Annexure D - Scope of work for RFI - Electronic Onboard Train Authorisation System

GENERAL CONDITIONS

1.1. Respondents are required to indicate the life cycle and maintenance requirements per proposed technology e.g. , Half-life upgrades, validity of safety cases or safety certification, inspection or testing frequency, local or international repairs, etc.;

1.2. Respondents are required to indicate all requirements concerning software licensing and maintenance of the technology e.g. skill and qualification level of maintainers, special tools and equipment, spares holding recommended, spares turnaround time, etc.;

1.3. Respondents are required to submit B-BBEE certificate and/or Sworn Affidavit just for information purposes as this will enable Transnet to determine the B-BBEE status of the relevant role-players in the market, with a view to a possible subsequent RFP process. B-BBEE will not form part of this RFI /EOI process;

1.4. Respondents are required to supply any additional information related to technologies which are currently not part of this RFI but which is deemed to be beneficial to Transnet;

1.5. Respondents are required to propose solutions which will meet Transnet requirements, although the proposed equipment may have multiple functionalities, which exceed Transnet's requirements;

1.6. Respondents are required:

1.6.1. To indicate the time period of their business' involvement in the train authorisation and control environment;

1.6.2. To indicate the time period of their business' involvement in the supply of railway equipment and/or services;

1.6.3. To indicate whether the respondent is a current respondent to Transnet;

1.6.4. To indicate the duration that the organisation in business;

1.6.5. To indicate whether the respondent's organisation is a local or foreign concern, and if foreign, the likelihood of establishing local business representation;

1.6.6. To indicate whether the solutions proposed are the intellectual property (IP) of the respondent, and if not, what are the legal IP ownership arrangements between the respondent and the manufacturer(s);

1.6.7. To indicate his/her organisation's five top train control-related projects over the last ten (10) years;

1.6.8. To supply credible information and statistics of the engineering performance of the proposed system for the five projects since commissioning, including;

- All dangerous or wrong-side failures (which may or may not have resulted in an accident);
- All safety incidents related to derailments over points or collisions with other rolling stock;
- The railway organisation and country where incidents have occurred, and to explain why the system did not prevent the occurrence;
- The proven reliability of the system; and
- Typical Mean-Time-To-Repair (MTTR).

1.7. To submit a brochure or information pack where possible of the system that they wish TFR to review and consider. The brochure should include but is not limited to:

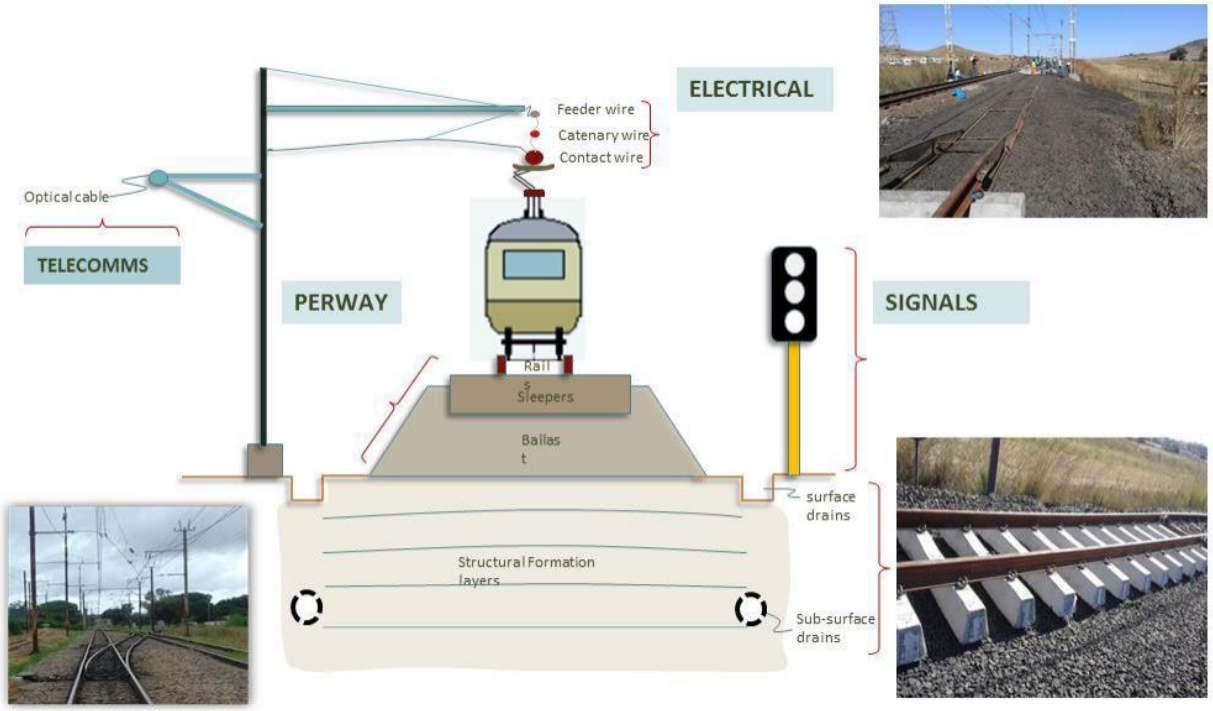
- Dimensions of the equipment
- Operating specifications
- Environmental operating conditions
- Safety certification of equipment
- Approach to the development of the safety case for the full system

