A Division of Transnet Limited
Registration Number 1990/000900/06



# MAIN SPECIFICATION

## SUPPLY, INSTALLATION AND COMMISSIONING OF OPTICAL FIBRE CABLE ROUTE

## Vereeniging - Sybrand

## Request For Quotation
## January 2011

## Revision 1.00

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## I DOCUMENT AUTHORISATION

| FUNCTION | NAME | TITLE & DIVISION | SIGNATURE | DATE |
|---|---|---|---|---|
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## II DISTRIBUTION

Once updated, a copy of the latest revision will be published in the document management system in use. E-mail to this effect will be sent to the relevant personnel or heads of department.

## III DOCUMENT CHANGE HISTORY

| ISSUE NO. | DATE ISSUED | ISSUED BY | HISTORY DESCRIPTION |
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| 1.00 | January 2011 | Technical Execution | New document |

## IV CHANGES SINCE LAST REVISION

| CLAUSE | DESCRIPTION |
|---|---|
| None | None |

## V ABBREVIATIONS, ACRONYMS AND DEFINITIONS

| ABBREVIATIONS AND ACRONYMS | DESCRIPTION |
|---|---|
| **AC** | Alternating Current |
| **CSTA** | Corrugated Steel Tape Armoured |
| **BoQ** | Bill of Quantities |
| **DC** | Direct Current |
| **NOC** | National Operations Centre |
| **ODF** | Optical Distribution Frame |
| **OFC** | Optical Fibre Cable |
| **OHS** | Occupational Health and safety |
| **OHTE** | Over Head Traction Equipment |
| **PE** | Polyethylene |
| **QAD** | Quality Assurance Department |
| **RFQ** | Request For Quotation |
| **STP** | Standard Test Procedure |
| **TFR-T** | Transnet Freight Rail Telecoms |

# VI RELEVANT DOCUMENTATION

## APPLICABLE

### Specifications

| DOCUMENT NO. | DESCRIPTION | LOCATION |
|---|---|---|
| **SPC-00029** | Trenching, laying and hauling in of communication cables | Document Control Centre |
| **SPC-00033** | Specification for Optical Fibre Testing Equipment | Document Control Centre |
| **SPC-00568** | Specification for Optical Fibre Fusion Splicer | Document Control Centre |
| **SPC-00571** | Single Mode Fibres (for information only) | Document Control Centre |
| **SPC-00573** | OFC make-up (for information only) | Document Control Centre |
| **SPC-00575** | Specification for the Erection of Self-Supporting Optical Fibre Cable on traction Masts | Document Control Centre |
| **SPC-01203** | Specification for Optical Fibre Accessories | Document Control Centre |
| **SPC-00588** | Specification for OFC Ducts | Document Control Centre |
| **SPC-01242** | Specification for Wooden Poles | Document Control Centre |
| **SPC-01279** | Specification for Erection of Wooden Pole Routes | Document Control Centre |

### Standard Test Procedures

The following Standard Test Procedures must be considered to be embodied within this specification :

| | | |
|---|---|---|
| **PRC-00107** | Standard Test Procedure : Pre-Test quality of Optic Fibre Cable on Drums | Document Control Centre |
| **PRC-00106** | Standard Test procedure : Post-Installation Tests of Optic Fibre Cable | Document Control Centre |

### Work Procedures

The following Written Safe Work Procedure must be considered to be embodied within this Specification :

| | | |
|---|---|---|
| **PRC-00112** | Written Safe Work Procedure for the erection of self supporting Optical Fibre on AC OHTE (including all associated documents) | Document Control Centre |
| **SOP-0H00 (Provisional)** | Safe Work Procedure for working in confined spaces | Document Control Centre |

## 1. INTRODUCTION

1.1 TFR Telecom intends to extend the current Optical Fibre Cable network in Gauteng between Sybrand and Vereeniging. Therefore TFR is issuing this RFQ (Request for Quotation) for the installation of Aerial Optical Cables on Electrification Traction Masts, Aerial Optical Cables on Wooden Poles and some Underground Duct Optical Cable Installations in the section mentioned above.

1.2 This RFQ is issued for one contract for installation, splicing, termination and testing of single mode optical fibre cable in the following sections :

| SECTION | DISTANCE | TYPE |
|---|---|---|
| VEREENIGING - SYBRAND | 31 km | OHTE 3 kV DC and Pole Routes |
| **Total** | **31 km** | |

1.3 Completion of the Works is expected by 20 March 2011. TFR will free issue sufficient Optical Fibre Cable (as indicated on the BoQ) for work to commence during February 2011. All Labour, OFC suspension brackets, OFC Suspension hardware, Optical Accessories, general and miscellaneous materials must be supplied by the successful Contractor.

