



THE SOUTH AFRICAN NATIONAL ROADS AGENCY SOC LIMITED

CONTRACT SANRAL R.052-030-2020/1C-SL

**SUB-CONTRACT FOR SITE MATERIALS
LABORATORY FOR THE IMPROVEMENT ON
NATIONAL ROAD R52 SECTION 3 FROM KOSTER
(KM 0.0) TO N4 RUSTENBURG (KM 38.70)**

PROJECT DOCUMENT

DATE: OCTOBER 2023

**TENDER DOCUMENT
VOLUME 3
BOOK 3 OF 3**

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Set sequential number

PART C3: SCOPE OF WORKS

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SUB-CONTRACT FOR SITE MATERIALS LABORATORY FOR THE IMPROVEMENT ON NATIONAL
ROAD R52 SECTION 3 FROM KOSTER (KM 0.0) TO N4 RUSTENBURG (KM 38.70)

PART C3: SCOPE OF WORKS

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C3.1 SCOPE

This section covers the requirements for the provision and quality management of a site laboratory established to carry out the necessary materials testing and construction quality control of the Works.

C3.2 SITE LABORATORY

Provision for the erection of a site laboratory building, together with workbenches, services, furniture etc. will be made under the Works Contract (i.e. not to be priced by the laboratory Service Provider.

The class and type of laboratory envisaged for this project is as follows:

Soils Laboratory:Class A

Concrete Laboratory:.....Class B

Asphalt Laboratory: Class C

Seals Laboratory:Class A

When submitting interim certificates for payment the Service Provider shall use the Clients standard forms and formats.

The service provider shall submit payment certificates for all work rendered in the Client's financial year within that specific year.

The service provider shall submit and update on a monthly basis a cash flow forecast for the remuneration of the full service to be rendered.

The Service Provider shall complete monthly reports regarding training, empowerment, capacity building, small contractor development, labour and staff returns and any such aspects on the Client's Project Information Module. Failure to comply may result in payments being withheld.

The Client has developed a comprehensive information management system to address all facets of its strategic and tactical planning, design, construction and maintenance of the entire road network. This provides support for the management tasks of the Client and to make technical decisions more quickly and efficiently.

ITIS is an integrated approach to the sharing and inter-relating of technical performance information for the Client, and relies on the Service Provider following procedures to populate the system with data. ITIS currently consist of the following platforms applicable to this project:

- ITIS Web – Web enabled portal providing online access to various functions, workflows and reports.
- ITIS Desktop – Offline data capture tool enabling the capture of information offline, validation and then synchronisation of data with ITIS database.

The Client then has several ITIS modules running on any of the above ITIS platforms which affect the Service Provider, who will need to use some of these modules to provide required information. The current modules applicable to this project is the SARDS Laboratory Module and the ITIS Project Information Modules.

Allowance has been made for these requirements in the Pricing Schedule under Additional Duties. Failure to comply may result in payments being withheld.

C3.2.1 SOILS LABORATORY

The laboratory shall supply sufficient major equipment, consumables and other apparatus required to conduct the tests listed in Table C3.2.1.1, which also indicates the anticipated number of each test that is envisaged to be conducted simultaneously. The number of simultaneous tests required is based on the time period in the anticipated construction programme when the highest peak production related to the test method is envisaged.

The cost of provision of the equipment required to perform the tests listed in Table C3.2.1.1 shall be priced as part of the provision of the specific class of soils laboratory.

TABLE C3.2.1.1: SOILS LABORATORY TEST METHODS

DESCRIPTION	REFERENCE	ANTICIPATED NO OF SIMULTANEOUS TESTS		
		CLASS A	CLASS B	CLASS C
Sampling of Road Pavement Layers	TMH5 MA2 or MC1	2	1	1
Sampling from Stockpiles	TMH5 MB1	2	1	1
Sampling of Treated Pavement Layers	TMH5 MB10	2	2	0
Division of a Sample Using the Riffler	TMH5 MD1	2	1	1
Division of a Sample by Quartering	TMH5 MD2	2	1	1
Wet preparation and air-drying of samples for plasticity index and hydrometer tests	SANS 3001-GR5	24	12	6
Apparent density of crushed stone base	SANS 3001-AG22	4	2	0
Determination of in situ density using a nuclear density gauge	SANS 3001-NG5	2	2	2
Wet preparation and particle size analysis	SANS 3001-GR1	2	1	1
Determination of the one-point liquid limit, plastic limit, plasticity index and linear shrinkage	SANS 3001-GR10	2	1	1
Determination of the liquid limit with the two-point method	SANS 3001-GR11	2	1	1
Determination of the moisture content by oven-drying	SANS 3001-GR20	30	15	7
Determination of the maximum dry density and optimum moisture content	SANS 3001-GR30	2	2	1
Determination of the maximum dry density and optimum moisture content of laboratory mixed cementitiously stabilized materials	SANS 3001-GR31	2	1	0
Determination of the California bearing ratio (Compaction stage only)	SANS 3001-GR40	2	2	1
Determination of the California bearing ratio (Soaking stage only)	SANS 3001-GR40	30	20	10
Determination of the California bearing ratio (Penetration stage only)	SANS 3001-GR40	1	1	1
Preparation, compaction and curing of specimens of laboratory mixed cementitiously stabilized materials	SANS 3001-GR50	2	2	0
Sampling, preparation, compaction and curing of field mixed freshly cementitiously stabilized materials including the determination of the maximum dry density and optimum moisture content (Compaction stage only)	SANS 3001-GR51	2	2	0
Sampling, preparation, compaction and curing of field mixed freshly cementitiously stabilized materials including the determination of the maximum dry density and optimum moisture content (Rapid curing stage only)	SANS 3001-GR51	20	15	0

TABLE C3.2.1.1: SOILS LABORATORY TEST METHODS

DESCRIPTION	REFERENCE	ANTICIPATED NO OF SIMULTANEOUS TESTS		
		CLASS A	CLASS B	CLASS C
Determination of the unconfined compressive strength of compacted and cured specimens of cementitiously stabilized materials (Crushing stage only)	SANS 3001-GR53	1	1	0
Determination of the indirect tensile strength of compacted and cured specimens of cementitiously stabilized materials (Crushing stage only)	SANS 3001-GR54	1	1	0
Determination of the initial stabilizer consumption of soils and gravels	SANS 3001-GR57	1	1	0

The plastic limit, plasticity index and linear shrinkage shall be determined using SANS 3001-GR10 and the Liquid Limit shall be determined by the two point method described in SANS 3001-GR11.

The Major and Specialised Equipment required to perform the soils testing listed in Table C3.2.1.1 are listed in Table C3.2.1.2 below. The cost of all the Major and Specialised Equipment required to perform the soils testing listed in Table C3.2.1.1 shall be included in the tendered rate for the specified soils laboratory. Any additional Major and Specialised Equipment listed in Table C3.2.1.2 that is required for testing other than those listed in Table C3.2.1.1 shall be provided for separately in the Schedule of Quantities under Specialised Equipment.

TABLE C3.2.1.2: MAJOR AND SPECIALISED EQUIPMENT FOR SOILS LABORATORIES

DESCRIPTION OF EQUIPMENT	TEST METHOD REFERENCE	REQUIRED QUANTITY		
		CLASS A	CLASS B	CLASS C
Mechanical Compactor	SANS3001-GR30	2	2	1
CBR / UCS / ITS Press	SANS 3001-GR40, GR53 & GR54	1	1	1
Nuclear Density Gauge	SANS 3001-NG5	2	2	2
Concrete Drill with Suitable Generator and 20 mm Drill Bits for Nuclear Density testing on Graded Crushed Stone pavement layers	SANS 3001-NG5	2	2	1
DCP Apparatus	TMH 6	1	1	1

The Senior/ Site Laboratory Manager shall in agreement with the Engineer's Representative determine the frequency of sampling and testing for the respective soils testing with the guidelines recommended in Appendix C of Chapter 13 of the South African Pavement Engineering Manual. The SAPEM is available on the Client's web-site.

C3.2.2 CONCRETE LABORATORY

The concrete laboratory equipment and consumables envisaged for this project shall be sufficient to conduct the test methods as listed in Table C3.2.2.1 in the site laboratory. The laboratory shall supply sufficient major equipment, consumables and other apparatus required to conduct the anticipated simultaneous number of tests listed in Table C3.2.2.1.

The number of simultaneous tests required is based on the time period in the anticipated construction programme when the highest peak production related to the test method is envisaged.

TABLE C3.2.2.1 CONCRETE LABORATORY TEST METHODS

DESCRIPTION	REFERENCE	ANTICIPATED NO OF SIMULTANEOUS TESTS		
		CLASS A	CLASS B	CLASS C
Sampling of Freshly Mixed Concrete	TMH5 MB9	1	1	1
Particle size analysis of aggregates by sieving	SANS 3001-AG1	2	1	0
Determination of the bulk density, apparent density and water absorption of aggregate particles retained on the 5 mm sieve for road construction materials	SANS 3001-AG20	1	1	0
Determination of the bulk density, apparent density and water absorption of aggregate particles passing the 5 mm sieve for road construction materials	SANS 3001-AG21	1	1	0
Making and curing of test specimens	SANS 5861-3	84	36	12
Consistence of freshly mixed concrete - Slump test	SANS 5862-1	4	2	1
Compressive strength of hardened concrete	SANS 5863	1	1	1

The Major and Specialised Equipment required to perform the concrete testing listed in Table C3.2.2.1 are listed in Table C3.2.2.2 below. The cost of all the Major and Specialised Equipment required to perform the concrete testing listed in Table C3.2.2.1 shall be included in the tendered rate for the specified concrete laboratory. Any additional Major and Specialised Equipment listed in Table C3.2.2.2 that is required for testing other than those listed in Table C3.2.2.1 shall be provided for separately in the Schedule of Quantities under Specialised Equipment.

TABLE C3.2.2.2: MAJOR AND SPECIALISED EQUIPMENT FOR CONCRETE LABORATORIES

DESCRIPTION OF EQUIPMENT	TEST METHOD REFERENCE	REQUIRED QUANTITY		
		CLASS A	CLASS B	CLASS C
Concrete Cube Press	SANS 5863	1	1	1

The Site Laboratory Manager shall in agreement with the Engineer's Representative determine the frequency of sampling and testing for the respective aggregate testing with the guidelines recommended in Appendix C of Chapter 13 of the South African Pavement Engineering Manual. The SAPEM is available on the Client's web-site. The frequency of the concrete testing shall be in accordance with the requirements of COTO Standard Specifications for Road and Bridge Works for South African Road Authorities as amended in the Project Specifications of the Works Contract.

C3.2.3 ASPHALT LABORATORY

The asphalt laboratory equipment and consumables envisaged for this project shall be sufficient to conduct the test methods as listed in Table C3.2.3.1 in the Site Laboratory. The laboratory shall supply sufficient major equipment, consumables and other apparatus required to conduct the anticipated simultaneous number of tests listed in Table C3.2.3.1.

The number of simultaneous tests required is based on the time period in the anticipated construction programme when the highest peak production related to the test method is envisaged.

TABLE C3.2.3.1 ASPHALT LABORATORY TEST METHODS

DESCRIPTION	REFERENCE	ANTICIPATED NO OF SIMULTANEOUS TESTS		
		CLASS A	CLASS B	CLASS C
Sampling from Stockpiles	TMH5 MB1	2	1	1
Sampling of Bituminous Binders	TMH5 MB4	1	1	1
Sampling of Previously Blended (ready mixed) Asphalt	TMH5 MB7	18	12	6
Sampling of Asphalt or Concrete from completed layer or structure (Coring)	TMH5 MC2	2	1	1
Sampling and Sample Preparation of Modified Binders	TG1 MB1 & MB2	1	1	0
Division of a Sample Using the Riffler	TMH5 MD1	2	1	1
Making of asphalt briquettes for Marshall tests and other specialized tests	SANS 3001-AS1	2	1	1
Particle size analysis of aggregates by sieving	SANS 3001-AG1	3	2	2
Determination of the flakiness index of coarse aggregate	SANS 3001-AG4	1	1	1
Sand equivalent value of fine aggregates	SANS 3001-AG5	1	1	1
Determination of the bulk density, apparent density and water absorption of aggregate particles retained on the 5 mm sieve for road construction materials	SANS 3001-AG20	1	1	1
Determination of the bulk density, apparent density and water absorption of aggregate particles passing the 5 mm sieve for road construction materials	SANS 3001-AG21	1	1	1
Determination of Marshall stability, flow and quotient	SANS 3001-AS2	1	1	1
Determination of bulk density and void content of compacted asphalt	SANS 3001-AS10	1	1	1
Determination of the maximum void-less density of asphalt mixes and the quantity of binder absorbed by the aggregate	SANS 3001-AS11	4	2	2
Determination of the soluble binder content and particle size analysis of an asphalt mix	SANS 3001-AS20	2	1	1
Determination of the in situ permeability of a bituminous surfacing (Marvil test)	SANS 3001-BT12	1	1	1
Standard Test Method for Penetration of Bituminous Materials	EN 1426	1	1	1
Standard Test Method for Softening Point of Bitumen (Ring-and-Ball Apparatus)	ASTM D36	2	1	1
Determination of in situ density using a nuclear density gauge	SANS 3001-NG5	2	2	2

The Major and Specialised Equipment required to perform the asphalt and binder testing listed in Table C3.2.3.1 are listed in Table C3.2.3.2 below. The cost of all the Major and Specialised Equipment required to perform the asphalt and binder testing listed in Table C3.2.3.1 shall be included in the tendered rate for the specified concrete laboratory. Any additional Major and Specialised Equipment listed in Table C3.2.3.2 that is required for testing other than those listed in Table C3.2.3.1 shall be provided for separately in the Schedule of Quantities under Specialised Equipment.

TABLE C3.2.3.2: MAJOR AND SPECIALISED EQUIPMENT FOR ASPHALT LABORATORIES

DESCRIPTION OF EQUIPMENT	TEST METHOD REFERENCE	REQUIRED QUANTITY		
		CLASS A	CLASS B	CLASS C
Mechanical Compactor	SANS3001-AS1	2	2	1
Press	SANS 3001-AS2	1	1	1
Gyratory Compactor	SANS3001-AS3	1	0	0
Core Drill with Suitable Generator and Applicable Core Barrels	TMH5 MC2	1	1	1
Centrifuge	SANS 3001-AS20	1	1	1

The Site Laboratory Manager shall in agreement with the Engineer's Representative determine the frequency of sampling and testing for the respective asphalt testing with the guidelines recommended in Appendix C of Chapter 13 of the South African Pavement Engineering Manual (SAPEM,). The SAPEM is available on the Client's web-site.

C3.2.4 BITUMINOUS SEAL LABORATORY

The seal laboratory equipment and consumables envisaged for this project shall be sufficient to conduct the test methods as listed in Table C3.2.4.1 in the Site Laboratory. The laboratory shall supply sufficient major equipment, consumables and other apparatus required to conduct the anticipated simultaneous number of tests listed in Table C3.2.4.1.

The number of simultaneous tests required is based on the time period in the anticipated construction programme when the highest peak production related to the test method is envisaged.

TABLE C3.2.4.1 SEAL LABORATORY TEST METHODS

DESCRIPTION	REFERENCE	ANTICIPATED NO OF SIMULTANEOUS TESTS		
		CLASS A	CLASS B	CLASS C
Sampling from Stockpiles	TMH5 MB1	1	1	1
Sampling of Bituminous Binders	TMH5 MB4	1	1	1
Sampling of Slurry Mixtures	TMH5 MB8	1	1	1
Sampling and Sample Preparation of Modified Binders	TG1 MB1 and MB2	1	1	1
Division of a Sample Using the Riffler	TMH5 MD1	1	1	1
Division of a Sample by Quartering	TMH5 MD2	1	1	1
Particle size analysis of aggregates by sieving	SANS 3001-AG1	1	1	1
Determination of the average least dimension of aggregates by direct measurement	SANS 3001-AG2	1	1	1
Determination of the flakiness index of coarse aggregate	SANS 3001-AG4	1	1	1
Determination of the in situ permeability of a bituminous surfacing (Marvil test)	SANS 3001-BT12	1	1	1
Standard Test Method for Penetration of Bituminous Materials	EN 1426	1	1	1
Standard Test Method for Softening Point of Bitumen (Ring-and-Ball Apparatus)	ASTM D36	2	2	2
Standard Test Method for Viscosity Determinations (HAAKE)	ASTM D4402	1	1	1
Ball penetration test for the design of surfacing seals	SANS 3001-BT10	1	1	1

TABLE C3.2.4.1 SEAL LABORATORY TEST METHODS

DESCRIPTION	REFERENCE	ANTICIPATED NO OF SIMULTANEOUS TESTS		
		CLASS A	CLASS B	CLASS C
Texture depth measurement for the design of surfacing seals	SANS 3001-BT11	2	2	2
Measurement of transverse distribution ('Bucket test') for a binder distributor	SANS 3001-BT24	1	1	1
Determination of the moisture content by oven-drying	SANS 3001-GR20	12	12	12

The Major and Specialised Equipment required to perform the seal, aggregate and binder testing listed in Table C3.2.4.1 are listed in Table C3.2.4.2 below. The cost of all the Major and Specialised Equipment required to perform the seal, aggregate and binder testing listed in Table C3.2.4.1 shall be included in the tendered rate for the specified concrete laboratory. Any additional Major and Specialised Equipment listed in Table C3.2.4.2 that is required for testing other than those listed in Table C3.2.4.1 shall be provided for separately in the Schedule of Quantities under Specialised Equipment.

