

RFP for the PRASA Train Control System (“PTCS”) Phase 1 through the Restoration, Verification, Testing, and Commissioning of the existing Original Equipment Manufacturer (“OEM”) electronic signalling interlocking system in PRASA’s Western Cape (“WC”) service region.



prasa
PASSENGER RAIL AGENCY
OF SOUTH AFRICA

Annexure 1.2:
General Technical Requirements
Telecommunications

RFP for the PRASA Train Control System (“PTCS”) Phase 1 through the Restoration, Verification, Testing, and Commissioning of the existing Original Equipment Manufacturer (“OEM”) electronic signalling interlocking system in PRASA’s Western Cape (“WC”) service region.



RFP for the PRASA Train Control System (“PTCS”) Phase 1 through the Restoration, Verification, Testing, and Commissioning of the existing Original Equipment Manufacturer (“OEM”) electronic signalling interlocking system in PRASA’s Western Cape (“WC”) service region.



Contents

1	GENERAL	4
1.1	Purpose of the Document	4
1.2	Executive Overview	4
2	MINIMUM SYSTEM REQUIREMENTS.....	5
2.1	Telecommunications System (“TS”) Overview.....	5
2.2	Fibre Transmission Network.....	6
2.3	Optic Fibre Cables	6
2.4	Patch panels.....	9
2.5	Protection at Equipment Rooms.....	9
3	CONSTRUCTION	10
3.1	General	10
4	TESTING AND COMMISSIONING	11
4.1	Factory Acceptance Testing (“FAT”).....	11
4.2	Site Acceptance Testing (“SAT”).....	12
4.3	Final Testing and Commissioning.....	13
5	DECOMMISSIONING, DISMANTLING AND REMOVAL	14
6	WARRANTIES	15

1 GENERAL

1.1 Purpose of the Document

- 1.1.1 The purpose of this document is to provide the General Technical Requirements (“GTR”) which form part of the minimum Requirements of the Passenger Rail Agency of South Africa (“PRASA”) for the enablement of the Prasa Train Control System (“PTCS”) Phase 1 through the restoration, verification, testing, and commissioning of the existing original equipment manufacturer (“OEM”) electronic signalling interlocking system in PRASA’s Western Cape (“WC”) service region (“the Project”) that the Bidder shall meet and deliver at the Bidder’s cost therefore within the Bid Price.

1.2 Executive Overview

- 1.2.1 Notwithstanding any other PRASA Requirements stated throughout the RFP, the Bidder shall uncompromisingly deliver the whole of the Works required to achieve successful delivery of the Project.
- 1.2.2 The Telecommunications Component of the Works, in this Phase 1 of the enabling of the PRASA PTCS, is at a minimum, summarised as follows:
- a) Install / Replace, where required, the Underground Signalling Fibre Cable (OFC 2) to enable a fully functional RSS.
 - b) Install / Replace, where required the Telecommunication Aerial Optic Fibre Cable (OFC 1) to enable a fully functional RSS, Transmission and Telephone System for operational applications.
 - c) Replace and restore the Telecommunication System at the Maitland AR to its full original functionality.

2 MINIMUM SYSTEM REQUIREMENTS

2.1 Telecommunications System (“TS”) Overview

2.1.1 The Telecommunications System (“TS”) shall, at a minimum, consist of the following elements:

- a) For Annexures PTR 2.1, PTR 2.2, PTR 2.3 and PTR 2.4 work packages:
 - Optic Fibre Cabling as required for the RSS, Transmission and Telephone Systems for Operational Applications
- b) For Annexure PTR 2.5 work package:
 - Optic Fibre Cabling as required for the RSS, Transmission and Telephone Systems for Operational Applications
 - Optic Transmission System as required by the RSS
- c) Any other Telecommunication Works, activities and resources required to restore and implement a fully, functional, complete original equipment manufacturer (“OEM”) Telecommunication System and associated sub-systems as requested throughout the RFP or as otherwise instructed in writing by PRASA

2.1.2 The TS shall, at a minimum, comply with all relevant Standards, Specifications, Regulations and Procedures as specified throughout the RFP.

2.1.3 The Bidder shall implement all necessary measures to protect the newly installed restored Telecommunications Fibre cabling against at least the following threats:

- a) Theft and vandalism.
- b) Continues exposure to extreme direct sunlight and elevated temperatures.
- c) Incoming high voltages, spikes, Electromagnetic Compatibility (“EMC”) and fluctuating voltages.
- d) Intermittent flash flooding in low laying areas.
- e) Severe thunderstorms with extreme heavy lightning.

2.1.4 Reliability:

- a) The Bidder shall restore the original designed predicted mean time to failure, for which all relevant information is to be provided.

