

RFP SIC 10033. Ground Penetrating Radar (GPR) Measurements

Particular Project Specification

1. Scope of work

- 1.1. Tenders are invited for the measurement of the extent of ballast fouling and of formation failure areas on rail track of Transnet Freight Rail (TFR), by means of Ground Penetrating Radar (GPR) measurements.
- 1.2. GPR Measurements shall identify:
 - Layer dimensions
 - Extent of ballast fouling
 - Moisture conditions.
- 1.3. The process of measurement shall be qualified. The process shall be a proven process, utilising the latest ground penetrating Radar antenna equipment utilised for measurement of ballast fouling and formation failure for Rail Track. The process and data collection and presentation shall be controlled by an experienced geophysicist / engineer.
- 1.4. Measurements shall be taken GPR antennas deployed at each sleeper head and in the middle the sleeper
- 1.5. The extent of measurement required to be done shall be between 3000 and 6000 km of track.
- 1.6. GPR Measurement data shall be integrated with TFR's IAMM (Infra Applied Maintenance Management system) database. Data shall include the provision of all electronic data in both original data formats, including software and TFR rights to use software applicable, as well as simplified, summarised data in Microsoft Excel format, integrated with IAMM data.
- 1.7. Tenderers shall provide information of Railway track GPR measurement done for other Railroads as reference and also provide references where possible to allow TFR to confirm or verify the tenderers actual experience and the relevance and quality of data measurement process and capacity.
- 1.8. Should clarification be required by any tenderer on any technical aspect of this contract, the questions should be e/mailed to the project manager, C. J. Norden (Chris.Norden@transnet.net) and copy to the TFR Supply Chain Services representative, L Kroukamp (Linda.Kroukamp@transnet.net). A written replay will then be made and be forwarded by e-mail to all tenderers

2. Data Processing and importing of Data into IAMM

- 2.1. Minimum GPR data required shall consist of:
 - 2.1.1. All data shall indicate:
 - 2.1.1.1.km value of track for data presented with track section / name ID
 - 2.1.1.2.GPS position, preferably linked to fixed assets such as Electrification masts and video ID
 - 2.1.1.3.Video linked image of data recorded
 - 2.1.1.4.Detail date & time of measurements.
 - 2.1.1.5.Any other relevant data as normally provided as standard in the rail industry.

- 2.1.2. GPR recording of ballast profile, indicating depth and extent of ballast fouling.
- 2.1.3. Presentation of various formats of ballast fouling data, including layers of information for different levels of decision making to determine ballast screening priorities and programs. The information shall be presented in such layers allowing TFR to determine how to decide on ballast screening programs for lines measured.
- 2.1.4. Data for formation related problem areas with intention of indicating spots and extent of “mud hole” problem areas and other formation failure areas.
- 2.1.5. Tenderers are to Qualify what alternative additional data can be provided related to areas such as:
 - 2.1.5.1. Poor density areas at bridge banks.
 - 2.1.5.2. Dolomite areas – probable voids.
 - 2.1.5.3. Other general track related problems
- 2.2. Tenderers shall clearly qualify what data will be provided and what forms data will be provided in.
- 2.3. Section related GPR data shall be provided in a format linking data the TFR IAMM data with at least on
- 2.4. The contractor will import the data into TFR’s IAMM Program as soon as possible and preferably after each section has been measured. Where sections are not available in IAMM the importing of data is not required. No payment for the importing of data into IAMM will be made in such an event.
- 2.5. The importing of all data into IAMM will be completed not less than one month after the completion of a section measured as described in clause 4 above.
- 2.6. An import will be taken as correct if the data imported displays correctly. Any errors will be brought under the attention of the contractor and must be rectified immediately. TFR may notify the contractor of any incorrect data imports up to 90 calendar days after measurement of the section was completed. Incorrect data importation must be corrected by the contractor within two weeks of this being determined. Should data not be corrected, TFR shall retain a proportional amount of the fixed and variable cost as tendered in the schedule of quantities and prices.
- 2.7. The contractor will develop a system for importing of the data in conjunction with the TFR developers of IAMM. The contractor will be responsible to obtain the requirements for importing the data from the developers and design a system together with them. The item in the Price list (Item 1.2) allowing for establishment of data system, allows for this cost, (To be determined by the contractor). At the time of tender the contact details of the developer is:

e-Logics
Riverfalls Office Park
Tamboti Building
Rose Avenue
Doornkloof
Centurion 0157
South Africa

