

PART C3: SCOPE OF WORKS

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PART C3**SERVICE INFORMATION****MAINTENANCE OF RAILWAY TRACK WITH ON-TRACK MACHINERY****CONTENTS**

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MAINTENANCE OF RAILWAY TRACK WITH ON-TRACK MACHINERY

3.1. EMPLOYERS OBJECTIVE

Permanent track, Country-wide are to be maintained by mechanized means and or on-track machinery to ensure safe, reliability and stability of permanent way infrastructure.

Any clause in this specification contradictory to requirements elsewhere in this contract except for particular specifications part **C3.24.2**, shall take preference.

Any reference in this Specification to “Contractor” will imply the Principal Machine Contractor, any subcontractor appointed by the Principal contractor for support of the contractor.

Where reference is made to any output which may be subcontracted by the principal contractor or Labour controlled by the principal contractor, this will also imply to the control of the output, performance or labour from a nominated sub contractor where and if such a nominated subcontractor is separately appointed for support service for a principal machine contractor.

3.2 DESCRIPTION OF THE WORK

The contract covers the maintenance of permanent track by the Contractor with on-track machinery, which he shall provide, maintain and operate subject to the terms of the succeeding clauses, and the specifications and schedules embodied in the contract.

3.3 EXTENT OF THE WORK

The Contractor would be required to maintain the permanent track anywhere in the Country on any lines owned or maintained by Transnet Freight Rail for the period as specified in the Contract Data. Maintenance of permanent track will be required on open lines, tunnels, platform lines, and loop and yard lines. It will be required that all different types of activities are performed as prescribed in the various particular specifications.

3.4 LOCATION OF THE WORKS

3.4.1 The Technical Officer where the Work shall be performed. Maintenance of permanent track will be required on open lines, tunnels, platform lines, and loop and yard lines. This shall include, but not limited to, the Coalline, Ore line, Natal mainline, Western mainline, Eastern mainline, Cape mainline, Port Elizabeth mainline, Beitbridge corridor, and any branch line.

3.4.2 The Contractor may be required to work in areas where varying degrees and types of security situations are prevailing such as may occur in remote rural areas through to densely populated metropolitan areas. This could require the contractor to work inside any of the Infrastructure Depot areas at any time of the year for any period of time.

3.4.3 The Technical Officer shall make the necessary arrangements to move the machinery by rail from one work site to another, and shall give the Contractor written notice of the date and time of departure. Major movements will be planned and the time allowed should be a minimum of 14 days or such shorter period as agreed.

3.4.4 Any delay to an announced move caused by the Contractor will render the machinery non-available for the period of such delay, excluding overnight stops.

3.5 **CARE OF MATERIAL SUPPLIED BY TRANSNET FREIGHT RAIL**

3.5.1 Any material supplied by Transnet Freight Rail shall be used in the most economical way, and the Contractor shall take all reasonable care to prevent loss or damage thereof. Any material lost or damaged through negligence on the part of the Contractor or his employees shall either be made good by the Contractor or Transnet Freight Rail will replace it.

3.5.2 The value of the material replaced by Transnet Freight Rail, including the cost of transport at normal tariffs applicable to the public, will be deducted from any money due to the Contractor or recovered in any other way.

3.5 **PROPERTY PROVIDED BY TRANSNET FREIGHT RAIL**

Transnet Freight Rail will provide the following free of charge: -

3.6.1 Water to operate the machinery, where available. The quality of water cannot be guaranteed.

3.6.2 Where available, at campsites as in clause 3.6.1, water for drinking and domestic purposes and hot water for ablutions.

3.6.3 Free traffic consignment notes for the conveyance by rail from one area of operation to another or from the Contractor's workshop or depot to the area of operation and vice versa will be issued for the machine (whether under own power, coupled to a train or loaded onto a railway truck), spares, caravans used with the machine and either of one spares trailer or one light delivery vehicle.

3.6.4 Transnet Freight Rail will be responsible for the safety of the machinery in so far as train working is concerned and will provide a qualified employee for each machine or group of machines, who will be in charge and who will -

- travel in the cab of the machinery whenever it moves as a train outside occupation areas.
- arrange protection for and supervise the operation of the machinery within the zone of protection, whether it is working, moving or standing idle.
- supervise all on-tracking and off-tracking operations and ensure that the machinery is made secure when parked at the staging point.
- The Contractor shall appoint one suitably qualified person as his representative at each occupation.

- 3.6.5 Before work is commenced, the Technical Officers Deputy's will enter in the work book the approximate positions of underground or hidden electrical conductors that may affect, or be affected by, the Work to be done under the Contract, or alternatively, endorse in the work book that no such conductors exist.
- 3.6.5 Nothing contained here in shall detract from the Contractor's obligation to exercise care in all respects in carrying out his duties under the Contract.
- 3.6.6 Any rail wagons that may be provided by Transnet Freight Rail will provide in terms of any specific requirement as specified I the Particular Specifications C3.24.2

3.7 **TO BE PROVIDED BY THE CONTRACTOR**

- 3.7.1 Except where otherwise specified the Contractor shall at his own cost provide all machinery, labour, transport, consumable stores, equipment, tools, services, materials, spare parts and ingredients of every description required for the performance and completion of his contractual obligations.
- 3.7.2 The Contractor shall provide and deliver to the place of Work all fuels and water required for the machine operations.
- 3.7.3 The Contractor shall maintain and operate the machinery, direct his own personnel and perform all work required.
- 3.7.4 During track occupations, the Contractor shall ensure that sufficient mechanics, operators and labour are present to ensure efficient operation of the machinery.
- 3.7.5 At least one qualified and experienced mechanic shall be in attendance at all times during track occupations and when the machinery travels as a train.
- 3.7.6 The Contractor shall appoint one suitably qualified person as his representative at each occupation.
- 3.7.7 The Contractor and the Technical Officer shall notify each other in writing of the names of their representatives who will be present during track occupations. These, as well as any changes in the personnel, shall be recorded in the workbook.
- 3.7.8 Failure to comply with the provisions of 3.7.1 to 3.7.7 shall render the machinery non-available.

3.8 **MACHINERY AND EQUIPMENT REQUIRED**

3.8.1 Mechanical and motive aspects

- 3.8.1.1 All machinery provided by the Contractor shall be in good mechanical condition and he shall maintain the machinery in good mechanical condition for the duration of the Contract.
- 3.8.1.2 Axle loads shall not exceed 20 tons.

- 3.8.1.3 The machine shall be self-propelled.
- 3.8.1.4 The machine shall have service brakes and independent emergency brakes capable of providing minimum retardation of 12,5% and 6% of gravitational acceleration respectively, on dry rail.
- 3.8.1.5 At the start of each occupation the Contractor shall, in the presence of the Technical Officer's Deputy's, perform the daily tests laid down by the Technical Officer. The brakes shall be briefly applied at low speed when traveling on level track or upgrade. If in the opinion of the Technical Officer's Deputy the brakes do not function satisfactorily, the machinery shall be removed immediately to a staging point. Machinery staged due to defective brakes will be regarded as non-available.
- 3.8.1.6 At approximately one-month intervals, the Technical Officers Deputy will test the brakes with a brake efficiency test meter and record the results in the workbook.
- 3.8.1.7 The machine shall actuate all signalling equipment used by Transnet Freight Rail for traffic control.
- 3.8.1.8 Regular checks shall be made for pressure loss on brake cylinders and circuits, wear and set of brake shoes, proper functioning of sirens and mechanical locks on hydraulic components.
- 3.8.1.9 The machine shall have an adequate lighting system for operation at night. Lights shall be provided for traveling in both forward and reverse directions. The trailing end headlights and leading end red lights shall not be switched on during motion.
- 3.8.1.10 The machine shall be capable of being hauled in both directions as the last vehicle of a train if required to clear the section after breakdown. The Contractor shall provide towing equipment.
- 3.8.1.11 Where specified, machinery shall have off-tracking equipment suitable for use on either of the off-track stand types shown in Annexure D. Should these stands not be suitable, Transnet Freight Rail will construct stands to the Contractor's requirements and at his cost, subject to the particulars of such requirements being submitted with his tender.
- 3.8.2 Wheel flanges, tyres and axles
- 3.8.2.1 The condition of the flanges and treads of wheels of all machines shall be carefully examined. Should any appear to be excessively worn, they shall be tested by means of the wheel flange thickness and skid limit gauge and the tyre wear limit gauge.
- 3.8.2.2 Wheels shall comply with the following requirements:
- The thickness of a flange shall not be less than the minimum indicated by the wheel flange thickness gauge.
 - Hollow wear on the tread shall not exceed 6mm.
 - The flange height shall not exceed 35mm.

- The angle of the flange shall not be less than 15° and the radius at the tip of the flange not less than 6mm.

3.8.2.3 Axles shall comply with the following requirements:

- Ultrasonic testing: to specifications laid down by Transnet Freight Rail, done for new axles and every time an axle is replaced after fitting new wheels.
- Distance between wheel flanges: 988mm ± 2mm.

3.8.3 Fuelling and maintenance

3.8.3.1 The Contractor shall not re-fuel, service or repair the machinery, during track occupations.

3.8.3.2 The Contractor may repair and adjust the machinery during stoppages caused by Transnet Freight Rail. The machinery will be regarded as available during such repairs or adjustments, provided that the required working of the machine is not delayed thereby.

3.8.4 Recording instruments

3.8.4.1 Each machine shall be fitted with an approved tacho-graph, a mechanically operated event recorder and a speedometer.

3.8.4.2 The Contractor shall be responsible for inserting recording cards in the tacho-graph and event recorders, and for synchronising these instruments.

3.8.4.3 The Technical Officers Deputy will be responsible for setting the event recorder.

3.8.4.4 The Technical Officers Deputy will test the tacho-graph and event recorders at least once a week in the presence of the Contractor. The Contractor shall either repair or replace any device, which is inaccurate by more than 1%. Failure to repair or replace an inaccurate device within 72 hours of the test will render the machinery non-available.

3.8.4.5 Should the tacho-graph or the event recorder break down, the Technical Officers Deputy will keep a complete written record of the starting and ending times of all events occurring during a track occupation. The Contractor shall sign this record if he agrees, and if he disagrees, he shall indicate on the record the reasons for the disagreement and then sign the document. Such disagreement shall be settled by negotiation between the Technical Officer and the Contractor.

3.8.5 Radio equipment

3.8.5.1 During track occupations the Contractor shall provide a cellular telephone for communication between the Work place and the controlling office on either side of the Work place or the area CTC office.