2.1.5 Equipment life cycle:

- a) The newly installed equipment shall be capable of complying with this standard including performing its intended purpose for a minimum period of 20 years from the date of Supply.

b) The supplier shall verify during restoration and advise PRASA of the following:

- The date at which the product was released for sale
- The anticipated date at which the product shall be withdrawn from sale, but support shall continue to be supplied
- The anticipated date that product support shall be withdrawn, i.e. Spares shall no longer be available and technical support is no longer provided

2.1.6 Racks and Clearances

a) All Telecommunications Fibre Cables to be installed, shall be mounted in existing inside racks on rails and in the newly installed racks and rails as per the original design documentation under work package in Annexure PTR 2.5.

2.2 Fibre Transmission Network

2.2.1 For Annexures PTR 2.1, PTR 2.2, PTR 2.3 and PTR 2.4 work packages:

- Restore the Railway Telecommunication Backbone as per approved or As-Built Drawings with the original intended functionality

2.2.2 For Annexure PTR 2.5 work package:

- Restore the Railway Telecommunication Backbone as per approved or As-Built Drawings with the original intended functionality
- The Fibre transmission System to be restored or installed shall be restored with compatible products suitable for at least the RSS, telephone Systems, intruder alarm and access control Systems
- The Transmission Network is the complete communication path, which transfers message streams between two applications, including transmission mediums, Equipment, technologies, interfaces and any other items, which contribute to communication

2.2.3 Any other Telecommunication Works, activities and resources required to restore and implement a fully, functional, complete original equipment manufacturer (“OEM”) Telecommunication System and associated sub-systems as requested throughout the RFP or as otherwise instructed in writing by PRASA.

2.3 Optic Fibre Cables

2.3.1 The Optic Fibre Cable shall be installed as per signalling scope of work and according to signalling as-built drawings provided.

- 2.3.2 The Optic Fibre Cabling, to be installed, shall, at a minimum, consist of the following elements:
- a) Optic Fibre Cable, buried, encased in concrete, in the signalling cable trench, as per the attached Installation Method Statement.
 - b) Manholes.
 - c) Dome Joints.
 - d) Patch Panels
- 2.3.3 The single mode OFC cable shall comply with the ITU-T G.652.D standard and the following attributes shall be used:
- a) Double Jacket.
 - b) Corrugated Steel Tape Armoring for underground installations.
- 2.3.4 The single mode optical cable shall provide protection to:
- a) Strain from both cable tension and bending.
 - b) Crush and impact both during installation and operational life.
 - c) Hydrogen gas generated by the presence of moisture and metallic elements.
 - d) Moisture permeation.
 - e) Water penetration.
 - f) Lightning damage.
 - g) Biological attacks.
 - h) Biotic damage.
 - i) Vibrations from railways.
 - j) South African temperature variations.
 - k) Chemical attack.
 - l) Mechanical aggression.
- 2.3.5 A minimum length of 5 metres from each end shall be implemented when splicing takes place inside the manhole.
- 2.3.6 A minimum length of 10 metres shall be achieved when splicing takes place outside the manhole.
- 2.3.7 Inside the manhole, the splice box shall be fixed directly on the wall or using an appropriate support, depending on the box design.
- 2.3.8 The installed manhole shall be:
- a) Corrosion resistant.

- b) UV resistant.
- c) Slack management mechanism.
- d) Impact resistant.
- e) PRASA branded with a PRASA LOGO.

2.3.9 The installed restored fibre cable shall comply with the following latest standard specifications:

- a) ITU-T G.651.1 – Characteristics of a 50/125 µm multimode graded index optical fibre cable for the optical access Network.
- b) ITU-T G.652 [6.0] – Characteristics of a zero-dispersion single-mode optical fibre and cable
- c) ITU-T G.653 – Characteristics of a dispersion-shifted, single-mode optical fibre and cable.
- d) ITU-T G.654 [11.0] – Characteristics of a cut-off shifted single-mode optical fibre and cable
- e) ITU-T G.655 – Characteristics of a cut-off shifted single-mode optical fibre and cable.
- f) ITU-T G.657 – Characteristics of a bending-loss insensitive single-mode optical fibre and cable.

2.3.10 The fibre optic cable splicing procedure shall be accordance with the ITU-T standard L.12 – Optical fibre splices.

2.3.11 All splicing shall be Electric arc-fusion method to make reliable optical splices using specially developed splicing machines.