Tel: 012 6673231
Fax: 012 6673262

- 2.8. If the contact details of the developer are to change, the bidder and/or contractor will be informed of such a change and will proceed with the development together with the new developer.
- 2.9. **It is strongly recommended that the bidder make contact with e-Logics well in advance to allow for the work to be done by the IAMM developer.** An original letter of confirmation signed by the developer of the IAMM system shall be included by the tenderer in the submitted tender that confirms that the bidder has negotiated with the developer to develop a system for the importing of the data and that the developer confirms that the data supplied by the contractor can be used to import into IAMM.
- 2.10. Software provision and Training.
- 2.10.1. Software required for the interpretation of the electronic data provided shall be provided by the contractor as part of the contract.
- 2.10.2. Software training shall also be provided as part of deliverables of the contract.
- 2.10.3. Training on software shall be arranged for at least a group of Tenderers shall.

3. Time frame for execution of project and program

3.1. Starting date of contract

The contract is to start as soon as possible after award of the contract. The starting date will be communicated to the contractor dependant on the accepted offer received and the adjudication process. It is assumed the contract shall start in March 2011.

3.2. Duration of contract and program.

3.2.1. Program for execution of work

- 3.2.1.1. Tenderers shall submit with their tenders a program indicating the intention of when what will be done when. (Preparation, Field measurements, Data processing, Submission of data, training in the use of the data etc)
- 3.2.1.2. TFR will prepare a provisional detail program for track possession occupations, based on time required by the accepted tenderer. This program will be discussed / agreed on with the contractor and then be finalised by TFR. This program may be altered by TFR depot's to suite probable local occupation conditions at that may occur.
- 3.2.1.3. The Technical Engineering technician and Track Inspector or Track Master appointed by TFR Central office will be required to confirm the program at the beginning of the contract as a whole as well as every day. The Engineering Technician and / or Track pilot of TFR must beforehand that any alterations in program or deviations of the program, are communicated to the next depot at hand over to ensure a smooth execution of the program.

3.2.2. Field measurements

Field measurement shall be done as soon as possible and the duration shall depend on:

- The period required as offered by the contractor and accepted by TFR. Tenderers shall qualify tenders stating how much time is required for field measurements and when work can start after award of a contract
- The acceptance of TFR operations of the trolley / measurement vehicle program and track occupations.

- c) The requirement to re-run for any problem what so ever. (Occupation requirements, requiring clearance of track, vehicle failure problems, data collection or scanning problems etc.)

4.3 Data processing

- 4.3.1 Data processing must mostly be done parallel to field measurements.
- 4.3.2 Tenderers must also qualify time required for processing of data and presentation to TFR of data in both electronic formats
- 4.3.3 Data must be available in not more than one month after final run of field measurements

4.4 Data support / interpretation

- 4.4.1 Tenderers to qualify requirements for support required by TFR to interpret Data after TFR had been issued with data
- 4.4.2 Support may be required up to 6 months after the original handing over of data.

4.5 Probable as-and-when additional measurements

- 4.5.1 Contract may be left open for a period of up to 1 year to allow for TFR requests to assist with additional measurement runs.

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4. Lines required to be measured / scanned

Lines to be measured with GPR (Version 1 - Project 2011)

Priority A measurements

A	Depot / Line	Line Section	km length
A1.1	Coal line (line 1 & 2)	Brood - Ermelo - Richards bay No 1 (Via Dumbi dev)	510
A1.2		Brood - Ermelo - Richards bay No 2	500
A1.3		Blackhill -Broodsnyersplaas	69
A2.1	Richardsbay	Gollella - Richards bay	195
A2.2		North Coast: Rich Bay - Stanger	103
A3.1	Natal Main Line (1 & 2)	North Coast: Stanger Durban No 1 & 2 lines	162
A3.2		Union - Clavis - Durban No 1	705
A3.3		Rietvallei - Clavis - Durban No 2	692
A4.1	Isando	Skansdam - Rooivlei - Zesfontein	116
A4.2		Zesfontein - Katbos fontein - Lud	90
A4.3		Zesfontein - Delmas - Ogies 1 & 2	160
A4.4		Union - Vereeniging - Houtheuvel (Part 1& 2)	160
A5	Krugersdorp	Veertienstrome - Klerksdorp (Single line portion)	120
A6	Koedoespoort	Pyramid - Lud (Greenview) (12 km double)	38
A Total			3620

