). In addition, the contractor shall take cognisance of the requirements set out below.

i) Quarries and borrow pits

The contractor's attention is drawn to the requirement of the Department of Minerals and Energy, that before entry into any quarry or borrow pit, an EMP for the establishment, operation and closure of the quarry or borrow pit shall have been approved by the Department. It is the responsibility of the contractor to ensure that he is in possession of the approved EMP or a copy thereof, prior to entry into the quarry or borrow pit. The conditions imposed by the relevant EMP are legally binding on the contractor and may be more extensive and explicit than the requirements of this specification. In the event of any conflict occurring between the requirements of the specific EMP and these specifications the former shall apply. The cost of complying with

the requirements shall be deemed to be included in existing rates in the Bill of Quantities. (Read with COLTO Specification 3100 and 3200).

ii) Excavation, hauling and placement

The contractor shall provide the engineer with detailed plans of his intended construction processes prior to starting any cut or fill or layer. The plans shall detail the number of personnel and plant to be used and the measures by which the impacts of pollution (noise, dust, litter, fuel, oil, sewage), erosion, vegetation destruction and deformation of landscape will be prevented, contained and rehabilitated. Particular attention shall also be given to the impact that such activities will have on the adjacent built environment. The contractor shall demonstrate his "good housekeeping", particularly with respect to closure at the end of every day so that the site is left in a safe condition from rainfall overnight or over periods when there is no construction activity. (Read with COLTO Standard Specification clauses 1217 and 3309)

iii) Spoil sites

The contractor shall be responsible for the safe siting, operation, maintenance and closure of any spoil site he uses during the contract period, including the defects notification period. This shall include existing spoil sites that are being re-entered. Before spoil sites may be used proposals for their locality, intended method of operation, maintenance and rehabilitation shall be given to the engineer for his approval. The location of these spoil sites shall have signed approval from the affected landowner before submission to the engineer. No spoil site shall be located within 500m of any watercourse. A photographic record shall be kept of all spoil sites for monitoring purposes. This includes before the site is used and after re-vegetation.

The use of approved spoil sites for the disposal of hazardous or toxic wastes shall be prohibited unless special measures are taken to prevent leaching of the toxins into the surrounding environment. Such special measures shall require the approval of the relevant provincial or national authority. The same shall apply for the disposal of solid waste generated from the various camp establishments. The engineer will assist the contractor in obtaining the necessary approval if requested by the contractor.

Spoil sites will be shaped to fit the natural topography. These sites shall receive a minimum of 75mm topsoil and be grassed with the recommended seed mixture. Slopes shall not exceed a vertical: horizontal ratio of 1:3. Only under exceptional circumstances will approval be given to exceed this ratio. Appropriate grassing measures to minimise soil erosion shall be undertaken by the contractor. This will include both strip and full sodding. The contractor may motivate to the engineer for other acceptable stabilising methods. The engineer may only approve a completed spoil site at the end of the defects notification period upon receipt from the contractor of a landowner's clearance notice and an engineer's certificate certifying slope stability (Read with COLTO standard Specifications clause 1214). The contractor's costs incurred in obtaining the necessary certification for opening and closing of spoil sites shall be deemed to be included in the tendered rates for spoiling.

iv) Stockpiles

The contractor shall plan his activities so that materials excavated from borrow pits and cuttings, in so far as possible, can be transported direct to and placed at the point where it is to be used. However, should temporary stockpiling become necessary, the areas for the stockpiling of excavated and imported material shall be indicated and demarcated on the site plan submitted in writing to the engineer for his approval, together with the contractor's proposed measures for prevention, containment and rehabilitation against environmental damage.

The areas chosen shall have no naturally occurring indigenous trees and shrubs present that may be damaged during operations. Care shall be taken to preserve all vegetation in the immediate area of these temporary stockpiles. During the life of the stockpiles the contractor shall at all times ensure that they are:

- Positioned and sloped to create the least visual impact;

- Constructed and maintained so as to avoid erosion of the material and contamination of surrounding environment; and
- Kept free from all alien/undesirable vegetation.

After the stockpiled material has been removed, the site shall be re-instated to its original condition. No foreign material generated / deposited during construction shall remain on site. Areas affected by stockpiling shall be landscaped, top soiled, grassed and maintained at the contractor's cost until clearance from the engineer and the relevant Authority is received.

Material milled from the existing road surface that is temporarily stockpiled in areas approved by the engineer within the road reserve, shall be subject to the same condition as other stockpiled materials. Excess materials from windrows, in-situ milling or any detritus of material from road construction activities may not be swept off the road and left unless specifically instructed to do so in the contract drawing or under instruction from the engineer

In all cases, the engineer shall approve the areas for stockpiling and disposal of construction rubble before any operation commences and shall approve their clause only when they have been satisfactorily rehabilitated. (Read with COLTO Specification 3203 and 4306).

v) Blasting activities

Wherever blasting activity is required on the site (including quarries and/or borrow pits) the contractor shall rigorously adhere to the relevant statutes and regulations that control the use of explosives. In addition, the contractor shall, prior to any drilling of holes in preparation for blasting, supply the engineer with a locality plan of the blast site on which shall be shown the zones of influence of the ground and air shock-waves and expected limits of fly-rock. The plan shall show each dwelling, structure and service within the zones of influence and record all details of the dwellings/structures/services including existing positions, lengths and widths of cracks, as well as the condition of doors, windows, roofing, wells, boreholes etc. The contractor, alone, shall be responsible for any costs that can be attributed to blasting activities, including the collection of fly-rock from adjacent lands and fields. The submission of such a plan shall not in any way absolve the contractor from his responsibilities in this regard. The contractor shall also indicate to the engineer the manner in which he intends to advertise to the adjacent communities and/or road users the times and delays to be expected for each individual blast.

i) Batching sites

Asphalt plants are considered scheduled processes listed in the second schedule to the Atmospheric Pollution Prevention Act, 1965 (Act No. 45 of 1965). Should the use of an asphalt plant be considered on site, the contractor shall be responsible to obtain the necessary permit from the Department of Environmental Affairs and Tourism, regardless of where they are sited.

Crushing plants and concrete batching plants, whether sited inside or outside of defined quarry or borrow pit areas, shall be subject to the requirements of the Department of Minerals and Energy legislation as well as the applicable industrial legislation that governs gas and dust emissions into the atmosphere. Such sites will be the subject of regular inspections by the relevant authorities during the life of the project. In addition, the selection, entry onto, operation, maintenance, closure and rehabilitation of such sites shall be the same as for those under section C1008(h)(iii), with the exception that the contractor shall provide additional measures to prevent, contain and rehabilitate against environmental damage from toxic/hazardous substances. In this regard the contractor shall provide plans that take into account such additional measures as concrete floors, bunded storage facilities, linings to drainage channels and settlement dams. Ultimate approval of these measures shall be from the relevant national authority, as shall approval of closure. The engineer will assist the contractor in his submissions to the relevant authority.

Effluent from concrete batch plants and crusher plants shall be treated in a suitable designated sedimentation dam to the legally required standards to prevent surface and groundwater pollution. The designs of such a facility should be submitted to the engineer for approval.

The contractor shall invite the relevant department to inspect the site within 2 months after any plant is commissioned and at regular intervals thereafter, not exceeding 12 months apart

j) Spillages

Streams, rivers and dams shall be protected from direct or indirect spillage of pollutants such as refuse, garbage, cement, concrete, sewage, chemicals, fuels, oils, aggregate, tailings, wash water, organic materials and tar or bituminous products. In the event of a spillage, the contractor shall be liable to arrange for professional service providers to clear the affected area.

Responsibility for spill treatment lies with the contractor. The individual responsible for, or who discovers a hazardous waste spill must report the incident to his/her DEO or to the engineer. The Designated Environmental Officer will assess the situation in consultation with the engineer and act as required. In all cases, the immediate response shall be to contain the spill. The exact treatment of polluted soil / water shall be determined by the contractor in consultation with the DEO and the engineer. Areas cleared of hazardous waste shall be re-vegetated according to the engineer's instructions

Should water downstream of the spill be polluted, and fauna and flora show signs of deterioration or death, specialist hydrological or ecological advice will be sought for appropriate treatment and remedial procedures to be followed. The requirement for such input shall be agreed with the engineer. The costs of containment and rehabilitation shall be for the contractor's account, including the costs of specialist input.

k) Areas of Specific Importance

Any area, as determined and identified within the project document as sensitive or of special interest within the site shall be treated according to the express instructions contained in these specifications or the approved EMP. The contractor may offer alternative solutions to the engineer in writing should he consider that construction will be affected in any way by the hindrance of the designated sensitive area or feature. However, the overriding principle is that such defined areas requiring protection shall not be changed. Every effort to identify such areas within the site will have been made prior to the project going out to tender. The discovery of other sites with archaeological or historical interest that have not been identified shall require ad hoc treatment.

i) Archaeological Sites

If an artefact on site is uncovered, work in the immediate vicinity shall be stopped immediately. The contractor shall take reasonable precautions to prevent any person from removing or damaging any such article and shall immediately upon discovery thereof inform the engineer of such discovery. The South African Heritage Research Agency (SAHRA) is to be contacted who will appoint an archaeological consultant. Work may only resume once clearance is given in writing by the archaeologist. (Read with COLTO General Condition of Contract Subclause 4.24 as amended by Particular Condition).

ii) Graves and middens

If a grave or midden is uncovered on site, or discovered before the commencement of work, then all work in the immediate vicinity of the graves/middens shall be stopped and the engineer informed of the discovery. SAHRA should be contacted and in the case of graves, arrangements made for an undertaker to carry out exhumation and reburial. The Employer will be responsible for attempts to contact family of the deceased and for the site where the exhumed remains can be re-interred. (Read with COLTO General Conditions of Contract Sub-clause 4.24 as amended by Particular Condition).

l) Noise Control

The contractor shall endeavour to keep noise generating activities to a minimum. Noises that could cause a major disturbance, for instance blasting and crushing activities, should only be carried out during daylight hours. Compliance with the appropriate legislation with respect to noise, shall be mandatory.

Should noise generating activities have to occur at night the people in the vicinity of the drilling shall be warned about the noise well in advance and the activities kept to a minimum.

m) Dust Control

Dust caused by strong winds shall be controlled by means of water spray vehicles. Dust omission from batching plants shall be subject to the relevant legislation and shall be the subject of inspection by the relevant office of the Department of Minerals and Energy.

n) Alien Vegetation

The contractor shall be held responsible for the removal of alien vegetation within the road reserve disturbed during road construction. This includes, for example, service roads, stockpile areas, stop/go facilities, windrows and wherever material generated for or from road construction has been stored temporarily or otherwise within the road reserve. This responsibility shall extend for the duration of the defects notification period.

C3.4.3.2.9. RECORD KEEPING

The engineer and the DEO will continuously monitor the contractor's adherence to the approved impact prevention procedures and the engineer shall issue to the contractor a notice of non-compliance whenever transgressions are observed. The DEO should document the nature and magnitude of the non-compliance in a designated register, the action taken to discontinue the non-compliance, the action taken to mitigate its effects and the results of the actions. The non-compliance shall be documented and reported to the engineer in the monthly report.

Copies of any record of decision or EMP's for specific borrow pits or quarries used on the project shall be kept on site and made available for inspection by visiting officials from the employer or relevant environmental departments.

C3.4.3.2.10. COMPLIANCE AND PENALTIES

The contractor shall act immediately when such notice of non-compliance is received and correct whatever is the cause for the issuing of the notice. Complaints received regarding activities on the construction site pertaining to the environment shall be recorded in a dedicated register and the response noted with the date and action taken. This record shall be submitted with the monthly reports and a verbal report given at the monthly site meetings.

Any avoidable non-compliance with the above-mentioned measures shall be considered sufficient ground for the imposition of a penalty

The following penalties shall apply for environmental violations:

a) Unnecessary removal or damage to trees

• 2600mm girth or less	:	R 5 000 per tree
• Greater than 2600mm, but less than 6180mm girth	:	R10 000 per tree
• Greater than 6180mm girth	:	R30 000 per tree

b) Serious violations:

• Hazardous chemical/oil spill and/or dumping in non-approved sites.	:	R10 000 per incident
• General damage to sensitive environments.	:	R 5 000 per incident
• Damage to cultural and historical sites.	:	R 5 000 per incident
• Uncontrolled/unmanaged erosion (plus rehabilitation at contractor's cost)	:	R 5 000 per incident
• Unauthorised blasting activities.	:	R 5 000 per incident
• Pollution of water sources.	:	R 10 000 per incident

The engineer's decision with regard to what is considered a violation, its seriousness and the penalty imposed shall be final.

c) Less serious violations:

• Littering on site.	:	R1 000 per incident
• Lighting of illegal fires on site.	:	R1 000 per incident
• Persistent or un-repaired fuel and oil leaks.	:	R1 000 per incident
• Excess dust or excess noise emanating from site.	:	R1 000 per incident
• Dumping of milled material in side drains or on grassed areas:	:	R1 000 per incident
• Possession or use of intoxicating substances on site. :	:	R 500 per incident
• Any vehicles being driven in excess of designated speed limits.	:	R 500 per incident
• Removal and/or damage to flora or cultural or heritage objects on site, and/or killing of wildlife.	:	R2 000 per incident
• Illegal hunting.	:	R2 000 per incident
• Urination and defecation anywhere except in designated areas.	:	R 500 per incident

The engineer's decision with regard to what is considered a violation, its seriousness and the penalty imposed shall be final. The calculation shall include allied construction activities in the same way as the calculation of reduced payments under section 8200. The imposition of such a penalty shall not preclude the relevant provincial or national authority from applying an additional penalty in accordance with its statutory powers. Any non-compliance with the agreed procedures of the EMP is a transgression of the various statutes and laws that define the manner by which the environment is managed.

Failure to redress the cause shall be reported to the relevant authority for them to deal with the transgression, as it deems fit.

C3.4.3.2.11. MEASUREMENT AND PAYMENT

The cost of complying to this specification shall be deemed to be included in the rates tendered for this project.

Item	Unit
B100.01	Penalty for unnecessary removal or damage to trees for the following diameter sizes
(a) 2600mm girth or less	number (No)
(b) Greater than 2600mm, but less than 6180mm girth	number (No)
(c) Greater than 6180mm girth	number (No)

The unit of measurement shall be the number of trees by diameter size removed unnecessary or damaged. The penalty rates applied shall be those stated in clause C3.4.3.2.10.

Item	Unit
B100.02	Penalty for serious violations
(a) Hazardous chemical/oil spill and/or dumping in non-approved sites	number (No)
(b) General damage to sensitive environments	number (No)
(c) Damage to cultural and historical sites	number (No)
(d) Pollution of water sources	number (No)
(e) Unauthorized blasting activities	number (No)

(f) Uncontrolled/unmanaged erosion per incident, plus rehabilitation at contractor's cost	number (No)

The unit of measurement for B100.02 (a) to (f) shall be the number of serious violation incidents. The penalty rates to be applied shall be those stated in clause C3.4.3.2.10.

Item	Unit
B100.03 Penalty for less serious violations	
(a) Littering on site	number (No)
(b) Lighting of illegal fires on site	number (No)
(c) Persistent or un-repaired fuel and oil leaks	number (No)
(d) Excess dust or excess noise emanating from site	number (No)
(e) Dumping of milled material in side drains or on grassed areas	number (No)
(f) Possession or use of intoxicating substances on site	number (No)
(g) Any vehicles being driven in excess of designated speed limits	number (No)
(h) Removal and/or damage to flora or cultural or heritage objects on site, and/or killing of wildlife	number (No)
(i) Illegal hunting	number (No)
(j) Urination and defecation anywhere except in designated areas	number (No)

The unit of measurement shall be the number of less serious violation incidents. The penalty rates applied shall be those stated in clause C3.4.3.2.10.

The engineer's decision with regard to what is considered a violation, its seriousness and the penalty imposed shall be final. The imposition of such a penalty shall not preclude the relevant provincial or national authority from applying an additional penalty in accordance with its statutory powers. Any non-compliance with the agreed procedures of the EMP is a transgression of the various statutes and laws that define the manner by which the environment is managed.

Failure to redress the cause shall be reported to the relevant authority for them to deal with the transgression, as it deems fit.

Table 1: Mechanisms that Cause Environmental Impacts during Construction Activities

SECTION	CONTENTS	ENVIRONMENTAL IMPACTS				
		POLLUTION TYPE	DEFORMATION OF LANDSCAPE	SOIL EROSION	ALIEN VEGETATION	SENSITIVE AREAS (to be completed by compiler)
1300	Camp Establishment	Waste treatment Hazardous waste Water supply Spillage Storage	Selection of site Preserve indigenous vegetation Preserve topsoil	Selection of site Preserve indigenous vegetation Preserve topsoil	Preserve indigenous vegetation Preserve topsoil Management of weeds	
1400	Housing, Offices and laboratories	Waste treatment Hazardous waste Water supply Spillage Storage Noise/lights	Selection of site Preserve indigenous vegetation Preserve topsoil Demarcate sensitive areas	Selection of site Preserve indigenous vegetation Preserve topsoil	Preserve indigenous vegetation Preserve topsoil Management of weeds	
1500	Accommodation of Traffic	Waste treatment Hazardous waste Water supply Spillage Storage Noise/lights Dust control	Selection of site Preserve indigenous vegetation Preserve topsoil Demarcate sensitive areas Maintenance of windrows	Selection of site Preserve indigenous vegetation Preserve topsoil	Preserve indigenous vegetation Preserve topsoil Management of weeds	
1600	Overhaul	Spillage Storage Noise/lights Dust control Exhaust fumes	Turning circles Parking areas	Restrict access to sensitive areas	Protection of indigenous vegetation Preserve topsoil	

SECTION	CONTENTS	ENVIRONMENTAL IMPACTS				
		POLLUTION TYPE	DEFORMATION OF LANDSCAPE	SOIL EROSION	ALIEN VEGETATION	SENSITIVE AREAS (to be completed by compiler)
		Washing waste				
1700	Clearing and grubbing	Waste treatment Hazardous waste Water supply Noise /lights Dust control	Selection of site Preserve indigenous vegetation Preserve topsoil	Selection of site Preserve indigenous vegetation Preserve topsoil	Protection of indigenous vegetation Preserve topsoil	
2100 2400	- Drainage	Waste treatment Hazardous waste Water supply Spillage Storage	Selection of site Preserve indigenous vegetation Preserve topsoil	Selection of site Preserve indigenous vegetation Preserve topsoil	Preserve indigenous vegetation Preserve topsoil Management of weeds	
3100	Borrow pits	Waste treatment Hazardous waste Water supply Spillage Storage	Selection of site Preserve indigenous vegetation Preserve topsoil	Selection of site Preserve indigenous vegetation Preserve topsoil	Preserve indigenous vegetation Preserve topsoil Management of weeds	
3200	Stockpiling	Waste treatment Hazardous waste Water supply Spillage Storage	Selection of site Preserve indigenous vegetation Preserve topsoil	Selection of site Preserve indigenous vegetation Preserve topsoil	Preserve indigenous vegetation Preserve topsoil Management of weeds	
3300	Mass Earthworks	Waste treatment Hazardous waste Water supply Spillage Storage	Selection of site Preserve indigenous vegetation Preserve topsoil	Selection of site Preserve indigenous vegetation Preserve topsoil	Preserve indigenous vegetation Preserve topsoil Management of weeds	

UPGRADING OF MAPATE ACCESS ROAD

SECTION	CONTENTS	ENVIRONMENTAL IMPACTS				
		POLLUTION TYPE	DEFORMATION OF LANDSCAPE	SOIL EROSION	ALIEN VEGETATION	SENSITIVE AREAS (to be completed by compiler)
3400 3900	- Pavement layers	Waste treatment Hazardous waste Water supply Spillage Storage Noise / lights Dust control	Selection of site Preserve indigenous vegetation Preserve topsoil Demarcate sensitive areas Maintenance of windrows	Selection of site Preserve indigenous vegetation Preserve topsoil	Preserve indigenous vegetation Preserve topsoil Management of weeds	
4100	Asphalt works / sealing operations	Waste treatment Hazardous waste Water supply Spillage Storage Noise / lights Dust control Smoke control Storage of materials	Selection of site Preserve indigenous vegetation Preserve topsoil Turning circles Parking areas	Selection of site Preserve indigenous vegetation Preserve topsoil	Preserve indigenous vegetation Preserve topsoil	
5000	Ancillary roadworks	Waste treatment Hazardous waste Water supply Spillage Storage	Selection of site Preserve indigenous vegetation Preserve topsoil	Selection of site Preserve indigenous vegetation Preserve topsoil	Preserve indigenous vegetation Preserve topsoil Management of weeds	
6000	Structures	Waste treatment Hazardous waste Water supply Spillage Storage	Selection of site Preserve indigenous vegetation Preserve topsoil	Selection of site Preserve indigenous vegetation Preserve topsoil	Preserve indigenous vegetation Preserve topsoil Management of weeds	

SECTION	CONTENTS	ENVIRONMENTAL IMPACTS				
		POLLUTION TYPE	DEFORMATION OF LANDSCAPE	SOIL EROSION	ALIEN VEGETATION	SENSITIVE AREAS (to be completed by compiler)
7000	Concrete pavements etc	Waste treatment Hazardous waste Water supply Spillage Storage	Selection of site Preserve indigenous vegetation Preserve topsoil	Selection of site Preserve indigenous vegetation Preserve topsoil	Preserve indigenous vegetation Preserve topsoil Management of weeds	

C3.4.3.3 PROVISION OF STRUCTURED TRAINING

CONTENTS

- C3.4.3.3.1 SCOPE
- C3.4.3.3.2 GENERIC TRAINING
- C3.4.3.3.3 ENTREPRENEURIAL SKILLS TRAINING
- C3.4.3.3.4 MEASUREMENT AND PAYMENT

C3.4.3.3.1 SCOPE

This specification covers the requirements for the provision of structured training to be arranged by the contractor over the period of this contract.

C3.4.3.3.2 GENERIC TRAINING

- C3.4.3.3.2.1 The contractor shall, from the commencement of the contract, implement a structured progressive training programme.
- C3.4.3.3.2.2 Training shall be at or by an approved accredited organisation and shall be delivered by suitably qualified and experienced trainers.
- C3.4.3.3.2.3 The contractor shall be responsible for the provision of everything necessary for the delivery of the generic training programme, including the following:
 - (a) A suitable venue with sufficient furniture, lighting and power.
 - (b) All necessary stationery consumables and study material.
 - (c) Transport of the students (as necessary).
- C3.4.3.3.2.4 Generic training courses shall commence within one month of possession of site and be completed before the end of the contract period. The Training Schedule should form part of the section 12 programme to be approved by the Engineer at the start of the project.
- C3.4.3.3.2.5 The contractor's training programme shall be subject to the approval of Thulamela Local Municipality and the contractor shall if so instructed by Thulamela Local Municipality alter or amend the programme and course content if a need is identified once the contract commences.
- C3.4.3.3.2.6 The contractor shall keep comprehensive records of the training given to each student and whenever required shall provide copies of such records to the engineer. At the successful completion of each course each student shall be issued with a certificate indicating the course contents as proof of attendance and completion.

In addition to the above, a monthly return shall be submitted by the contractor. An example of the form is illustrated in Part C5 of this document (form RDP 11 (E))

C3.4.3.3.3 ENTREPRENEURIAL SKILLS TRAINING

- C3.4.3.3.3.1 Small contractors, subcontractors and the Project Steering Committee (PSC) will be entitled to receive a structured training programme, which will comprise both management skills as well as business development skills.
- C3.4.3.3.3.2 The contractor shall closely monitor the performance of all small subcontractors

in the execution of their contracts and shall identify all such subcontractors who, in his opinion, display the potential to benefit from structured training as may be provided for in the contract and where required by the engineer, shall make recommendations in this regard. The final list of candidates will be decided between the contractor and the engineer.

C3.4.3.3.3.3 The training will be delivered by trainers who are accredited by the Civil Engineering Training Scheme (CEITS) or other institutions recognised by the Department of Labour. Accredited training refers to both the trainers as well as to the training material.

C3.4.3.3.3.4 The contractor shall facilitate in the delivery thereof, by instructing and motivating the subcontractor regarding attendance and participation therein.

C3.4.3.3.3.5 The contractor shall further make all reasonable efforts to co-ordinate the programming of the subcontractor's work with that of the delivery of the structured training.

C3.4.3.3.3.7 The contractor shall be responsible for the provision of everything necessary for the delivery of the entrepreneurial training programme, including the following:

- (a) A suitably furnished venue (if required) with lighting and power.
- (b) All necessary consumables, stationery and study material.
- (c) Transport of the subcontractors (as necessary).

C3.4.3.3.3.7 All entrepreneurial training shall take place within normal working hours.

C3.4.3.3.3.8 The contractor's training programme shall be subject to the approval of Thulamela Local Municipality and the contractor shall if so instructed by Thulamela Local Municipality alter or amend the programme and course content if a need is identified once the contract commences.

C3.4.3.3.3.10 The contractor shall keep comprehensive records of the training given to each subcontractor and whenever required shall provide copies of such records to the engineer. At the successful completion of each course each subcontractor shall be issued with a certificate indicating the course contents as proof of attendance and completion.

In addition to the above, a monthly return shall be submitted by the contractor. An example of the form to be used is illustrated in Part C5 of this document, (form RDP 12 (E)).

C3.4.3.3.4 MEASUREMENT AND PAYMENT

<u>ITEM</u>	<u>UNIT</u>
C12.05 Provision for accredited training	
(a) Generic skills.....	Provisional sum
(b) Entrepreneurial skills.....	Provisional sum
(c) Handling cost and profit in respect of sub-item C12.05(a) and (b) above.....	percentage (%)
(d) Training venue (only if required).....	lump sum

The prime cost sums are provided to cover the actual costs (including wages and the daily PSC reimbursement) for attendance of accredited training courses as agreed with the engineer and shall be expended in accordance with the provisions of sub-clause 48(2) of the general conditions of contract. The tendered percentage in sub-item C12.05 (c) is a percentage of the amount actually spent under sub-items C12.05(a) and (b) which shall include full compensation for the contractor's handling cost, profit, mentoring, record keeping, reporting and all other costs in connection therewith.

The lump sum tendered for C12.05(d) shall include full compensation for the provision of the training venue, for all necessary lighting, power, furniture, stationery, consumables and study material and for transportation of the students to and from the training venue.

Payment of the lump sum will be made after the provision of all the accredited training, issuing of all certificates and submission of all records as specified in the document.

C3.4.3.4 PROVISION OF THE TEMPORARY WORKFORCE

CONTENTS

C3.4.3.4.1 SCOPE

C3.4.3.4.2 INTERPRETATIONS

C3.4.3.4.3 PERMITTED SOURCES OF TEMPORARY WORKERS

C3.4.3.4.4 EMPLOYMENT RECORDS TO BE PROVIDED

C3.4.3.4.5 VARIATIONS IN WORKER PRODUCTION RATES

C3.4.3.4.6 TRAINING OF THE TEMPORARY WORKFORCE

C3.4.3.4.7 RECRUITMENT AND SELECTION PROCEDURES

C3.4.3.4.8 TERMS AND CONDITIONS PERTAINING TO THE EMPLOYMENT OF THE TEMPORARY WORKFORCE

C3.4.3.4.9 LABOUR RELATIONS AND WORKER GRIEVANCE PROCEDURES

C3.4.3.4.10 THE SUBCONTRACTORS' WORKFORCES

C3.4.3.4.11 MEASUREMENT AND PAYMENT

C3.4.3.4.1 SCOPE

This Specification covers the provisions and requirements relating to the provision of the temporary workforce. Reference is also made to the Basic Conditions of Employment Act (Act 75 of 1997) with specific reference to the Sectoral Determination 2: Civil Engineering Sector

C3.4.3.4.2 INTERPRETATIONS

C3.4.3.4.2.1 Supporting documents

The Tender Rules, Conditions of Contract, Standard and Project Specifications, Drawings and statutory minimum requirements relating to the employment and remuneration of labour shall *inter alia* be read in conjunction with this Specification.

C3.4.3.4.2.1.2 Definitions and abbreviations

For the purposes of this specification, the definitions given in the Conditions of Contract, the Standard Specifications and the Project Specifications, together with the following additional definitions shall, unless the context dictates otherwise, apply:

- (a) "Key Personnel" means all contracts managers, site agents, materials and survey technicians, trainers, supervisors, foremen, skilled plant operators, artisans and the like, and all other personnel in the permanent employ of the Contractor or Subcontractor who possess special skills and/or who play key roles in the Contractor's or Subcontractor's operation
- (b) "Project Committee" means a committee consisting of the Employer, the Engineer, the Contractor, (or their nominated representatives) as well as representatives of the temporary workforce, which is convened from time to time at the discretion of the Engineer, for the purposes of acting as an avenue for effective communication and liaison between all the parties referred to, in all matters pertaining to the Contract

- (c) "Subcontractor" means any person or group of persons in association, or firm, or body corporate (whether formally constituted or otherwise) not being the Contractor, to whom specific portions or aspects of the Works are sublet or subcontracted by the Contractor in accordance with the provisions of the Contract
- (d) "Worker" for the purposes of this Specification means any person, not being one of the Contractor's key personnel, nor any key personnel of any Subcontractor, who is engaged by the Contractor, a Subcontractor or the Employer to participate in the execution of any part of the Contract Works and shall include unskilled labour, semi-skilled and skilled labour, clerical workers and the like
- (e) "Workforce" means the aggregate body comprising all workers and shall, unless the context dictates otherwise, include the workforces of the Contractor and all Subcontractors
- (f) "Project Steering Committee (PSC)" means a committee comprising mainly of representatives (to a maximum of 10) of the affected communities with additional members from Thulamela Local Municipality, the Contractor, Consultants and the Municipality. The PSC convenes at least once a month as well as when the need so dictates, for the purpose of recruiting labour for the project, to address community issues and for acting as an avenue for effective communication and liaison between all the parties.
- (g) "Liaison Officer" means a local representative of the temporary workforce, duly appointed through the PSC processes, to act on behalf of the workers and through whom all matters pertaining to the temporary workforce can be channelled.

C3.4.3.4.2.1.3 Status

Where any provisions or requirements of this Specification are in conflict with anything elsewhere set out in the Contract, the provisions and requirements of this Specification shall take precedence and prevail.

C3.4.3.4.3 PERMITTED SOURCES OF TEMPORARY WORKERS

The Contractor shall as far as possible make optimum use of the human resources outside his own workforce and the workforces of all subcontractors. The temporary workforce that is to be used in the execution of the Works in terms of Part C3 may consist of the workers of local communities, and shall not be bound to one particular community.

C3.4.3.4.4 EMPLOYMENT RECORDS TO BE PROVIDED

- (a) The Contractor shall maintain accurate and comprehensive records of all workers engaged on the Contract and shall provide the Engineer at monthly intervals from the commencement of the Contract, with interim records substantiating the actual numbers of employment opportunities that shall have been generated to date and the amounts actually paid in respect thereof. Such interim records shall be in a Thulamela Local Municipality approved format. An example of the forms to be used is illustrated in Part C5 of this document, (forms RDP 9 and 10 (E)).
- (b) The Contractor shall, on completion of the Contract, and as a pre-requisite event to the release of any retention money in terms of the Conditions of Contract, provide the Engineer with copies of the Terms of Employment as well as independently audited documentary evidence of the total number of temporary and permanent employment opportunities actually generated during the Contract.

C3.4.3.4.5 VARIATIONS IN WORKER PRODUCTION RATES

Notwithstanding anything to the contrary as may be stated in or inferred from any other provision of this Contract, the Contractor shall not be entitled to any additional payment or compensation whatever, in respect of any differences as may result between the production rates actually

achieved by workers in the course of the execution of the Contract Works and those production rates on which he has based his tender.

C3.4.3.4.6 TRAINING OF THE TEMPORARY WORKFORCE

- (a) Selected members of the workforce are to be provided with structured training in accordance with the provisions of Part C3.4.3.3.
- (b) The Contractor shall make all necessary allowances in his programme of work to accommodate and facilitate the delivery of such structured training and shall comply fully with the requirements of Part C3.4.3.3.
- (c) The provision of structured training as described in Part C3.4.3.3. shall not relieve the Contractor of any of his obligations in terms of the Conditions of Contract and the Contractor shall remain fully liable for the provision, at his own cost, of all training of the workforce, additional to that as provided for in Part C3.4.3.3, as may be necessary to achieve the execution and completion of the works strictly in accordance with the provisions of the Contract.

C3.4.3.4.7 RECRUITMENT AND SELECTION PROCEDURES

C3.4.3.4.7.1 The Project Steering Committee, though the assistance of the Social Facilitator and the Contractor, shall be responsible for the recruitment and selection of the Community Liaison Officer and the workers to constitute the temporary workforce.

C3.4.3.4.7.2 The Contractor shall advise the Engineer in writing of the numbers of each category of temporary worker which he requires, together with the personal attributes which he considers desirable that each category of worker shall possess (taking due cognisance of the provisions of the Contract relating to training).

C3.4.3.4.7.3 The Social Facilitator shall take the necessary actions to advertise within the affected local communities comprising the personnel resources, the fact that temporary employment opportunities exist and the time and place where recruiting will occur

C3.4.3.4.7.4 The Social Facilitator shall record in writing, the details of all persons applying for employment, including *inter alia*:

- (a) Name, Identity Number, Date of Birth, age and sex
- (b) Marital status and number of dependants
- (c) Qualifications and previous work experience (whether substantiated or not)
- (d) On the job training programmes attended
- (e) Period since last economically active
- (f) Preference for type of work or task.

C3.4.3.4.7.5 The selection of workers from amongst the applicants should take into cognizance the Contractor's requirements for the workforce and the provisions of the contract in regard to the provision of training to the workforce and in accordance with the following principle:

- (a) No potential temporary worker shall be precluded from being employed by the Contractor on the execution of the Works, by virtue of his lack of skill in any suitable operation forming part of the Works, unless -
 - (i) all available vacancies have been or can be filled by temporary workers who already possess suitable skills, or

- (ii) the Time for Completion allowed in the Contract, or the remaining portion of the Contract Period (as the case may be) is insufficient to facilitate the creation of the necessary skills.
- (b) Preference shall be given to the unemployed and single heads of households.
- (c) The Contractor shall, in so far as is reasonably practicable, give priority to accommodating the applicants' expressed preferences regarding the types of work for which they are selected.
- (d) The selection process shall not be prejudicial to youth (over the age of fifteen years) and women. The Contractor should strive to achieve the participation target for employment set for this project which is 60% female and 20% youth.

C3.4.3.4.7.6 After making the selection, the Social Facilitator shall forward the list in writing and without undue delay, to the Engineer for record keeping.

C3.4.3.4.7.7 The provisions of this clause shall apply *mutatis mutandis* in respect of the selection of additional or replacement members of the workforce as may be necessary from time to time during the Contract.

C3.4.3.4.7.8 The Contractor shall, after appointing his temporary workforce, arrange at his own cost for the appointment of the Liaison Officer as representative of the workforce to act on their behalf with regards to all matters pertaining to the workforce.

C3.4.3.4.8 TERMS AND CONDITIONS PERTAINING TO THE EMPLOYMENT OF THE TEMPORARY WORKFORCE

C3.4.3.4.8.1 All temporary workers engaged in accordance with the provisions of Part A of the Project Specifications, shall be employed on the terms and conditions of employment as are consistent with those as set out in this Contract. The Contractor shall implement and adhere strictly to such terms and conditions relating to the employment of the temporary workforce, and subject only to the provisions of this Contract, shall not employ any temporary worker on terms and conditions which are less favourable to the worker or inconsistent with the standards and norms generally applicable to temporary workers in the Civil Engineering Industry and applicable to the particular area. Refer to the Contract of Employment drafted/published by Department of Labour.

C3.4.3.4.8.2 RATE OF REMUNERATION. The Contractor shall pay to all workers engaged in terms of the contract, not less than the applicable gazetted minimum rate of remuneration in terms of the Sectorial Determination 2: Civil Engineering Sector.

The remuneration of the CLO shall be paid monthly at the rate equivalent to Task Grade 3 in accordance with the provisions of the Basic Conditions of Employment Act, No. 75 of 1997, Amendment i.t.o Sectorial Determination 2: Civil Engineering Sector, South Africa

Compensation for transport for the members of the Project Steering Committee shall be made at a rate of R75 / month. This will cover for transport cost to and from the PSC meeting, site meeting and any other meeting deemed necessary to fulfil their obligations.