2.3.12 The Aerial Fibre Cable and installation must comply, but not limited to, the following:

- a) To be installed on the same route where the existing aerial fibre cable (OFC 1) is mounted. The existing OFC 1 will remain in operation and will only be decommissioned and removed at a later stage by PRASA.
- b) The aerial fibre cable to be terminated in dome joints at each drop-off point along the route, ie ticket offices, according to the Regional OFC 1 link plan design.
- c) The cable short span is a compact loose tube aerial self-supporting cable specifically designed for installation on railway traction masts and wooden pole routes with spans up to 100m.
- d) The cable must meet the stringent mechanical performance and installation methods of aerial cables as stipulated in the “*Specifications for the trenching of optical fibre cable, erection of self-supporting optical fibre cable on traction*”

masts, optical fibre accessories, for installations in the PRASA environment”

2.4 Patch panels

- 2.4.1 The Bidder shall at a minimum, restore the size patch panels in the Equipment/Apparatus Rooms as were originally installed during the Re-Signalling Project, if required.
- 2.4.2 The Bidder shall terminate and/or patch through all cores in a specific tube going to a specific Equipment Room.

2.5 Protection at Equipment Rooms

- 2.5.1 Restore and implement access control and intruder alarm Systems at the Signal Equipment Rooms that complies with PRASA requirements.

RFP for the PRASA Train Control System (“PTCS”) Phase 1 through the Restoration, Verification, Testing, and Commissioning of the existing Original Equipment Manufacturer (“OEM”) electronic signalling interlocking system in PRASA’s Western Cape (“WC”) service region.



3 CONSTRUCTION

3.1 General

- 3.1.1 The Telecommunication Construction work shall comply with all relevant Standards, Specifications, Regulations and Procedures as specified throughout the RFP.
- 3.1.2 The Bidder shall submit installation method statements for all Telecommunications Construction work to be performed to PRASA for review and approval before commencement of the work.
- 3.1.3 All Construction work on or near the railway line shall be performed under Occupation-between-trains (“OBT”) or Total Occupation conditions.

4 TESTING AND COMMISSIONING

4.1 Factory Acceptance Testing (“FAT”)

- 4.1.1 Each System shall be fully assembled and configured for factory Testing prior to dispatch.
- 4.1.2 The System shall be supplied defect free.
- 4.1.3 Defects found during site Commissioning and within the warranty period shall result in the part(s) concerned being returned to the Bidder for immediate correction/replacement at the cost of the supplier.
- 4.1.4 All relevant Telecommunications Systems, sub-Systems and Equipment shall undergo and pass a FAT before shipping to site.
- 4.1.5 The Bidder shall be responsible for all FAT.
- 4.1.6 All FAT shall be conducted at factory(s) at which the Plant and Materials are manufactured and assembled and by a Telecommunications Engineer or technologist, registered with the Engineering Council of South Africa (“ECSA”) as a professional Engineer or professional technologist and who has undergone training for the specific System, sub-System or Equipment and have experience in multiple FAT.
- 4.1.7 The person(s) responsible for the FAT shall not have been involved in any Design activities relating to the System, sub-System or Equipment to be tested.
- 4.1.8 The Bidder shall submit a FAT Method Statement to PRASA for acceptance before any FAT commences. The Method Statement shall clearly indicate:
- a) All Systems, sub-Systems and Equipment that shall be included in the FAT and which shall be omitted.
 - b) Specification against which the FAT shall be conducted.
 - c) Method of conducting the FAT for each System, sub-System and Equipment.
 - d) Details, including experience reports, of people which shall be conducting the FAT.
- 4.1.9 All FAT shall include but not be limited to:
- a) Point to point wiring check for impedance and continuity.
 - b) Serial numbers of all cards and modules shall be listed in an Excel spreadsheet.
 - c) Confirmation of all modules from the field terminal through to the diagnostic laptop.
 - d) Confirmation of control functions from the diagnostic laptop to the field terminals including exercising the dummy circuit breaker and the controls isolate switch.
 - e) Confirmation of effective communications between the Systems and other devices using the specified protocols

f) All powered Tests shall be carried out at the specified power Supply rating of the System

4.1.10 The Bidder shall invite PRASA to all FAT taking place at least 21 working days prior to commencing of the FAT. Should PRASA not be able to attend, PRASA shall give the Bidder permission to continue or request the dates for the FAT to be changed. PRASA shall not be held liable for any delays caused by this unavailability.

4.1.11 The Bidder shall submit all duly signed FAT certificates and associated Test sheet(s) to PRASA for information purposes, prior to Commissioning.

4.1.12 Test results for each System showing Tests undertaken, results and any corrective action taken shall be provided in an approved format and shipped with the System.

4.1.13 Colour photographs shall be included in the Test results to record the Equipment layout.

4.1.14 PRASA accepts no accountability nor liability for any FAT conducted, despite any checks done or inputs given by any of PRASA's agents.