The cell-phone for the official use of Transnet Freight Rail shall be provided with a talk time contract of not less than 500 talk minutes per month. If this allowed talk time is exceeded, Transnet Freight Rail shall pay the excess. This excess shall only be paid after all previous monthly account credits have been brought into consideration. The Technical Officers Deputy shall certify detail account excess.

This Cell-phone shall also be available for the use of the Transnet Freight Rail signal's or electrical technician involved if required for work directly related to the tamping work. Use of this phone by any other Transnet Freight Rail official than the Track inspector with the machine, may only be with his permission. The Track inspector with the machine shall be responsible for controlling the number of calls on this phone.

- 3.8.5.2 The Contractor shall provide and maintain walkie-talkie radio transceivers with a minimum range of 5km in open country. The Technical Officer, in consultation with the Contractor, will allocate suitable frequencies within the 450MHz to 470MHz band for configuration of the radio equipment. The Contractor will be given seven day's written notice when additional radios are required.
- 3.8.5.3 All of the above-mentioned radio equipment shall operate on 12,5kHz channel spacing, and shall comply with specification SABS-1069.
- 3.8.5.4 The Contractor may operate the radio equipment only for trackside protection. The use of the allocated frequencies must be terminated when the contract expires.
- 3.8.5.5 When walkie-talkie communication fails due to faulty equipment, the machinery will be deemed as non-available.
- 3.8.5.6 When radio and or cellular telephone communication between the place of Work and the controlling stations or the protection flagmen fails, the Contractor shall remove the machinery from the track as soon as possible.
- 3.8.5.7 Transnet Freight Rail will provide, install and maintain a radio in the cab of the machine for train control purposes. The Contractor shall indicate the position in which the radio shall be installed, and provide a suitable power supply point for the radio equipment when requested. The machine will not be allowed to operate without this radio.
- 3.8.6 Warning devices
- 3.8.6.1 The machine shall be fitted with a hooter for use during traveling.
- 3.8.6.2 The machine shall be fitted with a separate warning system used solely for and on the approach of a train. The pitch and intensity shall make it discernable from other sounding devices and easily heard above the working of the machine anywhere within 100m from the machine. The warning system shall be activated by an appointed employee of the Contractor.

3.8.6.3 The Contractor's appointed employee shall be in continuous radio communication with Transnet's protection flagmen who will warn the Contractor's employee of approaching trains on adjacent lines.

3.8.6.4 A rotating amber flashing light shall be fitted to the top of the machine's cab, for use during travel.

3.8.7 Machinery Specifications

Machinery shall be suitable for use under the following conditions and dimensional limitations:

3.8.7.1 Vehicle gauge: 1,065mm gauge track shown in Annexure 2 (Sht 1 of 2). Should the machinery exceed the vehicle gauge in any respect, this shall be clearly indicated by the Contractor by means of suitable drawings.

3.8.7.2 Track gauge: nominal 1,065mm, with a range of - 10mm to + 45mm.

3.8.7.3 Minimum structure gauges: as shown in Annexure 1 (Sht 1, 2, 3 and 5 of 5).

3.8.7.4 Single lines or multiple lines with a minimum distance of 4m between track centres.

3.8.7.5 Maximum track gradient: 1 in 30.

3.8.7.6 Minimum curve radius: 125m.

3.8.7.7 Work place altitude range: 0 to 2,000m above sea level.

3.8.7.8 Ambient temperature range: - 5°C to + 50°C.

3.8.7.9 Mass of rail: 60kg/m, 57kg/m, 48kg/m, 40kg/m, 30kg/m or 22kg/m.

3.8.7.10 Maximum mass per sleeper: Sets - 750kg; other - 300kg.

3.8.7.11 Types of sleepers in track: timber, steel, monolithic or tie-bar concrete.

3.8.7.12 Sleeper spacing: 500mm to 900mm.

3.8.8 Unknown / Alternative / Substitute Machines

3.8.8.1 Transnet Freight Rail will, in the case where alternative or substitute machines or machines with characteristics which are unknown to Transnet Freight Rail are offered by Tenderers or the Contractor, require that such machines, before they are accepted, be subjected to trials under the prevailing working conditions of the contract area(s) to demonstrate their compliance with the contract specifications. Machines that do not comply with the specifications will not be accepted.

3.9 **COMPLIANCE WITH STANDARDS OF WORKMANSHIP AND ACCURACY**

- 3.9.1 The Contractor shall work to the track dimensions required by the Technical Officers Deputy. These dimensions shall either be marked with chalk marks on the sleepers by the measurement gang of the contractor or by means of the approved measurement system operated on the high speed machines.
- 3.9.2 The Contractor shall continuously monitor and evaluate measurements of the track and shall ensure compliance with the specified standards of workmanship and accuracy.
- 3.9.3 Where, in the opinion of the Contractor, the condition of the track or any site condition is such that the specified performance standards cannot be achieved, he should record all relevant information before and after working in conjunction with the Technical Officers Deputy. The Technical Officers Deputy may, if he concurs with the Contractor's contentions, adapt the specified standards of workmanship and conformance to suit the track and/or site conditions.

3.10 **PROCUREMENT**

3.10.1 Definitions and interpretation

In this Contract, unless inconsistent with the context: -

ACTUAL PREPARATION TIME (Tp) means the period between the actual commencement of the track occupation and the actual commencement of the work by the machinery, plus the period of time between the actual end of the work by the machinery and the actual time when the machinery is secured at its staging point, clear of the occupied track. Preparation time excludes all periods of delay by Transnet Freight Rail.

ANNUAL HOLIDAYS means the annual holiday with duration of 15 consecutive working days plus statutory public holidays, Saturdays and Sundays that may fall within in this period, when no Work will be performed by the Contractor.

AVAILABLE means when required to do work, a machine is able to produce work to the standards specified.

BREAKDOWN TIME (Tb) means all periods during which the machinery is non-available.

CANT means the difference in elevation between the running surfaces of the two rails.

CURVE LOCATION POINTS means the four points, which locate the transitions of the curve, or the two points, which locate the circular curve, where no transitions are provided.

DAY shall mean a calendar day. Where a specific number of days is allowed in the Contract for the performance of any act or is stipulated for the extinction of any right or the duration of any event or circumstance the days between the commencement and last day of the Annual Holidays (both days included) and the day from which the period is stated or agreed to commence, shall be excluded from the calculation of the number of days concerned.

DOUBLE SHIFT WORKING means the working of two consecutive shifts of 8 hours, which may each be non-continuous and scheduled at any times during a 24 hour day.

EXECUTIVE OFFICER means the person appointed by Transnet Freight Rail from time to time as the EXECUTIVE OFFICER to act according to the rights, powers held by, and obligations placed upon him in terms of the Contract. In terms of this contract the EXECUTIVE OFFICER is the employer representative.

FREE-ON-RAIL implies allowing the contractor to move an On Track machine from one track destination to another with no track usage cost levied on the contractor. Transnet provides the right of passage and the pilot required for the machine to the contractor, without cost and at times whereby such a passage and pilot can be made available by Transnet. Free-on-rail passage will normally be allowed for at the start of a contract to deliver a machine to the starting place of work and at the end of the contract to return a machine to the contractor's depot if required or by the contractor. Free-on-Rail movement of a machine during a contract for major workshop repairs required of a machine may only occur if specifically agreed to by the Project Manager. Such a move shall then occur in the contractor's time.

IDLE TIME (T_i) means all periods of 15 consecutive days or longer during which Transnet Freight Rail does not require work to be performed by the machinery. This excludes the stoppage of work during the annual holiday.

JOINT ASSEMBLIES means all types of joints, including flash-butt and thermit welded, fishplate and block-joints.

LINE means the maximum rate of deviation of the running edge of one rail from a straight line between two points on the same rail of tangent track. Measurements will be taken 15mm below the top of the rail, against the gauge side of the rail used by the machine as a datum for aligning.

MACHINERY means the on-track machinery provided complete with all fittings, accessories and ancillary equipment including trailers, caravans and spare parts, as may be required to comply with the requirements of the specifications.

MAXIMUM OCCUPATION TIME (T_{om}) means the total occupation time, non-continuous, on a normal working day, not exceeding a total net period stated in the particular specifications.

MONTH means the continuous period from the first day to the last day of any calendar month, both days included.

MONTHLY WORKING TIME (T_{wm}) means the targeted average monthly working time.

MOVING TIME (T_m) means the period required to move the machinery from work site to work site as a train, as part of or on a train. Moving time will commence at the announced time of departure and will end when the staging point at the new work site is reached. Periods of overnight stops when the machinery is traveling as a train, as part of or on a train will be excluded from

moving time. Moving time will be included in occupation time for payment purposes.

NIGHT SHIFT ALLOWANCE means an allowance paid for any time worked between 19h00 and 05h00 (Night shift allowance is additional to either overtime or normal shift time, if applicable)

NON-AVAILABLE means when required to do work, the machinery or the operation thereof is unsafe, or the machinery is not able to produce work to the standards specified, due to any reason other than a stoppage of work caused by Transnet Freight Rail.

NORMAL WORKING DAY means a total shift of 8 hours, which may be non-continuous, out of every 24 hours for 5 consecutive days out of every 7-day period, or for 10 consecutive days out of every 14-day period. The Technical Officers Deputy will determine the daily starting time, which may vary to suit seasonal changes or train timetables.

The Technical Officers Deputy shall decide when 10/14 day work shifts will be worked. When a machine works further than 600km away from the machine's base depot, the contractor may request working a 10/14-day shift if occupation conditions allow. Transnet Freight Rail will consider such working shifts and the additional Saturday and Sunday shift payments will then apply.

OCCUPATION means a closure of the line on which work is to be performed for a specified period.

OCCUPATION DAY (To-day) means any day that the machinery will be required by the Technical Officers Deputy to be available.

OCCUPATION TIME (To) means the period(s) between the announced commencement time of an occupation and the time when the machinery is secured at its staging point for the last time.

OVERTIME means any time worked in excess of the hours of a normal working day and any time worked on Saturdays, Sundays and statutory public holidays in excess of 5 consecutive days out of 7-day period or in excess of 10 consecutive days out of 14-day period, all on the written instruction of, or as approved by the Technical Officers Deputy.

PLAIN TRACK means all track excluding sets and restricted track.

SERVICE MANAGER means the person appointed by Transnet Freight Rail from time to time as the Service Manager to administer the Contract according to the powers and rights held by and obligations placed upon him in terms of the Contract. Any reference made in any document of this contract of Project Manager shall imply or refer to the Service Manager.