C3.4.3.4.8.3 NON-PAYMENT OF LABOURERS. Under this contract it is expected of the Main Contractor to ensure that all labourers are paid in time on a monthly basis, whether they are employed by him/her directly or by any of his/her subcontractors. In the event of non-compliance, the employer reserves the right to use any remedies available at its disposal.

C3.4.3.4.9 LABOUR RELATIONS AND WORKER GRIEVANCE PROCEDURES

C3.4.3.4.9.1 The Contractor, as the Employer of the workforce, shall be fully responsible for the establishment and maintenance at his own cost, of satisfactory labour relations on site and the resolution of all grievances of temporary workers as may occur. Refer to Disciplinary Procedures for Small Business drafted/published by Department of Labour.

C3.4.3.4.9.2 The Contractor shall at all times adhere to the accepted norms and standards of labour relations prevailing generally in the Civil Engineering Construction Industry and shall conduct himself in a fair and reasonable manner, within the constraints as may be imposed upon him by the terms of the Contract.

C3.4.3.4.9.3 In the event of any temporary worker engaged by the Contractor in terms of the Contract, being aggrieved with regard to his Terms of Employment, working conditions and

training, he shall have the right, at his discretion, to be supported in any inquiry or disciplinary hearing or investigation instituted by the Contractor in terms of Subclause C3.4.3.4.9.2 above, by one member of the temporary workforce and one member of the Project Committee, which persons shall be nominated by the worker.

C3.4.3.4.9.4 In the event of any grievance not being satisfactorily resolved through the application of normal dispute resolution procedures in accordance with Sub clauses C3.4.3.4.9.2 and C3.4.3.4.9.3, then either the Contractor or the worker concerned may require that the matter be referred to the Project Committee for further consideration, with a view to facilitate the resolution thereof.

C3.4.3.4.10 THE SUBCONTRACTORS' WORKFORCES

C3.4.3.4.10.1 The provisions of this Part C shall apply *mutatis mutandis* to the workforces employed by all subcontractors engaged by the Contractor and the Contractor shall be fully responsible for ensuring, at his own cost, that the terms of every subcontract agreement entered into are such as to facilitate the application of these provisions in respect of the workforces of all subcontractors.

C3.4.3.4.10.2 The Contractor shall at his own cost and to the extent necessary, assist and monitor all subcontractors in the application of the provisions of this Specification, and shall, in terms of the Conditions of Contract, remain fully liable in respect of the acts, omissions and neglects of all subcontractors, in respect of the application of the provisions of this Specification.

C3.4.3.4.11 MEASUREMENT AND PAYMENT

The Contractor will not be separately reimbursed or compensated in respect of the provision of the workforce and creation of temporary employment opportunities and all the Contractor's costs associated with compliance with the provisions of this part of the Project Specifications shall, except to the extent provided for in Part C3.4.3.3. as relevant, be deemed to be included in the rates tendered for the various items of work listed in the Schedule of Quantities.

C3.5 MANAGEMENT

C3.5.1 MANAGEMENT MEETINGS

The following meetings will be required as minimum for the management of the contract.

- (a) Monthly client site meeting (using standard agenda for management control).
- (b) Technical meetings as required for each phase of the work.
- (c) Monthly safety meetings in terms of the OHS requirements.
- (d) Weekly progress meetings

C3.5.2 QUALITY CONTROL

Contractor to supply details of quality plan and procedures. These shall include:

- Accommodation of traffic.
- Inspection and test plans.
- Approval process.
- Hold-points.
- Milestones.

PART C4: SITE INFORMATION

C4.1 SITE INFORMATION.....C.355

C4.2 LOCALITY PLAN C.359

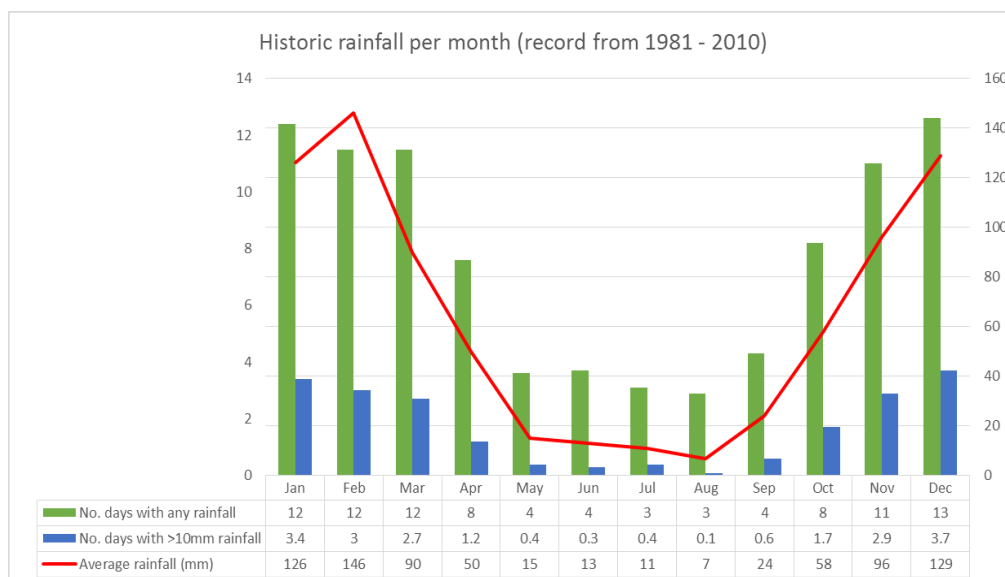
C4.1 SITE INFORMATION

C4.1.1 General

The project is located in the town of Thohoyandou in the Vhembe District Municipality of the Limpopo Province. Mapate access road is situated between Tshisaulu and Mapate in the Thulamela Local Municipality. The project entails the upgrading of the existing gravel road to surfaced standards which begins at the Mohlahla Road intersection and traverses westwardly crossing two streams and ends in the town of Mapate. The total project length, including the intersecting side road bellmouths is approximately 6.5km long.

C4.1.2 Climate and Weather

The average total annual rainfall for Thohoyandou is 765 mm with about 84% of the rainfall taking place between October and March (both inclusive). The distribution of rainfall over the year (monthly averages) is shown in the figure below and shows the number of days where any rainfall is experienced and more importantly it also shows the average number of days where rainfall is over 10mm.



The project road is situated within a moist sub-humid to wet zone according to Thornthwaite's Moisture Index.

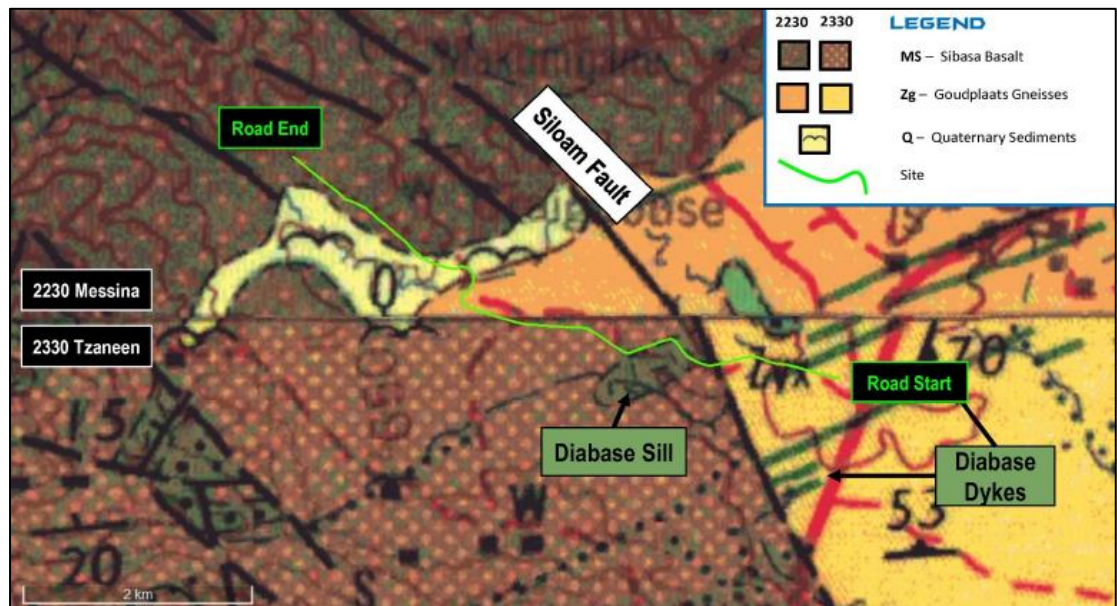
C4.1.3 Topography

The Mapate Access Road is located on flat to hilly terrain. The section starts at an elevation of about 608m above Mean Sea Level (MSL) and ends at its highest point of approximately 679m above MSL. The general profile indicated that the road is hilly on the western side of the road and flattens out towards the eastern side of the road.

C4.1.4 Geology

Detailed analysis of the geological series map 2230 (Messina) and 2330 (Tzaneen),

shown in the figure below, indicates that the initial length of the road (approximately 0+000 to 1+000) is seen to be underlain by grey biotite Gneiss, belonging to the Goudplaats Gneisses, which form part of the oldest lithological units of the Swazian Period. The remaining portions of the road are seen to be underlain predominantly by Basalt of the Sibasa Formation. Furthermore, the road is seen to be underlain by alluvial sediments of the Quaternary Period, localised to the valley structures traversing the road. The contact between the Gneiss and the much younger Basalts is formed by a prominent fault, known as the Siloam Fault.



C4.1.4 Material site investigation

A materials investigation was carried out in 2017 and included the excavation of test pits (19), profiling and sampling DCP testing. A full copy of the materials investigation study is attached as Annexure 5.3.

Wearing Course

The soil profiles indicate that the wearing course thickness varies throughout the length of the road (50 – 300 mm). The quality of the wearing course was not verified at all test pits as the material was found to have builder's rubble and waste in areas.

Supporting Layers

The soil profiles indicate the presence of an orange to dark red clayey sand throughout the length of the road. This material was found at varying depths in the test pits and suggests that this is the natural in-situ material.

C4.1.5 Pavement and layerworks design

Mohlahlala Road intersection to Vavhenda Brickworks - km 0.00 – km 1.60

- **Roadbed:** G9, 150mm thick, compacted to 92% of MDD
C.356

- **Selected Layer:** G7, 150mm thick compacted to 93% of MDD
- **Subbase:** C4, 200mm thick, compacted to 97% of MDD
- **Base:** G2, 150mm thick compacted to 85% of BRD.
- **Surfacing:** Asphalt Wearing Course (medium) Continuously graded 30mm thick using A-E2 binder

Vavhenda Brickworks - km 1.60 – km 1.85

- **Roadbed:** G9, 150mm thick, compacted to 92% of MDD
- **Selected Layer:** G7, 150mm thick compacted to 93% of MDD
- **Subbase:** C4, 200mm thick, compacted to 97% of MDD
- **Base:** Segmented Block Pavers
80mm, Type S-A, Class 40/2.6 (including 20mm of Bedding Sand and jointing sand as required)

Vavhenda Brickworks to Mapate Village - km 1.85 – km 5.94

- **Roadbed:** G9, 150mm thick, compacted to 92% of MDD
- **Selected Layer:** G7, 150mm thick compacted to 93% of MDD
- **Subbase:** C4, 200mm thick, compacted to 97% of MDD
- **Base:** G2, 150mm thick compacted to 85% of BRD
- **Surfacing:** Asphalt Wearing Course (medium) Continuously graded 30mm thick using A-E2 binder

Surfaced Sidewalks (km 0.00 – km 0.84 and km 4.10 – km 5.94)

- **Roadbed:** G10, 150mm thick, compacted to 90% of MDD
- **Selected Layer:** G9, 150mm thick compacted to 93% of MDD
- **Base:** G5, 150mm thick compacted to 95% of MDD
- **Surfacing:** Asphalt Wearing Course (Fine) Continuously graded 20mm thick using 70/100 Penetration Grade Bitumen.

C4.1.6 Structures and Drainage

Minor Culverts

Allowance has been made for the installation of longitudinal and transverse pipe culverts:

- 14 (no.) 450mm transverse pipe culverts crossing Mapate Access road and at intersections and accesses with a total length of 218m
- 39 (no.) 600mm longitudinal pipe culverts with a total length of 2420m
- 6 (no.) 900mm longitudinal pipe culverts with a total length of 120m

Side Drains

Allowance has been made for the construction of side drains:

- 410m of concrete lined V-drains with subsoil drainage systems
- 450m of concrete lined trapezoidal drains
- 580m of unlined earth drains
- 830m of Type A drains at guardrails

Major Structures

Two new major structures at the Dzindi river crossings will be constructed:

- Culvert at km 0.84
- Culvert at km 3.72

Both structures will have the following configuration:
7 portals of 3.4 m wide x 3.9 m high

C4.1.7 Fences

The road reserve will be reduced to 15m or road prism plus 3m minimum to the fenceline and will be undertaken in consultation with the local community. Approximately 1650m of fences and walls encroaching on the road reserve require relocation. Provision has also been made under this contract for the construction of 10 gates.

C4.1.8 Services

Services requiring relocation or protection measures are shown in the drawings. Service ducts have been provided at intersections or at specific road crossings, where possible. Services will be relocated within the first two months of the construction period before major road works commences to avoid any damage to these services and to avoid any delays to construction. The relocation and protection of services is shown in the geometric plans. **TABLE B1202/1: LIST OF KNOWN SERVICES** summarizes services found during site investigations and provides an indication of the actions to be taken. Clearance of overhead powerlines to be confirmed by the contractor prior to commencement of construction.

C4.1.9 Road Signs and Road Marking

This contract makes provision for the erection of approximately 158 road signs. Roadmarking using water-based paint will be done upon completion of the final surfacing

C4.2 LOCALITY PLAN

“Locality Map is attached under Volume 4 - Drawings.”

PART C5: ANNEXURES

C5.1 PROFORMA DOCUMENTS.....C.361

C5.2 CONTRACT DRAWING REGISTER.....C.413

C5.3 MATERIALS INVESTIGATION STUDY C.416

C5.1 PROFORMA DOCUMENTS

The following is a list of proforma documents and examples that are required to be completed by the successful tenderer.

C5.1.1 RETENTION MONEY GUARANTEE PROFORMA.....C.362

C5.1.2 MUNICIPALITY SUPPLY CHAIN MANAGEMENT POLICY.....C.364

C5.1.3 GENERAL CONDITONS OF CONTRACT (2015) C 365

C5.1.4 HEALTH AND SAFETY SPECTIFICATION – BASELINE RIASK ASSESSMENT
.....C.366

C5.1.1 RETENTION MONEY GUARANTEE PROFORMA

EXAMPLE

THULAMELA LOCAL MUNICIPALITY
Private Bag x 5066
Thohoyandou
0950

FOR INFORMATION ONLY:
This Guarantee is not to be
completed and signed by the
Guarantor.
A separate form will be issued
to the successful Tenderer

Notes to Tenderer

1. This pro forma is for information only. The successful tenderer's guarantor will need to reproduce it without amendment, omission or addition for completion and lodgement with the Employer.
2. The tenderer's guarantee will have to be on letterheads indicating the contact details of the guarantor, shareholders/board of directors, guarantee number and the company registration number.

Bid No.: 10/2024/2025

UPGRADING OF MAPATE ACCESS ROAD

The guarantee is issued on behalf of

Registration No

(hereinafter referred to as "the Contractor") in connection with the above mentioned contract (hereinafter referred to as "the Contract").

Whereas you have agreed that the Contractor may provide a guarantee in lieu of the retention monies provided for under the Contract.

Now therefore we, the undersigned, being duly authorised to represent the

.....
(full name of guarantor) registration number

undertake to pay you such amounts as you may from time to time demand from us, immediately upon receipt of a written demand from you.

1. Each demand shall be in writing and delivered to us at or such other address as we shall in writing notify to you.
2. Our liability to make the payments herein referred to shall be unconditional and not be affected or diminished by any disputes, claims or counterclaims between you and the Contractor.
3. Our aggregate liability under this guarantee is limited to
(R.....) and is restricted to payment of monies only.

-
4. This guarantee shall expire on the date on which the last of the retention monies, which but for this guarantee would have been retained by you, becomes payable to the Contractor.
5. This guarantee is neither negotiable nor transferable and must be returned to us against final payment of our aggregate liability or on the date of the expiry of the guarantee in terms of Clause 4 (above), whichever is the earlier.

Signed at for and on behalf of
on this the day of..... in the year

GUARANTOR:

AS WITNESS:

1. 2.

NAME(Print): NAME(Print):

ADDRESS ADDRESS

.....

.....

C5.1.2 MUNICIPALITY SUPPLY CHAIN MANAGEMENT POLICY

Note: Thulamela Municipality Supply Chain Management Policy is applicable on this contract and this policy document can be downloaded from Thulamela website (www.thulamela.gov.za) for free.

**C5.1.3 GENERAL CONDITIONS OF CONTRACT APPLICABLE TO THIS CONTRACT:
GCC 2015 THIRD EDITION**

Note: The 2015 GCC Third Edition is applicable for this contract.

C5.1.4 HEALTH AND SAFETY SPECIFICATIONS – PROJECT BASELINE RISK ASSESSMENT

Project Health and Safety Specification

In terms of Construction Regulations 2014

Project Client

MARISWE (PTY) LTD

Description of Project Works

UPGRADING OF MAPATE ACCESS ROAD

Project Location

**North-eastern portions of the Limpopo Province
in the
Thulamela Local Municipality District**

Preparation Date

August 2024

Project Health and Safety Specification developed by:

Safe Working Practice

Tel: 0860 111 540

Fax: 086 672 4991

Email: info@safeppractice.co.za

PROJECT HEALTH AND SAFETY SPECIFICATION

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Annexure A Requirements for the Safety Plan Assessment

Annexure B Legal Appointments

Annexure C Baseline Risk Assessment

Annexure D Safety Specification and Baseline Risk Assessment Issue Register

1.0 SPECIFIC PROJECT INFORMATION

1. 1 INTRODUCTION AND DEFINITIONS

THE REQUIREMENTS OF THE CONSTRUCTION REGULATIONS 2014 (AND GUIDANCE NOTES OF 2017) HAVE BEEN IN EFFECT SINCE 7TH AUGUST 2014. THE REGULATIONS PLACE LEGAL DUTIES UPON PRINCIPAL CONTRACTORS AND CONTRACTORS. ALTHOUGH THIS HEALTH AND SAFETY SPECIFICATION INCLUDES MUCH OF THE CONTENT OF THE REGULATIONS, THE CONTRACTOR WILL BE DEEMED TO BE FAMILIAR WITH THE REQUIREMENTS OF THESE REGULATIONS, AND OTHER ASSOCIATED HEALTH AND SAFETY REGULATIONS, AND TO HAVE FACTORED IN ALL THE DUTIES PLACED UPON CONTRACTORS AND PRINCIPAL CONTRACTORS IN THE TENDER. A COPY OF THE REGULATIONS CAN BE VIEWED ON THE DEPARTMENT OF LABOUR'S WEBSITE.

PLEASE NOTE THAT THE TERMS "CONTRACTOR" AND "PRINCIPAL CONTRACTOR" HAVE THE SAME MEANING AS THAT IN THE CONSTRUCTION REGULATIONS AND ARE USED INTERCHANGEABLY IN THIS DOCUMENT, I.E., REFERENCES TO "CONTRACTOR" REFER TO PRINCIPAL CONTRACTOR AND/OR CONTRACTOR AS THE REGULATIONS PERTAIN TO THEIR FUNCTIONS.

This Health and Safety Specification contains clauses that are generally applicable to construction activities, as well as imposing pro-active controls associated with activities that impact on Health and Safety as it relates to work on site. Compliance to the requirements of the Occupational Health and Safety Act 1993 is an additional requirement of this Health and Safety Specification and is part of the Contractor's responsibility. The Client, and/or their agents, will monitor that all Contractors comply with the requirements of such legislation.

ALL REFERENCES TO CLIENT IN THIS HEALTH AND SAFETY SPECIFICATION ALSO REFER TO SAFETY AGENT, WHERE SO APPOINTED.

Definitions (as per the Construction Regulations 2014) applicable to this Health and Safety Specification:

"agent" means a competent person who acts as a representative for a Client;

"angle of repose" means the steepest angle of a surface at which a mass of loose or fragmented material will remain stationary in a pile on the surface, rather than sliding or crumbling away;

"bulk mixing plant" means machinery, appliances or other similar devices that are assembled in such a manner so as to be able to mix materials in bulk for the purposes of using the mixed product for construction work;

"client" means any person for whom construction work is being performed;

"competent person" means a person who has, in respect of the work or task to be performed, the required knowledge, training and experience and, where applicable, qualifications, specific to that work or task: Provided that where appropriate qualifications and training are registered in terms of the provisions of the National Qualification Framework Act, 2000 (Act No.67 of 2000), those qualifications and that training must be regarded as the required qualifications and training; and is familiar with the Act and with the applicable regulations made under the Act;

"construction manager" means a competent person responsible for the management of the physical construction processes and the coordination, administration, and management of resources on a construction site;

"construction site" means a workplace where construction work is being performed;

"construction supervisor" means a competent person responsible for supervising construction activities on a construction site;

"construction vehicle" means a vehicle used as a means of conveyance for transporting persons or material, or persons and material, on and off the construction site for the purposes of performing construction work;

"construction work" means any work in connection with -

- the construction, erection, alteration, renovation, repair, demolition or dismantling of or addition to a building or any similar structure; or

- the construction, erection, maintenance, demolition or dismantling of any bridge, dam, canal, road, railway, runway, sewer or water reticulation system; or the moving of earth, clearing of land, the making of excavation, piling, or any similar civil engineering structure or type of work;

"construction work permit" means a document issued in terms of regulation 3;

"Contractor" means an Employer who performs construction work;

Note:

a) Includes organisations and or self-employed person that contracts with a client, Principal Contractor, or a Contractor to carry out construction work.

"demolition work" means a method to dismantle, wreck, break, pull down or knock down of a structure or part thereof by way of manual labour, machinery, or the use of explosives;

"design" in relation to any structure, includes drawings, calculations, design details and specifications;

"designer" means a competent person who-

- prepares a design;
- checks and approves a design;
- arranges for a person at work under his or her control to prepare a design, including an employee of that person where he or she is the Employer; or
- designs temporary work, including its components;
- an architect or engineer contributing to, or having overall responsibility for a design;
- a building services engineer designing details for fixed plant;
- a surveyor specifying articles or drawing up specifications;
- a Contractor carrying out design work as part of a design and building project; or
- an interior designer, shop-fitter, or landscape architect;

"ergonomics" means the scientific discipline concerned with the fundamental understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data, and methods to design in order to optimise human well-being and overall system performance;

"excavation work" means the making of any man-made cavity, trench, pit or depression formed by cutting, digging or scooping;

"explosive actuated fastening device" means a tool that is activated by an explosive charge and that is used for driving bolts, nails, and similar objects for the purpose of providing fixing;

"fall arrest equipment" means equipment used to arrest a person in a fall, including personal equipment, a body harness, lanyards, deceleration devices, lifelines, or similar equipment;

"falsework" means a combined system of formwork and support work;

"formwork" means temporary or permanent shutters used to form wet concrete into elements of a structure, and includes both horizontally and vertically placed shutters;

"fall prevention equipment" means equipment used to prevent persons from falling from a fall risk position, including personal equipment, a body harness, lanyards, lifelines or physical equipment such as guard-rails, screens, barricades, anchorages or similar equipment;

"fall protection plan" means a documented plan, which includes and provides for -

- all risks relating to working from a fall risk position, considering the nature of work undertaken;
- the procedures and methods to be applied in order to eliminate the risk of falling; and
- a rescue plan and procedures;

"fall risk" means any potential exposure to falling either from, off or into;

"health and safety file" means a file, or other record containing the information in writing required by these Regulations;

"health and safety plan" means a site, activity or project specific documented plan in accordance with the Client's health and safety specification;

"health and safety specification" means a site, activity or project specific document prepared by the Client pertaining to all health and safety requirements related to construction work;

"material hoist" means a hoist used to lower or raise material and equipment, excluding passengers;

"medical certificate of fitness" means a certificate contemplated in regulation 7(8);

"mobile plant" means any machinery, appliance or other similar device that is able to move independently, and is used for the purpose of performing construction work on a construction site;

"National Building Regulations" means the National Building Regulations made under the National Building Regulations and Building Standards Act, 1977 (Act No. 103 of 1977), and promulgated by Government Notice No. R. 2378 of 30 July 1990, as amended by Government Notices No's R. 432 of 8 March 1991, R. 919 of 30 July 1999 and R. 547 of 30 May 2008;

"person day" means one normal working shift of carrying out construction work by a person on a construction site;

"Principal Contractor" means an Employer appointed by the Client to perform construction work;

"Professional Engineer or Professional Certificated Engineer" means a person holding registration as either a Professional Engineer or Professional Certificated Engineer in terms of the Engineering Profession Act, 2000 (Act No. 46 of 2000);

"Professional Technologist" means a person holding registration as a Professional Engineering Technologist in terms of the Engineering Profession Act, 2000;

"provincial director" means the provincial director as defined in regulation 1 of the General Administrative Regulations, 2003;

"scaffold" means a temporary elevated platform and supporting structure used for providing access to and supporting workmen or materials or both;

"shoring" means a system used to support the sides of an excavation and which is intended to prevent the cave-in or the collapse of the sides of an excavation;

"structure" means-

- any building, steel or reinforced concrete structure (not being a building), railway line or siding, bridge, waterworks, reservoir, pipe or pipeline, cable, sewer, sewage works, fixed vessels, road, drainage works, earthworks, dam, wall, mast, tower, tower crane, bulk mixing plant, pylon, surface and underground tanks, earth retaining structure or any structure designed to preserve or alter any natural feature, and any other similar structure;
- any falsework, scaffold or other structure designed or used to provide support or means of access during construction work; or
- any fixed plant in respect of construction work which includes installation, commissioning, decommissioning, or dismantling and where any construction work involves a risk of a person falling;

"support work" means the temporary structure erected to support the formwork before the casting of a concrete element of a structure.

"suspended platform" means a working platform suspended from supports by means of one or more separate ropes from each support;

"temporary works" means any falsework, formwork, support work, scaffold, shoring or other temporary structure designed to provide support or means of access during construction work;

"the Act" means the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993);

"tunnelling" means the construction of any tunnel beneath the natural surface of the earth for a purpose other than the searching for or winning of a mineral.

Reference should be made to the following documentation in conjunction with this Safety Specification (including existing surveys, drawings, and reports):

- Tender documents
- Drawings

IMPORTANT NOTE:

This Health and Safety Specification has been prepared to comply with the requirements of the Construction Regulations 2014.

1.2 BACKGROUND TO THE HEALTH AND SAFETY SPECIFICATION

Historically, the Construction Industry has had a poor health and safety record. Due to the complex and potentially dangerous operations being undertaken, there is a high risk of incidents, accidents, and injuries. In many instances poor adherence to the Act and Regulations has resulted in severe consequences for Health and Safety performance. The Client is determined that the highest Health and Safety standards will prevail throughout the Contract and that there will be full commitment from all parties involved.

To achieve this goal the Client has arranged for the preparation of this Health and Safety Specification. The Health and Safety Specification sets out guidelines and minimum levels of awareness and guidance for Health and Safety requirements for the project. Contractual responsibility for adhering to these requirements rests with the Contractors. All employees are encouraged to be pro-active in compliance.

The Client is committed to ensuring the highest Health and Safety standards for all work undertaken within the Contract.

Contractors as Employers are fully responsible and accountable for compliance with all Health and Safety requirements.

IMPORTANT NOTE:

Compliance with the Occupational Health and Safety Act and Regulations shall not be limited to this Health and Safety Specification and definitions contained in this document.

Contractors shall be conversant with the requirements and effects of Health and Safety legislation upon their activities, in particular the Construction Regulations, 2014, and the Occupational Health and Safety Act, 1993, and to have made adequate resource in their tender submission to comply with all legislative requirements.

Failure to comply with the requirements of this Safety Specification will result in severe sanction and the severity of the sanction will depend on the severity of the noncompliance.

The Contractor's personnel will be responsible for the auditing of the implementation of the Health and Safety Specification and maintaining the document control and record systems associated with the Health and Safety Specification. The Client will arrange for Health and Safety audits to be conducted on site on their behalf to monitor health and safety compliance by Contractors.

1.3 PURPOSE OF THE HEALTH AND SAFETY SPECIFICATION

The purpose of this site-specific Health and Safety Specification is to comply with legal requirements and to provide health and safety information about specific project risks known by the Client, Designer and Safety Agent to be applicable to this project. This document also provides minimum health and safety requirements, standards, and expectations that the Contractor must adhere to.

The Contractor must take into account all information in this specification and ensure that their tenders include adequate resource and competence to deal with the matters detailed herein so that all relevant contents are dealt with in a way which is in compliance with legislation and the ethical concerns for the safeguarding of employees, Contractors and other persons affected by the construction activities. Please note that a detailed OHS bill of quantities must be provided by the Contractor on all Construction Work Permit projects. The Bill of Quantities will form part of the Construction Work Permit

appellation presented to Department of Labour for approval.

The Health and Safety Specification will be implemented during construction of the works and any construction activity that the Client has control over.

This will also assist in ensuring that all the costs related to the compliance with Occupational Health Act 85 of 1993 and the Construction Regulations 2014, as well as this Health and Safety Specification, are taken into consideration at Tender stage.

No advice, approval of any document required by the Health and Safety Specification such as hazard identification and risk assessment action plans or any other form shall be construed as an acceptance by the Client of any obligation that absolves the Contractor from achieving the required level of performance and compliance with legal requirements.

Further, there is no acceptance of liability by the Client which may result from the Contractor failing to comply with the Health and Safety Specification unless the Client has issued an instruction to any requirement, i.e. the Contractor remains responsible for achieving the required performance levels.

1.4 IMPLEMENTATION OF THE HEALTH AND SAFETY SPECIFICATION

This Health and Safety Specification forms an integral part of the Contract, and Contractors shall make it an integral part of their Contracts with other Contractors and Suppliers. Contractors employed by the Client are to ensure that the provisions of the Health and Safety Specification are applied both on the site and in respect of all off site activities relating to the project, in particular in transport activities and project dedicated off site fabrication works.

The Contractor shall enforce the provisions of the Health and Safety Specification amongst all Contractors and suppliers for the project.

The Contractor shall sign the acknowledgment on the last page of this safety specification that he/she has familiarized him/herself with the content of the Health and Safety Specification and shall comply with all obligations in respect thereof. The successful Contractor will be required to compile a Health and Safety Plan based on the requirements of the Occupational Health Act 85 of 1993 and these Specifications, which will need to be approved by Client (or their appointed safety agent) prior to commencement with construction work.

1.4.1 Client Duties

In terms of the Construction Regulations 2014 the Client (or their Agent, where appointed) has legal duties. Where an Agent (refer to "definitions" section of this document) is appointed in terms of this project, these Health and Safety duties assigned will also apply.

All references to "Client" will apply to their appointed "Safety Agent", where so appointed, in this Health and Safety Specification.

The Client must:

- Prepare a baseline risk assessment for the construction work
- Prepare a suitable, sufficiently documented, and coherent site specific Health and Safety specification for the intended construction work, based on the baseline risk assessment
- Include the health and safety specification in the tender documents
- Ensure that potential Principal Contractors submitting tenders have made adequate provision for the cost of health and safety measures
- Ensure that the Principal Contractor to be appointed has the necessary competencies and resources to carry out the construction work safely
- Take reasonable steps to ensure co-operation between all Contractors appointed by the Client to enable each of those Contractors to comply with the regulations
- Ensure, before work commences, that every Principal Contractor is registered and in good standing with the compensation fund, or with a licensed compensation insurer as contemplated in the Compensation for Occupational Injuries and Diseases Act, 1993 (Act no 130 of 1993)

- Appoint each Principal Contractor in writing for the project, or part thereof
- Discuss and negotiate with the Principal Contractor the contents of the Principal Contractor's safety plan and thereafter finally approve that plan for implementation
- Ensure that a copy of the Principal Contractor's health and safety plan is implemented and maintained
- Ensure that periodic health and safety audits and document verification are conducted at intervals mutually agreed upon between the Principal Contractor and any Contractor, but at least once every 30 days
- Ensure that a copy of the health and safety audit report is provided to the Principal Contractor within 7 days after the audit
- Stop any Contractor from executing a construction activity which poses a threat to the health and safety of persons which is not in accordance with the Principal Contractor's health and safety plan for site
- Where changes are brought about to the design or construction work, make sufficient health and safety information and appropriate resources available to the Principal Contractor to execute the work safely
- Ensure that the health and safety file is kept and maintained by the Principal Contractor.
- Where the Client requires additional work to be performed as a result of a design change or error in construction due to the actions of the Client, the Client must ensure that sufficient safety information and appropriate additional resources are available to execute the required work safely.
- Where more than one Principal Contractor is appointed, the Client must take reasonable steps to ensure co-operation between all Principal Contractors and Contractors to ensure compliance with the Regulations
- Where the Client has appointed a Safety Agent for the project, their details for this project are contained in the Project Directory section of this health and safety specification.

1.4.2 Designer Duties

It must be noted that the Designer also has Health and Safety duties assigned in terms of the Construction Regulations. Where the Contractor fulfils a design function in terms of this project (refer to "definitions" section of this document), these duties will also apply. Please refer to Regulation 6 of the Construction Regulations 2014.

Please note that the designer of temporary works must ensure that:

- all temporary works are adequately designed so that it will be capable of supporting all anticipated vertical and lateral loads that may be applied;
- the designs of temporary works are done with close reference to the structural design drawings issued by the Contractor, and in the event of any uncertainty consult the Contractor;
- all drawings and calculations pertaining to the design of temporary works are kept at the office of the temporary works designer and are made available on request by an inspector; and
- the loads caused by the temporary works and any imposed loads are clearly indicated in the design.

1.5 PROJECT DIRECTORY		
Project Manager	Mariswe (Pty) Ltd	Tel: 011 709 8420 Cell: 083 776 8518
Contact Person	Shannon Souter	e-mail: shannons@mariswe.com
Construction Safety Representative	Safe Working Practice SA CC	Tel: 0860 111 540 Cell: 082 968 3370
Contact Person	Stiaan Burger	e-mail: stiaan@safepractice.co.za
Project Client	Thulamela Local Municipality	Tel: 021 701 0470

Contact Person	Ofhani Mugwedi	e-mail: mugwedioj@thulamela.gov.za
Structural Engineer	Vic Wilson Taylor	Cell: 082 824 5274
Contact Person		e-mail: vic@vwtconsulting.co.za

1.6 PROJECT DETAILS

Description of Works

Upgrade of Mapate Access Road between Tshisahulu and Mapate from gravel to surfaced standards.

Scope of works comprises the construction of a 7.0km Road and Stormwater Control system

Roadworks:

Accommodation of traffic during construction;
Clearing and Grubbing of Road Reserve;
Earthworks comprising cut & borrow to fill & Construction of temporary bypasses;
Construction of Wing walls and gabion mattresses.
Construction of in-situ roadbed;
Construction of selected layer;
Construction of chemically stabilized subbase layer using imported natural gravel;
Construction of G2 basecourse;
Construction of Kerbs;
Construction of culverts with inlet & outlet structures;
Pitching, Stonework and Protection against erosion
Construction of sub soil drains
Steel reinforcement for structures
Construction of concrete kerbing/ edge beams;
Construction of stormwater pipes
Asphalt Surfacing;
Construction of Block paving for walk way.
Erection of road signs
Provide road markings;
Finishing of the road, road reserve & borrow areas.
Stop/Go traffic accommodation

Stormwater Drainage:

Earthworks for gabions, retaining walls, culverts and channelling;
Construction of culverts, concrete channelling, gabions and retaining walls;
Finishing, and cleaning.

Re-locating of Services:

Communication with Service Provider i.e Municipality; Eskom; District Municipality; Telkom; etc. on re-location and service specific specifications;
Earthworks for lowering or re-location of services;
Re-locate and lower service to required specifications;

Widening of Servitude

Communication and Negotiation with residents
Removal of obstructions (fencing; small structures; etc.);
Replace fences in new position and finish off.