1.4 Most of the OFC installations are required overhead on electrification traction masts with 3 kV DC Traction Voltage (electrification). Additional pole routes, single poles, underground sections and installations into existing and new underground cable ducts are also required and called for in this RFQ.

1.5 Emphasis is placed on safety and safe working procedures and Contractors shall adhere to all instructions and procedures issued with this tender enquiry, especially the Written Safe Working Procedure PRC-00112 and all its associated documents as well as provisional SOP 0H00 for working in confined spaces.

1.6 The work must be planned to ensure minimal interruption to normal train services.

1.7 To expedite the tendering process, a Bill of Quantities (BoQ) is attached for the section. The BoQ is as accurate as can be established at this stage. Tenderers are required to quote in accordance with the BoQ. Before commencement of the installations, a detailed survey, re-measurement and adjustment of quantities at unit (quoted) prices will apply that will serve as a baseline for the Works. The detailed survey must be carried out by the contractor in conjunction with TFR.

1.8 Tenderers must specify their installation capacity, proficiency, and ability to carry out the work, keeping in mind the deadline required. TFR will award the contract at its own discression, in accordance with CIDB regulations.

## 2. SCOPE OF WORK

2.1 The project must be completed as a complete project with its own individual deliverables.

2.2 The 48-fibre single mode aerial OFC will be free issued by TFR-T. The OFC supplied will be “fit for purpose” for the respective sections.

2.3 The OFC cables are currently stored at Sentrarand. Tenderers must allow for transport of the OFC to the site of work. If any of the OFC drums must be re-drummed, a unit cost per drum must be indicated in the Quotation.

2.4 All other OFC "short lead" installation and miscellaneous materials i.e., OFC accessories, cable support brackets, ducts, protection blocks, cable markers, building entry hardware, etc. must be supplied by the successful Contractor.

2.5 The following optical fibre cable accessories must be supplied by the successful Contractor. These will include splice protectors, joint closures with organisers, 19" optical distribution cabinets and 19" ODF subracks, mid-couplers, pigtails, patch leads and optical connectors. For quality purposes these accessories will be specified by TFR-T :

2.5.1 Splice protectors (TIS)

2.5.2 Joint closures with organisers (Aerial) (TIS)

2.5.3 Joint closures with organisers (Underground Chambers) (TIS)

2.5.4 19” Optical termination subracks (TIS)

2.5.5 Mid-couplers, pigtails, patch leads, optical connectors (DARTCOM)

2.5.6 19" ODF cabinets (if specified) (AFRAC)

2.6 All other consumable installation materials i.e. Unistrut, Warning tapes, Sista Foam, Rawl bolts, nuts, concrete, straps, cable ties, etc. must be included and supplied by the Contractor as consumables. A provision for consumables is made in the BoQ.

2.7 The Contractor, in conjunction with the TFR-T Project Manager or Supervisor and the Electrical Officer must carry out a detailed survey before commencing with installation. A revised BoQ must be submitted on completion of the detailed survey. The detailed survey must be completed within one calendar week from notification of acceptance of quotation.

2.8 Sign-off of the re-survey by the Electrical Officer and TFRT Project Manager is required before installation commences. On-site deviations from the agreed survey will only be allowed with the consent and instruction by both parties above.

2.9 Final "As Build" sheets must be submitted on completion of the work, within one month from the Notice of Completion Certificate issued by TFR-T.

2.10 The successful tenderer will be responsible for the transportation of the cable and materials from the storage depot at Sentrarand, direct to the various sites of work. The Contractor must ensure that the correct materials and quantities allocated for a specific section is taken out to site and accept full responsibility for such materials once it has been removed from storage.

2.11 Tenderers must note that the OFC drums have been pre-transported to the storage depot and all OFC drums must be pre-tested in accordance with PRC-00107 before these are taken out for installation. Caution must be exercised in OFC transportation to site. Full responsibility is placed on the Contractor for the safe transportation of the drums "to site".

2.12 The optical fibre cable is supplied on wooden drums in lengths of 4000 metres plus additional 50 metres per drum for testing and cut back.

2.13 Tenderers must state their experience in the installation, splicing and testing of self-supporting optical fibre cables on OHTE, Wooden pole routes and UG Duct installations as well as the provision of quality installations. The Tenderer's response to this requirement will be a deciding factor during the adjudication of the tender.

