

Document Title	Specifications – Robotic Total Station survey equipment and related software and maintenance contract
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1. Definitions

- TP = Transnet Property
- OD = Operational Divisions
- Robotic Total station = An electronic instrument used to measure distances and angles. Because it follows a predetermined target/survey prism, a robotic total station allows remote operation without the need of a survey assistant.
- Active target – Moving target/prism.
- Passive target – Stationary target/prism
- Geospatial relates to data that can be used to identify and locate positions of physical objects/assets on the earth's surface.
- Complete Robotic Total Station systems include Robotic Total Station, Tripod, plumb poles as described in 4.8 below, handheld controller, bracket for handheld controller and batteries)

2. BACKGROUND

- 2.1. Transnet Property (TP), Geo-Spatial uses various survey equipment, including Total stations, to execute land surveys (topographical, engineering, cadastral etc.) for Transnet Property, other Transnet OD's and to verify geospatial data for the drawing office.
- 2.2. The existing equipment is more than ten – thirty years old and since it is computerized/electronic it should be replaced every three to five years. The equipment is functionally and technically obsolete as spares are no longer kept by manufacturers thus leading to lengthy downtime periods.
- 2.3. The current Total stations are manually operated and requires an operator and an assistant. The Robotic total station offers sole user operation.
- 2.4. Transnet Property (TP), Geo-Spatial wishes to approach the market to procure four (4) complete Robotic total station systems including related software and accessories for the four (4) regional offices as stated below in Section 3.

3. Robotic total station SURVEY EQUIPMENT REQUIREMENTS

The supplier is required to quote Transnet Property (Geo-Spatial) for four (4) new Robotic Total station systems as stated below in table 1.

Regional Offices	QTY	Product Description
Cape Town (Western Cape)	1	Robotic Total station Systems, related software and accessories
Gqeberha (PE) (Eastern Cape)	1	Robotic total station Systems, related software and accessories
Durban (Coastal)	1	Robotic total station Systems, related software and accessories
Pretoria (Inland)	1	Robotic total station Systems, related software and accessories
	4	

Table 1: Robotic Total Station survey equipment requirements for Transnet Property

4. Technical and functional requirements

- 4.1. Minimum range of 1.5m to a maximum of not less than 1.5km with a single prism but greater distances will be an advantage.
Minimum range of 1.5m to a maximum range of 1.0km with no prism (reflector-less) but greater distances will be an advantage.
Servo motor to rotate at 30° to 50° per second and must provide silent movement.
To track active and passive targets

- 4.2. Positional Specifications
 - Minimum Accuracy $\pm 3\text{mm} + 2\text{ppm}$
 - Speed of measurement 1 to 5 seconds
 - Least distance count: 1 second
 - Angular Measuring interval: 2 seconds or better
 - Internal radio operating in public free 2.4GHz
 - Internal radio to use frequency hopping to ensure radio communications.
 - Tilt warning

4.3. Software

- Process the Raw data and provide output in industry standard formats e.g. Excel various formats, CAD, GIS, Survey related software
- Should include data transfer software.
- Survey Controller must be handheld.
- Software solution must be able to integrate with standard CAD software, Survey computing software.

4.4. Physical Characteristics

- Total Station must weigh less than 6.0Kg with internal batteries.
- Should have hot swappable batteries.
- Working time of at least 9 hours in one day (please quote for additional batteries to meet this requirement)
- Must have carry protective cases for DTM and prism.
- Telescope magnification 30X with erect image
- Auto lock for robotic function
- Endless horizontal and vertical adjustment screws

4.5. Environmental

- Operating temperature range from -30°C to 50°C
- Storage temperature range from -25°C to 60°C
- Dust/Water Protection class at least meeting IP65 (or better), should be protected from temporary immersion to depth of 1 metre.
- Operating Humidity up to 90%
- No lighting limitations

4.6. Survey Controller

- Full Colour Touch Screen, readable in daylight
- 32GB Storage or better with expansion memory slot & USB host
- Full QWERTY keyboard
- Integrated speaker and microphone
- 5MP camera or better, integrated GPS (Geo-referencing), compass and accelerometer
- Integrated Bluetooth, WIFI and GSM/GPRS
- Have cable free operation capabilities.

4.7. Additional Specifications

- Should have link rates within the industry standard range for example (4800 to 256000bps)
- Radio should have wide frequency band width industry standard range for example (390 to 470MHz)
- Should support wireless communication through integrated blue tooth / Radio communication / wi-fi for peripherals (cable free operation)
- Should have an optical or laser plummet.

- Should have Bluetooth / wi-fi and both a serial and a USB port for data transfer.
- 8GB Internal memory and 16GB (or better) flash memory

4.8. Accessories

- Tripod, with protective bag
- 5m Tape Measure, Metric/Tenths
- Snap-on Rod Level (Bubble)
- Rod - 2.0m Carbon fibre range pole without bipod, with protective bag
- Operating Prism System, with protective bag
- Prism Rod adjustable
- Prism Rod protective Bag
- 5m Twist lock telescopic prism pole

4.9. Data Transfer

Data transfer to be as simplistic as possible to avoid time delays in sending data to processor. Data transfer should be compatible to industry standard formats.

4.10. Software upgrade/maintenance

Should there be any software upgrade during the maintenance period of three years it should be updated to the latest software version. General maintenance and servicing to be done by local supplier. All support and training to be done by the supplier and proof that the supplier is qualified to provide support and training. Software updates usually comes with new tools and functionality that were not part of the previous version. The service provider will always make the latest software version available on a physical data storage device or through their website. Upgrade installation guidelines should be provided. Maintenance and servicing are exclusively entrusted to the local supplier.

4.11. Telephonic technical support/Training

Telephonic technical assistance to be offered to the end user when they experience challenges with the use of the software and operation of the equipment. The service provider should be available during the office hours stated on the agreement. Training to be provided on receipt of the Robotic Total Station equipment, software and accessories.

4.12. Warranty (Mandatory items)

- No grey products will be considered.
- Minimum warranty of 3 years. (May be a combination of Supplier and Manufacturer warranty).
- Maintenance period of 3 years as per Scope of work

5. Supplier support conditions

The service provider must specify the nature of the support that is outside the normal software annual maintenance service and the related rate per hour. Supplier should be contactable from 7:30 to 17:00 weekdays.

6. Deliverables

The Robotic Total Station systems and all accessories as listed above to be delivered to the four(4) Geo-Spatial Transnet offices in Cape Town, Gqeberha, Durban and Pretoria on receipt of payment.



Terence Stiles

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