PARTICULAR SPECIFICATION means any document titled Particular Specification, Special Conditions and Specifications, or Special Conditions, forming part of the documents constituting the Contract and which stipulates the special contract provisions and specifications pertaining to the Contract.

QUOTED PREPARATION TIME (T_q) means the combined period, as quoted by the Contractor in the Schedule of Machinery (for one complete cycle), to move the machinery from its staging point, travel to the point of work, to prepare it for work, and on completion of the work to return and secure it at the staging point, clear of the occupied track.

RESTRICTED TRACK means that portion of plain track where locking bars, guard rails and check rails are not removed prior to working or where sleepers are skewed by more than 75mm (measured at the rail's centre line) or where Dowty retarders and boosters are fitted which prevent the machine from producing work at the scheduled rates as defined in the Special Conditions and Specifications.

SETS mean all types of turnouts, including crossings, single and double slips.
SHIFT ALLOWANCE (normal) means an allowance paid for time worked on a Saturday, Sunday or statutory paid public holiday when working 5 consecutive days out of 7-day period or 10 consecutive days out of 14-day period (Payment for shift allowance ceases when overtime is paid)

SPLICE JOINT means a prefabricated rail expansion device. The thermit welds at either end demarcate the extremities of the splice joint.

SPLIT OCCUPATION means an occupation on any one-day, divided into 2 periods, the sum of which does not exceed 9 hours, with a 2 hour break in between and the total period not exceeding 11 hours.

STANDING TIME (T_s) means a stoppage of work caused by Transnet Freight Rail.

TECHNICAL OFFICER means the person appointed by the SERVICE MANAGER from time to time as the Service Manager's representative on a depot to administer the Contractor's performance and execution of the Work according to the powers and rights held by and obligations placed upon the Technical Officer in terms of the Contract.

TECHNICAL OFFICERS DEPUTY or TECHNICAL OFFICER means the person appointed by Transnet Freight Rail under the control of the TECHNICAL OFFICER from time to time to take occupations for the machines for the contract, pilot machines to and from site and to supervise the execution of the workload and ensure safe and quality work being done by the contractor and the machine..

TIME WORKED IN (T_{wi}) means any day a machine is agreed to be available and works outside of and in lieu of a normal working day. Such T_{wi} as well as production statistics and all relevant times must be reflected against the day for which the time was worked in.

TOP means a change of gradient of one or both rails.

TRACK means and includes plain track, restricted track, sets, splice joints and all joint assemblies.

TRAVELLING TIME (T_t) means the time for the machinery to travel between work site and staging point.

TWIST means the algebraic difference between adjacent cant measurements.

VERSINE means the offset measurement at midpoint of a 10m chord taken at any location on curved track. Measurements will be taken 15mm below the top of the rail, against the gauge side of the rail used by the machine as a datum for aligning.

WORK means the work to be carried out in terms of the Contract.

WORKING TIME (T_w) means the periods during which the machinery is actually engaged on the operation or function for which it was provided.

3.10.2 Subcontracting procedures

No part of the contract may be sub-contracted without written approval from Transnet Freight Rail

3.11. **AVAILABILITY**

3.11.1 The machinery shall be available, warmed up and at the place of Work on the date and at the time indicated by the Technical Officers Deputy.

3.11.2 Machinery will be regarded as available when moving from one Work place to another.

3.11.3 Moving to effect initial delivery, and final removal after completion of the Work, as well as moving requested by the Contractor (i.e. for maintenance or temporary storage of the machine at locations other than the Work place) will not be included when determining availability.

3.11.4 The Technical Officers shall give the Contractor a minimum of 14 days written notice to stop work temporarily for a period exceeding 14 consecutive days and a minimum of 14 days written notice to resume work after such temporary stoppage. Such idle time shall not be included in measurements for availability.

3.12. **NON-AVAILABILITY**

3.12.1 The Contractor shall advise the Technical Officers as soon as possible when any machinery is not available for work at its appointed place of Work and shall indicate the estimated time when it will be available for work.

3.12.2 Should any of the specified components or functions of the machine be non-available, the machine will be regarded as non-available.

3.12.3 Machinery will be regarded as available after breakdown when it is declared available and placed on the track for the purpose of testing, resetting or working, unless after the period of testing and resetting the machinery is still non-available. In the latter case, breakdown time will commence from the time that the machinery previously became non-available.

- 3.12.4 The provisions regarding productivity and standards of workmanship and accuracy shall apply during periods of testing or resetting.
- 3.12.5 When the machine is not available at all for Work on a day because of a breakdown on the previous day, occupation time and non-availability will both be equal to Tom hours.
- 3.12.6 Should a single stoppage of Work due to a breakdown of a machine exceed or be likely to exceed 60 minutes, the Technical Officers Deputy may require the machine to be removed to a staging point as soon as possible. Such traveling, whether from or returning to the point of breakdown, will not be included in Tt, but will be included in Tb.
- 3.12.7 If the Contractor is instructed to work either overtime or more than Twm, non-availability due to breakdown occurring in such time will not be penalised. Occupation time will also not be measured during such breakdown.

3.13 **UNSATISFACTORY PERFORMANCE OF THE MACHINERY**

- 3.13.1 The Service Manager or Technical Officers may terminate the Work and/or order the machinery to be moved to another place of Work and/or order the removal of mechanic(s) and/or operator(s), and/or order the temporary or permanent removal and replacement of a machine under the following conditions:
- When the output of the machinery is less than 70% of the required minimum productivity for a period of two consecutive months, or
 - when the percentage availability of the machinery (as described in the Special Conditions of Contract and Specifications) is less than 75% for a period of two consecutive months.
- 3.13.2 The Contractor may substitute, either temporarily or for the duration of the Contract, other machinery in place of that listed in the Schedule of Machinery offered. The substitute machinery shall be subject to all the terms and conditions of the Contract and shall in no way be inferior to the original machinery. The Service Manager and Technical Officers shall be advised of any proposed substitution, which shall be subject to his approval.
- 3.13.3 Should the Service Manager or Technical Officers at any time, be of the opinion that the machinery provided by the Contractor is performing defectively or is incapable of achieving the specified output and availability the Service Manager or Technical Officers may notify the Contractor in writing, but the Contractor shall not be relieved of any of his contractual obligations if such notification is not given.
- 3.13.4 The Contractor shall there-upon take steps to improve the output and availability of the machinery to specified performance levels or to replace the machinery with machinery capable of achieving the specified performance, failing which the Employer may act in terms of **Clause Z.5.9 of Contract Data**.

3.14 **MACHINE MOVEMENTS**

- 3.14.1 The Contractor shall deliver the machinery in full operational condition, with all operatives, to the initial place of Work, as directed by the Service Manager or Technical Officer.
- 3.14.2 The Contractor shall not place the machinery onto the track or remove it there from, or use it in any way, except when authorised to do so by the Technical Officer or his deputy.
- 3.14.3 The Contractor is responsible for movement of his machines in the occupation area.
- 3.14.4 Machinery shall not be operated as a train unless a representative of Transnet Freight Rail, appointed by the Technical Officer, who is authorised to give instructions regarding the movement of the machinery, travels on the machinery to its destination. The Contractor shall assist Transnet Freight Rail in all matters concerning the safety of trains, persons and the machinery.
- 3.14.5 The Contractor shall ensure that the off-tracking rails are correctly placed and fastened before lowering or moving the machinery onto them.
- 3.14.6 The Contractor shall point out to the Technical Officers deputy any part of the track or off-track stand where conditions may constitute a danger to the machinery and its ancillary equipment, and record this in the work book. The Contractor shall however repair off-track platforms where work can reasonable be expected to be done by the labour provided with the machine as per the schedule of labour.
- 3.14.7 The Contractor shall load and unload all machinery to be transported by rail truck and shall be responsible to properly secure all machinery to be so transported.

3.15 **MEASUREMENT AND PAYMENT**

- 3.15.1 The quantities in the Price List are estimated and may be more or less than stated. The Technical Officer will measure all the work done and certify payment therefore in accordance with the Price List. The absence of stated quantities is no guarantee that none will be required.
- 3.15.2 Payment for establishment of a machine at the commencement of the Contract will only be made after the machine has attained the required minimum availability over a period of one month.
- 3.15.3 Should the Contract not be completed for any reason whatsoever, due to the Contractor, he shall refund to Transnet Freight Rail a percentage of the establishment cost. The refund shall be proportional to the uncompleted period of the Contract.
- 3.15.4 In the case of unknown, alternative or substitute machines, establishment payments will only be made after successful completion of the trials and only for the initial machine establishment.

3.15.5 Measurement and payment for the hire and operation of the machinery will be made as specified in the Particular Specification. The following general payment provisions shall apply:

3.15.5.1 A machine-hire rate per day for each production machine that is available and operational. The rate shall include for all accessory labour, tools, equipment, etc., and every thing whatsoever pertaining to the operation and maintenance of the machine.

3.15.5.2 A production-rate for each unit of time worked or work produced by the machine during actual working time. The rate shall include for all labour, fuels, consumables, materials, etc. and every thing whatsoever, pertaining to the production output of the machine. The rate shall apply to all work performed on a "normal working day" as defined and to all Double-Shift working.

3.15.5.3 An extra-over payment will be made for overtime worked or production units produced during overtime working, i.e. time worked in excess of the maximum daily occupation time (Tom) on a normal working day and on Saturdays, Sundays and statutory public holidays. The overtime payment will not apply to Double Shift working.

3.15.5.4 Contractor shall submit, with their tenders, full particulars of the labour task crews, allowed for in the rates tendered in respect of **clause 3.15.5.1 and 3.15.5.2**, to undertake the tasks and functions specified in the Particular Specifications. Such particulars shall include the details of crew strengths i.e. numbers of labourers and supervisors or technicians, etc. Additional payment will be made when the machine is required to work outside the contract area described in the particular specifications.

3.15.5.5 No payment whatsoever will be made for periods of non-availability.

3.15.5.6 No payment will be made if a machine is unable to work as a result of an accident to the machine, regardless of the cause of such accident.

3.15.5.7 When two or more machines work in tandem and as an interdependent production system, the entire group of machines will be deemed to be non-available if the non-availability of one or more machines renders the entire production system substantially unproductive.

3.15.5.8 The Contractor shall be paid at the hourly rates in the Labour Payment Schedule when the Technical Officer approves a temporary increase in labour to perform the tasks and functions specified in the particular specification, at particular workplaces.

3.16. **PAYMENT CERTIFICATES**

3.16.1 On or about the last day of each month, the Technical Officer will make a progress measurement of the work done in conjunction with the Contractor.

