

**National Asset Delivery  
Technical Surveys and Testing**

**605788-P-009**

**Scope for Network Multi-Functional  
Vehicle Surveys**



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## 1 PURPOSE OF THE SERVICES

### 1.1 Project objectives

1.1.1 The principle objective of this project is to undertake 2 visual condition surveys of the pavement throughout the AD14 network for seasonal variation, utilising a multi-functional vehicle (MFV). The MFV shall be a combined pavement surface data collection system that incorporates several high-accuracy measurement components that can be collected at traffic speed. The surface profile is to be profiled utilising a 3D laser of the type Laser Crack Measurement System (LCMS-2). The survey is to obtain pavement condition data for the development of renewal schemes.

1.1.2 The specification that applies to the *services* is included in Section 6

### 1.2 Scope of services

1.2.1 The *services* to be provided under this contract are:

Category	Survey Description
Pavement	Pavement visual conditions surveys

### 1.3 Deliverables

1.3.1 The *Consultant* is required to produce the following deliverables:

- The survey is required to determine the following parameters:
  - Longitudinal ride quality
  - Rut depth, width and volume
  - Standing water depth
  - Texture – SMTD, RMST and MPD (both wheel paths and mid-lane)
  - Transverse texture – RMST (100mm to 250mm grid)
  - Cracking length, width and depth (categorised into alligator, transverse, longitudinal, block and surface fretting)
  - Potholes
  - Ravelling development indicator
  - Faulting at joints
  - Bleeding
  - Length of sealed cracks
  - Stone loss
  - Localised deformation
  - Geometry (crossfall and gradient)

- Geospatial positioning
- Digital Images allowing geospatial tagged feature identification
- The data sets are to be referenced to GPS coordinates and aligned to the Highways England HAPMS defined survey sections using the designated chainage referencing system.
- The survey information is to be presented in a data management system which must be a single integrated platform with all individual components linked by a unique time-stamp that will allow the datasets to be merged either during data collection or by post processing to an accuracy of 0.1mm.
- The data management system shall include digital image viewing software and shall:
  - Present the road reference
  - Enable efficient navigation to the location of interest
  - Present condition and geometry as a spatial map
  - Enable Horizontal and Vertical measurement of items of interest within the image
  - Enable the geospatial position of assets within the image to be defined
  - Present digital images from all camera views including the crack map
  - Synchronise the update of all views when navigating
  - Enable the creation of forms to be populated with information extracted from the images
  - Allow the user to post process: geometry, roughness, rutting, texture, cracking at different processing intervals, including but not limited to: 1 m, 10 m, 100 m, 1 km, etc
  - Be capable of exporting all data sets to various format including: MS Excel, CSV, KM and GIS.
  - Be maintained by the vendor.

## 2 EXISTING INFORMATION

### 2.1.1

- Highways England AD14 network shape file
- Highways England AD14 network chart plans (36 page booklet showing network route and chart sections on an OS Mastermap background)

- 2.1.2 The Drawings listed below apply to this contract. Refer to the site information for details of existing site conditions including ground conditions, limitation on access, position of existing structures etc.

Drawing Number	Title	Revision / Date
	[Note to Compiler: Insert details of drawings included in the contract]	
	Area 14 Chart Plans – Sheet 1 to 36	

### 3 CONSTRAINTS ON HOW THE CONSULTANT PROVIDES THE SERVICES

#### 3.1 General

- 3.1.1 The *Consultant* Provides the Services in such manner as to minimise the risk of damage or disturbance to or destruction of third party property.
- 3.1.2 The *Consultant* complies with the constraints and meets with the requirements outlined in Appendix 1.
- 3.1.3 The *Consultant* submits information detailing how the *Consultant* will provide the Services to the *Client* prior to the services commencing. This information will include any lifting plans, risk assessments, method statements, the *Consultant's* staff training information and any other relevant Health and Safety requirements.

#### 3.2 Working hours & site specific constraints

- 3.2.1 The site is the strategic road network for AD Area 14. The survey is to be conducted at traffic speed without need for traffic management. There are no restrictions working hours.
- 3.2.2 The *Consultant's* working hours for site works shall be determined by the Contractor, in line with their policies and H&S governance for safe working, and HSE guidance.

[Insert details of any site specific constraints on methods and or conduct of the work]

- 3.2.3 The survey programme has been developed in conjunction with the Client's construction delivery programme as to avoid loss of coverage due to planned / cyclic works. The order of survey, or dates maybe subject to change should the need arise due to delivery of the forward programme or incident/maintenance response.

#### 3.3 Health, Safety and Environment & Risk Management

### Health and Safety requirements

- 3.3.1 In Providing the Services the *Consultant* meets the requirements of Annex 2 of the supplementary constraints relation to health and safety duties.
- 3.3.2 The *Consultant* shall comply with the requirements of Highways England's safety passport scheme and ensure that all of his employees, and any of his subcontractor's, are registered in accordance with the implementation of the scheme. Details on the scheme can be found here: <http://www.highwayssafetyhub.com/safety-passport.html>
- 3.3.3 Not used.
- 3.3.4 Before commencing the construction phase of the *services*, the *Consultant* confirms to the *Client* that adequate welfare facilities are in place. Where the facilities detailed in section 5 are not deemed adequate, the *Consultant* provides all necessary facilities to Provide the Services and to comply with the minimum requirements set out in HSE guidance document L153.

### Environmental requirements

- 3.3.5 In Providing the Services the *Consultant* meets the requirements of Annex 2 of the supplementary constraints in relation to environmental duties.