TABLE C3.2.4.2: MAJOR AND SPECIALISED EQUIPMENT FOR SEAL LABORATORIES

DESCRIPTION OF EQUIPMENT	TEST METHOD REFERENCE	REQUIRED QUANTITY		
		CLASS A	CLASS B	CLASS C
Viscometer	ASTM D4402	1	1	1

The Site Laboratory Manager shall in agreement with the Engineer's Representative determine the frequency of sampling and testing for the respective seal testing with the guidelines recommended in Appendix C of Chapter 13 of the South African Pavement Engineering Manual. The SAPEM is available on the Client's web-site.

C3.2.5 MEASUREMENT AND PAYMENT

All the work shall be measured in the Item no's, units and rates as described in the relevant Schedule of Quantities. Only the actual quantities of work done as requested by the Employer or his authorised representative will be measured for payment and the rates shall apply irrespective of the margin in which the actual quantities differ from those scheduled.

Contract price adjustment shall be applied in accordance with sub-clause C2.1.12 of the Pricing Instructions.

Item

Unit

C3.2.01 Class A laboratory type:

- (a) Soils laboratory (complete):
 - (i) Establishment (including supply of equipment) Lump (L)/Sum
 - (ii) Operations month
- (d) Seal laboratory (complete):
 - (i) Establishment (including supply of equipment) Lump (L)/Sum
 - (ii) Operations month

<i>Item</i>	<i>Unit</i>
C3.2.02 Class B laboratory type:	
(b) Concrete laboratory (complete):	
(i) Establishment (including supply of equipment)	Lump (L)/Sum
(ii) Operations	month

<i>Item</i>	<i>Unit</i>
C3.2.03 Class C laboratory type:	
(c) Asphalt laboratory (complete):	
(i) Establishment (including supply of equipment)	Lump (L)/Sum
(ii) Operations	month

Time related payment items (per month or pro rata for parts of a month) shall only be applicable once the equipment has been established on site and shall be no earlier than fourteen (14) days prior to the Contractor's programmed commencement date for the relevant construction operations and shall cease on completion of the specific operations.

The rate tendered for the establishment and operation of each laboratory type shall include the costs associated with operating the site laboratory under the accredited parent laboratory's full Quality Assurance Management system as approved under the parent laboratory's SANAS accreditation.

The costs for producing a monthly materials report in the latest format specified prescribed by SANRAL, shall be included in the rate tendered. Included in this report shall be monthly Equivalent Indicator Unit (EIU) returns, which shall form the basis of the regular staffing level review.

The rate tendered under this specific item/s shall also include for all costs as follows:

- (a) All costs associated with providing all the equipment including loading, transporting and setting up the equipment on site to conduct the tests required;
- (b) All costs associated with loading, transporting and setting up the equipment on site;
- (c) Testing and calibration of equipment as specified in the relevant test methods and in accordance with the SANAS certification requirements;
- (d) The loading rates of the machines for all tests shall be verified;
- (e) Intermediate calibration as specified in the relevant test methods and SANAS certification requirements;
- (f) Calibration of all presses shall be done on site by calibration service providers that are SANAS accredited for force calibration;
- (g) Maintaining a neat and orderly working and training environment within the laboratory facility; and
- (h) Removal of equipment from site on completion of the Works.

In the event of the completion of Works occurring sooner than the estimated contractual period, sixty (60) days' notice shall be provided in writing to the laboratory for purposes of removal of equipment from site

<i>Item</i>	<i>Unit</i>
C3.2.04 Computers, printers and software:	
(a) Establishment (including supply of equipment)	Lump (L)/Sum
(b) Operations	month

The rate tendered for sub-item C3.2.04 for computers, printers and software shall be the rate per calendar month (pro rata for part of a month) and shall include full compensation for supplying and maintaining all necessary computer hardware, software, printers and modems (inclusive of data charges) and associated consumables required for the generation and reporting of test results.

A service provider 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.

Item	Unit
C3.2.05 Laboratory Administration and Consumables:	
(a) Operations	month
(b) ITIS data capture	month
(c) SARDS data capture	month

The unit of measurement for sub-item (a) shall be the rate per calendar month (pro rata for part of a month). The rate tendered for laboratory administration and consumables shall include full compensation for supplying and maintaining all office equipment and incidentals required for carrying out quality assurance testing and reporting including:

- (a) Routine quality assurance including correlation testing at least on a monthly basis for high frequency testing, with the number of any particular tests being sufficient in number in order to permit statistical evaluation of test results. The provision for correlation testing shall include for all costs including:
 - (i) Assessment personnel
 - (ii) Transport of samples
 - (iii) Accommodation and subsistence
 - (iv) Correlation testing in accordance with C5.
 - (v) Weekly replicate testing
- (b) Compilation of monthly laboratory reports
- (c) Cell phones, including rental and call charges
- (d) All safety equipment for laboratory personnel in accordance with the OH&S requirements (e.g. safety jackets, orange lights, boots, etc. All laboratory office consumables, stationary etc.
- (e) Digital camera
- (f) Any other items necessary for the capture of all relevant data required for reporting to the Engineer and the information required to compile "As-Built" Materials Records.

The tendered rate for sub-item (b) shall include full compensation for provision of suitable computed hardware and internet connection, and the capturing of the following on a monthly basis:

- (a) *Project Expenditure:* All vendor/supplier payments on the project must be captured, which include payments made to the consultant, contractor, sub-contractor and suppliers. The expenditure payments must be divided into Design, Construction and Supervision with the laboratory being responsible only capturing for payments made to the laboratory as part of the supervision.
- (b) *Vendors:* The vendor/supplier must first be loaded onto the system before the expenditure data can be captured. The following data will be required: vendor name, entity type, registration number, VAT number, BBBEE, copies of BBBEE certificate/affidavit must be uploaded, CSD number, ownership details and the company contact details. A vendor must only be added once.
- (c) *Employment Data:* The employment data of all employers, working on the project must be captured. The following data must be captured: employer/beneficiary, job type, days worked, hours worked, gross wage/salary paid for the hours worked and proof of payment and attendance registers for unskilled and semi-skilled employers must be uploaded.

- (d) *Training Data:* All accredited training provided to employers, working on the project, must be captured. The following data must be captured: employer/beneficiary, course type, training vendor, training days and training value.
- (e) *Beneficiaries:* The beneficiary must first be loaded onto the system before the employment and training data can be captured. The following data will be required: First name(s), surname, initials, RSA ID number and copy of ID must be uploaded or passport number, visa details and copy of passport and work visa must be uploaded, date of birth, gender, race, disabilities, qualifications and certificates, address and contract details, home languages, number of dependents and schoolchildren and grant information.

It shall further include for all personnel and other costs, disbursements, overheads and profit. The full description of the requirements of the computer hardware, software, internet connectivity and responsibilities of the services provider in capturing the ITIS data is available from the ITIS website using the hyperlink <https://itis.nra.co.za/Portal/MyAccount/UserManuals> which may be accessed once the user has registered on the ITIS portal as per Appendix D of this contract.

The tendered rate for sub-item (c) shall include full compensation for provision of suitable computer hardware and internet connection, the utilisation on a continued basis for the capturing and destitution of information as the test results are generated in the laboratory:

- (a) Capturing of all the required information on the equipment used during testing.
- (b) Utilisation of the SARDS software to register and track sample through the laboratory.
- (c) Utilisation of the SARDS software to calculate the test results and generation of the test results.
- (d) Utilisation of the SARDS software to generate and workflow the Acceptance Reports for submission to the employer.

It shall further include for all personnel and other costs, disbursements, overheads and profit. The full description of the requirements of the computer hardware, software, internet connectivity and responsibilities of the services provider in capturing the ITIS data is available from the ITIS website using the hyperlink <https://itis.nra.co.za/Portal/MyAccount/UserManuals> which may be accessed once the user has registered on the ITIS portal as per Appendix D of this contract.

A service provider 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.

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

C3.3 LABORATORY PERSONNEL

The Service Provider shall provide sufficient competent and experienced laboratory staff in order to carry out the required quality control testing of the Works contract. Provision has been made in the Pricing Schedule for various levels of managerial and materials testing staffs that may be required. The level and actual number of testers shall be appropriate to the scope of the works and the Works contractor's production rates.

An experienced Senior Site Laboratory Manager from the Lead Partner and Site Laboratory Manager from the Targeted Partner will be required for the full duration of the contract from approximately February 2024 to January 2027 as well as experienced Senior Materials Testers (Field), Senior Materials Testers (Laboratory), Materials Testers (Field), Materials Testers (Laboratory), Assistant Materials Testers (Field) and Assistant Materials Testers (Laboratory).

A Trainee Laboratory Manager will be required and may be identified and sourced by the Lead or Targeted Partner's laboratory or by SANRAL for the full duration of the contract from approximately February 2024 to January 2027.

C3.3.1 MINIMUM REQUIREMENTS FOR SITE LABORATORY STAFF

The laboratory managers and staff shall comply with the following minimum requirements for each category respectively

TABLE C3.3.1.1: MINIMUM REQUIREMENTS FOR LABORATORY STAFF

PAYMENT ITEM NO	POSITION	ENTRY QUALIFICATION REQUIREMENTS	COMPETENCE REQUIREMENTS
C3.3.01(a)	Senior Site Laboratory Manager (SLM)	<ul style="list-style-type: none"> Relevant National Diploma and 10 years relevant experience; or NQF 6 and 10 years relevant experience. Drivers Licence <p>OR</p> <ul style="list-style-type: none"> Grade 12 and 15 years relevant experience; or NQF 4 and 15 years relevant experience. Drivers Licence 	<ul style="list-style-type: none"> Laboratory Management production planning, liaison with clients, signing reports, implementation of quality control system, etc. Also in-charge of multi-disciplinary site laboratory (Soils, Concrete, Asphalt, Seals and Aggregates). Take Note (ECSA Civil Laboratory Technical Controller registration of the SENIOR LABORATORY MANAGER WILL BE REQUIRED AS OF 1 September 2025) Competent and qualified to do all tests in all divisions and do quality laboratory control and implementation. Do all calculations in full. Control laboratory activities on smaller projects. Competent and qualified to supervise and execute field work. Be familiar with COTO. Knowledge of Health and Safety Procedures
C3.3.01(b)	Site Laboratory Manager (LM)	<ul style="list-style-type: none"> Relevant National Diploma and 3 years relevant experience; or NQF 6 and 3 years relevant experience. Drivers Licence <p>OR</p> <ul style="list-style-type: none"> Grade 12 and 8 years relevant experience; or NQF 4 and 8 years relevant experience. Drivers Licence <p>OR</p> <ul style="list-style-type: none"> Grade 10 or equivalent and 15 years relevant experience. Drivers Licence 	<ul style="list-style-type: none"> Laboratory Management production planning, liaison with clients, signing reports, implementation of quality control system, etc. Also in-charge of multi-disciplinary site laboratory (Soils, Concrete, Asphalt, Seals and Aggregates). Take Note (ECSA Civil Laboratory Technical Controller registration of the SENIOR LABORATORY MANAGER WILL BE REQUIRED AS OF 1 September 2025) Competent and qualified to do all tests in all divisions and do quality laboratory control and implementation. Do all calculations in full. Control laboratory activities on smaller projects. Competent and qualified to supervise and execute field work. Be familiar with COTO.

TABLE C3.3.1.1: MINIMUM REQUIREMENTS FOR LABORATORY STAFF

PAYMENT ITEM NO	POSITION	ENTRY QUALIFICATION REQUIREMENTS	COMPETENCE REQUIREMENTS
			<ul style="list-style-type: none"> Knowledge of Health and Safety Procedures
C3.3.01(c)	Assistant (Trainee) Laboratory Manager (ATLM)	<ul style="list-style-type: none"> Grade 12 and 7 years relevant experience; or NQF 4 and 7 years relevant experience, or an additional 2 years relevant experience for each year of schooling below Grade 12. 	<ul style="list-style-type: none"> The person shall be at least at the level of a Senior Materials Tester with the predisposition to become a Laboratory Manager (Once available, ECSA Specified Category registration as a Candidate)
C3.3.01 (d)	Trainee (Student – Experiential Training)	<ul style="list-style-type: none"> Registered for National Diploma/Certificate in civil engineering 	
C3.3.01(e)	Senior Materials Tester (FIELD SMT)	<ul style="list-style-type: none"> Grade 12 and 3 years relevant experience; or NQF 4 and 3 years relevant experience or 2 additional years relevant experience for each year of schooling below grade 12. Drivers Licence 	<ul style="list-style-type: none"> Fieldwork (densities, layer/stockpile sampling, manufacture and handle concrete cubes, DCP, Ring and Ball test (road surfaces), Sand Patch, On site Viscosity tests, Sampling of Asphalt and Bitumen.
C3.3.01(f)	Senior Materials Tester (LAB SMT)	<ul style="list-style-type: none"> Grade 12 and 5 years relevant experience; or NQF 4 and 5 years relevant experience; or an additional 2 years relevant experience for each year of schooling below Grade 12. 	<ul style="list-style-type: none"> Competent and qualified to do all tests in all laboratory divisions (i.e.: soils, asphalt / seals, concrete / aggregate) and do all calculations in full. Control laboratory activities i.e.: quality control under supervision.
C3.3.01g) & C3.3.01(h)	Materials Tester (MT) Field and Laboratory	<ul style="list-style-type: none"> Grade 10 and 2 years relevant experience; or NQF 3 and 2 years relevant experience; or an additional 2 years relevant experience for each year of schooling below Grade 10 	<ul style="list-style-type: none"> Competent and qualified to execute all tests in one laboratory division (i.e.: soils, asphalt / seals, concrete / aggregate) with bench calculations.
C3.3.01(i) & C3.3.01(j)	Assistant Materials Tester (AMT) Field and Laboratory	<ul style="list-style-type: none"> Grade 10 and 1 year relevant experience; or NQF 3 and 1 year relevant experience; or an additional 2 years relevant experience for each year of schooling below Grade 10 If locally employed Grade 10 required 	<ul style="list-style-type: none"> Competent to execute and complete tests or group of tests under direct supervision
C3.3.01(j)	Laboratory General Assistant (LGA)	Grade 10	<ul style="list-style-type: none"> To be employed from the local community through the Works Contract Employment structure
C3.3.01(k)	Data Capturer	Grade 10	<ul style="list-style-type: none"> Computer literate competent to use MS Word and Excel for reporting of results To be employed from the local community through the Works Contract Employment structure

TABLE C3.3.1.1: MINIMUM REQUIREMENTS FOR LABORATORY STAFF

PAYMENT ITEM NO	POSITION	ENTRY QUALIFICATION REQUIREMENTS	COMPETENCE REQUIREMENTS
-	Quality Assurance Manager	<p>Minimum eight (8) years' relevant experience in Civil Engineering Materials Testing; and</p> <ul style="list-style-type: none"> Valid certificate for Laboratory Systems Course based on ISO 17025; and Valid certificate for Internal Auditing Course based on ISO 17025 	<ul style="list-style-type: none"> Implementation of the Main Laboratory's QA system on site Auditing of the site laboratory Raising and closing-out of non-conformance reports in the site laboratory

Addition in testing staff, from the tendered quantities, may be required by the time related specific requirements on the project. Additional testing staff shall be provided by the laboratory after having received written notice to increase the staff beyond the tendered quantities by the engineer. Compensation for additional staff shall be in accordance with the average of the rates tendered for the level of staff required. The laboratory shall be given 30 days' notice in writing.

Reduction in testing staff, from the tendered quantities, may be required by the time related specific requirements on the project. Reduction of testing staff shall be provided by the laboratory after having received written notice to decrease the staff beyond the tendered quantities by the engineer. The laboratory shall be given 30 days' notice in writing.

Notwithstanding the previous paragraph, the Employer shall be entitled to instruct the service provider to remove forthwith from the works any person employed by the Service Provider on or about the execution of the works who, in the opinion of the Employer, misconducts himself or is incompetent or negligent in the proper performance of his duties, or whose presence is otherwise considered by the Employer, on reasonable grounds to be undesirable.

C3.3.2. DUTIES AND RESPONSIBILITIES OF THE MANAGERIAL STAFF

The Senior Site Laboratory Manager and the Site Laboratory Manager shall be responsible for the management of the site laboratory facilities, personnel, equipment, testing, test records and reporting. His duties shall include inter alia the following:

- (a) Management of site laboratory facilities:
 - (i) Ensure the OHS requirements are met;
 - (ii) Ensure the laboratory's environmental issues are taken care of;
 - (iii) Ensure that a tidy working environment is maintained; and
 - (iv) Co-ordinate of the implementation of the quality system.
- (b) Management of site laboratory personnel:
 - (i) Monitor the performance of the testing staff and co-ordinate the HR development;
 - (ii) Practical training and supervision of testers in accordance with the laid-down procedures; and
 - (iii) Maintain personnel ad training files.
- (c) Management of the site laboratory equipment:
 - (i) Supervise the maintenance, including servicing and cleaning of all equipment;
 - (ii) Manage equipment and delegate operation of the equipment to testers;
 - (iii) Ensure that the site laboratory has sufficient roadworthy and safe vehicles for use; and
 - (iv) Calculate correction factors and ensure it is displayed properly and updated regularly.

- (d) Management of the site laboratory and off-site materials sampling and testing:
 - (i) Act as leader of the site laboratory and provide direction to the activities of the laboratory;
 - (ii) Liaise with the testing staff and Quality Manager for the day-to-day operations of the site laboratory;
 - (iii) Ensure that the prescribed test methods are strictly followed by the testing staff;
 - (iv) Ensure that all system problems are discussed with the QA Manager and that the necessary steps are taken to adopt or implement further procedures to prevent recurrences;
 - (v) Stop testing activities (in consultation with the QA Manager) upon identification of test errors and immediately inform the Employer's Representatives;
 - (vi) Monitor requests for testing and schedule sampling and testing activities;
 - (vii) Ensure that the requested testing is conducted in good time; and
 - (viii) Ensure that the sample storage is managed and records are kept.
- (e) Management of the test data and record keeping:
 - (i) Ensure that the test data is captured, processed, backed-up and retrieved when required; and
 - (ii) Issue work sheets to testers and co-ordinate correctness of samples to be tested.
- (f) Management of reporting of test results:
 - (i) Co-ordinate reporting of the test results and conduct final checking of the test results to ensure that the data transfer is correct;
 - (ii) Accept, sign-off and issue test results or reject test results and order retesting of samples; and
 - (iii) Recall test reports erroneously issued to the Employer's representatives.