3.16.2 Thereafter the Service Manager will issue a certificate authorising payment of such sum of money as he may consider represents the value of the work referred to in **clause 3.16.1**.

- 3.16.3 The Contractor shall be entitled to receive payment of the amount authorised in the said certificate within 45 days from the date of the Contractor's month-end statement. Such payment will be regarded as an open payment, and both the certificate and payment will be subject to revision and adjustment by the Service Manager if at any time he is of the opinion that the certificate does not represent accurately the value of work completed or to correct previous over or under payments.
- 3.16.4 In the event of failure by Transnet Freight Rail to make payment within the time stipulated in **clause 3.16.3**, he shall pay to the Contractor interest at prime overdraft rate as certified by the Contractor's bankers upon all overdue payments of such certified amounts, from the date on which such payments should have been made. Interest payments shall not be applicable to corrections made in respect of previous over- or underpayments.
- 3.16.5 The Service Manager shall, within 28 days after completion of the Contract, authorise the release of Performance Bond, and submit for approval by the Employer a final payment certificate which, after approval by the latter, shall be issued to the Contractor, thereby certifying both the final completion of the Contract Work and the amount due to the Contractor. The Service Manager may deduct from the Final Payment Certificate any money then due by the Contractor to Transnet Freight Rail under the Contract, and for such provisions for the resolution of any disputes which may at the time exist between the Contractor and Transnet Freight Rail, as is deemed necessary by him.
- 3.16.6 The Service Manager shall, within 14 days after approval by the Employer and subject to **clause 3.16.5**, send the final payment certificate to the Contractor who, by countersigning thereof, shall certify his acceptance of the amount shown due to him as being full and final payment, subject only to the resolution of outstanding disputes.
- 3.16.7 Within 30 days after the receipt of the Contractor's certification, Transnet Freight Rail will remit to the Contractor the balance of all money so due under the Contract in terms of the final payment certificate.
- 3.16.8 Where the Contractor fails to certify the final payment certificate or has not disputed the correctness thereof within three months after its receipt by him, Transnet Freight Rail will deem the Contractor to be in agreement with the final payment certificate and will effect payment in terms thereof.
- 3.16.9 Transnet Freight Rail will not consider or admit any claim arising from the final payment certificate or in connection with the Contract, which has not been lodged with the Service Manager within a period of three months after receipt by the Contractor of the final payment certificate, and the Contractor accepts and acknowledges that by his failure to lodge a claim within the above-stipulated period of three months, he waives such claim and relieves Transnet Freight Rail of responsibility for such claim.
- 3.16.10 Neither the issue of the final payment certificate nor any payment made there under shall release the Contractor from any liability to indemnify Transnet Freight Rail against, and to reimburse it in respect of, any claim made or to be made

against it by a third party for damage or loss sustained by such third party in consequence of any wrongful act or omission of the Contractor, or his employees or agents.

3.17 **DAILY RECORDS AND INSTRUCTION BOOK**

The Contractor shall submit such returns as may be required by the Technical Officer. He shall also provide and keep on each machine a duplicate carbon copy book, A4 size, the Workbook, in which instructions and events concerning the contract work shall be recorded, signed and dated by the Technical Officer or his deputy, and the Contractor.

3.18 **FORMAT OF COMMUNICATION**

- 3.18.1 The Contractor and the Technical Officer shall notify each other in writing of the names of their representatives who will be present during track occupations. These, as well as any changes in the personnel, shall be recorded in the workbook.
- 3.18.2 Before work is commenced, the Technical Officer's deputy will enter in the work book the approximate positions of underground or hidden electrical conductors that may affect, or be affected by, the Work to be done under the Contract, or alternatively, endorse in the work book that no such conductors exist.
- 3.18.3 The Technical Officer shall make the necessary arrangements to move the machinery by rail from one work site to another, and shall give the Contractor written notice of the date and time of departure. Major movements will be planned and the time allowed should be a minimum of 14 days or such shorter period as agreed.
- 3.18.4 The Technical Officer shall give the Contractor a minimum of 14 days written notice to stop work temporarily for a period exceeding 14 consecutive days and a minimum of 14 days written notice to resume work after such temporary stoppage. Such idle time shall not be included in measurements for availability.
- 3.18.5 The Contractor shall point out to the Technical Officer any part of the track or off-track stand where conditions may constitute a danger to the machinery and its ancillary equipment, and record this in the work book. The Contractor shall however repair off-track platforms where work can reasonable be expected to be done by the labour provided with the machine as per the schedule of labour
- 3.18.6 Should the tacho-graph or the event recorder break down, the Technical Officer's deputy will keep a complete written record of the starting and ending times of all events occurring during a track occupation. The Contractor shall sign this record if he agrees, and if he disagrees, he shall indicate on the record the reasons for the disagreement and then sign the document. Such disagreement shall be settled by negotiation between the Technical Officer and the Contractor.
- 3.18.7 The Contractor shall provide and maintain walkie-talkie radio transceivers with a minimum range of 5km in open country. The Technical Officer, in consultation with the Contractor, will allocate suitable frequencies within the 450MHz to

470MHz band for configuration of the radio equipment. The Contractor will be given seven day's written notice when additional radios are required.

3.19 **KEY PERSONNEL**

- 3.19.1 Service Manager is the person appointed by the Employer (Transnet Freight Rail) from time to time to administer the Contract according to the powers and rights held by and obligations placed upon him in terms of the Contract.
- 3.19.2 Machinery shall not be operated as a train unless a representative of Transnet Freight Rail, appointed by the Technical Officer, who is authorised to give instructions regarding the movement of the machinery, travels on the machinery to its destination. The Contractor shall assist Transnet Freight Rail in all matters concerning the safety of trains, persons and the machinery.
- 3.19.3 At least one qualified and experienced mechanic shall be in attendance at all times during track occupations and when the machinery travels as a train.
- 3.19.4 The Contractor shall appoint one suitably qualified person as his representative at each occupation.
- 3.19.5 The Contractor and the Technical Officer shall notify each other in writing of the names of their representatives who will be present during track occupations. These, as well as any changes in the personnel, shall be recorded in the workbook.
- 3.19.6 At the start of each occupation the Contractor shall, in the presence of the Technical Officer's deputy, perform the daily tests laid down by the Technical Officer. The brakes shall be briefly applied at low speed when traveling on level track or upgrade. If in the opinion of the Technical Officer's deputy the brakes do not function satisfactorily, the machinery shall be removed immediately to a staging point. Machinery staged due to defective brakes will be regarded as non-available.
- 3.19.7 The warning system shall be activated by an appointed employee of the Contractor. The Contractor's appointed employee shall be in continuous radio communication with Transnet's protection flagmen who will warn the Contractor's employee of approaching trains on adjacent lines.

3.20 **MANAGEMENT MEETINGS**

- 3.20.1 On or about the last day of each month, the Technical Officer will make a progress measurement of the work done in conjunction with the Contractor.

3.21 **FORMS OF CONTRACT ADMINISTRATION**

- 3.21.1 The Service Manager shall, within 28 days after completion of the Contract, authorise the release of Performance Bond, and submit for approval by the Employer a final payment certificate which, after approval by the latter, shall be issued to the Contractor, thereby certifying both the final completion of the Contract Work and the amount due to the Contractor. The Service Manager may deduct from the Final Payment Certificate any money then due by the Contractor

to Transnet Freight Rail under the Contract, and for such provisions for the resolution of any disputes which may at the time exist between the Contractor and Transnet Freight Rail, as is deemed necessary by him.

3.22 **PROFESSIONAL INDEMNITY INSURANCES**

- 3.22.1 The Contractor shall take every precaution not to cause damage to property or injury to any person as a result of his execution of the work.
- 3.22.2 Transnet will insure in the joint names of Transnet Freight Rail and the Contractor against all legal liabilities which may arise from the accidental death of or injury to third party persons and/or accidental loss of, or damage to third party property in the course of the Contractor's execution of the Work.
- 3.22.3 The insurance policy will be for an indemnity limit as stated in the policy and will be maintained in force during the entire period of the Contract.
- 3.22.4 The Contractor shall in the case of a liability arising out of a negligent act or omission on the part of the Contractor is responsible for payment of the amount(s) stated in the policy as being the deductible.
- 3.22.5 The insurance to be provided in terms clause 6.2.2 of Contract Data will have a cross liabilities cover in respect of which each party shall be separately indemnified in respect of claims made by any one of them against the other as though a separate policy has been issued to each of them.
- 3.22.6 The Contractor shall insure against loss of or damage to his own machinery, tools, equipment, materials and site establishments and any consequential financial losses arising from such damage. This insurance is to be maintained in force during the entire period of the Contract. The Contractor shall likewise arrange his own insurances in respect of motor vehicle liabilities and employer's common law liabilities of the Contractor.

3.23 **HEALTH AND SAFETY REQUIREMENT AND PROCEDURE**

- 3.23.1 The Contractor shall comply with all applicable legislation and the Transnet safety requirements. The cost of such compliance shall be borne by the Contractor and shall be deemed to have been allowed for in the rates and prices in the Contract.
- 3.23.2 The Contractor shall, in particular, comply with the following Acts: -
- 3.23.2.1 The Compensation for Occupational Injuries and Diseases Act, (Act 130 of 1993); The Contractor shall produce proof of his registration and good standing with the Compensation Commissioner in terms of the Act.
- 3.23.2.2 The Occupational Health and Safety Act (Act 85 of 1993); The Contractor is in terms of section 37(2) of Act 85 of 1993, deemed to be an employer in his own right with duties as prescribed in the Act and agrees to ensure that all work will be performed or machinery and plant used in accordance with the provisions of the Act in respect of all persons in his employ, other persons on the premises or the site or place of the Work or on the Work to be executed

by him and under his control in terms of the Contract. The agreements in this Contract and all documents attached or referred to, form an integral part of the arrangements and procedures stipulated in the aforementioned section.

- 3.23.3 The Contractor shall comply with the current Transnet Specification E.4E, Safety Arrangements and Procedural Compliance with the Occupational Health and Safety Act, Act 85 of 1993 and Regulations as applicable, and shall, before commencement with the execution of the Contract, submit to the Technical Officer,
- documentary proof of his procedural compliance with the Act and
 - particulars of his Health and Safety Policy and Programme to be implemented on the Work in accordance with Specification E.4E.

The Contractor's Health and Safety Policy and Programme will be subject to the agreement of the Technical Officer, who may order supplementary and/or additional safety arrangements and/or different safe working methods to ensure compliance by the Contractor with his obligations as an employer in terms of the Act.