4.2 Site Acceptance Testing (“SAT”)

4.2.1 All relevant Telecommunications Systems, sub-Systems and Equipment, shall undergo and pass SAT before Commissioning.

4.2.2 The Bidder shall be responsible for SAT.

4.2.3 The SAT shall be conducted by a Telecommunications Engineer or technologist, registered with the Engineering Council of South Africa (“ECSA”) as a professional Engineer or professional technologist and who has undergone training for the specific System, sub-System or Equipment and have experience in SAT.

4.2.4 The Bidder shall submit a SAT Method Statement to PRASA for acceptance before any SAT commences. The Method Statement shall clearly indicate:

a) All Systems, sub-Systems and Equipment shall be included in the SAT and which shall be omitted.

b) Specification against which the SAT shall be conducted.

c) Method of conducting the SAT for each System, sub-System and Equipment.

d) Details, including experience reports, of people which shall be conducting the SAT.

4.2.5 Where practical, all SAT shall be done under OBT conditions, prior to the final Testing and Commissioning Occupation.

4.2.6 The Bidder shall invite PRASA to all SAT taking place at least 21 working days prior to commencing of the SAT. Should PRASA not be able to attend, PRASA shall give the Bidder permission to continue or request the dates for the SAT to be changed. PRASA shall not be held liable for any delays caused by this unavailability.

4.2.7 The Bidder shall submit all duly signed SAT certificates and associated Test sheet(s)

RFP for the PRASA Train Control System (“PTCS”) Phase 1 through the Restoration, Verification, Testing, and Commissioning of the existing Original Equipment Manufacturer (“OEM”) electronic signalling interlocking system in PRASA’s Western Cape (“WC”) service region.



to PRASA for information purposes, prior to Commissioning.

- 4.2.8 The PRASA accepts no accountability nor liability for any SAT conducted, despite any checks done or inputs given by any of PRASA's agents.

4.3 Final Testing and Commissioning

- 4.3.1 Final Testing and Commissioning shall be done by a PRASA approved Test and Commissioning Engineer provided by the Bidder.
- 4.3.2 Once the Bidder is convinced the Bidder shall be ready for Final Testing and Commissioning, he shall agree with PRASA on a suitable date for the activity, at least 15 working days prior to proposed date.
- 4.3.3 The Bidder shall submit a comprehensive Final Testing and Commissioning Method Statement to PRASA for approval before any Commissioning commence.
- 4.3.4 The Bidder shall be responsible to provide a complete Testing and Commissioning team as per the Method Statement, as well as all Tools and Equipment required for introducing, Testing and Commissioning of the System.
- 4.3.5 The members of the Bidder’s Testing team shall have not been involved in any Design, FAT or SAT activities relating to the System, sub-System or Equipment for which that member is responsible during the final Testing and Commissioning.

5 DECOMMISSIONING, DISMANTLING AND REMOVAL

5.1 General

5.1.1 The Bidder shall, at a minimum, ensure that:

- a) The Decommissioning, dismantling and removal shall comply with all relevant Standards, Specifications, Regulations and Procedures as specified throughout the RFP.
- b) The Bidder shall be responsible for the Decommissioning, dismantling and removal of all old Telecommunications Equipment.
- c) The Bidder shall remove all redundant Fibre Optic communication cable which will be identified by PRASA.
- d) All redundant buried Fibre communication cable may be abandoned.
- e) The Bidder shall submit a Method Statement for the Decommissioning, dismantling and removal of all Equipment to PRASA for approval before commencing any work.
- f) The Bidder shall dispose of the Equipment according to the process described throughout the RFP.
- g) The Bidder shall complete the Decommissioning and removal of visible Fibre communication cable within 14 calendar days after the Commissioning of any Section.
- h) The Bidder shall complete the Decommissioning, dismantling and removal of outdoor and Indoor Equipment no later than 14 calendar days after the Commissioning of any Section.

6 WARRANTIES

6.1 General

6.1.1 The Bidder shall, take interim Warranty responsibility and liability for each Section of Fibre cabling that has been tested, commissioned and handed over to PRASA from the date of interim hand for a period of 365 calendar days.

- a) Warranties shall, for all Fibre Optic cable and related Telecommunications Works, at a minimum, be valid and cover:
 - Replacement of all faulty Fibre Cable and peripheral Equipment, Components and labour.
 - Tracking and tracing and correcting of any faults
- b) Failures caused by the environmental and infrastructure conditions as specified throughout the RFP including, but not limited to:
 - Any Equipment or Components damaged due to exposure to extreme direct sunlight and elevated temperatures
 - Any Equipment or Components damaged due to continuous exposure to high humidity
 - Any Equipment or Component failure due to corrosion