C3.3.3 DUTIES AND RESPONSIBILITIES OF THE QUALITY ASSURANCE MANAGER

The Quality Assurance (QA) Manager shall be responsible for the implementation of the Main Laboratory's quality assurance (QA) system on site, the regular auditing of the site laboratory to ensure compliance with the QA system, and the raising and closing-out of non-conformance reports (NCR's) in respect of the conducted audits. His/her duties shall include inter alia the following:

- (a) Implementation of the Main Laboratory's QA system on site:
 - (i) Ensure that the quality system is implemented and followed at all times;
 - (ii) Approve and issue worksheets, report sheets, verification sheets and test methods;
 - (iii) Manage the administration and maintenance of all quality selected documents;
 - (iv) Document and implement new quality management processes and procedures or changes to them as appropriate;
 - (v) Immediately remove all invalid and obsolete documents;
 - (vi) Ensure tester proof of competence is available on site;
 - (vii) Ensure personnel and training files are kept up to date;
 - (viii) Ensure the latest updated test methods are available to the testers;
 - (ix) Ensure all computer software is validated and proof of validation is available on site;
 - (x) Ensure a correlation testing schedule is approved by the engineer;
 - (xi) Ensure correlation testing is conducted in accordance with the approved schedule;
 - (xii) Ensure that correlation test results are suitably recorded, reviewed and evaluated and the correlation results are available on site in good time;
 - (xiii) Ensure regular and continued participation by the site laboratory in an accredited proficiency testing scheme ;
 - (xiv) Ensure that equipment meets accuracy and specification requirements;

- (xv) Prepare calibration / verification schedules and maintain schedules;
 - (xvi) Organise calibration of test and measurement equipment and check content of calibration certificates;
 - (xvii) Ensure the test results could not be compromised by the site laboratory facility and testing environment;
 - (xviii) Ensure all critical supplies are procured from an approved suppliers list;
 - (xix) Stop testing activities (in consultation with the Site Laboratory Manager) and immediately inform the Employer's representatives;
 - (xx) Instruct resumption of testing;
 - (xxi) Ensure that the test methods are strictly followed; and
 - (xxii) Approve the format of standard reports to be issued on site.
- (b) Auditing of the site laboratory:
- (i) Ensure that an internal Main Laboratory audit schedule is approved by the Employer's representative;
 - (ii) Ensure that internal Main Laboratory audits are conducted in accordance with the approved schedule;
 - (iii) Ensure that internal Main Laboratory audit reports are issued to site in good time; and
 - (iv) Ensure attendance of SANRAL or other external site laboratory inspections or audits by the Site Laboratory Manager and QA Manager.
- (c) Raising and closing-out of non-conformance reports in the site laboratory:
- (i) Ensure that non-conformance reports (NCR's) are raised in accordance with the Main Laboratory's QA system;
 - (ii) Carry out root cause analysis on all non-conformances;
 - (iii) Implement corrective action and preventive action timeously; and
 - (iv) Close-out all non-conformances upon implementation of corrective actions.

C3.3.4 NORMAL TIME AND OVERTIME

The Sub-service Provider shall so program its work so that all testing is done during normal working time which, for the purpose of this Contract shall be taken between 07h00 and 17h00 from Mondays to Fridays as well as Saturdays as required by the Contractor's programme. The normal working hours shall be taken as 45 hours per week and a month shall be taken as 23 working days.

C3.3.5 MEASUREMENT AND PAYMENT

All the work shall be measured in the Item no's, units and rates as described in the relevant Schedule of Quantities. Only the actual quantities of work done as requested by the Employer or his authorised representative will be measured for payment and the rates shall apply irrespective of the margin in which the actual quantities differ from those scheduled.

Contract price adjustment shall be applied in accordance with sub-clause C2.1.12 of the Section C2.1, Pricing Instructions.

<i>Item</i>	<i>Unit</i>
C3.3.01 Supply of Site Laboratory Personnel (specify type):	
(a) Senior Site Laboratory Manager:	
(i) Establishment	number (No)
(ii) Operations	month
(b) Site Laboratory Manager:	
(i) Establishment	number (No)
(ii) Operations	month

- (c) Trainee Laboratory Manager:
 - (i) Establishment Lump (L/) sum
 - (ii) Operations provisional (Prov) sum
 - (iii) Handling costs in respect of item C3.3.01(c)(ii) percentage (%)
- (d) Senior Materials Tester (Field):
 - (i) Establishment Lump (L/) sum
 - (ii) Operations month
- (e) Senior Materials Tester (Laboratory):
 - (i) Establishment Lump (L/) sum
 - (ii) Operations month
- (f) Materials Tester (Field):
 - (i) Establishment Lump (L/) sum
 - (ii) Operations month
- (g) Materials Tester (Laboratory):
 - (i) Establishment Lump (L/) sum
 - (ii) Operations month
- (h) Assistant Materials Tester (Field):
 - (i) Establishment Lump (L/) sum
 - (ii) Operations month
- (i) Assistant Materials Tester (Laboratory):
 - (i) Establishment Lump (L/) sum
 - (ii) Operations month
- (j) Laboratory General Assistant month
- (k) Data Capturer month

Payment for laboratory personnel shall only be applicable to those personnel necessary and approved by the Employer prior to establishment on site. Time related payment sub-sub-items (ii) (per month or pro rata for parts of a month) shall only be applicable once the personnel has been established on site and shall be no earlier than fourteen (14) days prior to the Contractor's programmed commencement date for the relevant construction operations and shall cease on completion of the specific operations.

The tendered rates for sub-sub-items (i) of sub-items (a), (b), (d), (e), (f), (g), (h) and (i) shall include full compensation for all costs related to establishing the individual personnel as listed in the Pricing Schedule on site and their removal after completion of the Works, and shall include all travelling costs, furniture removal costs if required, etc. No additional payment will be made for the de-establishment of personnel. Any replacement of staff members during the project for whatever reason shall not be eligible for additional payment of establishment.

The tendered rates for sub-sub-items (ii) of sub-items (a), (b), (d), (e), (f), (g), (h) and (i) and the tendered rates for sub-items (j) and (k) for each specific type of personnel shall include for all costs for the total number of personnel specified for that sub-item in the bill of quantities as follows:

- (i) Salary;
- (ii) Any additional allowances;
- (iii) Bonuses;
- (iv) Leave and sick leave taken during and outside of the standard industry shutdown period;
- (v) All company contributions such as provident fund, group life benefits, medical aid etc.;
- (vi) Taxes and levies; and
- (vii) Handling costs and profit.

Payment for laboratory personnel shall only be applicable to those personnel necessary and approved by the Employer prior to establishment on site. Time related payment items (per month or pro rata for parts of a month) shall only be applicable once the personnel has been established on site and shall be no earlier than fourteen (14) days prior to the Contractor's programmed commencement date for the relevant construction operations and shall cease on completion of the specific operations.

The rates tendered under sub-item C3.3.01(c)(i) shall include full compensation for all costs related to establishing the individual personnel as listed in the Pricing Schedule on site and their removal after completion of the Works, and shall include all travelling costs, furniture removal costs if required, etc. No additional payment will be made for the de-establishment of personnel. Any replacement of staff members during the project for whatever reason shall not be eligible for additional payment of establishment.

The Provision Sum under sub-item C3.3.01(c)(ii) provided shall cover the monthly (pro rata for part of a month) Total Annual Cost of Employment (TACE) of the Trainee Laboratory Manager which shall include the following:

- (a) Basic salary.
- (b) Other benefits not reflected in the basic salary, which may include:
 - (i) normal annual bonus (maximum of one month's salary) but excluding any performance bonuses or merit bonuses;
 - (ii) firm's contribution to medical aid;
 - (iii) group life assurance, accident and disability insurance;
 - (iv) pension/provident fund contributions by the firm;
 - (v) allowances forming part of the remuneration package which are pensionable (car allowances, etc.);
 - (vi) computer and cell phone allowance if part of package; and
 - (vii) other justifiable costs and allowances approved by the Employer.
- (c) Other costs payable due to all applicable statutory requirements such as:
 - (i) Workmen's compensation fund contributions;
 - (ii) Unemployment insurance contributions; and
 - (iii) Other applicable statutory levies.

A standardised site staff overhead factor of 1.44 shall be applied to the TACE of the Trainee Laboratory Manager which is made up as follows:

Description	Site staff overheads
Salaries (Technical) TACE	1.00
Salaries (Non-technical) TACE	0.24
Telephone and communication	Tendered item
Rental of premises, electricity, water	Provided by Client
Transport not recovered from project	Pay item
Paper, stationary, consumables	Tendered item
Audit, bank charges, interest, insurance	0.08
Marketing	0.02
Office equipment	Tendered item
Training and development	0.02
Project direct expenses not recoverable	0.08
Head Office expenses	Tendered item
Net Overhead Factor before profit	1.44

The percentage tendered under sub-sub-item C3.3.01(c)(iii) for handling cost shall include full compensation for all additional overhead costs related to the employment the training of trainee laboratory manager.

Replacement of staff as a result of any extended period of leave or sick leave outside the normal contractor's year end break shall be to the approval of the Employer.

The TACE shall be verified by means of an audited statement.

<i>Item</i>	<i>Unit</i>
C3.3.02 Extra-over item C3.3.01 for over-time payments to laboratory personnel:	
(a) Senior Materials Testers	hour (hr)
(b) Materials Testers	hour (hr)
(c) Assistant Materials Testers	hour (hr)

The unit of measurement under this pay item shall be the hour of overtime worked by the relevant hourly paid personnel. Extra payment to the Service Provider in respect of overtime shall only be done in cases in which the personnel qualify and are paid for overtime worked in accordance with the basic Conditions of Employment Act. In all such cases the Service Provider will be required to prove that his personnel are in fact receiving overtime pay. Joint approval of overtime shall be by the Laboratory Manager and the Engineer. Time sheets for all staff shall be included in the monthly certificate submitted to the Employer for payment.

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

C3.4 TRAINING

C3.4.1 TRAINING OF LOCALLY EMPLOYED LABORATORY PERSONNEL AND TARGETED PARTNER STAFF

Accredited training shall be provided by qualified experienced training practitioners. The training in the Engineering Skills shall include:

- Sampling and testing of materials and
- Appropriate level of theory in the use of construction materials.

The training related to the development of the trainees shall be suitable for the laboratory industry and the level of the trainees. The trainees shall be trained in both occupational safety in the laboratory as well as on the whole construction site. Safety measure related to road safety and traffic accommodation shall be provided as applicable.

C3.4.2 MEASUREMENT AND PAYMENT

All the work shall be measured in the Item no's, units and rates as described in the relevant Schedule of Quantities. Only the actual quantities of work done as requested by the Employer or his authorised representative will be measured for payment and the rates shall apply irrespective of the margin in which the actual quantities differ from those scheduled.

Contract price adjustment shall be applied in accordance with sub-clause C2.1.12 of the Pricing Instructions. No contract price adjustment is applicable to provisional and prime cost sums.

Item	Unit
C3.4.01 Training:	
(a) Engineering skills	provisional (Prov) sum
(b) Development	provisional (Prov) sum
(c) Safety	provisional (Prov) sum
(d) Training venue	provisional (Prov) sum
(e) Remuneration of workers undergoing training	provisional (Prov) sum
(f) Handling costs in respect of Sub-items C3.4.01(a), (b), (c), (d) and (e)	percentage (%)

Payment under item C3.4.01 does not include the cost of training which the Laboratory is required to provide as part of his obligations for the pre-qualification and tender processes. The laboratory shall be required satisfy the competence standards of its own personnel.

The Lead Partner's own staff may attend the courses provided. However, such attendants from the Lead Partner's staff and permanent labour complement, shall not be considered for measurement and payment purposes.

Payment under sub-items (a), (b) and (c) shall be the actual sum paid for the trainees to undergo training in the respective skills as specified.

Payment under sub-item (d) shall be 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 trainees to and from the training venue.

Payment under sub-item (e) shall be the daily wage in normal work hours of the individual workers whilst they are away from their normal duties and at training.

The tendered percentage for sub-item (f) is a percentage of the amounts actually spent under sub-items (a) to (e), which shall include full compensation for the overhead charges and profit of the Sub-service Provider.

C3.5 STANDARD OF TESTING

C3.5.1 QUALITY ASSURANCE

The Service Provider shall equip, staff and administer a site laboratory to undertake the relevant acceptance control testing in accordance with specified requirements of the Works Contract as well as the Employer's standard requirements. As the scope of the Works may not be finalized, more than one "laboratory type" or major "equipment type" may be included in the Pricing Schedule. Payment shall however only apply to the specific "laboratory types" and "major equipment type" necessary for the specific work.

The site laboratory shall operate under the umbrella of a SANAS accredited main laboratory that shall be responsible for ensuring that all sampling and testing is carried out accurately and strictly in accordance with the relevant SANS, Sabita Manual 37/TMH 5 as well as the SANAS accreditation requirements.

Any deviations from the full Quality Assurance Management system as approved under the parent laboratory's SANAS accreditation shall only be allowed if approved in writing by the employer.

The site laboratory shall conduct correlation testing with at least two SANAS accredited facilities in accordance with the approved inter-laboratory testing schedule and scope submitted to the Employer. Both the offsite facilities used in each round of inter-laboratory testing shall be accredited for the specific test method used in the correlation.

C3.5.2 INTERNAL, EXTERNAL AND THIRD PARTY INSPECTIONS AND AUDITS

The Client and the Employer reserves the right to inspect the Service Provider's equipment and compliance with the approved methods and specifications at any time, and to reject equipment not complying with the relevant specification. The Client and the Employer reserves the right to request an ad hoc SANAS technical assessment of the laboratory at any time during the Contract. These ad hoc technical assessments shall be paid for under sub-item C3.5.01(a) if no major non-conformances are found during the assessment. In the event that major non-conformances are found, the SANAS technical assessment shall be paid for solely by the Service Provider.

Audits conducted by the Site Laboratory Manager will not be regarded as sufficient.

C3.5.3 SAMPLING AND TESTING METHODS AND PROCEDURES

All testing of samples shall be carried out in accordance with the standard procedure prescribed by the following, in order of preference or as requested by the Client:

- (1) South African National Standards (SANS) 3001 – Civil engineering test methods.
- (2) Sabita Manual 37/TMH 5
- (3) Technical Guidelines: The use of Modified Bituminous Binders in Road Construction (TG1 –
- (4) Interim Guidelines: The design and use of foamed bitumen treated materials (Asphalt Academy TG2 -
- (5) SABITA Manuals.
- (6) British Standards Institute Specifications (abbreviation: B.S.).
- (7) American Society for Testing and Materials (abbreviation: ASTM).
- (8) American Association of State Highway and Transportation Officials (abbreviation: AASHTO).
- (9) Other methods as supplied by the Employer or Agency
- (10) COTO Standard Specifications for Road and Bridge Works for South African Road Authorities

In all cases the latest amendment or revision current when a test is requested should be used when reference is made to one of the above standard methods in the specification. The method and revision shall be reflected on the test results.

C3.5.4 OTHER METHODS SUPPLIED BY THE CLIENT

The following test methods form part of the works contract as described in Section B8100 of the Project Specifications.

(a) Determination of Ethylene Glycol Durability Index

The Ethylene Glycol Durability Index shall be determined as follows:

- (i) Apparatus
 - (1) Suitable pans or basins
 - (2) Ethylene Glycol solution
 - (3) 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 20 mm plus 14 mm 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 twenty four (24) hours, gently stir the aggregate and allow it to settle. Observe and record the response of the aggregate to the ethylene glycol according to the criteria listed in sub-sub-clause (iii) below. Continue the above cycle at intervals of twenty four (24) hours for a further four (4) days, in each case recording the observed response. After five (5) days allow the samples to remain submerged in the solution and observe and record the disintegration response after a total period of fifteen (15), thirty (30) and sixty (60) days have elapsed.

(iii) Classification of response

After each cycle, classify and record the response of the aggregate as follows:

(1) **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.

(2) **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 one (1) (no response) to nine (9) (rapid and complete disintegration) is thus determined."

(b) Procedure for the Testing of Concrete Cover

(i) Scope

This procedure covers all measurements to be done on concrete structures to establish conformance to specified concrete cover requirements.

(ii) Guidelines and Preparation

- (1) The contractor is to complete a cover survey request and forward it to the engineer.
- (2) The selected area for cover measurement is to be indicated on a sketch (see example attached).
- (3) 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.
- (4) 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.
- (5) 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).
- (6) 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.

- (7) Measurements are to be taken in accordance with cover meter manufacturer's guidelines.
 - (8) The person responsible for measurements must indicate the position, dimension, type and splicing of reinforcement on the sketch for each scanned area.
- (iii) Method of Measurement

Two methods of measurement are proposed as follows:

(1) *Quick/Linear Scan Method*

- Readings are to be taken perpendicular to the layer of rebar closest to the concrete surface for each scan area (± 30 readings per m^2), 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 $1.0 m^2$. At least three (3) cover readings, at 150 mm 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 5 mm (allowance for variation of equipment). As an example, if the specified cover is 40 mm, the lower limit for full acceptance is:

$$(40 \text{ mm} - 5 \text{ mm}) \times 85 \% = 30 \text{ mm}.$$

- 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.

An example of the Quick Scan information and presentation is shown in Figure C3.5.4.1 overleaf.