- 3.23.4 The Contractor shall comply with the current Specification for Work On, Over, Under or Adjacent to Railway Lines and near High Voltage Equipment - E7/1, where applicable, and shall take particular care of the safety of his employees working on or in close proximity to a railway line during track occupations as well as under normal operational conditions.
- 3.23.5 He shall also comply with all other safety requirements, regulations and guidelines of Transnet applicable to the nature of Work carried out under the Contract and shall obtain the particulars thereof from the Technical Officer.
- 3.23.6 In addition to compliance with clause 3.23.2 hereof, the Contractor shall report all incidents contemplated by Section 24 of the Act in writing to the Technical Officer. Any incident resulting in the death of or injury to any person on the WORK shall be reported within 24 hours of its occurrence and any other incident shall be reported within 48 hours of its occurrence.
- 3.23.7 The term "safety rules" is used in a generic sense and refers to all Transnet arrangements, procedures and requirements, pertaining to safety, specified or incorporated by reference in the contract documents, such as the Specification for Work On, Over, Under or Adjacent to Railway Lines and near High Voltage Equipment, E7/1, the Electrical Safety Instructions - High Voltage Equipment. (Copies of these documents are available for inspection at the offices of Transnet Freight Rail.)

3.24 **PARTICULAR SPECIFICATIONS**

Works specification

3.24.1 **Generic specifications:**

- E4B(November 1996): Minimum communal health requirements in areas outside the jurisdiction of Local Authority.
- E4E(August 2006) – Safety Arrangements and Procedural Compliance with the Occupational Health and Safety Act.

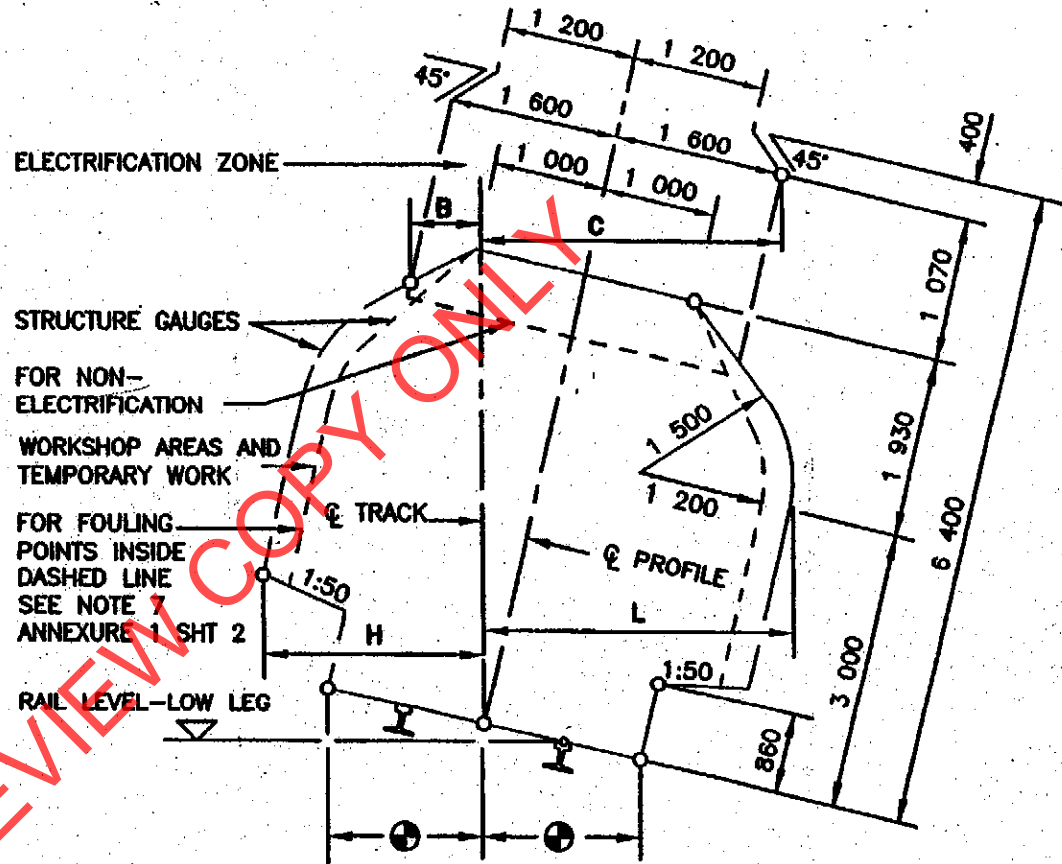
- Addendum No.1 to the E7/1 (July 1998) specification.
- Specification E7/1(July 1998) for works on, over, under or adjacent to railway lines and near high voltage overhead lines.

3.24.1 **Project specifications**

- Particular specifications for Machines and service required

PRIEVIEW COPY ONLY

| RADIUS (m) | WITH CANT | | NO CANT | WITH CANT | |
|---------------|-----------|--------|---------|-----------|--------|
| | H (mm) | L (mm) | H & L | B (mm) | C (mm) |
| 90 | 2 730 | 3 090 | 2 780 | 1 130 | 2 100 |
| 100 | 2 700 | 3 030 | 2 750 | 1 140 | 2 050 |
| 120 | 2 650 | 2 970 | 2 700 | 1 160 | 2 010 |
| 140 | 2 620 | 2 920 | 2 660 | 1 175 | 1 990 |
| 170 | 2 590 | 2 870 | 2 630 | 1 190 | 1 970 |
| 200 | 2 570 | 2 820 | 2 600 | 1 205 | 1 950 |
| 250 | 2 550 | 2 790 | 2 580 | 1 230 | 1 920 |
| 300 | 2 540 | 2 760 | 2 560 | 1 250 | 1 900 |
| 350 | 2 530 | 2 730 | 2 540 | 1 270 | 1 890 |
| 400 | 2 520 | 2 710 | 2 530 | 1 290 | 1 875 |
| 500 | 2 510 | 2 680 | 2 520 | 1 320 | 1 850 |
| 600 | 2 500 | 2 660 | 2 510 | 1 340 | 1 830 |
| 800 | 2 490 | 2 620 | 2 500 | 1 365 | 1 790 |
| 1 000 | 2 480 | 2 600 | 2 490 | 1 380 | 1 760 |
| 1 200 | 2 480 | 2 580 | 2 490 | 1 200 | 1 730 |
| 1 500 | 2 480 | 2 550 | 2 480 | 1 415 | 1 700 |
| 2 000 | 2 480 | 2 500 | 2 480 | 1 440 | 1 660 |
| 3 000 | 2 470 | 2 470 | 2 470 | 1 500 | 1 600 |
| >5 000 | 2 460 | 2 460 | 2 460 | 1 600 | 1 600 |



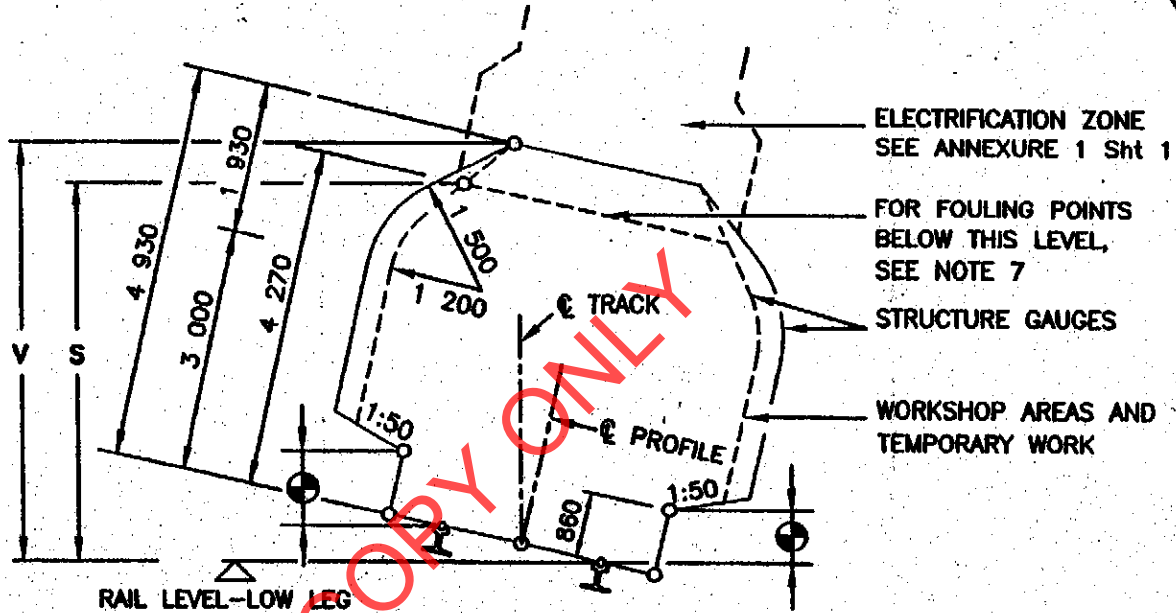
ANNEXURE 1
SHEET 1 of 5
AMENDMENT

HORIZONTAL CLEARANCES :
1 065mm TRACK GAUGE

REMARKS:

1. H AND B IS THE REQUIRED HORIZONTAL CLEARANCE ON THE OUTSIDE OF THE CURVE BASED ON MINIMUM CANT.
2. L AND C IS THE REQUIRED HORIZONTAL CLEARANCE ON THE INSIDE OF THE CURVE BASED ON MAXIMUM CANT.
3. INTERMEDIATE VALUES MAY BE INTERPOLATED BY THE ENGINEER IN CHARGE.
4. FOR WORKSHOP AREAS AND TEMPORARY WORK, CLEARANCES H AND L MAY BE REDUCED BY 300mm.
5. Ⓢ SEE ANNEXURE 1 SHEET 3 FOR PLATFORM CLEARANCES.
6. ALSO REFER TO REMARKS 4 TO 8 OF ANNEXURE 1 SHEET 2.

| LOCATION | RADIUS (mm) | NOT ELECTRIFIED S (mm) | ELECTRIFIED (PRESENT OR FUTURE) | |
|---|-------------|---------------------------|---------------------------------|----------------|
| | | | 3kV & 25kV V (mm) | 50kV V (mm) |
| ALL AREAS OTHER THAN THOSE INDICATED BY * BELOW | 100 | 4 470 | 5 050 | 5 400 |
| | 300 | 4 410 | 5 020 | 5 370 |
| | 600 | 4 370 | 5 000 | 5 350 |
| | 1 000 | 4 350 | 4 990 | 5 340 |
| | 1 500 | 4 310 | 4 960 | 5 310 |
| | 2 000 | 4 290 | 4 940 | 5 290 |
| | >3 000 | 4 270 | 4 930 | 5 280 |
| * OVER OR NEAR POINTS AND CROSSING IF REQUIRED BY ELECTRICAL IRRESPECTIVE OF RADIUS | | | 5 650 | 6 000 |