Priority B measurements

B	Depot / Line	Line Section	km length
B1.1	Coal line link lines	Ogies - Brood line 1 & 2	113
B1.2		Witbank - Ogies	60
B1.3		Brood - Hartbeesfontein	13
B1.4		Geluksplaas - Wonderfontein (Part of line)	40
B1.5		Ermelo Yard (Specific areas)	30
B1.6		Other Coal line links / deviations / loops / yard lines	40
B2.1	Isando	Union - Vereeniging - Houtheuvel (Outstanding lines)	100
B2.2		Houtheuvel - Potch	180
B2.3		Potch - Bloemhof - Veertienstrome (Double lines)	291
B3.1	Kimberley	Veertienstrome - Kimberley (Beaconsfld)	150
B3.3		Beaconsfield - De Aar	231
B3.5		Kamfersdam - Sishen (Selected sections)	100
B4.1	Koedoespoort (Witbank)	Greenview - Goedgeluk	232
B4.2		Goedgeluk - Nelspruit - Komatipoort	213
B4.3		Kaapmuiden - Hoedspruit - Phalaborwa	215
B4.4	Koedoespoort (Witbank)	Pyramid - Rustenburg	112
B Total			2120

5. Provided by TFR

5.1. Road /Rail vehicle for use by contractor.

An Isuzu double cab 2.5 D vehicle, equipped with High Rail equipment will be made available for use by the contractor for the duration of the contract. The following conditions shall apply for the use of this vehicle:

- 5.1.1. Vehicle is provided for the contract period free of charge to the contractor
- 5.1.2. The contractor shall submit a preliminary program, as required elsewhere, for the use of the vehicle with the tender. As soon as the preferred bidder is decided on by TFR and informed, detail arrangements for the moving of the vehicle will be made.
- 5.1.3. All consumables for the vehicle such as fuel, oils tyres must be provided by the contractor
- 5.1.4. The contractor shall be responsible for the control of the vehicle and the safekeeping of the vehicle and what ever equipment has been coupled to the vehicle for the GPR measurements. This shall include the security of the vehicle when ever parked.
- 5.1.5. The vehicle must be piloted on Track by the allocated TFR Track Inspector or pilot. The vehicle may under no circumstances move on to the track or move on track without the instruction of the TFR pilot.
- 5.1.6. Who ever drives / controls the RRV shall be responsible of ensuring compliance in terms of TFR RRV working rules. Rules applicable will be made available to the contractor when handing over the vehicle to the contractor.
- 5.1.7. The fuel required to run the vehicle must be arranged for and paid for by the contractor. The contractor shall also be responsible for any additional or special fuel delivery, where required.
- 5.1.8. Servicing or repair of the vehicle must be planned for ahead and be done by the Bidvest/ McCarthy, the owner of the vehicle from which TFR leases the vehicle.
- 5.1.9. Minor repairs such as tyre replacement, diesel filter replacement etc must be arranged for, with authority from Bidvest, by the contractor. The cost thereof shall be paid for by the contractor and be claimed for as an invoiced claim under the lump sum item allowed for in the pricing schedule.
- 5.1.10. The vehicle will normally be limited to a maximum speed of 60km per hour on track. An average of 50kmh should therefore be possible. The contractor can, for planning purposes, expect to normally not be able to travel for much more than 5-6 hours per day on track over an 8 hour day shift. The rest of the time may be required for waiting for trains and or authorisation to continue moving on track. The time on track will very from line to line.
- 5.1.11. Precautionary measures must be taken to regularly repair / improve signal detection brushes on the road / rail vehicles to ensure always properly being detected by signal controls when on track. Where detection is a problem, the vehicle will be required to vacate the track until proof can be provided that detection will be guaranteed.
- 5.1.12. When minor breakdowns are experienced with the vehicle, the contractor must immediately arrange for urgent repairs. Such repairs will be required to be approved by the owners of the vehicle, Bidvest/ McCarthy.
- 5.1.13. The vehicle's alternator & battery might not supply sufficient or constant power supply for the contractor to run the GPR antenna & all other equipment. The contractor may therefore either arrange for an alternative alternator or separate mobile power supply. This must be done at the cost of the contractor. Requirements and authority to arrange this must be informed by the contractor so as to arrange for permission from the vehicle owner for this.
- 5.1.14. Any other clarifications with regard to the use of the vehicle must be informed by the contractor. Should this affect the offer from the tenderer, this must be done before submission of the tender.