Anticipated Construction Duration

12 Months

Provisional Start Date

25 March 2025

Provisional Completion Date

26 March 2026

Construction Work Permit Required for the Project?

Yes

1.7 EXISTING ENVIRONMENT

Hazards particular to this project by virtue of location:

- Site is located in proximity to Tshisahulu and Mapate.
- Members of the public will be present (vehicular but predominately pedestrians).
- Working in/next to water source
- Bush clearing for widening of road.
- Snakes, spiders, scorpions
- Veld fires
- Schools
- Brick Factory
- General stores

Overhead, Above Ground and Underground Services crossing the site:

Overhead: Yes, Telkom (possibly decommissioned) and Eskom

Underground: Yes, water

Ground level: Supporting structures poles (Telkom and Eskom) transformers are present at some of the Eskom structures

Service Drawings available: No

Wayleaves required: Yes, Eskom

Existing structures and surrounding land use (with a significant impact on Health & Safety):

- Members of the public will be present (vehicular but predominately pedestrians).
- Working in/next to water source
- Schools
- Brick Factory
- General stores

Existing ground conditions and ground survey report:

- Existing roads in the vicinity consists of tar and gravel road.

- Road conditions varies from good at both entry points to bad with potholes in between

Existing Traffic Systems

Condition: Existing tar and gravel road

Options to access: None known

Speed restrictions: Usual urban speed limits apply. A speed limit of 30kph or less (depending on risk assessment by the contractor) applies to vehicles on site.

1.8 AVAILABLE DRAWINGS

Refer to project manager.

1.9 PROJECT HEALTH AND SAFETY REQUIREMENTS

Significant health and safety hazards identified by Safety Agent:

Protection of members of public and road users – The health and safety of members of public, road users and workers must be a priority at all times and all necessary steps must be taken to protect them. Existing roads will remain open during works. This is a critical hazard to traffic/members of public and to workers in the road. The Principal Contractor is responsible for directional signage to divert the public and road users.

Moving Plant & Construction Vehicles: All operators must provide copies of their competency, medical certificates and driver's license. Rotating amber lights and reverse alarms must be active when on site. Daily inspection registers to be completed and records kept in the safety file. Operators of mobile plant and construction vehicles must adhere to the 30kmh speed restriction. Use trained flag persons as applicable. There must be adequate exclusion areas in place where plant is operating so that personnel and public are not at risk.

Noise and Dust control: Measures to be put in place by the appointed contractor to minimize the dust and noise on site. Contractor must take sufficient steps to reduce the production of noise and dust.

Warning Notices: Construction warning signage must be prominently displayed to avoid access to site areas by unauthorised persons.

Working in/next to water (river) – barriers must be in place, as well as warning signage, workers must be able to swim and life bouys be site next to the river bank. Early warning system for flash flooding must be in place by the contractor.

Excavations – max depth will be 3m. Method statement to be in place. All workers must receive induction prior to commencement of works. Excavations must sloped to a safe repose where not shored. Excavations must be backfilled by end of each shift as far as is reasonably practicable. If this cannot be done then appropriate safety measures must be put in place by the contractor to prevent unauthorised entry to excavations, including barriers and warning signage. Ensure there is a safe distance between employees and plant when digging excavations.

- ALL EXCAVATIONS MUST HAVE A MINIMUM OF ORANGE PLASTIC BARRIER MESH IN PLACE but given the proximity of the residential housing, and as it is id a pedestrianised area it may be required to have proper panel fencing in place to keep public out of the works..
- Red & white danger tape is not permitted for securing excavated areas.
- Excavated soil is to be placed at a sufficiently safe distance from the excavation itself.

If hand excavation method is used there is a risk of collapse of excavation wall. Hence shoring may be required.

If machinery is used for excavations – Workspace limited. Contractor to prepare method statement for approval once appointed.

Other construction hazards expected are as follows:

Asphalting
Bricklaying
Brush cutting
Bulk Mixing Plant
Chainsaw Use
Compacting and Filling
Compactor Operations
Cutting Kerbs
Cutting Off Disc
Electric Tools
Hand tools
Kerb Laying
Lifting Operations
Manual Handling of General Items
Noise and Dust
Paving (Laying)
Plant/Vehicle and Equipment Operation
Precast Slab / Unit Laying and Fixing
Road Construction
Road Marking
Shuttering Walls, Beams, Columns
Site Strip
Steel Fixing

NOTE: Please refer to end of this Health and Safety Specification for the baseline risk assessment for these risks.

ACTIVITIES REQUIRING APPROVED METHOD STATEMENTS

Pre-Construction Phase Method Statements

- TBA

Construction Phase Method Statements

- Excavation and public safety
- Working in/next to water source
- Removal and reinstating of Eskom powerlines and supporting structures

ACTIVITIES REQUIRING PERMITS (FOR HEALTH AND SAFETY PURPOSES)

Permit to Enter Excavations: Principal Contractor to formally manage all excavation works.

Permit to Work with Electricity: Yes

Permit to Work under Power Lines: Yes

CONTRACTOR SAFETY OFFICER PROVISION

Records of safety audits undertaken by the Contractor's Safety Officer must be kept on site in the safety

file and nonconformances reported by the Safety Officer to the Contractor's management team. All nonconformances identified by the Safety Officer and client's safety agent must be investigated and corrective action taken by the Contractor to prevent re-occurrence.

Please note that as from 7th August 2018 the safety officer must be professionally registered with the SACPCMP. Proof of registration with the SACPCMP must be provided.

The principal contractor must have a full time appointed safety officers in place who need to carry out a once off site visit as a minimum.

MEDICAL CERTIFICATE OF FITNESS (ANNEXURE 3)

The contractor must ensure that their employees on site have a valid medical certificate of fitness, specific to the construction work being performed, issued by an occupational health practitioner in the form of an Annexure 3 template.

MANAGEMENT AND SUPERVISION OF CONSTRUCTION WORK

A principal contractor must, in writing, appoint one full-time competent person as the construction manager with the duty of managing all the construction work on a single site, including the duty of ensuring occupational health and safety compliance, and in the absence of the construction manager an alternate competent person must be appointed by the principal contractor. Proof of an all-inclusive assessment by the Principal Contractor of the Construction Manager's Competency in construction management and health and safety competency must be available in the Safety File.

The Construction Manager, Alternate Construction Managers, Assistant Construction Managers, and designated construction supervisor/s must, as a minimum, have training in Legal Liability, Construction Regulation 2014 and the OHS Act and Regulations.

TRAFFIC MANAGEMENT AND TRAFFIC SAFETY OFFICER PROVISION

The Traffic Management Plan must be approved by the Project Manager and as required, the Traffic Chief as per the National Road Traffic Act, No. 93 of 1996. The full time Traffic Safety Officer must have training as per Unit Standard 14561 or similar.

ENVIRONMENTAL CONDITIONS

Contractor must take into account adverse weather conditions on site activities and implement control measures to mitigate risk. This includes risk of exposure to excessive heat, cold, rain and wind. The open nature of the site works will not preclude any of the above.

Weather considerations must be allowed for on site, especially in terms of heavy rains stopping work, lightning, high winds and heat stress exposures.

ARRANGEMENTS FOR ACCESS, PARKING, DELIVERIES, ETC.

Access to site by Construction Vehicles: Off existing road network.

Access to site by Construction Workers and Visitors: As above.

All service providers must sign a 37.2 Mandatory Agreement and must be inducted before they can be allowed on site.

ARRANGEMENTS FOR SITE CAMP, ABLUTIONS AND YARD

Site camp location and set up

• Restrictions / requirements:	}	
	}	
• Storage areas:	}	Contractor to advise in consultation
	}	with Engineer / Professional Team
• Security:	}	

Ablutions and Welfare Arrangements

Contractor to supply ablutions and facilities in line with the Construction Regulations 2014, refer to section 2.31 of this health and safety specification regarding the below. Toilets should be provided with built in facilities for hand washing. Please note further that control measures form an important part of ablutions provision on site ref soap and water/hand sanitiser, signage, etc:

- **Toilets:** }
 } Contractor to provide as per Regulations
- **Washing facilities:** }
 }
- **Drinking Water:** }
 }
- **Shelter:** }
 } Contractor to provide as per Regulations
- **Showers:** }
 }

Mobile site facilities requirements:

A mobile toilet will be required for sites that cannot facilitate a permanent location for ablution units and must be available for each gender per location.

The use of a mobile toilet must be prepared and setup correctly with additional anchors and available toiletries prior to each working day and to be first priority when changing location of works along a set working path.

Teams are to ensure that the toilets are cleaned correctly and suitable for easy and hygienic uses and recorded on a daily register.

PROTECTION OF SITE AGAINST UNAUTHORISED ACCESS BY PUBLIC

Excavation Fencing: Note that excavations accessible to public, or adjacent to public roads / thoroughfares, must have (1) barrier / fence of at least 1m in height, and (2) warning illuminants at night or when visibility is poor, or have other suitable precautionary measures if of both these are not practicable.

- Orange plastic barrier mesh fencing is to be used at the minimum during excavation.
- Excavations left open are to be suitably protected if they are accessible by the public.

General Fencing of Site: Note that construction sites in built up areas adjacent to public walkway must be fenced off and have controlled access points with the correct signs to indicate the site office for any relevant enquiries.

Existing site area is not fenced off to prevent public access, works area must be fenced off by contractor.

Warning Notices: Construction warning signage must be prominently displayed to avoid unauthorised access to site and to warn of dangers associated with construction works.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

The Client requires the Contractor to ensure that employees (and others under his/her control) wear the following minimum PPE:

Overalls: Yes.

Hard Hats: As per task risk assessment

Reflective Vests: Yes.

Goggles / gloves / ear defenders / respiratory protection: As per task risk assessment.

Safety Footwear: Yes.

Specialist Equipment (e.g. for confined Spaces): Life vests, life bouys

HAZARDOUS SUBSTANCES

The following materials and substances have, or may have, to be used in the works and are identified as potentially posing special health and / or safety hazards during the project. Appropriate measures will need to be specified for their control:

Diesel, Petrol, hydraulic fluids

1.10 INTERFACE AND RESTRICTIONS BY CLIENT

Contractor must note that the following Client activities will continue during construction:

- Not thought to be applicable.

The following Client safety rules and/or requirements are to be observed:

All workers are to receive induction prior to commencement of work on site.

- All workers are to receive induction and training on the relevant risk assessments, company policies and fall protection plans prior to commencement of work on site.
- All contractor employees must undergo medicals before allowing them to carry out any work.

Other safety rules and requirements to be advised at induction.

Please also refer to tender document.

Restrictions on times, access or other restrictions by Client

Please refer to tender document.

Other restrictions may be advised at induction.

1.11 Project Close Out

The Health and Safety files for the Principal Contractors and all Contractors require closure and handover to the Client at the completion of the project in the form of a consolidated safety file. The following list is an example of what should be included but is not exhaustive. The Safety Agent or the Client may require further information at the time of completion and the Principal Contractor is to ensure that all instructions are responded to. Documentation would include all health and safety related records from the start of the project. All records to be in hard copy or electronic format and submitted to the Safety Agent for approval in adequately formatted lists and folders. Layout should be logical and in the same order as in the site files.

Consolidated Health and Safety close out file requirements include:

- Health and safety specification (most recent version)
- Principal Contractor's health and safety plan/s
- Site safety organograms

- Legal appointments
- Notification to Department of Labour of commencement of work / Construction Work Permit
- Workman's Compensation Letters of Good Standing for the project
- Full safety files for all contractors as well as their close out reports
- List of all contractors who worked on site
- Letters of safety plan approval of contractors by the Principal Contractor
- Mandatory agreements (section 37.2 agreements)
- Incident and accident records / Occupational Disease records
- Contractor Nonconformance records
- Safety agent's audit reports
- Safety Officer reports
- Method Statements
- Risk assessments
- Safe work procedures
- Medical surveillance certificates of fitness. Medical records are to be kept according to the Occupational Health and Safety Act, as amended.
- All temporary works drawings (suspended beams/scaffolds, etc.)
- Copies of test results, policies, and procedures for environmental monitoring (silica, noise, dusts, etc.)
- Detailed registers of all material used
- Copies of all Checklists completed

1.12 SAFETY FILE RETURN TO CLIENT

The consolidated Health and Safety Files for the Project is to be handed over by the Principal Contractor to the Client upon Project Completion in either hard copy or electronic format.

2.0 FURTHER REQUIREMENTS

2.1 Duties of Principal Contractor / Contractor in terms of Construction Regulations 2014

A Principal Contractor must:

- provide and demonstrate to the Client a suitable, sufficiently documented and coherent site specific health and safety plan, based on the Client's documented health and safety specifications, *which* plan must be applied from the date of commencement of and for the duration of the construction work and which must be reviewed and updated by the Principal Contractor as work progresses;
- open and keep on site a health and safety file, which must include all documentation required in terms of the Act and these Regulations, which must be made available on request to an inspector, the Client, the Client's Safety Agent, or a Contractor; and
- on appointing any other Contractor, in order to ensure compliance with the provisions of the Act –
 - provide Contractors who are tendering to perform construction work for the Principal Contractor, with the relevant sections of the health and safety specifications pertaining to the construction work which has to be performed;
 - ensure that potential Contractors submitting tenders have made sufficient provision for health and safety measures during the construction process;

-
- ensure that no Contractor is appointed to perform construction work unless the Principal Contractor is reasonably satisfied that the Contractor that he or she intends to appoint, has the necessary competencies and resources to perform the construction work safely;
 - ensure prior to work commencing on the site that every Contractor is registered and in good standing with the compensation fund or with a licensed compensation insurer as contemplated in the Compensation for Occupational Injuries and Diseases Act, 1993;
 - appoint each Contractor in writing for the part of the project on the construction site
 - take reasonable steps to ensure that each Contractor's health and safety plan is implemented and maintained on the construction site;
 - ensure that the periodic site audits and document verification are conducted at intervals mutually agreed upon between the Principal Contractor and any Contractor, but at least once every 30 days;
 - stop any Contractor from executing construction work which is not in accordance with the Client's health and safety specifications and the Principal Contractor's health and safety plan for the site or which poses a threat to the health and safety of persons;
 - where changes are brought about to the design and construction, make available sufficient health and safety information and appropriate resources to the Contractor to execute the work safely;
 - discuss and negotiate with the Contractor the contents of their health and safety plan and finally approve that plan for implementation;
 - ensure that a copy of both the Principal Contractor and Contractor's health and safety plan is available on request to an employee, an inspector, a Contractor, the Client, or the Client's Safety Agent;
 - hand over a consolidated health and safety file to the Client upon completion of the construction work, to include a record of all drawings, designs, materials used and other similar information concerning the completed structure;
 - in addition to the documentation required in the health and safety file include and make available a comprehensive and updated list of all the Contractors on site accountable to the Principal Contractor, the agreements between the parties and the type of work being done;
 - ensure that all his or her employees have a valid medical certificate of fitness specific to the construction work to be performed and issued by an occupational health practitioner in the form of Annexure 3.

A Contractor must prior to performing any construction work-

- provide and demonstrate to the Principal Contractor a suitable and sufficiently documented health and safety plan, based on the relevant sections of the Client's health and safety specification and provided by the Principal Contractor, which plan must be applied from the date of commencement of and for the duration of the construction work and which must be reviewed and updated by the Contractor as work progresses;
- open and keep on site a health and safety file, which must include all documentation required in terms of the Act and these Regulations, and which must be made available on request to an inspector, the Client, the Client's Safety Agent or the Principal Contractor;
- before appointing another Contractor to perform construction work be reasonably satisfied that the Contractor that he or she intends to appoint has the necessary competencies and resources to perform the construction work safely;
- co-operate with the Principal Contractor as far as is necessary to enable each of them to comply with the provisions of the Act;
- as far as is reasonably practicable, promptly provide the Principal Contractor with any information which might affect the health and safety of any person at work carrying out construction work on the site, any person who

might be affected by the work of such a person at work, or which might justify a review of the health and safety plan.

Where a Contractor appoints another Contractor to perform construction work, the duties that apply to the Principal Contractor will apply to the Contractor as if he or she were the Principal Contractor.

A Principal Contractor must take reasonable steps to ensure co-operation between all Contractors appointed by the Principal Contractor to enable each of those Contractors to comply with these Regulations.

No Contractor may allow or permit any employee or person to enter any site unless that employee or person has undergone health and safety induction training pertaining to the hazards prevalent on the site at the time of entry.

A Contractor must ensure that all visitors to a construction site undergo health and safety induction pertaining to the hazards prevalent on the site and must ensure that such visitors have the necessary personal protective equipment.

A Contractor must at all times keep on his or her construction site records of the health and safety induction training and such records must be made available on request to an inspector, the Client, the Client's Safety Agent or the Principal Contractor.

A Contractor must ensure that all his or her employees have a valid medical certificate of fitness specific to the construction work to be performed and issued by an occupational health practitioner in the form of Annexure 3 (a template of which can be found in the Construction Regulations, 2014).

2.2 Management and Supervision of Construction Work

A Principal Contractor must, in writing, appoint one full-time competent person as the construction manager with the duty of managing all the construction work on a single site, including the duty of ensuring occupational health and safety compliance, and in the absence of the construction manager an alternate must be appointed by the Principal Contractor. Proof of all-inclusive assessment of the Construction Manager's Competency in construction management and H & S competency must be available in the Safety File. The Construction Manager must, as a minimum, have a Construction Regulation course. No Contractors may be left unsupervised on site by the Principal Contractor.

A Principal Contractor must upon having considered the size of the project, in writing appoint one or more assistant construction managers for different sections thereof: Provided that the designation of any such person does not relieve the construction manager of any personal accountability for failing in his or her management duties in terms of this regulation.

Where the construction manager has not appointed assistant construction managers, or, in the opinion of an inspector, a sufficient number of such assistant construction managers have not been appointed, that inspector must direct the construction manager in writing to appoint the number of assistant construction managers indicated by the inspector, and those assistant construction managers must be regarded as having been appointed.

No construction manager appointed in terms of the Regulations 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.

A Contractor must, after consultation with the Client and having considered the size of the project, the degree of danger likely to be encountered or the accumulation of hazards or risks on the site, appoint a full-time or part-time construction health and safety officer in writing to assist in the control of all health and safety related aspects on the site: Provided that, where the question arises as to whether a construction health and safety officer is necessary, the decision of an inspector is decisive.

No Contractor may appoint a construction health and safety officer to assist in the control of health and safety related aspects on the site unless he or she is reasonably satisfied that the construction health and safety officer that he or she intends to appoint is registered with a statutory body approved by the Chief Inspector and has necessary competencies and resources to assist the Contractor

A construction manager must in writing appoint construction supervisors responsible for construction activities and ensuring occupational health and safety compliance on the construction site. Proof of all-inclusive assessment of the Construction Supervisor's competency in construction supervision and H&S competency must be available in the Safety

File. The Construction Supervisor must, as a minimum, have a supervision course as per Unit Standard 262845 (Civil Engineering), 119080 (Building Construction) and 262884 (Civil Engineering).

A Contractor must, upon having considered the size of the project, in writing appoint one or more competent employees for different sections thereof to assist the construction supervisor, and every such employee has, to the extent clearly defined by the Contractor in the letter of appointment, the same duties as the construction supervisor: Provided that the designation of such employee does not relieve the construction supervisor of any personal accountability for failing in his or her supervisory duties.

Where the Contractor has not appointed such an employee, or, in the opinion of an inspector, a sufficient number of such employees have not been appointed, that inspector must instruct the Employer to appoint the number of employees indicated by the inspector.

No construction supervisor appointed may supervise any construction work on or in any construction site other than the site in respect of which he or she has been appointed: Provided that if a sufficient number of competent employees have been appropriately designated on all the relevant construction sites, the appointed construction supervisor may supervise more than one site.

2.3 Notification of Intention to Commence Construction Work

The Contractor shall notify the Provincial Director of the Department of Labour of the intention to commence construction work at least 7 days prior to the works commencing if the intended construction work will:

- Include excavation work
- Include work at height where there is a risk of falling
- Include the demolition of a structure, or
- Include the use of explosives to perform construction work.

If the construction work involves construction of a single storey dwelling for a Client, and such Client will be residing in such dwelling upon completion, the contractor must also notify the Provincial Director of the Department of Labour at least 7 days before the works commence.

This must be done on a form similar to an Annexure 2 (template of which can be found in the Construction Regulations, 2014). A copy of the notification letter to the Provincial Director shall be forwarded to the Client for record purposes.

2.4 Construction Work Permit

Not thought to be applicable to this project.

2.5 Assignment of Contractor's Responsible Persons to Manage Health and Safety on Site

The Contractor shall submit management and supervisory appointments as well as any relevant appointments in writing (as stipulated by the Construction Regulations 2014 and the Occupational Safety and Health Act 1993), prior to commencement of work (refer to **Annexure B** at the end of this Health and Safety Specification).

2.6 Competency for Contractor's Responsible Persons

The Contractor's responsible persons shall be competent in health and safety and be familiar with the Occupational Health and Safety Act 1993, and applicable regulations. Valid proof of pertinent health and safety courses attended by such persons will be required to be presented to the Client.

2.7 Compensation of Occupational Injuries and Diseases Act 130 of 1993 (COIDA)

The successful Contractor shall submit to the Client a valid letter of good standing with the Compensation Insurer prior to appointment.

2.8 Occupational Health and Safety Policy

The Contractor shall submit their Health and Safety Policy, prior to construction commencement, signed by the Chief Executive Officer. The Policy must outline objectives and how they will be achieved and implemented within the company

operations. The Policy must be communicated to all employees and proof thereof must be available in the Safety File.

2.9 Health and Safety Organogram

The Contractor shall submit an organogram, prior to construction commencement, outlining the Health and Safety Site Team that will be assigned to the project, if successful with the tender. In cases where appointments have not been made, the organogram shall reflect the position. The organogram shall be updated when there is a change in the site team.

2.10 Risk Assessments

Baseline Risk Assessment

The Client shall cause a baseline risk assessment to be conducted by a competent person before the design process and tender process commence, and the assessed risks shall form part of the health and safety specifications.

The Contractor must, before commencement of any construction work, and during construction work, have risk assessments performed by a competent person appointed in writing, which risk assessments form part of the health and safety plan to be applied on the site and must include:

- The identification of the risks and hazards to which persons may be exposed to;
- An analysis and evaluation of the risks and hazards identified; based on a documented method
- A documented plan and applicable safe work procedures to mitigate, reduce or control the risks and hazards that have been identified;
- A monitoring plan; and
- A review plan

The Contractor must ensure that, as far as is reasonably practicable, ergonomic related hazards are analysed, evaluated, and addressed in a risk assessment.

The Contractor must ensure that all employees under his control are informed, instructed and trained by a competent person regarding any hazard and the related work procedures and/or control measures **before any work commences** and thereafter **at the times determined in the risk assessment monitoring and review plan of the relevant site.**

The Principal Contractor must ensure that all Contractors are informed regarding any hazard that is stipulated in the risk assessment **before any work commences** and thereafter **at the times determined in the risk assessment monitoring and review plan of the relevant site.**

The Contractor must consult with the health and safety committee or with a representative trade union or representative group of employees if no health and safety committee exists, on the monitoring and review of the risk assessments for the site.

The Contractor must ensure that copies of risk assessment for this site are available on site for inspection purposes by interested parties (inspector, the Client, Client's Safety Agent, any Contractor, any employee, a representative trade union, a health and safety representative or safety committee member.

A Contractor must review the relevant risk assessment where changes are effected to the design and/or construction that result in a change to the risk profile, or when an incident has occurred.

Preventative measures must first address the elimination of the hazard or risk. Should PPE be required to reduce risk, the equipment or clothing to be used must be SABS approved.

In general, the Contractor must ensure that the Risk Assessment involves identifying the hazards present in a work activity on site. This is followed by an evaluation of the extent of the risk involved taking into account those precautions already being taken.

The following general principle should be followed when conducting a risk assessment:

- All relevant risks and/or hazards should be systematically addressed;

- The risk assessment should address what actually happens in the workplace during the work activity;
- All employees and those who may be affected must be considered, including maintenance staff, security guards, visitors, and Contractors;
- The risk assessment should highlight those groups and individuals who may be required to work alone or who have disabilities;
- The risk assessment process should take into account the existing safety measures and controls.
- The level of detail on a risk assessment should be appropriate to the level of risk.

2.11 Health and Safety Representative(s)

The Contractor shall ensure that Health and Safety Representative(s) is/are elected and trained to carry out his / her functions. The Safety Representative(s) must be democratically nominated, elected, and appointed in writing. The Health and Safety Representative(s) shall carry out regular inspections, keep records and report to the supervisor to take appropriate action. The Safety Representative(s) shall attend Health and Safety Committee Meetings. The Health and Safety Representative shall be part of the team that will investigate incidents, accidents, and non-conformances. The Safety Representative(s) must be (a) full time employee(s) who is/are acquainted with conditions and activities at that workplace or section thereof. The Safety Representatives must have Safety Representative training and must be capable of performing their duties.

2.12 Health and Safety Committee

Where two or more health and safety representatives have been appointed on site, the Contractor shall ensure that monthly health and safety meetings are held with such representatives and minutes are kept on record. Meetings must be organized and chaired by the Contractor's Health and Safety Committee Chairperson. Minutes of these meetings must be available for the employees of the Contractor to refer to.

PLEASE NOTE THAT THE SAFETY AGENT MAY REQUIRE THAT THE PRINCIPAL CONTRACTOR CONVENES A SAFETY COMMITTEE MEETING ON SITE IN THE INTERESTS OF HEALTH AND SAFETY ON SITE. SUCH COMMITTEE MEETING MAY REQUIRE ATTENDANCE OF CONTRACTORS SAFETY OFFICERS/SAFETY REPRESENTATIVES, CONSTRUCTION SUPERVISION AND THE SAFETY AGENT.

2.13 Medical Certificate of Fitness

The Contractor must ensure that their employees on site have a valid medical certificate of fitness, specific to the construction work being performed, issued by an occupational health practitioner in the form of an Annexure 3 template (refer to the Construction Regulations 2014 on the Department of Labour website for a sample of this form).

Employees required to perform work at heights or from fall risk position must be medically fit to perform such work, such employee's medicals must specify "Fall Risk" or "Working at heights" in the exposure section of the annexure 3 template.

2.14 Health and Safety Training

The Contractor shall quarterly conduct a training needs analysis to ascertain what health and safety training is required. A plan of action should be devised and forwarded to the Client for records. Once the identified people have attended the training, the Contractor must provide the Client with copies of certificates obtained.

2.14.1 Induction

No Contractor may allow or permit any employee or person to enter site unless they have undergone health and safety induction training pertaining to the hazards prevalent on site at the time of entry. This includes visitors to site. The Contractor must ensure that visitors to site have the necessary protective equipment (PPE). A copy of attendance registers of all employees who attend inductions shall be kept.

2.14.2 Awareness

The Contractor shall conduct periodic toolbox talks on site, weekly or before any hazardous work takes place. The talks

shall cover the relevant activity and an attendance register must be signed by all attendees. This record of who attended and the content of the topic will be kept on the site health and safety file as evidence of training.

2.15 Competency

After the Contractor has identified the training to be conducted as part of the competency requirement, and based on Risk Assessment, he shall send the relevant persons on appropriate courses and keep certificates of training for reference. Familiarity with the Health and Safety Act and Regulations is an integral part of the definition of competence. All training must be conducted by an accredited training provider and the certificates must display the applicable unit standards and the expiry dates thereof.

2.16 General Record Keeping

The Contractor shall keep and maintain Health and Safety records to demonstrate compliance with the Health and Safety Specification and the Occupational Health and Safety Act. The Contractor shall ensure that all records of incidents, spot fines, training, etc. are kept on site. All documents shall be available for inspection by the Client, or the Department of Labour's Inspectors.

2.17 General Inspection, Monitoring and Reporting

The Contractor shall carry out inspections as required by this Health and Safety Specification, as well as by health and safety legislation.

2.18 Emergency Procedures

The Contractor shall submit a detailed Emergency Procedure for approval by the Client prior to commencement on site. The procedure shall detail the response plan including the following:

- List of key personnel;
- Details of emergency services;
- Actions or steps to be taken in the event of the emergency; and
- Information on hazardous materials / situations, including each material's hazardous potential impact or risk on the environment or human and measures to be taken in the event of an accident.

Emergency procedure(s) shall include, but shall not be limited to, fire, spills, accidents to employees, use of hazardous substances, dangers as a result of riot / service delivery protests / intimidation, etc. The Contractor shall advise the Client in writing of any on-site emergencies, together with a record of action taken, within 24 hours of the emergency occurring. A contact list of all service providers (Fire Department, Ambulance, Police, Medical and Hospital, etc.) must be maintained and available to site personnel.

2.19 First Aid Box and First Aid Equipment

The Contractor shall provide first aid box/es and appoint, in writing, First Aider(s) for this project in line with the results of the Contractor's risk assessment for the project, this health and safety specification as well as the provisions of the General Safety Regulations. The appointed First Aider(s) are to be sent for accredited first aid training before starting on site. Valid certificates are to be kept on site.

- First Aid box/es must be adequately stocked at all times, accessible and be controlled by a qualified First Aider.
- Perishables to be checked and replaced when expired.
- Stock per content list as per the General Safety Regulations Annexure.
- Signage to be in place.
- To be numbered and sealed with name of first aider on or above the First aid box.
- Dressing logbook to be available in the first aid box.
- If more than 5 employees are present, there must be a first aid box available.
- Register to be checked by a Competent person.

If required by the Client, the Contractor shall have a stretcher on site to be used in case of a serious incident.

2.20 Accident / Incident Reporting and Investigation

The Contractor shall, in addition to the prescribed requirements of the Occupational Health and Safety Act and General Safety Regulations, investigate, record, and report all Section 24 reportable incidents to the Client within 24 hours of the incident occurring. Incident investigations shall be conducted by the Contractor's appointed Accident Investigator – this Investigator must be a competent person or persons who have sufficient knowledge to carry out an investigation.

In the event of a fatality or a permanent disabling injury the Contractor must submit proof of reporting of incident to Department of Labour as well as proof of preventative measures to the Client. The Client reserves the right to conduct investigations into any incidents that they deem fit and the Contractor is required to provide full co-operation in this regard.

2.21 Hazards and Potential Situations

The Contractor shall immediately notify other Contractors of any hazardous or potentially hazardous situations, which may arise during performance of the activities.

2.22 Occupational Health and Safety Signage

The Contractor shall ascertain and provide adequate on site health and safety signage. This signage shall include, but shall not be limited to, Hard Hat / Helmet Area; Safety Shoes to be worn on site; Dust Masks to be worn in areas where there might be exposure to excessive dust; Ear Plugs / Muffs to be worn where there might be noise exposure over 85 dB; Gloves; Safety Goggles; Safety Harness, Workers in Excavation, traffic management, etc. The Contractor shall be responsible to maintain the quality and replacement of signage. Signage must comply with the requirements of SABS.

2.23 Management of Contractors by Principal Contractor

The Principal Contractor shall ensure that all Contractors under his control are complying with the respective Health and Safety Plans, as well as Health and Safety Legislation.

2.24 Stacking of Materials

In addition to the provisions for the stacking of articles in the General Safety Regulations, 2003, the Contractor must ensure that –

- a competent person is appointed in writing with the duty of supervising all stacking and storage on a construction site;
- adequate storage areas are provided;
- there are demarcated storage areas; and
- storage areas are kept neat and under control.

2.25 Housekeeping and General Safeguarding on Construction Sites

A Contractor must, in addition to compliance with the Environmental Regulations for Workplaces, 1987, promulgated by Government Notice No. R. 2281 of 16 October 1987, ensure that suitable housekeeping is continuously implemented on each construction site, including-

- the proper storage of materials and equipment;
- the removal of scrap, waste and debris at appropriate intervals;
- ensuring that materials required for use, are not placed on the site so as to obstruct means of access to and egress from workplaces and passageways;
- ensuring that materials which are no longer required for use, do not accumulate on and are removed from the site at appropriate intervals;
- ensuring that waste and debris are not disposed of from a high place with a chute, unless the chute complies with the requirements set out in the regulations;
- ensuring that construction sites in built-up areas adjacent to a public way are suitably and sufficiently fenced off and provided with controlled access points to prevent the entry of unauthorized persons; and

- ensuring that a catch platform or net is erected above an entrance or passageway or above a place where persons work or pass under or fencing off the danger area if work is being performed above such entrance, passageway, or place so as to ensure that all persons are kept safe in the case of danger or possibility of persons being struck by falling objects.

2.26 Construction Vehicles and Mobile Plant

A Contractor must ensure that all construction vehicles and mobile plant-

- are of an acceptable design and construction;
- are maintained in a good working order;
- are used in accordance with their design and the intention for which they were designed, having due regard to safety and health;
- are operated by a person who-
 - has received appropriate training, is certified competent and in possession of proof of competency and is authorised in writing to operate those construction vehicles and mobile plant;
 - has a medical certificate of fitness to operate those construction vehicles and mobile plant, issued by an occupational health practitioner in the form of Annexure 3.
- have safe and suitable means of access and egress;
- are properly organized and controlled in any work situation by providing adequate signalling or other control arrangements to guard against the dangers relating to the movement of vehicles and plant, in order to ensure their continued safe operation;
- are prevented from falling into excavations, water, or any other area lower than the working surface by installing adequate edge protection, which may include guard-rails and crash barriers;
- are fitted with structures designed to protect the operator from falling material or from being crushed should the vehicle or mobile plant overturn;
- are equipped with an acoustic warning device which can be activated by the operator;
- are equipped with an automatic acoustic reversing alarm;
- are equipped with fire extinguishers (2.5 – 4.5 kg); and
- are inspected by the authorised operator or driver on a daily basis using a relevant checklist prior to use and that the findings of such inspection are recorded in a register kept in the construction vehicle or mobile plant.

A Contractor must ensure that-

- no person rides or is required or permitted to ride on a construction vehicle or mobile plant otherwise than in a safe place provided thereon for that purpose;
- every construction site is organized in such a way that, as far as is reasonably practicable, pedestrians and vehicles can move safely and without risks to health;
- the traffic routes are suitable for the persons, construction vehicles or mobile plant using them, are sufficient in number, in suitable positions and of sufficient size;
- every traffic route is, where necessary, indicated by suitable signs;
- all construction vehicles and mobile plant left unattended at night, adjacent to a public road in normal use or adjacent to construction areas where work is in progress, have appropriate lights or reflectors, or barricades equipped with appropriate lights or reflectors, in order to identify the location of the vehicles or plant;
- all construction vehicles or mobile plant when not in use, have buckets, booms, or similar appendages, fully lowered, or blocked, controls in a neutral position, motors stopped, wheels chocked, brakes set, and ignition secured;
- whenever visibility conditions warrant additional lighting, all mobile plant are equipped with at least two headlights and two taillights when in operation;
- tools, material, and equipment are secured and separated by means of a physical barrier in order to prevent movement when transported in the same compartment with employees;
- vehicles used to transport employees have seats firmly secured and adequate for the number

of employees to be carried; and

- all construction vehicles or mobile plant travelling, working, or operating on public roads comply with the requirements of the National Road Traffic Act, 1996.
- all plant and vehicles are to be fitted with amber rotating beacons and reverse alarms.
- ALL construction site vehicles must be inspected daily especially if it has dangerous “items” (fuel, explosives, etc.) on vehicle, completed inspection registers must also be available for inspection.
- the vehicles must resemble the original manufacturer’s product. Levers, alarms, and amber lights to be fitted to construction vehicle for notification of vehicle.
- fire extinguishers, signage, and licence disc to be correctly mounted and displayed.
- when the vehicle is stationary no key to be left in or on vehicle or plant.
- Drip tray must be present when stationary.

2.27 Electrical Installations and Machinery on Construction Sites

A Contractor must, in addition to compliance with the Electrical Installation Regulations and the Electrical Machinery Regulations, ensure that –

- before construction commences and during the progress thereof, adequate steps are taken to ascertain the presence of and guard against danger to workers from any electrical cable or apparatus which is under, over or on the site;
- all parts of electrical installations and machinery are of adequate strength to withstand the working conditions on construction sites;
- the control of all temporary electrical installations on the construction site is designated to a competent person who has been appointed in writing for that purpose;
- all temporary electrical installations used by the Contractor are inspected at least once a week by a competent person and the inspection findings are recorded in a register kept on the construction site; and
- all electrical machinery is inspected by the authorized operator or user on a daily basis using a relevant checklist prior to use and the inspection findings are recorded in a register kept on the construction site.

