Transnet Freight Rail

an Operating Division **TRANSNET SOC LTD**

[Registration Number 1990/000900/30]

REQUEST FOR PROPOSAL (RFP)

MAINTENANCE OF RAILWAY TRACK WITH ON-TRACK BALLAST TAMPING DUAL PURPOSE MACHINES COUNTRYWIDE ON AN 'AS AND WHEN' REQUIRED BASIS FOR A PERIOD OF TWELVE (12) MONTHS.

RFP NUMBER	**: SIC23021CIDB/ HOAC-HO-42986**
ISSUE DATE	**: 05 October 2023**
NON-COMPULSORY BRIEFING	**: N/A**
CLOSING DATE	**: 19 OCTOBER 2023**
CLOSING TIME	**: 12h00pm**
TENDER VALIDITY PERIOD	**: 11 JANUARY 2024**

Contents

Number **Heading**

T1.1 TENDER NOTICE AND INVITATION TO TENDER

SECTION 1: NOTICE TO TENDERERS

1. INVITATION TO TENDER

Responses to this Tender [hereinafter referred to as a **Tender**] are requested from persons, companies, close corporations or enterprises [hereinafter referred to as a Tenderer].

DESCRIPTION	Maintenance of Railway Track with On-Track Ballast Tamping Dual Purpose Machines Countrywide on an 'As and When" required basis for a period of Twelve (12) months.
TENDER DOWNLOADING	**This Tender may be downloaded directly from the National Treasury eTender Publication Portal FREE OF CHARGE at** **Transnet Freight Rail website on the following links; www.etenders.gov.za or www.transnetfreightrailtfr.net/Supplier/Pages/Tenders.aspx** **NOTE:** **1.** It is the responsibility of the tenderer to ensure downloading or receipt of a complete RFP all specifications, drawings and annexures.
ISSUE DATE	**Tenderers can download the document from 05 October 2023 until 18 October 2023**
NON-COMPULSORY BRIEFING	**No briefing** but should Respondents have specific queries they should email these to the Transnet employee(s) indicated in paragraph 2 [Communication] below:
CLOSING DATE	**12:00pm on 19 October 2023** Tenderers must ensure that tenders are uploaded timeously onto the system. If a tender is late, it will not be accepted for consideration. Transnet has implemented a new electronic tender submission system, the e-Tender Submission Portal, in line with the overall Transnet digitalization strategy where suppliers can view advertised tenders, register their information, log their intent to respond to bids and upload their bid proposals/responses on to the system. **RESPONDENTS ARE TO UPLOAD THEIR BID RESPONSE PROPOSALS ONTO THE TRANSNET SYSTEM AGAINST EACH TENDER/RFQ SELECTED.** The Transnet e-Tender Submission Portal can be accessed as follows: ▪ Log on to the Transnet eTenders management platform website/Portal (transnetetenders.azurewebsites.net) (please use **Google Chrome** to access Transnet link/site free of charge); ▪ Click on "ADVERTISED TENDERS" to view advertised tenders; ▪ Click on "SIGN IN/REGISTER – for bidder to register their information (must fill in all mandatory information); ▪ Click on "SIGN IN/REGISTER" - to sign in if already registered; ▪ Toggle (click to switch) the "Log an Intent" button to submit a bid; ▪ Submit bid documents by uploading them into the system against each tender selected. No late submissions will be accepted. The bidder guide can be found on the Transnet Portal transnetetenders.azurewebsites.net

2. Communication

Specific queries relating to this RFP before the closing date of the RFP should be submitted to **Phumudzo Gadivhana [**Phumudzo.Gadivhana@transnet.net], Prudence Nkabinde Prudence.Nkabinde@transnet.net before **12:00 pm on 12 October 2023**. In the interest of fairness and transparency Transnet's response to such a query will then be made available to other bidders.

It is prohibited for Respondents to attempt, either directly or indirectly, to canvass any officer or employee of Transnet in respect of this RFP between the closing date and the date of the award of the business.

Respondents found to be in collusion with one another will be automatically disqualified and restricted from doing business with organs of state for a specified period.

Respondents may also, at any time after the closing date of the RFP, communicate with the name of delegated individual on any matter relating to its RFP response:

Telephone 011 584 0821 Email: Prudence.Nkabine@transnet.net

3. TENDER SUBMISSION

Transnet has implemented a new electronic tender submission system, the e-Tender Submission Portal, in line with the overall Transnet digitalization strategy where suppliers can view advertised tenders, register their information, log their intent to respond to bids and upload their bid proposals/responses on to the system.

a) The Transnet e-Tender Submission Portal can be accessed as follows:
   - Log on to the Transnet eTenders management platform website (https://www.transnet.net);
   - Click on "TENDERS";
   - Scroll towards the bottom right hand side of the page;
   - On the blue window click on "register on our new eTender Portal";
   - Click on "ADVERTISED TENDERS" to view advertised tenders;
   - Click on "SIGN IN/REGISTER – for bidder to register their information (must fill in all mandatory information);
   - Click on "SIGN IN/REGISTER" - to sign in if already registered;
   - Toggle (click to switch) the "Log an Intent" button to submit a bid;
   - Submit bid documents by uploading them into the system against each tender selected.

b) The tender offers to this tender will be opened as soon as possible after the closing date and time. Transnet shall not, at the opening of tenders, disclose to any other company any confidential details pertaining to the Tender Offers / information received, i.e. pricing, delivery, etc. The names and locations of the Tenderers will be divulged to other Tenderers upon request.

c) Submissions must not contain documents relating to any Tender other than that shown on the submission.

2. **CONFIDENTIALITY**

All information related to this RFP is to be treated with strict confidentiality. In this regard, Tenderers are required to certify that they have acquainted themselves with the Non-Disclosure Agreement. All information related to a subsequent contract, both during and after completion thereof, will be treated with strict confidence. Should the need however arise to divulge any information gleaned from provision of the Works, which is either directly or indirectly related to Transnet's business, written approval to divulge such information must be obtained from Transnet.

3. **DISCLAIMERS**

Tenderers are hereby advised that Transnet is not committed to any course of action as a result of its issuance of this Tender and/or its receipt of a tender offer. In particular, please note that Transnet reserves the right to:

3.1. Award the business to the highest scoring Tenderer/s unless objective criteria justify the award to another tenderer.

3.2. Award the business to the highest scoring Tenderer/s unless objective criteria justify the award to another tenderer. The below requirements will be verified under Objective Criteria:

- Letter indicating that the bidder owns the machine OR signed/stamped leasing agreement between the machine owner and the preferred bidder. The leasing agreement MUST contain the contact details (telephone and email address) of the Leaser for the ease of verification purposes.

3.3. Not necessarily accept the lowest priced tender or an alternative Tender;

3.4. Go to the open market if the quoted rates (for award of work) are deemed unreasonable (not market related);

3.5. Should the Tenderers be awarded business on strength of information furnished by the Tenderer, which after conclusion of the contract is proved to have been incorrect, Transnet reserves the right to terminate the contract;

3.6. Request audited financial statements or other documentation for the purposes of a due diligence exercise, in the absence of other documents such as stamped bank letter confirmation financial support or credible funding organisations or institutions such as NEF, IDC;

3.7. Not accept any changes or purported changes by the Tenderer to the tender rates after the closing date;

3.8. Verify any information supplied by a Tenderer by submitting a tender, the Tenderer/s hereby irrevocably grant the necessary consent to the Transnet to do so;

3.9. Conduct the evaluation process in parallel. The evaluation of Tenderers at any given stage must therefore not be interpreted to mean that Tenderers have necessarily passed any previous stage(s);

3.10. Unless otherwise expressly stated, each tender lodged in response to the invitation to tender shall be deemed to be an offer by the Tenderer. The Employer has the right in its sole and unfettered discretion not to accept any offer.

3.11. Not be held liable if tenderers do not provide the correct contact details during the clarification session and do not receive the latest information regarding this RFP with the possible consequence of being disadvantaged or disqualified as a result thereof.

3.12. Transnet reserves the right to exclude any Tenderers from the tender process who has been convicted of a serious breach of law during the preceding 5 [five] years including but not limited to breaches of the Competition Act 89 of 1998, as amended. Tenderers are required to indicate in tender returnable **T2.2-18** [**Breach of Law**] whether or not they have been found guilty of a serious breach of law during the past five [5] years.

3.13. Transnet reserves the right to award the business to the highest scoring bidder/s unless objective criteria justify the award to another bidder. The following objective criteria will be applied when considering exercising the right not to award business to the highest ranked bidder:

Verify the authenticity and credibility of the Proof of Machine Ownership / Offer to Purchase from the Bank provided by the bidder.

3.14. Transnet intends on splitting the award of this contract to mitigate the risk of security of supply. The split of business will be structured as follows:

Split the award of the contract between more than one Supplier/Service provider, should it at Transnet's discretion be more advantageous in terms of, amongst others, cost or developmental considerations. The number of successful responds may be up to three (3), depending on whether the full requirement of machines is met and the split award will be from the highest ranked tenderer.

Where a split is required, Transnet reserves the right to conduct post-tender negotiations with all the shortlisted respondents in an effort to achieve a market-related price, failure to achieve market related prices will mean no split award.

4. Transnet will not reimburse any Tenderer for any preparatory costs or other work performed in connection with this Tender, whether or not the Tenderer is awarded a contract.

NATIONAL TREASURY'S CENTRAL SUPPLIER DATABASE

Tenderer are required to self-register on National Treasury's Central Supplier Database (CSD), which has been established to centrally administer supplier information for all organs of state and facilitate the verification of certain key supplier information. The CSD can be accessed at https://secure.csd.gov.za/. Tenderer are required to provide the following to Transnet in order to enable it to verify information on the CSD:

Supplier Number…… and Unique registration reference number…… (Tender Data)

RFP CLARIFICATION REQUEST FORM

RFP No: SIC23021CIDB (HOAC-HO-42986)

RFP deadline for questions / RFP Clarifications: **12:00pm 12 October 2023**

TO: Transnet SOC Ltd
ATTENTION: Governance, Transnet Freight Rail Tender Office
EMAIL Prudence.Nkabinde@transnet.net
Cc Phumudzo.Gadivhana@transnet.net
DATE: _____
FROM: _____
_____

Indicate whether this query is general in nature and applicable to all service categories Yes ☐ No ☐

1. For all clarification questions **prior** to the tender closing date and time, direct the communication to the RFP Administrator at **Phumudzo.Gadivhana@transnet.net**
2. For all clarification questions **after** the tender closing date and time, direct the communication to:

TO: Transnet SOC Ltd
ATTENTION: Governance, Transnet Freight Rail Tender Office
EMAIL Prudence.Nkabinde@transnet.net
Cc Phumudzo.Gadivhana@transnet.net
DATE: _____
FROM: _____

REQUEST FOR RFP CLARIFICATION

_____

_____

_____

_____

_____

_____

SIGNED at _____ on this _____ day of _____20___

_____ _____
SIGNATURE OF TENDERER SIGNATURE OF WITNESS

_____ _____
NAME OF TENDERER NAME OF WITNESS

T1.2 TENDER DATA

The conditions of tender are the Standard Conditions of Tender as contained in Annex C of the CIDB Standard for Uniformity in Engineering and Construction Works Contracts. The Standard for Uniformity in Construction Procurement was first published in Board Notice 62 of 2004 in Government Gazette No 26427 of 9 June 2004. It was subsequently amended in Board Notice 67 of 2005 in Government Gazette No 28127 of 14 October 2005, Board Notice 93 of 2006 in Government Gazette No 29138 of 18 August 2006, Board Notice No 9 of 2008 in Government Gazette No 31823 of 30 January 2009, Board Notice 86 of 2010 in Government Gazette No 33239 of 28 May 2010, Board Notice 136 of 2015 in Government Gazette 38960 of 10 July 2015 and Board Notice 423 of 2019 in Government Gazette No 42622 of 8 August 2019.

This edition incorporates the amendments made in Board Notice 423 of 2019 in Government Gazette 42622 of 8 August 2019. (see www.cidb.org.za).

The Standard Conditions of Tender make several references to Tender data for detail that apply specifically to this tender. The Tender Data shall have precedence in the interpretation of any ambiguity or inconsistency between it and the Standard Conditions of Tender.

Each item of data given below is cross-referenced in the left-hand column to the clause in the Standard Conditions of Tender to which it mainly applies.

Clause		**Data**
C.1.1	The *Employer* is	**Transnet SOC Ltd** **(Reg No. 1990/000900/30)**
C.1.2	The tender documents issued by the *Employer* comprise:	
	Part T: The Tender	
	Part T1: Tendering procedures	T1.1 Tender notice and invitation to tender T1.2 Tender data
	Part T2 : Returnable documents	T2.1 List of returnable documents T2.2 Returnable schedules
	Part C: The contract	
	Part C1: Agreements and contract data	C1.1 Form of offer and acceptance C1.2 Contract data (Part 1 & 2) C1.3 Form of Securities
	Part C2: Pricing data	C2.1 Pricing instructions : Option A C2.2 Price List
	Part C3: Scope of work	C3.1 Service Information

	Part C4: Site information	C4.1 Site information

C.1.4	The Employer's agent is:	Procurement Officer
	Name:	Phumudzo Gadivhana
	Address:	15 Girton Road, Inyanda House 2, Parktown
	Tel No.	011 584 0765
	E – mail	Phumudzo.Gadivhana@transnet.net

C.2.1 Only those tenderers who satisfy the following eligibility criteria are eligible to submit tenders:

1. **Stage One - Eligibility in terms of the Construction Industry Development Board:**

a) Only those tenderers who are registered with the CIDB, or are capable of being so prior to the evaluation of submissions, in a contractor grading designation equal to or higher than a contractor grading designation determined in accordance with the sum tendered or a value determined in accordance with Regulation 25 (1B) or 25(7A) of the Construction Industry Development Regulations, designation of **7CE or higher** class of construction work, are eligible to have their tenders evaluated.

b) Joint Venture (JV)
Joint ventures are eligible to submit tenders subject to the following:

2. every member of the joint venture is registered with the CIDB;
3. the lead partner has a contractor grading designation of not lower than one level below the required class of construction works under consideration and possesses the required recognition status.
4. the combined Contractor grading designation calculated in accordance with the Construction Industry Development Regulations is equal to or higher than a Contractor grading designation determined in accordance with the sum tendered for a **7CE or higher** class of construction work or a value determined in accordance with Regulation 25(1B) or 25(7A) of the Construction Industry Development Regulations
5. The tenderer shall provide a certified copy of its signed joint venture agreement

Any tenderer that fails to meet the pre-qualifying criteria will be regarded as an unacceptable tender.

C.2.7 **No Briefing session.** Addenda will be issued/ uploaded on Transnet and NT eTender Portal before the tender closing date, if there will be any.

C.2.12 No alternative tender offers will be considered.

C.2.13.3	Each tender offer shall be in the **English Language.**
C.2.13.5 C2.15.1	The *Employer*'s details and identification details that are to be shown on each tender offer package are as follows: Identification details: The tender documents must be uploaded with: ▪ Name of Tenderer: ▪ Contact person and details: ▪ The Tender Number: SIC23021CIDB (HOAC-HO-42986) ▪ The Tender Description: Maintenance of Railway Track with On-Track Ballast Tamping Machines Dual Purpose Machines Countrywide on an "As and When" required' Basis for a Period of twelve (12) months. Documents must be marked for the attention of: ***Employer*'s Agent:**
C.2.13.9	Telephonic, telegraphic, facsimile or e-mailed tender offers will not be accepted.
C.2.15	The closing time for submission of tender offers is: Time: **12:00pm** on the **19 October 2023** Location: The Transnet e-Tender Submission Portal: transnetetenders.azurewebsites.net **NO LATE TENDERS WILL BE ACCEPTED**
C.2.16	The tender offer validity period is **12 weeks [11 January 2024]** after the closing date. Tenderers are to note that they may be requested to extend the validity period of their tender, on the same terms and conditions, if Transnet's internal evaluation and governance approval processes has not been finalised within the validity period.
C.2.23	The tenderer is required to submit with his tender: 1. A valid Tax Clearance Certificate issued by the South African Revenue Services. **Tenderers also to provide Transnet with a TCS PIN to verify Tenderers compliance status**. 2. A **valid B-BBEE Certificate** from a Verification Agency accredited by the South African Accreditation System [**SANAS**], or a **sworn affidavit** confirming annual turnover and level of black ownership in case of all EMEs and QSEs with 51% black ownership or more together with the tender; 3. A valid CIDB certificate in the correct designated grading; 4. Proof of registration on the Central Supplier Database; 5. Letter of Good Standing with the Workmen's compensation fund by the tendering entity or separate Letters of Good Standing from all members of a newly constituted JV. **Note:** Refer to Section T2.1 for List of Returnable Documents

C.3.11. The procedure for the evaluation of responsive tenders is Price and Preference:

Note: Any tender not complying with the above-mentioned requirements, will be regarded as non-responsive and will therefore not be considered for further evaluation. This note must be read in conjunction with Clause C.2.1.

Only tenders that met the eligibility criteria will be evaluated further in accordance with the 80/20 or 90/10 preference points systems as described in Preferential Procurement Regulations 6.
80 where the financial value of one or more responsive tenders received have a value below R50 million, inclusive of all applicable taxes or 90 where the financial value of one or more responsive tenders received have a value exceed R50 million

Evaluation Criteria	Final Weighted Scores
Price	80
Specific goals - Scorecard	20
TOTAL SCORE:	**100**

Up to 100 minus W_1 tender evaluation points will be awarded to tenderers who complete the preferencing schedule and who are found to be eligible for the preference claimed. **Should the evidence required for any of the Specific Goals applicable in this tender not be provided, a tenderer will score zero preference points for that particular "Specific Goal".**

In terms of Transnet Preferential Procurement Policy (TPPP) and Procurement Manuals, the following preference points must be awarded to a bidder who provides the relevant required evidence for claiming points

Selected Specific Goal	Number of points allocated (20)
B-BBEE Level of contributor (1 or 2)	5
Entities that are at least 51 % Black Owned	5
At least 30% Black Women Owned Entities	10
Non-Compliant and/or B-BBEE Level 3-8 contributors	0

The following Table represents the evidence to be submitted for claiming preference points for applicable specific goals in a particular tender:

Specific Goals	Acceptable Evidence
B-BBEE	B-BBEE Certificate / Sworn- Affidavit / B-BBEE CIPC Certificate (in case of JV, a consolidated scorecard will be accepted) as per DTIC guideline
At least 30% Black Women Owned Entities	B-BBEE Certificate / Sworn- Affidavit / B-BBEE CIPC Certificate (in case of JV, a consolidated scorecard will be accepted) as per DTIC guideline
Entities that are at least 51 % Black Owned	B-BBEE Certificate / Sworn- Affidavit / B-BBEE CIPC Certificate (in case of JV, a consolidated scorecard will be accepted) as per DTIC guideline

The maximum points for this bid are allocated as follows:

DISCRIPTION	**POINTS**
PRICE	80
B-BBEE Level of contributor (1 or 2)	5
Entities that are at least 51 % Black Owned	5
At least 30% Black Women Owned Entities	10
Total points for Price and Specific Goals must not exceed	100

Note: Transnet reserves the right to carry out an independent audit of the tenderers scorecard components at any stage from the date of close of the tenders until completion of the contract.

C.3.13 Tender offers will only be accepted if:

1. The tenderer or any of its directors/shareholders is not listed on the Register of Tender Defaulters in terms of the Prevention and Combating of Corrupt Activities Act of 2004 as a person prohibited from doing business with the public sector;

2. the tenderer does not appear on Transnet's list for restricted tenderers and National Treasury's list of Tender Defaulters;

3. the tenderer has fully and properly completed the Compulsory Enterprise Questionnaire and there are no conflicts of interest which may impact on the tenderer's ability to perform the contract in the best interests of the Employer or potentially compromise the tender process and persons in the employ of the state.

4. Transnet reserves the right to award the tender to the tenderer who scores the highest number of points overall, unless there are **objective criteria** which will justify the award of the tender to another tenderer. Objective criteria include but are not limited

to the outcome of a due diligence exercise to be conducted. The due diligence exercise may take the following factors into account inter alia;

the tenderer:

a) is not under restrictions, or has principals who are under restrictions, preventing participating in the employer's procurement,

b) can, as necessary and in relation to the proposed contract, demonstrate that he or she possesses the professional and technical qualifications, professional and technical competence, financial resources, equipment and other physical facilities, managerial capability, reliability, experience and reputation, expertise and the personnel, to perform the contract,

c) has the legal capacity to enter into the contract,

d) is not insolvent, in receivership, under Business Rescue as provided for in chapter 6 of the Companies Act, 2008, bankrupt or being wound up, has his affairs administered by a court or a judicial officer, has suspended his business activities, or is subject to legal proceedings in respect of any of the foregoing,

e) complies with the legal requirements, if any, stated in the tender data and

f) is able, in the option of the employer to perform the contract free of conflicts of interest.

C.3.17	The number of paper copies of the signed contract to be provided by the Employer is 1 (one).