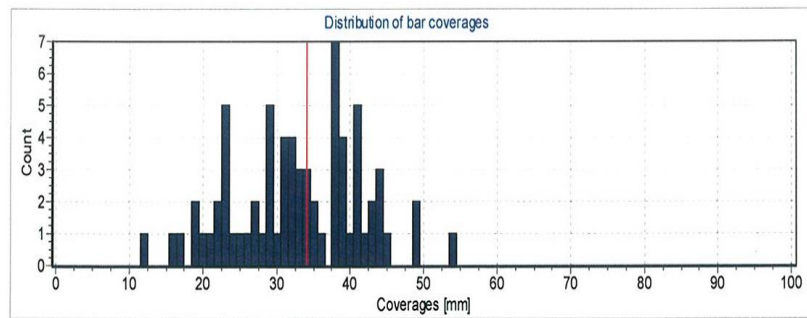
(2) *Image/Block/Grid Scan Method*

- Readings are to be taken in both directions of a marked grid as per the equipment manufacturer's recommendations.
- 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.
- For purposes of calculation of the averages for cover of a rebar layer, readings exceeding upper limit (cover + 15 mm) to be capped on upper limit. Further specified cover to be reduced by 5 mm (allowance for variation of equipment). As an example, if the specified cover is 40 mm, the lower limit for full acceptance is:

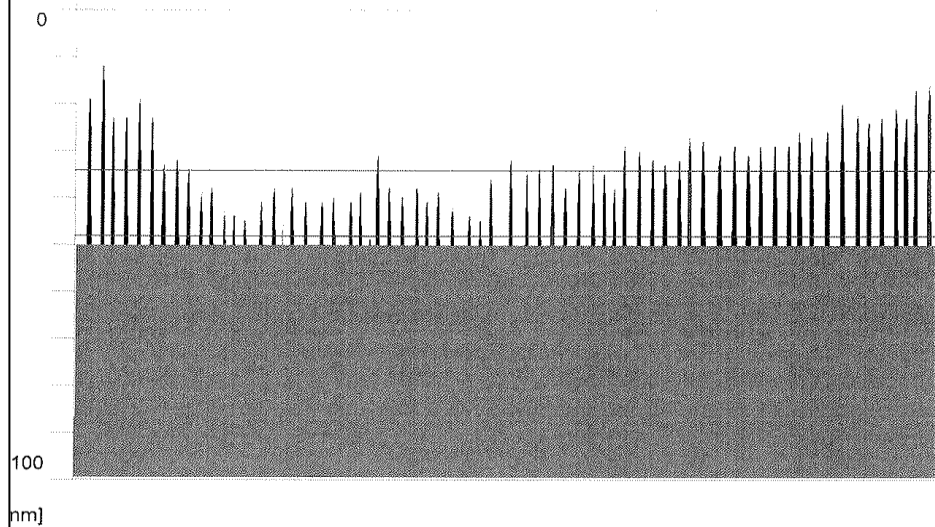
$$(40 \text{ mm} - 5 \text{ mm}) \times 85 \% = 30 \text{ mm}.$$

An example of Image Scan information and presentation is shown in Figure C3.5.4.2 overleaf. 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 C3.5.4.3 overleaf.

Calculated Statistic Data - Neville probability distribution with parameter estimation



number of bars:	70	arithmetic mean:	33 mm	top removal:	0 mm
minimum value:	12 mm	median:	33 mm	c_min:	34 mm
maximum value:	54 mm	standard deviation:	9 mm	cut-off:	100 mm
#bars below c_min:	37	5% quantile:	22 mm	10% quantile:	24 mm



Quickscan Statistics (first guess):

Minimum Coverage:	12 mm	T1:	34 mm
Maximum Coverage:	49 mm	#Bars at T1:	40
Mean Coverage:	32 mm	T2:	48 mm
Standard Deviation:	8 mm	#Bars at T2:	67
Cut-Off:	50 mm	T3:	48 mm
#Bars at Cut-Off:	69	#Bars at T3:	67

FIGURE C3.5.4.1: QUICKSCAN OUTPUT EXAMPLE

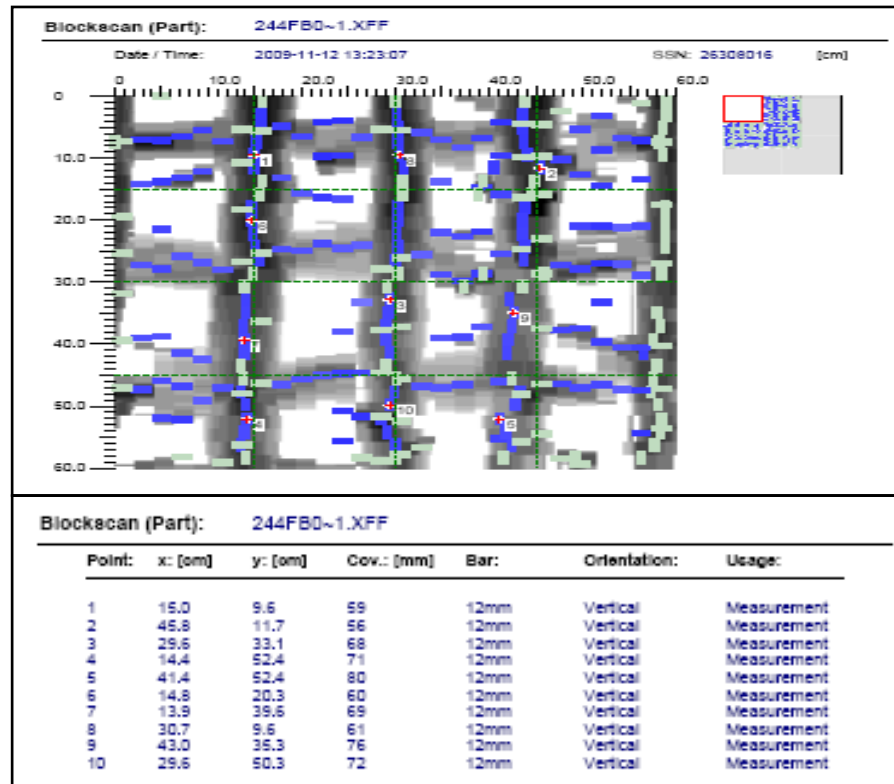


FIGURE C3.5.4.2: IMAGESCAN OUTPUT EXAMPLE

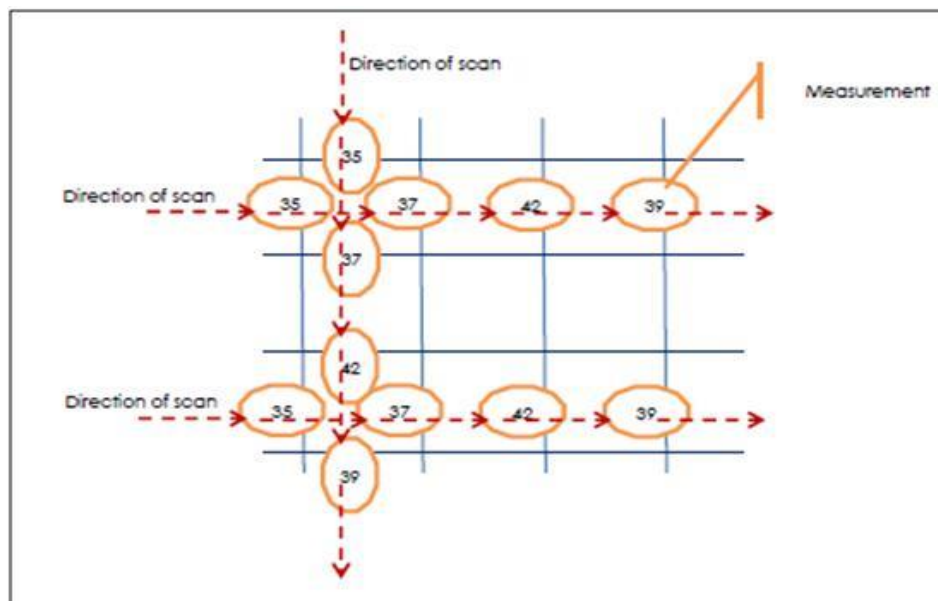


FIGURE C3.5.4.3: MANUAL RECORDING OF READINGS

C3.5.5 REPORTING OF RESULTS

All reports and results shall also be submitted in a compatible electronic format to the requirements of the Employer's representative. Original signed hardcopies of results shall also be made available.

C3.5.6 DELIVERY OF TEST RESULTS

The sampling and field testing and laboratory materials testing shall be done timeously to ensure that the results are delivered within the recommended periods as listed in Appendix C of Chapter 13 of the South African Pavement Engineering Manual the SAPEM is available on the Client's web-site.

C3.5.7 PENALTIES FOR LATE COMPLETION OF MATERIALS SAMPLING AND TESTING

The penalties for late completion of sampling and testing as defined in Sub-clause 3.11 of the Conditions of Contract as amended in Section C1.3.2, the Contract Data – Information provided by the Employer shall only be applied if the materials sampling and testing is not completed within the periods specified in sub-clause 0 above AND is not delaying the Contractor’s progress. Penalties shall be deducted on a monthly basis on a separate calculation sheet as part of the Service Provider’s monthly payment certificate.

C3.5.8 MEASUREMENT AND PAYMENT

All the work shall be measured in the Item no’s, units and rates as described in the relevant Schedule of Quantities. Only the actual quantities of work done as requested by the Employer or his authorised representative will be measured for payment and the rates shall apply irrespective of the margin in which the actual quantities differ from those scheduled.

Contract price adjustment shall be applied in accordance with sub-clause C2.1.12 of the Pricing Instructions. No contract price adjustment is applicable to provisional and prime cost sums.

Item **Unit**

C3.5.01 Quality Assurance and Audits of the Site Laboratory:

- (a) External inspections / Audits provisional (Prov) sum
- (b) Handling costs in respect of item C3.4.01(a) percentage (%)
- (c) Internal inspections / audits by SANAS accredited parent laboratory number (No)

Expenditure under sub-item C3.5.01(a) shall be for external inspections and audits carried out by a SANAS Technical assessor for civil engineering, current or previously contracted by SANAS on the site laboratory, on the instruction of the Engineer. The SANAS Technical assessor shall not be from the main laboratory or of the same laboratory group. All travel, accommodation and related costs incurred by the technical assessor shall be included in the item.

The % tendered under sub-item C3.5.01(b) shall include full compensation for costs associated with procuring the services of a SANAS contracted technical assessor.

The Sub-service Provider shall not be entitled to the handling cost if the procurement of the service of the SANAS Technical assessor is handled by the Employer or the Client.

Expenditure under sub-item C3.5.01(c) shall be for monthly audits performed by the Person provided for on Form B2 from the SANAS accredited parent laboratory on the site laboratory and shall include for the provision of audit reports to the Engineer. The internal audits shall take account of all the requirements of ISO 17025.

The frequency and intensity of the inspections / audits shall be programmed to cover the scheduled site tests within a six (6) monthly rotation. The Site Laboratory Manager and the Quality Assurance Manager shall not be the same person. The Quality Assurance Manager will be required to attend any External SANAS assessor audits and SANRAL laboratory inspections.

C3.6 PROVISION OF TRANSPORT AND HOUSING FOR SITE LABORATORY STAFF

C3.6.1 TRANSPORT FOR SAMPLING AND FIELDWORK

The Laboratory shall be required to retrieve samples on site and transport the samples to the site laboratory for testing as well as all fieldwork required. The rates tendered herein shall apply to the transport of these samples and fieldwork.

Only travel in the execution of these duties, as well as any other travel necessary as a result of any additional duties as ordered by the Employer, shall be claimable. Estimated travel costs as a result of week end travel by staff to their place of permanent residence shall be approved beforehand by the Employer. Estimated travel costs as a result of daily travel by staff from their site accommodation to site shall be approved beforehand by the Employer

Travel log sheets for each vehicle utilised shall be certified by the Engineer and included under cover of the payment certificates submitted to the Employer. The kilometre rate for all travel in excess of 5000 kilometres per vehicle per calendar month shall be reduced and paid for at 60% of the rate.

The kilometre for all staff shall be limited to a Category A and B type vehicle with a 2500 Engine Volume cc in accordance with the table below . In exceptional cases the Employer may consider a different category vehicle and/or engine volume.

TABLE C3.6.1.1 SCHEDULE OF TRAVEL TARIFFS (CENTS PER KILOMETRE)

ENGINE VOL (CC)	A	B	C	D
UP TO 1400	227 + 7.24 x PP	179 + 9.8 x PP	-	-
1401-1600	284 + 7.88 x PP	204 + 9.8 x PP	-	-
1601 – 1800	284 + 7.88 x PP	204 + 9.8 x PP	-	363 + 7.88 x PP
1801 – 2000	323 + 8.77 x PP	282 + 9.8 x PP	361+ 9.8 x PP	421 + 8.77 x PP
2001 – 25001	469 + 10.56 x PP	285 + 13.1 x PP	315 + 13.1 x PP	469 + 10.56 x PP
OVER 2501	482 + 10.98 x PP	366 + 13.8 x PP	456+ 13.8 x PP	482 + 10.98 x PP

NOTE:

- The formulas in this table are fixed for 1 (one) year only (April-March of each year) regardless of the Stage of the Project. The Employer will publish revised formulas on a yearly basis.
- “PP” is the lowest octane rating petrol price in Rand, for the month, in the city of the respective Regional Office. The “PP” rate can be downloaded from the AA website www.aa.co.za on a monthly basis.

Vehicle Classes

- A - Passenger motor cars and station wagons and 4x2 Double Cabs
- B - Two wheel drive light delivery vehicle, panel vans and other similar goods vehicles with a carrying capacity up to one metric ton
- C - Four wheel drive light delivery vehicle (single and double cab)
- D - Mini busses (up to 15 seater)

C3.6.2 ACCOMMODATION FOR LABORATORY PERSONNEL

The Service Provider shall provide appropriate housing for the laboratory managers and testing staff. A provisional sum has been allowed in the Pricing Schedule for this purpose. Accommodation of the laboratory managers and staff shall be located as near to the Works as practically possible.

Where site staff elect to occupy their own housing and approved by Employer, payment shall be made in accordance with the table below.

TABLE C3.6.2.1:MONTHLY ACCOMMODATION ALLOWANCE RATES

ANNUAL BASIC SALARY	AREA IN WHICH HOUSING UNIT IS LOCATED	
	OTHER	METROPOLITAN AREAS
Up to – R130 000	R 3 628	R 4 180
R130 000 – R260 000	R 4 597	R 5 494
R260 000 – R500 000	R 5 635	R 7 061
R500 000 and over	R 6 731	R 7 987

NOTE:

- The amounts in this table are fixed for one (1) year only (April-March of each year) regardless of the Stage of the Project. The rates shall be adjusted according to the rates published by the Client on an annual basis.

C3.6.3 MEASUREMENT AND PAYMENT

All the work shall be measured in the Item no's, units and rates as described in the relevant Schedule of Quantities. Only the actual quantities of work done as requested by the Employer or his authorised representative will be measured for payment and the rates shall apply irrespective of the margin in which the actual quantities differ from those scheduled.

Contract price adjustment shall be applied in accordance with sub-clause C2.1.12 of the Pricing Instructions. No contract price adjustment is applicable to provisional and prime cost sums.

Item

Unit

C3.6.01 Provision of transport for retrieving samples and all associated field work:

- (a) Travelling to perform sampling and field work provisional (Prov) sum
- (b) Mark-up i.r.o item C3.6.01(a)..... percentage (%)

The provisional sum under sub-item C3.6.01(a) shall cover the cost of travelling to perform the duties and any additional duties as may be ordered by the Employer. The rate for transport in excess of 3000 km per vehicle per month shall, however, be reduced and paid for at 60% of the rate. Completed log sheets for each vehicle shall be certified by the Engineer and included in the monthly payment certificate.

The kilometre for all staff shall be limited to a Category A and B type vehicle with a 2500 cc Engine Volume in accordance with the table below. In exceptional cases the Employer may consider a different category vehicle and/or engine volume.

The unit of measurement for payment sub-item C3.6.01(b) shall be percentage. The percentage tendered shall include full compensation for all administration, handling costs and profits incurred by the Service Provider.

Item

Unit

C3.6.02 Accommodation for site laboratory managers and laboratory testing personnel

- (a) Provisional sum for accommodationProvisional Sum
- (b) Handling costs in respect of item C3.6.02(a) Percentage (%)

Expenditure under this item shall be for rented or other appropriate accommodation (including all basic services connected with such accommodation) approved by the Engineer. The Service Provider shall be directly responsible for entering into any agreements/leases for such accommodation for all personnel established by the service provider to the contract.

The percentage (%) tendered in sub-item (b) shall include full compensation for costs associated with locating suitable accommodation, rental negotiations and entering into lease agreements.

C3.7 SPECIALISED EQUIPMENT AND OFFSITE TESTING

C3.7.1 PROVISION OF SPECIALISED EQUIPMENT

The Major and Specialised Equipment envisaged for the materials testing is listed in the following tables:

- Table C3.2.1.2 Soils Laboratory, Classes A, B & C;
- Table C3.2.2.2 Concrete Laboratory, Classes A, B & C;
- Table C3.2.3.2 Asphalt Laboratory, Classes A, B & C; and
- Table C3.2.4.2 Seal Laboratory, Classes A, B & C.

The cost of all the Major and Specialised Equipment required to perform the materials testing listed in:

- Table C3.2.1.1 Soils Laboratory, Classes A, B & C;
- Table C3.2.2.1 Concrete Laboratory, Classes A, B & C;
- Table C3.2.3.1 Asphalt Laboratory, Classes A, B & C; and
- Table C3.2.4.1 Seal Laboratory, Classes A, B & C,

shall be included in the tendered rate for the respective laboratory types and classes. Any additional Major and Specialised Equipment listed that is required for testing other than those listed in the tables above, shall be provided for separately in the Schedule of Quantities under Specialised Equipment.