2.28 Use and Temporary Storage of Flammable Liquids on Construction Sites

A Contractor must, in addition to compliance with the provisions for the use and storage of flammable liquids in the General Safety Regulations, 2003, ensure that –

- where flammable liquids are being used, applied, or stored at the workplace concerned, it is done in a manner that does not cause a fire or explosion hazard, and that the workplace is effectively ventilated;
- no person smokes in any place in which flammable liquid is used or stored, and the Contractor must affix a suitable and conspicuous notice at all entrances to any such areas prohibiting such smoking;
- an adequate amount of efficient fire-fighting equipment is installed in suitable locations around the flammable liquids store with the recognized symbolic signs;
- **only the quantity of flammable liquid needed for work on one day is taken out of the store for use;**
- **all containers holding flammable liquids are kept tightly closed when not in actual use and, after their contents have been used up, are removed from the construction site and safely disposed of;**
- where flammable liquids are decanted, the metal containers are bonded and earthed; and
- no flammable material, including cotton waste, paper, cleaning rags or similar material is stored together with flammable liquids
- proper containers are to be used for fuel. Marked and labelled as per the content.
- diesel on site; more than 800 litres must have a certificate, fire safe certificate. Locked in a ventilated, secure area with a drip tray and have a designated, responsible person to use it.

2.29 Water environments

A contractor must ensure that where construction work is done over or in close proximity to water,

provision is made for –

- preventing persons from falling into water; and
- the rescuing of persons in danger of drowning.

A contractor must ensure that where a person is exposed to the risk of drowning by falling into the water, the person is provided with and wears a lifejacket.

2.30 Fire precautions on Construction Sites

A Contractor must, in addition to compliance with the Environmental Regulations for Workplaces, 1987, ensure that –

- all appropriate measures are taken to avoid the risk of fire;
- sufficient and suitable storage is provided for flammable liquids, solids, and gases;
- smoking is prohibited and notices in this regard are prominently displayed in all places containing readily combustible or flammable materials;
- in confined spaces and other places in which flammable gases, vapours or dust can cause danger-
 - only suitably protected electrical installations and equipment, including portable lights, are used;
 - there are no flames or similar means of ignition;
 - there are conspicuous notices prohibiting smoking;
 - oily rags, waste, and other substances liable to ignite are without delay removed to a safe place; and
 - adequate ventilation is provided;
- combustible materials do not accumulate on the construction site;
- welding, flame cutting, and other hot work are done only after appropriate precautions have been taken to reduce the risk of fire;
- suitable and sufficient fire-extinguishing equipment is placed at strategic locations or as may be recommended by the Fire Chief or local authority concerned, and that such equipment is maintained in a good working order;
- the fire equipment contemplated above is inspected by a competent person, who has been appointed in writing for that purpose, in the manner indicated by the manufacturer thereof;
- a sufficient number of workers are trained in the use of fire-extinguishing equipment;
- where appropriate, suitable visual signs are provided to clearly indicate the escape routes in the case of a fire;
- the means of escape is kept clear at all times;
- there is an effective evacuation plan providing for all -
 - persons to be evacuated speedily without panic;
 - persons to be accounted for; and
 - plant and processes to be shut down; and
- a siren is installed and sounded in the event of a fire.

2.31 Construction Employees' Facilities

A Contractor must, in terms of the Construction Regulations 2014, provide:

- Shower facilities after consultation with the employees or employees' representatives, or at least one shower facility for every 15 persons;
- at least one sanitary facility for each sex and for every 30 workers;
- Toilets to be within walking distance
- Hygiene registers to be completed
- Proof of safe disposal of effluent waste disposal certificates to be obtained
- changing facilities for each sex;
- sheltered/shaded eating area.
- Protection from the Elements and raised off the ground.

- Sufficient clean water for all employees. 500ml to each employee every hour.

A Contractor must provide reasonable and suitable living accommodation for the workers at construction sites who are far removed from their homes and where adequate transportation between the site and their homes, or other suitable living accommodation, is not available.

2.32 Fall protection (working on steep slope if applicable)

The Contractor must:

- designate a competent person to be responsible for the preparation of a fall protection plan
- ensure that the fall protection plan contemplated above is implemented, amended where and when necessary and maintained as required; and
- take steps to ensure continued adherence to the fall protection plan.

A fall protection plan contemplated above must include-

- a risk assessment of all work carried out from a fall risk position and the procedures and methods used to address all the risks identified per location;
- the processes for the evaluation of the employees' medical fitness necessary to work at a fall risk position and the records thereof;
- the procedure addressing the inspection, testing, and maintenance of all fall protection equipment; and

A contractor must ensure that a construction manager appointed under regulation 8(1) is in possession of the most recently updated version of the fall protection plan.

No person is required to work in a fall risk position, unless such work is performed safely as contemplated in above and fall prevention and fall arrest equipment are approved as suitable and of sufficient strength for the purpose for which they are being used, having regard to the work being carried out and the load, including any person, they are intended to bear; and securely attached to a structure or plant, and the structure of plant and the means of attachment thereto are suitable and of sufficient strength and stability for the purpose of safely supporting the equipment and person who could fall, and fall arrest equipment is used only where it is not reasonably practicable to use fall prevention equipment.

2.33 Temporary works

Not thought to be applicable to this project.

2.34 Excavation – max 3m

A contractor must-

- ensure that all excavation work is carried out under the supervision of a competent person who has been appointed in writing for that purpose; and
- evaluate, as far as is reasonably practicable, the stability of the ground before excavation work begins.

A contractor who performs excavation work-

- must take reasonable and sufficient steps in order to prevent, as far as is reasonably practicable, any person from being buried or trapped by a fall or dislodgement of material in an excavation;
- may not require or permit any person to work in an excavation which has not been adequately shored or braced: Provided that shoring and bracing may not be necessary where-
 - the sides of the excavation are sloped to at least the maximum angle of repose measured relative to the horizontal plane; or
 - such an excavation is in stable material: Provided that-
 - permission has been given in writing by the appointed competent person contemplated above upon evaluation by him or her of the site conditions; and
 - where any uncertainty pertaining to the stability of the soil still exists, the decision from a professional engineer or a professional technologist competent in excavations is decisive and such a decision must be noted in writing and signed by both the competent person and the professional engineer or technologist, as the case may be;

- must take steps to ensure that the shoring or bracing contemplated above is designed and constructed in a manner that renders it strong enough to support the sides of the excavation in question;
- must ensure that no load, material, plant or equipment is placed or moved near the edge of any excavation where it may cause its collapse and consequently endangers 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;
- must ensure that where the stability of an adjoining building, structure or road is likely to be affected by the making of an excavation, steps are taken to ensure the stability of such building, structure or road and the safety of persons;
- must cause convenient and safe means of access to be provided to every excavation in which persons are required to work, and such access may not be further than six metres from the point where any worker within the excavation is working;
- must ascertain, as far as is reasonably practicable, the location and nature of electricity, water, gas or other similar services which may in any way be affected by the work to be performed, and must before the commencement of excavation work that may affect any such service, take the steps that are necessary to render the circumstances safe for all persons involved;
- must ensure that every excavation, including all bracing and shoring, is inspected-
 - daily, prior to the commencement of each shift;
 - after every blasting operation;
 - after an unexpected fall of ground;
 - after damage to supports; and
 - after rain,by the competent person, in order to ensure the safety of the excavation and of persons, and those results must be recorded in a register kept on site and made available on request to an inspector, the Client, the Client's Safety Agent, any other contractor or any employee;
- must cause every excavation which is accessible to the public or which is adjacent to public roads or thoroughfares, or whereby the safety of persons may be endangered, to be –
 - adequately protected by a barrier or fence of at least one metre in height and as close to the excavation as is practicable; and
 - provided with warning illuminants or any other clearly visible boundary indicators at night or when visibility is poor, or have resort to any other suitable and sufficient precautionary measure where this is not practicable;
- must ensure that all precautionary measures stipulated for confined spaces as determined in the General Safety Regulations, 2003, are complied with by any person entering any excavation;
- must cause warning signs to be positioned next to an excavation within which or where persons are working or carrying out inspections or tests.

2.35 Demolition Work

Not thought to be applicable to this project.

2.36 Tunnelling

Not thought to be applicable to this project.

2.37 Scaffolding

Not thought to be applicable to this project.

2.38 Bulk mixing plant

A contractor must ensure that the operation of a bulk mixing plant is supervised by a competent person who has been appointed in writing and is –

- aware of all the dangers involved in the operation thereof; and
- conversant with the precautionary measures to be taken in the interest of health and safety.

No person supervising or operating a bulk mixing plant may authorize any other person to operate the plant unless that person is competent to operate a bulk mixing plant.

A contractor must ensure that the placement and erection of a bulk mixing plant complies with the requirements set out by the manufacturer and that such plant is erected as designed.

A contractor must ensure that all devices to start and stop a bulk mixing plant are provided and that those devices are placed in an easily accessible position and constructed in a manner to prevent accidental starting.

A contractor must ensure that the machinery and plant selected is suitable for the mixing task and that all dangerous moving parts of a mixer are placed beyond the reach of persons by means of doors, covers or other similar means. No person may remove or modify any guard or safety equipment relating to a bulk mixing plant, unless authorized to do so by the appointed person.

A contractor must ensure that all precautionary measures stipulated for confined spaces as determined in the General Safety Regulations, 2003, are complied with when entering any silo.

A contractor must ensure that a record is kept of all repairs or maintenance to a bulk mixing plant and that the record is available on site to an inspector, the Client, the Client's Safety Agent, or any employee.

2.39 Rope Access Workc

Not thought to be applicable to this project.

2.40 Hazardous Chemical Substances (HCS)

In addition to the requirements in the HCS Regulations, the Principal Contractor must provide proof in the Health and Safety Plan that:

- Material Safety Data Sheets (MSDS's) of the relevant materials / hazardous chemical substances are available prior to use by the Contractor. All MSDS's shall be available for inspection by the agent at all times.
- Risk assessments are done at least once every 6 months.
- Exposure monitoring is done according to OESSM and by an Approved Inspection Authority (AIA) and that the medical surveillance programme is based on the outcomes of the exposure monitoring.
- How the relevant HCS's are being/going to be controlled by referring to:
 - Limiting the amount of HCS
 - Limiting the number of employees
 - Limiting the period of exposure
 - Substituting the HCS
 - Using engineering controls
 - Using appropriate written work procedures
- The correct PPE is being used.
- HCS are stored and transported according to SABS 072 and 0228.
- Training with regards to these regulations was given.

The Health and Safety plan should make reference to the disposal of hazardous waste on classified sites and the location thereof (where applicable).

The First Aider must be made aware of the MSDS and trained in how to treat HCS incidents appropriately.

2.41 Noise Induced Hearing Loss

Where noise is identified as a hazard the requirements of the NIHL regulations must be complied with and the following must be included / referred to in the Health and Safety Plan:

- Proof of training with regards to these regulations.
- Risk assessment done within 1 month of commencement of work.

- That monitoring carried out by an AIA and done according to SABS 083.
- Medical surveillance programme established and maintained for the necessary employees.
- Control of noise by referring to:
- Engineering methods considered
- Admin control (number of employees exposed) considered
- Personal protective equipment considered/decided on
- Describe how records are going to be kept for 40 years.

2.42 Explosives and Blasting

Not thought to be applicable to this project.

2.43 Personal Protective Equipment (PPE)

The Contractor shall carry out PPE or clothing needs analysis in accordance with his risk assessment, to determine the necessary PPE or clothing to be used during construction. The Contractor shall make provision to keep adequate quantities of appropriate, SABS approved PPE or clothing on site at all times.

The Contractor must ensure that personnel are trained in the correct use of PPE to be used.

The Contractor must ensure that lost, stolen, worn out or damaged PPE is replaced as required and receipt signed for by employees on site.

2.44 Asbestos

Not thought to be applicable to this project.

2.45 Pressure Vessels (Including Gas Bottles)

The Contractor shall comply with Pressure Equipment Regulations, including:

- Providing competency and awareness training to the operators;
- Providing PPE or clothing;
- Providing and maintain appropriate signage in areas where pressure equipment is used, as applicable;
- Inspect equipment regularly and keep records of inspections;
- Providing appropriate firefighting equipment (Fire Extinguishers).
- Under pressure equipment to have the following in place;
 - Service date
 - Seals on valves with no leaks and not broken
 - flash arrestors
 - Should be stored and chained together
 - Oxygen / Acetylene bottles to have clips
 - Signage to be visible
 - Gauges in working condition and be visible

2.46 Fire Extinguishers and Fire Fighting Equipment

The Contractor shall provide adequate, regularly serviced fire extinguishers located at strategic points on site. The Contractor shall keep spare serviced portable fire extinguishers. The Contractor shall have adequate persons trained or competent to use the Fire Fighting Equipment.

Safety signage shall be posted up in all areas where fire extinguishers are located.

2.47 Lifting Machinery and Tackle

The Contractor shall ensure that lifting machinery and tackle is inspected before use and on a monthly basis. The

Contractor shall have lifting machinery and tackle inspector who will inspect the equipment at intervals required by the Driven Machinery Regulations, taking into account that:

- All lifting machinery and tackle have a safe working load clearly indicated
- Regular inspection and servicing is carried out
- Records are kept of inspections and of service certificates
- Thorough examinations are carried out by competent personnel at the frequencies required by legislation
- There is proper supervision in terms of guiding the loads which includes a trained banks man to direct and check lifting tackle if it is safe for use
- Forklift to be inspected every year and lift plan every 2 years
- Load test certificate to be no older than 6 months
- Sufficient props to be used and max weight to be displayed
- Slings to be checked with regard to integrity, chains, serial numbers, checked for tears, cuts links and all other materials
- Hooks to be oiled, not in a fixed position and closed to prevent materials from slipping/falling off
- Lifting equipment must be used for the scope of work carried out

2.48 Ladders and Ladder work

The Contractor shall ensure that all ladders are numbered and inspected regularly keeping record of inspections. It should be noted that Aluminium ladders are preferred to wooden ladders.

2.49 General Machinery

The Contractor shall comply with the Driven Machinery Regulations, which include inspecting machinery regularly, appointing a competent person to inspect and ensure maintenance, issuing PPE or clothing and training those that use machinery and enforce compliance.

2.50 Portable Electrical Tools

The Contractor shall ensure that use and storage of all explosive actuating fastening devices and portable electrical tools are in compliance with relevant legislation.

The Contractor shall consider that:

- A competent person undertakes routine inspections;
- Only authorised persons use the tools;
- There are safe working procedures applied;
- Awareness training is carried out and compliance is enforced at all times; and
- PPE and clothing are provided and maintained.

2.51 High Voltage Electrical Equipment

The Contractor shall ensure that, where the work is under, on or near high-voltage electrical equipment the Electrical Installation Regulations, together with safety instructions (Regulations of the Owner of the Equipment) are complied with. Such equipment includes:

- Eskom and the Local Authority equipment
- The Contractor's own power supply; and
- Electrical equipment being installed but not yet taken over from a Contractor by The Client.

2.52 Public Health and Safety

The Contractor shall ensure that each person working on or visiting a site, and the surrounding community, shall be made aware of the dangers likely to arise from onsite activities and the precautions to be observed to avoid or minimize those dangers. Appropriate health and safety signage shall be posted at all times.

2.53 Night Work

Not thought to be applicable to this project.

2.54 Environmental Conditions and Flora and Fauna

The Contractor must be mindful of adverse weather conditions upon the health and safety of the workforce. This includes inclement weather, strong wind, heat stress, extreme cold, etc. The Contractor's risk assessment process must take into account the risks associated with such weather conditions. The same is true when working in an environment where there is a risk to employees' health and safety from presence of poisonous flora, or wildlife (including bees, snakes, etc). The Contractor's risk assessment process must take these risks into account.

2.55 Occupational Health

Exposure of workers to occupational health hazards and risks are quite common in any work environment, especially in construction. Occupational health hazards and risks exposure is a major problem, and all Contractors are to ensure that proper health and hygiene measures are put in place to prevent exposure to these hazards and risks.

The occupational hazards and risks may enter the body in three ways:

- Inhalation through breathing e.g., cement dust;
- Ingestion through swallowing maybe through food intake;
- Absorption through the skin (pores) e.g., painting or use of thinners.

The contractor is required to ensure that all his personnel are medically fit prior to being allowed onto the work site.

All Contractors should ensure that Occupational Hygiene surveys are conducted as per the Occupational Health and Safety Act to ensure employees are not exposed to hazards. Risk Assessments should identify areas where surveys are to be conducted.

2.56 Suspended Platforms

Not thought to be applicable to this project.

2.57 Material Hoists

Not thought to be applicable to this project.

2.58 Explosive Actuated Fastening Device

Not thought to be applicable to this project.

2.59 Confined Spaces

Not thought to be applicable to this project.

2.60 Alcohol and drugs (GSR 2)

1. A 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 site.
2. No employee shall be under the influence of or have in his or her possession or partake of or offer any other person intoxicating liquor or drugs.

3. An Employer or a user, as the case may be, shall, in the case where a person is taking medicines, only allow such person to perform duties at the site if the side effects of such medicine do not constitute a threat to the health or safety of the person concerned or other persons at such site.

2.61 General Practices when Working at Heights

- No Homemade structures or ladders will be permitted on the project.
- Trestle tables are not to be fully extended and must be fully boarded, no drums to be used.
- Surroundings to be clear of rubble.
- Fall protection, fall prevention, and fall rescue plans to be in place and communicated to site employees.
- Ladders to be structurally sound and not broken and in accordance with GSR 13A.
- Only competent persons may be allowed to work at heights
- Correct personal protective equipment to be used (safety harness and lanyard) and edge protection / lifelines to be used.
- Anchor points to be in place and determined by an engineer. Anchor points must be pull tested prior to use.
- GSR (6) 6. No employer shall require or permit any person to work in an elevated position and no person shall work in an elevated position, unless such work is performed safely from a ladder or scaffolding, or from a position where such person has been made as safe as if they were working from scaffolding.
- Construction regulation 10 of 2014 to be implemented when working at heights and to prevent any person from falling from heights.
- Employees required to perform work at heights or from fall risk position must be medically fit to perform such work, such employee's medicals must specify "Fall Risk" or "Working at heights" in the exposure section of the annexure 3 template.

2.62 Traffic Accommodation

All traffic signs must be displayed as per the traffic management plan drawings.

Size of signs used must be as per the traffic management drawings and all signs to be visible and in good condition.

- Traffic management Plan issued per Road and Traffic act (chapter 13). Must be approved by the Traffic Chief and professional team.
- Plans for signage deployment must be in order and must be placed correctly.
- Traffic management plan must be submitted and must be suitable for the tasks being performed.
- Traffic plan must be implemented and controlled by the sites Traffic safety officer and flag persons.
- Jersey barriers, where used, to be linked.
- No signs to be obstructed.
- STOP/GO structures must be protected against being struck by vehicles (e.g., new jersey barriers)
- Road marking buggies/vehicles must be protected by escort vehicles front and rear.
- Displayed traffic signs must be maintained in a daily register to be checked morning and evenings after works have been finalised.

Night work:

- Signage, traffic accommodation and personnel must be visible (reflective / illuminated).
- Certified, competent traffic officer and flag persons to be used during night operations.

Traffic Safety Officer must check signage daily and Engineer must sign it off daily.

2.63 Ventilation and Lighting in the Workplace

Every Employer shall cause every workplace in his undertaking to be lighted in accordance with the illuminance values specified in the Schedule to the General Safety Regulations:

Provided that where specialised lighting is necessary for the performance of any particular type of work, irrespective of whether that type of work is listed in the Schedule or not, the Employer of those employees who perform such work shall ensure that such specialised lighting is available to and is used by such employees.

The Contractor must ensure that:

- the average illuminance at any floor level in a workplace within five meters of a task is not less than one fifth of the average illuminance on that task;
- glare in any workplace is reduced to a level that does not impair vision;
- lighting on rotating machinery in such that the hazard of stroboscopic effects is eliminated; and
- luminaires and lamps are kept clean and, when defective, are replaced or repaired forthwith.

With a view to the emergency evacuation of indoor workplaces without natural lighting or in which persons habitually work at night, every Employer shall, in such workplaces, provide emergency sources of lighting which are such that, when activated, an illuminance of not less than 0.3 lux is obtained at floor level to enable employees to evacuate such workplaces: Provided that where it is necessary to stop machinery or shut down plant or processes before evacuating the workplace, or where dangerous materials are present or dangerous processes are carried out, the illuminance shall be not less than 20 lux.

The Contractor must ensure that the emergency sources of lighting prescribed above:

- are capable of being activated within 15 seconds of the failure of the lighting prescribed by subregulation (1);
- will last long enough to ensure the safe evacuation of all indoor workplaces;
- are kept in good working order and tested for efficient operation at intervals of not more than three months; and
- where directional luminaires are installed, these are mounted at a height of not less than two meters above floor level and are not aimed between 10° above and 45° below the horizontal line on which they are installed.

The Contractor must ensure that all rooms, stairways, passageways, gangways, basements, and other places where danger may exist through lack of natural light, to be lighted such that it will be safe.

The Contractor must ensure that every workplace in his undertaking is ventilated either by natural or mechanical means in such a way that –

- the air breathed by employees does not endanger their safety;
- the time-weighted average concentration of carbon dioxide therein, taken over an eight-hour period, does not exceed one half per cent by volume of air;
- the carbon dioxide content thereof does not at any time exceed three per cent by volume of air;
- the prescribed exposure limits for airborne substances therein are not exceeded; and
- the concentration therein of any explosive or flammable gas, vapour or dust does not exceed the lower explosive limit of that gas, vapour, or dust.

2.64 Nuclear Density Gauge (Troxler)

The use of a Troxler on site must be in line with the SANS 3001 of March 2014. The SANS consists of 5 sections

The in-situ density of road construction materials is only determined in civil engineering using indirect methods such as the nuclear density gauge and sand replacement methods.

This method forms part of a set of methods used to operate nuclear gauges, and includes the following:

- a) administration, handling, and maintenance (see SANS 3001-NG1);
- b) validation of standard calibration blocks (see SANS 3001-NG2);
- c) calibration of a nuclear gauge (see SANS 3001-NG3);
- d) verification of a nuclear gauge (see SANS 3001-NG4);
- e) in situ density determination using a nuclear gauge (see SANS 3001-NG5)

When used Troxlers must be:

Stored in a dedicated, lockable area and must have a warning signage displayed

- Must only be transported in a dedicated vehicle with the required signage displayed and by an authorised employee that has been appointed in writing.
- Must have a Troxler Calibration Certificate in place.
- Must have a Troxler Technician Appointment on file and signed and proof of competency within the safety file.

2.65 Ergonomics Regulation of 2019

"competent person" in relation to ergonomics, means a person who– (a) has in respect of the work or task to be performed the required knowledge, training and experience in ergonomics and, where applicable, qualifications specific to ergonomics: provided that where appropriate qualifications and training are registered in terms of the provisions of the National Qualifications Framework Act, 2008 (Act No. 67 of 2008), those qualifications and that training must be regarded as the required qualifications and training; and (b) is familiar with the Act and the applicable regulations made under the Act;

"ergonomic risk" means a characteristic or action in the workplace, workplace conditions, or a combination thereof that may impair overall system performance and human well-being;

"ergonomic risk assessment" means a programme, process, or investigation to identify, analyse, value and prioritise any risk from exposure to ergonomic risks associated with the workplace;

"ergonomics" means the scientific discipline concerned with the fundamental understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data and methods to design in order to optimise human well-being and overall system performance;

The ergonomics regulations will apply to any Employer or self-employed person who carries out work at the workplace who may expose any person to an ergonomic risk in the work place and any designer, manufacturer, importer or supplier of machinery, plant, or work systems for the work place.

An Employer must, before the commencement of any work that may expose employees to ergonomic risks, have an ergonomic risk assessment performed by a competent person.

The ergonomic risk assessment must be done at intervals not exceeding two years and must include the following;

- a complete hazard identification and all persons who may be affected by the ergonomic risk.
- how employees may be affected by the ergonomic risks;
- the analysis and evaluation of the ergonomic risks;
- the prioritisation of ergonomic risks.

An Employer must review the relevant ergonomic risk assessment if:

- such assessment is no longer valid;
- control measures are no longer effective;
- technological or scientific advances allow for more effective control methods;
- there has been a change in –
 - the work methods;
 - the type of work carried out; or
 - the type of equipment used to control the exposure; and
- an incident occurs or medical surveillance reveals an adverse health effect, where ergonomic risks are identified as a contributing factor.

An Employer must ensure that an employee is placed under medical surveillance, which is overseen by an occupational medicine practitioner, if–

- the ergonomic risk assessment referred to in regulation 6 indicates the need for the employee to be placed under medical surveillance; or
- an occupational health practitioner recommends that relevant employees must be under Medical surveillance, in which case the Employer may call upon an occupational medicine practitioner to ratify the appropriateness of such recommendation.

An Employer must ensure that the medical surveillance consists of–

- in the case of a new employee, an initial health examination before the employee commences employment or within 30 days of commencement of such employment;
- a periodic health examination informed by the ergonomic risk assessment, at intervals specified by an occupational medicine practitioner, but not exceeding two years; and

an exit health examination informed by the ergonomic risk assessment.

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Both the Client and the Contractor have a duty in terms of health and safety legislation to do all that is reasonably practicable to make members of the public and others being affected by the construction processes aware of possible risks and put preventative measures in place to mitigate the risks. The public and/or visitors shall go through a brief health and safety induction detailing hazards and risks they may be exposed to and what measures are in place to control these hazards and risks.

OTHER HEALTH AND SAFETY SPECIFICATION REQUIREMENTS

The Contractor must be aware of the following additional requirements:

What	When	Output
Awareness training (Toolbox Talks)	At least weekly and before hazardous work is carried out	Attendance Register
Health and Safety Committee Meetings	Monthly	Minutes signed by the Employer (Contractor) covering: a) Health and Safety Representative Checklist b) Safety report from Safety Officer and Safety Agent
Health and Safety Reports	Monthly	Report covering: a) Incidents/Accidents and Investigations b) Non-conformance c) Health and Safety Training d) HIRA Updates e) Internal and External Audits
General Inspections	As per Health and Safety Specification and OHSA	Report on Health and Safety Specification and OHSA compliance: a) Scaffolding b) Lifting Machinery c) Excavation
General Inspections	Monthly	Covering: a) Firefighting Equipment b) Portable Electrical Equipment c) Ladders
Record keeping	Ongoing	Covering: a) General complaints b) Fines c) General incidents d) MSDS e) Surveillance Medicals f) Inspection Register g) Dept of Labour Notices
Permits	Before commencement with certain activities	As stipulated by the Health and Safety Specification and the OHSA / Construction Regulations

Key:

OHSA – Occupational Health and Safety Act, 1993

ANNEXURE A – REQUIREMENTS FOR THE SAFETY PLAN ASSESSMENT

The Contractor must note that the information below is pertinent to the compilation of their safety plan response to this site-specific safety specification and it would be preferred if the Safety Plan is written in the order of the assessment documented below.

No	Item	Notes
1	Project Directory	State details of Project Client, Project Manager/Principal Agent, Safety Agent, Consulting Engineer, etc. (Name, address, contact details).
2	Contractors Directory	Indicate if you will be using Contractors on this project, if yes, include their details, trade, and FEM details.
3	Other Parties Directory	Please indicate contact details for any services applicable (electricity, water, etc.) as well as Department of Labour and Emergency Services.
4	Project Safety Statement	The Project Safety Statement must be included in the Safety Plan.
5	Health and Safety standards for the project (OHS Act, construction regulations, basic conditions of employment, etc.)	Health and Safety standards must be included in the Safety Plan.
6	Project Particulars	Scope of works must be included in the Safety Plan. This is critical.
7	Existing environment – Structures and Surroundings, Services (Electrical, Water, Sewerage, etc.), Traffic Arrangements, Parking, Access to Site, Storage of Plant and Materials	Include these items in the plan. The items must be Site Specific, the location of services and services that will be affected must be mentioned.
8	Management Structure for safety on the Project	Organogram with names of the responsible people must be included.
9	Appointed Persons, Supervision	Appointed persons must be identified. A list of the appointed persons must be included in the Safety Plan.
10	Security Procedures	Indicate if a security company will be appointed and include the contact information in the Safety Plan.
11	Registers list and inspection frequency	The Inspection Registers that will be on file must be included in the Safety Plan.
12	Design Co-ordination	Indicate your procedure for implementation of design changes by designer on the project, and the procedures for liaison and implementation of temporary works design on the project.
13	Contractor Co-ordination	It must be made of how Contractors will be co-ordinated on site to ensure that they work together and not adversely affected health and safety.
14	Housekeeping, stacking and storage	Housekeeping policies and procedures must be included in the Safety Plan.

No	Item	Notes
15	Waste Disposal Arrangements	Disposal arrangements procedures must be included in the Safety Plan.
16	Noise and dust control	Indicate if any noisy operations (more than 85 decibels) will be carried out and what measures will be used to reduce noise exposure to workforce.
17	Training Requirements	Requirements must be identified and recorded.
18	Plant and Equipment	Plant and equipment to be used on site must be included in the Safety Plan.
19	Safety Monitoring Arrangements	The name, contact details and SACPCMP registration status of the Safety Officer must be included in the Safety Plan. State how often the Safety officer will be on site (note safety specification requirement in section 1.7).
20	Information for Contractors	State how information will be given to Contractors on site.
21	Consultation/communication arrangements with Employees	How information will be given to employees e.g. notice board.
22	Selection of Contractors Procedures	Principal Contractor must state what health and safety procedures they will use to assess the competence and resources of their Contractors on site.
23	Activities with risk to Health and Safety (Risk Assessment)	The Risk Assessment must be included in the Safety Plan, it must address the Risks identified in the Safety Specification as well as the risk of any other hazards that the Principal Contractor is aware of that are relevant to the site.
24	Hazardous Substances	Must be listed in the Safety Plan and addressed in the Risk Assessment.
25	First Aid and Medical Procedures	Please indicate name of first aider, position of first aid box, location of nearest medical facility and emergency numbers.
26	Fire and Emergency Procedures	List of emergency telephone numbers must be drawn up and included in the Safety Plan. The position of Fire Extinguishers, Assembly Point location, fire drill frequencies, numbers of fire marshals, etc.
27	Accident and Incident Reporting and investigation	State the Accident and Incident Reporting and investigation procedures of your company.
28	Welfare and Site Facilities	Elaborate on toilets and eating areas, water provision, ablution provision, how will workers be protected during wet weather conditions etc.
29	Site Rules	The Site Rules must be included in the Safety Plan.
30	Personal Protective Equipment	The necessity must be identified by Risk Assessments, the required PPE for site risks and control measures.
31	Health & Safety File arrangements	Please indicate arrangements for the return of the Health and Safety File to the safety agent at the end of the project.
No	Item	Notes
32	Method Statements/Safe System of Works	Method Statements/Safe System of Works must be included in Safety Plan for all High-risk activities.
33	Permits and wayleaves	Activities that Principal Contractor anticipates will require

		permits and wayleaves (including those stated in the safety specification) to be included.
34	Fall Prevention and Protection Plan and Fall Rescue Plan	of the Fall Prevention and Protection Plan, fall rescue plan and fall risk assessment must be included in the Safety Plan.
35	Demolition method statement	A copy of the Demolition Method Statement must be included in the Safety Plan.
36	Confined spaces	The Principal Contractors' procedures for managing access, egress and work in confined spaces must be specified in the Safety Plan. Includes permit procedures, air monitoring, PPE, etc.
37	Safety Representatives and Safety Committees	When a project has more than 20 employees a designated employee must be chosen by the labourers to represent them. A safety committee must be established if 2 or more safety representatives are appointed. Please note Safety Specification requirements regarding this section (section 2.12).
38	Have the significant hazards from the safety specification been addressed?	tion 1.9 of the Specifications and ensure practical measures have been detailed in the safety plan.
39	Safety File - Safety Policies in File and Signed by 16(1) CEO.	policies must be signed and explained to employees.
40	Safety File - A copy of the valid Letter of Good standing from FEM / Workman's Compensation must be on file.	of the valid Letter of Good standing from FEM / Workman's Compensation must be on file.
41	Safety File - Signed copy of the 37.2 Mandatary Agreement	Mandatary Agreement needs to be signed between the Client and the Principal Contractor.
42	Safety File - Appointment letter from Client (as well as 5.1.K)	ent must appoint the Principal Contractor in writing.
43	Safety File – Notification / Permit	A copy of the Annexure 2 Notification (and proof of submission) to Department of Labour must be available. This can be in the form of a Department stamp, email, or copy of Construction Work Permit.

ANNEXURE B – LEGAL APPOINTMENTS	
The Contractor shall make the following appointments, as required:	
Chief Executive Officer (OSH Act 16(1))	
Contract Director/Manager (OSH Act 16(2))	
Construction Manager (CR 8(1))	
Construction Supervisor (CR 8(7))	
Assistant Construction Supervisor (CR 8(8))	
Construction Safety Officer (CR 8(5))	
Traffic Safety Officer	
Safety Representative (where > 20 employees on site)	
Temporary work Designer (CR 12(1))	
Temporary work Supervisor (CR12(2))	
Construction risk assessor (CR 9(1))	
Excavation Supervisor (CR13(1)(a))	
Demolition Supervisor (CR14(1))	
Scaffold Supervisor (CR16(1))	
Suspended Platform Supervisor (CR17(1))	
Material Hoist Inspector (CR19(8)(a))	
Material Hoist Operator (CR19(6))	
Bulk Mixing Plant Supervisor (CR20(1))	
Bulk Mixing Plant Operator (CR20(2))	
Controller of Explosive Actuated Fastening Devices Nails, Cartridges or Studs Issue and Collection (CR21(2)(g)(1))	
Construction Vehicle and Mobile Plant Operator (CR23(1)(d)(i))	
Controller of Temporary Electrical Installations (CR24(c))	
Stacking Supervisor (CR28(a))	
Fire Extinguishing Equipment Inspector (CR29(h))	
Fall Protection Plan Developer (CR 10(1)(a))	
Incident Investigator (OSH Act 9(2))	
Competent Person – Confined Spaces (GAR 5(1))	

ANNEXURE C - BASELINE RISK ASSESSMENT FOR PROJECT

Irrespective of the risk presented on site, it will be ensured that sufficient supervision is in place on site, that personnel are trained in accordance with legislation, including the requirement for site specific inductions on site to inform personnel on site of the risks and hazards applicable to the site. Site supervision is responsible for ensuring that the control measures required below are implemented on site.