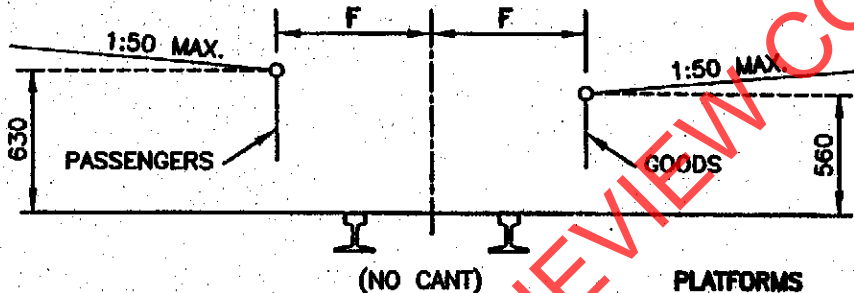
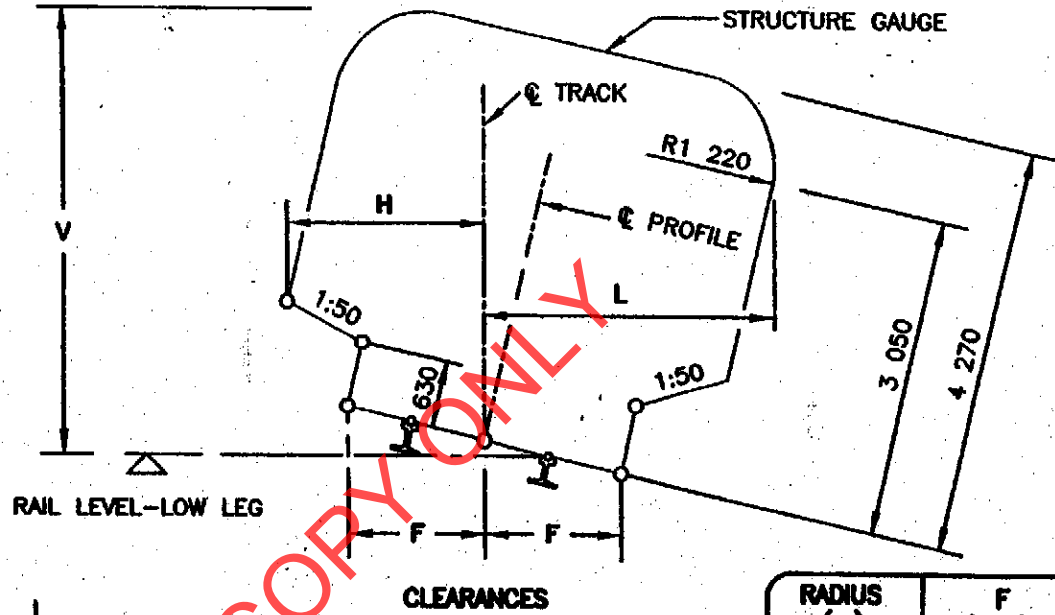
ANNEXURE 1
SHEET 2 of 5
AMENDMENT

VERTICAL CLEARANCES :
1 065mm TRACK GAUGE

REMARKS:

1. V IS THE REQUIRED VERTICAL CLEARANCE EXCEPT WHERE REDUCED CLEARANCE S APPLIES.
2. S IS THE MINIMUM VERTICAL CLEARANCE FOR STRUCTURES AND TEMPORARY WORK OVER NON-ELECTRIFIED LINES.
3. INTERMEDIATE VALUES MAY BE INTERPOLATED BY THE ENGINEER IN CHARGE.
4. FOR APPLICATION AT CURVES
 - 4.1 APPLY INCREASED CLEARANCES FOR CURVES TO POINTS 3m BEYOND THE ENDS OF THE CIRCULAR CURVE.
 - 4.2 REDUCE CLEARANCES AT A UNIFORM RATE OVER THE REMAINDER OF THE TRANSITION CURVE.
 - 4.3 FOR NON-TRANSITIONED CURVES REDUCE AT A UNIFORM RATE OVER A LENGTH OF 15m ALONG STRAIGHTS.
5. NEW STRUCTURES: SEE BRIDGE CODE.
6. TUNNELS: SEE DRAWING BE 82-35.
7. FOULING POINTS: SEE CLAUSE 8.1.
8. CLEARANCES ARE BASED ON 15m BOGIE CENTRES AND 21,2m VEHICLE BODY LENGTH.
9. SEE ANNEXURE 1 SHEET 3 FOR PLATFORM CLEARANCES.

| RADIUS (m) | WITH CANT | | NO CANT | V (mm) |
|------------|-----------|--------|------------|--------|
| | H (mm) | L (mm) | H & L (mm) | |
| 50 | 2 370 | 2 490 | 2 400 | 4 320 |
| 70 | 2 310 | 2 420 | 2 330 | 4 310 |
| 100 | 2 260 | 2 370 | 2 280 | 4 310 |
| 140 | 2 220 | 2 340 | 2 250 | 4 310 |
| 200 | 2 200 | 2 300 | 2 220 | 4 300 |
| 300 | 2 190 | 2 270 | 2 200 | 4 300 |
| 500 | 2 180 | 2 230 | 2 190 | 4 290 |
| 700 | 2 170 | 2 200 | 2 180 | 4 270 |
| 1 000 | 2 170 | 2 170 | 2 170 | 4 270 |
| >2 000 | 2 160 | 2 160 | 2 160 | 4 270 |



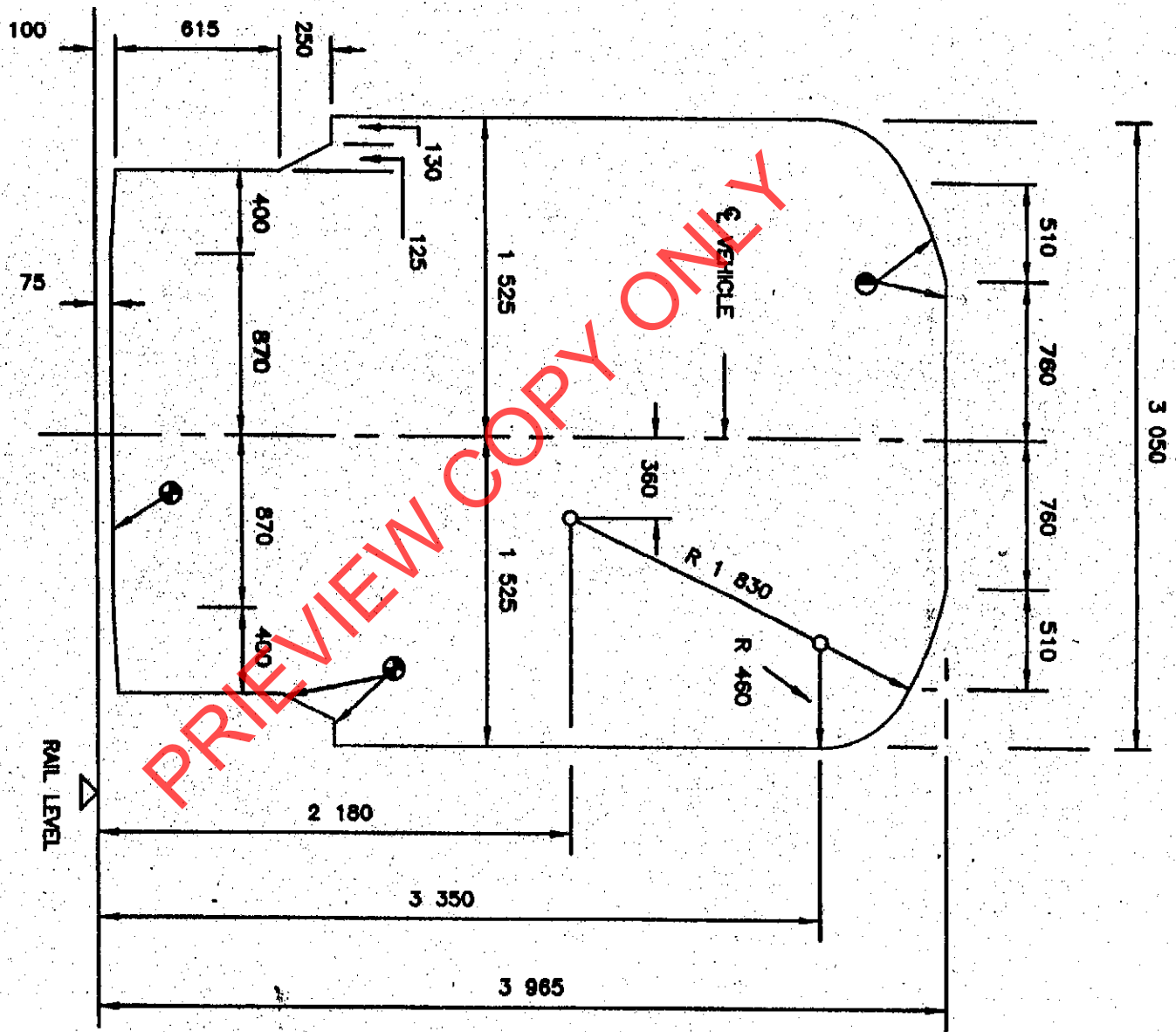
| RADIUS (m) | F (mm) |
|------------|--------|
| 50 | 1 550 |
| 60 | 1 510 |
| 80 | 1 480 |
| 100 | 1 430 |
| 120 | 1 410 |
| 140 | 1 390 |
| 170 | 1 380 |
| 200 | 1 370 |
| 250 | 1 360 |
| 300 | 1 350 |
| 600 | 1 330 |
| 1 000 | 1 320 |
| >2 000 | 1 320 |
| STRAIGHT | 1 310 |

REMARKS:

- H IS THE MINIMUM HORIZONTAL CLEARANCE ON THE OUTSIDE OF THE CURVE BASED ON MINIMUM CANT.
- L IS THE MINIMUM HORIZONTAL CLEARANCE ON THE INSIDE OF THE CURVE BASED ON MAXIMUM CANT.
- V IS THE MINIMUM VERTICAL CLEARANCE.
- FOR APPLICATION AT CURVES:
 - 4.1 APPLY INCREASED CLEARANCES FOR CURVES TO POINTS 2m BEYOND THE ENDS OF THE CIRCULAR CURVE.
 - 4.2 REDUCE CLEARANCES AT A UNIFORM RATE OVER THE REMAINDER OF THE TRANSITION CURVE.
 - 4.3 FOR NON-TRANSITIONED CURVES REDUCE AT A UNIFORM RATE OVER A LENGTH OF 18m ALONG STRAIGHTS.
- INTERMEDIATE VALUES MAY BE INTERPOLATED BY THE ENGINEER IN CHARGE.
- ALSO REFER TO REMARKS 5, 6 AND 7 OF ANNEXURE 1 SHEET 2.
- CLEARANCES ARE BASED ON 9 700mm BOGIE CENTRES AND 13 700mm VEHICLE BODY LENGTH.
- SEE ANNEXURE 1 SHEET 3 FOR STRUCTURES ON PLATFORMS.