C3.7.2 PROVISION FOR OFFSITE TESTING

Specialised test not allowed for under Sub-clauses 0, 0, 0 and 0 shall be submitted to SANAS accredited laboratories for offsite testing. All offsite testing shall be in accordance with the works contract documentation and shall comply with SANS 3001. The testing shall be conducted at a SANAS accredited facility that is accredited for the test method specified for the testing.

Only where not a single laboratory in the Republic of South Africa is accredited for the required test method may the testing be conducted by a laboratory that is not accredited for the test method, and then only at a facility that is SANAS accredited for testing of the materials type that requires testing.

C3.7.3 MEASUREMENT AND PAYMENT

All the work shall be measured in the Item no's, units and rates as described in the relevant Schedule of Quantities. Only the actual quantities of work done as requested by the Employer or his authorised representative will be measured for payment and the rates shall apply irrespective of the margin in which the actual quantities differ from those scheduled.

Contract price adjustment shall be applied in accordance with sub-clause C2.1.12 of the Pricing Instructions. No contract price adjustment is applicable to provisional and prime cost sums.

<i>Item</i>	<i>Unit</i>
C3.7.01 Specialised equipment, not included in the cost of the various laboratory types:	
(a) <i>(Specify test type of equipment):</i>	
(i) Establishment (including supply of equipment	Lump (L/) sum
(ii) Operations	month

Payment for laboratory specialised equipment shall only be applicable to that laboratory equipment specified by the Employer in this payment item. Time-related payment items (per month or pro rata for parts of a month) shall only be applicable once the equipment has been established on site and shall be no earlier than fourteen (14) days prior to the Contractor's programmed commencement date for the relevant construction operations and shall cease on completion of the specific operations.

The rate tendered under this specific item/s shall include for all costs as follows:

- All costs associated with loading, transporting and setting up the equipment on site;
- Testing and calibration of equipment as specified in the relevant test methods and in accordance with the SANAS certification requirements;
- Intermediate calibration as specified in the relevant test methods and SANAS certification requirements; and
- Removal of equipment from site on completion of the Works.

Item		Unit
-------------	--	-------------

C3.7.02 Off-site specialised testing:

- | | | |
|-----|----------------------------------------------------------------------------------------------------------------|------------------------|
| (a) | Testing by an external SANAS accredited laboratory upon the instruction of the Employer's representative | provisional (Prov) sum |
| (b) | Handling costs in respect of sub-item C3.7.02(a) | percentage (%) |

Expenditure under pay sub-item (a) shall be for all laboratory testing of materials carried out off-site by the Main Laboratory or an external sub-service provider on the instruction of the Employer's representative.

The Employer's representative shall specify which facility shall be used.

The percentage tendered under sub-item (b) shall include full compensation for all costs associated with:

- (i) producing a schedule of all testing envisaged;
- (ii) compiling a quotation / tender document;
- (iii) evaluation of quotations / tenders received; and
- (iv) procurement of sub-service provider on approval by the Employer.

The Service Provider shall not be entitled to the handling cost if the off-site testing is conducted by the Main Laboratory.

Item		Unit
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C3.7.03 Off-site testing by Main Laboratory, including sampling and laboratory quality control:

- | | | |
|-----|----------------------------------------------------------|-------------|
| (a) | Standard tests for soil, sand, gravel and crushed stone: | |
| | (i) Specify test type | number (No) |
| (b) | Standard tests for concrete: | |
| | (i) Specify test type | number (No) |
| (c) | Standard tests for asphalt: | |
| | (i) Specify test type | number (No) |
| (d) | Standard tests for bituminous seals: | |
| | (i) Specify test type | number (No) |

The unit of measurement under payment sub-items (a) to (d) shall be the number of tests prescribed by the Engineer's Representative and carried out by the Main Laboratory.

The tendered rates shall cover all costs associated with the sampling of materials and execution of the individual tests, including the management and labour costs and the cost of all incidentals as well as the calculations required for the testing and reporting in the format prescribed by the Engineer's Representative. Any tests proven to be erroneous shall not be paid for. The cost of transporting the samples from the site to the Main Laboratory shall be excluded from the tendered rate, as this cost is covered by the tendered rates for transport of personnel, equipment and materials under item C3.6.01.

C3.8 OCCUPATIONAL HEALTH AND SAFETY SPECIFICATION

LIST OF ABBREVIATIONS

CR	Construction Regulations
GAR	General Administration Regulations
GSR	General Safety Regulations
HCSR	Hazardous Chemical Regulations
HIRA	Hazard Identification and Risk Analysis
OHS Act	Occupational Health and Safety Act 85 of 1993
OHSS	Occupational Health and Safety Specification
SANS	South African National Standards
SANRAL	South African National Roads Agency SOC Ltd

C3.8.1 INTRODUCTION

C3.8.1.1 PROJECT SCOPE

Part C4 : Site Information for the Scope of the Project.

C3.8.1.2 KEY ROLE PLAYERS

Employer:
Ilifa Africa Engineers (Pty) Ltd

Client:
The South African National Roads Agency SOC Limited

C3.8.1.3 COMPLEXITY, SPECIFIC PROJECT RISKS AND REQUIREMENTS

Design risks are generally those associated with the functioning of a general civil engineering site laboratory that includes the testing of soils, bitumen, stone, concrete, and the use of chemicals for the testing of stabilizing and bitumen materials. The tenderer must supply a full HIRA covering all the tests set out in this document.

C3.8.2 HEALTH AND SAFETY SPECIFICATION

C3.8.2.1 Purpose of the Occupational Health and Safety Specification

The OHSS is a performance specification to ensure that the Employer and any bodies that enter into formal agreements with the Employer viz. Agents, Consultants, Laboratory Contractors and Contractors achieve an acceptable level of OHS performance. No advice, approval of any document required by the OHSS such as hazard identification and risk assessment action plan or any other form of communication from the Employer shall be construed as an acceptance by the Employer of any obligation that absolves the Laboratory Contractor from achieving the required level of performance and compliance with legal requirements. Further, there is no acceptance of liability by the Employer which may result from the Laboratory Contractor failing to comply with the OHSS, i.e. the Laboratory Contractor remains responsible for achieving the required performance levels.

C3.8.2.2 Implementation of the Occupational Health and Safety Specification

This OHSS forms an integral part of the Contract, and Laboratory Contractors are required to make it an integral part of their Contracts with Contractors and Suppliers.

This specification must be read in conjunction with the OHS Act No 85 of 1993 (as amended)(The Act), and the Regulations thereto as amended from time to time.

The OHS Act Agreement in Section C1 of the Tender Document (Contract Forms) must be fully completed by the Contractor. These documents shall be deemed to form part of the Contract Documents.

No work is to be commenced without written approval of the H&S plan. Failure to comply with this requirement will result in a fine or stoppage of work, with no extension of time or allowable claims.

C3.8.2.3 Interpretations

Application

The OHSS contains clauses that are generally applicable to building / construction and that impose pro-active controls associated with activities that impact on human health and safety as they relate to plant and machinery.

Compliance to the requirements of the OHSS is in addition to the requirements of the OHSA, Construction Regulations and General Safety and is part of the Laboratory Contractor's responsibility. The Employer will through the Agents, as appointed, monitor that the Laboratory Contractor complies with the requirements of the OHSA and will not prescribe to the Laboratory Contractor how such compliance is achieved.

Definitions

The definitions used will be those set out in the Regulation Gazette No 7721 of 18 July 2003 with the following additions:

SANRAL: The South African National Roads Agency SOC Ltd

Employer: Ilifa Africa Engineers (Pty) Ltd

Engineer: Mr J.J. Olivier

Epidemic Disease:

Means a disease "affecting many persons at the same time and spreading from person to person in a locality where the disease is not permanently prevalent." The World Health Organization (WHO) further specifies *epidemic* as occurring at the level of a region or community.

Hazard: Source of exposure to danger

Hazard Identification and Risk Assessment (HIRA) and Risk Control:

Means a documented plan, which identifies hazards, assesses the risks and details the control measures and safe working procedures which are to be used to mitigate and control the occurrence of hazards and risks during construction or operation phases.

Health and Safety Management Plan:

Means a site, activity or project specific documented plan in accordance with the client's health and safety specification, OHS Act and Regulations. (as per CR, 2014)

Induction Training:

Means once off introductory training on general health and safety issues given to all employees and visitors to the site before commencement of work on site.

Pandemic Disease:

Means an *epidemic* that has spread over a large area, that is, it's "prevalent throughout an entire country, continent, or the whole world."

Risk:

Means the probability or likelihood that a hazard can result in injury or damage.

Regulation/s:

Shall mean the relevant regulation/s promulgated in terms of the Occupational Health and Safety Act, 1993 (ACT NO. 85 of 1993).

Site:

Means the area in the possession of the Contractor for the construction of the works. Where there is no demarcated boundary it will include all adjacent areas and haul roads that are reasonably required for the activities for the Laboratory Contractor, and approved for such use by the Engineer.

The Act:

Means, unless the context indicates otherwise, the Occupational Health and Safety Act, 1993 (ACT NO. 85 of 1993) and Regulations promulgated thereunder as amended from time to time

C3.8.4 NOTIFICATION OF COMMENCEMENT OF WORK

After award of the contract, but before commencement of work, the Laboratory Contractor shall notify the Provincial Director of the Department of Labour in writing that work is to commence in terms of the Construction Regulations 2014, Section 4. The notification must be done in the form of the pro forma given in Annexure 2 to the Construction Regulations.

A copy of the notification form must be kept on site, available for inspection by inspectors, Employer, Engineer, employees and persons on site. Proof of submission must also be provided.

Work will not commence without the Notification being correctly completed and signed by the Employer.

If there are any changes to the conditions given in the submission, a revised form (Annexure A) must be submitted to the Department of Labour.

C3.8.5 GUIDELINES FOR THE DEVELOPMENT OF A HEALTH & SAFETY PLAN

C3.8.5.1 Background

In terms of the Construction Regulations [Section 5.1(a)&(b)] of the Occupational Health and Safety Act, No 85 of 1993, the Employer is required to compile an Occupational Health and Safety Specification for each of its projects and the Laboratory Contractor, appointed by the Employer in terms of Section 5.1(k), is required to prepare an Occupational Health and Safety Plan.

This plan has to be prepared in terms of Section 7.1(a) and must be based on the requirements of the Employer's Occupational Health & Safety Specification, as well as the OHS Act and any other legal standard incorporated under Section 44 of the OHS Act. In terms of Section 5.1(l), the Employer and the Laboratory Contractor are required to agree on the Occupational Health and Safety Plan before any work may commence.

C3.8.5.2 Framework for an Occupational Health and Safety Plan

Introduction

The Laboratory Contractor has to demonstrate to the Employer that he has a suitable and sufficiently documented Occupational Health and Safety Plan as well as the necessary competencies, experience and resources to perform the construction work safely.

This OHS plan shall, answer and if necessary amplify the requirements of the OHS specification outlined above.

The Laboratory Contractor is required to submit at, or before, commencement of work, the following documentation for perusal and verification by the Employer:

- (a) Management Structure including an organogram, this shall be populated with the names of the holders of the various posts as far as shall be practical at the start of the project but shall include, at a minimum, the names of the Laboratory Manager and the Laboratory Health and Safety officer with their CVs.
- (b) Letter of good standing issued by the Compensation Commissioner or licensed Compensation insurer.

Contents of an Occupational Health and Safety Plan

A Site Specific Health and Safety Plan must be developed based on Legal - and the OHSS requirements. The Occupational Health and Safety Plan shall include, as a minimum the following:

- (a) A Health and Safety Policy
- (b) Risk Assessments, Safe Work Procedures and Method Statements
- a. Risk assessment monitoring and review process
- (c) Appointments and responsibilities
- (d) Inspection process of laboratory equipment
- (e) Hazardous chemical agents handling and storage
- (f) Radioactive equipment transportation, handling and storage
- (g) Waste management
- (h) Emergency plan / Incident investigations
- (i) Employee medical surveillance and first aid
- (j) Ergonomics
- (k) Personal Protective Equipment (PPE)

C3.8.6 APPOINTMENT OF HEALTH AND SAFETY (H&S) PERSONNEL

C3.8.6.1 Supervision

In terms of Section 16 of the Act, the Chief Executive Officer of the Laboratory Contractor may delegate, in writing, part or all of his powers to a suitable person on the site.

The Laboratory Contractor shall appoint a full-time **Supervisor (Laboratory Manager)**, in writing, in terms of Regulation 8.1(i) of the OHS Act with the duty of supervising the performance of the laboratory testing and field work.

C3.8.6.2 Laboratory Health and Safety Officer

The Laboratory Health and Safety Officer must be competent in the administration of Health and Safety in a site civil engineering laboratory and the CV submitted should reflect this.

The appointed person must have had formal training in Health and Safety Management which could include as a minimum SAMTRAC, NEBOSH or similar and exposure to the OHS Act and Regulations. A driver's license is essential.

Unless otherwise decided by the Engineer and/or the Health and Safety Agent, this may be a part-time position.

The Laboratory Health and Safety Officer shall liaise closely with the Construction Contractor's Health and Safety Officer.

C3.8.6.3 Health and safety representatives

Notwithstanding the requirements of Reg 17 & 18 of the OHS Act, the Laboratory Contractor shall appoint in writing a health and safety representative for the workplace.

Where more than 20 employees are employed in the workplace the number of representatives must increase in relation to the number employed. The health and safety representatives must be elected from employees who are employed in a full-time capacity at a specific workplace and must be nominated and elected according to the General Administrative Regulation, Section 6.

Representatives from local labour can be appointed to represent such labour for the duration of the contract. The functions of the H&S Representatives are as outlined in the OH&S Act, Section 18.

C3.8.6.4 Health and safety committee

As it is highly unlikely for the Laboratory Contractor to have more than two health and safety representatives, which would remove the requirement to form a health and safety committee. It is therefore required that the health and safety representative of the Laboratory Contractor form part of the Principal Contractor health and safety committee and attend their scheduled meetings.

Any health and safety related concerns should be raised at the health and safety committee meetings.

C3.8.6.5 Competent persons

The appointment of competent persons to supervise parts of the work does not relieve the Laboratory Contractor from any of his responsibilities to comply with **all** requirements of the OHS Act and its Regulations.

The Laboratory Manager should have basic training in Occupational Health and Safety and be familiar with the requirements of the OHS Act and regulations.

The Health and Safety Officer whether full or part time must have training in the application of the OHS Act and Regulations, could have a qualification of SAMTRAC, NEBOSH or equivalent and be familiar with laboratory testing. He/she should be supplied with any equipment necessary to carry out the duties of an H&SO.

C3.8.7 PROJECT / SITE SPECIFIC REQUIREMENTS

A list of the testing required is given elsewhere in this document, all occupational health and safety risks engendered by this testing must be taken into account in the preparation of the HIRA for the Laboratory.

In addition, the following health risks should be taken into account. It may become necessary to include others according to the requirements of the project.

C3.8.7.1 Health risks

Health risks arising from the project must be identified and dealt with under the risk assessment for each activity.

C3.8.7.2 Noise Risks

The Laboratory, Contractor or owner of the machinery or equipment shall take noise level readings for each type of laboratory equipment to be used on the project and establish a noise zone for each type in terms of Section 9 of the Noise-Induced Hearing Loss Regulations. Where required in terms of the Regulations, suitable hearing protective equipment shall be issued and worn. Where several items of laboratory equipment are in operation at or near to each other, the noise zone for the combined plant should be established and suitable hearing protective equipment used within this zone.

Based on the results of this monitoring, the contractor may have to make budgetary provision for an Approved Inspection Authority to conduct noise monitoring as well as for medical screening of all employees working in an area where the OEL is exceeded.

C3.8.7.3 Construction traffic

The Principal Contractor state at what maximum speed traffic, shall be allowed to travel at on site and on haul roads. This limit must be strictly adhered to by the laboratory vehicles. Unreasonable limits may be revised by the Engineer or OHS agent. On EPWP projects additional care must be taken where workers and construction traffic interface. This should be in the form of flagmen to direct trucks and adequate signage.

C3.8.7.4 Emergency Procedures

The Laboratory Contractor shall submit a detailed Emergency Procedure for approval by the Employer / employers OHS Agent prior to commencement on site. It is advised that the system should be simple and easy for any worker to follow. The procedure shall detail the response plan including the following key elements:

- (a) The name of the emergency response co-ordinator;
- (b) A list of persons competent to respond to an emergency and their duties.
- (c) Details of emergency services;
- (d) Actions or steps to be taken in the event of emergencies occurring on site
- (e) Information on hazardous material/situations;
- (f) A list of local providers of emergency response, if possible, arrangements should be made with these persons at the start of the project.

Emergency procedure(s) shall include, but shall not be limited to, fire, spills, accidents to employees, use of hazardous substances, major incidents/accidents, etc. The Laboratory Contractor shall advise the Employer, Agent, Engineer and all relevant authorities forthwith, of any emergencies, together with a record of action taken. This shall be confirmed in writing as soon as possible after the incident. A contact list of all service providers (Fire Department, Ambulance, Police, Medical and Hospital, etc) must be maintained and available to site personnel. These procedures shall form part of the Health and Safety Plan.

C3.8.7.5 First Aid Boxes and First Aid Equipment

The Laboratory Contractor and all Contractors shall appoint in writing First Aider(s). If not already accredited, the appointed First Aider(s) are to be sent for accredited first aid training. At least one first aider shall be certified in First Aid level 1. Valid certificates are to be kept on site. The Laboratory Contractor shall provide an on-site First Aid Station with first aid facilities, including first aid boxes containing, at least the requirements of the Annexure to Regulation 3 of the General Safety Regulations. Notwithstanding the requirements of General Safety Regulation 3(2), all Laboratory Contractors shall supply their own first aid box. It is suggested that all supervisors carry a first aid kit in their vehicles at all times. All first aid boxes shall have an eye wash, in the event of incidents affecting the eyes of employees.

