SOUTH AFRICAN NATIONAL ROADS AGENCY SOC LIMITED

ROAD CONDITION SURVEY SPECIFICATIONS

VOLUME 2 BOOK 1

PREPARED AND ISSUED BY:

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S1000 GENERAL

S1100 GENERAL REQUIREMENTS FOR SURVEY WORK

S1110 SCOPE

This section supplements Parts A through G of the TMH13 - Automated Road Condition Assessments and TMH18 - Standard for Road Network Data.

S1120 PROGRESS AND STANDARDS OF WORK

The amount of insurance required shall be a stipulated in the Contract Data.

S1120(a) PROGRESS AND TECHNICAL REPORTS

Bi-Weekly reports of the progress made with surveys, shall be prepared for each of the survey contracts. The report shall be provided in the latest version of Microsoft Excel spreadsheet and shall include details such as, but not limited to the Route, Section, Direction, Lane, start km distance and end km distance of each survey run per line. Together with these details there should be details listed if the run was successful or if some parts were influenced by factors such as weather, wet patches due to mist or rainfall, poor visual conditions, construction activities or equipment issues and failures. Patches where newly laid surfaces caused flushing of lasers should also be noted. The document should contain remarks about the progress of each survey vs the planned surveys, for the week under review as well as if the data was processed and whether the files were submitted to the Employer.

S1130 CHECKS TO BE UNDERTAKEN PRIOR TO DATA SUBMISSION

Data shall be verified before submission as prescribed below and must comply with the formats as set out in section S1250 for Package A and Package B. Payment will only be approved upon file verification by the employer.

For Package A nd B – Traffic Speed Deflectometer data: Verify that

- RoadNumber = the correct Route that was surveyed
- RoadPath is the correct Section number that was surveyed
- RoadSide is the correct direction of the section that was surveyed
- Lane is the correct lane in which the section was surveyed. If lanes were changed during the survey this must be indicated
- Distance is in 10 meter intervals and falls within the section limits
- Latitude should fall within the borders of South Africa and do fall on the road that was surveyed
- Longitude should fall within the borders of South Africa and do fall on the road that was surveyed
- All other values should be within their reasonable limits and in the correct format as prescribed in S1250

S1140 DELIVERY NOTES

A detailed list of all items delivered to the Client must be provided. Where the progressive submission of items is envisaged then such list must be provided with each submission.

All items should be submitted in good order.

Where progressive submissions have been made, then on completion of the survey project the entire data set must be submitted such that the Client is able to disregard previous submissions. The final submission should then comprise of the entire survey project data sets.

Storage devices containing the project survey data must be clearly labelled with the project number, project description, date of submission and the data set version number. All data versions, whether submitted on storage devices or electronically, should be numbered in accordance with the example below:

First submission	Version 1.0 (6 March 2026)
Second submission	Version 1.1 (20 March 2026)
Third submission	Version 1.2 (3 April 2026)
Final Submission	Final Version (20 April 2026)

A digital submission to the client via a digital platform or online data transfer utility that the client can easily access, can also be used to submit interim information, provided that the above requirements are also met.

The Service Provider and Employer shall agree from time to time which method of data delivery shall be used.

S1150 PROGRAMME FOR THE EXECUTION OF THE WORKS

The Service Provider shall perform its duties in accordance with the programme outlined in the Table below.

The onus is on the Service Provider to plan where and when the different sections of roads will be surveyed. This will be influenced by weather conditions for which the Employer cannot be held accountable. It is upon the Service Provider to plan around these circumstances. Sections where construction is under way can be skipped and continued where construction is completed. These can be encountered all over the network and must be logged in the daily survey register.

Road sections that are Single Carriageway only need to be surveyed in one direction. Dual Carriageway and Undivided Carriageways (divided by solid line and not barrier), must be surveyed in both directions. Only one lane per carriageway needs to be surveyed. and this should be the lane most trafficked by heavy vehicles. Interchange on and offramps need not be surveyed.

Table: Programme of Works

FUNCTION	**PROGRAMME**
The maintenance of all survey registers	Continuous. Bi-Weekly reporting required

FUNCTION	PROGRAMME
The supply of surveyed data to the employer until all road sections under contract is completed	Continuous. Bi-Weekly reporting required
Validation runs once monthly until completion of all surveys is completed. (Only 2 runs at 80km/h per validation section required for interim validation checks) as stipulated in SECTION S1230	Continuous until contract is completed

S1160 STANDARD OF WORK

All survey tasks and quality control shall be executed in accordance with latest version of the Technical Methods for Highways TMH13: Automated Road Condition Assessments and Technical Methods for Highways TMH18: Standard for Road Network Data or any other requirement specified in writing.