ANNEXURE 2
SHEET 1 of 2
AMENDMENT

VEHICLE GAUGE :
1 065mm TRACK GAUGE

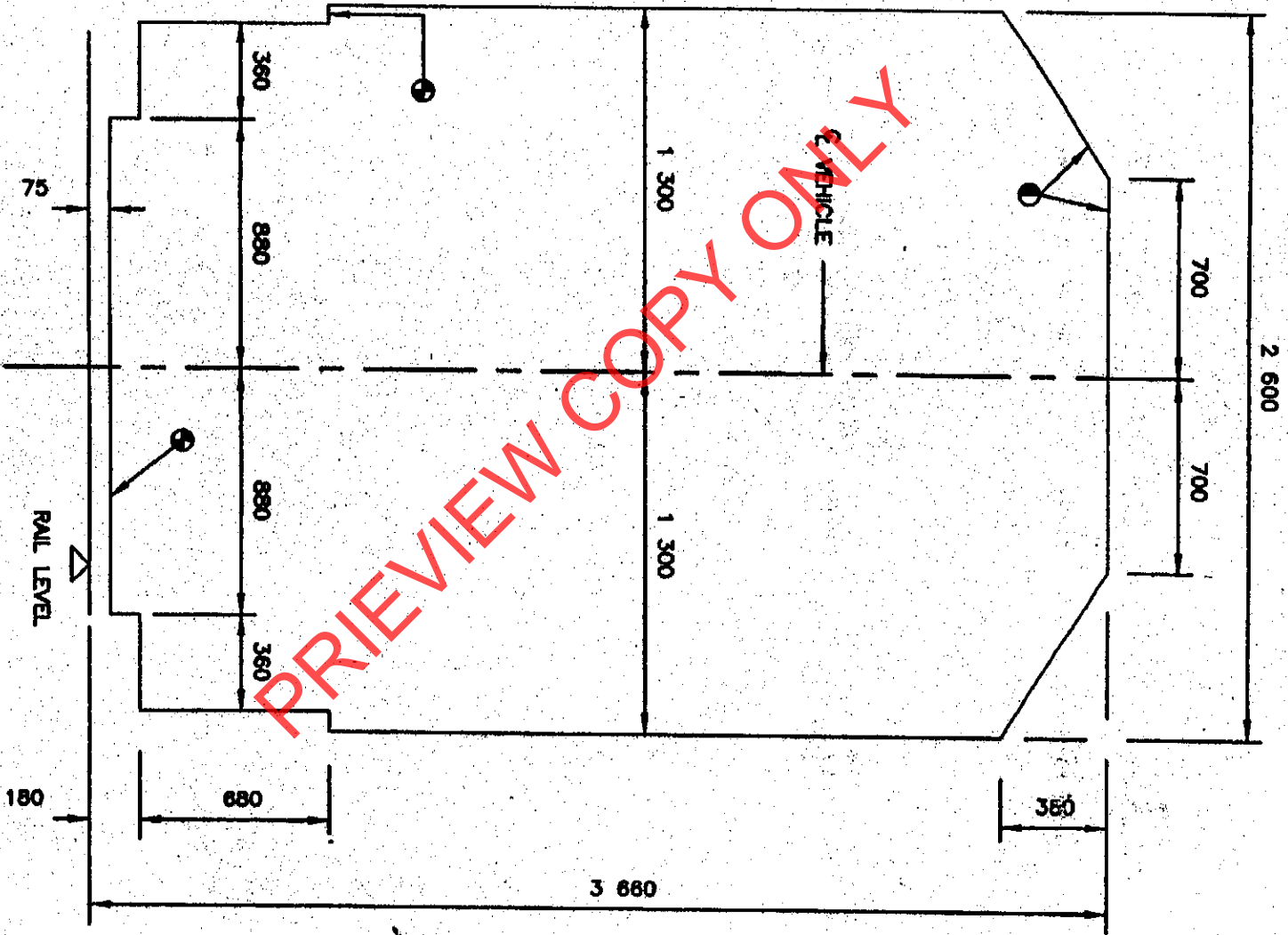


REMARKS:

1. ⓪ WITHOUT LOAD AND WITH NEW TYRES, VEHICLE MUST NOT BE HIGHER THAN THIS OUTLINE.
2. Ⓛ WITH FULL LOAD AND WORN TYRES, VEHICLE MUST NOT BE LOWER THAN THIS OUTLINE.

ANNEXURE 2
SHEET 2 of 2
AMENDMENT

VEHICLE GAUGE :
610mm TRACK GAUGE

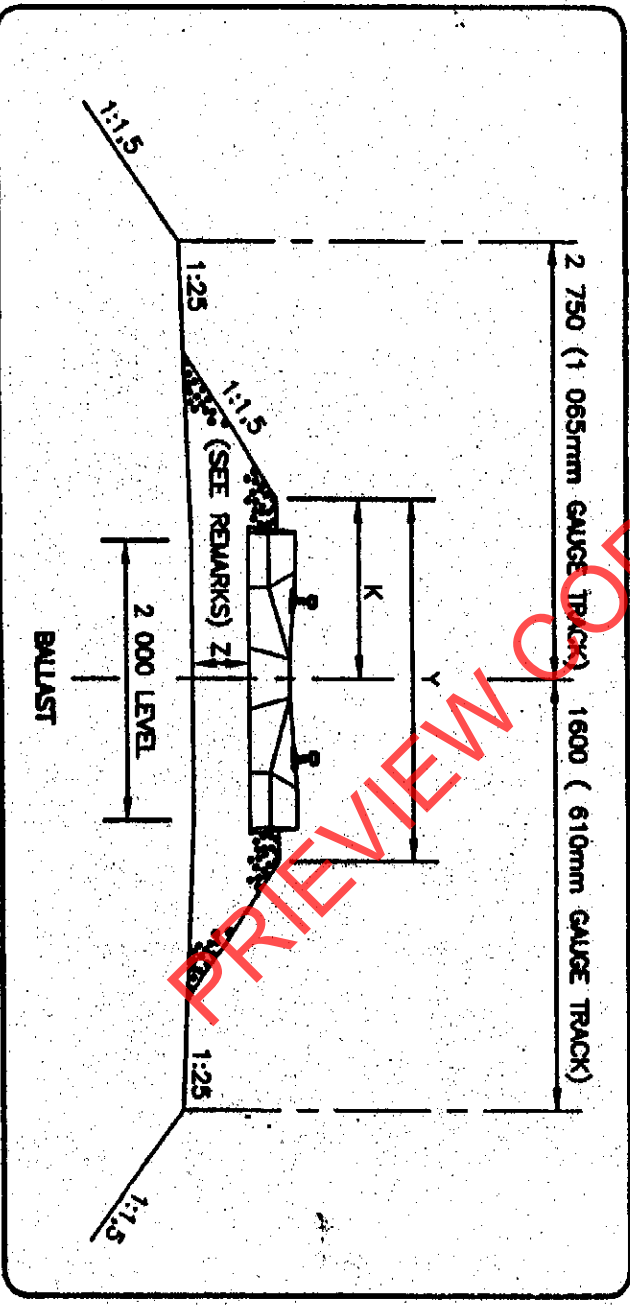
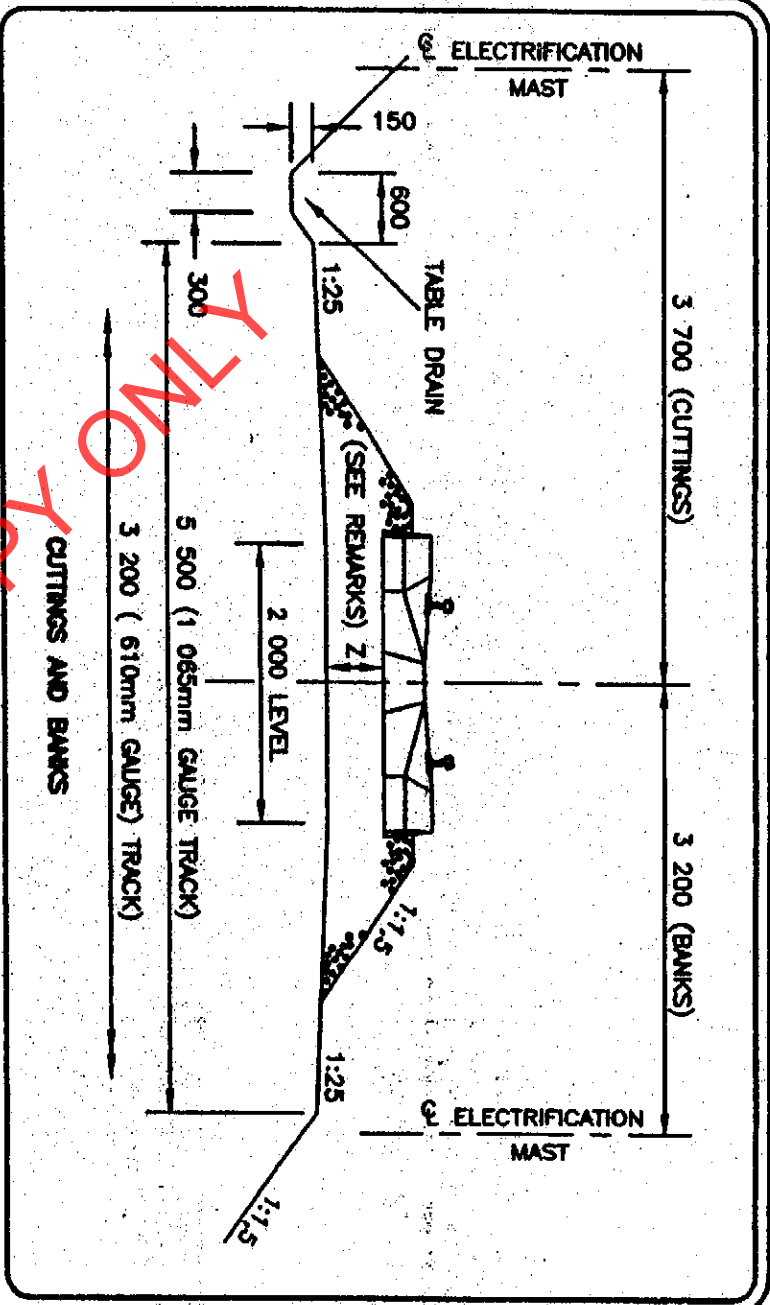


PRIEVIEW COPY ONLY

REMARKS:

1. ⓪ WITHOUT LOAD AND WITH NEW TYRES, VEHICLE MUST NOT BE HIGHER THAN THIS OUTLINE.
2. ⊕ WITH FULL LOAD AND WORN TYRES, VEHICLE MUST NOT BE LOWER THAN THIS OUTLINE.