1.8. Any environmental or safety features required of the goods;

- Packaging, marking and labelling requirements; (not applicable)
- Details of inspection or testing requirements, including performance parameters;
- Any documentation required e.g. manuals, user guides, licences, test certificates.

1.9. Transnet seeks a solution that will be compatible to existing and planned Transnet infrastructure using existing employees. The graphic below depicts TFR infrastructure in different areas.

TRANSNET



TECHNICAL SPECIFICATION

INTRODUCTION

Transnet Freight Rail wishes to improve the safety, availability and reliability of its operations over its railway network, and to do so requires an affordable and reliable train control system that uses minimal trackside equipment. The system shall have low susceptibility to vandalism and theft noting that ideal placement of equipment away from human settlements or access roads, amongst others, is not guaranteed.

Responsive and affordable local support for the equipment over its life cycle is required.

The system shall support both automated, mechanically trailable points, and hand-operated point machines, as well as runaway points, runaway blades or derailers.

Although fail-safety is considered integral to the system, where possible, the system shall support graceful degradation whereby part of the system remains available rather than full system failure.

SCOPE

The scope of this procurement event is to gather information on cab-based train control systems that may be used as a primary train control system in TFR, in addition to, or to replace track warrant and colour light signalling systems. Where the system of concern has functionality beyond the issuing of electronic train movement authorisations, warrants or train orders, and includes enforcement to the spatial limits of the movement authorisations. The system of concern shall include the protection of staged wagons at crossing places and yards, protection of on-track maintenance machines and personnel, and protecting against unauthorised train movements or runaway rolling stock.

The respondent should indicate the following:

- Is the system suited to multiple line operation (double or more tracks in parallel), and has it been implemented as such in one or more revenue-generating railway organisations. If this is not the case, the respondent shall clearly define the limitations of the system to support multi-track operations. Where the system is specifically suited to single line operations, the respondent shall clearly indicate so and indicate where the system has been deployed in revenue-generating railway service.

- The respondent shall indicate whether the system enforces permanent and temporary speed limits, as well as train-specific speed limits, and enforces the spatial limit of the authorised movement. Where this is not provided as an integral part of the system, the respondent shall indicate the various options available to achieve this functionality, as well as indicating how the system can interface with such an enforcement system.

- Prerequisites for the system to operate effectively. Clear justification to be provided to justify these requirements e.g. wireless data communication, power requirements for equipment, etc.

- High availability of the system is required and therefore the respondent shall propose a design to achieve this objective but shall clearly indicate that the additional equipment is for redundancy purposes. The information shall be so provided that TFR shall be in a position to clearly differentiate between the basic system and one with redundancy built into the design.

- Where a catastrophic data communications failure occurs such as the complete loss of the service(s) on a national level, the respondent to indicate whether the system has partial functionality or not.

- The specific equipment requirements per locomotive, assuming any locomotive can be the leading locomotive on a train. Additionally, the respondent shall indicate whether there is a requirement from the actual system / product that all locomotives in the locomotive consist on a specific train are required to be equipped from an operational perspective, and what the pros and cons of that decision may be.