S1170 SAFEGUARDING DATA

The Service Provider shall take all reasonable precautions to preserve the integrity of its data and also prevent any corruption or loss of the Employer's data.

The Service Provider shall ensure that a regular back-up copy of its data is made, so that any loss of the Employer's data submitted during the contract period, can be reconstructed from the Service Provider's data.

In the event that the Employer's data is corrupted or lost as a result of any fault by the Service Provider the Employer shall have the option, in addition to any other remedies that may be available to it either under this Contract or otherwise, to select either of the following remedies:

a) The Employer may require the Service Provider to restore or procure the restoration of the Employer's data using the back-up copy referred to above, or,
b) the Employer may itself restore or procure restoration of its data using the back-up copy referred to above and shall be compensated by the Service Provider for all cost related thereto.

S1180 PAYMENT

General requirements for survey work

Item		Unit
S11.01	Bi-Weekly survey reports	No.
S11.02	Completed and submitted data	km.
S11.03	Establishment once monthly for validation runs	Each.

Payment for Bi-Weekly reports submitted to the Employer shall be made for each kilometer of completed and submitted data, per month. For the avoidance of doubt, for each week that acceptable, accurate reports are submitted, a cumulative payment shall be made at the tendered rate before the end of the following month, and claimed in interim payment certificates, for completed surveys that do not contain errors.

Payment for the once monthly instrument validation check, as stipulated in SECTION S1230, shall be made as per tendered amount.

S1200 TECHNOLOGY AND FILE MANAGEMENT

S1210 SCOPE

This section covers the responsibilities of the Service Provider with respect to the storage of documentation over and above the requirements contained in the GENERAL SPECIFICATIONS FOR ROAD CONDITION SURVEY SERVICES.

S1220 INFORMATION TECHNOLOGY PROVIDED BY THE EMPLOYER

Any software packages for the processing of the recorded data will be for the Service Provider's account. The Service Provider will also be responsible for any software developments costs as a result of this software.

S1230 VALIDATION OF INSTRUMENTS

All instruments shall be validated prior to the start of surveys.

Service providers will be required to undergo a series of validations whereby vehicles will have to travel over at least 8 sections, surveyed by the employer with a walking profilometer.

These sections are located in the province of Gauteng and the positions of these will be supplied to the Service Provider to measure the sections.

It will be required of the Service provider to measure the validation sections and do 5x runs at three different speeds each for a total of 15x runs on each section. Two of these sections are of 1 kilometer length and the rest is 200 meters in length.

During surveys it will be required to do 2x runs at 80km/h, once per month, on each of these sections; to check if there is any drift in the results from the survey instruments.

Checks will be performed for Roughness and Texture on these sections. Rutting will be validated on known profiles kept at the employer's office. Two scales are available at SANRAL Head Office to check that the load on the axle of the TSD – Traffic Speed Deflectometer is 9ton with an allowable margin of error of 200kg, while static.

If results from the instruments do not comply with the prescriptions as set out in TMH13, the instruments need to be corrected / adjusted before re-evaluation of sections may continue, at the expense of the Service Provider.

S1240 FILES

Survey registers shall be submitted bi-weekly by the contractor containing the progress of surveys. These shall be named according to the date as at the end of each survey week, ie: 20260207_####, for surveys completed by the end of the week, falling on Saturday, 7 February 2026, completed by Service Provider ####. (#### = code assigned by employer for Service Provider)

Processed data files will be submitted per road section surveyed or part thereof and shall be named as follows:

- ROAD_ID followed by underscore (Road Id contains Route, section and direction information)
- Lane expressed as P# or S# followed by underscore (Fastest lane is P1, next lane towards slower lanes is P2 etc.
- Primary direction (P) is in the direction of increasing kilometers. Secondary(S) direction is in the direction of decreasing kilometers.
- Start of file expressed in meters padded with six zeroes followed by underscore
- End of file expressed in meters padded with six zeroes followed by underscore
- Date of survey as one continuous number as YYYYMMDD

For example, a survey completed on the National Route 2 section 3 east on the fast lane, from kilometer 3.56 to kilometer 56.8 on the 2nd of February 2026 will be named: N00203E_P1_003560_056800_20260202.csv

Each file should be recorded in the survey register together with comments regarding the success or failure of the recorded file, together with any relevant information.

RAW files must also be submitted to the employer, linked to the exported file as described above. RAW files may be requested to be reprocessed in the presence of the employer for time to time for auditing purposes. No prescription for the naming of RAW files is prescribed but must be linked in the survey register with an exported file, named as prescribed in SECTION S1230.

