

QMS SUPPORTING DOCUMENT	DOCUMENT NR: A54
	VERSION: 3.0
Provision of Geotechnical Field and Laboratory Testing services	DATE: 2025/05/27
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## Provision of Geotechnical Field and Laboratory Testing Services

### SPECIFICATION

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## 1 DEFINITIONS AND ABBREVIATIONS

### **Dynamic Probe Super Heavy (DPSH)**

The test consists of a weight of 63,5kg dropping 750mm onto a string of rods with a 50mm diameter (20cm<sup>2</sup> projected area), 90° apex angle, disposable cone at the front. The result of the test is presented as a graph of the number of blows required for each 300mm penetration (DPSH N-Value) against depth. The test is continued to refusal when more than 80 blows are required for 300mm penetration.

### **Standard Penetration Test (SPT)**

This test is also performed by measuring the number of blows from a 63,5kg hammer dropping 760mm to advance a standard split spoon sampler through 6 increments of 75mm. The upper 150mm is considered "disturbed material" and these blow counts ignored. The number of blow counts for the remaining 300mm is reported as the SPT N-value. A compressed and disturbed sample may be retrieved from the sampler for logging and for laboratory classification testing.

### **Continuous Raymond Spoon sampling**

The sampling technique involves using a split-barrel sampler to collect soil samples from boreholes. The sampler is driven into the ground using a hammer, and the soil collected is then analysed for various geotechnical properties

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## 2 SPECIFICATION VERSION

This specification supersedes all previous specifications for the provision of Geotechnical field and Laboratory testing services by a service provider for geotechnical investigations for Ladysmith depot boundaries.

## 3 DESCRIPTION OF THE SERVICES

The Ladysmith depot has seen an increase in requests for geotechnical field and laboratory testing services on the railway line. This increase has made the procurement process lengthy, causing delays in the turnaround time for geotechnical investigation reports. To address this challenge, the report proposes appointing a service provider to perform geotechnical testing services, which is expected to improve the quality of engineering work and the turnaround time for geotechnical laboratory services.

The purpose of this document is to detail the minimum requirements for the provision of geotechnical field and laboratory testing services by a service provider over a period of 2 years on an as and when required service level agreement contract. The suitable field and/or laboratory testing method will vary and depend on the complexity of the investigated problem. The number of test samples will differ per site investigation.

The service provider should be able to cater for all engineering requirements and needs. Where specialised testing is not part of your day-to-day functionality a subcontractor should be utilised without interference to the agreed turnaround times of delivery of service.

## 4 SCOPE OF WORK

### 4.1 In-situ Field Testing and Sampling

The service provider is required to conduct the following In-situ Field Testing and Sampling techniques:

- Standard Penetration Test (SPT)
- Continuous Raymond Spoon Sampling
- Dynamic Probe Super Heavy (DPSH)

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## 4.2 Laboratory Testing

- The service provider is required to conduct a series of laboratory tests on disturbed and undisturbed soil samples collected from various test sites.
- A list of the required laboratory tests is outlined in section 5.1
- Samples will be delivered to the Laboratory for testing by Transnet personnel.
- The test request order will be given together with the samples to the testing laboratory.

## 5 TECHNICAL REQUIREMENTS

### 5.1 In situ Field Testing requirements

- The service provider is required to perform SPT or DPSH testing by advancing probes to refusal, across testing positions set by the engineer from Transnet.
- Samples retrieved by the Raymond spoon sampler must be profiled by a engineering geologist/qualified personnel.
- The soil samples retrieved from testing must be made available to the engineer from TFR.

Table 1 below is a list of the field tests required:

*Table 1: In situ field test requirements*

Item No.	Field Testing	Standard Specifications, Equipment/Techniques Used
1	DPSH probing (probes to be advanced to refusal)	ISSMFE Technical Committee on penetration testing, 1988
2	SPT probing (probes to be advanced to refusal)	
3	Raymond Spoon sampling	
4	Profiling of sampled material	Profiling of test pits guidelines of soil and rock logging in Southern Africa, 2002 and Jennings et al.

