Annexure A

Note: In all cases check against online version for the latest revision prior to use

TECHNICAL SPECIFICATION

For: Transnet Freight Rail Operating Company

Project Name: Procurement of Recovery Track Bulldozers, Excavators and Lowbed Trailers

Project Number: National-Resource Mngmnt-10-24-039

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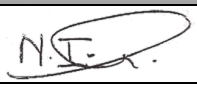
PREPARED BY:	**Nkosinathi Gumede**	**Engineering Technician**		20/10/2025
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Contents

Project Technical Specification

1 GENERAL

This specification contains a detailed description of the technical requirements for recovery track bulldozers, excavators and lowbed trailers required to supplement the current recovery equipment availability and reliability. Tenderers shall allow for any items, whether specifically indicated in the tender documents, essential to design, manufacture and deliver customized 8 track bulldozers, 6 excavators, and 3 low bed trailers with 7 years/7 000 hours maintenance plan according to standards and regulations outlined below in clause 2.

2 STANDARDS

The system should be designed according to the below standards and not limited to:

- **Code of Practice 29 (COP29):** The code pertains to the safe management of lifting equipment and requirements with regard to the procurement of the lifting equipment which must be complied with (section 17).
- **Occupational Health and Safety, Act no 85 of 1993 and regulation:** (Driven Machinery Regulation section 18). The regulation pertains to the requirements and management of the lifting equipment.
- **Railway Safety Regulator (RSR):** Promote safe railway operations through appropriate support, monitoring, and enforcement guided by an enabling regulatory framework.
- **SANS 1395:**1 Road Transport Management Systems (RTMS) standard stipulates requirements for the implementation of a management system that demonstrates compliance with Road Traffic Regulations and contributes to preserving road infrastructure, improving road safety, ensuring driver health and wellness, and improving productivity.
- **SAE J397 OCT95, SAE J1040 MAY94, ISO 3164:1995, ISO 3471:1994** for rollover protection.
- **SAE J231 JAN81, ISO 3449:1992** for falling object protection.
- **SAE J1026 APR90, ISO 10265:1998** for Brakes standard.
- **ANSI/SAE J1166 MAY90** standard for noise levels

NB: The appointed bidder is further expected to identify all environmental related standard, regulatory and approvals applicable to the proposed project and ensure that these are obtained from the relevant competent authorities.

3 ANNEXURE:A1 -RECOVERY TRACK BULLDOZERS SPECIFICATION

3.1 General Description

This specification outlines the requirements for a specialized track bulldozer equipped with front lifting forks and a rear-mounted winch, intended for the lifting and pulling of rolling stock in a derailment site. Normally the track bulldozers are operated in pairs of 2 depending on each scenario to pull the rolling stock. The equipment should be engineered for durability, stability, and high performance in different operational and weather conditions. The following are requirements for the track bulldozers:

3.2 Functional Requirements

3.2.1 Track Bulldozer Operating Speed……Minimum 10km/h.
3.2.2 Track Bulldozer Operating Weight Including Winch and Forks……Maximum 45 tons.
3.2.3 Front Forks Lifting Capacity……Minimum 20 tons.
3.2.4 Winch Pulling Capacity……..Minimum 45 tons.
3.2.5 Maximum Equipment Height……. Not to exceed 3.9 meters TFR Structural Gauge Limit
3.2.6 Maximum Equipment Width……...Not to exceed 3.05 meters TFR Structural Gauge Limit
3.2.7 Track Bulldozer length……Maximum 10 meters.
3.2.8 Transportation……..Should be transportable on rail and road and must comply with TFR structural gauge limits and Road Traffic Regulations

Figure 1 below signifies the required track bulldozers.