	HAZARD	RISK	MINIMUM CONTROL MEASURES
1.	Compacting and Filling	Contact with tipping materials Contact with moving plant Vehicles/personnel falling into excavations Contact with underground services	- Trained banksman to control vehicles movement - Only trained personnel use plant - Personal Protective Equipment to be worn - Personnel to stand clear as materials are being tipped - Use stop blocks and signs to warn vehicles of excavations, where applicable - Stand clear of plant whilst materials are being compacted - Establish position of underground services and protect services from damage
2.	Compactor Operations	Crushing of feet	- Only trained and competent personnel to use the machine - Ensure operative wears steel toe cap shoes or boots at all times
3.	Excavations (Working in and around)	Toxic fumes Collapse of trench walls/trapping Falling into excavation Collapse of adjacent structures	- Deep excavations / monitor air for toxic fumes - Prevent collapse by battering back sides to a safe angle or install temporary support - Protect vehicles from falling into excavations – provide barriers, signage, etc. as necessary - Beware of undermining of other structures (e.g. buildings, scaffolds) - Record excavation inspections by competent person on daily basis - Provide suitable means of access/egress in case of emergency.
4.	Fire	Injuries to workers, pedestrians, residents, road users, damage to property through fire	- No littering on site which could become fire hazard, maintain site in clean condition. - No fires to be lit on site. Have a working fire extinguisher at hand at all times. - No smoking or naked flame near flammable substances or in unauthorised areas - Ensure proper storage/use of Petrol/diesel/flammable substances – post warning notices
5.	Flammable Liquids and Gases (Use of)	Fire Explosion	- No littering on site which could become fire hazard, maintain site in clean condition. - Have a working fire extinguisher at hand at all times. - No smoking or naked flame near flammable substances or in unauthorised areas - Ensure proper storage/use of Petrol/diesel/flammable substances – post warning notices - Equipment must be in good condition, maintained - Personnel using substances must be trained in safe use and risks
6.	Hand tools	Injuries caused by use of hand tool Impact with the tool Falls due to access problems Contamination with substance being worked	- Ensure: - Tool is correct for job - Tool is in good order and suitably sharp - Personnel must be competent/instructed in tool usage and tool safely - Lighting is sufficient - Access is safe, working platform is secure, leading edge is guarded - Operative is wearing all necessary PPE
7.	Hazardous Substances	Injuries to workers through use of hazardous substances, eg: injuries to eyes, skin, etc	- Use substances in accordance with data sheet, particularly reference protective clothing required (example: gloves, goggles, etc) - Know what First Aid measures are - Have welfare facilities available for washing of hands, etc

UPGRADING OF MAPATE ACCESS ROAD

	HAZARD	RISK	MINIMUM CONTROL MEASURES
8.	Manual Handling of General Items	Muscular skeletal injuries if the load is too heavy or awkward Operative falling/ tripping Contamination from the substance being carried Fall of material being carried	- Personnel should be aware of safe manual handling techniques - Personnel to wear Personal Protective Equipment when carrying items, eg: safety footwear and gloves. - Ensure good housekeeping against tripping/fall hazards. - Operative to get assistance if load too heavy- team lift if necessary. - Utilise mechanical lifting and carrying aids where possible. - Personnel to ensure access equipment, ladders will take weight of operative and load being carried. - Personnel to ensure item being carried is properly bonded or is not liable to break apart whilst being manually handled.
9.	Members of Public – Protection of	Injury to member of public and road users from site works	- Barriers and signage to be in place - Workers must warn away any members of public from the works - Footpaths and bridges which are open to public must be closed off if in area of works or otherwise made safe so that no injury occurs to members of public - Traffic turning into site – traffic management and signage as required. - Signage to be on road at site entrance warning motorists that construction traffic turning into/out of site access. Keep roads free of mud where possible - Refer to plant risk assessment for details on plant safety precautions - NOTE: SAFE MEANS OF ACCESS FOR BOTH CONSTRUCTION TRAFFIC TO SITE AND ROAD USERS MUST BE AGREED.
10.	Noise and Dust	Breathing in dust can cause long term health problems, noise can damage hearing	- Wear respiratory and hearing protection - Dampen down and minimise dust where possible.
11.	Plant or Vehicles and Equipment Operation	Workers injured by passing traffic Road users and pedestrians at risk from plant operation Noise Rolling over on the slope	- Implement traffic protection measures - Trained and competent operators must be used - Check plant and vehicles on daily basis before use and record inspections. Maintain vehicles in safe condition. - Medical certificates of fitness required for construction plant. - Crossing of road by construction vehicles or machines must be limited to the practical minimum - Plant and vehicles must be fitted with amber rotating beacons and reverse alarms. - Wear appropriate protective clothing/equipment, eg: goggles, gloves, ear defenders, etc as appropriate. - Maintain sufficient exclusion zone between plant movements and other operations / personnel / public so that safety of others is not put at risk by the terrain conditions.
12.	Road Working – working in or next to road	Injury to workers caused by passing traffic Injury to road users and pedestrians by works	Flagmen to be used where interface with construction plant with passers-by or where hazard posed by delivery vehicles turning into/out of site. - Traffic management plan to be approved by Municipality and, if necessary, traffic department - No construction activities to commence until adequate provision made to accommodate traffic in accordance with the South African Traffic Signs Manual. - Use safety signage to warn traffic and pedestrians of construction works - Where existing walk ways/pavements affected by works, must direct pedestrian traffic away to safe walking area. - Wear reflective waistcoats when working on or near the road or road shoulder as well as any other required personal protective clothing. - Crossing of road by personnel must be limited to the practical minimum - Use of fencing or other barriers as appropriate
	HAZARD	RISK	MINIMUM CONTROL MEASURES
13.	Snakes	Snake bite	- Qualified first aider required for site who can treat snakebite - Check area before working

UPGRADING OF MAPATE ACCESS ROAD

			Find out nearest hospital and get emergency telephone numbers.
14.	Working at Height	Personnel falling from height / down slope Falling debris Those beneath being injured	- All access equipment is properly constructed (inspections record must be maintained) - Only trained personnel construct, dismantle or control the access equipment - All fall arrest equipment to be correctly maintained - Ensure if ladders are being used for access, they are either footed or tied. Also, the ladder must be set at the correct level of 1 in 4 or approximately 75° - Exclusion zone required under overhead working.
15.	Work over or next to Water	Drowning	- Evaluate depth of water, height above water that work takes place, whether workers can swim or not and then determine safety precautions required: these may include such measures such as barriers, signage, life belts, safety harnesses, - When working on water edge - erect life saving devices and barriers to protect workers and vehicles (stop blocks may also be required). Only trained and competent persons to be used.

Date of Original Safety Specification Compilation	Compiled By	Issue Date
July 2024.	Mark Winter	13 th July 2024.

Revision Summary	Revised By	Revision Date

I, _____ representing
_____(Contractor), have satisfied myself with the
content of this Health and Safety Specification and shall ensure that our employees and Contractors on site comply
with the requirements of this document, our safety documentation and health and safety legislation.

Date

C5.2 CONTRACT DRAWINGS REGISTER (Drawings are included under Volume 4)

The following is a list of contract drawings

ROADWORKS	
10104-001	DRAWING INDEX AND LOCALITY PLAN
10104-006	TYPICAL PAVEMENT DESIGN CROSS SECTION SHEET 1 OF 1
10104-008	PLAN AND LONGITUDINAL SECTIONS km 0+000 to km 1+000
10104-009	PLAN AND LONGITUDINAL SECTIONS km 1+000 to km 2+000
10104-010	PLAN AND LONGITUDINAL SECTIONS km 2+000 to km 3+000
10104-011	PLAN AND LONGITUDINAL SECTIONS km 3+000 to km 4+000
10104-012	PLAN AND LONGITUDINAL SECTIONS km 4+500 to km 5+000
10104-013	PLAN AND LONGITUDINAL SECTIONS km 5+000 to km 5+911
10104-014	SETTING OUT TABLES
10104-021	ROAD SIGNAGE LAYOUT PLAN - SHEET 1
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10104-304	GUARDRAIL ELEMENT AND MOUNTING DETAIL
10104-305	GUARDRAIL PLACING DETAILS
10104-306	TYPE 1 STOCK PROOF FENCING
10104-307	TYPICAL LAYOUT OF OFFICE & LABORATORY UNITS
10104-308	DETAIL OF FARM ACCESSES
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10104-C002-09	BENDING SCHEDULES - SHEET 1*
10104-C002-10	GABION LAYOUT AND DETAILS*

C5.3 MATERIALS INVESTIGATION STUDY

2017

MABU

GEOTECHNICAL CONSULTANCY
CENTERLINE AND MATERIALS INVESTIGATION

UPGRADING FROM GRAVEL TO TAR
MAPATE ACCESS ROAD

LIMPOPO PROVINCE

GEOTECHNICAL CONSULTANCY

VAT NO. 4050248519 / REG NO. 2016/278015/07

CENTERLINE AND MATERIALS INVESTIGATION MAPATE ACCESS ROAD THE UPGRADING FROM GRAVEL TO TAR THULAMELA LOCAL MUNICIPALITY LIMPOPO PROVINCE - SOUTH AFRICA

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LETABA LAB (Pty) Ltd
CIVIL ENGINEERING MATERIALS LABORATORY

The logo for ilac-MRA is a circular emblem with the text 'ilac-MRA' inside.The logo for sanas Testing Laboratory features the word 'sanas' in a red, stylized font, with 'Testing Laboratory' and 'T0049' in smaller text below it.

087 285 0816

GEOTECHNICAL CONSULTANCY

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This report is exclusively compiled for **UWP Consulting (Pty) Ltd** with specific application to the proposed development.

LIST OF ABBREVIATIONS AND DEFINITIONS

CBR	California Bearing Ratio CBR is a penetration test for the evaluation of the mechanical strength of road subgrades and base-courses. It was developed by the California Department of Transportation before World War II.
Excavatability	The excavatability of an earth (rock and regolith) material is a measure of the material to be excavated with conventional excavation equipment such as a bulldozer with rippers, light mechanical excavator or other grading equipment.
Excavation Classification (SANS 1200 D)	Restricted Excavation Hard Rock: Material that cannot be removed without blasting or wedging and splitting Intermediate: Material which can be removed by a back-acting excavator having a fly wheel power >0.10 kW for each mm of tined-bucket width, or with the use of pneumatic tools before removal by a machine capable of removing soft material. Soft: Material which can be efficiently removed by a back-acting excavator of a fly wheel power >0.10 kW for each mm of tined bucket width Non-restricted Excavation Hard Rock: Material that cannot be effectively ripped by a bulldozer having an approximate mass of 35 tonne and a fly wheel power of 220 kW Intermediate: Material which can be effectively ripped by a bulldozer having an approximate mass of 35 tonne and a fly wheel power of 220 kW Soft: Material which can be effectively removed or loaded, without prior ripping, by any of the following plant: • A bulldozer or track type front end loader having an approximate mass of 22 tonne and a fly wheel power of 145 kW. • A tractor-scraper unit having an approximate mass of 28 tonne and a fly wheel power of 245 kW, pushed during loading by a bulldozer equivalent to that described above.
MOD AASHTO	The Modified AASHTO Soil Classification System which was developed by the American Association of State Highway and Transportation Officials, and is used as a guide for the classification of soils and soil-aggregate mixtures for highway construction purposes.
Pedocrete	Pedocretes are surficial deposits formed from absolute enrichment (cementation or replacement) or relative enrichment (weathering residue) of soils by various cementing minerals. The various types of pedocretes and their associated cementing constituents include: Ferricrete: iron oxide enriched Calcrete: carbonate enriched Gypcrete: gypsum enriched Silcrete: silica enriched
Residual Soil	Residual soils are soils that develop from the complete weathering of their underlying parent rocks (in-situ) and have the same general chemistry as those rocks.
Scree/Talus	A transported soil, formed through a sloping accumulation of loose clasts of granule grade or larger, at the base of a steep rock face from which the clasts fall/roll as a result of weathering and erosion.
Transported Soil	Soils which form through weathering and erosional processes and characterised by the transporting agent/agents through which the soil is formed. Transporting agents include wind, water, ice and/or gravity.
TP	Test Pit An excavation made to examine the subsurface conditions (stratigraphy and composition) on a potential construction site. Samples are taken at specified depths for lab analysis.

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1 Project Introduction and Background

1.1 Project Description

This report describes the results of a multi-disciplinary geotechnical **centerline and materials investigation** conducted for the upgrading from gravel to tar, of the main access road to the Mapate Rural Settlement, within the Limpopo Province of South Africa. This gravel access road in question has a length of approximately 6.0 km.

This investigation was undertaken in order to assess the engineering geological character of the area, focusing on the geotechnical properties which will affect the design and construction of the proposed new sealed road.

1.2 Terms of Reference

Letaba Lab was appointed by UWP Consulting (Pty.) Ltd., to undertake the detailed geotechnical centerline and materials investigation for the proposed upgrading of the existing gravel road. The appointment was formalised by means of a signed 'Service Provider Agreement', with a recorded contract start date of 05/06/2017.

Formal Project Title: Road Centreline and Borrow Pit Materials Investigations and testing required for Mapate Access Road - Thulamela

The roads location and orientation was provided in an electronic mail by the Client.

The field work phase of the investigation commenced and was completed in June 2017. Laboratory testing commenced on the samples collected during the field work phase of the investigation. The quantity and locations of samples was governed by the Clients' outcomes and the in-situ characteristics of the material excavated across the site.

Mabu Geotechnical Consultancy was appointed by Letaba Lab to compile an in-depth geotechnical report for the above mentioned centerline and materials investigation. No field work exercises (excavations) were completed by the author of this report. However, Mabu Geotechnical Consultancy conducted a detailed site walkover exercise in order to gain a better understanding of the roads nature and its surroundings.

1.3 Investigative Standard

This report is based on point data collected during the fieldwork phase of the investigation. Every effort was made during the site investigation to ensure that generally accepted practices of our profession were used in the sub-surface evaluation of the site, and that the sampling and testing was representative of the soil/rock conditions observed on-site. The investigation has therefore attempted, through interpolation and extrapolation at known test locations, to identify problem issues of a geotechnical nature on which this report is based. Variances in soil and rock quality and quantity from those predicted may be encountered during construction and these should be recorded.

The cumulative phases of this investigation were undertaken in accordance with the appropriate accepted **South African Codes of Practise** and associated testing standards.

1.4 Available Information

The following sources of information were utilized:

- **Geological maps:**
 - 2230 Messina; scale 1 : 250 000 (digital copy)
 - 2330 Tzaneen; scale 1 : 250 000 (digital copy)
- **Hydro-geological maps:**
 - 2127 Messina; scale 1:500 000 (Hard Copy)
 - 2330 Phalaborwa; scale 1:500 000 (Hard Copy)
- **Topocadastral maps:**
 - 2230 CD; scale 1:50 000 (digital format)
 - 2330 AB; scale 1:50 000 (digital format)
 - Elevation Heat Map; Online Resource
- **Remote sensing data:**
 - Google Earth Pro TM

1.5 Scope of the Investigation

The investigation had the aim of determining and assessing the geotechnical characteristics encountered across the site, with regards to the generalised succession of soil and rock, identification of potential problem soils, excavatability as well as the re-use of the excavated material during construction.

The investigation had the following aims:

- To assess the geological, topographical and geotechnical character of the site.
- To determine and describe, where possible, the succession of soil and rock materials occurring beneath and across the site.
- To assess the mechanical properties of the imported and natural soils underlying the existing gravel road in question, with regard to the construction of a new sealed road.
- To evaluate the excavation characteristics of the site material.
- To determine and assess the geotechnical characteristics of the rock aggregate and soil material samples collected from a local commercial source, specifically with regard to their suitability for use as road construction materials.
- To recommend measures to be implemented during design of the roads

The development potential of the study area is assessed based on the following premises:

- Upgrading, from gravel to tar, of a 6.0 km low-volume main road.

It must be noted that this investigation was conducted to assist with the design and construction phases of the development.

1.6 Investigative Methodology

The detailed centerline and materials investigation was undertaken in a number of phases as to allow for an accurate geotechnical assessment of the site and its surroundings.

Below is a summary of the various investigative phases (the methodology of each phase is explained in greater detail overleaf):

1. Introduction and Regional Assessment of the Study Area:

- a. Project **introduction and background**.
- b. Regional study area **description**.
- c. Regional **topographic** nature of the study area.
- d. Regional **geological** nature of the study area.

2. Geotechnical Analysis- Centerline and Materials Investigation:

- a. **Introduction and Description**
- b. Generalised Site **Character**
 - i. Introduction to **Site Segmentation**
 - ii. Summarised **nature** of each geotechnical Segment
 - iii. Detailed **description** of on-site exposures
- c. **Materials analysis**
 - i. Summary of all the lab results **per segment and soil horizon**
- d. **In-situ testing**
 - i. DCP Testing: Results presentation and Modelling

3. Construction Material Suitability Analysis- Commercial Sources:

- a. **Commercial Source:** Mathombo Suppliers
 - i. **“Fill”** Material
 - ii. **“G5”** Material
 - iii. **“G1”** Material
- b. **Commercial Source:** Sandberg
 - i. **“Natural Gravel”** Material
 - ii. **“Crushed Gravel”** Material

4. Cumulative Data Analysis and Report Compilation

The compilation of a detailed geotechnical report **combining Phases 1 to 3**.

The detailed methodology of each phase is outlined overleaf...

1.6.1 Introduction and Regional Assessment of the Site

The collation and evaluation of all the available topographic, geomorphological and geological data across the investigated road and its' surroundings. This assessment is done through the use of available regional maps and remote sensing images. This section of the report will include a description and summary of the sites nature, based on existing literature, and will be concluded with the compilation of a series of base maps showing the study areas' regional setting.

1.6.2 Geotechnical Analysis- Centerline and Materials Investigation

Based on the results of this centerline and materials investigation (as provided by Letaba Lab); the investigated gravel road is subdivided into a number of geotechnical segments, each displaying their own unique geotechnical nature and characteristics. Although each road segment may display its own unique nature; they were all assessed based on the same methodology. Below is an outline of the methodology followed throughout the centreline and materials investigation.

1. Site Walk Over Exercise

Mabu Geotechnical Consultancy conducted a detailed site walkover exercise prior to the commencement of the fieldwork phase of the investigation (detailed below). This site walkover gave the author of this report a better understanding of the study areas' geotechnical nature. Where necessary, this allowed for the manipulation/amendments to the planned fieldwork actions; whereby the test pit locations were adjusted on ground level, as to obtain a more detailed understanding of the variation in the in-situ materials across the site. The accurate placement of testing locations allowed for the detailed geotechnical modelling of the gravel road in question. Tests pits were concentrated around areas of concern, specifically within the vicinity of the known drainage channels and topographic features.

The site walkover exercise was concluded with the compilation of a detailed annotated photographic library (Appendix A); with special reference to areas of primary concern.

2. Trenching

The field work phase of the investigation was undertaken by Letaba Lab Polokwane in June 2017. Test pits were excavated through the use of a TLB-type light mechanical excavator, at the various locations identified during the desktop study and site walkover phases of the investigation. Excavations, and associated sampling, were conducted as to accurately describe the general soil conditions occurring along the length of the existing gravel access road. The succession of soil and rock layers exposed within the test pits were logged and a series of detailed photographs were taken of the different soil layers.

3. Sampling

Disturbed and bulk samples were taken of the soil and rock material deemed to be important to the proposed development. Laboratory testing commenced on the samples collected during the field work phase of the investigation. The quantity and locations of samples were governed by the Clients' outcomes and the in-situ characteristics of the material excavated across the site.

4. Laboratory Testing

The following tests were conducted by **Letaba Lab Nelspruit** (SANAS Accredited Laboratory) on **soil samples** taken during the field work phase of the investigation:

- Standard **road indicator tests** were conducted on **disturbed soil samples** in order to determine its composition (i.e.: the relative percentages of gravel, sand, silt and clay present within each sample), and to evaluate the suitability of the materials for the re-use in the proposed roads' construction.

The following tests were conducted:

- i. Moisture Content (density samples)
 - ii. Atterberg Limits (Liquid Limit and Plasticity Index) and Linear Shrinkage
 - iii. Particle-size distribution (sieve analysis)
- Further **compaction tests** were conducted on **bulk soil samples** in order to determine the sites' sub-soils re-usability potential in the proposed road construction. This suitability evaluation is based on the results from standardised material compaction methods (NRB, Proctor and MOD AASHTO).

The following additional tests were conducted:

- i. Maximum Dry Density versus Optimum Moisture Content
- ii. Californian Bearing Ratio versus Compaction Effort (MOD AASHTO method)

5. In-situ Testing- DCP

One meter Dynamic Cone Penetrometer (DCP) tests were completed across the road at approximately 50 m intervals, measured on ground level with a meter-wheel.

Standardised DCP tests (8 kg hammer falling 575 mm with a tip/cone of 60°) were implemented as to give an indication of the **consistency** of the **in-situ** material spanning the length of the roads in question.

In the design of roads, the DCP is a practical test used for onsite measuring of road material strength. The test results can be correlated with the California Bearing Ratio (CBR) by applying a formula; results of which can be correlated to the laboratory tests conducted on the soils from the same location.

1.6.3 Material Suitability Analysis- Commercial Sources

A borrow pit exploration program was initiated by Letaba Lab in June 2017. This investigation intended on locating possible local sources of material to be used in the construction of the proposed new sealed road. Borrow pits in this portion of the Limpopo Province are often subject to varying degrees of community politics, with existing quarries seen to be extensively excavated. For these reasons, Letaba Lab commenced with the testing of various **commercial sources**. Material from each source was tested for the re-use in the proposed construction. The commercial sources in the area typically provide a more reliable quality and volume of material as compared to the extensively mined local quarries.

This detailed centerline and materials investigation was supplemented with the testing of a **soil material** and **rock aggregate** sampled from two commercial sources within the region; namely:

1. **Mathombo Suppliers**

2. **Sandberg**

Various samples were taken from these commercial sources and tested to assess the suitability of the materials for the re-use in the proposed roads' construction.

The following tests were conducted by **Letaba Lab Nelspruit** (SANAS Accredited Laboratory) on soil material and rock aggregate samples:

- Standard **road indicator tests** were conducted on **disturbed soil samples** in order to determine its composition (i.e.: the relative percentages of gravel, sand, silt and clay present within each sample), and to evaluate the suitability of the materials for the re-use in the proposed roads' construction.

The following tests were conducted:

- i. Moisture Content (density samples)
 - ii. Atterberg Limits (Liquid Limit and Plasticity Index) and Linear Shrinkage
 - iii. Particle-size distribution (sieve analysis)
- Further **compaction tests** were conducted on **bulk soil samples** in order to determine the sites' sub-soils re-usability potential in the proposed road construction. This suitability evaluation is based on the results from standardised material compaction methods (NRB, Proctor and MOD AASHTO).

The following additional tests were conducted:

- iii. Maximum Dry Density versus Optimum Moisture Content
- iv. Californian Bearing Ratio versus Compaction Effort (MOD AASHTO method)

Continued overleaf...

- The investigation was aided by **treatment of the natural soils** which were sampled. The samples extracted from various commercial sources and stabilized with the addition of cement (Lafarge Roadcem 32.5 N cement)

The following additional tests were conducted on the mixed sample:

- i. Maximum Dry Density versus Optimum Moisture Content
- ii. Californian Bearing Ratio versus Compaction Effort (MOD AASHTO method)
- iii. UCS/ITS design on mixed material

1.6.4 Cumulative Data Analysis and Report Compilation

The investigation concluded with the compilation of a technical report detailing all methodology utilised during the phases of the investigation. This report includes a detailed potential evaluation of the gravel road in terms of the proposed development, based on the results of the geotechnical investigation, with recommendations regarding construction, excavatability and material sourcing.

1.7 Development within 1 : 100 year-flood lines

It must be noted that the National Water Act (Act 36 of 1998) states the following regarding development within the 1 : 100 year-flood line of any stream or river (Thompson, 2006):

Section 21(c):

Impeding or diverting the flow of water in watercourses (including alteration of the hydraulic characteristics of flood events) requires licensing according to the Act

Section 21(i):

Any action that may alter the bed, banks, courses or characteristics of watercourses (including flood events) requires licensing according to the Act, including:

- i. widening or straightening of the bed or banks of a river to allow for the construction of a bridge, sports ground or housing development
- ii. altering the course of a river partially or completely (i.e.: river diversion) to be able to use or develop the area where the watercourse originally was.

The National Water Act does not prohibit development within 1 : 100 year-flood lines; however, the Act requires detailed analysis of the effects of the proposed development on the surrounding environment, with special reference to surface and sub-surface water flow. The Act requires that suitable precautionary measures be implemented to limit the effect within and downstream from the proposed development.

2 Description of Environment

2.1 Site location and Description

The **study area** for this investigation is located in the southern portion of the Thulamela Local Municipality, within the north eastern portion of the Limpopo Province, South Africa. On a more localised scale; the study area is seen to fall within the western portion of the of the Thohoyandou Township, approximately 6 km south west of the University of Venda. (Figure 1)

This investigation focuses on the upgrading of the main gravel road connecting the **Tshisahulu Settlement** to the **Mapate Settlement**. The gravel road has a total length of approximately 6.0 km and serves as the main access road to the Mapate Settlement.

The starting point (chainage 0+000) of the investigated gravel road is within the Tshisahulu Rural Settlement, in close proximity to the intersection between the Regional Road 524 (R524) and the sealed road leading to the Duthuni Settlement. Thereafter, the road extends in a general north westerly direction, displaying a slightly meandering nature as it navigates multiple topographical features.

The central portions of the road were seen to traverse mostly undeveloped land, with dense vegetation encroaching on the roads flanks. The only notable development within this section of the road was a brickyard (currently in operation); at a chainage of approximately 1+750. As such, during the fieldwork phase of the investigation, the road was seen to be subject to frequent traffic between the brickyard and the Tshisahulu Rural Settlement. Furthermore, this length of the road was seen to host scattered pockets of dumped material comprised of natural material contaminated with refuse and building rubble (bricks).

The final section of the road, from a chainage of 4+300, is situated within the southern portions of the Mapate Rural Settlement. Within this portion of the settlement, a number of low hanging electrical cables were seen to traverse the road in question. These cables may restrict the movement of heavy earthmoving machinery during the construction phase of the development.

The roads end point (chainage 6+000) was seen to be at the intersection of the gravel road under investigation, with the main gravel ring-road connecting the Duthumo, Mapate and Khumbe Rural Settlements (Image 1 overleaf).

The road is located roughly at the following coordinates:

Road Start: Latitude: 23.005319° S Longitude: 30.403278° E

Road End: Latitude: 22.986849° S Longitude: 30.355562° E

The initial construction of the gravel road entailed the construction of associated road infrastructure in the form of two narrow and low-lying culvert structures; spanning existing drainage channels. Additional to the construction of these infrastructural units, bulk earthworks were implemented along the route to create level working platforms during the initial construction of the gravel road. The implemented earthworks typically encompassed the cutting of the natural soils, and were focussed within the steep sloping segments of the road, adjacent to the valley structures.

Image 1a

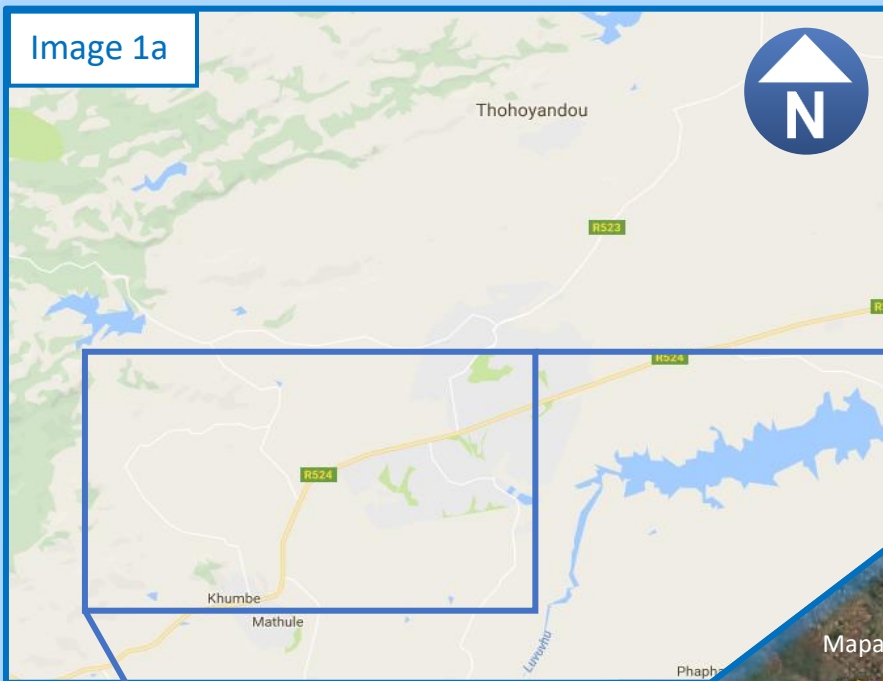
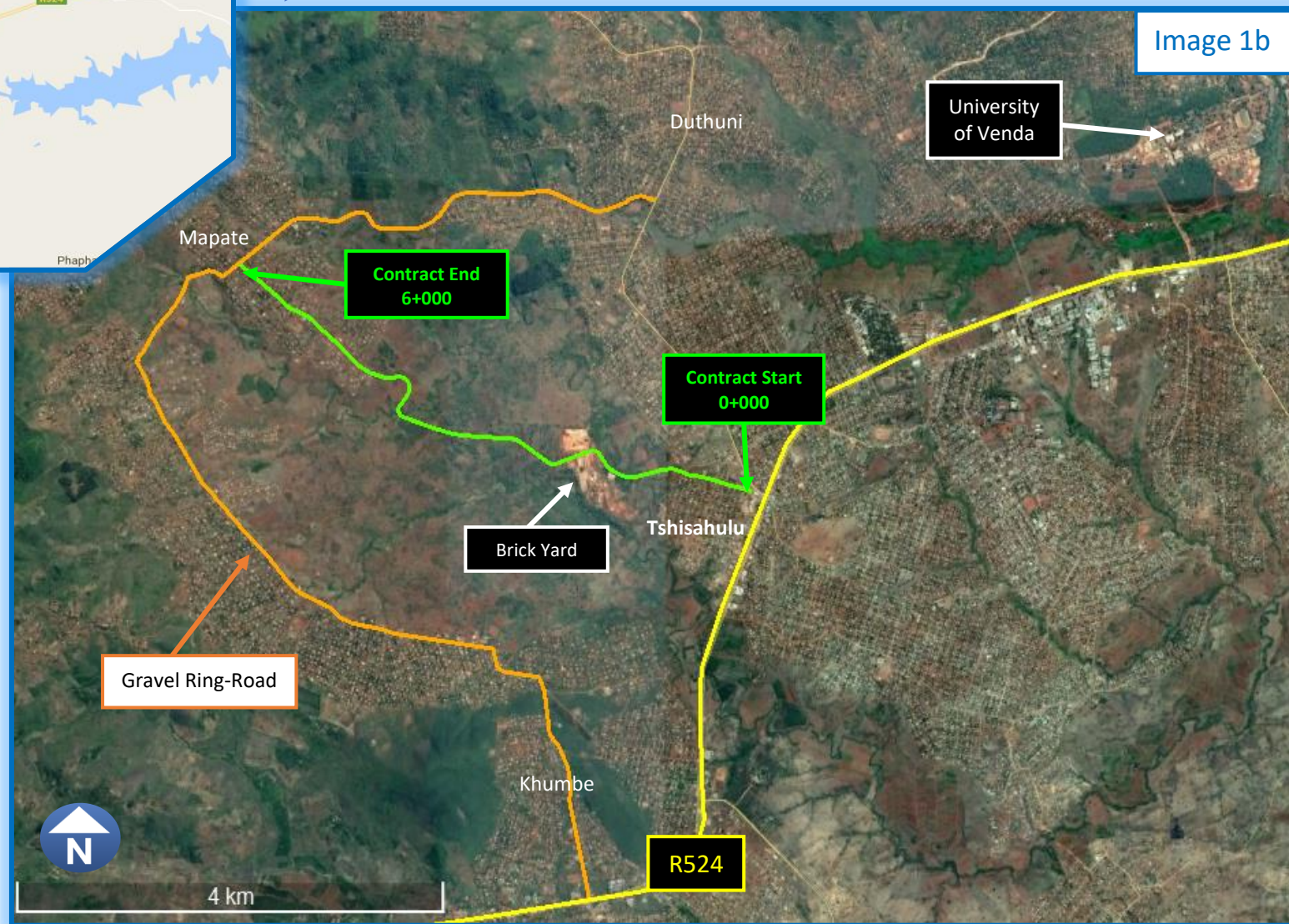


Image 1: Geographical Location and Breakdown of the Study Area (1a and 1b)

Image 1b

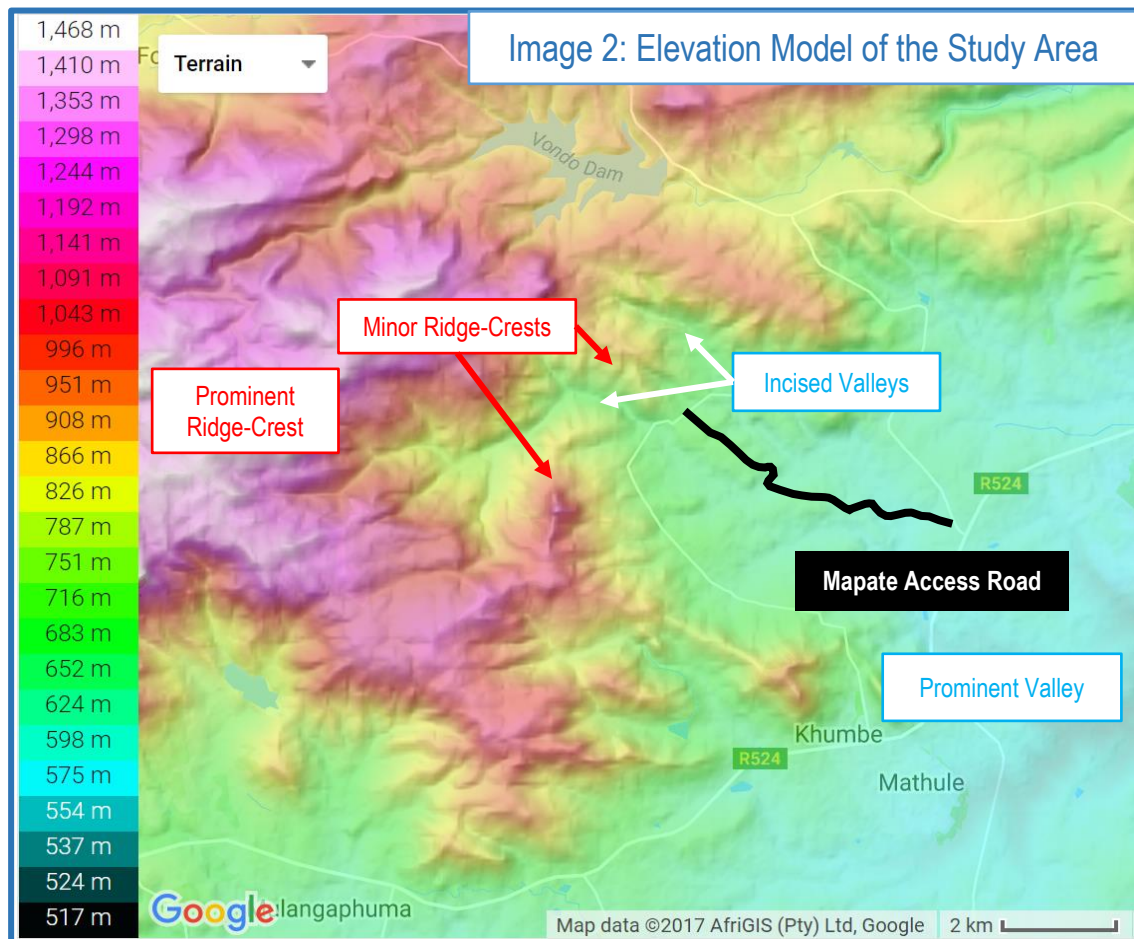


2.2 Topography

2.2.1 Regional Topographic Nature of the Study Area

The study area (regional setting) is situated on the southern edge of the **Soutpansberg Mountain Range**. The Soutpansberg is characterised by a highly undulating surface topography, with steeply dipping southern scarp slopes, in combination with shallower dipping northern side slopes. This change/difference in slope morphology can be attributed to the northerly dipping strata of the Soutpansberg Group, in conjunction with regional orogenic and erosional processes.

Refer to Image 2 below which graphically depicts the topography of the **study area**.



As seen in this annotated image above, the north western and western portions of the **study area** are seen to display **irregular shaped** prominent ridge crests (depicted by the white and pink colours). Furthermore, multiple minor ridge-crest structures are seen to extend perpendicularly across the study area, from these variable prominent ridge crests, in the form of finger-like limbs (pink and yellow colours in the image above).

Due to the steep sloping nature of these crest structures, the associated high energy run-off has resulted in the formation of **deep incised valley structures** (green colours in the image above). These incised valley structures are seen to fall between alternating elongated ridge crests and are seen to span from the high lying prominent ridge-crests, converging in a easterly and south easterly direction. This convergence results in the formation of the lower lying prominent valley structure (blue and grey colours in the image above) in the eastern and south western portions of the study area.

Image 2 clearly depicts the **highly variable topographic nature** of the study area, with the occurrence of alternating incised valley structures and ridge-crest structures accentuating the undulating nature seen across the investigated area.

2.2.2 Regional Topographic Nature of the Site

The site is seen to display a similar topographic nature to that of the study area; whereby the road traverses multiple incised valley and ridge-crest structures along its length. Consequently, the road displays a **highly undulating nature** generally categorised as a rolling hill morphology, with alternating crest and valley landforms, as depicted in Image 3 overleaf.