2.14 Portions of the 3 kV DC electrification mast installations also entail the erection of short wooden pole routes or single poles and the suspension of the OFC on these poles. In this regard strict adherence to the requirements of the Electrical Officer is required.

2.15 Wooden poles must be supported by stays and struts and where necessary the poles must be concreted in position. Poles must be erected vertically.

2.16 OHTE installation, wooden pole routes and underground installations must comply with TFR-T Specifications. Tenderers must state their expertise in this area of construction and provide a reference list of OHTE, wooden pole and underground routes successfully completed.

2.17 Other portions of the work will also entail civil construction works like hand trenching, sub ducting, backfilling and compaction, constructing pipe and draw-pit systems, track pipe crossings, bush clearing, tree felling, etc. Tenderers must state their expertise in this area of civil construction and provide a reference list of works successfully completed.

2.18 All underground OFC must be placed in 32 mm OFC specific sub-duct and where the duct is directly buried, indicated by means of marker tape above the sub-duct and cable markers as per the appropriate specification. The preferred method of installing underground OFC in ducts is by “blowing in” the OFC.

## 3. TENDER REQUIREMENTS

3.1 Only Tenderers registered with the CIDB (Construction Industry Development Board) will be eligible for this RFT. A CIDB rating of at least 4EE will be required. CIDB Certificates must be presented with quotations.

3.2 Tenders will be adjudicated as per method 4 of the CIDB.

**3.3** NB: **A clause-by-clause statement of compliance is required for this and all embodied specifications. Specifications marked "for information only" shall be "noted as read".**

3.4 Tenderers must quote for all aspects of the work and materials as per this RFQ, Specification and BoQ. If certain work or materials are not quoted for, this must be clearly stated and shown separately.

3.5 Tenderers must quote separately for alternative items or changes they may recommend.

3.6 Due to the short time constraint, Tenderers must state their expertise in projects completed exactly similar to the Works described in this specification and must submit a reference list. Tenderers must have the necessary certificated persons and the correct installation tools to complete this work. The tenderer's response to this requirement will be a deciding factor during the adjudication of this RFQ.

3.7 Tenderers must allow and include overtime and week-end work.

3.8 The successful Contractor must supply "as built" information (based on revision of the survey sheets) on completion of the Works. As build documentation must include GPS co-ordinates of all joints, slack, crossing places and other important events.

3.9 Should the cost of certain material items offered be excessive in TFRT's opinion, TFRT reserve the right to supply any of the material quoted for, free of charge.

3.10 Tenderers must familiarise themselves with the requirements stipulated in the RFQ Document as well as all other documents, annexures and specifications referred to in the RFQ Document and this specification.

3.11 Any item or requirement that is not clear to the tenderer must be clarified with the TFR-T Project Manager before submission of tenders.

3.12 The material and labour to be supplied by the Contractor must be derived from the BoQ (Annexure A). TFR-T's BoQ format must be used to supply this information. Soft copies in Excel format will be provided.

3.13 Any materials, installation and other items excluded from the BoQs, but required to complete the installations in the Tenderer's opinion must be shown separately in the RFQ Response.

## 4. SPECIFICATIONS

4.1 All materials and installations must comply with the incorporated specifications. These specifications must be considered to be embodied as part of this specification.

## 5. Clause-by-clause statements of compliance, where applicable, are mandatory for Specifications, Standard Test Procedures and Work Procedures indicated under section VI.

5.1 The following drawings must be considered to be embodied within this specification :

5.1.1 Bracket drawings (Annexure C).

5.1.2 All drawings referred to in Specifications above.

5.1.3 All annexures to this specification:

- Annexure A – Bill of Quantities.

## 6. INSTALLATIONS

6.1 The **CBI 48-fibre, ADSS,** aerial self-supporting optical fibre cable parameters are as follows :

6.1.1 Mass of cable : 115 kg/km .

6.1.2 Installation tensile force not to be exceeded: 1,4 kN .

6.1.3 Outside diameter: 12,0 mm .

6.1.4 Minimum bending radius : 145 mm .

6.1.5 Nominal delivery length : 4 000 m .

6.2 The Laserfab remote installation bracket must be used. The brackets must be hot dipped galvanised to SANS 121 or similarly protected against corrosion. All PLP fittings shall be of the “allu-clad” type.