STAATSKOERANT, 8 AUGUSTUS 2019

DEPARTMENT OF PUBLIC WORKS
NOTICE 423 OF 2019

STANDARD FOR UNIFORMITY IN ENGINEERING AND CONSTRUCTION WORKS CONTRACTS
AUGUST 2019

Annex C

Standard Conditions of Tender

C.1 General

C.1.1 Actions

C.1.1.1 The employer and each tenderer submitting a tender offer shall comply with these conditions of tender. In their dealings with each other, they shall discharge their duties and obligations as set out in C.2 and C.3, timeously and with integrity, and behave equitably, honestly and transparently, comply with all legal obligations and not engage in anticompetitive practices.

C.1.1.2 The employer and the tenderer and all their agents and employees involved in the tender Process shall avoid conflicts of interest and where a conflict of interest is perceived or known, declare any such conflict of interest, indicating the nature of such conflict. Tenderers shall declare any potential conflict of interest in their tender submissions. Employees, agents and advisors of the employer shall declare any conflict of interest to whoever is responsible for overseeing the procurement process at the start of any deliberations relating to the procurement process or as soon as they become aware of such conflict and abstain from any decisions where such conflict exists or recuse themselves from the procurement process, as appropriate.

Note: 1) A conflict of interest may arise due to a conflict of roles which might provide an incentive for improper acts in some circumstances. A conflict of interest can create an appearance of impropriety that can undermine confidence in the ability of that person to act properly in his or her position even if no improper acts result.

2) Conflicts of interest in respect of those engaged in the procurement process include direct, indirect or family interests in the tender or outcome of the procurement process and any personal bias, inclination, obligation, allegiance or loyalty which would in any way affect any decisions taken.

C.1.1.3 The employer shall not seek and a tenderer shall not submit a tender without having a firm intention and the capacity to proceed with the contract.

C.1.2 Tender Documents

The documents issued by the employer for the purpose of a tender offer are listed in the tender data.

C.1.3 Interpretation

C.1.3.1 The tender data and additional requirements contained in the tender schedules that are Included in the returnable documents are deemed to be part of these conditions of tender.

C.1.3.2 These conditions of tender, the tender data and tender schedules which are required for Tender evaluation purposes, shall form part of any contract arising from the invitation to tender.

C.1.3.3 For the purposes of these conditions of tender, the following definitions apply:

a) **conflict of interest** means any situation in which:

i) someone in a position of trust has competing professional or personal interests which make it difficult to fulfill his or her duties impartially;

ii) an individual or tenderer is in a position to exploit a professional or official capacity in some way for their personal or corporate benefit; or

iii) incompatibility or contradictory interests exist between an employee and the tenderer who employs that employee.

b) **comparative offer** means the price after the factors of a non-firm price and all unconditional discounts it can be utilised to have been taken into consideration;

c) **corrupt practice** means the offering, giving, receiving or soliciting of anything of value to influence the action of the employer or his staff or agents in the tender process;

d) **fraudulent practice** means the misrepresentation of the facts in order to influence the tender process or the award of a contract arising from a tender offer to the detriment of the employer, including collusive practices intended to establish prices at artificial levels;

C.1.4 Communication and employer's agent

Each communication between the employer and a tenderer shall be to or from the employer's agent only, and in a form that can be readily read, copied and recorded. Communications shall be in the English language. The employer shall not take any responsibility for non-receipt of communications from or by a tenderer. The name and contact details of the employer's agent are stated in the tender data.

C.1.5 Cancellation and Re-Invitation of Tenders

C.1.5.1 An employer may, prior to the award of the tender, cancel a tender if

a) due to changed circumstances, there is no longer a need for the engineering and construction works specified in the invitation;

b) funds are no longer available to cover the total envisaged expenditure; or

c) no acceptable tenders are received.

d) there is a material irregularity in the tender process.

C.1.5.2 The decision to cancel a tender invitation must be published in the same manner in which the original tender invitation was advertised

C.1.5.3 An employer may only with the prior approval of the relevant treasury cancel a tender Invitation for the second time.

C.1.6 Procurement procedures

C.1.6.1 General

Unless otherwise stated in the tender data, a contract will, subject to C.3.13, be concluded with the tenderer who in terms of C.3.11 is the highest ranked or the tenderer scoring the highest number of tender evaluation points, as relevant, based on the tender submissions that are received at the closing time for tenders.

C.1.6.2 Competitive negotiation procedure

C.1.6.2.1 Where the tender data require that the competitive negotiation procedure is to be followed, tenderers shall submit tender offers in response to the proposed contract in the first round of submissions. Notwithstanding the requirements of C.3.4, the employer shall announce only the names of the tenderers who make a submission. The requirements of C.8 relating to the material deviations or qualifications which affect the competitive position of tenderers shall not apply.

C.1.6.2.2 All responsive tenderers or at least a minimum of not less than three responsive tenderers that are highest ranked in terms of the evaluation criteria stated in the tender data shall be invited to enter into competitive negotiations based on the principle of equal treatment, keeping confidential the proposed solutions and associated information.

Notwithstanding the provisions of C.2.17, the employer may request that tenders be clarified, Specified and fine-tuned in order to improve a tenderer's competitive position provided that such clarification, specification, fine-tuning or additional information does not alter any fundamental aspects of the offers or impose substantial new requirements which restrict or distort competition or have a discriminatory effect.

C.1.6.2.3 At the conclusion of each round of negotiations, tenderers shall be invited by the employer to revise their tender offer based on the same evaluation criteria, with or without adjusted weightings. Tenderers shall be advised when they are to submit their best and final offer.

C.1.6.2.4 The contract shall be awarded in accordance with the provisions of C.3.11 and C.3.13 after tenderers have been requested to submit their best and final offer.

C.1.6.3 Proposal procedure using the two stage-system

C.1.6.3.1 Option 1

Tenderers shall in the first stage submit technical proposals and, if required, cost parameters around which a contract may be negotiated. The employer shall evaluate each responsive submission in terms of the method of evaluation stated in the tender data, and in the second stage negotiate a contract with the tenderer scoring the highest number of evaluation points and award the contract in terms of these conditions of tender.

C.1.6.3.2 Option 2

C.1.6.3.2.1 Tenderers shall submit in the first stage only technical proposals. The employer shall invite all responsive tenderers to submit tender offers in the second stage, following the issuing of procurement documents.

C.1.6.3.2.2 The employer shall evaluate tenders received during the second stage in terms of the method of evaluation stated in the tender data, and award the contract in terms of these conditions of tender.

C.2 Tenderer's obligations

C.2.1 Eligibility

C.2.1.1 Submit a tender offer only if the tenderer satisfies the criteria stated in the tender data and the tenderer, or any of his principals, is not under any restriction to do business with employer.

C.2.1.2 Notify the employer of any proposed material change in the capabilities or formation of the tendering entity (or both) or any other criteria which formed part of the qualifying requirements used by the employer as the basis in a prior process to invite the tenderer to submit a tender offer and obtain the employer's written approval to do so prior to the closing time for tenders.

C.2.2 Cost of tendering

C.2.2.1 Accept that, unless otherwise stated in the tender data, the employer will not compensate the tenderer for any costs incurred in the preparation and submission of a tender offer, including the costs of any testing necessary to demonstrate that aspects of the offer complies with requirements.

C.2.2.2 The cost of the tender documents charged by the employer shall be limited to the actual cost incurred by the employer for printing the documents. Employers must attempt to make available the tender documents on its website so as not to incur any costs pertaining to the printing of the tender documents.

C.2.3 Check documents

Check the tender documents on receipt for completeness and notify the employer of any discrepancy or omission.

C.2.4 Confidentiality and copyright of documents

Treat as confidential all matters arising in connection with the tender. Use and copy the documents issued by the employer only for the purpose of preparing and submitting a tender offer in response to the invitation.

C.2.5 Reference documents

Obtain, as necessary for submitting a tender offer, copies of the latest versions of standards, specifications, conditions of contract and other publications, which are not attached but which are incorporated into the tender documents by reference.

C.2.6 Acknowledge addenda

Acknowledge receipt of addenda to the tender documents, which the employer may issue, and if necessary apply for an extension to the closing time stated in the tender data, in order to take the addenda into account.

C.2.7 Clarification meeting

Attend, where required, a clarification meeting at which tenderers may familiarize themselves with aspects of the proposed work, services or supply and raise questions. Details of the meeting(s) are stated in the tender data.

C.2.8 Seek clarification

Request clarification of the tender documents, if necessary, by notifying the employer at least five (5) working days before the closing time stated in the tender data.

C.2.9 Insurance

Be aware that the extent of insurance to be provided by the employer (if any) might not be for the full cover required in terms of the conditions of contract identified in the contract data. The tenderer is advised to seek qualified advice regarding insurance.

C.2.10 Pricing the tender offer

C.2.10.1 Include in the rates, prices, and the tendered total of the prices (if any) all duties, taxes Except Value Added Tax (VAT), and other levies payable by the successful tenderer, such duties, taxes and levies being those applicable fourteen (14) days before the closing time stated in the tender data.

C.2.10.2 Show VAT payable by the employer separately as an addition to the tendered total of the prices.

C.2.10.3 Provide rates and prices that are fixed for the duration of the contract and not subject to adjustment except as provided for in the conditions of contract identified in the contract data.

C.2.10.4 State the rates and prices in Rand unless instructed otherwise in the tender data. The conditions of contract identified in the contract data may provide for part payment in other currencies.

C.2.11 Alterations to documents

Do not make any alterations or additions to the tender documents, except to comply with instructions issued by the employer, or necessary to correct errors made by the tenderer. All signatories to the tender offer shall initial all such alterations.

C.2.12 Alternative tender offers

C.2.12.1 Unless otherwise stated in the tender data, submit alternative tender offers only if a main tender offer, strictly in accordance with all the requirements of the tender documents, is also submitted as well as a schedule that compares the requirements of the tender documents with the alternative requirements that are proposed.

C.2.12.2 Accept that an alternative tender offer must be based only on the criteria stated in the tender data or criteria otherwise acceptable to the employer.

C.2.12.3 An alternative tender offer must only be considered if the main tender offer is the winning tender.

C.2.13 Submitting a tender offer

C.2.13.1 Submit one tender offer only, either as a single tendering entity or as a member in a joint venture to provide the whole of the works identified in the contract data and described in the scope of works, unless stated otherwise in the tender data.

C.2.13.2 Return all returnable documents to the employer after completing them in their entirety, either electronically (if they were issued in electronic format) or by writing legibly in non-erasable ink.

C.2.13.3 Submit the parts of the tender offer communicated on paper as an original plus the number Of copies stated in the tender data, with an English translation of any documentation in a language other than English, and the parts communicated electronically in the same format as they were issued by the employer.

C.2.13.4 Sign the original and all copies of the tender offer where required in terms of the tender data. The employer will hold all authorized signatories liable on behalf of the tenderer. Signatories for tenderers proposing to contract as joint ventures shall state which of the signatories is the lead partner whom the employer shall hold liable for the purpose of the tender offer.

C.2.13.5 Seal the original and each copy of the tender offer as separate packages marking the Packages as "ORIGINAL" and "COPY". Each package shall state on the outside the employer's address and identification details stated in the tender data, as well as the tenderer's name and contact address.

C.2.13.6 Where a two-envelope system is required in terms of the tender data, place and seal the returnable documents listed in the tender data in an envelope marked "financial proposal" and place the remaining returnable documents in an envelope marked "technical proposal". Each envelope shall state on the outside the employer's address and identification details stated in the tender data, as well as the tenderer's name and contact address.

C.2.13.7 Seal the original tender offer and copy packages together in an outer package that states on the outside only the employer's address and identification details as stated in the tender data.

C.2.13.8 Accept that the employer will not assume any responsibility for the misplacement or premature opening of the tender offer if the outer package is not sealed and marked as stated.

C.2.13.9 Accept that tender offers submitted by facsimile or e-mail will be rejected by the employer, unless stated otherwise in the tender data.

C.2.14 Information and data to be completed in all respects

Accept that tender offers, which do not provide all the data or information requested completely and in the form required, may be regarded by the employer as non-responsive.

C.2.15 Closing time

C.2.15.1 Ensure that the employer receives the tender offer at the address specified in the tender data not later than the closing time stated in the tender data. Accept that proof of posting shall not be accepted as proof of delivery.

C.2.15.2 Accept that, if the employer extends the closing time stated in the tender data for any reason, the requirements of these conditions of tender apply equally to the extended deadline.

C.2.16 Tender offer validity

C.2.16.1 Hold the tender offer(s) valid for acceptance by the employer at any time during the validity period stated in the tender data after the closing time stated in the tender data.

C.2.16.2 If requested by the employer, consider extending the validity period stated in the tender data for an agreed additional period with or without any conditions attached to such extension.

C.2.16.3 Accept that a tender submission that has been submitted to the employer may only be withdrawn or substituted by giving the employer's agent written notice before the closing time for tenders that a tender is to be withdrawn or substituted. If the validity period stated in C.2.16 lapses before the employer evaluating tender, the contractor reserves the right to review the price based on Consumer Price Index (CPI).

C.2.16.4 Where a tender submission is to be substituted, a tenderer must submit a substitute tender in accordance with the requirements of C.2.13 with the packages clearly marked as "SUBSTITUTE".

C.2.17 Clarification of tender offer after submission

Provide clarification of a tender offer in response to a request to do so from the employer during the evaluation of tender offers. This may include providing a breakdown of rates or prices and correction of arithmetical errors by the adjustment of certain rates or item prices (or both). No change in the competitive position of tenderers or substance of the tender offer is sought, offered, or permitted.

Note: *Sub-clause C.2.17 does not preclude the negotiation of the final terms of the contract with a preferred tenderer following a competitive selection process, should the Employer elect to do so.*

C.2.18 Provide other material

C.2.18.1 Provide, on request by the employer, any other material that has a bearing on the tender offer, the tenderer's commercial position (including notarized joint venture agreements), preferencing arrangements, or samples of materials, considered necessary by the employer for the purpose of a full and fair risk assessment. Should the tenderer not provide the material, or a satisfactory reason as to why it cannot be provided, by the time for submission stated in the employer's request, the employer may regard the tender offer as non-responsive.

C.2.18.2 Dispose of samples of materials provided for evaluation by the employer, where required.

C.2.19 Inspections, tests and analysis

Provide access during working hours to premises for inspections, tests and analysis as provided for in the tender data.

C.2.20 Submit securities, bonds and policies

If requested, submit for the employer's acceptance before formation of the contract, all securities, bonds, guarantees, policies and certificates of insurance required in terms of the conditions of contract identified in the contract data.

C.2.21 Check final draft

Check the final draft of the contract provided by the employer within the time available for the employer to issue the contract.

C.2.22 Return of other tender documents

If so instructed by the employer, return all retained tender documents within twenty-eight (28) days after the expiry of the validity period stated in the tender data.

C.2.23 Certificates

Include in the tender submission or provide the employer with any certificates as stated in the tender data.

C.3 The employer's undertakings

C.3.1 Respond to requests from the tenderer

C.3.1.1 Unless otherwise stated in the tender Data, respond to a request for clarification received up To five (5) working days before the tender closing time stated in the Tender Data and notify all tenderers who collected tender documents.

C.3.1.2 Consider any request to make a material change in the capabilities or formation of the Tendering entity (or both) or any other criteria which formed part of the qualifying requirements used to prequalify a tenderer to submit a tender offer in terms of a previous procurement process and deny any such request if as a consequence:

a) an individual firm, or a joint venture as a whole, or any individual member of the joint venture fails to meet any of the collective or individual qualifying requirements;
b) the new partners to a joint venture were not prequalified in the first instance, either as individual firms or as another joint venture; or
c) in the opinion of the Employer, acceptance of the material change would compromise the outcome of the prequalification process.

C.3.2 Issue Addenda

If necessary, issue addenda that may amend or amplify the tender documents to each tenderer during the period from the date that tender documents are available until three (3) working days before the tender closing time stated in the Tender Data. If, as a result a tenderer applies for an extension to the closing time stated in the Tender Data, the Employer may grant such extension and, shall then notify all tenderers who collected tender documents.

C.3.3 Return late tender offers

Return tender offers received after the closing time stated in the Tender Data, unopened, (unless it is necessary to open a tender submission to obtain a forwarding address), to the tenderer concerned.

C.3.4 Opening of tender submissions

C.3.4.1 Unless the two-envelope system is to be followed, open valid tender submissions in the presence of tenderers' agents who choose to attend at the time and place stated in the tender data. Tender submissions for which acceptable reasons for withdrawal have been submitted will not be opened.

C.3.4.2 Announce at the meeting held immediately after the opening of tender submissions, at a venue indicated in the tender data, the name of each tenderer whose tender offer is opened and, where applicable, the total of his prices, number of points claimed for its BBBEE status level and time for completion for the main tender offer only.

C.3.4.3 Make available the record outlined in C.3.4.2 to all interested persons upon request.

C.3.5 Two-envelope system

C.3.5.1 Where stated in the tender data that a two-envelope system is to be followed, open only the technical proposal of valid tenders in the presence of tenderers' agents who choose to attend at the time and place stated in the tender data and announce the name of each tenderer whose technical proposal is opened.

C.3.5.2 Evaluate functionality of the technical proposals offered by tenderers, then advise tenderers who remain in contention for the award of the contract of the time and place when the financial proposals will be opened. Open only the financial proposals of tenderers, who score in the functionality evaluation more than the minimum number of points for functionality stated in the tender data, and announce the score obtained for the technical proposals and the total price and any points claimed on BBBEE status level. Return unopened financial proposals to tenderers whose technical proposals failed to achieve the minimum number of points for functionality.

C.3.6 Non-disclosure

Not disclose to tenderers, or to any other person not officially concerned with such processes, information relating to the evaluation and comparison of tender offers, the final evaluation price and recommendations for the award of a contract, until after the award of the contract to the successful tenderer.

C.3.7 Grounds for rejection and disqualification

Determine whether there has been any effort by a tenderer to influence the processing of tender offers and instantly disqualify a tenderer (and his tender offer) if it is established that he engaged in corrupt or fraudulent practices.

C.3.8 Test for responsiveness

C.3.8.1 Determine, after opening and before detailed evaluation, whether each tender offer properly received:

a) complies with the requirements of these Conditions of Tender,

b) has been properly and fully completed and signed, and

c) is responsive to the other requirements of the tender documents.

C.3.8.2 A responsive tender is one that conforms to all the terms, conditions, and specifications of the tender documents without material deviation or qualification. A material deviation or qualification is one which, in the Employer*'s* opinion, would:

a) detrimentally affect the scope, quality, or performance of the works, services or supply identified in the Scope of Work*,*

b) significantly change the Employer*'s* or the tenderer's risks and responsibilities under the contract, or

c) affect the competitive position of other tenderers presenting responsive tenders, if it were to be rectified. Reject a non-responsive tender offer, and not allow it to be subsequently made responsive by correction or withdrawal of the non-conforming deviation or reservation.

C.3.9 Arithmetical errors, omissions and discrepancies

C.3.9.1 Check responsive tenders for discrepancies between amounts in words and amounts in figures. Where there is a discrepancy between the amounts in figures and the amount in words, the amount in words shall govern.

C.3.9.2 Check the highest ranked tender or tenderer with the highest number of tender evaluation points after the evaluation of tender offers in accordance with C.3.11 for:

a) the gross misplacement of the decimal point in any unit rate;

b) omissions made in completing the pricing schedule or bills of quantities; or

c) arithmetic errors in:

(i) line item totals resulting from the product of a unit rate and a quantity in bills of quantities or schedules of prices; or

(ii) the summation of the prices.

C.3.9.3 Notify the tenderer of all errors or omissions that are identified in the tender offer and either confirm the tender offer as tendered or accept the corrected total of prices.

C.3.9.4 Where the tenderer elects to confirm the tender offer as tendered, correct the errors as follows:

a) If bills of quantities or pricing schedules apply and there is an error in the line item total resulting from the product of the unit rate and the quantity, the line item total shall govern and the rate shall be corrected. Where there is an obviously gross misplacement of the decimal point in the unit rate, the line item total as quoted shall govern, and the unit rate shall be corrected.

b) Where there is an error in the total of the prices either as a result of other corrections Required by this checking process or in the tenderer's addition of prices, the total of the prices shall govern and the tenderer will be asked to revise selected item prices (and their rates if bills of quantities apply) to achieve the tendered total of the prices.

C.3.10 Clarification of a tender offer

Obtain clarification from a tenderer on any matter that could give rise to ambiguity in a contract arising from the tender offer.

C.3.11 Evaluation of tender offers

The Standard Conditions of Tender standardize the procurement processes, methods and procedures from the time that tenders are invited to the time that a contract is awarded. They are generic in nature and are made project specific through choices that are made in developing the Tender Data associated with a specific project. Conditions of tender are by definition the document that establishes a tenderer's obligations in submitting a tender and the employer's undertakings in soliciting and evaluating tender offers. Such conditions establish the rules from the time a tender is advertised to the time that a contract is awarded and require employers to conduct the process of offer and acceptance in terms of a set of standard procedures.

The CIDB Standard Conditions of Tender are based on a procurement system that satisfies the following system requirements:

Requirement Qualitative interpretation of goal

Fair The process of offer and acceptance is conducted impartially without bias, providing simultaneous and timely access to participating parties to the same information.

Equitable Terms and conditions for performing the work do not unfairly prejudice the interests of the parties.