- The system requirements for the protection of a maintenance team taking occupation on the track, as well as on one of multiple tracks.
- Similarly, the respondent shall indicate how control is passed from one control desk to another within the same CTC, and from one CTC to another, as trains cross control boundaries.
- The requirements for geo-mapping the network are required to be clearly defined, and where existing maps exist in TFR, how these can be repurposed for the system.
- Does the system operate effectively with electronically controlled pneumatic braking and radio distributed power systems, and if the system has not been previously implemented with these mentioned systems, to demonstrate why this is likely to be easily and quickly resolved.
- The respondent shall indicate what the requirements are to install equipment into rolling stock, the estimated duration for such installation, and whether this can be performed while in operation, within the yard environment, within a Transnet Engineering rolling stock workshop, or required to be hauled to a respondent's facility or elsewhere for fitment.
- The respondent to clearly indicate how onboard equipment and any exposed equipment at the trackside or at the CTC may best be protected from theft and vandalism as any exposure is likely to be exploited by criminals, who may possess expert knowledge in railway systems. And therefore, solutions should consider this to be the intended environment that the system shall operate within.
- The respondent shall indicate the size/dimensions of product wherever equipment is required to be installed.
- The respondent shall indicate the operating conditions for the products/systems/technologies proposed. This shall include operating temperature range, vibration, humidity, electro-magnetic compatibility, power requirements, etc.
- The respondent shall indicate shall advise whether the system can interface to any other train control system, onboard- or trackside-based, at the CTC or dispatching office, at the trackside, and onboard the rolling stock. This will be important as Transnet interfaces with different railway operators on its network, while Transnet trains also operate on networks owned and operated by others, and this system may also interface to different train control systems at its boundaries of control. This shall include interfacing to private sidings/yards/etc. and the process interfacing.
- The respondent shall indicate how the system may still be used under different levels of degraded conditions e.g. partial or full loss of data communications in an area, but voice communications still being possible, etc. to enhance safety under degraded conditions.
- The respondent to indicate how the system makes provision for Employee-in-Charge functions, and train working during occupations, railway incidents, etc., where such functionality exists in the system.
- The respondent shall indicate how the system may interface with existing security systems and advise whether there may be early warning detection systems that may alert relevant authorities proactively.
- From an affordability perspective, respondents are expected to indicate how upfront investment costs may be minimised e.g. equipping only leading locomotives when having a ringfenced locomotive fleet. The respondent shall indicate the relevant <u>estimated</u> unit costs of the system and sub-systems, assuming adequate existing telecommunication coverage e.g. investment cost per CTC/dispatching centre, per locomotive, per signalling element such as an electrical point machine or derailer, per level crossings, per road-rail vehicle or trolley, per maintenance team, etc.

- Transnet has a number of different systems already in use and may, as far as possible, wish to continue deriving the benefit pf such system as integral components in the new intended system. Where appropriate to do so, can existing Transnet Freight Rail (TFR)-approved systems be utilised e.g. track vacancy / train detection, EoT telemetry, etc.
- The respondent shall indicate how the system caters for shunting movements, either on loops or on the mainline.
- The respondent shall indicate how the system caters for maintenance vehicles such Road-Rail Vehicles (RRV's), rail trollies, and on-track machines are catered for.
- Where the respondent is able to do so, the respondent shall provide estimated deployment timelines, the respondent shall indicate typically the duration it may take to equip a single locomotive and a CTC/dispatcher control desk.
- The respondent shall clearly indicate the capacity limitations of the system from either a track layout perspective or number of trains movements per specified time period e.g. twelve (12) trains per direction per day upper limit, or any other measure proposed.
- The system shall need to interface to a limited number of business systems.
- The respondent shall indicate the training/education requirements for TCO/train dispatchers, train drivers/engineers/RRV- or trolley-drivers, maintenance teams, and contractors e.g. operating on-track machines.
- The respondent to indicate the location(s) for provision of equipment and services noting that the technologies may be required nationally where TFR believes it is feasible and affordable to do so. Transnet may provide further details once all technologies have been evaluated.

OTHER REQUIREMENTS

While theft and vandalism at the trackside remains high, theft from rolling stock has also increased significantly. In both cases the theft is primarily for batteries and for equipment containing copper, but any high-valued items may be the future target of thieves and other opportunists. It is therefore imperative that the respondent indicates whether there are any security requirements for the equipment proposed, or whether there are other means to reduce this risk sufficiently.

All telecommunications equipment shall be Independent Communications Authority of South Africa (ICASA) approved.

Where a respondent wishes to develop a solution with Transnet, estimated timelines, costs and royalty apportionment shall be clearly defined.

The availability of training materials shall be indicated.