- 5.1.15. Any attachments on the vehicle such as the brackets for the antenna and any aerials for GPS equipment or attachments of video camera's shall conform to any track vehicle gauge limitations as specified in the general Technical Specifications (Old Spec E160 Technical)
- 5.1.16. Insurance against accident claim for the vehicle.
 - 5.1.16.1. The vehicle will be ensured against accident if a TFR employee drives the vehicle.
 - 5.1.16.2. Additional separate insurance may be required in for when the contractor drives the vehicle.
 - 5.1.16.3. Should this be required, the contractor shall be informed of this requirement before handing over the vehicle to the contractor.
 - 5.1.16.4. The contractor shall then arrange for this additional insurance and pay for this and claim the premium from TFR in terms of this cost, to be paid for as part of the lump sum item provided for unforeseen expenses.
 - 5.1.16.5. Any excess costs will be paid for by the contractor
- 5.1.17. Insurance and safeguarding of all equipment of the contractor remains the responsibility of the contractor, whatever the cause of damage or loss of equipment.

5.2. TFR Track Inspector / Pilot

- 5.2.1. TFR shall provide a Track Inspector to pilot the RRV vehicle for each depots sections.
- 5.2.2. Only the TFR authorised Track inspector shall under any circumstances be allowed to enter / occupy track with the RRV.
- 5.2.3. The contractor shall remain responsible for fuelling and control of the vehicle for safety and parking and moving from one section to the other.
- 5.2.4. The Track inspector shall, in coordination with the contractor, arrange for track occupations and ensure obtaining authority to enter onto the track.

6. Safety arrangements & training.

- 6.1. The contractor shall under all circumstances comply with the safety requirements as required by TFR for working on Track and as specified in the General Technical specifications. (Old E160 Technical)
- 6.2. The contractor shall also be required to at all times comply with any specific safety requirements as specified in the TFR Specification E7 for working close to an electrified line.
- 6.3. Access of the RRV shall be controlled by the TFR appointed pilot for each track section.
- 6.4. The necessary protective shoes and safety vest for high visibility shall be worn at all times when on close to the track
- 6.5. Security arrangements for the safekeeping of the vehicle at night and specifically for the safeguarding of the high value GPR antenna, laptops and any other gear shall be the responsibility of the contractor

7. General

- 7.1. The successful bidder shall be required to provide a surety of 5% of the value of the tender before the contract will be awarded
- 7.2. No escalation or rate adjustment shall apply for this contract. The rates tendered shall be fixed.
- 7.3. No adjustment of price for variation in rate of exchange shall apply for this contract either.

Ground Penetrating Radar (GPR) Measurements (Edit 1)

Pricing Instructions

1. General Conditions for Pricing and Payment

- 1.1. All payments shall be made in terms of the accepted schedule of prices and quantities, including any approved and accepted qualifications.
- 1.2. Tenderers shall qualify any deviations or additional requirements related to any offers made.
- 1.3. Tenderers shall preferably submit offers based on this schedule of quantities.
- 1.4. Alternative offers and or additional items may be submitted separately for consideration.
- 1.5. All offers and additional qualifications shall be evaluated and be considered for the adjudication of this tender.
- 1.6. At this stage it is intended to limit the value of this contract. The length of line to be measured shall therefore be limited or be increased to ensure compliance with this requirement. Tenderers shall however qualify how to interpret changes in the quantity for item 2.1.

2. Conditions for payment related to Schedule of Quantities and Prices.

2.1. Item 1: Establishment.

2.1.1. Item 1.1: Establishment for Measurements

- 2.1.1.1. All establishment costs to physically be able to conduct measurements shall be paid for under this item. This shall include for the importing of the GPR measurement antenna's and equipment, preparation of the RRV vehicle and any other fixed costs related the GPR measurements.
- 2.1.1.2. Payment of this item shall be made as follows:
 - 50% Payment shall only become payable once 50% of the GPR field measurements as per item 2.1 are done and the data is processed and presented and accepted as correct by TFR.
 - The balance of 50% shall become payable on completion of measurements, under same conditions as per the bullet above
- 2.1.1.3. No additional payment will apply for de-establishment.
- 2.1.1.4. No additional establishment payment shall apply should part of the quantity as per item 2.2 and or item 2.3 be approved or accepted to be done.
- 2.1.1.5. The full establishment cost shall still be payable if only part of the priority A workload is accepted and awarded.
- 2.1.1.6. Refer Item 2.4. A separate rate and conditions shall apply in the event that extra work is required at another date after completion of the original first project work. (Portion A and or any part added as the first portion of the project)

2.1.2. Item 1.2: Establishment for Data logging.

- 2.1.2.1. All hardware and software related costs and fixed costs related to incorporating data in the TFR IAMM system shall be included in this item. Tenderers shall clearly qualify what has been included in this item. Also refer clause 2 requirements of the Project specification of this contract.