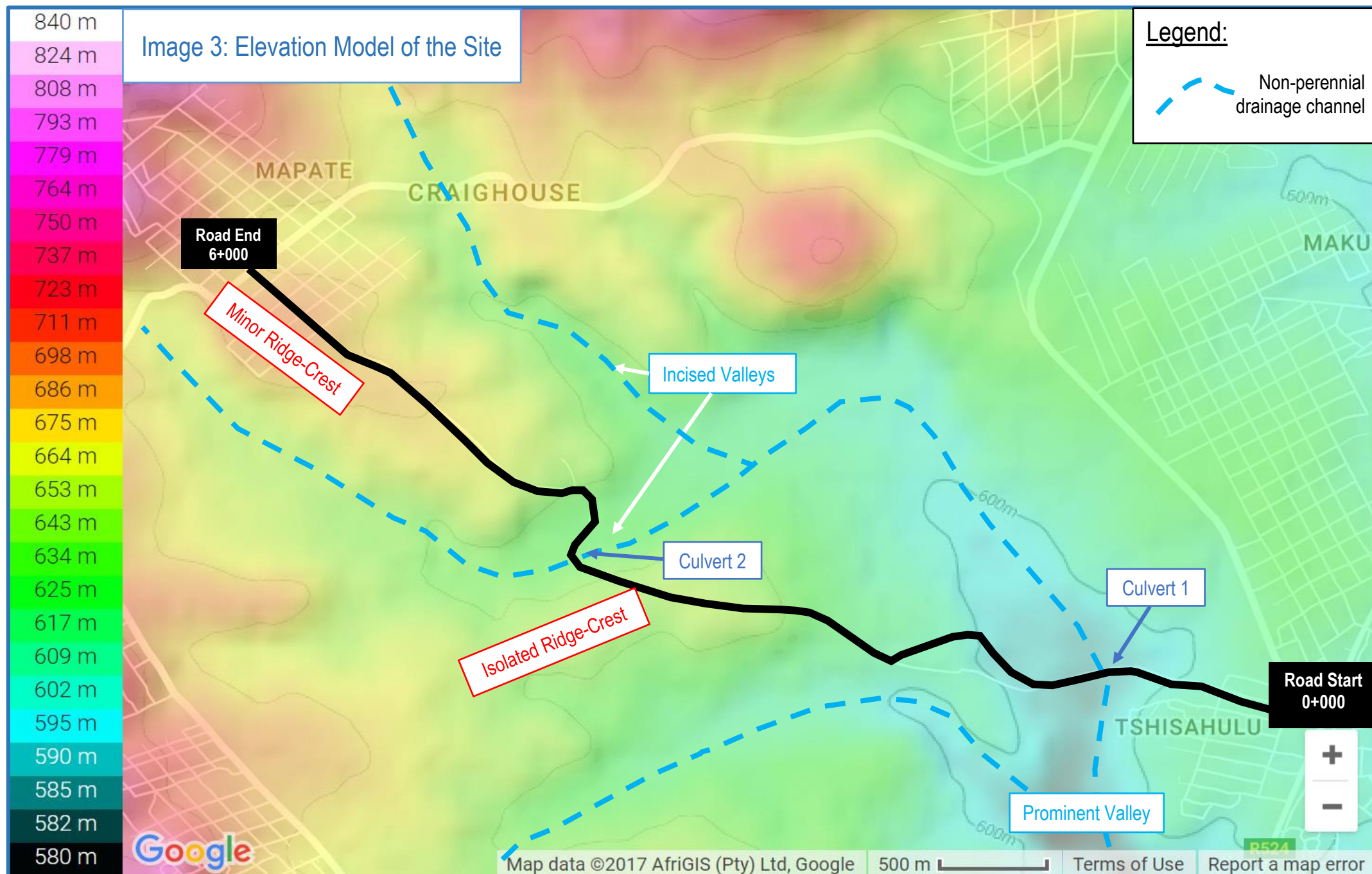
As seen in the image overleaf, the south eastern section of the road is seen to traverse a prominent valley structure, with a gradual decrease in elevation towards the valley structure. This portion of the greater valley structure displays a distinct meandering nature, resulting in a broad valley floor.

The central sections of the road display a more variable nature, with a sharp increase in the degree of sloping as the road ascends out of the above mentioned prominent valley structure. Thereafter, the road continues to climb gradually as it traverses the isolated ridge-crest structure. After traversing the peak of this ridge crest, the road gradually descends in a north westerly direction towards the minor valley structure, as depicted in Image 3 overleaf. This incised valley structure was seen to display a narrow valley floor, with steep sloping flanks converging towards its' centre.

The north western section of the site displays a more uniform nature as the road climbs out of the incised valley structure, and ascends the peak of the minor elongated ridge-crest structure. The final section of the road was seen to descend sharply towards the end of the contract.

The road is seen display an overall increase in elevation with an increase in chainage, with the exception of the two locations where the road traverses the above-mentioned valley structures. The road displays its lowest elevation of approximately 590 m above mean sea level (Google Earth Pro tm) within the prominent valley structure (chainage of ~1+000) along its' south eastern section. The road's highest elevation is towards the end of the contract in the north western section (chainage of ~5+600); with an elevation of approximately 700 m above mean sea level, as calculated through the use of Google Earth Pro tm.

Image 3 overleaf graphically depicts the topographic nature of the gravel road in question.

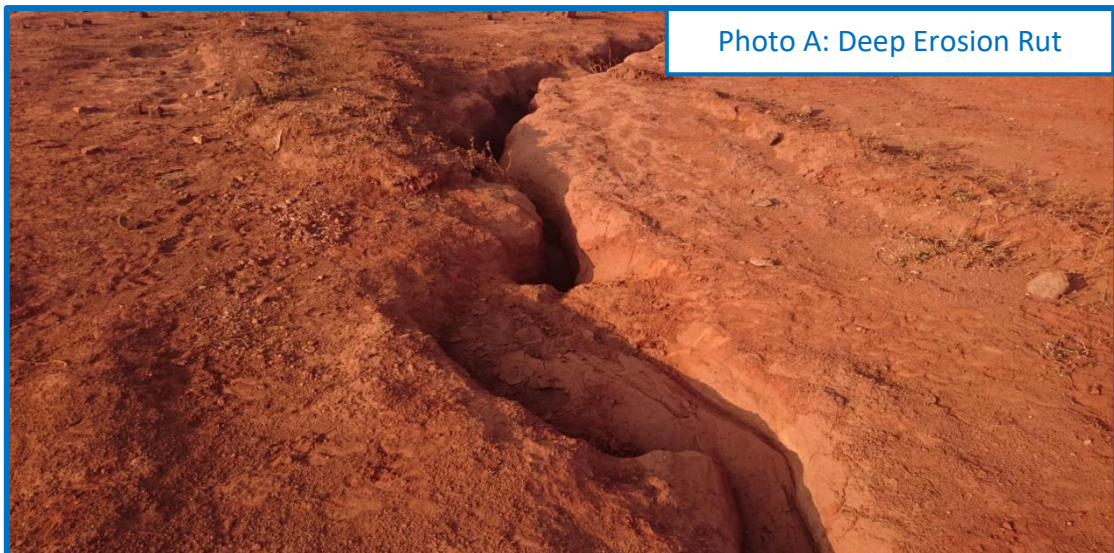


2.3 Drainage

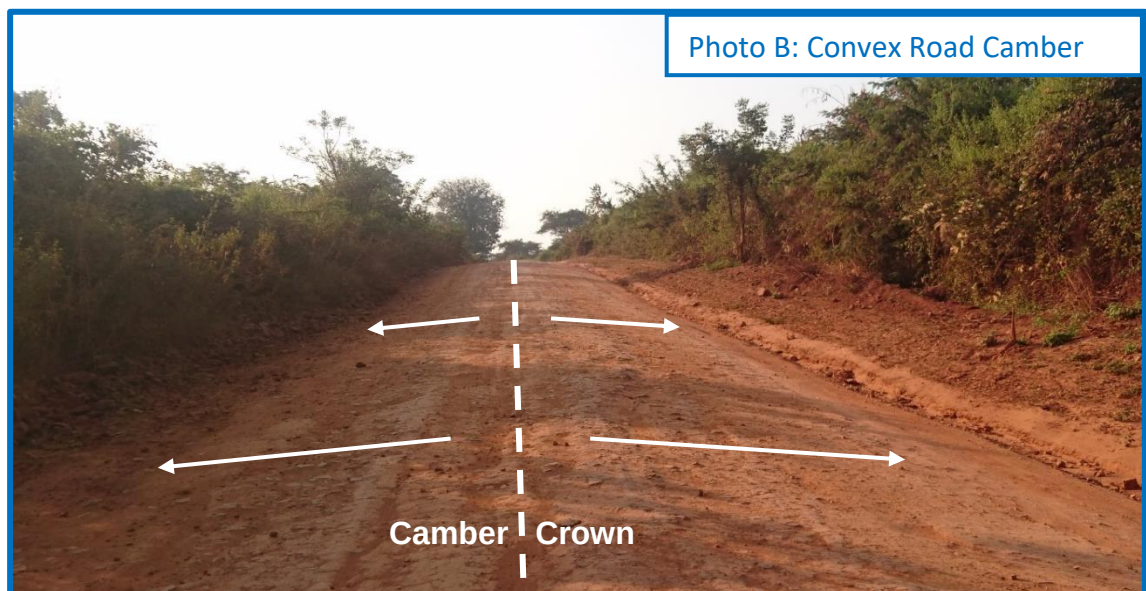
The drainage nature of the site will mirror its topographic nature as detailed in section 2.2.2 of this report. The alternations to the sites surface during the entail construction of the road as well as the diversity of the sites slopes will result in a variable drainage character.

Due to the predominantly steep sloping nature of the road, the site will drain by means of **high energy surface run-off**. Storm water will eventually flow from the high lying limbs of the ridge-crest, towards the surrounding valley structures (Section 2.2.2). Due to the undulating nature of the road, drainage will be highly variable across the length of the road.

The steep sloping nature of the site will aid **rapid surface water flow**, rather than surface infiltration into the underlying soils. This steep sloping nature has resulted in the formation of multiple **erosion features** along the roads length. The most notable of these features were in the form of deep erosion ruts running parallel to the road. These erosion ruts were most extensively encountered in close proximity to the brickyard (Photo A below).



Within the central sections of the road, between chainages of approximately 1+950 and 3+550, the gravel road was seen to host a distinct **convex camber**, implemented to promote drainage away from the road, towards its outermost flanks.



Furthermore, evidence for periodic **surface water ponding**, in the form of moist localised depressions, was encountered in scattered locations within the initial stretches of the road (0+250 to 0+750). Moreover, evidence for fluctuating ground water levels, in the form of ferricrete nodules, was encountered in scattered locations across this length of the road, giving further evidence for the periodic saturation of the underlying soils.



With reference to the available information (Topocadastral Maps 2330AB and 2230CD (Figure 2), scale 1:50 000), the valley structures traversing the site are seen to host non-perennial drainage structures. The initial construction of the gravel road incorporated the installation of culvert structures at both of these locations (Photo D and Photo E overleaf).

The existing culvert structures were seen to be of a narrow and low-lying nature. As a results, the existing culvert structures may not be suitable for the proposed sealed road. During the site walkover, this drainage feature was seen to be flowing at both traversing locations.





The development will influence natural infiltration and run-off rates and appropriate precautions against concentrated flow should therefore be implemented. Adequate drainage should be implemented in order to drain surface water away from the road, and towards the various drainage features surrounding the site. Further channelized flow may occur within the multiple erosion ruts seen to occur at scattered locations along the roads chainage, parallel to the existing road (Photo A in previous section).

2.4 Climate

Thohoyandou receives about **752 mm** of rain per year, with most rainfall occurring during **summer**. It receives the lowest rainfall (4 mm) in June and the highest (154 mm) in January. The average midday temperatures for Thohoyandou range from 22.9°C in June to 30.3°C in January. The region is the coldest during July when the mercury drops to 7.5°C on average during the night.

According to Köppen and Geiger climate classification, the climate is classified as **warm temperate climate**, within the **Lowveld Mountain Bushveld Climatic Region** (Temperate interior (SANS 204-2)). The climatic N-value (Weinert, 1980) of the area is deemed to be between **3 and 4**; therefore, chemical disintegration of the parent rocks in the regional setting is deemed the principal mode of weathering. This mode of weathering favours soil formation, rather than an abundance of rocky fragments occurring within the soil matrix. Physical/mechanical disintegration of parent rock will take place but on a lower scale.

2.5 Vegetation

The study area is located within the Savanna Biome (Mucina and Rutherford, 2006). This biome is a mixed woodland and grassland ecosystem characterised by the trees being sufficiently widely spaced so that the canopy does not close. The natural vegetation has been denuded across the study area due to on-going human activity and infrastructure. However, the areas immediately adjacent to the road were seen to host dense vegetation, specifically between chainages of 1+100 to 1+600 and 2+000 to 3+600.

3 Site Geology and Groundwater Seepage

3.1 Regional Stratigraphic Setting

According to the available geological information (geological series map: 2230 Messina and 2330 Tzaneen); the **site** is underlain by multiple geological units along its length comprising of both metamorphic and igneous bodies.

The initial length of the road (approximately 0+000 to 1+000) is seen to be underlain by grey biotite **Gneiss**, belonging to the **Goudplaats Gneisses**, which form part of the oldest lithological units of the **Swazian Period**. The remaining portions of the road are seen to be underlain predominantly by **Basalt** of the **Sibasa Formation**. Furthermore, the road is seen to be underlain by **alluvial sediments** of the **Quaternary Period**, localised to the valley structures traversing the road, outlined in Section 2.2 (Figure 3).

The contact between the Gneiss and the much younger Basalts is formed by a **prominent fault**.

It should be noted that there is a degree of discontinuity between the two geological series maps, with specific reference to the continuity of the underlying Gneissic bedrock. It has been deduced that the Gneiss terminates at the fault as seen in the geological series map 2330 (Tzaneen), and therefore does not underlay the central length of the road, as depicted in geological series map 2230 (Messina).

The study area does not reflect any risk for the formation of sinkholes or subsidence's caused by the presence of water-soluble rocks (dolomite or limestone), and as such is not deemed "**dolomitic land**".

During the fieldwork phase of the investigation, the road was seen to be **predominantly** underlain by thick deposits deemed to be **transported material** of the Quaternary Period. In **localised portions** of the site, the underlying **residual Basalt** soils were encountered.

Transported Material

These young deposits consist of **multiple cycles of deposition** resulting from varying transport mechanisms (a combination of both alluvial and colluvial deposits). The final product is a layered sediment deposit with **frequent in-situ variations** in predominantly composition and colour.

The variability of these thick sediment deposits will have an effect on the **continuity** of the material properties; with the variability directly linked to the transported nature of the in-situ soils.

The predominant sediment deposits within the region are seen to comprise of transported material of an alluvial origin. Alluvium is a general name for sediments which have been deposited by river and stream systems during different depositional times. The properties of the alluvium can **vary substantially**, and are dependent on the geology within the catchment area, the depositional nature of the river system, as well the competence of the river.

Continued Overleaf...

Residual Basalt

For a **low degree of weathering of the Basaltic bedrock**, the residual soils of these rocks may comprise of **gravel** within a matrix of silt and clay, depending on the climatic nature of the area (physical, chemical or biochemical weathering). Under **more intense and prolonged weathering**, the residuum will break down into finer grained silty/clayey soils. The relative thickness of these soils will be directly linked to the bedrock topography, morphology and mineralogy. However, the properties of the soil are not only controlled by the regional geology (i.e. the parent material) but also by the mechanism of decomposition and weathering.

The material exposed during the fieldwork phase of the investigation was seen to display a high degree of weathering. The Basalt was seen to display a deeply weathered nature, with thick deposits of clay-rich material, as seen in the borrow area exposures (Appendix A)

3.2 Prominent Geological Structures

The available geological information indicates the presence of a number of geological features traversing the road, seen to comprise of a number of intrusions and faults. Diabase dyke and sill intrusions are seen to traverse the road at multiple locations. The dyke intrusions have a prominent NE/SW strike and are most frequently associated with the Gneiss underlying the eastern lengths of the road. A single sill intrusion is seen to have intruded into the Basalt, and is located at the approximate location of the brickyard. Due to the chemical similarities between Basalt and Diabase, the residual soils are anticipated to display similar properties.

As previously mentioned, a prominent fault, namely the Siloam Fault, is seen to subdivide the Gneiss and Basalt at an approximate chainage of 1+150.

Due to the thick nature of the transported soils, the structures mentioned above were **not** seen to traverse the site. It must be noted that the localised presence of the above mentioned geological structures can lead to the formation of micro-structures which could traverse the site i.e. jointing, feeder dykes and hydrothermal veins. These structures can affect the geotechnical properties of the in-situ bedrock.

3.3 Regional Seismic Risk

According to **Kijko et al (2003)** the regional seismic hazard in the project area can be defined as **LOW**, exhibiting a 10% probability of a seismic event with a peak ground acceleration that will exceed 0.1 G within a period of 50 years. This is due to the tectonic stability of both the Kaapvaal Craton.

3.4 Regional Hydro-geological Setting

According to the available published hydrogeological information (Hydrogeological Series Maps: 2127 Messina (2002) and 2330 Phalaborwa (1998)); the fractured rock mass underlying the study area at depth represents an **Intergranular and Fractured Aquifer** where groundwater rest levels occurs within both the fractures of the bedrock as well as between grains of the intact rock. Borehole yields are typically in the order of 2.0 to 5.0 l/s.

The groundwater quality is deemed to be between **0 and 70 mS/m** (electrical conductivity range).

No large scale groundwater abstraction is seen to occur within close proximity to the site, according to the available information.

3.5 Groundwater Occurrences- Site Specific

Groundwater seepage was not encountered in any of the test pits excavated across the site. However, pedogenic material (ferricrete nodules) was identified within a short length of the road, between a chainage of approximately 0+400 to 0+750. The presence of pedogenic material indicates the formation of a fluctuating water table after prolonged precipitation events. The **pedogenic material** was seen to occur from depths of between approximately **0.05 and 0.50 m** below the existing ground level.

4 Geotechnical Setting

Mabu Geotechnical Consultancy was appointed by Letaba Lab to compile an in-depth geotechnical report for the above mentioned centerline and materials investigation. No field work exercises (excavations) were completed by the author of this report.

4.1 Trenching and DCP Testing- Centerline Investigation

A total of **nineteen (19) test pits**, marked TP1 to TP19, were excavated to a depth of at least 1.2 meter below the existing ground level or refusal; through the use of a TLB-type light mechanical excavator (as requested by the Client). The test pits were excavated along the proposed route of the new sealed road in such a way as to expose the various soil horizons at representative locations across the site.

Testing locations can be viewed in Figure 6 and Figure 7. Profile logs, as set up by Letaba Lab, are included in Appendix B1.

Furthermore, a total of **120 Dynamic Cone Penetrometer (DCP)** tests were completed across the road at approximately 50 m intervals, measured on ground level with a meter-wheel; to give an indication of the consistency of the in-situ material spanning across the site. Detailed results for the one-meter DCP's are included in Appendix B3.

The results of the fieldwork phase of the investigation can be **summarized** as detailed below:

4.2 Generalised Geotechnical Properties

Note: this description is based on field observations, and does **not** reflect the results of any laboratory tests.

4.2.1 Introduction to Site Segmentation

The road in question was seen to display a **narrow, meandering and undulating character**. Due to the variable and steep nature of the surface morphology, the initial construction of the road incorporated a degree of cut and fill operations to level the roads surface. Cutting typically occurred in the steep segments of the road, particularly east of the brickyard, between chainages of approximately 1+750 to 1+450, as well as east of Culvert 2, between chainages of 3+350 to 3+600. The road was not seen to be elevated (fill) extensively along its length.

The in-situ **natural soils** encountered across the site were typically seen to display a **very poor nature** with regards to the use in road construction, hosting a significant proportion of fines, displaying a plastic nature.

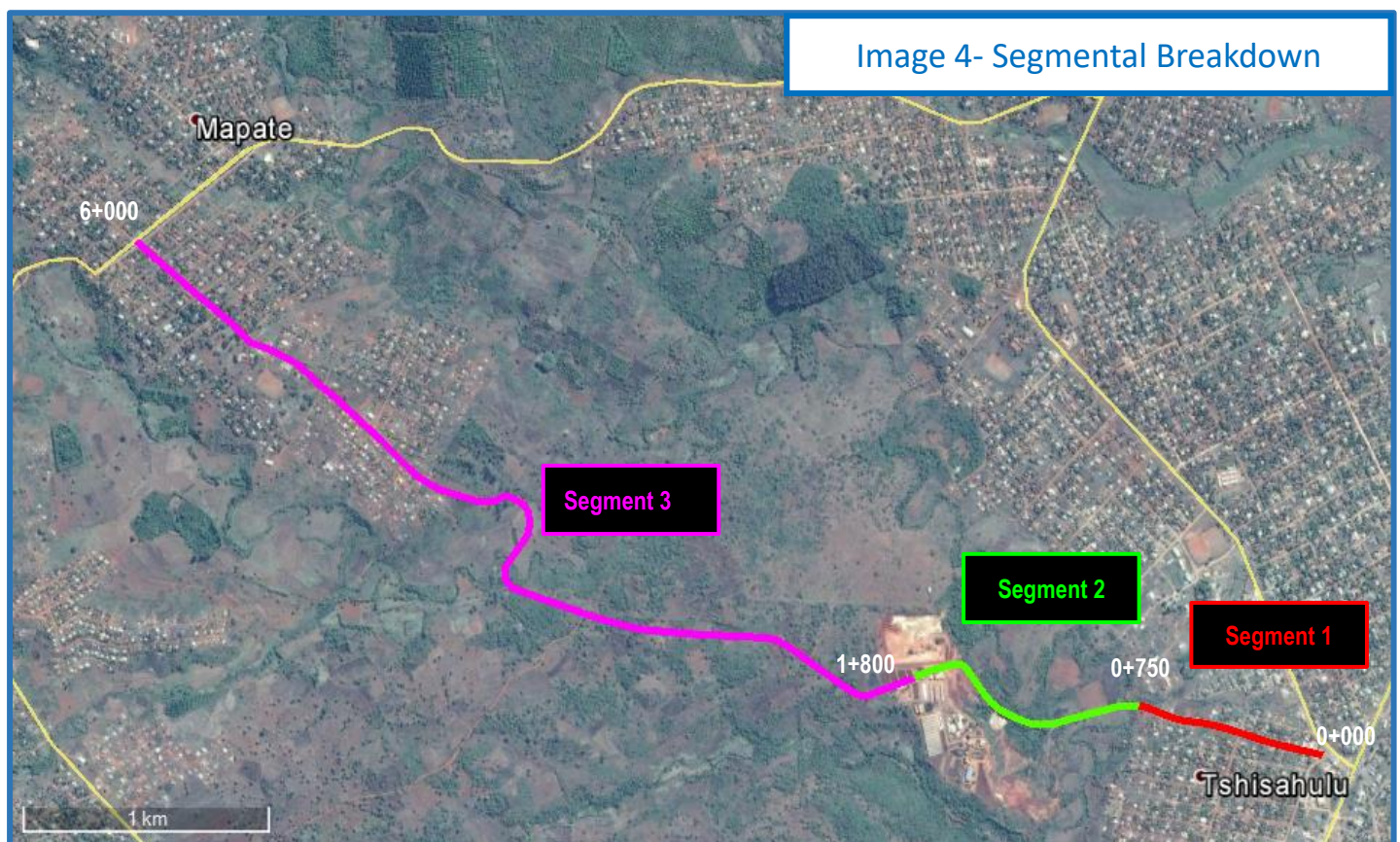
In contrast, the **imported soils** encountered across the road displayed a more **competent nature** for use as road layer works. However, the **continuity** of this horizon was seen to be **limited**. The imported material was seen to be most prominent and extensive along the stretch of road between the first culvert and the brickyard. Within the remainder of the road, the presence of the imported material was seen to be limited, particularly with regards to its thickness.

It should however be noted that in localised lengths of the road, the uppermost material encountered was seen to be **uncontrolled fill material** laid down during past human activities. This material was seen to be comprised of natural materials contaminated with frequent refuse and building rubble (bricks). The uncontrolled fill was **very limited** in **extent** (both lateral and vertical), occurring in localised portions of the road across the road. This material was seen to be most frequent within the vicinity of the brickyard, as well as in scattered pockets within the Tshisahulu Settlement. As such, the occurrence of this material will not form a critical part of the roads segmentation.

The analysis and associated segmentation of the existing wearing course below, is based directly on the information which was collected during the fieldwork phase of the investigation- including soil profiling, sampling and photography- as presented by Letaba Lab. The information presented in the section to follow serves as a summary of the material exposed across the road, and is based on point data. For this reason, fluctuations in the presented material properties may occur between known testing locations.

With reference to the presented soil profiles and the detailed site walkover (field observations); the entire section can be sub-divided into **three separate geotechnical entities** (Image 4 and Figure 5). This sub-division takes into account both the distinct changes in the exposed **soil profiles** across the road, with the occurrence and non-occurrence suitable material within the **upper 300 mm**. The segment breakdown of the gravel road is as follows:

- **Segment 1** (Chainage 0+000 to 0+750)
- **Segment 2** (Chainage 0+750 to 1+800)
- **Segment 3** (Chainage 1+800 to 6+000)



Exact soil properties are displayed in the soil profiles presented in **Appendix B1** of this report.

The table below displays the generalised site nature and segmentation of the road; with the text to follow giving a more detailed breakdown of the exposed soil profiles and associated geotechnical character:

Table 1: Generalised Site Nature and Segmentation

Segment Number	Chainage	Excavated Test Pits	General Observed Character
1	0+000 to 0+750	TP1 to TP3	Steep slopes approaching the valley structure The occurrence of uncontrolled fill material (limited vertical extent) Typically underlain by fine grained transported clayey soils of a poor nature (to full excavation depth) Localised occurrence of pedogenic material (indicating periodic saturation of the subsoils)
2	0+750 to 1+800	TP4 to TP7	Steep slopes approaching the brickyard Uneven road surface surrounding the brickyard with deep erosion ruts The localised occurrence of uncontrolled fill material (limited vertical extent) The occurrence of controlled imported material typically exceeding a depth of 300 mm below the existing road level Lowermost material comprised of fine grained transported clayey soils of a poor nature Non-perennial Drainage channel between chainages of approximately 0+750 to 1+100
3	1+800 to 6+000	TP8 to TP19	Typically steep slopes becoming gentle towards the Mapate Settlement Cambered surface between the brickyard and Culvert 2 The occurrence of uncontrolled fill material within close proximity to the brickyard The occurrence of controlled imported material of variable thickness Lowermost natural material comprised of fine grained clayey soils of a poor nature (either transported or residual material) Non-perennial Drainage channel between chainages of approximately 3+600 to 3+950

The sections of the road traversing the various drainage channels will display their own characteristic spatial variability. Therefore, these sections have been addressed separately from the roads segmentation.

4.2.2 Prominent Drainage Structures

As seen during the site walkover phase of the investigation, the gravel road traverses known drainage channels, and associated valley landforms, at two locations. The approximate chainages of these road segments are as follows:

- 0+750 to 1+100; and
- 3+600 to 3+950

These two road sections were seen to each host an existing culvert structure, as depicted in the Photo Library in (Appendix A). These culverts structures were seen to be relatively narrow and low lying. The suitability of these structures should be addressed prior to the construction of the proposed new sealed road.

The material succession encountered in the vicinity of the drainage channels was seen to host limited imported material. Furthermore, the in-situ natural material exposed within these sections of the site were seen to of a poor nature. As such, the in-situ material horizons encountered in close proximity to the drainage channels were not seen to display a notably different nature compared to those encountered across the remainder of the site. However, due to the intrinsic variability within these geomorphological settings, the drainage channels will require additional attention during the construction phase.

Emphasis needs to be placed on areas bordering or traversing existing drainage structures. It must be noted that groundwater flow may occur at shallow depth within the sandy deposits lining the stream channels for a period after the rainy season, with the ponding of surface water also possible in localized areas after precipitation events. This may lead to localized quicksand conditions (i.e.: loss of strength under loading) in the sandy topsoil during and after precipitation events, hampering access to heavy vehicles traversing the site.

A detailed description of the nature of the material present within each segment, as presented in Section 4.2.1, is as follows:

Excluding the drainage structures presented in Section 4.2.2 the remaining portions of the site can be summarised as follows:

4.2.3 Segment 1: 0+000 to 0+750 (Test pit TP1 to TP3)

Segment 1 can be summarised as follows:

The results of the trenching and site walkover phases indicate that Segment 1 of the existing gravel road is generally underlain by transported material displaying a characteristic fine grained nature. In localised lengths of Segment 1, the transported material was overlain by a thin horizon of uncontrolled imported fill material. Test pits were placed in such a way as to determine the extent of these deposits.

In localised lengths of Segment 1, the uppermost material encountered was seen to comprise of imported material deemed to be **uncontrolled fill material**, contaminated with frequent refuse and building rubble. This material was laid down in an **uncontrolled manner** due to past human activities within the Tshisahulu Settlement. This material was seen to display a highly variable nature with regards to both material properties, as well as extent (vertical and lateral).

The **uncontrolled fill material** was seen to be present as a *slightly moist; yellowish brown; medium dense; silty clayey sand and clayey sand with frequent gravel sized inclusions; with frequent refuse and building rubble*.

Where encountered, this uncontrolled fill horizon was seen to span from the surface to depths of between 0.05 and 0.08 meters below the existing wearing course.

The lowermost material horizon encountered across Segment 1, was seen to comprise of natural transported material deemed to be of an **alluvial origin**. Alluvium is a general name for sediments which have been deposited by river and stream systems during different depositional sequences. The properties of the alluvium are impacted by the source of the material, as well as the nature of both the transport mechanism and the depositional environment.

The alluvium encountered across Segment 1 was seen to display a slightly variable nature, particularly with reference to the occurrence of pedogenic material. In general, these soils were seen to display a fine grained clayey nature and was typically described as a *slightly moist; reddish brown mottled black; firm to stiff; intact; clayey sand with scattered gravel sized inclusions*.

Within test pits TP2 and TP3, the alluvium was seen to host scattered to frequent ferricrete nodules, encountered from depths of between 0.05 and 0.50 m below the existing ground level.

This transported material was seen to span from either the surface or from below the above mentioned uncontrolled fill horizon to a depth of approximately 1.3 m below the existing wearing course.

Excavations were stopped at a depth of approximately 1.3 m below the existing ground level, in accordance with the Clients request.

4.2.4 Segment 2: 0+750 to 1+800 (Test pit TP4 to TP7)

Segment 2 can be summarised as follows:

The results of the trenching and site walkover phases indicate that Segment 2 of the existing gravel road is generally underlain by imported material. Thereafter, the imported material was seen to be underlain by transported material deemed to be of alluvial origin. In localised lengths of Segment 2, the imported material was blanketed by a thin horizon of uncontrolled fill material.

The imported material encountered in close proximity to the culvert structure (Culvert 1) was seen to be of limited extent (0.05 m); however, due to the good quality of the underlying transported material, this length of road has been grouped into Segment 2.

Within the vicinity of the brickyard, the uppermost material encountered was seen to comprise of imported material deemed to be **uncontrolled fill material**. This material was seen to display a similar nature as that encountered within Segment 1. However, within Segment 2, this material was seen to be of limited extent, and was only encountered within test pit TP7, spanning from the surface to a depth of approximately 0.1 m below the existing wearing course.

Segment 2 was seen to be underlain with material deemed to be of an **imported origin**. This material was laid down in a **controlled manner** across Segment 2 as part of the initial construction of the gravel road structure.

The imported fill was seen to be present in **multiple horizons** of (up to three distinct horizons) each of **variable extent**. The imported material can be broadly separated into an uppermost coarse-grained material, and a lowermost fine-grained material.

The uppermost imported material was seen to be present as a *dry to slightly moist; olivey grey and olivey brown to brown; medium dense; intact; fine sand with frequent gravel sized inclusions*.

The lowermost imported material was seen to be present as a *slightly moist; reddish orange; stiff; silty clay*.

The various imported horizons were seen to span from either the surface or below the uncontrolled fill material (from 0.1 m in TP7), with a typical combined thickness of 0.3 m, with localised sections displaying a thicker nature (1.0 m within TP5 at the base of the drainage channel). It should be noted that the imported material within the vicinity of the culvert structure was of limited extent, present to 0.05 m below the existing ground level.

The lowermost material horizon encountered across Segment 2, was seen to comprise of natural transported material deemed to be of an **alluvial origin**. The alluvium encountered across Segment 2 was seen to display a slightly variable nature, particularly with reference to the alluvium encountered in close proximity to the drainage channel.

In general, these soils were seen to display a fine grained clayey nature and were typically described as a *slightly moist; reddish brown; stiff; intact; silty clayey sand*.

Within test pits TP4, in close proximity to the drainage channel, the transported material was seen to have a distinctly lower clay content resulting in a lower plasticity and non-cohesive nature.

This transported material was seen to span from below the above mentioned imported fill material to a depth of between approximately 1.3 and 1.5 m below the existing wearing course.

Excavations were stopped at a depth of between approximately 1.3 and 1.5 m below the existing ground level, in accordance with the Clients request.

4.2.5 Segment 3: 1+800 to 6+000 (Test pit TP8 to TP19)

Segment 3 can be summarised as follows:

The results of the trenching and site walkover phases indicate that Segment 3 of the existing gravel road is generally underlain by **imported material of variable extent**. Thereafter, the imported material was seen to be underlain by transported material deemed to be of alluvial origin. In scattered locations of the road, this transported material was seen to be further underlain by residual Basalt. Furthermore, localised lengths of Segment 3 were seen to be blanketed by uncontrolled fill material.

Within close proximity to the brickyard (chainage of 1+800 to 2+600), the uppermost material encountered was seen to comprise of imported material deemed to be **uncontrolled fill material**. This material was seen to display a similar nature as that encountered across Segment 1 and Segment 2. However, within Segment 3, this material was seen display a thicker nature, spanning from the surface to depths of between 0.3 and 0.6 m below the existing wearing course.

The majority of Segment 3 was seen to be overlain with material deemed to be of an **imported origin of variable extent**. The imported material was seen to display a similar character to that of the uppermost imported horizon encountered across Segment 2.

The imported material was seen to be present as a *slightly moist; light brown to light reddish orange and olive grey; medium dense; intact; silty clayey sand to a silty clayey gravel*.

The various imported horizons were seen to span from the surface to depths typically varying between 0.05 and 0.2 meters below the existing wearing course. Localised sections of the road were seen to host thicker imported deposits, of up to 0.35 m (TP19).

Across Segment 3, the abovementioned imported horizons were seen to be underlain by natural transported material deemed to be of an **alluvial origin**. The alluvium encountered across Segment 3 was seen to display a variable nature, with reference to the soil texture, and associated cohesive nature.

In general, these soils were seen to display a fine grained nature and were typically described as a *slightly moist; reddish brown; medium dense and firm; intact; silty clay and clayey silty*.

Continued overleaf...

This transported material was seen to span from below the above mentioned imported fill horizons to a depth of between approximately 0.9 and 1.5 m below the existing wearing course.

In localised lengths of Segment 3, the abovementioned material horizons were seen to be underlain by natural material deemed to be **residual Basalt**. Material within this horizon has predominantly similar chemical properties to that of the in-situ bedrock, but due to weathering will behave/respond as a soil.

The residual material displayed a very similar nature to that of the transported material exposed across the site. This material horizon was only encountered in locations where the uppermost material horizons were removed during the previously construction of the gravel road.

These soils were seen to display a fine grained nature and were described as a *slightly moist; reddish brown to dark reddish brown blotched yellow with orange streaks; firm; intact; silty clay with the localised occurrence of frequent gravel and cobble sized inclusions*.

The residual Basalt was only encountered within test pits TP11 and TP14, spanning from below either the imported or transported material, to a depth of between approximately 1.35 and 1.5 m below the existing wearing course.

Excavations were stopped at a depth of between approximately 1.2 and 1.5 m below the existing ground level, in accordance with the Clients request.