C3.8.7.6 Personal Protective Equipment (PPE) and Clothing

The Laboratory Contractor shall ensure that all workers, temporary or permanent, are issued with at least , protective footwear and reflective vests as well as any other necessary PPE as identified as a control measure in the risk assessment of the activity. Particular attention should be paid to the requirements for chemical and bitumen testing.

The Laboratory Contractor and all Contractors shall make provision and keep adequate quantities of SABS approved PPE on site at all times. This shall include necessary safety gear for visitors. The Laboratory Contractor shall clearly outline procedures to be taken when PPE or Clothing is:

- (a) Issued
- (b) Lost or stolen;
- (c) Worn out or damaged
- (d) Issued to temporary labour or staff.

The above procedure applies to Laboratory Contractors and their Contractors, as they are all Employers in their own right. Any person found on site without the necessary PPE, especially reflective jackets, will be removed from site until the PPE is supplied and worn.

In order to facilitate the payment for PPE as defined in Regulation C.03 the Contractor must set out his system for the procurement of PPE.

C3.8.7.7 Medical Certificates and Medical Surveillance

Intake and exit medical certificates provided by a registered Occupational Health Professional must be obtained for all persons involved in:

- (a) Exposure to Hazardous chemicals (HCSR Section 7)
- (b) Working at Heights (CR Section 10.2(b))
- (c) Noise (noise induced hearing loss regulations, Section 8)
- (d) Operation of Construction Vehicles (CR Section 23.1(d)(ii))
- (e) "Listed" activities in terms of Section 12(1)(c) of the Act
- (f) Work where exposure to high levels of silica dust is involved
- (g) Any work involving risks to the skeleton-muscular system.

Environmental monitoring results and risk assessments are to be made available to the occupational health professionals doing the medical surveillance, as well as job specifications per job category. Annexure 3 "Medical Certificate of Fitness", to the Construction Regulation 2014, must be used for the purpose of this.

Workers need to be screened annually. Where new workers are employed, surveillance is required prior to commencing, annually and prior to exit. Permanent employees must be on an annual programme.

In the case of permanent employees of the Laboratory, Contractor or sub contractor, no payment will be made for these certificates as they are deemed to be already issued. In the case of temporary employees, payment will be made in terms of the payment item.

C3.8.7.8 Exposure to hazardous materials

The Laboratory Contractor shall, in his Health and Safety Plan, state what methods will be used to determine the exposure of workers to any hazardous materials used on site. Particular attention must be given to those who are exposed for long periods. This is particularly important in the cases of workers exposed to bituminous materials and the testing of them. Annual medical surveillance must form part of the Principle Contractor's Health and Safety Plan. The Health and Safety Plan must include statements as to how the risks will be dealt with.

C3.8.7.9 Occupational Health and Safety Signage

The Laboratory Contractor shall provide adequate on-site OHS signage. This should include but is not limited to: 'no unauthorised entry', 'report to site office', 'site office', and appropriate signage in the laboratory. This shall apply in particular to the storage of radioactive devices and hazardous chemicals in the appropriate positions. Signage shall be posted up at all entrances to the laboratory as well as on site in strategic locations e.g. where radioactive devices are being used and other potential risk areas/operations. These signs shall be in accordance with the requirements of the General Safety Regulations and the "Code of Practice for the safe use of soil moisture and density gauges containing radioactive sources" as amended.

All excavations including trial pits shall be suitably guarded.

C3.8.7.10 Induction of employees and visitors

In terms of the Construction Regulations, Section 7.5,6 & 7 inductions must be carried out for employees and visitors to the site. The Contractor's Health and Safety Plan must set out how this will be done as well as how the entrance of visitors to the site will be regulated. The type of proof of induction contemplated in Section 7.5,6 & 7 shall also be stated.

C3.8.7.11 Accommodation of Traffic

The Site Laboratory Manager shall liaise closely with the Construction Contractor's traffic officer so as to ensure safe travel on the site

C3.8.7.12 Use of Radioactive Equipment

The use of radioactive equipment for the measuring of compaction parameters shall conform to the requirements of the "Code of Practice for the safe use of soil moisture and density gauges containing radioactive sources" as published by the Department of Health: Directorate: Radiation Control Soil revised September 2001.

C3.8.7.13 Transportation of workers on site

Workers shall be transported to, from and on site according to both the provisions of Section 23 of the CR as well as the Road Traffic Act. Over and above this, Vehicles be covered and the cover shall be securely fixed to the vehicle. No equipment or materials shall be transported in the same compartment as workers. Failure to transport workers in a safe manner will be regarded as a high level non-conformance per worker.

C3.8.7.14 Sampling on site

All sampling on site, whether from the roadway, excavations, conveyors, concrete mixers or other places shall be carried out in such a manner as to ensure the safety of the sampler and any assistants.

Sampling methods should be as set out in the relevant standards and test methods and should be included in the HIRA for the Laboratory.

C3.8.7.15 Communication on Site

All communication on site should be done through the Engineer's Representative to the Principle Contractor and be in writing. The use of briefing and debriefing sessions after audits is encouraged. The Departmental project manager must at all times be informed of what is happening on site.

C3.8.7.16 Health related Epidemics and Pandemics

The contractor shall, as far as reasonably practicable describe in his health and safety plan how health related epidemics and pandemics will be dealt with. The employer is aware that this section in the health and safety plan will not speak to specifics, but generic procedures. The Contractor must ensure that the requirements stipulated in the Hazardous Biological Agents (HBA) Regulation are adhered to and in particular the following as described in the mentioned Regulation:

- Risk Assessment and risk assessment reviews;
- Prevention measures;
- Response measures;
- Employee training / information sharing;
- Employee health monitoring;
- Management of infected persons;
- Isolation rooms;
- Employee transportation;
- Employee accommodation;
- Eating facilities;
- Meetings / toolbox talks / Daily safety talks;
- Cleaning of offices / facilities;
- Duties of person that may be exposed to HBA's
- Monitoring exposure at the workplace
- Medical surveillance of employees
- Keeping of records
- Personal Protective Equipment and facilities
- Maintenance of control measures and facilities

Once the nature and scale of the epidemic or pandemic is known, the Contractor must update his health and safety plan with the relevant information and send the updated plan to the relevant appointed OHS Agent for approval. Once approved, the Contractor must implement the updated health and safety plan and maintain the updated plan on site.

The Contractor shall implement all legal requirements, as published from time to time in the government gazette, in relation the epidemic or pandemic and shall supply his employees with the required PPE free of charge.

C3.8.8 HEALTH AND SAFETY FILE

The Laboratory Contractor shall, in terms of Construction Regulation 7.1(b), maintain a Health and Safety File on site at all times. The Health and Safety File is a file or other permanent record containing information on aspects of the construction project that will be necessary to ensure the health and safety of any person who may be affected by the construction work.

The Laboratory Contractor shall appoint a suitably qualified person to prepare the Health and Safety File and to keep it up to date for the duration of the contract. The Health and Safety file shall include at least the following information as required by the Act and Regulations including:-

- (a) Notification of construction work
- (b) Proof of registration with the Compensation Commissioner or FEMA (Letter of Good Standing)
- (c) All reports of inspections and audits
- (d) All non-conformity reports
- (e) Detailed list of Contractors with contact details
- (f) List of all hazardous materials used and stored on site with Data Sheets and Materials Hazard Data sheets
- (g) All Method Statements, Hazard Identification and Risk Assessments carried out for the project.
- (h) All Health and Safety Plans for the project.
- (i) All method statements
- (j) Minutes of relevant meetings
- (k) Incident records, including investigations and results
- (l) Record of all appointments under the Regulations
- (m) Medical certificates of fitness.
- (n) Record of Competencies
- (o) Training Records
- (p) Inspection records of equipment

The Health & Safety File shall be handed over to the Agent on completion of the contract. It must contain all the documentation as set out above, or as instructed, as well as any handed to the Laboratory Contractor by any subcontractors.

C3.8.9 RISK ASSESSMENT

Before commencement of any laboratory work during the construction period, which is not included in the initial H&S Plan, the Laboratory Contractor shall have a risk assessment performed and recorded in writing by a competent person; this shall be based on a method statement drawn up specifically for the task in question. (Refer Section 9 of the Construction Regulations 2014).

Risk is a measure of the likelihood that the harm from a particular hazard will be realised, taking into account the possible severity of the harm. Harm to people includes death, injury (permanent or temporary), physical or mental health or any combination thereof. Risk management in health and safety includes the identification of hazards, assessing risks, taking action to eliminate or reduce the risk, monitoring the effectiveness and performing regular reviews of the entire process. The Laboratory Contractor shall compile method statements to address or handle the following:

- (a) Hazards specific to the contract
- (b) Identify what could go wrong and how
- (c) Identify the likelihood of this happening
- (d) Identify the persons at risk
- (e) Identify the extent of possible harm
- (f) Eliminating or reducing this risk
- (g) A monitoring plan
- (h) A review plan

Laboratory Contractors must ensure that all contractors conduct risk assessments for their scope of work as well.

The risk assessment shall identify and evaluate the risks and hazards that may be expected during the execution of the work under the contract, and it shall include a documented plan of safe work procedures to mitigate, reduce or control the risks and hazards identified.

The risk assessment shall be available on site for inspection by inspectors, Employer, Engineer, subcontractors, employees, trade unions and health and safety committee members, and must be monitored and reviewed annually or when an incident has occurred, by the Laboratory Contractor.

The Laboratory Contractor shall ensure that his employees and other contractors affected by the operations of the Laboratory Contractor are informed, instructed and trained on the risk assessments, safe work procedures and control measures identified in the risk assessment, by a competent person.

The Employer reserves the right to make changes to this specification and HIRA should new items or changes in legislation require this. These changes will be agreed with the Contactor before implementation.

C3.8.10 ARRANGEMENTS FOR MONITORING AND REVIEW

The Employer, or his agent, will conduct a Monthly Audit to review compliance, as required by the Construction Regulation 5.1(o) to ensure that the Laboratory Contractor has implemented and is maintaining the agreed and approved OH&S Plan.

The Employer reserves the right to conduct other ad hoc audits and inspections as deemed necessary.

A representative of the Laboratory Contractor must accompany the Employer, or his agent, on all audits and inspections and may conduct his own audit/inspection at the same time. Each party will, however, take responsibility for the results of his own audit/inspection results.

C3.8.11 MEASUREMENT AND PAYMENT

Item	Unit
3.8.01 Compliance with the Occupational Health and Safety Act (85 of 1993) and Regulations including the Construction Regulations (2014),.....	Month

The rate for this item must cover all expenses incurred in complying with the Occupational health and Safety Act (85 of 1993) and the regulations thereto including the Construction Regulations 2014.

- (a) Preparation and approval of the project specific health and safety plan
- (b) The provision of personal protective Equipment as required by the project shall be included in this rates and will not be paid for separately
- (c) The provision of a properly qualified full time health and safety officer and all transport and equipment needed to enable the work to be carried out
- (d) The cost of all medical testing as required by the Construction Regulations 2014
- (e) Any other costs incurred in compliance with the OHS Act and Regulations

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

C3.8.4 DEVELOPMENT OF THE TARGETED PARTNER'S PERSONNEL

The service provider shall be responsible to ensure effective skills transfer to the targeted partner's laboratory manager. This shall be demonstrated through the targeted partner's laboratory manager being included on the site laboratory's Schedule of Accreditation as a Technical Signatory. The inclusion shall be accomplished no later than eighteen (18) months after establishment of the laboratory. The establishment date shall be mutually agreed between the service provider and the employer and shall be in accordance with the provisions in the Contract Conditions and Contract Data related to the commencement date.

PART C4: SITE INFORMATION

CONTRACT SANRAL R.052-030-2020/1C-SL
SUB-CONTRACT FOR SITE MATERIALS LABORATORY FOR THE IMPROVEMENT ON NATIONAL
ROAD R52 SECTION 3 FROM KOSTER (KM 0.0) TO N4 RUSTENBURG (KM 38.70)

PART C4: SITE INFORMATION

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Information Only

All data and descriptions contained in this section of the contract documents are given for information purposes only and cannot be interpreted as prescriptive despite the fact that the text may give the opposite perspective. If any conflict arises between the content of this section and other sections of the contract documents, the latter take precedence.

C4.1 DESCRIPTION OF THE WORKS

C4.1.1 PROJECT LOCATION

The project road is located within the Bojanala Platinum District Municipality of the North West Province. The Locality Plan included in Appendix A hereto shows the extent of the project.

C4.1.2 GENERAL DESCRIPTION OF THE PROJECT

The South African National Roads Agency SOC Limited (SANRAL) as the Client appointed ILIFA AFRICA ENGINEERS (Pty) Ltd as the consulting engineer for the supervision of the construction works of Contract SANRAL R.052-030-2020/1 for the Improvement of National Road R52 Section 3 between Koster (km 0.0) and the N4 Rustenburg (km 38.70). The tender for the works contract is currently in progress. The approximate duration of the works contract is 36 months for construction and 3 months mobilisation with an expected commencement in November 2023.

The project route consists of a single carriageway road. The current surfacing is an asphalt surfacing from Km 0.0 – Km 4.9 whereafter it changes to a double seal for the remainder of the route.

This project will include widening of the entire road and the addition of climbing lanes.

The existing pavement conditions are summarised as follows:

- **Existing Surfacing:**
The R52 consist of an asphalt surfacing from Km 0.0 ñ Km 4.9 where it changes to a double seal from Km 4.9 - Km 38.7.
- **Crocodile Cracking:**
Severe crocodile cracking as well as transverse and block cracking have been observed between Km 0,0 and Km 5.9. Isolated cracks were found at Km 13,0 - Km 14,0; Km 34,0 – Km35,0 and Km 37,7 – Km 38. Crocodile cracking varied between a degree 4 and 5.
- **Pumping of Fines:**
Limited pumping of fines was observed.
- **Patching:**
Patching was in general limited to the Koster town section between Km 0,0 and Km 5,0. The degree varied between 2 and 5.
- **Bleeding:**
Bleeding or flushing occurs throughout the whole section of road. The degree of the bleeding varied between 1 and 2 with the extent varying between 2 and 4.
- **Aggregate Loss:**
Aggregate loss was observed along the whole section of road mainly in centre of road and in some localised areas between the wheel tracks. The degree of aggregate loss varied between 1 and 2 with the extent varying between 1 and 2.

- **Undulations:**
Undulations were observed over the total length of the road. Varied between degree 1 and 2.
- **Potholes and Failures:**
Only a few isolated potholes were observed along the road, km 0,0 ñ km 0,8 north and south bound as well as a few other areas.
- **Overall Pavement Condition**
The overall condition of the road varies between good to fair, but the first 5 km are in a very poor state.

C4.1.3 ROADWORKS

The project is on a single carriageway road located on National Road R52 Section 3 between Koster (km 0.0) and the N4 Rustenburg (km 38.70) in the North West Province. The project limits are from the junction between the R509 and R52 Section 3, in Koster, proceeding in a north-easterly direction towards the N4 and R52 Section 3 junction, west of Rustenburg. It should be noted that both intersections fall outside the extent of the project, however the bellmouth of both intersections are included to the road edge of the through road.

The R52 consist of an asphalt surfacing from Km 0.0 – Km 4.9 where it changes to a double seal from Km 4.9 – Km 38.7. The existing road consist of:

- 3 Lanes between km 0.0 to km 0.6 (12.3m wide)
- 2 Lanes between km 0.6 to km 1.44 (10.4m wide)
- 2 Lanes between km 1.44 to km 2.040 (8.2m wide)
- 3 Lanes between km 2.04 to km 3.840 (10.4m wide)
- 2 Lanes between km 3.840 to km 38.70 (7.2m wide)

The existing road will be widened to the following cross-section:

- 3.7m Lanes
- 3.0m Paved Shoulders

Climbing lanes with a width of 3.6m will be constructed at the following sections:

- Southbound km 1.860 to km 5.200
- Southbound km 13.020 to km 15.400
- Southbound km 18.340 to km 23.640

All road signs, edge beams, guardrails will have to be removed and reconstructed or re-installed after the widening of the road has been constructed. Damaged items shall be replaced with new items. Most of the fencing consists of game proof fencing in fairly good condition. Some areas do have stock proof fencing, which are mostly in poor condition. For road safety requirements areas with no fencing or fencing in a poor condition shall be replaced with a 9-strand fence and Reagile area will be closed off with Welded Mesh Pedestrian fencing.

All minor culverts will be extended to fit the new formation width. Kerb inlets to be constructed within Reagile to discharge the water from the kerb and channels.

C4.1.4 TRAFFIC ACCOMMODATION

The main objective of the traffic accommodation is to have two-way traffic always and to limit the need for stop and go as far as possible. The traffic accommodation consists of the following:

A maximum of three work zones will be allowed on the full extent of the project.

- Each work zone may not be more than 3 km in length.
- A minimum of 5km between two adjacent works zones are required.

The envisaged traffic accommodation in Koster are as follows:

- Between km 0.0 to km 0.6 the existing road has three lanes and 12.3m wide. This section of the road is wide enough to allow for 2-way traffic to be accommodated while the work is carried out in a three-staged construction plan.
- Between km 0.6 to km 1.44 the existing road has two lanes and 10.4m wide. This section of road is not wide enough to accommodate 2-way traffic. The work zones in this section will be between major intersections and traffic will be diverted to the adjacent side streets.