S1250 FILE CONTENTS

S1250(a) FILE CONTENTS OF EXPORTED DATA FILES FOR PACKAGE A – TSD DEFLECTIONS, ROUGHNESS, TEXTURE AND RUTTING SURVEYS

Data files must provide data files containing the following data averaged over 10 meter increments.

Note: Files may be supplied as either MsExcel or CSV file formats.

FIELD HEADER	FORMAT	DATA DESCRIPTION	EXAMPLE
RoadNumber	A000	Route where survey is being done	N002 or R574
RoadPath	00	Section of route where survey is being done	3 or 15
RoadSide	Aa	Direction of Section	N, E, S, W, NX, WX etc.
Lane	P0 or S0	Lane indicator	P1, P2, P3, S1, S2 etc.Fast lane is 1, slower lanes 2 or 3 etc.
Distance	9	Distance in meters	33910
LATITUDE	-dd.dddddddd	Degrees latitude up to 8 decimal places	-25.74724604
LONGITUDE	dd.dddddddd	Degrees longitude up to 8 decimal places	28.28919801
Height	mmmm.mm	Height in meters	1356.23
Date and Time	yyyy-mm-dd HH:mm:ss	Date and time(24HR fromat) point captured (Exact format)	2026-01-21 14:39:06
PDOP	9.9	Satellite Dilution of Precision	1.1
No Satellites	9	Number of visible satellites	23

FIELD HEADER	FORMAT	DATA DESCRIPTION	EXAMPLE
Gradient	9.9	Percentage of incline (ave. over 10m)	2.5
Crossfall	9.9	Percentage of crossfall (ave. over 10m)	2.0
IRIL	9.9	IRI in mm/m or m/km up to 4 decimal places in the LEFT Wheel-path (ave. over 10m)	1.3564
IRIR	9.9	IRI in mm/m or m/km up to 4 decimal places in the RIGHT Wheel-path (ave. over 10m)	1.8476
IRILSW	9.9	Short Wave IRI in mm/m or m/km up to 4 decimal places in the LEFT Wheel-path (ave. over 10m)	1.2544
IRIRSW	9.9	Short Wave IRI in mm/m or m/km up to 4 decimal places in the RIGHT Wheel-path (ave. over 10m)	1.6787
IRILMW	9.9	Medium Wave IRI in mm/m or m/km up to 4 decimal places in the LEFT Wheel-path (ave. over 10m)	1.2564
IRIRMW	9.9	Medium Wave IRI in mm/m or m/km up to 4 decimal places in the RIGHT Wheel-path (ave. over 10m)	1.5646
IRILLW	9.9	Long Wave IRI in mm/m or m/km up to 4 decimal places in the LEFT wheel-path(ave. over 10m)	1.1124
IRIRLW	9.9	Long Wave IRI in mm/m or m/km up to 4 decimal places in the RIGHT wheel-path(ave. over 10m)	1.2689
HRI	9.9	HRI in mm/m or m/km up to 4 decimal places (ave. over 10m)	1.602
MPDLAVG	9.9	Texture depth in LEFT wheel-path up to 2 decimals in mm (ave. over 10m)	2.01
MPDLSTD	9.9	Standard dev. of texture depth in LEFT wheel-path up to 2 decimals in mm over 10m	1.55
MPDRAVG	9.9	Texture depth in LEFT wheel-path up to 2 decimals in mm (ave. over 10m)	2.51
MPDRSTD	9.9	Standard dev. of texture depth in RIGHT wheel-path up to 2 decimals in mm over 10m	1.01

FIELD HEADER	FORMAT	DATA DESCRIPTION	EXAMPLE
RutLAVG	9.9	Rutting in Left wheel-path, up to 1 decimal, in mm calculated as measured under 2m straightedge (ave. over 10m)	10.8
RutLStd	9.9	Standard dev. of Rutting in Left wheel-path, up to 1 decimal, in mm calculated as measured under 2m straightedge over 10m	0.5
RutRAVG	9.9	Rutting in Right wheel-path, up to 1 decimal, in mm calculated as measured under 2m straightedge (ave. over 10m)	5.5
RutRStd	9.9	Standard dev. of Rutting in Right wheel-path, up to 1 decimal, in mm calculated as measured under 2m straightedge over 10m	1.1
WaterDepLAvg	9.9	Standing water depth level in LEFT rut calculated using crossfall and rutting in mm up to 1 decimal. (Average over 10m)	5.2
WaterDepRAvg	9.9	Standing water depth level in RIGHT rut calculated using crossfall and rutting in mm up to 1 decimal. (Average over 10m)	3.2
Dr.Speed	9.9	Speed at time point captured in km/h (ave. over 10m)	79.5 km/h
Dr.Accl	9.9	Vehicle Acceleration in m/s, averaged over 10m to 6 decimal places	0.584522
AxleLoadL	9.9	Axle load on left wheels in kg to 1 decimal	4512.1
AxleLoadR	9.9	Axle load on left wheels in kg to 1 decimal	4489.2
PaveTemp	9.9	Pavement surface temperature in ºC to 4 decimal places	45.2546
AirTemp	9.9	Air temperature in ºC to 4 decimal places	28.5788
Defl0	9.9	Deflection under the axle in micrometers to 3 decimal places	456.587
Defl100	9.9	Deflection 100mm in front of the axle in micrometers to 3 decimal places	398.554
Defl200	9.9	Deflection 100mm in front of the axle in micrometers to 3 decimal places	258.254
Defl300	9.9	Deflection 100mm in front of the axle in micrometers to 3 decimal places	225.587