Figure 1: Recovery Track Bulldozer

Figure 2 below outlines the structural gauge

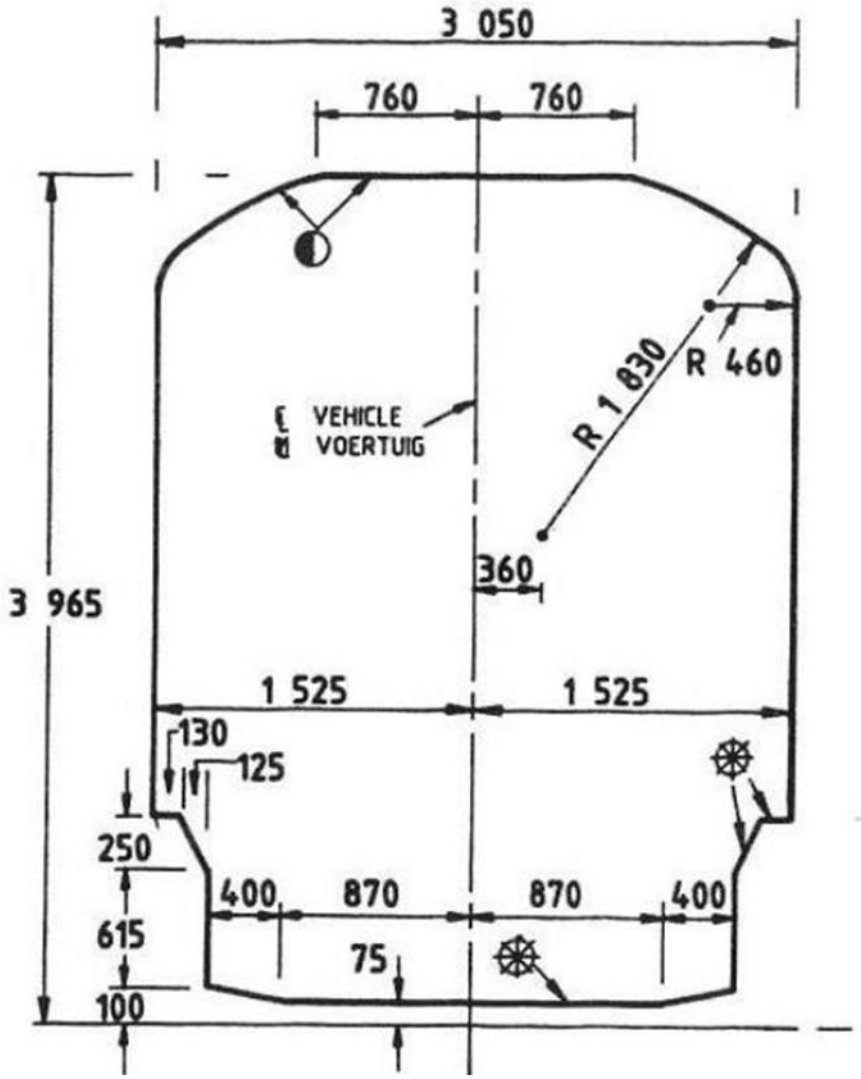

Figure 2: Structural Gauge

NB: When the track bulldozer is loaded on the flatbed rail wagon, the total weight of the wagon and track bulldozer shall not exceed a wagon payload of 74 tons and shall be within an axle load of 20 tons/axle.

3.3 Technical Parameters

The bidders are expected to conduct their own design calculations and select the correct track bulldozer size to be modified to fit the above outlined functional requirements. Table below outlines the estimated technical parameters for the track bulldozer.

Engine	Under Carriage
Engine Net Power……Min 179kW @1900 rpm Number of cylinders ……..6 Bore x Stroke……125 mmx150 mm Piston Displacement…… 11.04 L Cooling System……Water cooled	Track Shoe Width……..500 mm. Track Rollers……..Each Side 7 Number of Shoes……..Each Side 40 Track on Ground……..2930 mm Ground Contact Area……2.93 m^2. Ground Pressure ……..88.3 kPa. Grouser Height……..49 mm
Drive System	**Hydraulic System**
Type……..Hydrostatic drive Drive Pump……Two, variable-displacement, slipper-type axial piston pumps Track Motor ……Two, variable-displacement, bent axis piston motors. Drawbar pull rating ……60 tons. Gradeability……35° ***The drawbar pull depends on the traction and weight of the equipment including mounted components (such as winch and forks)***	Output……..335 L/min Main Relief Valve Setting……..19 000 kPa Lift Cylinders……..Bore 165 mm Lift Cylinders……..Stroke 935 mm Tilt Cylinders……..Bore 140 mm Tilt Cylinders……..Stroke 633 mm
Coolant and Lubricant Capacity	**Operator Compartment**
Fuel Tank……..490 L Cooling System……58 L Crankcase (with Filter)……29 L Final Drives (each)……26 L Hydraulic Tank……67 L Pump Drive Box ……3.8 L Pivot Shaft……..3 L Hydraulic System……169 L Hydrostatic Drive System……..83 L	No enclosed CAB and the following technologies should be considered. - Control switch light - Hooter button - Control switches for winch and forks - Reverse gear auto-activate reverse alarm capability ***There is a safety concern with the enclosed CAB in case the winch slips and swing back while pulling the load.***

Table 1:Track Bulldozer High Level Specification

4 ANNEXURE:A2 -EXCAVATORS SPECIFICATION

4.1 General Description

The excavators are used in a derailment site to put back the commodity into the wagon in case of a spillage and to offload the commodity from the derailed wagon in a case where the wagon is totally damaged and requires it to be lifted off the track.