2.1.3. Any later establishment for later measurements after completion of the first part of this contract that may be required by TFR shall be dealt with separately. Tenderers shall qualify terms if such

2.2. Item 2: Measurement of Track.

2.2.1. Item 2.1: Measurement of track Priority A sections: Payment will be made per km of track measured. Payment shall allow for all variable cost of measurement such as running costs and time related costs related to time taken to do physical measurements, including any additional transport and accommodation costs. Tenderers submit with their tenders any requirements with regard to the situations which may affect the rate allowed for this variable item, such as:

- a) Less or more km done than allowed for in the original planning. (Refer item
- b) Loss of time due to breakdown of RRV and no alternative vehicle being available or due to any fault for which TFR is responsible.
- c) Loss of time due to a requirement to return to re-measure due to occupation / track possession problems due to TFR.
- d) No additional time related cost shall be considered due to faulty measurements made by the contractor, requiring re – runs to re-measure.
- e) As per clause 1.6, quantities under this item may be reduced or increased so as to ensure compliance with clause 1.6

2.2.2. Item 2.2: Measurement of additional length of track added to that of Priority A sections: Payment will be made per km of track under the same conditions as per item 2.2 above. This item shall only apply should the quantity as per item 2.1 be exceeded. This is only a provisional item and will only become applicable if authorised by the Project Manager of the contract

2.2.3. Item 2.3: Measurement of track Priority B sections: Payment for any track under this item shall be made the same conditions as per item 2.2.

2.2.4. Time required to measure track and additional costs for longer time than planned for by contractor.

2.2.4.1. Tenderers must allow sufficient time for measurement of track. The costs related to the time required for the measurements in the field shall be paid for as part of the variable cost, paid for per km under item 2. This time allowed for shall be sufficient for:

- Time required for induction / planning of start of contract.
- Time for TFR to arrange for staff and programs to execute the measurement plan
- Time required to collect vehicle in PE
- Lost time to hand over from one depot to the other.
- Lost time due to occupations planned but not executed.
- Lost time for vehicle failure / service
- Lost time waiting on permission to enter onto track after stating a days shift.
- Time for travel to and from accommodation

2.2.4.2. Tenderers shall qualify how much time was allowed for, for field measurements and clearly indicate on what basis claims for additional cost, such as accommodation cost of contractor's staff, may be required.

2.2.4.3. If additional time is required and if the method to determine additional time is properly qualified in the tender and accepted, such additional costs may be approved and paid for by invoice as part of the lump sum amount allowed for.

2.3. Item 3: Data Processing.

2.3.1. Item 3.1: Processing of data, logging of data on IAMM and presentation of data to TFR.

2.3.1.1. Payment for this item shall be for the variable cost if applicable. (If required by tenderer). The item shall cover time related and quantity related cost required for the preparation and presentation of the data as specified in the project specification.

2.3.1.2. Payment of this item shall be made as follows:

- 50% Payment shall only become payable once 50% of the GPR field measurements as per item 2.1, 2.2 and or part of 2.3 done as part of the first stage of this project, are done and the data is processed and presented and accepted as correct by TFR.
- The balance of 50% shall become payable on completion of measurements, under same conditions as per the bullet above

2.4. Overtime and shift time.

Transnet shall arrange for the schedule of running line for the physical of measurements. Because of operational requirements and or conditions this may have to be done over longer hours than the normal 8 hour work day, 5 days per week.

Should tenderers require staff to be paid extra because of the Overtime working and or shift working this item is provided to cover the additional variable cost that contractors may require. Tenderers may either offer no quote under this item or use the item to cover the probable variable cost. The conditions applicable for payment shall only apply to the actual field measurement process and shall not apply to any other part of this contract.

2.4.1. Item 4.1 Overtime: Payment shall be made for Overtime for time worked in excess of 8 hours per day or Saturdays or extra work days, worked in excess of 5 out of seven work days per week or for days in excess of 10 work days out of 14 worked.

2.4.2. Item 4.2 Sunday time: Sunday time for time worked in excess of 8 h/day

2.4.3. Item 4.3 Shift time. Overtime: Shift time for Saturdays' within 8h/day if program requires shift working

2.4.4. Item 4.4 Shift time. Sunday time: Shift time for Sundays & PPH within 8h/day if program requires shift working

2.5. Provisional Lump Sum allowance for RRV vehicle and unforeseen costs.

2.5.1. The lump sum item is purely a provisional item and may only be used for payments approved by the Project Manager.

2.5.2. Any payment under the lump sum item shall be supported by a referenced site instruction and be substantiated by an approved / signed invoice.

2.5.3. The Lump sum is intended for support of cost experienced for the RRV for which the contractor is not liable, as well as other unforeseen items.-

3. Schedule of Quantities and prices (Edition 1)

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