FIELD HEADER	FORMAT	DATA DESCRIPTION	EXAMPLE
Defl450	9.9	Deflection 100mm in front of the axle in micrometers to 3 decimal places	201.321
Defl600	9.9	Deflection 100mm in front of the axle in micrometers to 3 decimal places	187.244
Defl750	9.9	Deflection 100mm in front of the axle in micrometers to 3 decimal places	150.235
Defl900	9.9	Deflection 100mm in front of the axle in micrometers to 3 decimal places	120.223
Defl1200	9.9	Deflection 100mm in front of the axle in micrometers to 3 decimal places	80.254
Defl1500	9.9	Deflection 100mm in front of the axle in micrometers to 3 decimal places	50.221

S1250(b) FILE CONTENTS OF EXPORTED DATA FILES FOR PACKAGE B - ROUGHNESS, TEXTURE AND RUTTING SURVEYS

Service providers that are appointed for the collection of only Roughness, Texture and Rutting data, must provide data files containing the following data averaged over 10 meter increments:

Note: Files may be supplied as either MsExcel or CSV file formats.

FIELD HEADER	FORMAT	DATA DESCRIPTION	EXAMPLE
RoadNumber	A000	Route where survey is being done	N002 or R574
RoadPath	00	Section of route where survey is being done	3 or 15
RoadSide	Aa	Direction of Section	N, E, S, W, NX, WX etc.
Lane	P0 or S0	Lane indicator	P1, P2, P3, S1, S2 etc.Fast lane is 1, slower lanes 2 or 3 etc.
Distance	9	Distance in meters	33910
LATITUDE	-dd.dddddddd	Degrees latitude up to 8 decimal places	-25.74724604
LONGITUDE	dd.dddddddd	Degrees longitude up to 8 decimal places	28.28919801
Height	mmmm.mm	Height in meters	1356.23
Date and Time	yyyy-mm-dd HH:mm:ss	Date and time(24HR fromat) point captured (Exact format)	2026-01-21 14:39:06
PDOP	9.9	Satellite Dilution of Precision	1.1
No Satellites	9	Number of visible satellites	23
Speed	9.9	Speed at time point captured in km/h (ave. over 10m)	79.5 km/h
Gradient	9.9	Percentage of incline (ave. over 10m)	2.5
Crossfall	9.9	Percentage of crossfall (ave. over 10m)	2.0

FIELD HEADER	FORMAT	DATA DESCRIPTION	EXAMPLE
IRI_Left	9.9	IRI in mm/m or m/km up to 4 decimal places in the LEFT Wheel-path (ave. over 10m)	1.3564
IRI_Right	9.9	IRI in mm/m or m/km up to 4 decimal places in the RIGHT Wheel-path (ave. over 10m)	1.8476
Short wave IRI L	9.9	Short Wave IRI in mm/m or m/km up to 4 decimal places in the LEFT Wheel-path (ave. over 10m)	1.2544
Short wave IRI R	9.9	Short Wave IRI in mm/m or m/km up to 4 decimal places in the RIGHT Wheel-path (ave. over 10m)	1.6787
Medium wave IRI L	9.9	Medium Wave IRI in mm/m or m/km up to 4 decimal places in the LEFT Wheel-path (ave. over 10m)	1.2564
Medium wave IRI R	9.9	Medium Wave IRI in mm/m or m/km up to 4 decimal places in the RIGHT Wheel-path (ave. over 10m)	1.5646
Long wave IRI L	9.9	Long Wave IRI in mm/m or m/km up to 4 decimal places in the LEFT wheel-path(ave. over 10m)	1.1124
Long wave IRI R	9.9	Long Wave IRI in mm/m or m/km up to 4 decimal places in the RIGHT wheel-path(ave. over 10m)	1.2689
HRI	9.9	HRI in mm/m or m/km up to 4 decimal places (ave. over 10m)	1.602
RutLAVG	9.9	Rutting in Left wheel-path, up to 1 decimal, in mm calculated as measured under 2m straightedge (ave. over 10m)	10.8
RutLStd	9.9	Standard dev. of Rutting in Left wheel-path, up to 1 decimal, in mm calculated as measured under 2m straightedge over 10m	0.5
RutRAVG	9.9	Rutting in Right wheel-path, up to 1 decimal, in mm calculated as measured under 2m straightedge (ave. over 10m)	5.5
RutRStd	9.9	Standard dev. of Rutting in Right wheel-path, up to 1 decimal, in mm calculated as measured under 2m straightedge over 10m	1.1