The envisaged traffic accommodation for Reagile (km 1.44 to km 3.48) and the Rural Section of the Road (km 3.48 to km 38.7) are as follows:

Two different scenarios are envisaged:

- Scenario One: The final road level is within 200mm of the existing road level.
 - The temporary deviation to be constructed as part of the widening of the road shoulder on the northbound lane.
 - The layer works for the deviation will be constructed as per the pavement layer works for the final road pavement, with the exception that the subbase layers will not be stabilised.
 - The traffic will then be accommodated on the existing northbound lane and the temporary deviation, while the construction of the southbound lane and paved shoulder is undertaken.
 - After the completion of the southbound lane the traffic will be accommodated on the completed southbound lane and paved shoulder, to allow for the construction of the northbound lane.
- Scenario Two: The final road level significantly differs from the existing road level.
 - A temporary deviation to be constructed on the northbound side of the road. The temporary deviation may be away from the existing road completely or a widened temporary deviation against the existing road to allow for two-way traffic. The temporary deviation to be constructed far enough to allow for a 1:1.5 slope for the filling or cutting to the required levels.
 - The traffic will be accommodated on the deviation and/or combination of existing road and deviation while the construction of the southbound lane and paved shoulder is undertaken.
 - After the completion of the southbound lane the traffic will be accommodated on the completed southbound lane and paved shoulder, to allow for the construction of the northbound lane.

C4.1.5 PAVEMENT DESIGN FOR ALL PARTS OF THE VARIOUS ROADS

The pavement designs are as follows:

Koster Town (km 0.00 to km 1.44)

- Existing asphalt layer to be milled off and be provided to the RRM and/or local municipality and/or used for farm access.
- Existing pavement layers to be excavated to a depth of 420mm and be stockpiled for use as fill material.
- Rip and re-compact in-situ material to 93% MDD.
- Lower Subbase:
 - Import from a commercial source or from stockpile G5A material and chemically stabilise to create a C3 layer of 150mm thick and compact to 95% MDD
- Upper Subbase:
 - Import from a commercial source or from stockpile G5A material and chemically stabilise to create a C3 layer of 150mm thick and compact to 97% MDD
- Base:
 - Import 80mm Asphalt Base with 35/50 penetration grade bitumen compacted to minimum 97% minus design voids of MVD
- Surfacing:
 - 45mm Coarse continuously graded stone skeletal mix asphalt (AC) with a NMPS of 14mm utilising A-E2 modified binder compacted to minimum 97% minus design voids of MVD.

Reagile Town (km 1.44 to km 3.480 Reconstruction of existing pavement and widening)

- Existing asphalt layer to be milled off and be provided to the RRM and/or local municipality and/or used for farm access.
- Existing base material of 150mm thick to be milled or excavated and stockpiled.
- Lower Subbase:
 - Construction of the pavement layers to obtain the necessary width of the road to be constructed to the lower subbase using the pavement layers for widening of pavement.
 - Existing in-situ subbase layer to be pulverised. The pulverised existing road material to be cross mixed with the imported G5A material (widening) to form a homogenous layer. The mixed material to be chemically stabilised to create a 150mm thick C3 layer compacted to 95% MDD.
- Upper Subbase:
 - Import from commercial source or from stockpile G5A material and chemically stabilise to create a 150mm thick C3 layer and compact to 97% MDD.
- Base:
 - Import from commercial source 150mm G1 Crushed Stone Layer and compact to 88% AD.
- Surfacing:
 - 45mm Coarse continuously graded stone skeletal mix asphalt (AC) with a NMPS of 14mm utilising A-E2 modified binder compacted to minimum 97% minus design voids of MVD.

Reagile Area (Widening of Pavement for reconstruction)

- Material to be excavated in separate horizons and be stockpiled in separate areas with the same material classification. The excavation controller and/or material manger together with the engineer's supervision team to determine the excavated layers. Excavation to be carried out to the correct levels to construct the pavement layers.
- Roadbed:
 - Rip and recompact in-situ material to 93% MDD
- Fill layers:
 - Where the finished road level requires no excavation then normal fill material from stockpile or a commercial source to be imported and constructed in layer thickness not exceeding 200mm and compacted to 93%MDD.
- Lower Selected:
 - Import from commercial source or from stockpile 150mm G7 material and compact to 95% MDD.
- Upper Selected:
 - Import from commercial source or from stockpile 150mm G6 material and compact to 95% MDD.
- Lower Subbase:
 - Import from commercial source or from stockpile G5A material. Existing in-situ subbase layer to be pulverised. The pulverised existing road material to be cross mixed with the imported G5A material to form a homogenous layer. The mixed material to be chemically stabilised to create a 150mm thick C3 layer compacted to 95% MDD.
- Upper Subbase:
 - Import from commercial source or from stockpile G5A material and chemically stabilise to create a 150mm thick C3 layer and compact to 97% MDD.
- Base:
 - Import from commercial source 150mm G1 Crushed Stone Layer and compact to 88% AD.
- Surfacing:
 - 45mm Coarse continuously graded stone skeletal mix asphalt (AC) with a NMPS of 14mm utilising A-E2 modified binder compacted to minimum 97% minus design voids of MVD.

Rural Area (Reconstruction of existing pavement and widening)

- Existing seal layer to be processed with the 150mm base layer and be milled or excavated to stockpile.
- Lower Subbase:
 - Construction of the pavement layers to obtain the necessary width of the road to be constructed to the lower subbase using the pavement layers for widening of pavement.
 - Existing in-situ subbase layer to be pulverised. The pulverised existing road material to be cross mixed with the imported G5A material (widening) to form a homogenous layer. The mixed material to be chemically stabilised to create a 150mm thick C3 layer compacted to 95% MDD.
- Upper Subbase:
 - Import from commercial source or from stockpile G5A material and chemically stabilise to create a 150mm thick C3 layer and compact to 97% MDD.
- Base:
 - Import from commercial source 150mm G1 Crushed Stone Layer and compact to 88% AD.

- Surfacing:
 - Multiple stone seal consisting of:
 - 20mm Aggregate Grade A (Precoated)
 - Split application of 7.1mm Aggregate Grade A. (One layer precoated)
 - Hot applied S-E2 homogenous modified binder.
 - Cover spray of 65% cationic spray-grade emulsion
 - At all major rural intersections and bridge decks:
 - 45mm Coarse continuously graded stone skeletal mix asphalt (AC) with a NMPS of 14mm utilising A-E2 modified binder compacted to minimum 97% minus design voids of MVD.
 - Rolled in chips to be provided in the rural area due to the increased speed limit and to obtain the minimum texture depth required.

Rural Area (Widening of Pavement for reconstruction)

- Material to be excavated in separate horizons and be stockpiled in separate areas with the same material classification. The excavation controller and/or material manger together with the engineer's supervision team to determine the excavated layers. Excavation to be carried out to the correct levels to construct the pavement layers.
- Roadbed:
 - Rip and recompact in-situ material to 93% MDD
- Fill layers:
 - Where the finished road level requires no excavation then normal fill material from stockpile or a commercial source to be imported and constructed in layer thickness not exceeding 200mm and compacted to 93%MDD.
- Lower Selected:
 - Import from commercial source or from stockpile 150mm G7 material and compact to 95% MDD.
- Upper Selected:
 - Import from commercial source or from stockpile 150mm G6 material and compact to 95% MDD.
- Lower Subbase:
 - Import from commercial source or from stockpile G5A material. Existing in-situ subbase layer to be pulverised. The pulverised existing road material to be cross mixed with the imported G5A material to form a homogenous layer. The mixed material to be chemically stabilised to create a 150mm thick C3 layer compacted to 95% MDD.
- Upper Subbase:
 - Import from commercial source or from stockpile G5A material and chemically stabilise to create a 150mm thick C3 layer and compact to 97% MDD.
- Base:
 - Import from commercial source 150mm G1 Crushed Stone Layer and compact to 88% AD.
- Surfacing:
 - Multiple stone seal consisting of:
 - 20mm Aggregate Grade A (Precoated)
 - Split application of 7.1mm Aggregate Grade A. (One layer precoated)
 - Hot applied S-E2 homogenous modified binder.
 - Cover spray of 65% cationic spray-grade emulsion

- At all major rural intersections and bridge decks:
 - 45mm Coarse continuously graded stone skeletal mix asphalt (AC) with a NMPS of 14mm utilising A-E2 modified binder compacted to minimum 97% minus design voids of MVD.
 - Rolled in chips to be provided in the rural area due to the increased speed limit and to obtain the minimum texture depth required.

Rural Area (Cut Pavement)

- Existing pavement layers and seal to be milled or excavated and stockpiled. Material to be excavated in separate horizons and be stockpiled in separate areas with the same material classification. The excavation controller and/or material manager together with the engineer's supervision team to determine the excavated layers. Excavation to be carried out to the correct levels to construct the pavement layers.
- Roadbed:
 - Rip and recompact in-situ material to 93% MDD
- Lower Selected:
 - Import from commercial source or from stockpile 150mm G7 material and compact to 95% MDD.
- Upper Selected
 - Import from commercial source or from stockpile 150mm G6 material and compact to 95% MDD.
- Lower Subbase:
 - Import from commercial source or from stockpile G5A material. Existing in-situ subbase layer to be pulverised. The pulverised existing road material to be cross mixed with the imported G5A material to form a homogenous layer. The mixed material to be chemically stabilised to create a 150mm thick C3 layer compacted to 95% MDD.
- Upper Subbase:
 - Import from commercial source or from stockpile G5A material and chemically stabilise to create a 150mm thick C3 layer and compact to 97% MDD.
- Base:
 - Import from commercial source 150mm G1 Crushed Stone Layer and compact to 88% AD.
- Surfacing:
 - Multiple stone seal consisting of:
 - 20mm Aggregate Grade A (Precoated)
 - Split application of 7.1mm Aggregate Grade A. (One layer precoated)
 - Hot applied S-E2 homogenous modified binder.
 - Cover spray of 65% cationic spray-grade emulsion
 - At all major rural intersections and bridge decks:
 - 45mm Coarse continuously graded stone skeletal mix asphalt (AC) with a NMPS of 14mm utilising A-E2 modified binder compacted to minimum 97% minus design voids of MVD.
 - Rolled in chips to be provided in the rural area due to the increased speed limit and to obtain the minimum texture depth required.

Rural Area (Fill Pavement)

- Existing pavement layers and seal to be milled or excavated and stockpiled.
- Roadbed:
 - Rip and recompact in-situ material to 93% MDD
- Fill layers:
 - Where the finished road level requires no excavation then normal fill material from stockpile or a commercial source to be imported and constructed in layer thickness not exceeding 200mm and compacted to 93%MDD.
- Lower Selected:
 - Import from commercial source or from stockpile 150mm G7 material and compact to 95% MDD.
- Upper Selected:
 - Import from commercial source or from stockpile 150mm G6 material and compact to 95% MDD.
- Lower Subbase:
 - Import from commercial source or from stockpile G5A material and chemically stabilise to create a 150mm thick C3 layer compacted to 95% MDD.
- Upper Subbase:
 - Import from commercial source or from stockpile G5A material and chemically stabilise to create a 150mm thick C3 layer and compact to 97% MDD.
- Base:
 - Import from commercial source 150mm G1 Crushed Stone Layer and compact to 88% AD.
- Surfacing:
 - Multiple stone seal consisting of:
 - 20mm Aggregate Grade A (Precoated)
 - Split application of 7.1mm Aggregate Grade A. (One layer precoated)
 - Hot applied S-E2 homogenous modified binder.
 - Cover spray of 65% cationic spray-grade emulsion
 - At all major rural intersections and bridge decks:
 - 45mm Coarse continuously graded stone skeletal mix asphalt (AC) with a NMPS of 14mm utilising A-E2 modified binder compacted to minimum 97% minus design voids of MVD.
 - Rolled in chips to be provided in the rural area due to the increased speed limit and to obtain the minimum texture depth required.

C4.1.6 STRUCTURAL WORKS

The following minor structural works form part of the works contract:

(a) Culverts

C0410

Culvert C0410 is situated at chainage 0.407. This pedestrian underpass culvert consists of a single cell 2.4x2.4 m precast box culvert laid on an in-situ concrete floor slab. The culvert is 28.9 m long. The ends of the culvert consist of reinforced concrete wing walls. The fill over the culvert is approximately 3.2m high. Only minor remedial work will be required at this culvert which includes repairing scoured embankments, sealing cracks, and repairing spalls in the cell walls.

C4606

Culvert C4606 is situated at chainage 5.091. This major culvert spans the Koster stream and comprises a 3 cell 2.4 m wide precast box culvert laid on an in-situ concrete floor slab. Each cell is 1.8 m high and 23.7 m long. The ends of the culvert consist of reinforced concrete wing walls and apron slabs. The fill over the culvert is approximately 2 m high and is retained by 2 rows of gabions on the right-hand side. The envisaged work will include the lengthening of the culvert on the Northern side by approximately 8m. The lengthening will include demolishing the existing downstream wing walls and constructing a 8m, 3 cell insitu box type culvert with new wing walls and apron gabions mattress.

C04522

Culvert C4522 is situated at chainage 8.304. This major culvert spans an unknown stream and comprises a 2 cell 3x3 m in-situ concrete box culvert that is 15.7 m long. The ends of to the culvert consist of reinforced concrete wing walls and apron slabs. The fill over the culvert is approximately 0.5 m high. The envisaged work will include the lengthening of the culvert on the Northern side by approximately 3m. The lengthening will include demolishing the existing downstream wing walls and constructing a 3m, 2 cell insitu box type culvert with new wing walls and apron gabions mattress.

C0394

Culvert C0394 is situated at chainage 35.77. This major culvert spans an unknown stream and comprises a 2 cell 2.4x2.4 m in-situ concrete box culvert that is 17.2 m long. The ends of to the culvert consist of reinforced concrete wing walls and apron slabs. The fill over the culvert is approximately 0.5 m on the Right-hand side and 2 m on the Left-hand side with two rows of gabions retaining the fill. The envisaged work will include the lengthening of the culvert on the Western side by approximately 6m. The lengthening will include demolishing the existing downstream wing walls and constructing a 6m, 2 cell insitu box type culvert with new wing walls and apron gabions mattress.

(b) Bridges

B2237

Bridge B2237 is situated at chainage 0.311 and comprises a 15.9 m wide, five span in-situ reinforced concrete deck type structure, spanning a total length of 70 m. It spans the R509 and the railway line from Swartruggens to Derby. Only remedial work will be required to this bridge.

B4607

Bridge B4607 is situated at chainage 28.81 and comprises a 12.40 m wide simply supported single span structure. It spans 17.4 m over the Selons River. The bridge consists of in-situ reinforced concrete beams, abutments, wing walls, deck and parapets. The proposed work will include demolishing the existing concrete parapets and replacing it with new insitu casted F-shape parapets and endblocks. There is also some minor remedial work required to the rest of the bridge.

B1340

Bridge B4607 is situated at chainage 32.04 and comprises a 12.90m wide simply supported single span structure. It spans 10.1 m over the Sandsloot River. The bridge consists of in-situ reinforced concrete beams, abutments, wing walls, deck and parapets. The proposed work will include demolishing the existing concrete parapets and replacing it with new insitu casted F-shape parapets and endblocks. There is also some minor remedial work required for the rest of the bridge.

C4.1.7 ELECTRICAL AND MECHANICAL WORKS

The works contract include the provision of Streetlighting through Koster and Reagile.

C4.1.8 BUILDING WORKS

The works contract does not include any building works.

C4.1.8 MAINTENANCE WORKS

The Client currently has a routine road maintenance (RRM) contract in progress along the route. The RRM contractor shall still be responsible to take care of all maintenance issues in the road reserve, except for the surfaced portion of the road reserve, which will be the responsibility of the contractor. The contractor's attention is drawn to the clause B1224 as amended in this respect.

The contact details of the parties involved in the RRM contract are as follows:

Route Manager: TBC

Contractor: TBC

C4.2 CAMP ESTABLISHMENT, POWER SUPPLY AND OTHER SERVICES

The works contractor shall be responsible for the camp establishment. The Sub-service Provider shall only be responsible for the establishment of the staff, labour, equipment and materials required to perform the site laboratory services. The proposed site laboratory layout is indicated in Appendix C.

C4.3 SCOPE OF SITE LABORATORY SERVICES

The Service Provider to the Employer shall be responsible for all process and acceptance quality control testing on the project. The Service Provider shall perform all materials sampling, field and laboratory testing other than any specialised testing required by the Employer.

The materials sampling, field and laboratory testing entail mainly the acceptance control testing related to hot-mix asphalt surfacing, with the estimated quantities over the duration of the contract listed in Section C2.2, PRICING SCHEDULE (INCORPORATING SBD3.3) of this document.

The following organogram shows the required staff requirements as envisaged by the Employer, and for which provision was made in Section C2.2 PRICING SCHEDULE (INCORPORATING SBD3.3) of this document:

C4.4 PROGRAMME

The Service Provider is not required to present a programme of his services to the Employer, as his services are dependent upon the programme of the Works Contract. Appendix B shows the example programme included in the Tender Document for the Works Contract as prepared by the Employer. This programme together with the typical test frequency listed in the Project Specifications for the respective types of laboratories shall be used by the Service Provider to determine the quantity of resources required for the project.

C4.5 CLIMATE

The road is situated within a moderate summer rainfall area with an average annual rainfall of 552mm. The most rain occurs between October and March with the driest month being July. The average monthly maximum temperature is 26.8°C, with a maximum of 30.3°C in January. The average monthly minimum temperature is 11.4°C, with a minimum of 3.2°C in July.

The weather data is provided in tabular format on the following page.