- Excavators are required to be 20 tons and should be transportable on the road using lowbed trailers since there is a limitation to transport the excavators on rail due to OHTE height restrictions.
- The excavators must be able to operate and withstand all weather conditions.

Figure 3 below signifies the required excavator.

Figure 3: 20 Ton Excavator.

4.2 Technical Parameters

Engine	Under Carriage
Model .....20-ton Excavator.	Centre frame.....X-frame
Type .....Water-cooled, 4-cycle, direct injection.	Track frame.....Box-section.
Aspiration .....Turbocharged, aftercooled	Seal of track.....Sealed track
Number of cylinders 6	Track adjuster.....Hydraulic.
Bore .....107 mm.	Number of shoes (Each side).....45
Stroke .....124 mm.	Number of carrier rollers.....2 each side

Piston displacement ……6.69 L Horsepower: Gross ……..123 kW 165 HP Net ……..123 kW 165 HP Rated rpm……..2000 min^-1. Fan drive method for radiator cooling…Mechanical. Governor……All-speed control, electronic	Number of track rollers (Each side)……..7
Drive System	**Hydraulic System**
Steering control……Two levers with pedals Drive method……..Hydrostatic Maximum drawbar pull……178 kN. Gradeability……35° Maximum travel speed……5 km/h Service brake……..Hydraulic lock. Parking brake……Mechanical disc brake	Type……Hydraulic Mechanical Intelligence Number of selectable working modes……6 Main pump: Type……Variable displacement piston type. Maximum flow……..475 L/min Hydraulic motors: Travel……..2 x axial piston motor. Swing……1 x axial piston motor. Relief valve setting: Implement circuits……..37.3 MPa. Travel circuit……..37.3 MPa. Swing circuit……..28.9 MPa. Pilot circuit……3.2 MPa Hydraulic cylinders: Number of cylinders…bore x stroke x rod diameter. Boom……2–120 mm x 1334 mm x 85 mm. Arm……1–135 mm x 1490 mm x 95 mm. Bucket: for 2.93 m arm…….1–115 mm x 1120 mm x 80 mm for 2.41 m arm…….1–115 mm x 1120 mm x 80 mm for 1.84 m arm…….1–125 mm x 1110 mm x 85 mm
Coolant and Lubricant Capacity	
Fuel tank……400 L. Coolant ……21.8 L Engine ……..23.1 L Final drive (Each side) ……..3.3 L Swing drive ……..5.3 L. Hydraulic tank……135 L	

Table 2: 20 Ton Excavator Specification

5 ANNEXURE:A2-LOWBED TRAILERS SPECIFICATION

5.1 General Description

The lowbed trailers are used to transport track bulldozers and excavators to the derailment site via road.

- The lowbed trailers must be detachable and shall be able to transport either 45-ton track bulldozers or 20-ton excavators.
- The low bed trailer must be able to operate and withstand all weather conditions.

Figure 4 below signifies the required lowbed trailer.

Figure 4: Lowbed Trailer

5.2 Technical Parameters

Rear Loading Ramps	Lowbed Capacity
Two hydraulic operated heavy duty rear loading ramps. Length of the ramp……approx. 3 meters Width of Ramp……approx. 1.2 meters	Heavy duty off-road lowbed semi-trailer for safe transporting recovery equipment Payload……approx. 80 tons Overall length……17 meters Lowbed width……3 meters Lowbed height from the ground……1.45 meters King pin height ……approx. 1.4 meters Number of shoes (Each side)……45 Number of carrier rollers……2 each side Number of track rollers (Each side)……7

Table 3: Lowbed Trailer Specification

6 RECOVERY EQUIPMENT TRAINING

The recovery equipment are specialized in nature, the awarded bidder shall be responsible for the development and delivery of comprehensive training material and training on the operation and maintenance of recovery bulldozers and excavators. This must include the following:

- Detailed training manuals, presentations, and any other relevant materials tailored to the specific recovery equipment supplied.
- Training materials must be developed in conjunction with Transnet School of Engineering to ensure that the training material aligns to Transnet standards.
- Provide theoretical and practical training to a total of **20 Transnet employees**, including designated trainers from the Transnet School of Engineering.
- Training should be for a duration of 2 months for excavators and 2 months for recovery track bulldozers and this should be before the handover of the equipment to Transnet.