4.3 In-situ Testing- DCP Testing

A total of 120 Dynamic Cone Penetrometer (DCP) tests were performed throughout the length of the road in order to give an indication of the consistency of the in-situ material spanning across the site. DCP tests were completed at approximately 50 m intervals and staggered along the existing gravel road (left-hand side, centerline or right-hand side).

DCP tests were performed at natural moisture conditions and thus the values vary greatly from the CBR results measured under controlled conditions within the laboratory. This variation is mainly due to the lab specimens being analysed under saturated conditions. It should be noted that the strength of the in-situ soil changes greatly with change in moisture conditions. DCP test should therefore only be used as indicative statistics for the site.

The tables below display the modelled DCP results across the length of the investigated road. An overall trend was observed within the DCP test results whereby an **initial high consistency** (inferred in-situ CBR) was observed, followed by a **rapid decrease in consistency** with an increase in depth.

Moreover, the **upper 300 mm**; and more specifically uppermost 150 mm, yielded the **highest consistency results**, attributed to the compacted nature of the uppermost material horizons overlying the majority of the gravel road. Although the uppermost horizons displayed the highest consistencies; it must be noted that these soils displayed extensive variability between known testing points (short distances). This variability can be link to the variable composition of the uppermost soils along the length of the road as well as varying degrees of in-situ compaction (staggered testing completed within and surrounding existing primary wheel tracks).

Furthermore, as seen in the Graph 1 and 2 overleaf, the DCP tests completed across the entire length of road, within the uppermost soil horizons, were seen to display a **general decrease in CBR values with an increase in chainage** (as depicted by the red trend line). Graph 1 and 2 model the changes and variability of the inferred in-situ CBR values present for depths ranging from the 0 to 150 mm and 150 to 300 mm respectively.

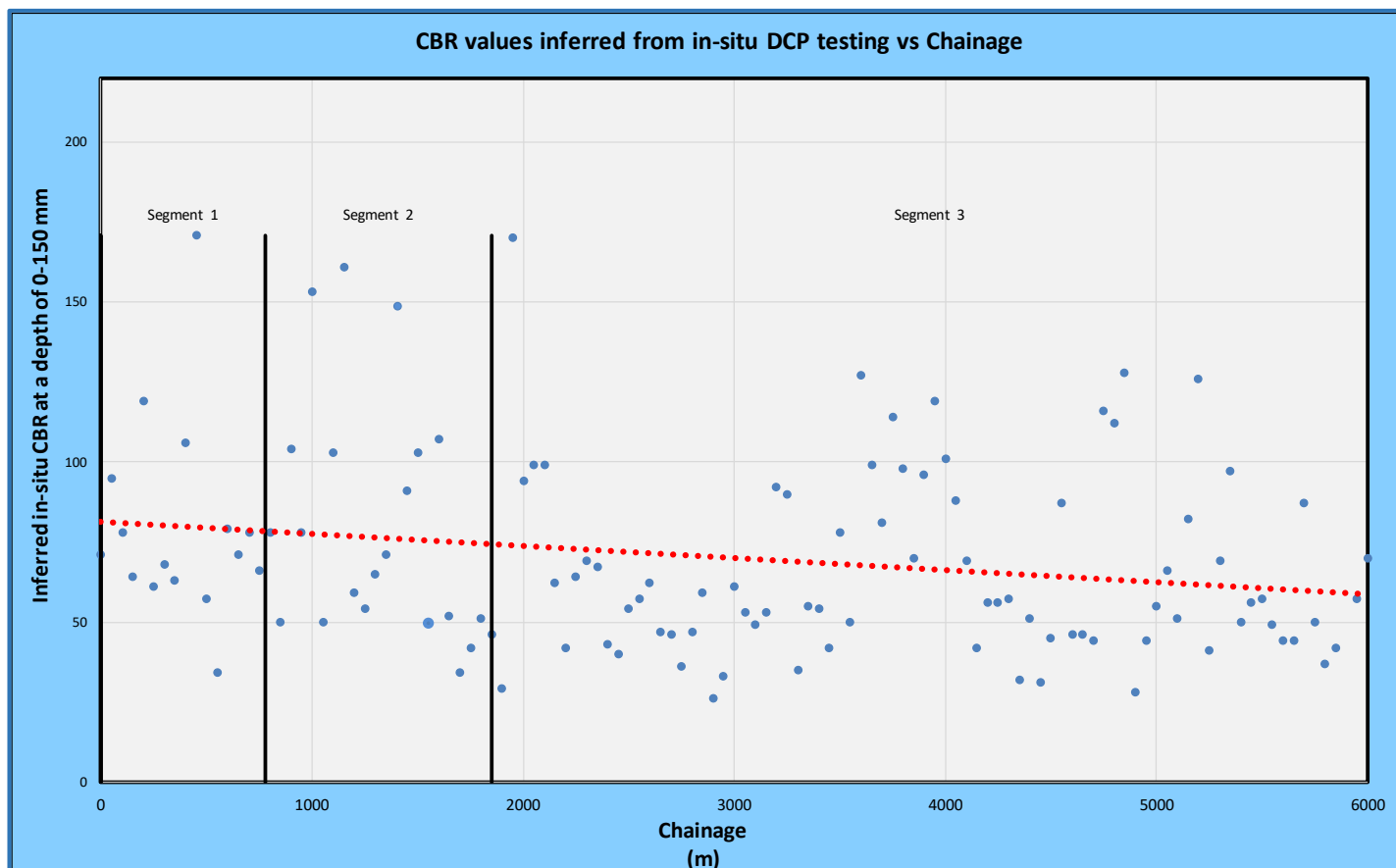
On the other hand, the **natural material**, was seen to display **substantially lower** and more uniform consistency results across the entire length of the existing gravel road.

The majority of the DCP tests completed across the site reached full penetration depths of between approximately 950 and 1000 mm below the existing ground level. Refusal was encountered in scattered locations and at variable depths across the site; typically resulting from the occurrence of cobble sized inclusions in the in-situ soil horizons.

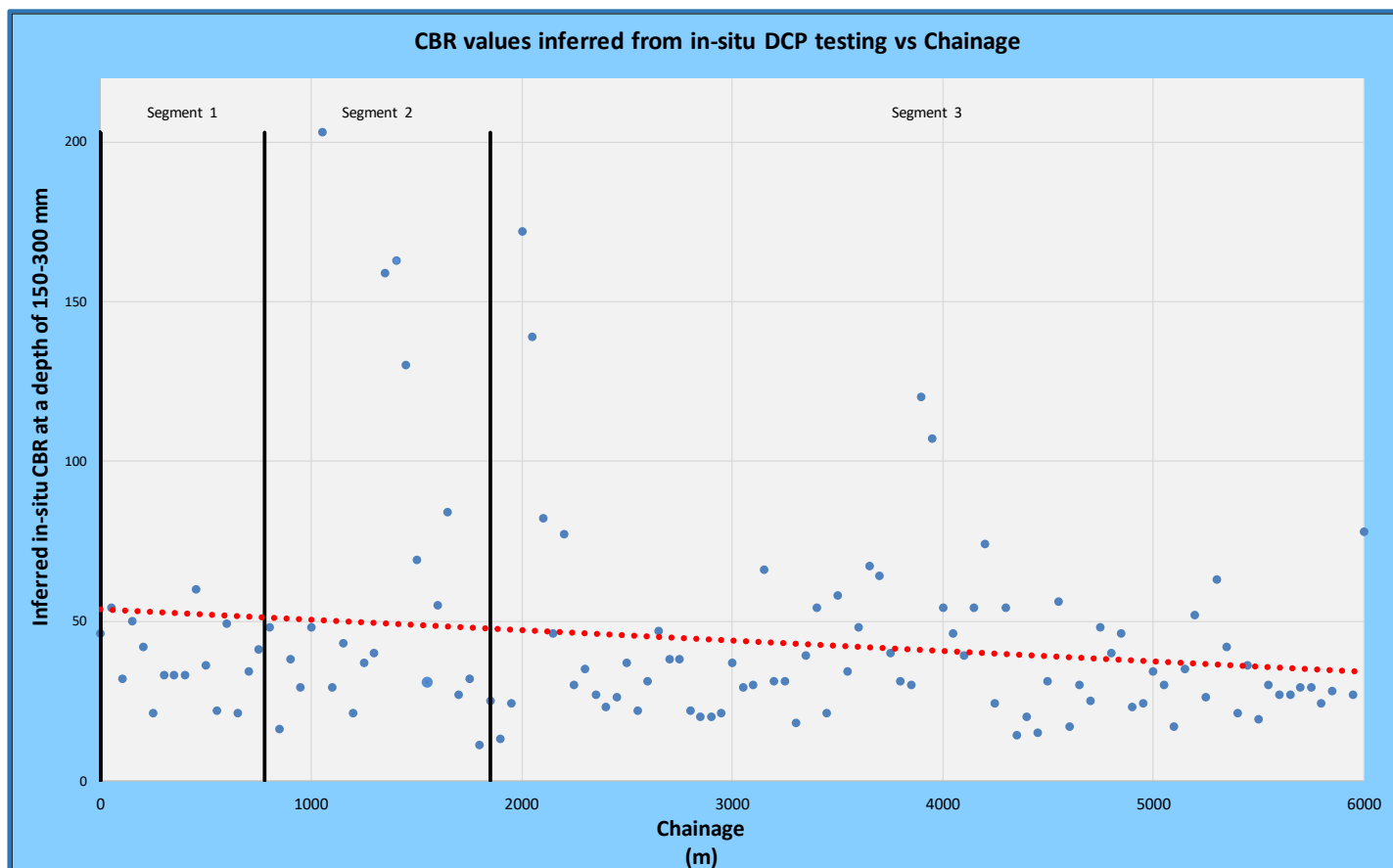
It must be noted that the fluctuations of the in-situ moisture content within the exposed soil horizons may have had a detrimental effect on the accuracy of the DCP results, specifically with regards to the fine transported material.

Detailed results are included in Appendix B3

Graph 1: CBR values inferred from in-situ DCP testing at a depth of 0 – 150 mm versus chainage



Graph 2: CBR values inferred from in-situ DCP testing at a depth of 150 – 300 mm versus chainage



Please see the summaries of the DCP Tests overleaf ...

Table 2: DCP Summary displaying inferred in-situ CBR values across the centerline

CENTERLINE INVESTIGATION- DCP SUMMARY- LETABA LAB									
ANNOTATED BY MABU GEOTECHNICAL CONSULTANCY									
Modelled in-situ CBR at 150 mm depth intervals									
Contract : Upgrading of Mapate Access Road									
DCP no.	Position Offset	KM	Insitu C.B.R at following depths in mm						Max. Pen. Depth
			0-150	150-300	300-450	450-600	600-750	750-900	
Segment 1									
1	CL	0+000	71	46	24	24	21	14	1000
2	LHS	0+050	95	54	36	27	12	9	990
3	RHS	0+100	78	32	22	18	10	8	1000
4	CL	0+150	64	50	20	13	12	11	970
5	LHS	0+200	119	42	27	19	11	9	1000
6	RHS	0+250	61	21	54	68	56	17	980
7	CL	0+300	68	33	19	23	20	15	1000
8	LHS	0+350	63	33	24	68	82	67	1000
9	RHS	0+400	106	33	31	19	15	20	990
10	CL	0+450	171	60	31	26	22	17	959
11	LHS	0+500	57	36	29	35	32	30	1000
12	RHS	0+550	34	22	17	15	13	11	980
13	CL	0+600	79	49	22	13	10	7	1000
14	LHS	0+650	71	21	10	9	15	14	940
15	RHS	0+700	78	34	15	21	15	13	1000
16	CL	0+750	66	41	27	19	24	24	990
Segment 2									
17	LHS	0+800	78	48	45	32	15	11	1000
18	RHS	0+850	50	16	8	-	-	-	540
19	CL	0+900	104	38	20	15	9	8	1000
20	LHS	0+950	78	29	11	8	7	5	1000
21	RHS	1+000	153	48	14	8	7	4	945
22	CL	1+050	50	203	182	-	-	-	515
23	LHS	1+100	103	29	22	13	12	8	985
24	RHS	1+150	161	43	51	23	12	13	985
25	CL	1+200	59	21	23	18	22	19	1000
26	LHS	1+250	54	37	18	8	7	6	994
27	RHS	1+300	65	40	54	37	22	13	954
28	CL	1+350	71	159	53	38	22	23	1000
29	LHS	1+400	149	163	53	22	15	13	1000
30	RHS	1+450	91	130	125	27	9	8	983
31	CL	1+500	103	69	101	20	21	31	1000
32	LHS	1+550	50	31	25	22	14	12	956
33	RHS	1+600	107	55	21	14	13	9	1000
34	CL	1+650	52	84	47	24	15	18	970
35	LHS	1+700	34	27	17	16	10	10	960
36	RHS	1+750	42	32	21	20	18	13	1000
37	CL	1+800	51	11	9	16	14	11	978
Segment 3									
38	LHS	1+850	46	25	17	12	12	11	988
39	RHS	1+900	29	13	11	16	12	8	1000
40	CL	1+950	170	24	10	10	10	10	940
Legend									
150									
0									

Table 3: DCP Summary displaying inferred in-situ CBR values across the centerline

CENTERLINE INVESTIGATION- DCP SUMMARY- LETABA LAB									
ANNOTATED BY MABU GEOTECHNICAL CONSULTANCY									
Modelled in-situ CBR at 150 mm depth intervals									
Contract : Upgrading of Mapate Access Road									
DCP no.	Position Offset	KM	Insitu C.B.R at following depths in mm						Max. Pen. Depth
			0-150	150-300	300-450	450-600	600-750	750-900	
41	LHS	2+000	94	172	44	14	10	14	1000
42	RHS	2+050	99	139	20	12	12	10	1000
43	CL	2+100	99	82	32	48	37	21	1000
44	LHS	2+150	62	46	13	9	6	4	1000
45	RHS	2+200	42	77	27	24	25	20	978
46	CL	2+250	64	30	16	16	13	12	984
47	LHS	2+300	69	35	14	9	10	10	1000
48	RHS	2+350	67	27	15	9	9	7	975
49	CL	2+400	43	23	17	11	9	7	930
50	LHS	2+450	40	26	19	17	16	15	1000
51	RHS	2+500	54	37	16	12	11	7	1000
52	CL	2+550	57	22	15	12	13	11	1000
53	LHS	2+600	62	31	14	20	-	-	688
54	RHS	2+650	47	47	29	30	16	13	1000
55	CL	2+700	46	38	21	20	21	18	973
56	LHS	2+750	36	38	21	17	18	15	974
57	RHS	2+800	47	22	18	16	-	-	750
58	CL	2+850	59	20	17	12	10	10	954
59	LHS	2+900	26	20	21	17	16	16	958
60	RHS	2+950	33	21	18	18	17	20	970
61	CL	3+000	61	37	17	15	16	16	983
62	LHS	3+050	53	29	25	24	23	19	1000
63	RHS	3+100	49	30	16	17	15	16	950
64	CL	3+150	53	66	37	31	19	16	982
65	LHS	3+200	92	31	19	16	16	15	973
66	RHS	3+250	90	31	18	13	13	14	988
67	CL	3+300	35	18	14	11	13	15	978
68	LHS	3+350	55	39	17	12	9	8	967
69	RHS	3+400	54	54	27	19	17	14	968
70	CL	3+450	42	21	15	21	21	15	1000
71	LHS	3+500	78	58	32	19	13	13	1000
72	RHS	3+550	50	34	20	16	12	15	1000
73	CL	3+600	127	48	28	20	15	15	958
74	LHS	3+650	99	67	47	40	22	20	1000
75	RHS	3+700	81	64	26	14	9	8	930
76	CL	3+750	114	40	21	9	14	14	1000
77	LHS	3+800	98	31	10	5	5	5	1000
78	RHS	3+850	70	30	14	8	6	6	970
79	CL	3+900	96	120	71	23	14	14	1000
80	LHS	3+950	119	107	77	71	35	20	980
Legend			150						
			0						

Table 4: DCP Summary displaying inferred in-situ CBR values across the centerline

CENTERLINE INVESTIGATION- DCP SUMMARY- LETABA LAB									
ANNOTATED BY MABU GEOTECHNICAL CONSULTANCY									
Modelled in-situ CBR at 150 mm depth intervals									
Contract : Upgrading of Mapate Access Road									
DCP no.	Position Offset	KM	Insitu C.B.R at following depths in mm						Max. Pen. Depth
			0-150	150-300	300-450	450-600	600-750	750-900	
81	RHS	4+000	101	54	36	26	17	15	990
82	CL	4+050	88	46	20	16	22	17	1000
83	LHS	4+100	69	39	18	17	18	16	1000
84	RHS	4+150	42	54	22	22	25	17	1000
85	CL	4+200	56	74	30	20	19	18	1000
86	LHS	4+250	56	24	16	12	9	8	980
87	RHS	4+300	57	54	26	23	18	14	974
88	CL	4+350	32	14	6	5	7	11	980
89	CL	4+400	51	20	15	13	12	10	1000
90	LHS	4+450	31	15	8	7	6	6	954
91	RHS	4+500	45	31	22	19	19	17	990
92	CL	4+550	87	56	32	20	20	15	988
93	LHS	4+600	46	17	13	14	9	9	1000
94	RHS	4+650	46	30	15	9	12	10	1000
95	CL	4+700	44	25	20	14	14	11	925
96	LHS	4+750	116	48	21	16	10	8	1000
97	RHS	4+800	112	40	24	15	8	6	943
98	CL	4+850	128	46	22	16	17	19	1000
99	LHS	4+900	28	23	17	11	8	7	1000
100	RHS	4+950	44	24	16	13	11	10	1000
101	CL	5+000	55	34	19	15	15	15	1000
102	LHS	5+050	66	30	20	15	15	11	1000
103	RHS	5+100	51	17	12	8	9	8	1000
104	CL	5+150	82	35	16	16	13	11	1020
105	LHS	5+200	126	52	27	18	21	20	1000
106	RHS	5+250	41	26	15	10	8	8	970
107	CL	5+300	69	63	27	14	7	6	981
108	LHS	5+350	97	42	13	6	5	3	987
109	RHS	5+400	50	21	14	12	10	10	953
110	CL	5+450	56	36	22	24	43	25	1000
111	LHS	5+500	57	19	10	6	4	3	940
112	RHS	5+550	49	30	20	15	12	11	1000
113	CL	5+600	44	27	17	14	8	10	1000
114	LHS	5+650	44	27	19	10	8	8	980
115	RHS	5+700	87	29	16	9	8	6	1000
116	CL	5+750	50	29	16	13	9	9	982
117	LHS	5+800	37	24	17	12	10	9	1000
118	RHS	5+850	42	28	13	8	8	9	985
119	CL	5+950	57	27	15	10	9	9	975
120	LHS	6+000	70	78	36	22	8	6	1000
Legend			150						
			0						

4.4 Laboratory Analysis- Materials Investigation

The results from the laboratory testing phase of the investigation are based directly on the nature of the samples extracted by the field team of Letaba Lab, from the various exposed soil horizons across the site.

Across the entire site, the exposed **natural soils** (both transported and residual material) were seen to display a **poor quality** with regards to the use in road construction, with highly localised pockets of better quality natural material.

The segmentation (Segment 1 to Segment 3), as described in the previous sections of this report will form the framework of the material summaries to follow. Detailed Lab results are included in Appendix B2.

Within **Segment 1 and Segment 3**, all of the material present within the excavated test pits was seen to **display poor characteristics** with regards to the use in road construction.

Within **Segment 2**, the uppermost **imported material** sampled was seen to be of a **good quality** for the use in road construction. However, the **underlying material** within this segment was seen to display **poor characteristics** with regards to the use in road construction.

The summaries of the lab results presented below are separated according to the material horizons sampled from each test pit, within the specified segment, namely **imported, transported** and **residual** material. It should be noted that the imported material across Segment 1 was not sampled, due to its' limited extent and contaminated nature.

See the table at the end of this section which provides a detailed summary of the lab results.

4.4.1 Laboratory Analysis- Segment 1

The findings summarized below are based on the samples collected from the various soil horizons sampled along the length of Segment 1 of the road in question:

- **Summary of Transported Material**
 - Less than 10 % of the total volume of material exhibits a particle size of larger than 37.5 mm.
 - The material tested is deemed to display a medium to high plasticity with PI values of between 18 and 25.
 - The material reacts **poor** to compaction, with **Californian Bearing Ratio- (CBR) values** of between 5 and 13 at a compaction effort of 93% MOD AASHTO; increasing to between 7 and 25 at a compaction effort of 100% MOD AASHTO.
 - The material exhibits a **Maximum Dry Density** of between 1662 and 1978 kg/m³, with an **Optimum Moisture Content** of between 8.5 and 22.3 %.
 - The material classifies as a **<G9 and G9- type material** (COLTO)
 - The material can be used as **sub-grade** in road construction.

See the table at the end of this section which provides a detailed summary of the lab results.

4.4.2 Laboratory Analysis- Segment 2

The findings summarized below are based on the samples collected from the various soil horizons sampled along the length of Segment 2 of the road in question:

- **Summary of Imported Materials**

- Less than 10% of the total volume of material exhibits particle size of larger than 37.5 mm.
- The material tested is deemed to be non-plastic to slightly plastic with PI values of between NP and SP.
- The material reacts **well** to compaction, with Californian Bearing Ratio- (CBR) values of between 13 and 19 at a compaction effort of 93% MOD AASHTO; increasing to between 29 and 42 at a compaction effort of 100% MOD AASHTO.
- The material exhibits a **Maximum Dry Density** of between 1847 and 2103 kg/m³, with an **Optimum Moisture Content** of between 6.4 and 14.9 %.
- The material classifies as a **G7 and G8- type material** (COLTO)
- The material can be used as **selected layers** in road construction.

- **Summary of Transported Materials**

- Less than 10% of the total volume of material exhibits particle size of larger than 37.5 mm.
- The material tested is deemed to display a low to high plasticity with PI values of between 8 and 22.
- The **majority** of the material reacts **poor** to compaction, with Californian Bearing Ratio- (CBR) values of between 5 and 7 at a compaction effort of 93% MOD AASHTO; increasing to between 12 and 14 at a compaction effort of 100% MOD AASHTO.
- The material exhibits a **Maximum Dry Density** of between 1870 and 1908 kg/m³, with an **Optimum Moisture Content** of between 13.4 and 14.2 %.
- The **majority** of this material classifies as a **worse than G9- type material** (COLTO); with the material sampled from test pit **TP4** classifying as a **G7- type material** (COLTO).
- The material can be used as **sub-grade** layers in road construction.

See the table at the end of this section which provides a detailed summary of the lab results.

4.4.3 Laboratory Analysis- Segment 3

The findings summarized below are based on the samples collected from the various soil horizons sampled along the length of Segment 3 of the road in question:

It should be noted that a **contaminated fill horizon** (hosting refuse and building rubble) was sampled to give an indication of its' re-usability. Furthermore, the building rubble and refuse was excluded during the sampling process.

- **Summary of Contaminated Fill Material**

- Less than 10% of the total volume of material exhibits particle size of larger than 37.5 mm.
- The material tested is deemed to moderately plastic with a PI values of 13.
- The material reacts **well** to compaction, with a Californian Bearing Ratio- (CBR) value of 17 at a compaction effort of 93% MOD AASHTO; increasing to 28 at a compaction effort of 100% MOD AASHTO.
- The material exhibits a **Maximum Dry Density** of 1900 kg/m³, with an **Optimum Moisture Content** of 12.3 %.
- The material classifies as a **<G9- type material** (COLTO), this is due to is **fine grained** nature.
- The material can be used as **sub-grade** layers in road construction.

- **Summary of Imported Materials**

- Less than 10% of the total volume of material exhibits particle size of larger than 37.5 mm.
- The material tested is deemed to be non-plastic to slightly plastic with PI values of between NP and 9.
- The material reacts **well** to compaction, with a Californian Bearing Ratio- (CBR) value of 14 at a compaction effort of 93% MOD AASHTO; increasing to 28 at a compaction effort of 100% MOD AASHTO.
- The material exhibits a **Maximum Dry Density** of 1976 kg/m³, with an **Optimum Moisture Content** of 11.5 %.
- The material classifies as a **G8- type material** (COLTO)
- The material can be used as **selected layers** in road construction.

- **Summary of Transported Materials**

- Less than 10% of the total volume of material exhibits particle size of larger than 37.5 mm.
- The material tested is deemed to display a low to high plasticity with PI values of between 9 and 26.
- The material reacts **poor** to compaction, with Californian Bearing Ratio- (CBR) values of between 4 and 12 at a compaction effort of 93% MOD AASHTO; increasing to between 7 and 21 at a compaction effort of 100% MOD AASHTO.
- The material exhibits a **Maximum Dry Density** of between 1615 and 1856 kg/m³, with an **Optimum Moisture Content** of between 12.1 and 25 %.
- The material classifies as a **worse than G9- type material** (COLTO).
- The material can be used as **sub-grade** layers in road construction.

- **Summary of Residual Material**

- Less than 10% of the total volume of material exhibits particle size of larger than 37.5 mm.
- The material tested is deemed to display a high plasticity with PI values of between 20 and 25.
- The material reacts **poor** to compaction, with Californian Bearing Ratio- (CBR) values of between 10 and 14 at a compaction effort of 93% MOD AASHTO; increasing to between 16 and 26 at a compaction effort of 100% MOD AASHTO.
- The material exhibits a **Maximum Dry Density** of between 1660 and 1663 kg/m³, with an **Optimum Moisture Content** of between 21.1 and 23.3 %.
- The material classifies as a **<G9- and G9- type material** (COLTO).
- The material can be used as **sub-grade** layers in road construction.

4.4.4 Combined Laboratory Test Result Summaries

Please see the detailed **combined summary** of the lab results per sampled soil horizon for Segments 1 through to 3 overleaf. These **tables** graphically display the material characteristics of the various sampled horizons across the site.

The legend below can be used as a guideline of the suitability (COLTO 1998) of the material for the use as controlled layers in road construction.

Legend

-  Material can be used as Subbase (G5; G6)
-  Material can be used as Selected Layers (G7; G8)
-  Material can be used as Subgrade (G9; worse than G9)

Table 5: Material Summary of all the samples extracted across Segment 1 and Segment 2 (Summary annotated by Mabu)

Annotated by Mabu Geotechnical Consultancy					SUMMARY OF TEST RESULTS																				
Test Pit No.	Sample Depth	Sample No. (Site)	Sample No. (Nelspruit Lab)	Sample Description	COLTO Classification	Sieve Analysis Cumulative Percentage Passing									Atterberg Limits			Modified AASHTO		Briquette Info @ 100 % Compaction		CBR of 13,44 kN @			
						53.0	37.5	26.5	19.0	13.2	4.75	2.0	0.425	0.075	GM	LL	PI	LS	OMC %	MDD	Compaction Moisture	% Swell	100%	93%	90%
Segment 1																									
Transported Material																									
1	0,0-1,3	P9060/1	18439/1	Dark Red Inorganic Clay	<G9					100	97	90	73	60	0.77	42	21	9.1	17.5	1785	17.4	0.61	7	5	5
2	0,08-0,5	P9060/2	18439/2	Dark Reddish Orange Clayey Sand	G9					100	92	75	56	43	1.26	43	20	8.5	22.3	1704	22.4	0.28	25	13	7
2	0,5-1,0	P9060/3	18439/3	Dark Red Clayey Sand	G9					100	94	76	50	39	1.35	49	25	10.5	20.5	1662	20.5	0.97	20	9	6
2	1,0-1,3	P9060/4	18439/4	Dark Red Clayey Sand	G9					100	94	76	52	42	1.29	45	20	8.8	8.5	1978	8.5	0.23	21	11	7
3	0,05-1,3	P9060/5	18439/5	Dark Red Inorganic Silt	<G9					100	99	93	75	61	0.71	45	18	7.5	22.3	1717	22.2	0.34	20	5	2
Segment 2																									
Imported Material																									
5	0,0-0,2	P9060/7	18439/7	Light Brown Silty Sand	G7			100	98	96	87	77	53	20	1.5		NP	0	7.5	2080	7.4	0.03	36	15	9
5	0,2-0,5	P9060/8	18439/8	Light Brown Silty Sand	G8		100	95	94	92	83	73	50	21	1.57		SP	0.8	8.8	2072	8.6	0.02	37	13	8
5	0,5-1,0	P9060/9	18439/9	Light Red Silty Sand	G8				100	99	93	81	51	23	1.45		SP	0.8	14.9	1847	15	0.04	29	14	10
6	0,0-0,2	P9060/11	18439/11	Light Reddish Brown Clayey Sand	G7		100	98	92	87	75	65	43	20	1.71	27	19	7.8	7.4	2103	7.2	0.06	42	18	13
7	0,1-0,4	P9060/13	18439/13	Light Yellowish Orange Silty Sand	G7			100	97	95	87	75	48	14	1.63		NP	0	6.4	2041	6.4	0.02	37	19	14
Transported Material																									
4	0,05-1,4	P9060/6	18439/6	Dark Reddish Orange Clayey Sand	G7						100	99	85	40	0.75	25	8	3.4	13.6	1960	13.5	0.1	28	15	8
5	1,0-1,5	P9060/10	18439/10	Dark Red Clayey Sand	<G9					100	96	90	71	49	0.89	31	13	5.8	14.2	1908	14.2	0.2	12	5	3
6	0,3-1,3	P9060/12	18439/12	Dark Red Inorganic Clay	<G9					100	99	98	80	68	0.54	42	22	8.8	13.4	1870	13.2	0.35	14	7	4

Legend

Material can be used as Subbase (G5; G6)



Material can be used as Selected Layers (G7; G8)



Material can be used as Subgrade (G9; worse than G9)

Table 6: Material Summary of all the samples extracted across Segment 3 (Summary annotated by Mabu)

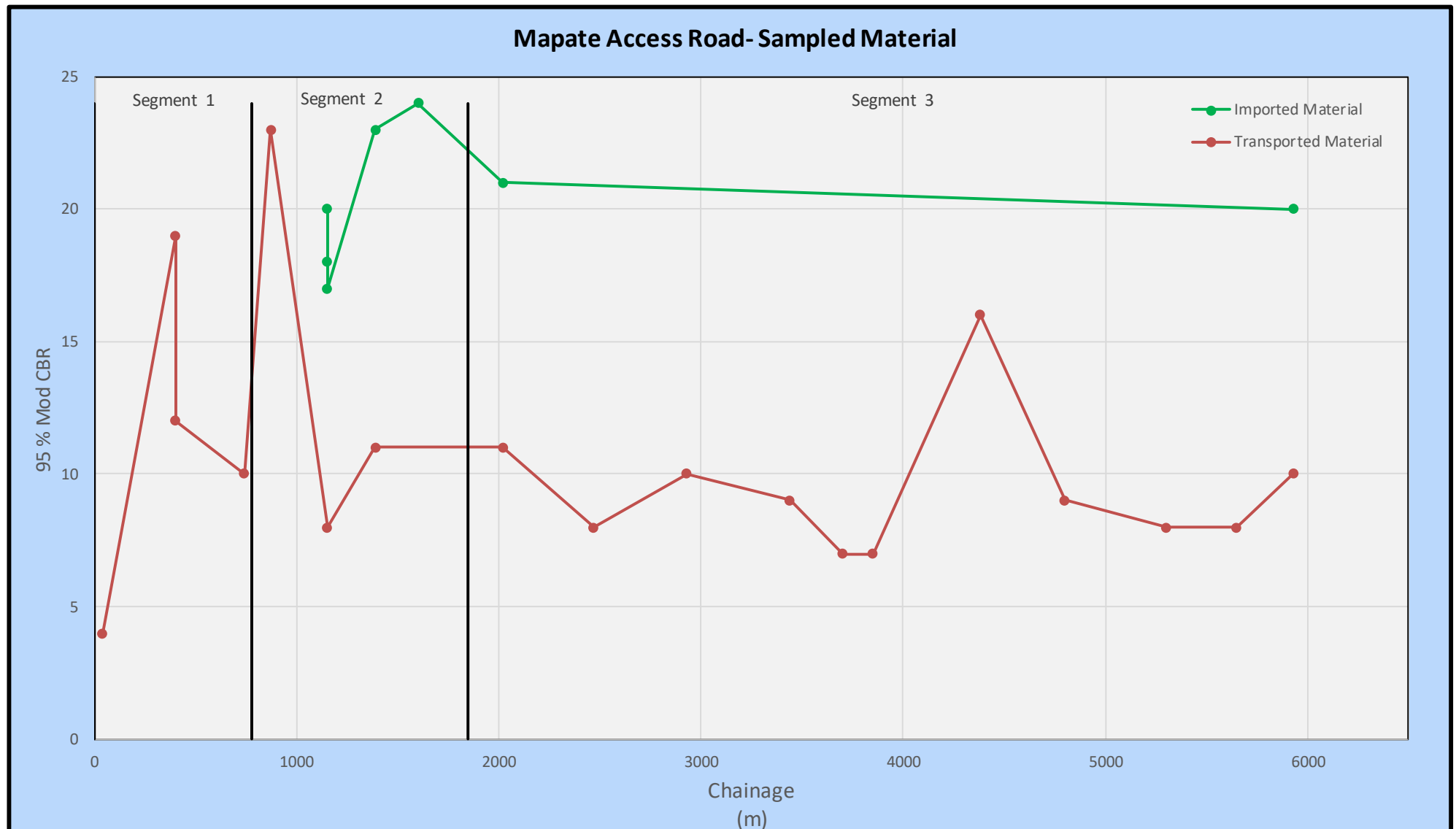
Annotated by Mabu Geotechnical Consultancy					SUMMARY OF TEST RESULTS																				
Test Pit No.	Sample Depth	Sample No. (Site)	Sample No. (Nelspruit Lab)	Sample Description	COLTO Classification	Sieve Analysis Cumulative Percentage Passing								Atterberg Limits			Modified AASHTO		Briquette Info @ 100 % Compaction		CBR of 13,44 kN @				
						53.0	37.5	26.5	19.0	13.2	4.75	2.0	0.425	0.075	GM	LL	PI	LS	OMC %	MDD	Compaction Moisture	% Swell	100%	93%	90%
Segment 3																									
Contaminated Fill Material																									
8	0,0-0,6	P9060/14	18439/14	Dark Reddish Brown Clayey Sand	<G9						100	99	91	49	0.61	31	13	5.1	12.3	1900	12.3	0.13	28	17	12
Imported Material																									
12	0,0-0,2	P9060/20	18439/20	Pale Red Silty Sand	N/A				100	99	96	92	63	22	1.23		NP	0							
19	0,0-0,35	P9060/28	18439/28	Dark Reddish Orange Clayey Sand	G8				100	99	92	83	60	30	1.26	28	9	3.4	11.5	1976	11.3	0.09	28	14	8
Transported Material																									
8	0,6-1,3	P9060/15	18439/15	Dark Red Inorganic Clay	<G9					100	99	99	96	75	0.31	44	20	8.2	19.7	1698	19.7	0.46	13	8	6
9	0,3-1,2	P9060/16	18439/16	Dark Red Inorganic Clay	<G9						100	97	82	64	0.56	48	26	11.1	25	1615	25.1	0.76	14	7	5
10	0,05-1,3	P9060/17	18439/17	Dark Brown Inorganic Clay	<G9							100	98	82	0.19	47	24	9.9	18.2	1719	18.1	0.56	15	8	6
11	0,1-0,9	P9060/18	18439/18	Dark Red Inorganic Clay	<G9						100	99	96	83	0.22	48	24	9.8	21.8	1643	21.4	0.48	13	7	4
12	0,2-1,5	P9060/21	18439/21	Dark Red Clayey Sand	<G9		100	92	86	83	73	66	52	33	1.49	28	9	3.5	12.1	1856	12.2	0.17	10	6	5
13	0,05-1,45	P9060/22	18439/22	Dark Red Inorganic Clay	<G9						100	98	91	62	0.49	36	17	7.2	18.2	1771	18.1	0.38	7	5	4
15	0,2-1,25	P9060/24	18439/24	Dark Red Inorganic Silt	<G9					100	99	96	82	63	0.6	51	23	9.8	22.7	1676	22.7	0.58	21	12	8
16	0,2-1,45	P9060/25	18439/25	Dark Red Inorganic Clay	<G9					100	99	95	77	56	0.73	43	20	8.6	22.5	1674	22.7	0.42	16	7	4
17	0,05-1,35	P9060/26	18439/26	Dark Red Inorganic Silt	<G9					100	99	93	79	65	0.62	44	17	7	26.2	1628	26	0.45	12	4	2
18	0,05-1,25	P9060/27	18439/27	Dark Red Inorganic Silt	<G9						100	95	79	55	0.7	46	18	7.6	20	1649	19.8	0.43	14	4	2
19	0,35-1,45	P9060/29	18439/29	Dark Red Inorganic Silt	<G9					100	99	94	79	60	0.66	47	20	8.7	21	1691	21	0.35	14	8	7
Residual Material																									
11	0,9-1,5	P9060/19	18439/19	Dark Red Inorganic Clay	G9			100	97	92	82	76	67	55	1.03	49	25	10.8	23.3	1660	23.4	0.99	16	10	7
14	0,1-1,35	P9060/23	18439/23	Dark Red Inorganic Clay	<G9					100	97	90	71	64	0.75	47	20	8.8	21.1	1663	21	0.43	26	14	9

Please note that the information in the tables above and its' associated analysis are based directly of the sample results as received from Letaba Lab Nelspruit

Summary of Compaction Characteristics of Material Tested

The information presented in the graphs below displays the variability with regards to the compaction characteristics of the **material** encountered across the road in question, at a **compaction effort of 95 % MOD AASHTO**.