Number: 0511399 X

CLIMATE OF SOUTH AFRICA

Name: RUSTENBURG

WB 42

$\phi = 25^{\circ} 39' S$

CLIMATE STATISTICS

$\lambda = 27^{\circ} 13' E$

HT: 1150 m

1981 - 2010

Period: 1992-2010

TABLE 1 - AIR TEMPERATURE IN DEGREES CELSIUS

TABLE 1 - AIR TEMPERATURE IN DEGREES CELSIUS																																				
	AVERAGE OF DAILY				MAXIMUM (TX) P = 30 Years																MINIMUM (TN) P = 30 Years															
	MAX	MIN	MEAN	RANGE	HIGHEST (TX)				AVERAGE NUMBER OF DAYS WITH TX								LOWEST (TXN)				HIGHEST (TN)				AVERAGE NUMBER OF DAYS WITH TN								LOWEST (TN)			
	TX	TN	(TX+TN)/2	TX - TN	MAX	YYDD	MEAN	≥ 35	≥ 30	≥ 25	≥ 20	≥ 15	≥ 10	MEAN	MIN	YYDD	MAX	YYDD	MEAN	≥ 20	≥ 15	≥ 10	≥ 5	≥ 0	≤ 5	≤ 0	≤ -5	MEAN	MIN	YYDD						
J	30.3	17.5	23.9	12.8	48.3	04/07	34.8	2.7	17.0	27.2	29.3	29.6	0.0	22.3	16.9	00/15	25	09/17	19.9	1.8	2.1	0.0	0.0	0.0	0.0	0.0	13.5	8.4	01/03							
F	30.1	17.4	23.8	12.8	39.0	04/15	34.7	2.0	14.8	24.4	26.8	26.9	0.0	23.0	17.5	01/08	23.3	03/23	20.6	2.0	2.5	0.0	0.0	0.0	0.0	0.0	13.7	10.8	06/08							
M	28.6	15.4	22.0	13.2	38.0	04/03	33.2	0.6	10.8	25.0	28.3	28.9	0.0	21.2	13.9	08/17	21.6	07/02	19.2	0.5	11.7	0.4	0.0	0.0	0.0	0.0	11.1	7.1	03/25							
A	26.4	11.6	19.0	14.7	35.5	07/08	29.9	0.1	3.9	19.5	27.4	28.4	0.0	19.1	14.4	09/27	18.8	08/03	15.7	0.0	25.3	6.6	0.5	0.0	0.0	0.0	6.1	1.5	02/19							
M	24.0	7.0	15.5	17.0	31.4	08/07	28.3	0.0	0.3	11.9	27.8	30.2	0.0	17.7	13.2	07/28	16.7	05/01	12.6	0.0	30.5	26.0	6.8	0.4	0.0	0.0	1.8	-2	07/24							
J	21.2	3.6	12.4	17.6	28.8	08/05	25.8	0.0	0.0	2.5	21.0	29.3	0.0	15.1	7.9	08/27	13.9	09/08	8.8	0.0	30.1	29.6	21.7	2.0	0.0	-0.9	-3.4	08/10								
J	21.2	3.2	12.2	18.0	29.8	02/29	25.3	0.0	0.0	2.3	21.5	30.3	0.1	14.7	8.0	08/21	13.2	09/12	8.5	0.0	30.9	30.5	23.6	3.1	0.0	-1.4	-4.7	00/21								
A	24.0	5.8	14.9	18.2	32.0	01/29	29.6	0.0	0.8	12.3	26.5	29.2	0.0	17.1	10.2	04/08	17.1	06/29	12.0	0.0	29.5	26.9	11.4	0.6	0.0	0.7	-2.9	03/21								
S	27.9	10.4	19.2	17.6	38.6	09/08	34.0	0.3	10.8	22.5	27.8	28.9	0.0	18.9	13.2	07/27	28	02/28	16.6	0.1	27.2	12.8	1.2	0.0	0.0	4.6	-0.9	01/03								
O	29.1	13.9	21.5	15.2	37.4	02/19	33.8	1.1	13.8	23.9	27.6	28.3	0.0	18.9	10.1	03/19	21.5	00/24	18.1	0.2	17.8	2.7	0.0	0.0	0.0	8.1	4.2	04/09								
N	29.6	15.5	22.6	14.1	39.1	00/14	34.6	2.1	14.9	24.3	27.8	28.6	0.0	19.8	15.1	09/20	22.9	07/08	19.0	0.4	10.4	0.5	0.0	0.0	0.0	10.4	7.6	07/19								
D	30.0	16.7	23.3	13.3	39.0	04/29	34.8	1.5	16.6	27.3	29.5	29.8	0.0	22.0	17.9	01/09	21.6	08/28	19.7	1.1	5.1	0.1	0.0	0.0	0.0	13.0	9	04/12								
YR	26.8	11.4	19.1	15.4	46.3	04/07	37.8	10	104	223	321	348	0	13.2	7.9	08/27	25	09/17	21.8	6	223	136	65	6	0	-1.9	-4.7	00/21								

TABLE 2 - PRECIPITATION (and FOG), DRY- AND WETBULB TEMPERATURES, RELATIVE HUMIDITY and CLOUD COVER

TABLE 2 - PRECIPITATION (mm) (mm), DRY- AND WET-BULB TEMPERATURES, RELATIVE HUMIDITY AND CLOUD COVER																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
PRECIPITATION (R mm) P = 30 Years										P = 23 Years										TEMPERATURE (°C)										REL HUM (%)										CLOUD (eighths)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
MONTH			24 HOUR MAX			TOTAL PER MONTH / YEAR							AVERAGE NO. OF DAYS WITH R (mm) ≥							AVERAGE NO. OF DAYS WITH							MEAN on the hour							MEAN on the hour							MEAN on the hour							MEAN on the hour																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
TOT			ROK			YYDD			MAX				YEAR			MIN				YEAR				0.1			1				5				10				30				TH			HA				SN				FOG				DRY BULB (P = 30 years)			WET BULB (P = 30 years)				P=30 Years							P=30 Years							P=30 Years																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															

Period = years covering the data for all the columns of both tables.

P = Average number of years covering the data in the columns concerned.

TX = Average maximum, TN = Average minimum air temperature

TX = Highest maximum, MAX = highest in P years.

TXN = Lowest maximum, MIN = lowest in P years.

TNX = Highest minimum, MAX = highest in P years.

TNN = Lowest minimum, MIN = lowest in P years.

— = MEAN - AVE = AVERAGE e.g.

08, 14, 20 = MEANS of observations which were made on these hours (SAST).

YYDD = Year/Day of occurrence of the extreme in the previous column.

(Number of days (NOD) with TX ≥ 10) = (NOD in the month - NOD with TX ≥ 10).

TH = Thunder, HA = Hail, SN = Snow, FOG = fog.

\geq signifies greater than, \leq signifies greater than or equal to.

(Number of days (NOD) with TN ≤ 20) = (NOD in the month - NOD with TN ≤ 20).

$<$ signifies less than, \leq signifies less than or equal to.

C4.6 MANAGEMENT OF THE ENVIRONMENT

The Service Provider shall be responsible for executing the work according to the approved environmental management plan (EMP) of the Works Contract. The Service Provider shall ensure that his staff and labour is duly inducted by the Contractor's Designated Environmental Officer (DEO) in respect of the EMP to ensure adherence thereto.

C4.7 REQUIREMENTS OF THE OCCUPATIONAL HEALTH AND SAFETY ACT AND REGULATIONS 2014

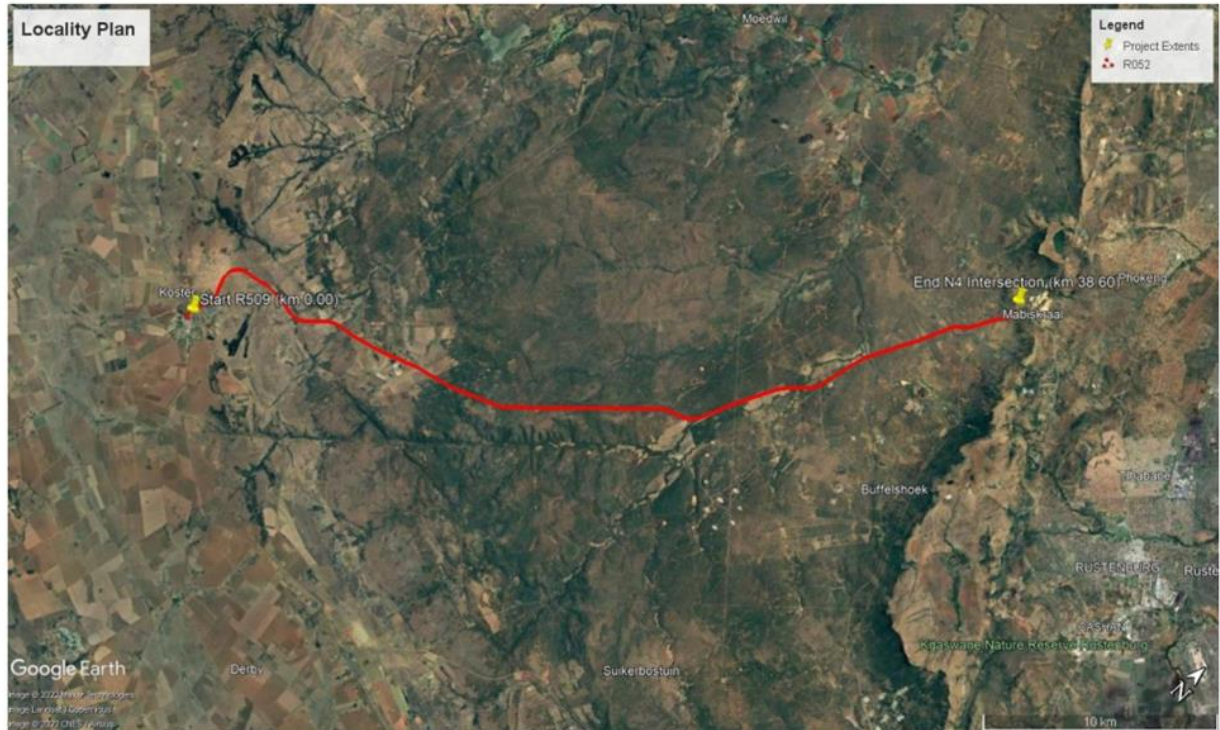
The Service Provider shall be responsible for carrying out his activities in a manner which is both safe, and not a health risk for his staff and labour. In this regard the Service Provider shall adhere to the requirements of Section 0 of the Project Specifications.

C4.8 APPENDICES

- APPENDIX A: Locality Plan
- APPENDIX B: Example Programme of Works Contract
- APPENDIX C: Proposed Laboratory Site Layout Plan
- APPENDIX D: ITIS Public User Registration Manual

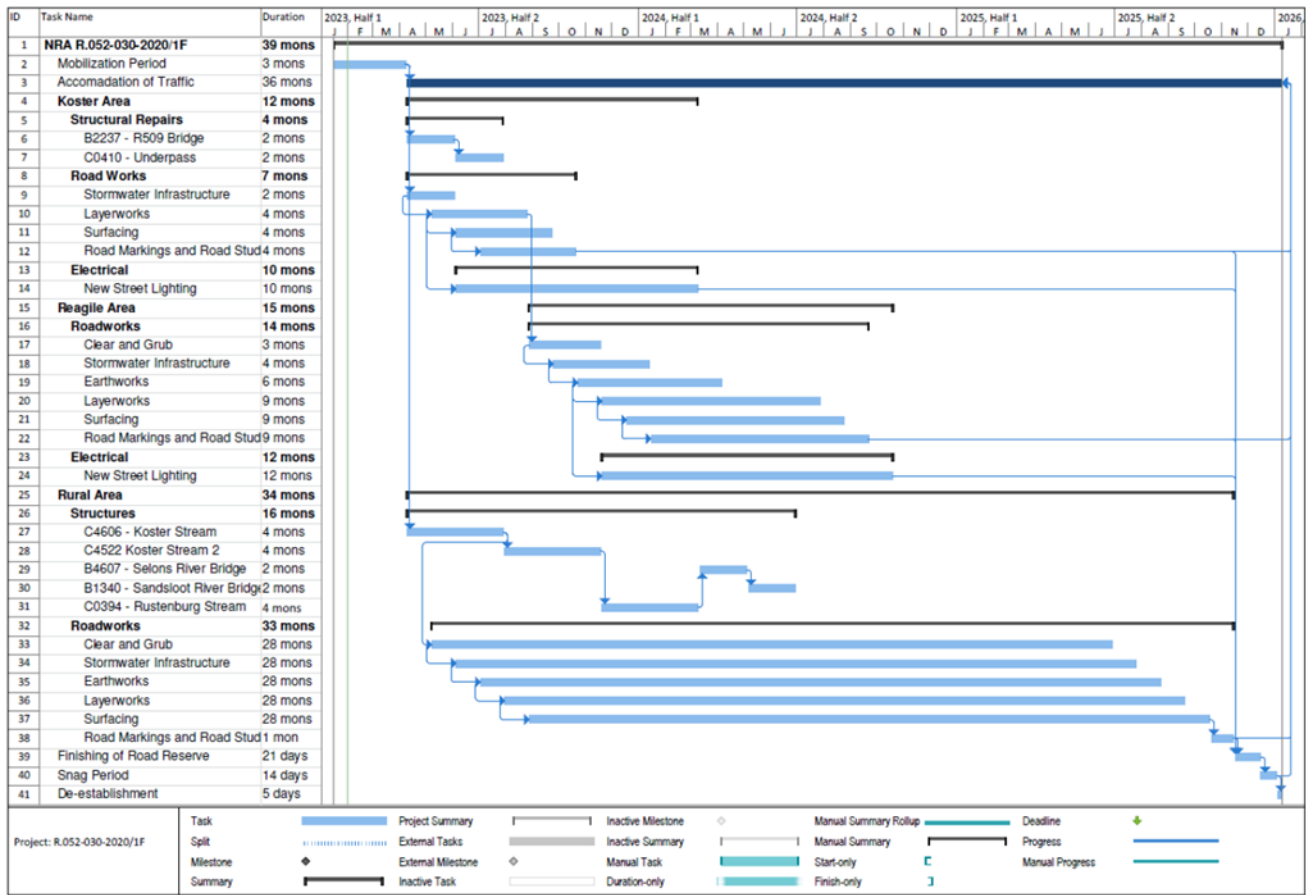
Appendix A: Locality Plan

CONTRACT SANRAL R.052-030-2020/1C-SL
SUB-CONTRACT FOR SITE MATERIALS LABORATORY FOR THE IMPROVEMENT ON NATIONAL
ROAD R52 SECTION 3 FROM KOSTER (KM 0.0) TO N4 RUSTENBURG (KM 38.70)



APPENDIX B: Example Programme of Works Contract

CONTRACT SANRAL R.052-030-2020/1C-SL
SUB-CONTRACT FOR SITE MATERIALS LABORATORY FOR THE IMPROVEMENT ON NATIONAL ROAD R52 SECTION 3 FROM KOSTER (KM 0.0) TO N4 RUSTENBURG (KM 38.70)



APPENDIX D: Integrated Transport Information System (ITIS)
Public User Registration Manual

Integrated Transport Information System

ITIS Public User Registration

July 2018

Publication Details

Documentation Details

This document was developed for the South African National Road Agency (SANRAL). For content revisions, questions, or comments, contact the writer at itisissues@nra.co.za.

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Revision History

Revision	Description of Change	Author	Effective Date
0	Initial Release	K Niebuhr	July 2018

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Technical Support

For technical support please send an email to ITIS Support at itisissues@nra.co.za. The email needs to contain a short description of the problem in the Subject field. Please note that emails without a subject will be rejected. In the body of the email please describe your problem and provide your contact details.

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----	-------------------	-------

I. REGISTRATION

To register a new ITIS user, go to the ITIS website <https://itis.nra.co.za>

- i. Click on Register and accept the Term and Conditions and click on Next
- ii. Select Public User from the dropdown on the registration category screen. Click on Next

Figure 1: Registration Category

Register - Registration Category

Please select service provider or authority user

Registration Category

Public User

Service Provider: Any person who has authorisation to work for a relevant roads authority and is not a direct employee of the authority.

Authority User: Any person who is employed directly by a relevant roads authority. Please do not attempt to register here if you are not a direct employee as your registration will be declined.

Public User: Any person who is not employed directly by a relevant roads authority. Please do not register here if you are a direct employee.

Registration Category

Previous Next Close

- iii. Complete the User details form:

Figure 2: User Details

Register - User Details

e-Mail address

e-Mail address

Confirmation e-mail address

Confirmation e-mail address

Password

Password

Confirm password

Confirm password

Security Question

Please select

Security answer

Security answer

Name

Name

Surname

Surname

☒ I have a valid RSA ID number

User Details

Previous Next Close

- **E-Mail Address** - This email address will be used as your user name to access this website and the ITIS software. Each user must have their own email address and users will not be allowed to share an email address
- **Password** - This password will be required when trying to access the website and the ITIS software. The password must contain at least 1 UPPERCASE letter, 1 lowercase letter, 1 special character and 1 number
- **Security Question** - Select a security question from the dropdown. This question will be used for confirmation when resetting your password
- **Security Answer** - Enter the answer to the question selected above
- **Name** - Your name
- **Surname** - Your surname
- **Telephone Number** - Your telephone number at the office
- **Mobile Number** - Your mobile number
- **Fax Number** - Your Fax number

- iv. Click on Next
- v. Enter the characters as seen on the Captcha Image and click on Register
- vi. Clicking on Register will send a verification email to the email address you specified. Open the email and click on the email verification link.
- vii. After a successful email verification, you should be able to Login

Figure 3: Verification Email

ITIS : User Account

New account

A request for access to <http://itisqa.nra.co.za/Portal/> was made:

User: Kallie Niebuhr

Organization: SANRAL

- Product/s:**
- Incident Capture - Module used for capture of Incident Data
 - Project Info - Module used for capture of employment data
 - RRM - Module used for the administration of routine road maintenance

[Click here](#) to verify your e-mail address.

Thanks,
The ITIS team

PART C5: ANNEXURES