Transparent The only grounds for not awarding a contract to a tenderer who satisfies all requirements are restrictions from doing business with the employer, lack of capability or capacity, legal impediments and conflicts of interest.

Competitive The system provides for appropriate levels of competition to ensure cost effective and best value outcomes.

Cost effective The processes, procedures and methods are standardized with sufficient flexibility to attain best value outcomes in respect of quality, timing and price, and least resources to effectively manage and control procurement processes.

The activities associated with evaluating tender offers are as follows:

a) Open and record tender offers received
b) Determine whether or not tender offers are complete
c) Determine whether or not tender offers are responsive
d) Evaluate tender offers
e) Determine if there are any grounds for disqualification

f) Determine acceptability of preferred tenderer

g) Prepare a tender evaluation report

h) Confirm the recommendation contained in the tender evaluation report

C.3.11.1 General

The employer must appoint an evaluation panel of not less than three persons conversant with the proposed scope of works to evaluate each responsive tender offer using the tender evaluation methods and associated evaluation criteria and weightings that are specified in the tender data.

C.3.12 Insurance provided by the employer

If requested by the proposed successful tenderer, submit for the tenderer *'s* information the policies and / or certificates of insurance which the conditions of contract identified in the contract data, require the employer to provide.

C.3.13 Acceptance of tender offer

Accept the tender offer; if in the opinion of the employer, it does not present any risk and only if the tenderer:

a) is not under restrictions, or has principals who are under restrictions, preventing participating in the employer's procurement;

b) can, as necessary and in relation to the proposed contract, demonstrate that he or she possesses the professional and technical qualifications, professional and technical competence, financial resources, equipment and other physical facilities, managerial capability, reliability, experience and reputation, expertise and the personnel, to perform the contract;

c) has the legal capacity to enter into the contract;

d) is not; insolvent, in receivership, under Business Rescue as provided for in chapter 6 of the Companies Act No. 2008, bankrupt or being wound up, has his/her affairs administered by a court or a judicial officer, has suspended his/her business activities or is subject to legal proceedings in respect of any of the foregoing;

e) complies with the legal requirements, if any, stated in the tender data; and

f) is able, in the opinion of the employer, to perform the contract free of conflicts of interest.

C.3.14 Prepare contract documents

C.3.14.1 If necessary, revise documents that shall form part of the contract and that were issued by The employer as part of the tender documents to take account of:

a) addenda issued during the tender period,

b) inclusion of some of the returnable documents and

c) other revisions agreed between the employer and the successful tenderer.

C.3.14.2 Complete the schedule of deviations attached to the form of offer and acceptance, if any.

C.3.15 Complete adjudicator's contract

Unless alternative arrangements have been agreed or otherwise provided for in the contract, arrange for both parties to complete formalities for appointing the selected adjudicator at the same time as the main contract is signed.

C.3.16 Registration of the award

An employer must, within twenty-one (21) working days from the date on which a contractor's offer to perform a construction works contract is accepted in writing by the employer, register and publish the award on the cidb Register of Projects.

C.3.17 Provide copies of the contracts

Provide to the successful tenderer the number of copies stated in the Tender Data of the signed copy of the contract as soon as possible after completion and signing of the form of offer and acceptance.

C.3.18 Provide written reasons for actions taken

Provide upon request written reasons to tenderers for any action that is taken in applying these conditions of tender but withhold information which is not in the public interest to be divulged, which is considered to prejudice the legitimate commercial interests of tenderers or might prejudice fair competition between tenderers.

T2.1: List of Returnable Documents

2.1.1 These schedules are required for eligibility purposes:

T2.2-1 **Stage One as per CIDB: Eligibility Criteria Schedule -** CIDB Registration

2.1.3 Returnable Schedules:

T2.2-2 Health and Safety Management
T2.2-3a Tender Safety, Environmental and Risk Objective Questionnaire
T2.2-3b Health and Safety Cost Breakdown
T2.2-3c Letter of Good Standing
T2.2-4 Risk Elements
T2.2-5 Environmental Management Plan
T2.2-6 Changes to tender document
T2.2-7 Schedule of Machine/s and Schedule of labour
T2.2-8 Authority to submit tender
T2.2-9 Record of addenda to tender documents
T2.2-10 Availability of Equipment and Other Resources

Agreement and Commitment by Tenderer:

T2.2-11 Compulsory Enterprise Questionnaire
T2.2-12 Supplier Code of Conduct
T2.2-13 Unilateral Non-Disclosure Agreement
T2.2-14 Supplier declaration form
T2.2-15 RFP Declaration Form
T2.2-16 Certificate of Acquaintance with Tender Document Pact
T2.2-17 Service Provider Integrity Pact
T2.2-18 Request for quotation – Breach of law
T2.2-19 Job-Creation Schedule
T2.2-20 Confirmation of machine/s ownership
T2.2-21 Agreement in terms of Protection of Personal Information Act, 4 of 2013 ("POPIA")

2.1.4 Bonds/Guarantees/Financial/Insurance:

T2.2-22 Insurance provided by the Contractor

T2.2-23 Three (3) years audited financial statements

T2.2-24 Form of Intent to Provide a Performance Guarantee

2.2 C1 - Agreement and Contract Data

C1.1 Form of Offer

C1.2 Contract Data Part 2 (Data by Contractor)

C1.3 Forms of Securities

2.3 C2 – Pricing Data

C2.2 Price List

Part T2.2: Returnable Schedules

T2.2-1: CIDB Grading Designation (Eligibility Criteria Schedule)

Note to tenderers:

Tenderers are to indicate their CIDB Grading by filling in the table below. **Attach a copy of the CIDB Grading Designation or evidence of being capable of being so registered.**

CRS Number	Status	Grading	Expiry Date

1. Only those tenderers who are registered with the CIDB, or are capable of being so prior to the evaluation of submissions, in a contractor grading designation equal to or higher than a contractor grading designation determined in accordance with the sum tendered or a value determined in accordance with Regulation 25 (1B) or 25(7A) of the Construction Industry Development Regulations, for a **7CE or higher** class of construction work, are eligible to have their tenders evaluated.

2. Joint Venture (JV)

Joint ventures are eligible to submit tenders subject to the following:

a) every member of the joint venture is registered with the CIDB;
b) the lead partner has a contractor grading designation of not lower than one level below the required grading designation in the class of construction works under consideration and possesses the required recognition status; and the
c) combined Contractor grading designation calculated in accordance with the Construction Industry Development Regulations is equal to or higher than a Contractor grading designation determined in accordance with the sum tendered for a **7CE or higher** class of construction work or a value determined in accordance with Regulation 25(1B) or 25(7A) of the Construction Industry Development Regulations
d) The tenderer shall provide a certified copy of its signed joint venture agreement
e) The tenderer shall provide a certified copy of its signed joint venture agreement.

T2.2-2: Assessment Schedule - Health and Safety Requirements

Submit the following documents as a minimum with your tender:

1. The Tenderers must provide their own project specific health and safety Plan.
2. Health and safety cost breakdown (Bill of Quantities)
3. Safety, Policy signed by the Chief Executive Officer, must include or cover the following five elements –
    - Commitment to Safety, prevention of pollution,
    - Continual improvement,
    - Compliance to legal requirements, appropriate to the nature of contractor's activities,
    - Hold management accountable for development of the safety systems
    - Include objectives and targets.
4. Table or outline the Roles & Responsibilities, such as S16.2 CEO, CR8.1 Construction manager, CR8.2 Assistant Construction manager, CR8.5 Safety officer, CR8.7 Construction Supervisor, CR8.8 Construction assistant supervisor, CR9.1 Risk Assessor, 17.1 SHE Reps, etc. as per the Occupational health and safety Act 85 of 1993
5. List of job categories for project and competencies required per category and develop a training Matrix for all employees who will be working on the project. This matrix must include Management and highlight training planned dates.
6. Overview of the project specific Baseline Risk Assessment (RA), indicating major activities of the project
7. **Three years** synopsis of SHE incidents, description, type and action taken to prevent re-occurrence.
8. Complete and return with tender documentation the Contractor Safety Questionnaire included as an Annexure B.

Attached submissions to this schedule:

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T2.2-3a: Health and Safety Questionnaire

1. SAFE WORK PERFORMANCE

1A. Injury Experience / Historical Performance - Alberta

Use the previous three years injury and illness records to complete the following:

Year			
Number of medical treatment cases			
Number of restricted work day cases			
Number of lost time injury cases			
Number of fatal injuries			
Total recordable frequency			
Lost time injury frequency			
Number of worker manhours			

1 - Medical Treatment Case	Any occupational injury or illness requiring treatment provided by a physician or treatment provided under the direction of a physician
2 – Restricted Work Day Case	Any occupational injury or illness that prevents a worker from performing any of his/her craft jurisdiction duties
3 – Lost Time injury Cases	Any occupational injury that prevents the worker from performing any work for at least one day
4 – Total Recordable Frequency	Total number of Medical Treatment, Restricted Work and Lost Time Injury cases multiplied by 200,000 then divided by total manhours
5- Lost Time Injury Frequency	Total number of Lost Time Injury cases multiplied by 200,000 then divide by total manhours

- 1B. Workers' Compensation Experience

Use the previous three years injury and illness records to complete the following (if applicable):

Industry Code:	Industry Classification:

Year			
Industry Rate			
Contractor Rate			
% Discount or Surcharge			

Is your Workers' Compensation account in good standing? ☐ Yes ☐ No
(Please provide letter of confirmation)

- 2. CITATIONS

2A. Has your company been cited, charged or prosecuted under Health, Safety and/or Environmental Legislation in the last 5 years?
☐ Yes ☐ No
If yes, provide details:

2B.	Has your company been cited, charged or prosecuted under the above Legislation in another Country, Region or State? ☐ Yes ☐ No If yes, provide details:

3. CERTIFICATE OF RECOGNITION

Does your company have a Certificate of Recognition?
☐ Yes ☐ No If Yes, what is the Certificate No. _____ Issue Date _____

4. SAFETY PROGRAM

Do you have a written safety program manual? ☐ Yes ☐ No
If Yes, provide a copy for review

Do you have a pocket safety booklet for field distribution? ☐ Yes ☐ No
If Yes, provide a copy for review

Does your safety program contain the following elements:

	YES	NO		YES	NO
CORPORATE SAFETY POLICY	☐	☐	EQUIPMENT MAINTENANCE	☐	☐
INCIDENT NOTIFICATION POLICY	☐	☐	EMERGENCY RESPONSE	☐	☐
RECORDKEEPING & STATISTICS	☐	☐	HAZARD ASSESSMENT	☐	☐
REFERENCE TO LEGISLATION	☐	☐	SAFE WORK PRACTICES	☐	☐
GENERAL RULES & REGULATIONS	☐	☐	SAFE WORK PROCEDURES	☐	☐
PROGRESSIVE DISCIPLINE POLICY	☐	☐	WORKPLACE INSPECTIONS	☐	☐
RESPONSIBILITIES	☐	☐	INVESTIGATION PROCESS	☐	☐
PPE STANDARDS	☐	☐	TRAINING POLICY & PROGRAM	☐	☐
ENVIRONMENTAL STANDARDS	☐	☐	COMMUNICATION PROCESSES	☐	☐
MODIFIED WORK PROGRAM	☐	☐			

5. TRAINING PROGRAM

5A. Do you have an orientation program for new hire employees? ☐ Yes ☐ No
If Yes, include a course outline. Does it include any of the following:

	YES	NO		YES	NO
GENERAL RULES & REGULATIONS	☐	☐	CONFINED SPACE ENTRY	☐	☐
EMERGENCY REPORTING	☐	☐	TRENCHING & EXCAVATION	☐	☐
INJURY REPORTING	☐	☐	SIGNS & BARRICADES	☐	☐
LEGISLATION	☐	☐	DANGEROUS HOLES & OPENINGS	☐	☐
RIGHT TO REFUSE WORK	☐	☐	RIGGING & CRANES	☐	☐

PERSONAL PROTECTIVE EQUIPMENT	☐	☐	MOBILE VEHICLES	☐	☐
EMERGENCY PROCEDURES	☐	☐	PREVENTATIVE MAINTENANCE	☐	☐
PROJECT SAFETY COMMITTEE	☐	☐	HAND & POWER TOOLS	☐	☐
HOUSEKEEPING	☐	☐	FIRE PREVENTION & PROTECTION	☐	☐
LADDERS & SCAFFOLDS	☐	☐	ELECTRICAL SAFETY	☐	☐
FALL ARREST STANDARDS	☐	☐	COMPRESSED GAS CYLINDERS	☐	☐
AERIAL WORK PLATFORMS	☐	☐	WEATHER EXTREMES	☐	☐

5B. Do you have a program for training newly hired or promoted supervisors? ☐ Yes ☐ No

(If Yes, submit an outline for evaluation. Does it include instruction on the following:

	Yes	No		Yes	No
EMPLOYER RESPONSIBILITIES	☐	☐	SAFETY COMMUNICATION	☐	☐
EMPLOYEE RESPONSIBILITIES	☐	☐	FIRST AID/MEDICAL PROCEDURES	☐	☐
DUE DILIGENCE	☐	☐	NEW WORKER TRAINING	☐	☐
SAFETY LEADERSHIP	☐	☐	ENVIRONMENTAL REQUIREMENTS	☐	☐
WORK REFUSALS	☐	☐	HAZARD ASSESSMENT	☐	☐
INSPECTION PROCESSES	☐	☐	PRE-JOB SAFETY INSTRUCTION	☐	☐
EMERGENCY PROCEDURES	☐	☐	DRUG & ALCOHOL POLICY	☐	☐
INCIDENT INVESTIGATION	☐	☐	PROGRESSIVE DISCIPLINARY POLICY	☐	☐
SAFE WORK PROCEDURES	☐	☐	SAFE WORK PRACTICES	☐	☐
SAFETY MEETINGS	☐	☐	NOTIFICATION REQUIREMENTS	☐	☐

6. SAFETY ACTIVITIES

Do you conduct safety inspections? Yes ☐ No ☐ Weekly ☐ Monthly ☐ Quarterly ☐

Describe your safety inspection process (include participation, documentation requirements, follow-up, report distribution).

Who follows up on inspection action items? _____

Do you hold site safety meetings for field employees? If Yes, how often?

Yes ☐ No ☐ Daily ☐ Weekly ☐ Biweekly ☐

Do you hold site meetings where safety is addressed with management and field supervisors?

Yes ☐ No ☐ Weekly ☐ Biweekly ☐ Monthly ☐

Is pre-job safety instruction provided before to each new task? ☐ Yes ☐ No

Is the process documented? ☐ Yes ☐ No

Who leads the discussion? _____

Do you have a hazard assessment process? ☐ Yes ☐ No

- Are hazard assessments documented? If yes, how are hazard assessments communicated and implemented on each project? Who is responsible for leading the hazard assessment process?

_____

_____

_____

Does your company have policies and procedures for environmental protection, spill clean-up, reporting, waste disposal, and recycling as part of the Health & Safety Program?

☐ Yes ☐ No

How does your company measure its H&S success?

- Attach separate sheet to explain

7. SAFETY STEWARDSHIP

7A Are incident reports and report summaries sent to the following and how often?

	Yes	No	Monthly	Quarterly	Annually
Project/Site Manager	☐	☐	☐	☐	☐
Managing Director	☐	☐	☐	☐	☐
Safety Director/Manager	☐	☐	☐	☐	☐
/Chief Executive Officer	☐	☐	☐	☐	☐

7B How are incident records and summaries kept? How often are they reported internally?

	Yes	No	Monthly	Quarterly	Annually
Incidents totaled for the entire company	☐	☐	☐	☐	☐
Incidents totaled by project	☐	☐	☐	☐	☐
• Subtotaled by superintendent	☐	☐	☐	☐	☐
• Subtotaled by foreman	☐	☐	☐	☐	☐

7C How are the costs of individual incidents kept? How often are they reported internally?

	Yes	No	Monthly	Quarterly	Annually
Costs totaled for the entire company	☐	☐	☐	☐	☐
Costs totaled by project	☐	☐	☐	☐	☐
• Subtotaled by superintendent	☐	☐	☐	☐	☐
• Subtotaled by foreman/general foreman	☐	☐	☐	☐	☐

7D Does your company track non-injury incidents?

	Yes	No	Monthly	Quarterly	Annually
Near Miss	☐	☐	☐	☐	☐
Property Damage	☐	☐	☐	☐	☐
Fire	☐	☐	☐	☐	☐
Security	☐	☐	☐	☐	☐

	Environmental	☐	☐	☐	☐	☐

8 PERSONNEL

List key health and safety officers planned for this project. Attach resume.

Name	Position/Title	Designation

Supply name, address and phone number of your company's corporate health and safety representative. Does this individual have responsibilities other than health, safety and environment?

Name	Address	Telephone Number

Other responsibilities:

9 REFERENCES

List the last three company's your form has worked for that could verify the quality and management commitment to your occupational Health & Safety program

Name and Company	Address	Phone Number

T2.2-3b: Health and Safety Cost Breakdown

NB: This Safety Cost breakdown is required to illustrate to Transnet that safety costs have been factored into your tender price and will not be paid for as a separate expense.

Tenderer (Company)	**Responsible Person**	**Designation**	**Date**
Project/Tender Title	**Project/Tender No.**	**Project Location / Description**	

#	Cost element	Unit Cost (R)	# of Units	Total Cost (R)
1.	Human Resources			
2.	Systems Documentation			
3.	Meetings & Administration			
4.	H&S Training			
5.	PPE & Safety Equipment			
6.	Signage & Barricading			
7.	Workplace Facilities			
8.	Emergency & Rescue Measures			
9.	Hygiene Surveys & Monitoring			
10.	Medical Surveillance			
11.	Safe Transport of Workers			
12.	HazMat Management (e.g. asbestos /silica)			
13.	Substance Abuse Testing (3 kits @R500 pm)			
14.	H&S Reward & Recognition			
15.	Other			

Total Health and Safety Estimate (R)	

Total Estimate Value (R)	
H&S Cost as % of Tender value	

T2.2-3c Letter/s of Good Standing with the Workmen's Compensation Fund

Attached to this schedule is the Letter/s of Good Standing.
1.
2.
3.
4.

Name of Company/Members of Joint Venture:

.....
.....
.....
.....
.....
.....
.....
.....
.....
.....

T2.2-4: Risk Management [Assessment Schedule]

Tenderers to identify and evaluate the potential risk elements associated with the Works and possible mitigation thereof. The risk elements and the mitigation as identified thereof by the Tenderer are to be submitted.

If No Risks are identified "No Risks" must be stated on this schedule.

Tenderers are also to evaluate any risk/s stated by the Employer in Contract Data Part C1 and provide possible mitigation thereof.

Annexure 3: Risk Elements

The Due Diligence of the Tenderer's Risk Elements will be as follows:

1. Due Diligence Elements: Risk Management and Business Continuity Management	
Tender Number:	
Tender Description:	
1.1. Business Impact Analysis	**Due Diligence**
1.1.1. Identification of critical processes within the project / service: Demonstrate that the critical activities and/ or processes are identified. These are activities and/ or processes if disrupted prevent project completion / service delivery. **1.1.2. Recovery Time Objective (RTO) in case of any interruption that may arise:** Detail for each of the above critical activities and/ or processes what is the determined acceptable recovery time objective for re-instatement of the activity/ process (consider all applicable SLA or regulatory requirements). **1.1.3. Recovery Strategy:** How will the service provider/ supplier recover - Detail the step-by-step process as to how the critical activities and/ or processes will be recovered? In which order? Whom is to undertake the recovery etc. **1.1.4. Operational dependencies:** Note all internal and external dependencies for the recovery of the listed critical activities and/ or processes e.g.: Operational equipment, telephones etc. needed to ensure continuity. **1.1.5. Alternative supply of equipment and/ or supply of extra staff:** Provide adequate information on how alternate equipment or additional experienced staff will be secured if a BCM incident negatively impacting these resources as originally allocated for completion of a project/ delivery of a service. **1.1.6. Battle Box:** Provide details on whether a battle box is established and what its entails/ contains. This may be either a physical collection or an electronic repository of recovery plans, other necessary documentation, templates, memo's, letter heads etc. required for re-instatement of business-critical systems. In some instance this can also include off-site stores of certain equipment or electronic devices etc.	The 6 listed elements for the BIA are required. All elements will be assessed as per the guide provided, for adequacy and relevance to the project / service offering etc. and a due diligence report provided.

Signed ..... Date .....

Name ..... Position .....

Tenderer .....

T2.2-5: Environmental Management Plan [Assessment Schedule]

The tenderer must provide an environmental management plan describing:-

- Key environmental impacts and aspects associated with the proposed project.
- Possible mitigation measures associated with identified impacts and aspects.
- Key roles and responsibilities for both the Tender's project team and Transnet with regards to the project.
- Monitoring techniques and reporting of both accidents and incidents.
- Details of induction and other forms of training and EMP awareness (if any).

The following documents are key -

1.0 Transnet SOC Limited – Integrated Management Systems (IMS) Policy,

1.1 By signing this Tender Schedule, the tenderer confirms that they will comply with the above policy statement and environmental commitments therein.

1.2 Tender to provide a signed declaration of understanding as part of the returnable acknowledging understanding thereof and the budget provision for the implementation of environmental management requirements.