Graph 3: Compaction characteristics of the sampled material encountered along the gravel road



5 Material Suitability Analysis- Commercial Source Testing

A borrow pit exploration program was initiated by Letaba Lab in June 2017. This investigation intended on locating possible local sources of material to be used in the construction of the proposed new sealed road.

Borrow pits in this portion of the Limpopo Province are often subject to varying degrees of community politics, with existing quarries seen to be extensively excavated. For these reasons, Letaba Lab commenced with the testing of various **commercial sources**. Material from each source was tested for the re-use in the proposed construction.

This detailed centerline and materials investigation was supplemented with the testing of a **soil material** and **rock aggregate** sampled from **two commercial sources** within the region; namely:

1. Sandberg Quarry

- Crushed Gravel
- Natural Gravel

2. Mathombo Supplies

- Fill Material
- G5-type Material
- G1-type Material

Various samples were taken from these commercial sources and tested to assess the suitability of the materials for the re-use in the proposed roads' construction.

The following tests were conducted by **Letaba Lab Nelspruit** (SANAS Accredited Laboratory) on soil material and rock aggregate samples:

- Standard **road indicator tests** were conducted on **disturbed soil samples** in order to determine its composition (i.e.: the relative percentages of gravel, sand, silt and clay present within each sample), and to evaluate the suitability of the materials for the re-use in the proposed roads' construction.

The following tests were conducted:

- i. Moisture Content (density samples)
- ii. Atterberg Limits (Liquid Limit and Plasticity Index) and Linear Shrinkage
- iii. Particle-size distribution (sieve analysis)

- Further **compaction tests** were conducted on **bulk soil samples** in order to determine the sites' sub-soils re-usability potential in the proposed road construction. This suitability evaluation is based on the results from standardised material compaction methods (NRB, Proctor and MOD AASHTO).

The following additional tests were conducted:

- v. Maximum Dry Density versus Optimum Moisture Content
- vi. Californian Bearing Ratio versus Compaction Effort (MOD AASHTO method)
- The investigation was aided by **treatment of the natural soils** which were sampled. The samples extracted from various commercial sources and stabilized with the addition of cement (Lafarge Roadcem 32.5 N cement)

The following additional tests were conducted on the mixed sample:

- iv. Maximum Dry Density versus Optimum Moisture Content
- v. Californian Bearing Ratio versus Compaction Effort (MOD AASHTO method)
- vi. UCS/ITS design on mixed material

5.1 Sandberg- Laboratory Testing

Material tested from this commercial source comprised **crushed gravel** and **natural gravel**. Both of these materials typically displayed good compaction characteristics; however, the crushed gravel was deemed to be moderately plastic. It is envisaged that during the crushing process, a large proportion of fines are produced, which is deemed to be active. For this reason, during the initial stabilisation, the PI reduced slightly; however, remained high (exceeding a PI of 6), resulting in the material being classified as a <C4-type material according to the COLTO Classification.

The summarised results can be seen below:

Crushed Gravel- Neat Material:

Sandberg quarry provided Letaba Lab a single bulk sample for testing. The sample results are as follows:

- Less than 10 % of the total volume of material exhibits a particle size of larger than 37.5 mm
- The material tested is deemed to be **moderately plastic** with a PI value of **15**.
- The material reacts well to compaction, with a Californian Bearing Ratio- (CBR) value of **21** at a compaction effort of **93% MOD AASHTO**, increasing to a CBR of **27** at a compaction effort of **95 % MOD AASHTO**
- The material exhibits Maximum Dry Density of 2157 kg/m³, with an Optimum Moisture Content of 9.5 %.
- The material classifies as a **G7-type material** (COLTO)
- Material can be used as **selected layers** in road construction.

Natural Gravel- Neat Material:

Sandberg quarry provided Letaba Lab a single bulk sample for testing. The sample results are as follows:

- Less than 10 % of the total volume of material exhibits a particle size of larger than 37.5 mm
- The material tested is deemed to be **non-plastic** with a PI value of **NP**.
- The material reacts well to compaction, with a Californian Bearing Ratio- (CBR) value of **18** at a compaction effort of **93% MOD AASHTO**, increasing to a CBR of **23** at a compaction effort of **95 % MOD AASHTO**
- The material exhibits Maximum Dry Density of 2102 kg/m³, with an Optimum Moisture Content of 5.4 %.
- The material classifies as a **G7-type material** (COLTO)
- Material can be used as **selected layers** in road construction.

Thereafter, the extracted bulk samples were stabilized with the addition of **Lafarge Roadcement** at **2%, 3% and 4%** respectively. Lab tests were again performed on this representative sample to determine **UCS values**. Detailed UCS results for the material sampled from Sandberg quarry can be viewed in Appendix C1.

The results of these tests are summarised in the Table 7 overleaf:

Table 7: Summary of the UCS Designs conducted on the samples taken from the Sandberg Quarry

Sample Location	Percentage Stabilised (Lafarge Roadcem Cement)	Plasticity Index PI	Grading Modulus GM	Maximum Dry Density MDD (kg/m ³)	Optimal Moisture Content OMC (%)	USCS	Measured Results			Classification			
							UCS (Mpa)		ITS (kPa)	COLTO			US Highway
							97%	100%		According to UCS	According to ITS	Combined	
Sandberg Crushed Gravel	Neat	15	2.2	2157	9.5	SC	-	-	-	G7			A-2-6
	2%	8		2144	10.2		1.31	1.77	266	C3	C3	<C4 PI exceeds 6	A-2-4
	3%	SP		2126	10.7	SM	1.81	2.46	371	C3	C3	C3	A-1-a
	4%	NP		2111	11.4		2.62	3.74	506	C2	C2	C2	A-1-a
Sandberg Natural Gravel	Neat	NP	2.2	2102	5.4	sw/sm	-	-	-	G7			A-1-a
	2%	NP		2085	6.3	sp/sm	1.39	1.93	264	C3	C3	C3	A-1-a
	3%	NP		2068	6.8		1.83	2.62	402	C3	C3	C3	A-1-a
	4%	NP		2051	7.4		2.33	3.32	484	C2	C3	<C4 Very high strength- possible stabilisation cracking	A-1-a

It should be noted that in accordance with Table 3402/5 in the requirements for chemically stabilised pavement layers (COLTO, 1998), the neat material should be of at least **G6 Quality** with a **PI not exceeding 6**; to class as a C3 or C4 type material.

Please note that the information in the tables above and its' associated analysis are based directly of the sample results as received from Letaba Lab Nelspruit

5.2 Mathombo Supplies – Laboratory testing

The results below serve as a summary of the material sampled from the above mentioned commercial source.

G1-type material- Neat:

Mathombo Supplies provided Letaba Lab a single bulk sample for testing. The sample results are as follows:

- Less than 10 % of the total volume of material exhibits a particle size of larger than 37.5 mm
- The material tested is deemed to be **slightly-plastic** with a PI value of **SP**.
- The material reacts well to compaction, with a Californian Bearing Ratio- (CBR) value of **33** at a compaction effort of **93%** MOD AASHTO, increasing to a CBR of **44** at a compaction effort of **95 %** MOD AASHTO
- The material exhibits Maximum Dry Density of 2295 kg/m³, with an Optimum Moisture Content of 5.0 %.
- The material classifies as a **G6-type material** (COLTO)
- Material can be used as **sub-base layers** in road construction.

G5-type material- Neat:

Mathombo Supplies provided Letaba Lab a single bulk sample for testing. The sample results are as follows:

- Less than 10 % of the total volume of material exhibits a particle size of larger than 37.5 mm
- The material tested is deemed to be **non-plastic** with a PI value of **NP**.
- The material reacts well to compaction, with a Californian Bearing Ratio- (CBR) value of **23** at a compaction effort of **93%** MOD AASHTO, increasing to a CBR of **38** at a compaction effort of **95 %** MOD AASHTO
- The material exhibits Maximum Dry Density of 2164 kg/m³, with an Optimum Moisture Content of 7.4 %.
- The material classifies as a **G6-type material** (COLTO)
- Material can be used as **sub-base layers** in road construction.

Fill Material- Neat:

Mathombo Supplies provided Letaba Lab a single bulk sample for testing. The sample results are as follows:

- Less than 10 % of the total volume of material exhibits a particle size of larger than 37.5 mm
- The material tested is deemed to display a **low plasticity** with a PI value of **9**.
- The material reacts well to compaction, with a Californian Bearing Ratio- (CBR) value of **16** at a compaction effort of **93% MOD AASHTO**, increasing to a CBR of **18** at a compaction effort of **95 % MOD AASHTO**
- The material exhibits Maximum Dry Density of 2130 kg/m³, with an Optimum Moisture Content of 8.8 %.
- The material classifies as a **G7-type material** (COLTO)

Material can be used as **selected layers** in road construction

Thereafter, the **G5-type material** were stabilized with the addition of **Lafarge Roadcem cement** at **2%, 3% and 4%** respectively. Lab tests were again performed on this representative sample to determine **UCS values**. Detailed UCS results for the **G5-type material** sampled from Mathombo Supplies can be viewed in Appendix C2.

The results of these tests are summarised in the Table 8 overleaf:

Table 8: Summary of the UCS Designs conducted on the G5-type material taken from Mathombo Supplies

Sample Location	Percentage Stabilised (Lafarge Roadcem Cement)	Plasticity Index PI	Grading Modulus GM	Maximum Dry Density MDD (kg/m ³)	Optimal Moisture Content OMC (%)	USCS	Measured Results			Classification			
							UCS (Mpa)		ITS (kPa)	COLTO			US Highway
							97%	100%		According to UCS	According to ITS	Combined	
Mathombo Supplies G5- type Material	Neat	NP	2.1	2164	7.4	SM	-	-	-	G6			A-1-a
	2%	NP		2144	8.1		1.55	2.09	371	C3	C3	C3	A-1-a
	3%	NP		2125	8.5		2.13	2.9	495	C3	C3	C3	A-1-a
	4%	NP		2116	8.9		2.63	3.75	630	C2	C2	<C4 Very high strength- possible stabilisation cracking	A-1-a

It should be noted that in accordance with Table 3402/5 in the requirements for chemically stabilised pavement layers (COLTO, 1998), the neat material should be of at least **G6 Quality** with a **PI not exceeding 6**; to class as a C3 or C4 type material.

Please note that the information in the tables above and its' associated analysis are based directly of the sample results as received from Letaba Lab Nelspruit.

6 General Material Specifications

Pavement structure on low volume paved roads

6.1 Natural materials

- Natural gravel (G5 and G6) should have a maximum size of 63 mm or two-thirds of the compacted layer thickness, whichever is smaller. A minimum grading modules of 1.5 (G5) and 1.2 (G6) should be obtained.
- Gravel soil (G7) should have a maximum size, in place, after compaction, not greater than two-thirds the compacted thickness of the layer. A minimum grading modulus of 0.75 is recommended.
- Gravel-soil (G8, G9 and G10) no grading requirements.
- G6 and G7 material may not have a Plasticity Index (PI) higher than 12, calcrete can have a PI of up to 15.
- Normal field compaction for untreated layered materials:
 - Subbase – 95% MOD AASHTO
 - Selected Layers – 93% MOD AASHTO
 - Subgrade – 90% MOD AASHTO

6.2 Treated Materials

Cemented natural gravel (C3 and C4)

- This is selected natural material equivalent to G5 or G6 material
- After treatment, the material should have a PI not greater than 6
- Strength of treated material with not more than 5% stabilizer:
 - C3 – 1 to 2 MPa at 97%, 1.5 to 3 MPa at 100% Mod AASHTO
 - C4 – 0.5 to 1 MPa at 97%, 0.5 to 1.5 MPa at 100% Mod AASHTO

Bituminous treated natural gravel (BT2)

- This is a selected natural gravel generally equivalent to G4, G5 or G6 material treated with a very low content of cutback tar, bitumen or emulsion (tar or bitumen)
- It is recommended that the grading modulus of the material before treatment should not be less than 1.75 (base) and 1.5 (subbase).
- Lime, rather than cement should be used to stabilize soils that have a Liquid Limit greater than 45, and also in materials that have more than 15% passing the 0.425 mm sieve (indicating clayey materials) and also in material with a PI exceeding 10.
- Maximum size of material after compaction in place should not exceed two-thirds of the compacted thickness of the layer or 63 mm, whichever is smaller.

8 General Material Specifications

Pavement structure on low volume paved roads

8.1 Natural materials

- Natural gravel (G5 and G6) should have a maximum size of 63 mm or two-thirds of the compacted layer thickness, whichever is smaller. A minimum grading modules of 1.5 (G5) and 1.2 (G6) should be obtained.
- Gravel soil (G7) should have a maximum size, in place, after compaction, not greater than two-thirds the compacted thickness of the layer. A minimum grading modulus of 0.75 is recommended.
- Gravel-soil (G8, G9 and G10) no grading requirements.
- G6 and G7 material may not have a Plasticity Index (PI) higher than 12, calcretes can be have a PI of up to 15.
- Normal field compaction for untreated layered materials:
 - Subbase – 95% MOD AASHTO
 - Selected Layers – 93% MOD AASHTO
 - Subgrade – 90% MOD AASHTO

8.2 Treated Materials

Cemented natural gravel (C3 and C4)

- This is selected natural material equivalent to G5 or G6 material
- After treatment, the material should have a PI not greater than 6
- Strength of treated material with not more than 5% stabilizer:
 - C3 – 1 to 2 MPa at 97%, 1.5 to 3 MPa at 100% Mod AASHTO
 - C4 – 0.5 to 1 MPa at 97%, 0.5 to 1.5 MPa at 100% Mod AASHTO

Bituminous treated natural gravel (BT2)

- This is a selected natural gravel generally equivalent to G4, G5 or G6 material treated with a very low content of cutback tar, bitumen or emulsion (tar or bitumen)
- It is recommended that the grading modulus of the material before treatment should not be less than 1.75 (base) and 1.5 (subbase).
- Lime, rather than cement should be used to stabilize soils that have a Liquid Limit greater than 45, and also in materials that have more than 15% passing the 0.425 mm sieve (indicating clayey materials) and also in material with a PI exceeding 10.
- Maximum size of material after compaction in place should not exceed two-thirds of the compacted thickness of the layer or 63 mm, whichever is smaller.

10 Good Construction Practices

10.1 Drainage

A principal factor in the promotion of a stable road is the control and removal of both surface and ground water from the site. It is important that the design of the storm water management system allow for the drainage of accumulated surface water.

10.1.1 Surface Drainage

It is recommended that an efficient surface drainage system be installed along roads in order to:

- prevent the ponding at the surface next to the road directly after heavy precipitation events
- prevent large-scale changes in soil moisture beneath the road on a seasonal basis
- prevent the seasonal formation of perched water tables (i.e.: short-term groundwater seepage) within the soil material at shallow depth.

The precautionary measures should ideally include:

- the sealing of open ground surfaces by means of either of the following:
 - the cultivation of a natural soil cover (e.g.: grass)
 - compaction of the soil surface
 - bitumen or concrete paving
- the removal of storm water, by means of an efficient surface drainage system
- Wet services (i.e.: water supply pipes and sewers) must be designed and maintained to prevent leaks and blockages, and proper backfilling should be enforced to reduce storm water inflow
- roads should preferably be constructed parallel to the natural surface elevation contours rather than perpendicular to it, in order to reduce run-off velocities

10.1.2 Sub Surface Drainage

Due to highly variable nature of the drainage channel located to the south of the site; areas requiring subsoil drainage will have to be assessed on site during the construction phase of the road. It is recommended that a combination of surface and sub-surface drainage measures be implemented as to control where water traverses the road.

10.2 Earthworks

During this investigation it was seen that pockets of the road had been cut during maintenance cycles (grading of the roads surface), possibly requiring multiple fill processes to create level/suitable working platforms. The nature and extent of the new working level and associated earth works; are to be determined by the responsible engineer as to ensure surface stability.

It is recommended that all earthworks be carried out in accordance with SANS 1200 (South African Standards- current version). All vegetation should be cleared from the prescribed development areas, including associated root systems and biotic activity.

Fill slopes should be top soiled and planted with grass. This will limit erosion of these slopes and the problems associated with wash-aways of fill embankments.

10.3 Recommendations

The site is seen to traverse drainage channels (non-perennial river) at multiple locations along its length; for this reason, it is recommended that the 1:100 flood line be determined by a competent person. Any construction activities within the 1 :100 year flood lines of the inferred non-perennial streams cutting across the site may have to be licensed according to the National Water Act (Act 36 of 1998).

The two existing culvert structures present along the road, were seen to be of a narrow and low-lying nature. As such, these culverts may need to be upgraded as part of the upgrades to the sealed road. Therefore, a detailed culvert investigation will need to be conducted by a competent engineering geologist or geotechnical engineer, within these areas to assist with the design and construction of the new culvert structures.

The natural soils seen to overly the entire study area was seen to display a typically poor nature, with short lengths of road hosting more competent imported material. Furthermore, localised lengths of the road, were seen to host pockets of uncontrolled fill material displaying a poor nature (contaminated) and variable extent. With this said, it is recommended that an adequate **quality control system** be implemented during the construction phase of the development to ensure that the road layer works adhere to the prescribed design.

Letaba Lab conducted the field work for this investigation; as such, due to their intimate knowledge of the site, it is recommended that Letaba be used for future testing during the construction of the new road structure.

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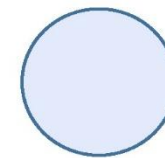
The natural road construction materials of Southern Africa. Academia, Cape Town.

LAYOUT MAPS

FIGURE 1

Study Area Location

LEGEND



Study Area



Drawn By: André Joubert

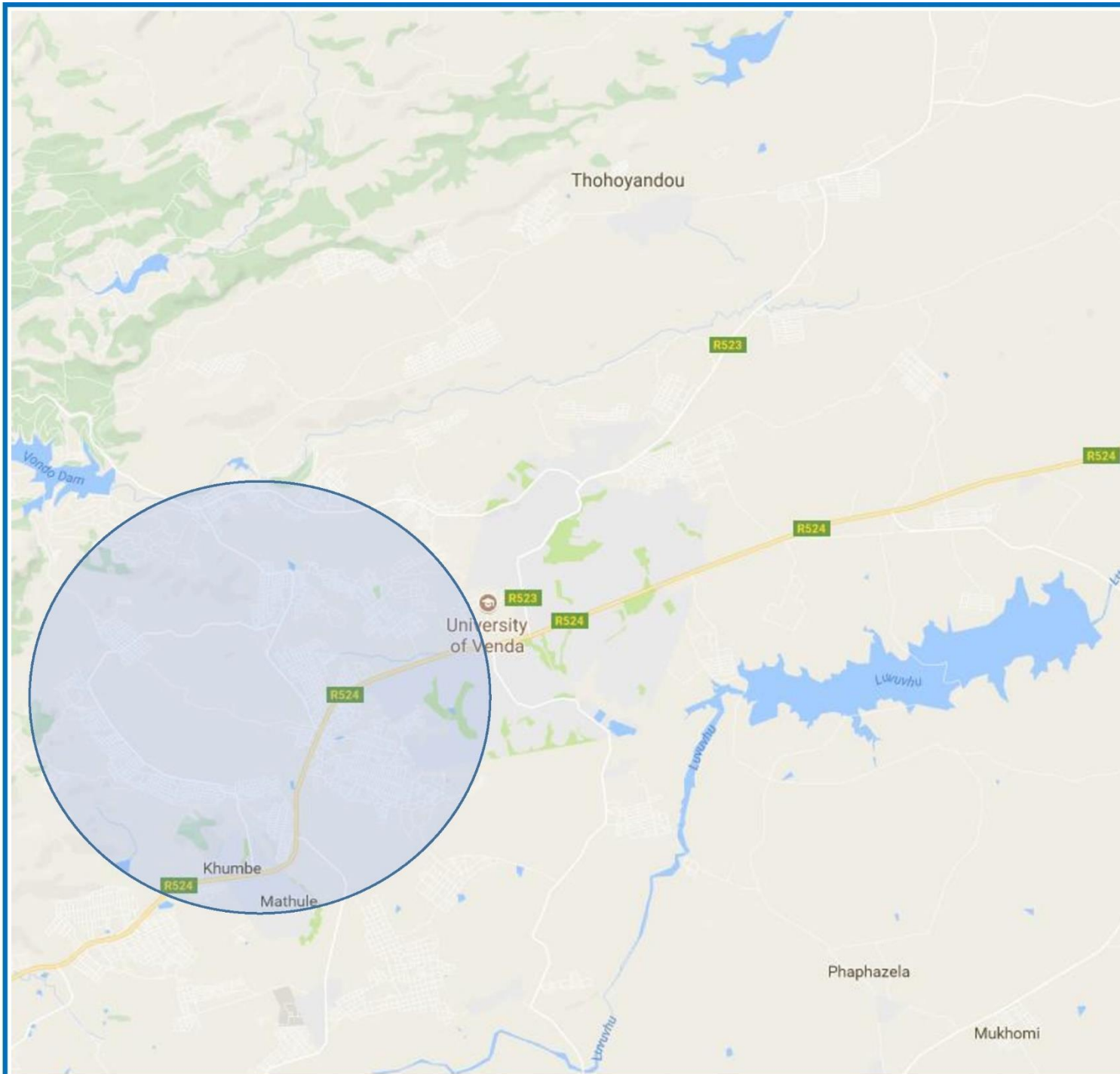


FIGURE 2

Topocadastral Map- Site Location



Drawn By: Andre Joubert

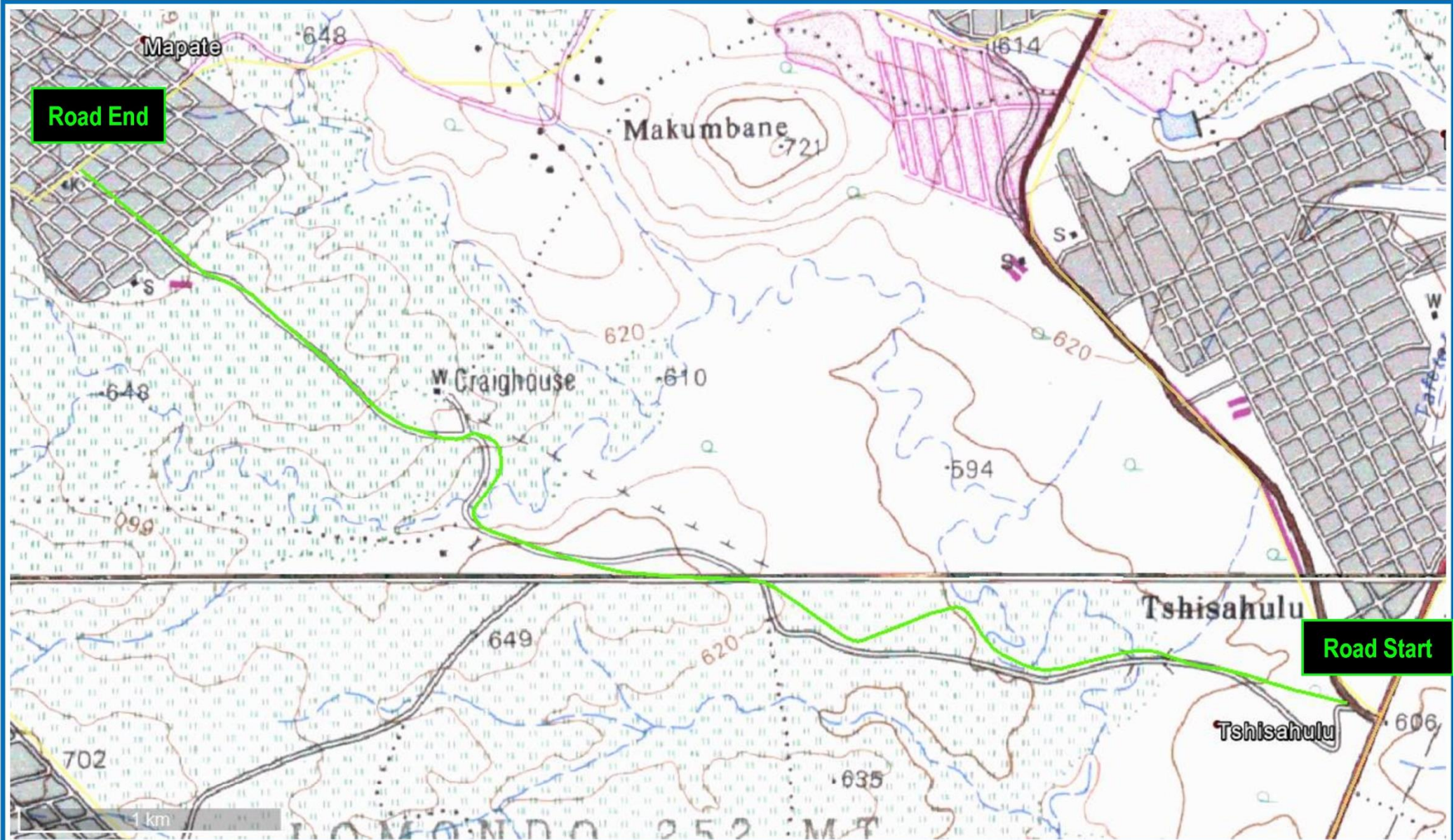


FIGURE 3

Regional Geological Setting

Geological Series Maps:
2230 Messina & 2330 Tzaneen;
Scale 1 : 250 000



Drawn By: André Joubert

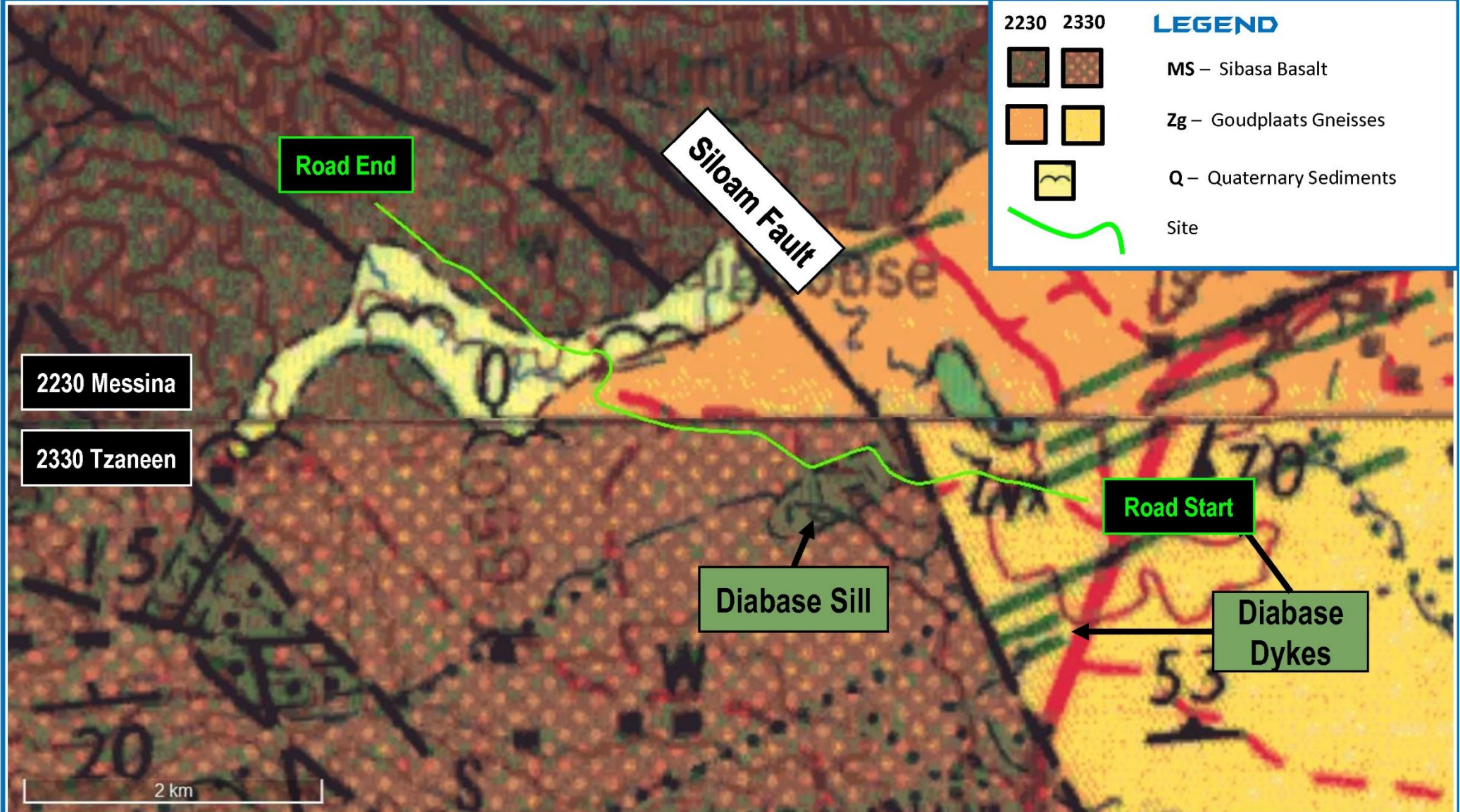


FIGURE 4

Aerial Photograph

Site Location



Drawn By: André Joubert



FIGURE 5

Segment Breakdown of the Site



Drawn By: André Joubert

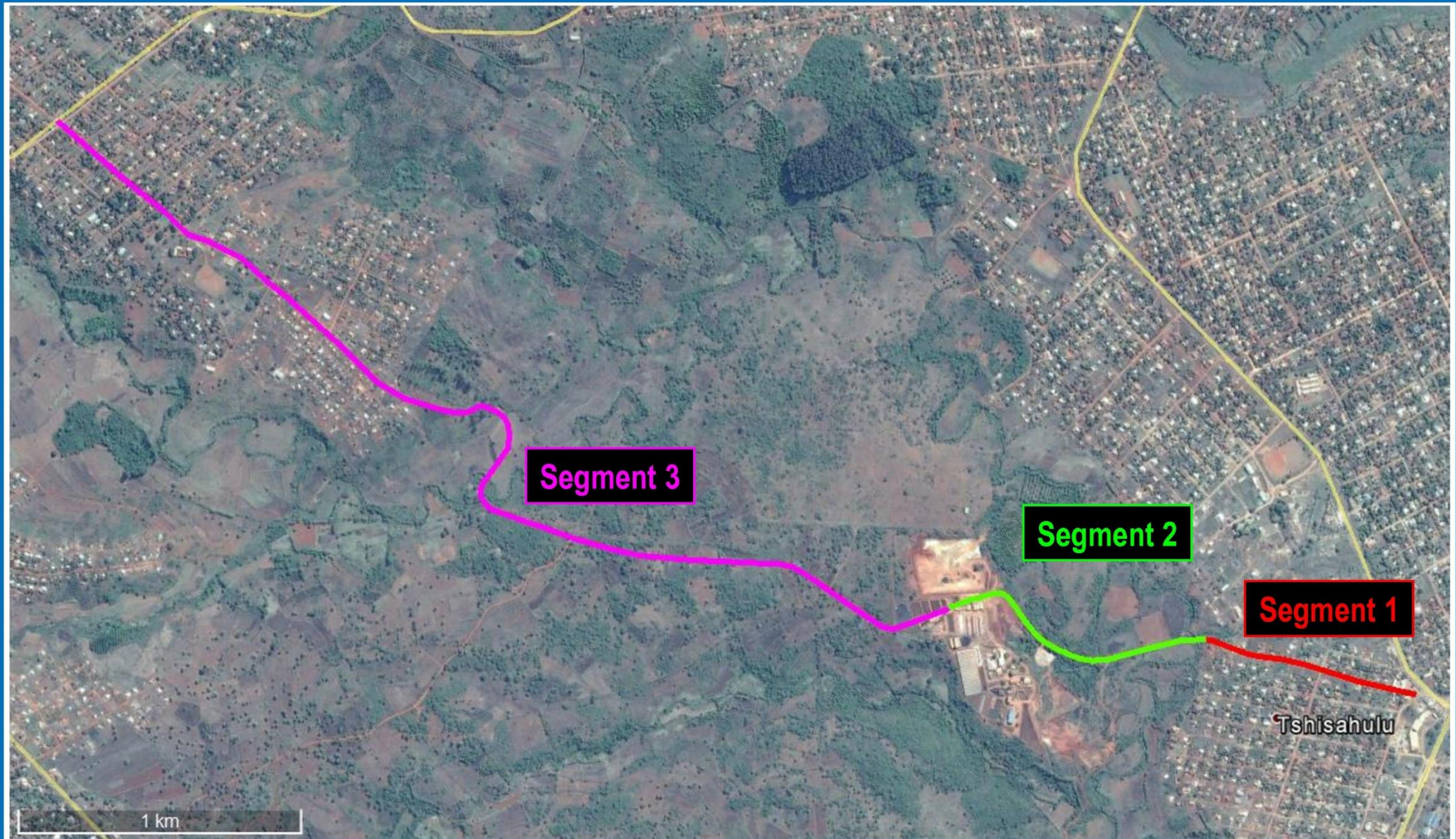


FIGURE 6

Testing Locations
Segment 1 and Segment 2



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Test Pit Location



FIGURE 7

Testing Locations

Segment 3



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Test Pit Location



Project Testing Locations- GPS Co-ordinates

Co-ordinate list provided by Letaba Lab

GPS CO-ORDINATES OF TEST PITS FOR UPGRADING OF MAPATE ACCESS ROAD

Name	Position	
	Latitude	Longitude
CENTRELINE		
TP1	23° 0'19.08"S	30°24'11.05"E
TP2	23° 0'15.75"S	30°23'58.55"E
TP3	23° 0'13.24"S	30°23'47.17"E
TP4	23° 0'12.83"S	30°23'42.84"E
TP5	23° 0'14.97"S	30°23'33.15"E
TP6	23° 0'13.45"S	30°23'25.21"E
TP7	23° 0'7.90"S	30°23'20.15"E
TP8	23° 0'10.88"S	30°23'6.90"E
TP9	23° 0'4.56"S	30°22'53.25"E
TP10	23° 0'3.00"S	30°22'37.41"E
TP11	22°59'59.22"S	30°22'20.00"E
TP12	22°59'55.01"S	30°22'12.73"E
TP13	22°59'51.45"S	30°22'15.39"E
TP14	22°59'46.02"S	30°22'11.22"E
TP15	22°59'44.25"S	30°22'3.39"E
TP16	22°59'35.29"S	30°21'52.17"E
TP17	22°59'26.12"S	30°21'38.33"E
TP18	22°59'18.54"S	30°21'28.02"E
TP19	22°59'13.20"S	30°21'21.00"E

APPENDIX INDEX

APPENDIX A: Site Walkover- Photographic Library

APPENDIX B: Centerline and Materials Investigation

B1: Soil Profiles

B2: Combined Lab Results- Bulk and Disturbed Samples

B3: In-situ Testing: DCP Results

APPENDIX C: Material Suitability Analysis- Commercial Source Testing

C1: Sandberg Quarry

C2: Mathombo Supplies