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## 5.2 Laboratory Test Requirements

Below is a list of soil and aggregate tests required from the service provider. The tests must be conducted according to the various standard testing methods:

*Table 2: Laboratory test requirements*

Item No.	Types of Tests/Properties Measures, Range of Measurement	Standard Specifications, Equipment/Techniques Used
<b>1</b>	The wet preparation and sieve analysis of gravel, sand and soil samples	TMH 1 Method A1 (a)
<b>2</b>	The determination of liquid limit of soils by means of the flow curve method	TMH 1 Method A2
<b>3</b>	The determination of plastic limit and plasticity index of soils	TMH 1 Method A3
<b>4</b>	The determination of linear shrinkage of soils	TMH 1 Method A4
<b>5</b>	The determination of the percentage of material passing 0.075mm sieve in a soil sample	TMH 1 Method A5
<b>6</b>	Hydrometer Analysis to 2microns	ASTM: D422
<b>7</b>	The determination of the maximum dry density and optimum moisture content of gravel, soil and sand	TMH 1 Method A7
<b>8</b>	The determination of the California Bearing Ratio of untreated soils and gravels	TMH 1 Method A8
<b>9</b>	The determination of the in-place dry density and moisture content of soils and gravels by nuclear methods	TMH 1 Method A10 (b)
<b>10</b>	The determination of the moisture content of soils	TMH 1 A17
<b>11</b>	Complete consolidated Undrained Triaxial Test	BS 1377 Part 8
<b>12</b>	Complete consolidated Drained Triaxial Test	BS 1377 Part 8
<b>13</b>	Shear Box	BS 1377 Part 7
<b>14</b>	Standard Consolidation Test with single loading cycle (seven load increments) plus single unloading cycle (three load decrement).	BS 1377 Part 5
<b>15</b>	Double Oedometer Test	
<b>16</b>	Collapse potential rapid test with single load cycle	BS 1377 Part 5

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<b>17</b>	Swelling pressure (consolidometer)	BS 1377 Part 5
<b>18</b>	Free swell test at 10kPa	BS 1377 Part 5
<b>19</b>	Permeability: falling or constant head	
<b>20</b>	Permeability: constant head in triaxial cell	ASTM D5084-90
<b>21</b>	Dispersiveness: Pinhole Test: modified apparatus	BS 1377 Part 5
<b>22</b>	Dispersiveness: Crumb Test	BS 1377 Part 5
<b>23</b>	Dispersiveness: Double Hydrometer	BS 1377 Part 5
<b>24</b>	10 per cent Fines Aggregate Crushing Test (% FACT)	THM 1 Method B2
<b>25</b>	The sieve analysis of aggregates, including the determination of the material passing the 0.425 and 0.075mm sieves	THM 1 Method B4

If undisturbed samples cannot be extracted, disturbed specimens will be remoulded to match the field-measured density. Transportation and storage of block samples must be conducted with due care.

## 6 QUANTITY

Testing will be required on an as-and-when basis, with varying testing locations, sample numbers, and geotechnical testing services.

*Table 3: Bill of Quantities*

<b>Item No.</b>	<b>Item Description</b>	<b>Price per Item</b>	<b>Quantity</b>
<b>Type of Laboratory Test</b>			
<b>1</b>	The wet preparation and sieve analysis of gravel, sand and soil samples		As and when required
<b>2</b>	The determination of liquid limit of soils by means of the flow curve method		As and when required
<b>3</b>	The determination of plastic limit and plasticity index of soils		As and when required
<b>4</b>	The determination of linear shrinkage of soils		As and when required
<b>5</b>	The determination of the percentage of material passing 0.075mm sieve in a soil sample		As and when required

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<b>6</b>	Hydrometer Analysis to 2microns		As and when required
<b>7</b>	The determination of the maximum dry density and optimum moisture content of gravel, soil and sand		As and when required
<b>8</b>	The determination of the California Bearing Ratio of untreated soils and gravels		As and when required
<b>9</b>	The determination of the in-place dry density and moisture content of soils and gravels by nuclear methods		As and when required
<b>10</b>	The determination of the moisture content of soils		As and when required
<b>11</b>	Complete consolidated Undrained Triaxial Test		As and when required
<b>12</b>	Complete consolidated Drained Triaxial Test		As and when required
<b>13</b>	Shear Box		As and when required
<b>14</b>	Standard Consolidation Test with single loading cycle (seven load increments) plus single unloading cycle (three load decrement).		As and when required
<b>15</b>	Double Oedometer Test		As and when required
<b>16</b>	Collapse potential rapid test with single load cycle		As and when required
<b>17</b>	Swelling pressure (consolidometer)		As and when required
<b>18</b>	Free swell test at 10kPa		As and when required
<b>19</b>	Permeability: falling or constant head		As and when required
<b>20</b>	Permeability: constant head in triaxial cell		As and when required
<b>21</b>	Dispersiveness: Pinhole Test: modified apparatus		As and when required
<b>22</b>	Dispersiveness: Crumb Test		As and when required