By signing this Tender Schedule, the tenderer confirms that they will **comply** with the above requirements and in particular Transnet Freight Rail IMS policy statement and environmental commitments therein.

The assessment of the Tenderer's Environmental Management Plan will be as follows:

Key Environmental Impacts and Possible Mitigation Measures	
	Assessment Feedback
The EMP is **not submitted** by the bidder.	
EMP with **zero/no key** impacts and mitigation measures specific to the project	
EMP contains **1-3** key impacts and mitigation measures specific to the project.	
EMP contains **4-6** key impacts and mitigation measures specific to the project.	
EMP contains **7-9** key reasonable and relevant impacts and mitigation measures specific to the project.	
EMP contains **10 and more** key reasonable and relevant impacts and mitigation measures specific to	

the project, which meet and exceed tender requirements.	

Key Roles and Responsibilities	
	Assessment Feedback
The EMP is **not submitted** by the bidder.	
EMP with **zero/no key** roles and responsibilities specific to the project.	
EMP **contains 1-3 key** reasonable and relevant roles and responsibilities specific to the project.	
EMP contains **4-6 key** reasonable and relevant roles and responsibilities specific to the project.	
EMP contains **7-9 key** reasonable and relevant roles and responsibilities specific to the project.	
EMP contains **10 and more key** reasonable and relevant roles and responsibilities specific to the project, which meet and exceed tender expectations.	

Environmental Monitoring, Training and Reporting	
	Assessment Feedback
The EMP is **not submitted** by the bidder.	
EMP with **zero/no** monitoring techniques, no training and no form of reporting.	
Tenderer did not demonstrate understanding of the project scope and **provided irrelevant information** on monitoring techniques, training methods and types of reports.	
Tenderer understood the project scope but provided relevant but **less detailed information** on monitoring techniques, training methods and types of reports.	
Tenderer understood the project scope and identified **relevant** monitoring techniques, relevant training methods and relevant reports.	
Tenderer understood the project scope and addresses critical aspects with regards to monitoring, training and reporting which meets **and exceeds tender requirements**.	

Attached submissions to this schedule:

See EMP comments above.

Signed ..... Date .....

Name ..... Position .....

Tenderer .....

T2.2-6: Changes to Tender Document

Changes to the tender documents are only allowed if a main tender complying fully with the tender documents has also been provided.

Do not return this schedule if no alternative tender is submitted.

The Conditions of Tender state that the tenderer may:

C.2.12.1 Submit alternative tender offers only if a main tender offer, strictly in accordance with all the requirements of the tender documents, is also submitted. The alternative tender offer is to be submitted with the main tender offer together with a schedule that compares the requirements of the tender documents with the alternative requirements the tenderer proposes.

C.2.12.2 Accept that an alternative tender offer may be based only on the criteria stated in the tender data or criteria otherwise acceptable to the employer.

Having examined the criteria stated in the Tender Data for this tender the proposed changes to the tender documents are:

Document No.	Subject of the proposed change	Propose to change to:

Signed ..... Date .....

Name ..... Position .....

Tenderer .....

T2.2-7: Schedule of Machine/s and Schedule of Labour

Schedules of Machine/s
Workload: Dual Purpose Ballast Tamper

TYPE OF MACHINE OFFERED:

1 MAKE:……..
2 MODEL(YEAR) :……..
3 NOMINAL PRODUCTION RATE (for existing track condition :…….(sleepers/min)
4 LIFTING AND SLEWING
4.1 MAXIMUM LIFT (mm) :……..
4.2 MAXIMUM SLEW PER PASS (mm) :…….
5 NOMINAL TRAVELLING SPEED (km/h)
5.1 LEVEL GRADIENT (minimum 80 km/h) :……..
5.2 GRADIENT OF 1:60 (minimum 45 km/h):……...

5.3 WHEN TRAVELLING AS PART OF AND COUPLED TO A TRAIN:……
(minimum 60 km/h)
6. TAMPING FREQUENCY (Hz) :……..

Note : Nominal in the schedule of machines indicates the average continuous production rate that the machine is capable of.

TYPE OF TAMPING	UNIT	SCHEDULED RATE/TIME		
To be completed by bidder. Turnout Information to be filled only where applicable				
Plain track	sl/min	Rp	=	
Restricted track	sl/min	Rr	=	
Maximum rate	sl/min	R max.	=	
Sets:				
1:20 wood	Each	R20w	=	
1:20 concrete	Each	R20c	=	
1:12 wood	Each	R12w	=	
1:12 concrete	Each	R12c	=	
1:9 wood	Each	R9w	=	
1:9 concrete	Each	R9c	=	
1:8 wood	Each	R8	=	
1:6 wood	Each	R6	=	
1:7 or 1:4 diamond	Each	Rd	=	
Scissors	Each	Rci	=	NA
Single slip	Each	Rss	=	NA

Double slip	Each	Rds	=	NA
Splice joint	Each	Rsj	=	

Note: All scheduled rates must include the machine preparation time for turnout tamping where applicable.

Schedule of Labour for full time support of machine operations
Workload:Dual Purpose Ballast Tamping machine.

	A) Machine support Labour	B) Full time support Subcontract labour as part of machine activity.	C) Any other full time labour – (Functions to be specified.)
1. Contract supervisor			
2. Machine operators			
3. Machine maintenance support Technicians			
4. Machine Technician Trade hands supporting each machine:			
5. Other Machine support Grades: Specify:			
6. Subcontractor supervisor / Track master for tamping support			
7. Subcontractors Trade hands for track support. Trackman etc.			
8. Bonders.			
9. Flagmen			
10. Workers (Track workers Un – skilled labour)			
11. Vehicle allowed for transport of workers & tools. (Type & Capacity)			
12.. Any other support allowed for execution of this function (Clarify)			

SCHEDULE OF CELL-PHONE CONTRACT (REFER CLAUSE 5.2.3 OF THE C3)

Name of Service Provider (i.e. Vodacom / MTN/8TA/Virgin/CellC) & Type of Contract (e.g. Talk 500 / Pinical 600)

Cellular Telephone 1 _____

Cellular Telephone 2 _____

T2.2-8: Authority to submit a Tender

Indicate the status of the tenderer by ticking the appropriate box hereunder. The tenderer must complete the certificate set out below for his category of organisation or alternatively attach a certified copy of a company / organisation document which provides the same information for the relevant category as requested here.

A - COMPANY	B - PARTNERSHIP	C - JOINT VENTURE	D - SOLE PROPRIETOR

A. Certificate for Company

I, _____ chairperson of the board of directors _____

_____, hereby confirm that by resolution of the board taken on _____

_____ (date), Mr/Ms _____, acting in the capacity of _____

_____, was authorised to sign all documents in connection with this tender offer and any contract resulting from it on behalf of the company.

Signed		Date	
Name		Position	Chairman of the Board of Directors

B. Certificate for Partnership

We, the undersigned, being the **key partners** in the business trading as _____ _____ hereby authorise Mr/Ms _____ acting in the capacity of _____, to sign all documents in connection with the tender offer for Contract _____ and any contract resulting from it on our behalf.

Name	Address	Signature	Date

NOTE: This certificate is to be completed and signed by the full number of Partners necessary to commit the Partnership. Attach additional pages if more space is required.

C. Certificate for Joint Venture

We, the undersigned, are submitting this tender offer in Joint Venture and hereby authorise Mr/Ms _____, an authorised signatory of the company _____ _____, acting in the capacity of lead partner, to sign all documents in connection with the tender offer for Contract _____and any contract resulting from it on our behalf.

This authorisation is evidenced by the attached power of attorney signed by legally authorised signatories of all the partners to the Joint Venture.

Furthermore we attach to this Schedule a copy of the joint venture agreement which incorporates a statement that all partners are liable jointly and severally for the execution of the contract and that the lead partner is authorised to incur liabilities, receive instructions and payments and be responsible for the entire execution of the contract for and on behalf of any and all the partners.

Name of firm	**Address**	**Authorising signature, name (in caps) and capacity**

D. Certificate for Sole Proprietor

I, _____, hereby confirm that I am the sole owner of the business trading as _____.

Signed ..... Date .....

Name ..... Position Sole Proprietor .....

T2.2-9: Record of Addenda to Tender Documents

This schedule as submitted confirms that the following communications received from the *Employer* before the submission of this tender offer, amending the tender documents, have been taken into account in this specific tender offer:

	Date	**Title or Details**
1		
2		
3		
4		
5		
6		
7		
8		
9		

Attach additional pages if more space is required.

Signed ..... Date .....

Name ..... Position .....

Tenderer .....

T2.2-10: Availability of Equipment and Other Resources

The Tenderer to submit a list of all Equipment and other resources that will be used to execute the *services* as described in the Service Information.

Equipment Type and Availability – Description	Hourly Rate	Number of Equipment	Details of Ownership

Signed ..... Date .....

Name ..... Position .....

Tenderer .....

2.2-11 : ANNEX G Compulsory Enterprise Questionnaire

The following particulars hereunder must be furnished.

In the case of a Joint Venture, separate enterprise questionnaires in respect of each partner/member must be completed and submitted.

Section 1: Name of enterprise: _____

Section 2: VAT registration number, if any: _____

Section 3: CIDB registration number, if any: _____

Section 4: CSD number: _____

Section 5: Particulars of sole proprietors and partners in partnerships

Name	**Identity number**	**Personal income tax number**

***** Complete only if sole proprietor or partnership and attach separate page if more than 3 partners

Section 6: Particulars of companies and close corporations

Company registration number _____

Close corporation number _____

Tax reference number: _____

Section 7: The attached SBD4 must be completed for each tender and be attached as a tender requirement.
Section 8: The attached SBD 6 must be completed for each tender and be attached as a requirement.

The undersigned, who warrants that he / she is duly authorised to do so on behalf of the enterprise:

i) authorizes the Employer to obtain a tax clearance certificate from the South African Revenue Services that my / our tax matters are in order;

ii) confirms that the neither the name of the enterprise or the name of any partner, manager, director or other person, who wholly or partly exercises, or may exercise, control over the enterprise appears on the Register of Tender Defaulters established in terms of the Prevention and Combating of Corrupt Activities Act of 2004;

iii) confirms that no partner, member, director or other person, who wholly or partly exercises, or may exercise, control over the enterprise appears, has within the last five years been convicted of fraud or corruption;

iv) confirms that I / we are not associated, linked or involved with any other tendering entities submitting tender offers and have no other relationship with any of the tenderers or those responsible for compiling the scope of work that could cause or be interpreted as a conflict of interest; and

v) confirms that the contents of this questionnaire are within my personal knowledge and are to the best of my belief both true and correct.

Signed		Date	
Name		Position	
Enterprise name			

SBD 6.1

PREFERENCE POINTS CLAIM FORM

This preference form must form part of all bids invited. It contains general information and serves as a claim for preference points for Specific Goals contribution. Transnet will award preference points to companies who provide valid proof of evidence as per the table of evidence in paragraph 4.1 below.

---

1. GENERAL CONDITIONS

1.1 The following preference point systems are applicable to all bids:

- the 80/20 system for requirements with a Rand value of up to R50 000 000 (all applicable taxes included); and
- the 90/10 system for requirements with a Rand value above R50 000 000 (all applicable taxes included).

1.2 The value of this bid is estimated to not exceed R50 000 000 (all applicable taxes included) and therefore the 80/20 preference point system shall be applicable. Despite the stipulated preference point system, Transnet shall use the lowest acceptable bid to determine the applicable preference point system in a situation where all received acceptable bids are received outside the stated preference point system.

1.3 Preference points for this bid shall be awarded for:

(a) Price;

(b) B-BBEE Status Level of Contribution; and

(c) Any other specific goal determined in the Transnet preferential procurement policy

1.4 The maximum points for this bid are allocated as follows:

	POINTS
PRICE	**80**
B-BBEE Level of contributor (1 or 2)	**5**
Entities that are at least 51 % Black Owned	**5**
At least 30% Black Women Owned Entities	**10**
Total points for Price and B-BBEE must not exceed	**100**

1.5 Failure on the part of a bidder to submit proof of evidence required for any of the specific goals together with the bid will be interpreted to mean that preference points for that

specific goal are not claimed.

1.6 The purchaser reserves the right to require of a bidder, either before a bid is adjudicated or at any time subsequently, to substantiate any claim in regard to preferences, in any manner required by the purchaser.

2. DEFINITIONS

(a) **"all applicable taxes"** includes value-added tax, pay as you earn, income tax, unemployment insurance fund contributions and skills development levies;

(b) **"B-BBEE"** means broad-based black economic empowerment as defined in section 1 of the Broad-Based Black Economic Empowerment Act;

(c) "**B-BBEE status level of contributor"** means the B-BBEE status received by a measured entity based on its overall performance using the relevant scorecard contained in the Codes of Good Practice on Black Economic Empowerment, issued in terms of section 9(1) of the Broad-Based Black Economic Empowerment Act;

(d) **"bid"** means a written offer in a prescribed or stipulated form in response to an invitation by an organ of state for the supply/provision of services, works or goods, through price quotations, advertised competitive bidding processes or proposals;

(e) **"Broad-Based Black Economic Empowerment Act"** means the Broad-Based Black Economic Empowerment Act, 2003 (Act No. 53 of 2003);

(f) **"EME"** means an Exempted Micro Enterprise as defines by Codes of Good Practice under section 9 (1) of the Broad-Based Black Economic Empowerment Act, 2003 (Act No. 53 of 2003);

(g) **"functionality"** means the ability of a bidder to provide goods or services in accordance with specification as set out in the bid documents

(h) **"Price"** includes all applicable taxes less all unconditional discounts.

(i) **"Proof of B-BBEE Status Level of Contributor"**

i) the B-BBBEE status level certificate issued by an authorised body or person;

ii) a sworn affidavit as prescribed by the B-BBEE Codes of Good Practice; or

iii) any other requirement prescribed in terms of the B-BBEE Act.

(j) **"QSE"** means a Qualifying Small Enterprise as defines by Codes of Good Practice under section 9 (1) of the Broad-Based Black Economic Empowerment Act, 2003 (Act No. 53 of 2003);

(k) **"rand value"** means the total estimated value of a contract in South African currency, calculated at the time of bid invitations, and includes all applicable taxes and excise duties.

(l) **Specific goals"** means targeted advancement areas or categories of persons or groups either previously disadvantaged or falling within the scope of the

Reconstruction and Development Programme identified by Transnet to be given preference in allocation of procurement contracts in line with section 2(1) of the PPPFA.

3. POINTS AWARDED FOR PRICE

3.1 THE 80/20 PREFERENCE POINT SYSTEMS

A maximum of 80 points is allocated for price on the following basis:

80/20

$$Ps = 80\left(1 - \frac{Pt - P\min}{P\min}\right)$$

Where

Ps = Points scored for comparative price of bid under consideration

Pt = Comparative price of bid under consideration

Pmin = Comparative price of lowest acceptable bid

4. EVEDINCE REQUIRED FOR CLAIMING SPECIFIC GOALS

4.1 In terms of Transnet Preferential Procurement Policy (TPPP) and Procurement Manuals, preference points must be awarded to a bidder for providing evidence in accordance with the table below:

Specific Goals	Acceptable Evidence
B-BBEE	B-BBEE Certificate / Sworn- Affidavit / B-BBEE CIPC Certificate (in case of JV, a consolidated scorecard will be accepted) as per DTIC guideline
At least 30% Black Women Owned Entities	B-BBEE Certificate / Sworn- Affidavit / B-BBEE CIPC Certificate (in case of JV, a consolidated scorecard will be accepted) as per DTIC guideline
Entities that are at least 51 % Black Owned	B-BBEE Certificate / Sworn- Affidavit / B-BBEE CIPC Certificate (in case of JV, a consolidated scorecard will be accepted) as per DTIC guideline

4.2 The table below indicates the required proof of B-BBEE status depending on the category of enterprises:

Enterprise	**B-BBEE Certificate & Sworn Affidavit**
Large	Certificate issued by SANAS accredited verification agency
QSE	Certificate issued by SANAS accredited verification agency Sworn Affidavit signed by the authorised QSE representative and attested by a Commissioner of Oaths confirming annual turnover and black ownership (only black-owned QSEs - 51% to 100% Black owned)

	[Sworn affidavits must substantially comply with the format that can be obtained on the DTI's website at www.dti.gov.za/economic_empowerment/bee_codes.jsp.]
EME	Sworn Affidavit signed by the authorised EME representative and attested by a Commissioner of Oaths confirming annual turnover and black ownership Certificate issued by CIPC (formerly CIPRO) confirming annual turnover and black ownership Certificate issued by SANAS accredited verification agency only if the EME is being measured on the QSE scorecard

4.3 A trust, consortium or joint venture (including unincorporated consortia and joint ventures) must submit a consolidated B-BBEE Status Level verification certificate for every separate bid.

4.4 Tertiary Institutions and Public Entities will be required to submit their B-BBEE status level certificates in terms of the specialized scorecard contained in the B-BBEE Codes of Good Practice.

4.5 A person will not be awarded points for B-BBEE status level if it is indicated in the bid documents that such a bidder intends sub-contracting more than 25% of the value of the contract to any other enterprise that does not qualify for at least the points that such a bidder qualifies for, unless the intended sub-contractor is an EME that has the capability and ability to execute the sub-contract.

4.6 A person awarded a contract may not sub-contract more than 25% of the value of the contract to any other enterprise that does not have an equal or higher B-BBEE status level than the person concerned, unless the contract is sub-contracted to an EME that has the capability and ability to execute the sub-contract.

4.7 Bidders are to note that the rules pertaining to B-BBEE verification and other B-BBEE requirements may be changed from time to time by regulatory bodies such as National Treasury or the DTI. It is the Bidder's responsibility to ensure that his/her bid complies fully with all B-BBEE requirements at the time of the submission of the bid.

5. BID DECLARATION

5.1 Bidders who claim points in respect of B-BBEE Status Level of Contribution must complete the following:

6. B-BBEE STATUS LEVEL OF CONTRIBUTION CLAIMED IN TERMS OF PARAGRAPHS 1.4 AND 6.1

6.1 B-BBEE Status Level of Contribution: . …… (maximum of 20 points)

(Points claimed in respect of paragraph 6.1 must be in accordance with the table reflected in paragraph 4.1 and must be substantiated by relevant proof of B-BBEE status level of contributor.

7. SUB-CONTRACTING

7.1 Will any portion of the contract be sub-contracted?

(***Tick applicable box***)

YES		NO	

7.1.1 If yes, indicate:

i) What percentage of the contract will be subcontracted.....%

ii) The name of the sub-contractor.....

iii) The B-BBEE status level of the sub-contractor.....

iv) Whether the sub-contractor is an EME or QSE.

(Tick applicable box)

YES		NO	

8. DECLARATION WITH REGARD TO COMPANY/FIRM

8.1 Name of company/firm:.....

8.2 VAT registration number:.....

8.3 Company registration number:.....

8.4 TYPE OF COMPANY/ FIRM

- ☐ Partnership/Joint Venture / Consortium
- ☐ One person business/sole propriety
- ☐ Close corporation
- ☐ Company
- ☐ (Pty) Limited

[TICK APPLICABLE BOX]

8.5 DESCRIBE PRINCIPAL BUSINESS ACTIVITIES

.....
.....
.....

8.6 COMPANY CLASSIFICATION

- ☐ Manufacturer
- ☐ Supplier
- ☐ Professional Supplier/Service provider
- ☐ Other Suppliers/Service providers, e.g. transporter, etc.

[*TICK APPLICABLE BOX*]

8.7 Total number of years the company/firm has been in business:.....

8.8 I/we, the undersigned, who is / are duly authorised to do so on behalf of the company/firm, certify that the points claimed, based on the B-BBE status level of contribution indicated in paragraphs 1.4 and 6.1 of the foregoing certificate, qualifies the company/ firm for the preference(s) shown and I / we acknowledge that:

i) The information furnished is true and correct;

ii) The preference points claimed are in accordance with the General Conditions as indicated in paragraph 1 of this form;

iii) In the event of a contract being awarded as a result of points claimed as shown in paragraph 1.4 and 6.1, the contractor may be required to furnish documentary proof to the satisfaction of the purchaser that the claims are correct;

iv) If a bidder submitted false information regarding its B-BBEE status level of contributor,, which will affect or has affected the evaluation of a bid, or where a bidder has failed to declare any subcontracting arrangements or any of the conditions of contract have not been fulfilled, the purchaser may, in addition to any other remedy it may have

(a) disqualify the person from the bidding process;

(b) recover costs, losses or damages it has incurred or suffered as a

result of that person's conduct;

(c) cancel the contract and claim any damages which it has suffered as a result of having to make less favourable arrangements due to such cancellation;

(d) if the successful bidder subcontracted a portion of the bid to another person without disclosing it, Transnet reserves the right to penalise the bidder up to 10 percent of the value of the contract;

(e) recommend that the bidder or contractor, its shareholders and directors, or only the shareholders and directors who acted on a fraudulent basis, be restricted by the National Treasury from obtaining business from any organ of state for a period not exceeding 10 years, after the audi alteram partem (hear the other side) rule has been applied; and

(f) forward the matter for criminal prosecution.

WITNESSES 1. …….. 2. …….	…… SIGNATURE(S) OF BIDDERS(S) DATE:…….. ADDRESS ……..