### Risk Management

- 3.3.6 The *Consultant* identifies, manages and mitigates risks in accordance with the principles of ISO31000.
- 3.3.7 The *Consultant* submits a risk register, which captures all risks associated with the delivery of the *services* including those identified by the *Client*, with his tender and maintains it for the contract period.

## **4 REQUIREMENTS FOR THE PROGRAMME**

- 4.1.1 The *Consultant* submits programme to the *Client* with his tender.
- 4.1.2 The *Consultant* Provides the Services taking into account the following programme constraints:
- (i) the *starting date* and *completion date* and any post site works, reporting and review period
  - (ii) The services and other things provided by *Client* (see Section 5)

(iii) ***There will be 2 MFV runs for seasonal variation. The starting date for the 1<sup>st</sup> run will be 30/11/2020 and the starting date for 2<sup>nd</sup> run will be 22/02/2021.***

(iv) The site survey data collection is expected to be completed within 2 weeks from start date.

(v) The processed and digitised data and management system is to be provided within 30 days of the completion of site activity.

(vi) The survey contractor is expected to call in the start and end location of the survey for each day, by midday of the preceding day. An email should be sent to the Highways England survey coordinator [REDACTED] and the Network Occupancy management Team at [REDACTED]

4.1.3 The programme should be in the form of an activity and time related bar chart, produced as a result of a critical path analysis.

4.1.4 The programme should preferably be provided in either a PDF or MS Excel format and cover the full contract period including post site activities. Activities should be clearly defined and named and the programme should detail the following:

- (i) dates and times associated with the project, including the *starting date*, *completion date* & *Consultant's* planned completion, and any other dates or times that will specifically impact the delivery of the project
- (ii) activities associated with delivering the project

4.1.5 The *Consultant* should provide details of the proposed resources (plant, labour, subcontractors etc.) expected to deliver each activity. This information can either be shown on the programme itself or provided in an associated resource statement included in the Proposal for Providing the Services.

4.1.6 The *Consultant* updates the programme daily. The *Consultant* submits an updated programme to the *Client* upon request.

## **5 SERVICES AND OTHER THINGS PROVIDED BY THE CLIENT**

5.1.1 The Client does not provide traffic management: The survey vehicle should be capable of data collection at traffic speed, eliminating the need for traffic management.

5.1.2 The Contractor is expected to make use of nearest maintenance depot or service station, to be advised by Supervisor / Highways England Representative, and welfare facilities adjacent to the network.

5.1.2: Not used

## 6 SPECIFICATION FOR THE SERVICES

6.1.1 The *Consultant* shall Provide the Services in accordance with:

6.1.2 The components included on the vehicle shall include (but not be limited to) the following:

- Distance measuring instrument (DMI)
- Elevation sensors measuring longitudinal profile and texture
- Accelerometers positions in the wheel paths
- Integrated Geospatial and Geometry Positioning System
- HD cameras for multiple views and high-quality images
- 3D laser scanning sensors measuring minimum 28,000 profiles/second (LCMS-2)

6.1.3 The equipment should automatically determine the condition of asphalt and concrete pavements and the data quality shall be independent from lighting, measurement speed or other conditions.

6.1.4 The technical specification of data capturing equipment is as per the table below:

Distance Measurement Instrument	
- Mounting	Wheel mounted
- Pulses per revolution	2000
- Precision	≤ +/-0.1%, and subsequent bias of ≤ 0.1%
Elevation Measuring Lasers	
- Minimum Sampling Frequency	32.5 kHz (data collected every 1mm)
- Minimum Bandwidth	20 kHz
- Spot Size	0.5mm to 0.7mm
- Resolution	0.045mm maximum
- Measuring Range	± 70mm to 90mm
- Stand Off	≥ 260mm
Accelerometers	
- No of Sensors	2 - one with each wheel path
- Minimum Measuring Range	± 5G
- Minimum Resolution	10 µG
- Minimum Bandwidth	DC -300Hz
GPS	

- Minimum sampling frequency	1Hz
- Horizontal Accuracy	< 0.3m RMS
- Vertical Accuracy	< 0.3m RMS
Gradient	
- Range	± 150 degrees (at 70km/hr)
- Resolution	degrees
- Accuracy	± 0.1 degrees
Crossfall	
- Range	± 45 degrees (from the horizon)
- Resolution	0.1 degrees
- Accuracy	± 0.3 degrees
Radius of Curvature	
- Range	± 150 degrees (at 70km/hr)
- Resolution	degrees
- Accuracy	± 0.1 degrees
High Definition Cameras	
Mounting Positions	Front centre, front left, front right, rear centre
Minimum recording interval	5m
Colour images	Yes
Image resolution	1600 x 1200 pixels
Synchronisation tolerance	0.1m
Image measurement distance	± 20cm
3D Laser scanning sensors	
Combined scanning width	4m
Acquisition rate	28,000 profiles/second
Elevation (z) resolution	0.1mm
Lateral resolution	1mm

6.1.5 The MFV supplier shall be required to provide confirmation that they have carried out similar investigations with this type of equipment and have the capability with suitably experienced specialists for the analysis and reporting of the collected data, in accordance with industry standards and Design Manual for Road and Bridges Volume 7 Section 2: HD29/08 and HD30/08.

6.1.6 The data collection system must be a single integrated platform with all individual components linked by a unique time-stamp that will allow the

datasets to be merged either during data collection or by post processing to an accuracy of 0.1mm.

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