FIELD HEADER	FORMAT	DATA DESCRIPTION	EXAMPLE
WaterDepLAvg	9.9	Standing water depth level in LEFT rut calculated using crossfall and rutting in mm up to 1 decimal. (Average over 10m)	5.2
WaterDepRAvg	9.9	Standing water depth level in RIGHT rut calculated using crossfall and rutting in mm up to 1 decimal. (Average over 10m)	3.2
MPDLAVG	9.9	Texture depth in LEFT wheel-path up to 2 decimals in mm (ave. over 10m)	
MPDLSTD	9.9	Standard dev. of texture depth in LEFT wheel-path up to 2 decimals in mm over 10m	
MPDRAVG		Texture depth in LEFT wheel-path up to 2 decimals in mm (ave. over 10m)	
MPDRSTD		Standard dev. of texture depth in RIGHT wheel-path up to 2 decimals in mm over 10m	

ROW – Right of Way video files for both Package A and Package B should be of JPEG format with a high quality image of no less than 1280x640 pixels.

Every image must be georeferenced with a separate xls or csv file, named as the Section ROAD_ID_LANE (ie. N01205NP1.csv), containing Latitude and Longitude and file name that matches the name per image file.

Image files must be named as follows:

N01205NP1_000000.jpg
N01205NP1_000010.jpg
N01205NP1_000020.jpg
N01205NP1_000030.jpg…Etc.
The example indicating the recording was done on Route N12, section 5 North in Primary direction lane 1 from km0 to km 0.03

S1260 PAYMENT

General requirements for technology and file management

Item		Unit
S12.01	Validation of instruments	Lum Sum
S12.02	Package A - data files	km
S12.03	Package A - RAW data files	km.
S12.04	Package A - Right of Way video files	km.
S12.05	Package A – Final Data Quality Report	No.

S12.06	Package B - data files	km
S12.07	Package B - RAW data files	km.
S12.08	Package B - Right of Way video files	km.
S12.09	Package B – Final Data Quality Report	No.

S1300 SAFETY ADMINISTRATION

S1310 SCOPE

This section covers the safety in traffic during road surveys.

S1320 TRAFFIC ACCOMMODATION

As surveys will be carried out at traffic speeds, no additional traffic accommodation measures will be needed. Service providers do however need to adhere to all general traffic rules and must take care when stopping between sections to not disrupt traffic unnecessarily.

S1330 PROVISION OF SAFETY OF SURVEY VEHICLES

The safety of the road user is of paramount importance, and the Service Provider shall maintain accurate and complete health and safety records, as required.

The road condition survey vehicle should be roadworthy, highly visible, and safe to operate in live traffic. The vehicle requires high-visibility markings and securely mounted sensors and equipment. Laser and electronic systems must be eye-safe and properly fused. The vehicle should carry standard emergency equipment and warning triangles, and support safe operation, at all times.

The survey vehicle should meet all licence, registration and insurance requirements (e.g. width, height, signage) for operation in the survey jurisdiction and be clean and presentable.

The survey vehicle should have sufficient space for the survey team. The vehicle should be available for viewing and inspection during the period of the contract, or as requested by the Employer.

S1340 SAFETY AND THE SUSPENSION OF WORK

Failure of the Service Provider to take the necessary precautions for the safety and convenience of public traffic shall be sufficient cause for the suspension of work until the Service Provider has complied with all safety requirements to the satisfaction of the Employer.

Claims for compensation as a result of the suspension of the work under these circumstances will not be considered. Penalties for incompliance shall be applied in accordance with the General Specifications.

S1350 PAYMENT

Safety Administration

Item		Unit
S13.01	Provision of Safety of Survey Vehicles.	Lump Sum