BIDDER'S DISCLOSURE

1. PURPOSE OF THE FORM

Any person (natural or juristic) may make an offer or offers in terms of this invitation to bid. In line with the principles of transparency, accountability, impartiality, and ethics as enshrined in the Constitution of the Republic of South Africa and further expressed in various pieces of legislation, it is required for the bidder to make this declaration in respect of the details required hereunder.

Where a person/s are listed in the Register for Tender Defaulters and / or the List of Restricted Suppliers, that person will automatically be disqualified from the bid process.

2. Bidder's declaration

2.1 Is the bidder, or any of its directors / trustees / shareholders / members / partners or any person having a controlling interest1 in the enterprise, employed by the state? **YES/NO**

2.1.1 If so, furnish particulars of the names, individual identity numbers, and, if applicable, state employee numbers of sole proprietor/ directors / trustees / shareholders / members/ partners or any person having a controlling interest in the enterprise, in table below.

Full Name	**Identity Number**	**Name of State institution**

2.2 Do you, or any person connected with the bidder, have a relationship with any person who is employed by the procuring institution? **YES/NO**

[1] the power, by one person or a group of persons holding the majority of the equity of an enterprise, alternatively, the person/s having the deciding vote or power to influence or to direct the course and decisions of the enterprise.

2.2.1 If so, furnish particulars:

……
……

2.3 Does the bidder or any of its directors / trustees / shareholders / members / partners or any person having a controlling interest in the enterprise have any interest in any other related enterprise whether or not they are bidding for this contract? **YES/NO**

2.3.1 If so, furnish particulars:

……
……

3 DECLARATION

I, the undersigned, (name)…… in submitting the accompanying bid, do hereby make the following statements that I certify to be true and complete in every respect:

3.1 I have read and I understand the contents of this disclosure;

3.2 I understand that the accompanying bid will be disqualified if this disclosure is found not to be true and complete in every respect;

3.3 The bidder has arrived at the accompanying bid independently from, and without consultation, communication, agreement or arrangement with any competitor. However, communication between partners in a joint venture or consortium2 will not be construed as collusive bidding.

3.4 In addition, there have been no consultations, communications, agreements or arrangements with any competitor regarding the quality, quantity, specifications, prices, including methods, factors or formulas used to calculate prices, market allocation, the intention or decision to submit or not to submit the bid, bidding with the intention not to win the bid and conditions or delivery particulars of the products or services to which this bid invitation relates.

3.4 The terms of the accompanying bid have not been, and will not be, disclosed by the bidder, directly or indirectly, to any competitor, prior to the date and time of the official bid opening or of the awarding of the contract.

3.5 There have been no consultations, communications, agreements or arrangements made by the bidder with any official of the procuring institution in relation to this procurement process prior to and during the bidding process except to provide clarification on the bid submitted where so required by the institution; and the

[2] Joint venture or Consortium means an association of persons for the purpose of combining their expertise, property, capital, efforts, skill and knowledge in an activity for the execution of a contract.

bidder was not involved in the drafting of the specifications or terms of reference for this bid.

3.6 I am aware that, in addition and without prejudice to any other remedy provided to combat any restrictive practices related to bids and contracts, bids that are suspicious will be reported to the Competition Commission for investigation and possible imposition of administrative penalties in terms of section 59 of the Competition Act No 89 of 1998 and or may be reported to the National Prosecuting Authority (NPA) for criminal investigation and or may be restricted from conducting business with the public sector for a period not exceeding ten (10) years in terms of the Prevention and Combating of Corrupt Activities Act No 12 of 2004 or any other applicable legislation.

I CERTIFY THAT THE INFORMATION FURNISHED IN PARAGRAPHS 1, 2 and 3 ABOVE IS CORRECT.
I ACCEPT THAT THE STATE MAY REJECT THE BID OR ACT AGAINST ME IN TERMS OF PARAGRAPH 6 OF PFMA SCM INSTRUCTION 03 OF 2021/22 ON PREVENTING AND COMBATING ABUSE IN THE SUPPLY CHAIN MANAGEMENT SYSTEM SHOULD THIS DECLARATION PROVE TO BE FALSE.

……	……
Signature	Date
……	……
Position	Name of bidder

T2.2-12: Supplier Code of Conduct

Transnet SOC Limited aims to achieve the best value for money when buying or selling goods and obtaining services. This however must be done in an open and fair manner that supports and drives a competitive economy. Underpinning our process are several acts and policies that any supplier dealing with Transnet must understand and support. These are:

- The Transnet Procurement Policy – A guide for Tenderers.
- Section 217 of the Constitution - the five pillars of Public PSCM (Procurement and Supply Chain Management): fair, equitable, transparent, competitive and cost effective;
- The Public Finance Management Act (PFMA);
- The Broad Based Black Economic Empowerment Act (BBBEE)
- The Prevention and Combating of Corrupt Activities Act (PRECCA); and
- The Construction Industry Development Board Act (CIDB Act).

This code of conduct has been included in this contract to formally appraise Transnet Suppliers of Transnet's expectations regarding behaviour and conduct of its Suppliers.

Prohibition of Bribes, Kickbacks, Unlawful Payments, and Other Corrupt Practices

Transnet is in the process of transforming itself into a self-sustaining State Owned Enterprise, actively competing in the logistics industry. Our aim is to become a world class, profitable, logistics organisation. As such, our transformation is focused on adopting a performance culture and to adopt behaviours that will enable this transformation.

1. ***Transnet SOC Limited will not participate in corrupt practices. Therefore, it expects its suppliers to act in a similar manner.***
    - Transnet and its employees will follow the laws of this country and keep accurate business records that reflect actual transactions with, and payments to, our suppliers.
    - Employees must not accept or request money or anything of value, directly or indirectly, from suppliers.
    - Employees may not receive anything that is calculated to:
        - Illegally influence their judgement or conduct or to ensure the desired outcome of a sourcing activity;

- Win or retain business or to influence any act or decision of any person involved in sourcing decisions; or
- Gain an improper advantage.

- There may be times when a supplier is confronted with fraudulent or corrupt behaviour of Transnet employees. We expect our Suppliers to use our "Tip-offs Anonymous" Hot line to report these acts. (0800 003 056).

2. *Transnet SOC Limited is firmly committed to the ideas of free and competitive enterprise.*

- Suppliers are expected to comply with all applicable laws and regulations regarding fair competition and antitrust practices.
- Transnet does not engage with non-value adding agents or representatives solely for the purpose of increasing BBBEE spend (fronting).

3. Transnet's relationship with suppliers requires us to clearly define requirements, to exchange information and share mutual benefits.

- Generally, suppliers have their own business standards and regulations. Although Transnet cannot control the actions of our suppliers, we will not tolerate any illegal activities. These include, but are not limited to:
  - Misrepresentation of their product (origin of manufacture, specifications, intellectual property rights, etc);
  - Collusion;
  - Failure to disclose accurate information required during the sourcing activity (ownership, financial situation, BBBEE status, etc.);
  - Corrupt activities listed above; and
  - Harassment, intimidation or other aggressive actions towards Transnet employees.
- Suppliers must be evaluated and approved before any materials, components, products or services are purchased from them. Rigorous due diligence is conducted and the supplier is expected to participate in an honest and straight forward manner.
- Suppliers must record and report facts accurately, honestly and objectively. Financial records must be accurate in all material respects.

Conflicts of Interest

A conflict of interest arises when personal interests or activities influence (or appear to influence) the ability to act in the best interests of Transnet SOC Limited.

- Doing business with family members.
- Having a financial interest in another company in our industry

Where possible, contracts will be negotiated to include the above in the terms of such contracts. To the extent such terms are not included in contractual obligations and any of the above code is breached, then Transnet reserves its right to review doing business with these suppliers.

I, _____ of _____

(insert name of Director or as per Authority Resolution from Board of Directors) *(insert name of Company)*

hereby acknowledge having read, understood and agree to the terms and conditions set out in the "Transnet Supplier Code of Conduct."

Signed this on day _____ at _____

_____

Signature

T2.2-13: Unilateral Non-Disclosure Agreement

Note to tenderers: This Non-Disclosure Agreement is to be completed and signed by an authorised signatory:

THIS AGREEMENT is made effective as of ..... day of ..... 20..... by and between:

TRANSNET SOC LTD

(Registration No. 1990/000900/30), a company incorporated and existing under the laws of South Africa, having its principal place of business at 2nd Floor, Waterfall Business Estate, 9 Country Estate Drive, Midrand, 1662, South Africa

and

.....

(Registration No. .....),a private company incorporated and existing under the laws of South Africa having its principal place of business at

.....

.....

WHEREAS

Transnet and the Company wish to exchange Information [as defined below] and it is envisaged that each party may from time to time receive Information relating to the other in respect thereof. In consideration of each party making available to the other such Information, the parties jointly agree that any dealings between them shall be subject to the terms and conditions of this Agreement which themselves will be subject to the parameters of the Tender Document.

IT IS HEREBY AGREED

1. INTERPRETATION

In this Agreement:

1.1 **Agents** mean directors, officers, employees, agents, professional advisers, contractors or sub-contractors, or any Group member;

1.2 **Bid** or **Bid Document** (hereinafter Tender) means Transnet's Request for Information [**RFI**] Request for Proposal [**RFP**] or Request for Quotation [**RFQ**], as the case may be;

1.3 **Confidential Information** means any information or other data relating to one party [the **Disclosing Party**] and/or the business carried on or proposed or intended to be carried on by that

party and which is made available for the purposes of the Bid to the other party [the **Receiving Party**] or its Agents by the Disclosing Party or its Agents or recorded in agreed minutes following oral disclosure and any other information otherwise made available by the Disclosing Party or its Agents to the Receiving Party or its Agents, whether before, on or after the date of this Agreement, and whether in writing or otherwise, including any information, analysis or specifications derived from, containing or reflecting such information but excluding information which:

1.3.1 is publicly available at the time of its disclosure or becomes publicly available [other than as a result of disclosure by the Receiving Party or any of its Agents contrary to the terms of this Agreement]; or

1.3.2 was lawfully in the possession of the Receiving Party or its Agents [as can be demonstrated by its written records or other reasonable evidence] free of any restriction as to its use or disclosure prior to its being so disclosed; or

1.3.3 following such disclosure, becomes available to the Receiving Party or its Agents [as can be demonstrated by its written records or other reasonable evidence] from a source other than the Disclosing Party or its Agents, which source is not bound by any duty of confidentiality owed, directly or indirectly, to the Disclosing Party in relation to such information;

1.4 **Group** means any subsidiary, any holding company and any subsidiary of any holding company of either party; and

1.5 **Information** means all information in whatever form including, without limitation, any information relating to systems, operations, plans, intentions, market opportunities, know-how, trade secrets and business affairs whether in writing, conveyed orally or by machine-readable medium.

2. CONFIDENTIAL INFORMATION

2.1 All Confidential Information given by one party to this Agreement [the **Disclosing Party**] to the other party [the **Receiving Party**] will be treated by the Receiving Party as secret and confidential and will not, without the Disclosing Party's written consent, directly or indirectly communicate or disclose [whether in writing or orally or in any other manner] Confidential Information to any other person other than in accordance with the terms of this Agreement.

2.2 The Receiving Party will only use the Confidential Information for the sole purpose of technical and commercial discussions between the parties in relation to the Tender or for the subsequent performance of any contract between the parties in relation to the Tender.

2.3 Notwithstanding clause 2.1 above, the Receiving Party may disclose Confidential Information:

2.3.1 to those of its Agents who strictly need to know the Confidential Information for the sole purpose set out in clause 2.2 above, provided that the Receiving Party shall ensure that such Agents are

made aware prior to the disclosure of any part of the Confidential Information that the same is confidential and that they owe a duty of confidence to the Disclosing Party. The Receiving Party shall at all times remain liable for any actions of such Agents that would constitute a breach of this Agreement; or

2.3.2 to the extent required by law or the rules of any applicable regulatory authority, subject to clause 2.4 below.

2.4 In the event that the Receiving Party is required to disclose any Confidential Information in accordance with clause 2.3.2 above, it shall promptly notify the Disclosing Party and cooperate with the Disclosing Party regarding the form, nature, content and purpose of such disclosure or any action which the Disclosing Party may reasonably take to challenge the validity of such requirement.

2.5 In the event that any Confidential Information shall be copied, disclosed or used otherwise than as permitted under this Agreement then, upon becoming aware of the same, without prejudice to any rights or remedies of the Disclosing Party, the Receiving Party shall as soon as practicable notify the Disclosing Party of such event and if requested take such steps [including the institution of legal proceedings] as shall be necessary to remedy [if capable of remedy] the default and/or to prevent further unauthorised copying, disclosure or use.

2.6 All Confidential Information shall remain the property of the Disclosing Party and its disclosure shall not confer on the Receiving Party any rights, including intellectual property rights over the Confidential Information whatsoever, beyond those contained in this Agreement.

3. RECORDS AND RETURN OF INFORMATION

3.1 The Receiving Party agrees to ensure proper and secure storage of all Information and any copies thereof.

3.2 The Receiving Party shall keep a written record, to be supplied to the Disclosing Party upon request, of the Confidential Information provided and any copies made thereof and, so far as is reasonably practicable, of the location of such Confidential Information and any copies thereof.

3.3 The Company shall, within 7 [seven] days of receipt of a written demand from Transnet:

3.3.1 return all written Confidential Information [including all copies]; and

3.3.2 expunge or destroy any Confidential Information from any computer, word processor or other device whatsoever into which it was copied, read or programmed by the Company or on its behalf.

3.4 The Company shall on request supply a certificate signed by a director as to its full compliance with the requirements of clause 3.3.2 above.

4. ANNOUNCEMENTS

4.1 Neither party will make or permit to be made any announcement or disclosure of its prospective interest in the Tender without the prior written consent of the other party.

4.2 Neither party shall make use of the other party's name or any information acquired through its dealings with the other party for publicity or marketing purposes without the prior written consent of the other party.

5. DURATION

The obligations of each party and its Agents under this Agreement shall survive the termination of any discussions or negotiations between the parties regarding the Tender and continue thereafter for a period of 5 [five] years.

6. PRINCIPAL

Each party confirms that it is acting as principal and not as nominee, agent or broker for any other person and that it will be responsible for any costs incurred by it or its advisers in considering or pursuing the Tender and in complying with the terms of this Agreement.

7. ADEQUACY OF DAMAGES

Nothing contained in this Agreement shall be construed as prohibiting the Disclosing Party from pursuing any other remedies available to it, either at law or in equity, for any such threatened or actual breach of this Agreement, including specific performance, recovery of damages or otherwise.

8. PRIVACY AND DATA PROTECTION

8.1 The Receiving Party undertakes to comply with South Africa's general privacy protection in terms Section 14 of the Bill of Rights in connection with this Tender and shall procure that its personnel shall observe the provisions of such Act [as applicable] or any amendments and re-enactments thereof and any regulations made pursuant thereto.

8.2 The Receiving Party warrants that it and its Agents have the appropriate technical and organisational measures in place against unauthorised or unlawful processing of data relating to the Tender and against accidental loss or destruction of, or damage to such data held or processed by them.

9. GENERAL

9.1 Neither party may assign the benefit of this Agreement, or any interest hereunder, except with the prior written consent of the other, save that Transnet may assign this Agreement at any time to any member of the Transnet Group.

9.2 No failure or delay in exercising any right, power or privilege under this Agreement will operate as a waiver of it, nor will any single or partial exercise of it preclude any further exercise or the exercise of any right, power or privilege under this Agreement or otherwise.

9.3 The provisions of this Agreement shall be severable in the event that any of its provisions are held by a court of competent jurisdiction or other applicable authority to be invalid, void or otherwise unenforceable, and the remaining provisions shall remain enforceable to the fullest extent permitted by law.

9.4 This Agreement may only be modified by a written agreement duly signed by persons authorised on behalf of each party.

9.5 Nothing in this Agreement shall constitute the creation of a partnership, joint venture or agency between the parties.

9.6 This Agreement will be governed by and construed in accordance with South African law and the parties irrevocably submit to the exclusive jurisdiction of the South African courts.

Signed	.....	Date	.....
Name	.....	Position	.....
Tenderer	.....		

T2.2-14: Supplier declaration form

Respondents are to furnish the following documentation and complete the Supplier Declaration Form below:

1. **Original or certified** cancelled cheque **OR** letter from the Respondent's bank verifying banking details [**with bank stamp]**
2. **Certified copy** of Identity Document(s) of Shareholders/Directors/Members *[where applicable]*
3. **Certified copy** of Certificate of Incorporation, CM29 / CM9 *[name change]*
4. **Certified copy** of Share Certificates [CK1/CK2 if CC]
5. Original or certified letterhead confirm physical and postal addresses
6. **Original or certified** valid SARS Tax Clearance Certificate [RSA entities only]
7. **Certified copy** of VAT Registration Certificate [RSA entities only]
8. A signed letter from your entity's auditor or accountant confirming most recent annual turnover figures or certified BBBEE certificate
9. **Certified copy** of valid Company Registration Certificate *[if applicable]*

Note: No contract shall be awarded to any South African Respondent whose tax matters have not been declared by SARS to be in order.

Note: No agreement shall be awarded to any Respondent whose tax matters have not been declared by SARS to be in order.

Company Trading Name						
Company Registered Name						
Company Registration Number Or ID Number If A Sole Proprietor						
Form of entity	CC	Trust	Pty Ltd	Limited	Partnership	Sole Proprietor
VAT number (if registered)						
Company Telephone Number						
Company Fax Number						
Company E-Mail Address						
Company Website Address						
Bank Name		Bank Account Number				
Postal Address						
		Code				
Physical Address						
		Code				
Contact Person						
Designation						
Telephone						
Email						

Annual Turnover Range (Last Financial Year)	< R5 Million		R5-35 million		> R35 million	
Does Your Company Provide	Products		Services		Both	
Area Of Delivery	National		Provincial		Local	
Is Your Company A Public Or Private Entity			Public		Private	
Does Your Company Have A Tax Directive Or IRP30 Certificate			Yes		No	
Main Product Or Service Supplied (E.G.: Stationery/Consulting)						

BEE Ownership Details					
% Black Ownership		% Black women ownership		% Disabled person/s ownership	
Does your company have a BEE certificate		Yes		No	
What is your broad based BEE status (Level 1 to 9 / Unknown)					
How many personnel does the firm employ		Permanent		Part time	
Transnet Contact Person					
Contact number					
Transnet operating division					

Duly Authorised To Sign For And On Behalf Of Firm / Organisation			
Name		Designation	
Signature		Date	

Stamp And Signature Of Commissioner Of Oath			
Name		Date	
Signature		Telephone No.	

T2.2-15: RFP declaration form

NAME OF COMPANY: _____
We _____ do hereby certify that:

1. Transnet has supplied and we have received appropriate tender offers to any/all questions (as applicable) which were submitted by ourselves for tender clarification purposes;
2. we have received all information we deemed necessary for the completion of this Tender;
3. at no stage have we received additional information relating to the subject matter of this tender from Transnet sources, other than information formally received from the designated Transnet contact(s) as nominated in the tender documents;
4. we are satisfied, insofar as our company is concerned, that the processes and procedures adopted by Transnet in issuing this tender and the requirements requested from tenderers in responding to this tender have been conducted in a fair and transparent manner; and
5. furthermore, we acknowledge that a direct relationship exists between a family member and/or an owner / member / director / partner / shareholder (unlisted companies) of our company and an employee or board member of the Transnet Group as indicated below: *[Respondent to indicate if this section is not applicable]*

   FULL NAME OF OWNER/MEMBER/DIRECTOR/
   PARTNER/SHAREHOLDER: ADDRESS:
   _____
   _____
   _____
   Indicate nature of relationship with Transnet:
   _____
   _____
   _____
   _____
   [Failure to furnish complete and accurate information in this regard may lead to the disqualification of your response and may preclude a Respondent from doing future business with Transnet]

We declare, to the extent that we are aware or become aware of any relationship between ourselves and Transnet (other than any existing and appropriate business relationship with Transnet) which could unfairly advantage our company in the forthcoming adjudication process, we shall notify Transnet immediately in writing of such circumstances.

6. We accept that any dispute pertaining to this tender will be resolved through the Ombudsman process and will be subject to the Terms of Reference of the Ombudsman. The

Ombudsman process must first be exhausted before judicial review of a decision is sought. (Refer "Important Notice to respondents" below).

7. We further accept that Transnet reserves the right to reverse a tender award or decision based on the recommendations of the Ombudsman without having to follow a formal court process to have such award or decision set aside.

8. We have acquainted ourselves and agree with the content of T2.2-39 "Service Provider Integrity Pact".

For and on behalf of ..... duly authorised thereto
Name:
Signature:
Date:

IMPORTANT NOTICE TO TENDERERS

- Transnet has appointed a Procurement Ombudsman to investigate any material complaint in respect of tenders exceeding R5,000,000.00 (five million S.A. Rand) in value. Should a Tenderer have any material concern regarding an tender process which meets this value threshold, a complaint may be lodged with Transnet's Procurement Ombudsman for further investigation.
- It is incumbent on the Tenderer to familiarise himself/herself with the Terms of Reference for the Transnet Procurement Ombudsman, details of which are available for review at Transnet's website www.transnet.net.
- An official complaint form may be downloaded from this website and submitted, together with any supporting documentation, within the prescribed period, to procurement.ombud@transnet.net
- For transactions below the R5,000,000.00 (five million S.A. Rand) threshold, a complaint may be lodged with the Chief Procurement Officer of the relevant Transnet Operating Division.
- All Tenderers should note that a complaint must be made in good faith. If a complaint is made in bad faith, Transnet reserves the right to place such a tenderer on its List of Excluded Bidders.