7 RECOVERY EQUIPMENT MAINTENANCE

The maintenance of the recovery equipment should consist of both planned and unplanned maintenance. This will cover the equipment service plan (scheduled maintenance) and repairs in case of the equipment breakdown. Transnet Engineering facilities will be utilized to conduct maintenance, and the OEM personnel shall work with TE maintenance personnel to conduct scheduled maintenance and repairs on site. The following are the requirements for maintenance of the recovery equipment as per the scope of the project.

- The Original Equipment Manufacturer (OEM) should offer fully Managed maintenance support, including an automatic maintenance schedule as per the equipment maintenance manuals, readily available spare parts and labour in the event of a breakdown for a period of 7 years/7 000 hours.
- Fixed maintenance cost inclusive of national coverage for labour, spare parts, repairs, scheduled maintenance and replacement of consumables should be quoted for the maintenance period.
- The service agreement for maintenance and repairs should be purchased with the OEM at the time of sale for the required maintenance period for the recovery equipment.
- Guaranteeing the availability of spare parts for the entire lifespan of recovery equipment, ensuring continuous operational support without interruption and management of obsolescence.

NB: Fully managed maintenance plan refers to a comprehensive service agreement where the equipment supplier takes full responsibility for the maintenance servicing of the equipment and breakdown repairs over a set period or hours on site inclusive of predicting equipment component potential failures. Supplier must sign a fully managed maintenance agreement with Transnet according to the scope and requirements of the project.

6.1 Equipment Components

The Table below highlight the list of equipment components but not limited to that requires maintenance.

BULLDOZERS	**EXCAVATORS**	**LOWBED TRAILERS**
SCHEDULED MAINTENANCE BASED ON DIFFERENT INTERVALS		
Change Oils • Change coolant. • Change engine oil, final drive oil and hydraulic oil. **Replace Filters** • Replace engine oil filters, engine air filters, fuel main filter, engine lube oil filter, hydraulic filter. • Pre fuel filters **Replace Breather elements** • Replace fuel tank breather element. • Replace DEF tank breather element. • Replace hydraulic tank breather element. **Others** such as Lubricating machine, draining sediment from fuel tank and cleaning hydraulic tank strainer	**Change Oils** • Change coolant. • Change engine oil, final drive oil and hydraulic oil. **Replace Filters** • Replace engine oil filters, engine air filters, fuel main filter, engine lube oil filter, hydraulic filter. • Pre fuel filters **Replace Breather elements** • Replace fuel tank breather element. • Replace DEF tank breather element. • Replace hydraulic tank breather element.	• Greasing of the axles and suspension • Control of the brake lining thickness • Lubricating hub and bearing

	Others such as Lubricating machine, draining sediment from fuel tank and cleaning hydraulic tank strainer	
REPAIRS AND REPLACEMENTS		
Engine • Transmission • Axles • Steering **Hydraulics** • Pumps • Hydraulic motors • Cylinders • Valves **Electricals** • Electronic • controllers • Sensors • Wire harnesses **Structural** • Undercarriage • Cabin		• Inspection/ lubrication and replacement of the king pin • Suspension Systems. • Lights and Electrical Systems. • Coupling Systems. • Roll-Up Doors or Swing Doors. • Landing Gear.
CONSUMABLES		
• Fuel injection system. • Water pump • Starter • Alternator • Batteries • A/C system • Equipment cooling system.		• Tyres • Brake Systems • Flooring

• Brakes • Aftertreatment filters • Seals • Hoses • Gaskets • Pins and bushings • V belt • Wiper blades • Wiper motors	

8 DRAWINGS AND DOCUMENTATION

The following documents are mandatory returnable documents and if not submitted by the closing date, the bidder's proposal will be rendered invalid.

- Pricing schedule that outlines the individual costs associated with different components of the project, such as cost of modifications and cost of delivery.
- Delivery schedule that outlines the supply and delivery lead times with start and end date.
- Maintenance Cost

All documents must be written in clear, English-language.

Upon completion of the project the contractor shall provide as built drawings, operational and maintenance documents for all equipment components.

9 TESTING AND COMMISSIONING

Testing and commissioning shall be done in accordance with the related clauses of the Technical Specification and code of standard. Prior to the first delivery of the completed unit, the contractor shall satisfy himself that the works are complete in every respect according to the specification and accompanying drawings. The contractor shall perform pretesting of the equipment in the presence of Transnet at their own expense. Only then shall the contractor arrange for the equipment delivery and commissioning of the equipment to Transnet. The Contractor shall ensure that all test certificates and commissioning data is provided to Transnet before the project close out.