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<b>23</b>	Dispersiveness: Double Hydrometer		As and when required
<b>24</b>	10 per cent Fines Aggregate Crushing Test (% FACT)		As and when required
<b>25</b>	The sieve analysis of aggregates, including the determination of the material passing the 0.425 and 0.075mm sieves		As and when required
<b>Type of In-situ Field Test</b>		<b>Price per Item</b>	<b>Quantity</b>
<b>26</b>	DPSH probing (probes to be advanced to refusal)		As and when required
<b>27</b>	SPT probing (probes to be advanced to refusal)		As and when required
<b>28</b>	Raymond Spoon sampling		As and when required
<b>29</b>	Soil Profile Log of embankment		As and when required

## 7 TIME FRAME

The contractual period shall be **2 years** (As and when required).

## 8 EVALUATION OF SUPPLIERS/SERVICE PROVIDERS

Technical Evaluation Criteria	Weighted Points	Criteria	Scoring Method	Bidder Score
<b>1. Company's Previous Experience</b>	<b>30</b>	The bidder must submit documentation i.e. traceable reference letter/ completion certificate/ purchase order	Bidder has successfully completed 3 similar projects, clearly indicating the scope of work.	<b>30</b>

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		<p>demonstrating that they can perform the required geotechnical field and laboratory testing services:</p> <p>a) Standard Penetration Test (SPT)</p> <p>b) Continuous Raymond Spoon Sampling</p> <p>c) Dynamic Probe Super Heavy (DPSH)</p> <p>d) Geotechnical laboratory testing services (see technical specification)</p> <p>Reference document must meet the below criteria:</p> <ul style="list-style-type: none"> <li>Reference letters must be on the client's company letterhead with the key contact person, email address, and contact number.</li> <li>Reference letter must be signed and dated by the key contact person.</li> <li>Client satisfaction</li> </ul>	Bidder has successfully completed 2 similar projects clearly indicating the scope of work.	<b>20</b>
			Bidder has successfully completed 1 similar project, clearly indicating the scope of work.	<b>10</b>
			No evidence provided	<b>0</b>
<b>2. Lead Time for Field and Laboratory Testing Services</b>	<b>20</b>	<p>Bidder to submit a written statement/ letter (company letterhead to be signed by delegated official with contactable details) confirming lead time from receipt of test request order and/or test samples</p> <p>NOTE: Excluding long running laboratory tests</p>	Lead time between 2 and 4 weeks	<b>20</b>
			Lead time between 4 and 6 weeks	<b>10</b>
			Lead time more than 6 week	<b>5</b>
			No evidence provided	<b>0</b>
<b>3. Quality</b>	<b>50</b>	<p>The bidder must demonstrate that geotechnical field and laboratory testing will be conducted by an accredited service provider/testing laboratory</p> <p>Bidders must submit a valid:</p>	Submission of a valid ISO 17025:2017 certificate and ISO 9001: 2015 certificate	<b>50</b>
			Submission of a valid ISO 17025:2017 certificate and Quality Management system	<b>40</b>

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		a) ISO 17025 :2017 certificate	Submission of a valid ISO 9001: 2015 Certificate	<b>30</b>
		b) ISO 9001: 2015 Certificate or Quality management system	Submission of Quality Management system	<b>10</b>
		The bidder must demonstrate that the testing laboratory is ISO 17025:2017 accredited, for the required tests, as specified in the schedule of accreditation.	No evidence provided	<b>0</b>
<b>Minimum Threshold (Bidders must obtain a minimum of 70 points to qualify to be evaluated further)</b>				<b>70</b>

## 9 REFERENCE DOCUMENTATION

- SAICE: Code of Practice for Site Investigations (2010) and Guidelines for Soil and Rock Logging in South Africa (2002)
- TMH Series: Relevant standards of the Technical Methods for Highways
- TRH Series: Relevant standards of the Technical Recommendations for Highways