T2.2-16: Certificate of Acquaintance with Tender Documents

NAME OF TENDERING ENTITY:

_____

1. By signing this certificate I/we acknowledge that I/we have made myself/ourselves thoroughly familiar with, and agree with all the conditions governing this RFP. This includes those terms and conditions of the Contract, the Supplier Integrity Pact, Non-Disclosure Agreement etc. contained in any printed form stated to form part of the documents thereof, but not limited to those listed in this clause.
2. I/we furthermore agree that Transnet SOC Ltd shall recognise no claim from me/us for relief based on an allegation that I/we overlooked any tender/contract condition or failed to take it into account for the purpose of calculating my/our offered prices or otherwise.
3. I/we understand that the accompanying Tender will be disqualified if this Certificate is found not to be true and complete in every respect.
4. For the purposes of this Certificate and the accompanying Tender, I/we understand that the word "competitor" shall include any individual or organisation, other than the Tenderer, whether or not affiliated with the Tenderer, who:
   a) has been requested to submit a Tender in response to this Tender invitation;
   b) could potentially submit a Tender in response to this Tender invitation, based on their qualifications, abilities or experience; and
   c) provides the same Services as the Tenderer and/or is in the same line of business as the Tenderer
5. The Tenderer has arrived at the accompanying Tender independently from, and without consultation, communication, agreement or arrangement with any competitor. However communication between partners in a joint venture or consortium will not be construed as collusive Tendering.
6. In particular, without limiting the generality of paragraph 5 above, there has been no consultation, communication, agreement or arrangement with any competitor regarding:
   a) prices;

b) geographical area where Services will be rendered [market allocation]

c) methods, factors or formulas used to calculate prices;

d) the intention or decision to submit or not to submit, a Tender;

e) the submission of a tender which does not meet the specifications and conditions of the tender; or

f) Tendering with the intention not winning the tender.

7. In addition, there have been no consultations, communications, agreements or arrangements with any competitor regarding the quality, quantity, specifications and conditions or delivery particulars of the Services to which this tender relates.

8. The terms of the accompanying tender have not been, and will not be, disclosed by the Tenderer, directly or indirectly, to any competitor, prior to the date and time of the official tender opening or of the awarding of the contract.

9. I/We am/are aware that, in addition and without prejudice to any other remedy provided to combat any restrictive practices related to tenders and contracts, tenders that are suspicious will be reported to the Competition Commission for investigation and possible imposition of administrative penalties in terms of section 59 of the Competition Act No 89 of 1998 and/or may be reported to the National Prosecuting Authority [NPA] for criminal investigation. In addition, Tenderers that submit suspicious tenders may be restricted from conducting business with the public sector for a period not exceeding 10 [ten] years in terms of the Prevention and Combating of Corrupt Activities Act No 12 of 2004 or any other applicable legislation.

Signed on this _____ day of _____20___

_____

SIGNATURE OF TENDERER

T2.2-17: Service Provider Integrity Pact

Important Note: All potential tenderers must read this document and certify in the RFP Declaration Form that that have acquainted themselves with, and agree with the content.

The contract with the successful tenderer will automatically incorporate this Integrity Pact and shall be deemed as part of the final concluded contract.

INTEGRITY PACT

Between

TRANSNET SOC LTD

Registration Number: 1990/000900/30

("Transnet")

and

The Contractor (hereinafter referred to as the "Tenderer/Service Providers/Contractor")

PREAMBLE

Transnet values full compliance with all relevant laws and regulations, ethical standards and the principles of economical use of resources, fairness and transparency in its relations with its Tenderers / Service Providers/Contractors.

In order to achieve these goals, Transnet and the Tenderer / Service Provider hereby enter into this agreement hereinafter referred to as the "Integrity Pact" which will form part of the Tenderer's / Service Provider's / Contractor's application for registration with Transnet as a vendor.

The general purpose of this Integrity Pact is to agree on avoiding all forms of dishonesty, fraud and corruption by following a system that is fair, transparent and free from any undue influence prior to, during and subsequent to the currency of any procurement and / or reverse logistics event and any further contract to be entered into between the Parties, relating to such event.

All Tenderers / Service Providers / Contractor's will be required to sign and comply with undertakings contained in this Integrity Pact, should they want to be registered as a Transnet vendor.

OBJECTIVES

Transnet and the Tenderer / Service Provider / Contractor agree to enter into this Integrity Pact, to avoid all forms of dishonesty, fraud and corruption including practices that are anti-competitive in nature, negotiations made in bad faith and under-pricing by following a system that is fair, transparent and free from any influence / unprejudiced dealings prior to, during and subsequent to the currency of the contract to be entered into with a view to:

a) Enable Transnet to obtain the desired contract at a reasonable and competitive price in conformity to the defined specifications of the works, goods and services; and

b) Enable Tenderers / Service Providers / Contractors to abstain from bribing or participating in any corrupt practice in order to secure the contract.

COMMITMENTS OF TRANSNET

Transnet commits to take all measures necessary to prevent dishonesty, fraud and corruption and to observe the following principles:

Transnet hereby undertakes that no employee of Transnet connected directly or indirectly with the sourcing event and ensuing contract, will demand, take a promise for or accept directly or through intermediaries any bribe, consideration, gift, reward, favour or any material or immaterial benefit or any other advantage from the Tenderer, either for themselves or for any person, organisation or third party related to the contract in exchange for an advantage in the tendering process, Tender evaluation, contracting or implementation process related to any contract.

Transnet will, during the registration and tendering process treat all Tenderers / Service Providers with equity, transparency and fairness. Transnet will in particular, before and during the registration process, provide to all Tenderers / Service Providers the same information and will not provide to any Tenderers / Service Providers / Contractors confidential / additional information through which the Tenderers / Service Providers / Contractors could obtain an advantage in relation to any tendering process.

Transnet further confirms that its employees will not favour any prospective Tenderer in any form that could afford an undue advantage to a particular Tenderer during the tendering stage, and will further treat all Tenderers / Service Providers / Contractors participating in the tendering process.

Transnet will exclude from the tender process such employees who have any personal interest in the Tenderers / Service Providers / Contractors participating in the tendering process.

OBLIGATIONS OF THE TENDERER / SERVICE PROVIDER

The Tenderer / Service Provider / Contractor commits itself to take all measures necessary to prevent corrupt practices, unfair means and illegal activities during any stage of its Tender or during any ensuing contract stage in order to secure the contract or in furtherance to secure it and in particular the Tenderer / Service Provider / Contractor commits to the following:

a) The Tenderer / Service Provider / Contractor will not, directly or through any other person or firm, offer, promise or give to Transnet or to any of Transnet's employees involved in the tendering process or to any third person any material or other benefit or payment, in order to obtain in exchange an advantage during the tendering process; and

b) The Tenderer / Service Provider / Contractor will not offer, directly or through intermediaries, any bribe, gift, consideration, reward, favour, any material or immaterial benefit or other advantage, commission, fees, brokerage or inducement to any employee of Transnet, connected directly or indirectly with the tendering process, or to any person, organisation or third party related to the contract in exchange for any advantage in the tendering, evaluation, contracting and implementation of the contract.

The acceptance and giving of gifts may be permitted provided that:

a) the gift does not exceed R1 000 (one thousand Rand) in retail value;

b) many low retail value gifts do not exceed R 1 000 within a 12 month period;

c) hospitality packages do not exceed R5 000 in value or many low value hospitality packages do not cumulatively exceed R5 000;

d) a Tenderer / Service Provider does not give a Transnet employee more than 2 (two) gifts within a 12 (twelve) month period, irrespective of value;

e) a Tenderer / Service Provider does not accept more than 1 (one) gift in excess of R750 (seven hundred and fifty Rand) from a Transnet employee within a 12 (twelve) month period, irrespective of value;

f) a Tenderer / Service Provider may under no circumstances, accept from or give to, a Transnet employee any gift, business courtesy, including an invitation to a business meal and /or drinks, or hospitality package, irrespective of value, during any Tender evaluation process, including a period of 12 (twelve) months after such tender has been awarded, as it may be perceived as undue and improper influence on the evaluation process or reward for the contract that has been awarded; and

g) a Tenderer / Service Provider may not offer gifts, goods or services to a Transnet employee at artificially low prices, which are not available to the public at those prices.

The Tenderer / Service Provider / Contractor will not collude with other parties interested in the contract to preclude a competitive Tender price, impair the transparency, fairness and progress of the tendering process, Tender evaluation, contracting and implementation of the contract. The Tenderer / Service Provider further commits itself to delivering against all agreed upon conditions as stipulated within the contract.

The Tenderer / Service Provider / Contractor will not enter into any illegal or dishonest agreement or understanding, whether formal or informal with other Tenderers / Service Providers / Contractors. This applies in particular to certifications, submissions or non-submission of documents or actions that are restrictive or to introduce cartels into the tendering process.

The Tenderer / Service Provider / Contractor will not commit any criminal offence under the relevant anti-corruption laws of South Africa or any other country. Furthermore, the Tenderer /Service Provider will not use for illegitimate purposes or for restrictive purposes or personal gain, or pass on to others, any information provided by Transnet as part of the business relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically.

A Tenderer / Service Provider / Contractor of foreign origin shall disclose the name and address of its

agents or representatives in South Africa, if any, involved directly or indirectly in the registration or tendering process. Similarly, the Tenderer / Service Provider / Contractor of South African nationality shall furnish the name and address of the foreign principals, if any, involved directly or indirectly in the registration or tendering process.

The Tenderer / Service Provider / Contractor will not misrepresent facts or furnish false or forged documents or information in order to influence the tendering process to the advantage of the Tenderer / Service Provider or detriment of Transnet or other competitors.

The Tenderer / Service Provider / Contractor shall furnish Transnet with a copy of its code of conduct, which code of conduct shall reject the use of bribes and other dishonest and unethical conduct, as well as compliance programme for the implementation of the code of conduct.

The Tenderer / Service Provider / Contractor will not instigate third persons to commit offences outlined above or be an accessory to such offences.

INDEPENDENT TENDERING

For the purposes of that Certificate in relation to any submitted Tender, the Tenderer declares to fully understand that the word "competitor" shall include any individual or organisation, other than the Tenderer, whether or not affiliated with the Tenderer, who:

a) has been requested to submit a Tender in response to this Tender invitation;
b) could potentially submit a Tender in response to this Tender invitation, based on their qualifications, abilities or experience; and
c) provides the same Goods and Services as the Tenderer and/or is in the same line of business as the Tenderer.

The Tenderer has arrived at his submitted Tender independently from, and without consultation, communication, agreement or arrangement with any competitor. However communication between partners in a joint venture or consortium will not be construed as collusive tendering.

In particular, without limiting the generality of paragraph 5 above, there has been no consultation, communication, agreement or arrangement with any competitor regarding:

a) prices;
b) geographical area where Goods or Services will be rendered [market allocation];
c) methods, factors or formulas used to calculate prices;
d) the intention or decision to submit or not to submit, a Tender;
e) the submission of a Tender which does not meet the specifications and conditions of the RFP; or
f) tendering with the intention of not winning the Tender.

In addition, there have been no consultations, communications, agreements or arrangements with any competitor regarding the quality, quantity, specifications and conditions or delivery particulars of the Goods or Services to which his/her tender relates.

The terms of the Tender as submitted have not been, and will not be, disclosed by the Tenderer, directly or indirectly, to any competitor, prior to the date and time of the official Tender opening or of the awarding of the contract.

Tenderers are aware that, in addition and without prejudice to any other remedy provided to combat any restrictive practices related to Tenders and contracts, Tenders that are suspicious will be reported to the Competition Commission for investigation and possible imposition of administrative penalties in terms of section 59 of the Competition Act No 89 of 1998 and/or may be reported to the National Prosecuting Authority [NPA] for criminal investigation and/or may be restricted from conducting business with the public sector for a period not exceeding 10 [ten] years in terms of the Prevention and Combating of Corrupt Activities Act No 12 of 2004 or any other applicable legislation.

Should the Tenderer find any terms or conditions stipulated in any of the relevant documents quoted in
the Tender unacceptable, it should indicate which conditions are unacceptable and offer alternatives by written submission on its company letterhead, attached to its submitted Tender. Any such submission shall be subject to review by Transnet's Legal Counsel who shall determine whether the proposed alternative(s) are acceptable or otherwise, as the case may be.

Disqualification from Tendering Process

If the Tenderer / Service Provider / Contractor has committed a transgression through a violation of section 3 of this Integrity Pact or in any other form such as to put its reliability or credibility as a Tenderer / Service Provider into question, Transnet may reject the Tenderer's / Service Provider's / Contractor's application from the registration or tendering process and remove the Tenderer / Service Provider from its database, if already registered.

If the Tenderer / Service Provider / Contractor has committed a transgression through a violation of section 3, or any material violation, such as to put its reliability or credibility into question. Transnet may after following due procedures and at its own discretion also exclude the Tenderer / Service Provider / Contractor from future tendering processes. The imposition and duration of the exclusion will be determined by the severity of the transgression. The severity will be determined by the circumstances of the case, which will include amongst others the number of transgressions, the position of the transgressors within the company hierarchy of the Tenderer / Service Provider /Contractor and the amount of the damage. The exclusion will be imposed for up to a maximum of 10 (ten) years. However, Transnet reserves the right to impose a longer period of exclusion, depending on the gravity of the misconduct.

If the Tenderer / Service Provider / Contractor can prove that it has restored the damage caused by it and has installed a suitable corruption prevention system, or taken other remedial measures as the circumstances of the case may require, Transnet may at its own discretion revoke the exclusion or suspend the imposed penalty.

TRANSNET'S LIST OF EXCLUDED TENDERERS (BLACKLIST)

All the stipulations around Transnet's blacklisting process as laid down in Transnet's Supply Chain Policy and Procurement Procedures Manual are included herein by way of reference. Below follows a condensed summary of this blacklisting procedure.

Blacklisting is a mechanism used to exclude a company/person from future business with Transnet for a specified period. The decision to blacklist is based on one of the grounds for blacklisting. The standard of proof to commence the blacklisting process is whether a "prima facie" (i.e. on the face of it) case has been established.

Depending on the seriousness of the misconduct and the strategic importance of the Goods/Services, in addition to blacklisting a company/person from future business, Transnet may decide to terminate some or all existing contracts with the company/person as well.

A Service Provider or Contractor to Transnet may not subcontract any portion of the contract to a blacklisted company.

Grounds for blacklisting include: If any person/Enterprise which has submitted a Tender, concluded a contract, or, in the capacity of agent or subcontractor, has been associated with such Tender or contract:

a) Has, in bad faith, withdrawn such Tender after the advertised closing date and time for the receipt of Tenders;

b) has, after being notified of the acceptance of his Tender, failed or refused to sign a contract when called upon to do so in terms of any condition forming part of the Tender documents;
c) has carried out any contract resulting from such Tender in an unsatisfactory manner or has breached any condition of the contract;
d) has offered, promised or given a bribe in relation to the obtaining or execution of the contract;
e) has acted in a fraudulent or improper manner or in bad faith towards Transnet or any Government Department or towards any public body, Enterprise or person;
f) has made any incorrect statement in a certificate or other communication with regard to the Local Content of his Goods or his B-BBEE status and is unable to prove to the satisfaction of Transnet that:

(i) he made the statement in good faith honestly believing it to be correct; and

(ii) before making such statement he took all reasonable steps to satisfy himself of its correctness;

g) caused Transnet damage, or to incur costs in order to meet the contractor's requirements and which could not be recovered from the contractor;
h) has litigated against Transnet in bad faith.

Grounds for blacklisting include a company/person recorded as being a company or person prohibited from doing business with the public sector on National Treasury's database of Restricted Service Providers or Register of Tender Defaulters.
Companies associated with the person/s guilty of misconduct (i.e. entities owned, controlled or managed by such persons), any companies subsequently formed by the person(s) guilty of the misconduct and/or an existing company where such person(s) acquires a controlling stake may be considered for blacklisting. The decision to extend the blacklist to associated companies will be at the sole discretion of Transnet.

PREVIOUS TRANSGRESSIONS

The Tenderer / Service Provider /Contractor hereby declares that no previous transgressions resulting in a serious breach of any law, including but not limited to, corruption, fraud, theft, extortion and contraventions of the Competition Act 89 of 1998, which occurred in the last 5 (five) years with any other public sector undertaking, government department or private sector company that could justify its exclusion from its registration on the Tenderer's / Service Provider's / Contractor's database or any tendering process.
If it is found to be that the Tenderer / Service Provider /Contractor made an incorrect statement on this subject, the Tenderer / Service Provider / Contractor can be rejected from the registration process or removed from the Tenderer / Service Provider / Contractor database, if already registered, for such reason (refer to the Breach of Law Form contained in the applicable RFX document.)

SANCTIONS FOR VIOLATIONS

Transnet shall also take all or any one of the following actions, wherever required to:

a) Immediately exclude the Tenderer / Service Provider / Contractor from the tendering process or call off the pre-contract negotiations without giving any compensation the Tenderer / Service Provider / Contractor. However, the proceedings with the other Tenderer / Service Provider / Contractor may continue;
b) Immediately cancel the contract, if already awarded or signed, without giving any compensation to the Tenderer / Service Provider / Contractor;
c) Recover all sums already paid by Transnet;

d) Encash the advance bank guarantee and performance bond or warranty bond, if furnished by the Tenderer / Service Provider / Contractor, in order to recover the payments, already made by Transnet, along with interest;
e) Cancel all or any other contracts with the Tenderer / Service Provider; and
f) Exclude the Tenderer / Service Provider / Contractor from entering into any Tender with Transnet in future.

CONFLICTS OF INTEREST

A conflict of interest includes, inter alia, a situation in which:

a) A Transnet employee has a personal financial interest in a tendering / supplying entity; and
b) A Transnet employee has private interests or personal considerations or has an affiliation or a relationship which affects, or may affect, or may be perceived to affect his / her judgment in action in the best interest of Transnet, or could affect the employee's motivations for acting in a particular manner, or which could result in, or be perceived as favouritism or nepotism.

A Transnet employee uses his / her position, or privileges or information obtained while acting in the capacity as an employee for:

a) Private gain or advancement; or
b) The expectation of private gain, or advancement, or any other advantage accruing to the employee must be declared in a prescribed form.
Thus, conflicts of interest of any Tender committee member or any person involved in the sourcing process must be declared in a prescribed form.

If a Tenderer / Service Provider / Contractor has or becomes aware of a conflict of interest i.e. a family, business and / or social relationship between its owner(s) / member(s) / director(s) / partner(s) / shareholder(s) and a Transnet employee / member of Transnet's Board of Directors in respect of a Tender which will be considered for the Tender process, the Tenderer / Service Provider / Contractor:

a) must disclose the interest and its general nature, in the Request for Proposal ("RFX") declaration form; or
b) must notify Transnet immediately in writing once the circumstances has arisen.

The Tenderer / Service Provider / Contractor shall not lend to or borrow any money from or enter into any monetary dealings or transactions, directly or indirectly, with any committee member or any person involved in the sourcing process, where this is done, Transnet shall be entitled forthwith to rescind the contract and all other contracts with the Tenderer / Service Provider / Contractor.

MONITORING

Transnet will be responsible for appointing an independent Monitor to:

a) Conduct random monitoring of compliance to the provisions of this Integrity Pact for contracts entered into between Transnet and the Tenderer / Service Provider / Contractor for less than R100,000.000 (one hundred million Rand) in value;
b) Monitor compliance to the provisions of this Integrity Pact for contracts entered into between Transnet and the Tenderer / Service Provider / Contractor for greater than R100,000.000 (one hundred million Rand) in value; and
c) Investigate any allegation of violation of any provisions of this Integrity Pact for contracts entered into between Transnet and the Tenderer / Service Provider / Contractor, irrespective of value.

The Monitor will be subjected to Transnet's Terms of Conditions of Contract for the Provision of Services to Transnet, as well as to Transnet's Service Provider Code of Conduct.

EXAMINATION OF FINANCIAL RECORDS, DOCUMENTATION AND/OR ELECTRONIC DATA

For the purpose of Monitoring, as stipulated above, the Monitor shall be entitled to:

a) Examine the financial records, documentation and or electronic date of Tenderer / Service Provider / Contractor / Transnet. The Tenderer / Service Provider / Transnet shall provide all requested information / documentation / data to the Monitor and shall extend all help possible for the purpose of such examination.