6.3 The "Remote" AC cable installation technique must be used. The climbing of masts on DC sections is prohibited for Safety reasons, except where the required clearances can be obtained. It must be kept in mind that maintenance will be carried out remotely under “live” conditions.

6.4 Certain work could be carried out in confined spaces (manholes) and special precaution must be taken for the safety of workers (see SOP "working in confined spaces).

6.5 Tenderers must take specific note of the safety aspects as depicted in Written Safe Work Procedure PRC-00112 as well as the safety arrangements and instructions attached thereto and procedural compliance with the Occupational Health and Safety Act; Act 85 of 1993 and regulations. A Statement of Compliance must be submitted for WSWP PRC-00112.

6.6 An Occupational Health and Safety Plan must be submitted to the Project Manager by the successful contractor. The Safety Plan must also be placed on the Contractor's Site Safety File. The minimum safety clearances from live electrical conductors and Safety Instructions and Guidelines must be observed at all times.

6.7 Sufficient Certificated employees to work on OHTE structures must be in the Contractors employment during construction works. The names of Certificated employees must be provided with the RFQ.

6.8 The Contractor must be equipped with all the required plant, tools, safety equipment and PPE (Personal Protective Equipment) to effectively and safely carry out the Works.

6.9 Where electrical and track occupations are required, these must be arranged by the Contractor with the TFR-T Supervisor and Electrical Officer. Overtime and weekend work will be required depending on the occupations program.

6.10 Maximum benefit must be gained from normal electrical and track occupations requested by other departments. It is therefore imperative that the TFR-T Supervisor and Contractor's Supervisor attend the regular "occupation" meetings arranged by Train Operations.

6.11 Contractors must note that TFR-T will utilize one TFR-T supervisor / inspector at any time during the contract period to inspect the progress and quality of the Contractor's work. This person is not available on a full time basis on site and will make scheduled and random site visits.

6.12 The successful Contractor must appoint a Site Supervisor for the duration of the contract. The Site Supervisor must be on site for the full duration of the contract.

6.13 TFR-T will provide the Contractor's site supervisor with a site diary and site instruction book. These books must be kept updated at all times and copies handed over to the TFR-T Project Manager at progress meetings

6.14 Contractors must take note that Freight Rail must approve and supervise all underground and overhead (boom) rail crossings.

## 7. PRE-TESTING, SPLICING AND TERMINATION

### 7.1 Drum Testing

Tenderers are required to submit pricing for the OFC drum tests in compliance with TFR Standard Test Procedure No. PRC-00107.

7.1.1 Splicing, termination and post-installation testing must be included by tenderers for the Works.

7.1.2 Terminations must be done by the Contractor at those buildings indicated on Annexure B. Tenderers must note that these buildings may be some distance away from the railway lines.

7.1.3 The Contractor must determine the exact location of the termination panels in the respective buildings when leaving slack inside the building for later termination.

7.1.4 All OFC drum test values must be presented to TFR-T Quality Assurance Department in .trc format immediately on completion of testing and must not be held back unnecessarily as the capacity to analyse the traces by QAD is limited.

7.1.5 Sufficient slack in the backbone cable, for future express jointing and splicing, must be left at stations, relay rooms, sub stations and other wayside buildings as determined during the detailed surveys.

### 7.2 Post Installation Testing

Post installation testing must be included in the quotation and will be carried out at the 1550 nm wavelength in compliance with TFR Standard Test Procedure No. PRC-00106. Therefore emphasis is placed on the correct installation techniques to enable TFR-T to obtain the results required.

## 8. FINAL TESTING AND COMMISSIONING

8.1 The Contractor will be responsible for the testing of all installations and this must be allowed for by tenderers.

## 9. INSPECTION AND ACCEPTANCE

9.1 The Site Supervisor and the Project Manager will carry out progress, quality and safety inspections at random during the duration of the Works.

9.2 Quality Assurance, the Project Manager, Project Supervisor and the Contractor must jointly carry out final acceptance. The Contractor must advise the Project Manager one (1) week in advance that the work is ready for inspection / acceptance.

9.3 Outstanding observations and small defects (snags), not affecting system functionality, as indicated by the Project Manager at the final inspection, must be corrected by the Contractor within one month of acceptance (Acceptance = the issue of a Notice of Completion Certificate).

9.4 The Project Manager will issue a "Notice of Completion" certificate at his own discretion on completion of the Works or on pre-determined functional sections of the Works.

End of specification

**ANNEXURE A**

**BILL OF QUANTITIES FOR THE SECTION :**

**VEREENIGING - SYBRAND**

**ATTACHED**