FORMATION AND BALLAST :
MINIMUM REQUIREMENTS



| CLASS OF LINE | Z (mm) | Y (mm) | K (mm) | QUANTITY (m ³ /m) | | WOOD |
|---------------|--------|--------|--------|--------------------------------|--------------------------------|-------|
| | | | | P ₁ /F ₁ | P ₂ /F ₂ | |
| S | 300 | 2 800 | 1 400 | 1 600 | - | - |
| N1 | 280 | 2 700 | 1 350 | 1 500 | 1 400 | - |
| N2 | 200 | 2 700 | 1 350 | - | 1 200 | 1 100 |

REMARKS:

1. Z TO BE MEASURED UNDER THE LOW LEG RAIL ON CURVES.
2. DEPTH OF BALLAST (Z) ARE TO BE MEASURED IN THE CONSOLIDATED STATE, THAT IS AFTER 100 000 GROSS TON TRAIN TRAFFIC.

DESTRESSING AND WORKING
TEMPERATURE RANGES

| SECTION | DESTRESSING RANGES | | WORKING RANGES FOR RAIL LAYING | | |
|---------------------------------|--------------------|-------------|--------------------------------|---------|---------|
| | THROUGH LINES | YARD TRACKS | A | B | C |
| KLERKSDORP - * POTCHERSTROOM | 20 - 35 | 25 - 30 | 20 - 40 | 15 - 50 | 15 - 55 |
| POTCHERSTROOM - * KRUGERSDORP | 20 - 40 | 25 - 35 | 15 - 45 | 15 - 55 | 15 - 55 |
| KRUGERSDORP - JOHANNESBURG | 15 - 40 | 20 - 35 | 10 - 45 | 10 - 55 | 10 - 55 |
| JOHANNESBURG - OLIFANTSFONTEIN | 20 - 40 | 25 - 35 | 15 - 45 | 15 - 55 | 15 - 55 |
| POTCHERSTROOM - VERENIGING | 20 - 40 | 25 - 35 | 15 - 45 | 15 - 55 | 15 - 55 |
| VERENIGING - GERALSTON | 20 - 40 | 25 - 35 | 15 - 45 | 15 - 55 | 15 - 55 |
| VOLKSRUST - * STANDERTON | 15 - 35 | 20 - 30 | 10 - 40 | 10 - 50 | 10 - 50 |
| STANDERTON - * HEIDELBERG | 20 - 35 | 25 - 30 | 15 - 40 | 15 - 50 | 15 - 50 |
| HEIDELBERG - GERALSTON | 20 - 40 | 25 - 35 | 15 - 45 | 15 - 55 | 15 - 55 |
| BALFOUR NORTH - * GROOTVLEI | 20 - 35 | 25 - 30 | 15 - 40 | 15 - 50 | 15 - 50 |
| GROOTVLEI - REDAN | 20 - 40 | 25 - 35 | 15 - 45 | 15 - 55 | 15 - 55 |
| FIRHAM - VREDE | 20 - 35 | 25 - 30 | 15 - 40 | 15 - 50 | 15 - 50 |
| VOLKSRUST - BREYTEN | 15 - 40 | 25 - 35 | 10 - 45 | 15 - 55 | 15 - 55 |
| BETHAL - SPRINGS | 20 - 40 | 25 - 35 | 15 - 45 | 15 - 55 | 15 - 55 |
| SPRINGS - KATDIE | 20 - 40 | 25 - 35 | 15 - 45 | 15 - 55 | 15 - 55 |
| MIDWAY - HOUTHELMEL | 20 - 35 | 25 - 30 | 15 - 40 | 15 - 50 | 15 - 50 |
| BANK - LANGLAAGTE | 20 - 35 | 25 - 30 | 15 - 40 | 15 - 50 | 15 - 50 |
| MARKENG - * KRUGERSDORP | 25 - 40 | 30 - 35 | 20 - 45 | 20 - 50 | 20 - 55 |
| APEX - WITBANK | 20 - 35 | 25 - 30 | 15 - 40 | 15 - 50 | 15 - 50 |
| DELMAS - HANDEKIP | 20 - 35 | 25 - 30 | 15 - 40 | 15 - 50 | 15 - 50 |
| SENTRARAAND AREA | 15 - 35 | 20 - 30 | 10 - 40 | 10 - 50 | 10 - 50 |
| JOHANNESBURG CENTRAL METRO AREA | 15 - 40 | 20 - 35 | 10 - 45 | 10 - 55 | 10 - 55 |
| OLIFANTSFONTEIN - * BREKE | 15 - 40 | 20 - 35 | 10 - 45 | 10 - 55 | 10 - 55 |
| RENE - PRETORIA | 20 - 40 | 25 - 35 | 15 - 45 | 15 - 55 | 15 - 55 |
| PRETORIA - * WARABATHS | 20 - 40 | 25 - 35 | 15 - 45 | 15 - 55 | 15 - 55 |
| WARABATHS - * POTJETERSRUS | 20 - 45 | 25 - 40 | 15 - 55 | 15 - 60 | 15 - 60 |
| POTJETERSRUS - BETERBROE | 20 - 45 | 25 - 40 | 15 - 55 | 15 - 60 | 15 - 60 |
| * PRETORIA - * WATERVAL BOVEN | 20 - 40 | 25 - 35 | 15 - 50 | 15 - 55 | 15 - 55 |
| WATERVAL BOVEN - * NELSPRUIT | 20 - 45 | 25 - 40 | 15 - 55 | 15 - 60 | 15 - 60 |
| NELSPRUIT - KONAIFPOORT | 25 - 45 | 30 - 40 | 20 - 55 | 20 - 60 | 20 - 60 |
| HERCULES - MAGALESBURG | 20 - 40 | 25 - 35 | 15 - 45 | 15 - 55 | 15 - 55 |
| PRETORIA - BRITS | 20 - 40 | 25 - 35 | 15 - 45 | 15 - 55 | 15 - 55 |
| RUSTENBURG - * THABAZIMBI | 20 - 40 | 25 - 35 | 15 - 45 | 15 - 55 | 15 - 55 |
| RUSTENBURG - * ELSRUS | 25 - 40 | 30 - 35 | 20 - 45 | 20 - 55 | 20 - 55 |
| THABAZIMBI - ATLANTA | 20 - 40 | 25 - 35 | 15 - 45 | 15 - 55 | 15 - 55 |
| NTLSTROOM - VALLWATER | 20 - 40 | 25 - 35 | 15 - 45 | 15 - 55 | 15 - 55 |
| MABOKSPRUIT - ZEBEDELA | 20 - 40 | 25 - 35 | 15 - 45 | 15 - 55 | 15 - 55 |
| PENWANSRIVER - IANBELE HALL | 25 - 40 | 30 - 35 | 20 - 45 | 20 - 55 | 20 - 55 |
| RAYTON - CILLMAN | 25 - 45 | 30 - 40 | 20 - 50 | 20 - 60 | 20 - 60 |
| GROENBURG - KAAPVLIEDEN | 25 - 45 | 30 - 40 | 20 - 50 | 20 - 60 | 20 - 60 |
| HOTSPRUIT - PHALABORWA | 20 - 45 | 25 - 40 | 15 - 50 | 15 - 60 | 15 - 60 |
| * KAAPVLIEDEN - BARBERTON | 20 - 35 | 25 - 30 | 15 - 40 | 15 - 50 | 15 - 50 |
| * NELSPRUIT - GVSROOP | 20 - 45 | 25 - 40 | 15 - 45 | 15 - 55 | 15 - 55 |
| CIRUS - PLUSTON | 20 - 40 | 25 - 35 | 15 - 45 | 15 - 55 | 15 - 55 |
| BELFAST - STELPOORT | 20 - 40 | 25 - 35 | 15 - 45 | 15 - 55 | 15 - 55 |
| DERVENT - ROOSSENEKAL | 20 - 40 | 25 - 35 | 15 - 45 | 15 - 55 | 15 - 55 |
| PRETORIA CENTRAL METRO AREA | 20 - 40 | 25 - 35 | 15 - 45 | 15 - 55 | 15 - 55 |
| SALDANHA - BAMBOESBAAI | 20 - 50 | 25 - 45 | 15 - 55 | 15 - 60 | 15 - 60 |
| * BAMBOESBAAI - SISHEN | 25 - 40 | 30 - 35 | 20 - 45 | 20 - 55 | 20 - 55 |
| RICHARDSBAY - ULUNDI | 20 - 45 | - | 20 - 55 | 15 - 65 | 15 - 65 |
| * ULUNDI - PET RETEF | 20 - 40 | 25 - 35 | 20 - 50 | 15 - 55 | 15 - 55 |
| PET RETEF - * SHEEPMORE | 20 - 40 | 25 - 35 | 20 - 50 | 15 - 55 | 15 - 55 |
| SHEEPMORE - ERWELD | 15 - 35 | 20 - 30 | 15 - 45 | 10 - 50 | 10 - 50 |
| * ERWELD - BROODSNIERSPLAAS | 15 - 40 | 20 - 35 | 15 - 50 | 10 - 55 | 10 - 55 |
| BROODSNIERSPLAAS - OGIES | 15 - 40 | 20 - 35 | 15 - 50 | 10 - 55 | 10 - 55 |

REMARKS:

1. RAIL TEMPERATURES IN DEGREE CELSIUS.
2. USE A RAIL TENSOR WHEN THE DIFFERENCE IN THE 'A' RANGE IS 10° CELSIUS OR SMALLER.
3. * DENOTES "EXCLUDED".