DISPUTE RESOLUTION

Transnet recognises that trust and good faith are pivotal to its relationship with its Tenderer / Service Provider / Contractor. When a dispute arises between Transnet and its Tenderer / Service Provider / Contractor, the parties should use their best endeavours to resolve the dispute in an amicable manner, whenever possible. Litigation in bad faith negates the principles of trust and good faith on which commercial relationships are based. Accordingly, following a blacklisting process as mentioned in paragraph 0 above, Transnet will not do business with a company that litigates against it in bad faith or is involved in any action that reflects bad faith on its part. Litigation in bad faith includes, but is not limited to the following instances:

a) **Vexatious proceedings**: these are frivolous proceedings which have been instituted without proper grounds;
b) **Perjury:** where a Tenderer / Service Provider / Contractor make a false statement either in giving evidence or on an affidavit;
c) **Scurrilous allegations:** where a Tenderer / Service Provider / Contractor makes allegations regarding a senior Transnet employee which are without proper foundation, scandalous, abusive or defamatory; and
d) **Abuse of court process:** when a Tenderer / Service Provider / Contractor abuses the court process in order to gain a competitive advantage during a Tender process.

GENERAL

This Integrity Pact is governed by and interpreted in accordance with the laws of the Republic of South Africa.

The actions stipulated in this Integrity Pact are without prejudice to any other legal action that may follow in accordance with the provisions of the law relating to any civil or criminal proceedings.

The validity of this Integrity Pact shall cover all the tendering processes and will be valid for an indefinite period unless cancelled by either Party.

Should one or several provisions of this Integrity Pact turn out to be invalid the remainder of this Integrity Pact remains valid.

Should a Tenderer / Service Provider / Contractor be confronted with dishonest, fraudulent or corruptive behaviour of one or more Transnet employees, Transnet expects its Tenderer / Service Provider / Contractor to report this behaviour directly to a senior Transnet official / employee or alternatively by using Transnet's "Tip-Off Anonymous" hotline number 0800 003 056, whereby your confidentiality is guaranteed.

The Parties hereby declare that each of them has read and understood the clauses of this Integrity Pact and shall a Tenderer by it. To the best of the Parties' knowledge and belief, the information

T2.2-18: Request for Proposal – Breach of law

NAME OF COMPANY: _____

I / We _____ do hereby certify that ***I/we have/have not been*** found guilty during the preceding 5 (five) years of a serious breach of law, including but not limited to a breach of the Competition Act, 89 of 1998, by a court of law, tribunal or other administrative body. The type of breach that the Tenderer is required to disclose excludes relatively minor offences or misdemeanours, e.g. traffic offences.

Where found guilty of such a serious breach, please disclose:

NATURE OF BREACH:

_____

_____

_____

DATE OF BREACH:

_____

Furthermore, I/we acknowledge that Transnet SOC Ltd reserves the right to exclude any Tenderer from the tendering process, should that person or company have been found guilty of a serious breach of law, tribunal or regulatory obligation.

Signed on this _____ day of _____ 20____

_____

SIGNATURE OF TENDER

T2.2-19: JOB-CREATION SCHEDULE

The Government has identified State Owned Enterprises sourcing activities as a key enabler to achieve the National Development Plan (NDP) objective of reducing unemployment from the current baseline of 28% to 6%.

In order to give effect to these job creation objectives, Tenderers are required to provide the following undertaking of new jobs that will be created (either by them or by their subcontractors) should they be awarded this tender.

Tenderers to note, that if successful, any deviations from the Job creation Schedule in the contract phase will be subject to acceptance by the *Project Manager* in terms of the Conditions of Contract. Please also note the applicable Z clauses in Contract Data by *Employer*.

(a) Please indicate total number of new jobs that will be created over the term of the contract:

Total number and value of new jobs created	**Total number of new jobs**	**Total rand value of new jobs created**

(b) Of the total number of new jobs created, please indicate the number and value of new jobs to be created for the following designated groups:

	Total number of new jobs	**Total rand value of new jobs**
Black men		
Black women		
Black Youth		
Black people living in rural or underdeveloped areas or townships		
Black People with Disabilities		

(c) Of the total number of new jobs created, please indicate the number of skilled, semi-skilled and unskilled new jobs that will be created over the term of the contract:

	Total number of Skilled jobs	**Total number of Semi-skilled jobs**	**Total number of Unskilled jobs**
Black men			
Black women			
Black Youth			
Black people living in rural or underdeveloped areas or townships			
Black People with Disabilities			

Other			

(d) Please indicate the number of new jobs to be created, broken down per quarter over the term of the contract.

Year 1	Q1	Q2	Q3	Q4
Total number of new jobs				
Number of new jobs for Black men				
Number of new jobs for black women				
Number of new jobs for black youth				
Number of new jobs for black people living in rural or underdeveloped areas or townships				
Number of new jobs for black People with Disabilities				
Number of new jobs for other categories				
Number of new skilled jobs				
Number of new semi-skilled jobs				
Number of new unskilled jobs				

T2.2-20: Confirmation of machine/s ownership

The tenderer must submit the following letters together with the tender submission:

- Proof of Ownership – Letter indicating that the bidder owns the machine OR signed/stamped leasing agreement between the machine owner and the preferred bidder. The leasing agreement MUST contain the contact details (telephone and email address) of the Leaser for the ease of verification purposes

  (Tenderers who submit a proposal based on an offer to purchase will be required to conclude the purchase of the equipment within a period of one (1) month. Written and valid Proof of the purchase and the financing thereof must be submitted to Transnet within a period of one (1) month from the date of award. Failure to provide such written and valid proof within the stipulate timeframe may result in the termination of the awarded contract. Therefore, Transnet reserves the right to validate any information that is provided as confirmation)

- Letter of Commitment indicating that the bidder will be able to start rendering services within thirty (30) days. The letters should be signed and stamped, and the information must be provided on the client's letter head with their client's company stamp.

Equipment Description	Number of Equipment	Name of OEM

Signed ..... Date .....

Name ..... Position .....

Tenderer .....

T2.2-21: Agreement in terms of Protection of Personal Information Act, 4 of 2013 ("POPIA")

1. PREAMBLE AND INTRODUCTION

1.1. The rights and obligation of the Parties in terms of the Protection of Personal Information Act, 4 of 2013 ("POPIA") are included as forming part of the terms and conditions of this contract.

2. PROTECTION OF PERSONAL INFORMATION

2.1. The following terms shall bear the same meaning as contemplated in Section 1 of the Protection of Person information act, No. of 2013 "(POPIA"):

consent; data subject; electronic communication; information officer; operator; person; personal information; processing; record; Regulator; responsible party; special information; as well as any terms derived from these terms.

2.2. The Operator will process all information by the Transnet in terms of the requirements contemplated in Section 4(1) of the POPIA:

Accountability; Processing limitation; Purpose specification; Further processing limitation; Information quality; Openness; Security safeguards and Data subject participation.

2.3. The Parties acknowledge and agree that, in relation to personal information of Transnet and the information of a third party that will be processed pursuant to this Agreement , the Operator is (..... insert name of Tenderer/Contractor) hereinafter Operator and the Data subject is "Transnet". Operator will process personal information only with the knowledge and authorisation of Transnet and will treat personal information and the information of a third party which comes to its knowledge as confidential and will not disclose it, unless so required by law or subject to the exceptions contained in the POPIA.

2.4. Transnet reserves all the rights afforded to it by the POPIA in the processing of any of its information as contained in this Agreement and the Operator is required to comply with all prescripts as detailed in the POPIA relating to all information concerning Transnet.

2.5. In terms of this Agreement, the Operator acknowledges that it will obtain and have access to personal information of Transnet and the information of a third party and agrees that it shall only process the information disclosed by Transnet in terms of this Agreement and only for the purposes as detailed in this Agreement and in accordance with any applicable law.

2.6. Should there be a need for the Operator to process the personal information and the information of a third party in a way that is not agreed to in this Agreement, the Operator must request consent from Transnet to the processing of its personal information or and the information of a third party in a manner other than that it was collected for, which consent cannot be unreasonably withheld.

2.7. Furthermore, the Operator will not otherwise modify, amend or alter any personal information and the information of a third party submitted by Transnet or disclose or permit the disclosure of any personal information and the information of a third party to any third party without prior written consent from Transnet.

2.8. The Operator shall, at all times, ensure compliance with any applicable laws put in place and maintain sufficient measures, policies and systems to manage and secure against all forms of risks to any information that may be shared or accessed pursuant to the services offered to Transnet in terms of this Agreement (physically, through a computer or any other form of electronic communication).

2.9. The Operator shall notify Transnet in writing of any unauthorised access to personal information and the information of a third party , cybercrimes or suspected cybercrimes, in its knowledge and report such crimes or suspected crimes to the relevant authorities in accordance with applicable laws, after becoming aware of such crimes or suspected crime. The Operator must inform Transnet of the breach as soon as it has occurred to allow Transnet to take all necessary remedial steps to mitigate the extent of the loss or compromise of personal information and the information of a third party and to restore the integrity of the affected personal information as quickly as is possible.

2.10. Transnet may, in writing, request the Operator to confirm and/or make available any personal information and the information of a third party in its possession in relation to Transnet and if such personal information has been accessed by third parties and the identity thereof in terms of the POPIA.

2.11. Transnet may further request that the Operator correct, delete, destroy, withdraw consent or object to the processing of any personal information and the information of a third party relating to the Transnet or a third party in the Operator's s possession in terms of the provision of the POPIA and utilizing Form 2 of the POPIA Regulations .

2.12. In signing this addendum that is in terms of the POPIA, the Operator hereby agrees that it has adequate measures in place to provide protection of the personal information and the information of a third party given to it by Transnet in line with the 8 conditions of the POPIA and that it will provide to Transnet satisfactory evidence of these measures whenever called upon to do so by Transnet.

The Operator is required to provide confirmation that all measures in terms of the POPIA are in place when processing personal information and the information of a third party received from Transnet:

YES		NO	

2.13. Further, the Operator acknowledges that it will be held liable by Transnet should it fail to process personal information in line with the requirements of the POPIA. The Operator will be subject to any civil or criminal action, administrative fines or other penalty or loss that may arise as a result of the processing of any personal information that Transnet submitted to it.

2.14. Should a Tenderer have any complaints or objections to processing of its personal information, by Transnet, the Tenderer can submit a complaint to the Information Regulator on https://www.justice.gov.za/inforeg/, click on contact us, click on complaints.IR@justice.gov.za

3. SOLE AGREEMENT

3.1. The Agreement, constitute the sole agreement between the parties relating to the subject matter referred to in paragraph 1.1 of this and no amendment/variation/change shall be of any force and effect unless reduced to writing and signed by or on behalf of both parties.

Signed at _____ on this _____day of _____ 202_

Name: _____

Title: _____

Signature: _____

_____*(Name of company)*

(Operator)

Authorised signatory for and on behalf of ……(*Name of company*) who warrants that he/she is duly authorised to sign this Agreement.

AS WITNESSES:

1. Name: _____ Signature: _____

2. Name: _____ Signature: _____

T2.2-22: Insurance provided by the *Contractor*

Clause 83.1 in NEC3 Term Service Contract (June 2005)(amended June 2006 and April 2013) requires that the *Contractor* provides the insurance stated in the insurance table except any insurance which the *Employer* is to provide as stated in the Contract Data.

Please provide the following details for insurance which the *Contractor* is still to provide. Notwithstanding this information all costs related to insurance are deemed included in the tenderer's rates and prices.

Insurance against (See clause 83.2 of the TSC)	**Name of Insurance Company**	**Cover**	**Premium**
Liability for death of or bodily injury to employees of the *Contractor* arising out of and in the course of their employment in connection with this contract			
Motor Vehicle Liability Insurance comprising (as a minimum) "Balance of Third Party" Risks including Passenger and Unauthorised Passenger Liability indemnity with a minimum indemnity limit of R10 000 000.			
Insurance in respect of loss of or damage to own property and equipment.			
(Other)			

Signed ..... Date .....

Name ..... Position .....

Tenderer .....

T2.2-23: Three (3) years audited financial statements

Attached to this schedule is the last three (3) years audited financial statements of the single tenderer/members of the Joint Venture.

NAME OF COMPANY/IES and INDEX OF ATTACHMENTS:

.....

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T2.2-24: Form of Intent to Performance Guarantee

It is hereby agreed by the Tenderer that a Performance Guarantee drafted **exactly** as provided in the tender documents will be provided by the Guarantor named below, which is a **bank or insurer registered in South Africa**:

Name of Guarantor (Bank/Insurer) .....

Address .....

The Performance Guarantee shall be provided within **2** (**Two**) weeks after the Contract Date defined in the contract unless otherwise agreed to by the parties.

Signed .....

Name .....

Capacity .....

On behalf of (name of tenderer) .....

.....

Date .....

Confirmed by Guarantor's Authorised Representative

Signature(s) .....

Name (print) .....

Capacity .....

On behalf of Guarantor (Bank/insurer) .....

Date .....

Part C1.2: Contract Data

C1.1 Form of Offer & Acceptance

Offer

The Employer, identified in the Acceptance signature block, has solicited offers to enter into a contract for the procurement of:

MAINTENANCE OF RAILWAY TRACK WITH ON-TRACK BALLAST TAMPING DUAL PURPOSE MACHINES COUNTRYWIDE ON AN 'AS AND WHEN REQUIRED' BASIS FOR A PERIOD OF TWELVE MONTHS

The tenderer, identified in the Offer signature block, has examined the documents listed in the Tender Data and addenda thereto as listed in the Returnable Schedules, and by submitting this Offer has accepted the Conditions of Tender.

By the representative of the tenderer, deemed to be duly authorised, signing this part of this Form of Offer and Acceptance the tenderer offers to perform all of the obligations and liabilities of the *Contractor* under the contract including compliance with all its terms and conditions according to their true intent and meaning for an amount to be determined in accordance with the *conditions of contract* identified in the Contract Data.

The *currency of this contract* is the South African Rand.

The offered total of the Prices exclusive of VAT is	**R**
Value Added Tax @ 15% is	**R**
The offered total of the Prices inclusive of VAT is	**R**
(in words)	

This Offer may be accepted by the Employer by signing the Acceptance part of this Form of Offer and Acceptance and returning one copy of this document including the Schedule of Deviations (if any) to the tenderer before the end of the period of validity stated in the Tender Data, or other period as agreed, whereupon the tenderer becomes the party named as the *Contractor* in the *conditions of contract* identified in the Contract Data.

Signature(s) .....

Name(s) .....

Capacity .....

For the tenderer:

.....

Name & signature of witness *(Insert name and address of organisation)* Date

Tenderer's CIDB registration number: .....

Acceptance

By signing this part of this Form of Offer and Acceptance, the *Employer* identified below accepts the tenderer's Offer. In consideration thereof, the *Employer* shall pay the *Contractor* the amount due in accordance with the *conditions of contract* identified in the Contract Data. Acceptance of the tenderer's Offer shall form an agreement between the *Employer* and the tenderer upon the terms and conditions contained in this agreement and in the contract that is the subject of this agreement.

The terms of the contract, are contained in:

Part C1	Agreements and Contract Data, (which includes this Form of Offer and Acceptance)
Part C2	Pricing Data
Part C3	Scope of Work: Service Information
Part C4	Site Information

and drawings and documents (or parts thereof), which may be incorporated by reference into the above listed Parts.

Deviations from and amendments to the documents listed in the Tender Data and any addenda thereto listed in the Returnable Schedules as well as any changes to the terms of the Offer agreed by the tenderer and the Employer during this process of offer and acceptance, are contained in the Schedule of Deviations attached to and forming part of this Form of Offer and Acceptance. No amendments to or deviations from said documents are valid unless contained in this Schedule.

The tenderer shall within two weeks of receiving a completed copy of this agreement, including the Schedule of Deviations (if any), contact the Employer's agent (whose details are given in the Contract Data) to arrange the delivery of any securities, bonds, guarantees, proof of insurance and any other documentation to be provided in terms of the *conditions of contract* identified in the Contract Data at, or just after, the date this agreement comes into effect. Failure to fulfil any of these obligations in accordance with those terms shall constitute a repudiation of this agreement.

Notwithstanding anything contained herein, this agreement comes into effect on the date when the tenderer receives one fully completed original copy of this document, including the Schedule of Deviations (if any).

Unless the tenderer (now *Contractor*) within five working days of the date of such receipt notifies the Employer in writing of any reason why he cannot accept the contents of this agreement, this agreement shall constitute a binding contract between the Parties.

Signature(s) .....

Name(s) .....

Capacity .....

for the Employer Transnet SOC Ltd

.....

(Insert name and address of organisation)

Name & signature of witness .....

Date .....

Schedule of Deviations

Note:

1. To be completed by the Employer prior to award of contract. This part of the Offer & Acceptance would not be required if the contract has been developed by negotiation between the Parties and is not the result of a process of competitive tendering.
2. The extent of deviations from the tender documents issued by the Employer prior to the tender closing date is limited to those permitted in terms of the Conditions of Tender.
3. A tenderer's covering letter must not be included in the final contract document. Should any matter in such letter, which constitutes a deviation as aforesaid be the subject of agreement reached during the process of Offer and Acceptance, the outcome of such agreement shall be recorded here and the final draft of the contract documents shall be revised to incorporate the effect of it.

No.	Subject	Details
1		
2		
3		
4		
5		
6		
7		

By the duly authorised representatives signing this Schedule of Deviations below, the Employer and the tenderer agree to and accept this Schedule of Deviations as the only deviations from and amendments to the documents listed in the Tender Data and any addenda thereto listed in the Tender Schedules, as well as any confirmation, clarification or changes to the terms of the Offer agreed by the tenderer and the Employer during this process of Offer and Acceptance.

It is expressly agreed that no other matter whether in writing, oral communication or implied during the period between the issue of the tender documents and the receipt by the tenderer of a completed signed copy of this Form shall have any meaning or effect in the contract between the parties arising from this Agreement.

	For the tenderer:	**For the Employer**
Signature	.....	.....
Name	.....	.....
Capacity	.....	.....
On behalf of	*(Insert name and address of organisation)*	Transnet SOC Ltd
Name & signature of witness	.....	.....
Date	.....	.....

C1.2 Contract Data

Part one - Data provided by the *Employer*

Clause	Statement	Data
1	**General**	
	The *conditions of contract* are the core clauses and the clauses for main Option:	
		A: Priced contract with price list
	dispute resolution Option	**W1: Dispute resolution procedure**
	and secondary Options	
		X2: Changes in the law
		X4: Parent company guarantee
		X13: Performance Bond
		X17: Low service damages
		X18: Limitation of liability
		X19: Task Order
		Z: *Additional conditions of contract*
	of the NEC3 Term Service Contract (June 2005) (and amended June 2006 and April 2013)	
10.1	The *Employer* is (name):	**Transnet SOC Ltd**
	Address	Registered address: **Transnet Corporate Centre** **138 Eloff Street** **Braamfontein** **Johannesburg** **2000**
	Having elected its Contractual Address for the purposes of this contract as:	**Transnet Freight Rail** **15 Girton Road** **Parktown, Johannesburg** **South Africa, 2000**
	Tel No.	**011 584 0590**
10.1	The *Service Manager* is (name):	**Mr RHULANI KHOSA**

	Address	**Inyanda House, 21 Wellington Road**
	Tel	**(011) 544 9550**
	e-mail	**Rhulani.Khosa@transnet.net**
11.2(2)	The Affected Property is	**In respect of each Task Order, the identified portion of the South African Freight Rail Network**
11.2(13)	The *service* is	**Maintenance of Railway Track with On-Track Ballast Tamping Dual Purpose Machines Countrywide on an "As and When" required' basis**
11.2(14)	The following matters will be included in the Risk Register	**(a)** ***Cancellation of track occupations at short notice.*** **(b)** ***The shortage of pilots to move machines between depots.*** **(c)** ***Work on railway track near live OHTE electrical equipment holds a danger of electrocution for workers.*** **(d)** ***Working on a railway line adjacent to lines on which rail traffic continue to run holds the risk of injury or death to workers.*** **(e)** ***Dry vegetation at or near most worksites is a fire hazard.***
11.2(15)	The Service Information is in	**The Scope of Services**
12.2	The *law of the contract* is the law of	**the Republic of South Africa subject to the jurisdiction of the Courts of South Africa.**
13.1	The *language of this contract* is	**English**
13.3	The *period for reply* is	**2 weeks**
2	**The *Contractor*'s main responsibilities**	**No additional data is required for this section of the *conditions of contract*.**
21.1	The *Contractor* submits a first plan for acceptance within	**2 weeks of the Contract Date**
3	**Time**	
30.1	The *starting date* is.	**01 November 2023**
30.1	The *service period* is	**12 months**
4	**Testing and defects**	**No additional data is required for this section of the *conditions of contract*.**
5	**Payment**	
50.1	The *assessment interval* is	**25th (twenty fifth) day of each successive month.**
51.1	The *currency of this contract* is the	**South African Rand.**

51.2	The period within which payments are made is	**Payment will be effected on or before the last day of the month following the month during which a valid Tax Invoice and Statement were received.**
51.4	The *interest rate* is	**The prime lending rate of the Standard Bank South Africa.**
6	**Compensation events**	
	60.1(15) A weather measurement is	determined by a suitable weather station most conveniently located in the Affected area
	60.1(15) The *weather data* is	the weather data issued with the Task Order or within **[5 days]** thereof, covering the area in which the Affected Property is situated, or if not so issued the national weather data available from the South African Weather Services
7	**Use of Equipment Plant and Materials**	**No additional data is required for this section of the *conditions of contract*.**
8	**Risks and insurance**	
80.1	These are additional *Employers* risks	**None**
83.1	The minimum limit of indemnity for insurance in respect of loss and damage to property (except goods, plant and materials and equipment) and liability for bodily injury or death of a person (not an employee of the *Contractor)* caused by activity in connection with this contract for any one event is:	**Whatever *Contractor* deems necessary as the *Employer* is not carrying this indemnity.**
83.1	The minimum limit of indemnity for insurance in respect of death of or bodily injury to employees of the *Contractor* arising out of and in the course of their employment in connection with this contract for any one event is:	**As prescribed by the Compensation for Occupational Injuries and Diseases Act No. 130 of 1993 and the *Contractor's* common law liability for people falling outside the scope of the Act.**
83.1	Motor Vehicle Liability Insurance comprising (as a minimum) "Balance of Third Party" Risks including Passenger and Unauthorised Passenger Liability indemnity with a minimum indemnity limit of R 10 000 000	

83.1	The *Contractor* liability to the *Employer* for indirect or consequential loss including loss of profit, revenue and goodwill, is limited to:	**The total of the prices.**
83.1	For any one event, the *Contractor* liability to the *Employer* for loss of or damage to the *Employers* property is limited to:	**The total of the prices.**
83.1	The *Contractor* total liability to the *Employer* for all matters arising under or in connection with this contract, other than the excluded matters, is limited to:	**The total of the prices.**
9	**Termination**	**There is no Contract Data required for this section of the *conditions of contract*.**
10	**Data for main Option clause**	
A	**Priced contract with price list**	
20.5	The *Contractor* prepares forecasts of the final total of the Prices for the whole of the *service* at intervals no longer than	**4weeks**
11	**Data for Option W1**	
W1.1	The *Adjudicator* is (Name)	**Both parties will agree as and when a dispute arises. If the parties cannot reach an agreement on the *Adjudicator*, the chairman of the Association of Arbitrators will appoint an *Adjudicator*.**
W1.2(3)	The *Adjudicator nominating body* is: If no *Adjudicator nominating body* is entered, it is	 **The Association of Arbitrators (Southern Africa)**
W1.4(2)	The *tribunal* is:	**Arbitration**
W1.4(5)	The *arbitration procedure* is The place where arbitration is to be held is	**The Rules for the Conduct of Arbitrations of the Association of Arbitrators (Southern Africa)** **Johannesburg, South Africa**

	The person or organisation who will choose an arbitrator - if the Parties cannot agree a choice or - if the arbitration procedure does not state who selects an arbitrator, is	**The Chairman of the Association of Arbitrators (Southern Africa)**

12 Data for secondary Option clauses

X1 Price adjustment for inflation

X1.1 The base date for indices is **30 March 2023**

The proportions used to calculate the Price Adjustment Factor are:

proportion	linked to index for	Index prepared by
0.35	**Labour (People)**	**The Consumer Price Index (CPI) for "All Items" in Table 1 (Consumer price indices for the total country) of the Statistical Release P0141 "Consumer Price Index - Additional Tables" published by Statistics South Africa.**
0.00	**Material (Electrical)**	**The "Electrical Engineering" index in Table 5 (Mechanical and Electrical Engineering Input Price Indices) of the Statistical Release P0151.1 "Construction Materials Price Indices" published by Statistics South Africa.**
0.00	**Material (Mechanical)**	**The "Mechanical Engineering" index in Table 5 (Mechanical and Electrical Engineering Input Price Indices) of the Statistical Release P0151.1 "Construction Materials Price Indices" published by Statistics South Africa.**

	0.40	**Plant (Equipment)**	**The "Plant and Equipment" index in Table 4 (Mining and construction plant and equipment price index) of the Statistical Release P0151.1 "Construction Materials Price Indices" published by Statistics South Africa.**
	0.13	**Material (Civil)**	**The "Civil Engineering Material - Total" index in Table 6 (Civil engineering material price indices) of the Statistical Release P0151.1 "Construction Materials Price Indices" published by Statistics South Africa.**
	0.12	**Fuel**	**The "Diesel" index in Table 1 (PPI for final manufactured goods) of the Statistical Release P0142.1 "Producer Price Index" published by Statistics South Africa.**
	0.00	**Non-adjustable**	

X2	**Changes in the law**	**No additional data is required for this Option**
X4	**Parent company guarantee**	**No additional data is required for this Option**
X13	**Performance bond**	
X13.1	The amount of the performance bond is	**5% (five percent) of the total of the Prices as determined in the Pricing data**

X17 Low service damages

X17.1 The *service level table* is in

Performance level	% Achieved of performance against Tw for each Task Order	Low service damages for each task order
Rate of production of machine (as per *Employer's* Service Information	99-100% performance achieved	R0 (nil)
	95 - 98% performance achieved	-2,5% of the Price for Services Planned in terms of the Task Order (Item 1.1 of Price List)
	90 – 94% performance achieved	-5% of the Price for Services Planned to Date in terms of the Task Order (Item 1.1 of Price List)

	88-89% performance achieved	-7,5% of the Price for Services Planned to Date in terms of the Task Order (Item 1.1 of Price List)
	86-87% performance achieved	-10% of the Price for Services Planned he Task Order (Item 1.1 of Price List)
	84-85% performance achieved	-12,5% of the Price for Services Planned to Date in terms of the Task Order (Item 1.1 of Price List)
	<84% performance achieved	-15% of the Price for Services Planned to Date in terms of the Task Order (Item 1.1 of Price List)

X18	**Limitation of liability**	
X18.1	The *Contractor*'s liability to the *Employer* for indirect or consequential loss is limited to	**In respect of each Task Order 10% of the total of the Prices for the Task Order or R1,000,000.00 (One million Rand), whichever is the higher amount.**
X18.2	For any one event, the *Contractor*'s liability to the *Employer* for loss of or damage to the *Employer*'s property is limited to	**the deductible in terms of the *Employer's* arranged insurance.**
X18.3	The *Contractor*'s liability for Defects due to his design of an item of Equipment is limited to	**in respect of each Task Order, the total of the Prices for the Task Order other than for the additional excluded matters.**
X18.4	The *Contractor*'s total liability to the *Employer*, for all matters arising under or in connection with this contract, other than the excluded matters, is limited to	**in respect of each Task Order, the total of the Prices for the Task Order other than for the additional excluded matters.** • **The *Contractor's* total liability for the additional excluded matters is not limited.** • **The additional excluded matters are amounts for which the *Contractor* is liable under this contract for** • **Defects due to his design, plan and specification,** • **Defects due to manufacture and fabrication outside the Affected Property,** • **loss of or damage to property (other than the *Employer*'s property, Plant and Materials),** • **death of or injury to a person and** • **infringement of an intellectual property right.**
X18.5	The *end of liability date* is	**6 (Six) months after the completion of the *services* at a specific Affected Property or the completion of a Task Order (whichever is applicable).**
X19	**Task Order**	
X19.3	Amount of delay damages for every day that elapses between the Task Order Completion Date and the Task Order Completion is	**2.5 %** of the total of the Prices of the Task Order as at the date of issue thereof subject to a maximum of **15%** of the total of the Prices at such date

X19.5	The *Contractor* submits a Task Order programme to the *Service Manager* within	**5 (five) days of receiving the Task Order.**

Z1	**Obligations in respect of Termination**	
Z1.1		The following will be included under core clause 91.1: In the second main bullet, after the word 'partnership' add 'joint venture whether incorporated or otherwise (including any constituent of the joint venture)'; and Under the second main bullet, insert the following additional bullets after the last sub-bullet: • commenced business rescue proceedings (R22) • repudiated this Contract (R23)
Z1.2	Termination Table	The following will be included under core clause 90.2 Termination Table as follows: Amend "A reason other than R1 – R21" to "A reason other than R1 – R23"
Z1.3		Amend "R1 – R15 or R18" to "R1 – R15, R18, R22 or R23."

Z2	**Right Reserved by Transnet to Conduct Vetting through SSA**	
Z2.1		Transnet reserves the right to conduct vetting through State Security Agency (SSA) for security clearances of any Contractor who has access to National Key Points for the following without limitations: 1. Confidential – this clearance is based on any information which may be used by malicious, opposing or hostile elements to harm the objectives and functions of an organ of state. 2. Secret – clearance is based on any information which may be used by malicious, opposing or hostile elements to disrupt the objectives and functions of an organ of state. 3. Top Secret – this clearance is based on information which may be used by malicious, opposing or hostile elements to neutralise the objectives and functions of an organ of state.

Z3	**Additional clause relating to Collusion in the Construction Industry**	
Z3.1		The contract award is made without prejudice to any rights Transnet may have to take appropriate action later with regard to any declared bid rigging including blacklisting.
Z4	**Protection of Personal Information Act**	
Z4.1		The *Employer* and the *Contractor* are required to process information obtained for the duration of the Agreement in a manner that is aligned to the Protection of Personal Information Act

C1.2 Contract Data

Part two - Data provided by the *Contractor*

The tendering *contractor* is advised to read both the NEC3 Term Service Contract (June 2005) and the relevant parts of its Guidance Notes (TSC3-GN) in order to understand the implications of this Data which the tenderer is required to complete.

Completion of the data in full, according to Options chosen, is essential to create a complete contract.

Clause	Statement	Data
10.1	The *Contractor* is (Name):	
	Address	
	Tel No.	
	Fax No.	
11.2(8)	The *direct fee percentage* is	**%**
	The *subcontracted fee percentage* is	**%**
11.2(14)	The following matters will be included in the Risk Register	**.....**
11.2(15)	The Service Information for the *Contractor*'s plan is in:	**.....**
21.1	The plan identified in the Contract Data is contained in:	**.....**
24.1	The key persons are:	
	1 Name:	
	Job:	
	Responsibilities:	
	Qualifications:	
	Experience:	

	2 Name:	
	Job	
	Responsibilities:	
	Qualifications:	
	Experience:	
	CV's (and further key persons data including CVs) are appended to Tender Schedule entitled .	
A	**Priced contract with price list**	
11.2(12)	The *price list* is in	
11.2(19)	The tendered total of the Prices is	(in figures) (in words), excluding VAT

C1.3 Forms of Securities

Pro forma Performance Guarantee

For use with the NEC3 Term Service Contract - June 2005 (with amendments June 2006 and April 2013)

The *conditions of contract* stated in the Contract Data Part 1 include the following Secondary Option:

Option X13: Performance bond

The pro forma document for this Guarantee is provided here for convenience but is to be treated as part of the *Service Information*.

The organisation providing the Guarantee does so by copying the pro forma document onto its letterhead without any change to the text or format and completing the required details. The completed document is then given to the *Employer* within the time stated in the contract.

The Performance Bond needs to be issued by an institution that are reasonably acceptable to the *Employer*.

Transnet may choose to not to accept an Issuer. Should the issuer not being accepted, the performance bond needs to be replaced by an issuer that are acceptable to Transnet. Issuers need to be verified for acceptance by Transnet before a performance bond is issued.

Pro-forma Performance Bond (for use with Option X13)

(to be reproduced exactly as shown below on the letterhead of the Surety)

Transnet SOC Ltd
C/o Transnet Freight Rail
Transnet Corporate Centre
138 Eloff Street
Braamfontein
Johannesburg
2000

Date:

Dear Sirs,

Performance Bond for Contract No. .....

With reference to the above numbered contract made or to be made between

Transnet SOC Limited, Registration No. 1990/000900/30 (the *Employer*) and

{Insert registered name and address of the *Contractor*} (the *Contractor*), for

{Insert details of the *service* from the Contract Data} (the *service*).

I/We the undersigned .....

on behalf of the Guarantor .....

of physical address .....

.....

and duly authorised thereto do hereby bind ourselves as Guarantor and co-principal debtors in solidum for the due and faithful performance of all the terms and conditions of the Contract by the *Contractor* and for all losses, damages and expenses that may be suffered or incurred by the *Employer* as a result of non-performance of the Contract by the *Contractor*, subject to the following conditions:

1. The terms *Employer*, *Contractor*, *Service Manager*, *service* have the meaning as assigned to them by the *conditions of contract* stated in the Contract Data for the aforesaid Contract.

2. We renounce all benefits from the legal exceptions "Benefit of Excussion and Division", "No value received" and all other exceptions which might or could be pleaded against the validity of this bond, with the meaning and effect of which exceptions we declare ourselves to be fully acquainted.

3. The *Employer* has the absolute right to arrange his affairs with the *Contractor* in any manner which the *Employer* deems fit and without being advised thereof the Guarantor shall not have the right to claim his release on account of any conduct alleged to be prejudicial to the Guarantor. Without derogating from the foregoing compromise, extension of the service period, indulgence, release or variation of the *Contractor's* obligation shall not affect the validity of this performance bond.

4. This bond will lapse on the earlier of

   - the date that the Guarantor receives a notice from the *Service Manager* stating that the Completion Certificate for the whole of the *service* has been issued, that all amounts due from the

Contractor as certified in terms of the contract have been received by the *Employer* and that the *Contractor* has fulfilled all his obligations under the Contract, or

- the date that the Surety issues a replacement Performance Bond for such lesser or higher amount as may be required by the *Service Manager*.

5. Always provided that this bond will not lapse in the event the Guarantor is notified by the *Service Manager*, (before the dates above), of the *Employer's* intention to institute claims and the particulars thereof, in which event this bond shall remain in force until all such claims are paid and settled.

6. The amount of the bond shall be payable to the *Employer* upon the *Employer's* demand and no later than 7 days following the submission to the Guarantor of a certificate signed by the *Service Manager* stating the amount of the *Employer's* losses, damages and expenses incurred as a result of the non-performance aforesaid. The signed certificate shall be deemed to be conclusive proof of the extent of the *Employer's* loss, damage and expense.

7. Our total liability hereunder shall not exceed the sum of:

   (say) _____

   R _____

8. This Performance Bond is neither negotiable nor transferable and is governed by the laws of the Republic of South Africa, subject to the jurisdiction of the courts of the Republic of South Africa

Signed at _____ on this _____ day of _____ 20__

Signature(s)		
Name(s) (printed)		
Position in Guarantor company		
Signature of Witness(s)		
Name(s) (printed)		

Part C1.2: Contract Data

PART C2: PRICING DATA

C2.1 Pricing assumptions: Option A

1. GENERAL

1.1 How work is priced and assessed for payment

Clause 11 in NEC3 Term Service Contract (TSC3) core clauses and Option A states:

Identified and defined terms	11 11.2	(12) The Price List is the price list unless later changed in accordance with this contract. (17) The Price for Services Provided to Date is the total of the Price for each lump sum item in the Price List which the Contractor has completed and where a quantity is stated for an item in the Price List, an amount calculated by multiplying the quantity which the Contractor has completed by the rate. (19) The Prices are the amounts stated in the Price column of the Price List. Where a quantity is stated for an item in the Price List, the Price is calculated by multiplying the quantity by the rate.

Clause 50 in NEC3 Term Service Contract (TSC3) core clauses and Option A states:

Assessing the amount due

50.2 The amount due is

- the Prices for the Services Provided to Date,
- plus, other amounts to be paid to the Contractor,
- less amounts to be paid by or retained from the Contractor.

This confirms that Option A is a priced contract where the Prices are derived from a list of items of service which can be priced as lump sums or as estimated quantities of service multiplied by a rate or a mix of both.

1.2 Function of the Price List

Clause 54.1 in Option A states: “Information in the Price List is not Service Information”. This confirms that instructions to do work or how it is to be done are not included in the Price List but in the Service Information. This is further confirmed by Clause 20.1 which states, “The Contractor Provides the Service in accordance with the Service Information”. Hence the Contractor does not provide the Service in accordance with the Price List. The Price List is only a pricing document.

1.3 Preparing the price list

Before preparing the price list, both the Employer and tendering contractors should read the TSC3 Guidance Notes pages 14 and 15. In an Option A contract, either Party may have entered items into the price list either as a process of offer and acceptance (tendering) or by negotiation depending on the nature of the service to be provided. Alternatively, the Employer, in his Instructions to Tenderers or in a Tender Schedule, may have listed some items that he requires the Contractor to include in the price list to be prepared and priced by him.

It is assumed that in preparing or finalising the price list the Contractor:

- Has taken account of the guidance given in the TSC3 Guidance Notes relevant to Option A.
- Understands the function of the Price List and how work is priced and paid for.
- Is aware of the need to link priced rates with parameters for the volume of work involved in Providing the Service as contemplated in *price list* contained in section C2.2.

- Has listed and priced items in the price list which are inclusive of everything necessary and incidental to Providing the Service in accordance with the Service Information, as it was at the time of tender, as well as correct any Defects not caused by an Employer's risk. This should also include all liabilities and obligations set forth or implied in the Contract data, as well as any profit.
- Has priced work he decides not to show as a separate item within the Prices or rates of other listed items to fulfil the obligation to complete the service for the tendered total of the Prices.
- Understands there is no adjustment to items priced as lump sums if the amount, or quantity, of work within that item later turns out to be different to that which the Contractor estimated at time of tender. The only basis for a change to the (lump sum) Prices is because of a compensation event.

2. FORMAT OF THE PRICE LIST

Entries in the first four columns in the price list in section C2.2 are made either by the Employer or the tendering contractor.

If the Contractor is to be paid an amount for the item which is not adjusted if the quantity of work in the item changes, the tendering contractor enters the amount in the Price column only, the Unit, Estimated Quantity and Rate columns being left blank.

The pricing table contained in section C2.2 contemplates.

(i) establishment fee paid monthly and
(ii) volume based pricing with applicable rates based on actual volumes of work provided to the Contractor

The tendering contractor is required in the first row to provide its proposed monthly rate for establishment.

The remaining portion of the total of the Prices is determined through volume-based pricing, whereby the amounts finally due to the Contractor in each year within the *service period* are determined annually by applying the applicable rate to the actual volume of Works issued to the Contractor subject to the terms of the contract. In the interim period (prior to the annual assessment) the Contractor is paid an Interim Average Work Rate (as further described in paragraph 4.6 below), and the amount paid is reconciliated after the annual assessment.

In this regard the tendering contractor is required to propose the relevant rates for the defined parameters of works for items 2.1 to 2.4 of the Price List (as further described in paragraphs 4.2 to 4.5 below), from which an Interim Average Working Rate is determined by applying the price weighting percentage indicator stipulated by the Employer in the Price List.

3. GENERAL PRICING ASSUMPTIONS

3.1 The agreement is based on the NEC Term Service Contract.

3.2 It will be assumed that prices included in the Price List are based on Acts, Ordinances, Regulations, By-laws, International Standards and National Standards that were published 28 days before the closing date for tenders.

3.3 The Price List is not intended for the ordering of materials. Any ordering of materials, based on the Price List, is at the Contractor's risk.

3.4 The prices should cover the cost (as explained in par 1.3 above) for the work as described. The quantities set out in these Price Lists are estimates and do not necessarily represent the actual amount of work to be done per quantity item. The quantities of work accepted and certified for payment will be used for determining payments due and not the quantities given in these Price Lists (refer to par 1.1 above).

3.5 The short descriptions of the items of payment given in this Price List are only for purposes of identifying the items. More details regarding the extent of the work entailed under each item appear in the Service Information.

3.6 For each item in the Price List, the *Contractor* shall provide in the appropriate column the portion of the tendered sum (inclusive of labour and material).

3.7 The total in the Price List shall be exclusive of VAT and shall be transferred to form C1.1 (Form of Offer and Acceptance).

4. MEASUREMENT AND PAYMENT FOR CONTRACT

This part C2 of the specification as well as any reference in part **C3** will apply to determine conditions under which payments for this contract are to be made.

This section must be read together with the Additional Definitions and Interpretation Provisions contained in the Z- Clauses contained in **Contract Data provided by the Employer (C1.2 TSC3 Contract Data)** and in particular **Clause ZD6** providing for the annual assessment of the amount due to the Contractor for Providing the Services.

Payment will be made for the actual Km tamped, in accordance with the rates tendered in the schedule of prices. The following information shall be recorded continually:

(a) Tw, Tww, Twr, Ttr, To, Tb, Tx and Ts, Tt, Tp and Tm and total number of sleepers tamped for each day and totals for the month.

(b) Availability: $A = \frac{To - Tb}{To}$

(c) Productivity: $P = \frac{\text{Actual rate}}{\text{Tendered rate}}$

(d) Utilisation: $U = \frac{Tw}{To}$

(e) Only work that was required and accepted will be included for payment

4.1 ITEM 1.1: Total Standard track Km tamped

Payment for Actual km tamped shall be made per machine. This rate shall include for the full time availability of the machine including all costs for the provision and maintenance of the machine in full operational condition, and also including all maintenance and support staff and fuels.
Payment for work done shall be as follow:

Actual km tamped =
km Standard track tamped
+ km non Standard track tamped x Standard sleeper spacing / actual sleeper spacing
+ km Double tamp std spacing x 1.5
+ km Double tamp non Std spacing x Std spacing / actual spacing x 1.5
+ Time restricted track tamping (Twr) x tendered tamp rate per hour / std sleepers per km

All time, Availability, Utilization and productivity records and calculations shall be recorded on every month's payment calculations as per clause 9 of the Particular Specifications to monitor time allowed for the contractor to achieve the required output. This item will be paid in conjunction with clause X17 of the Contract Data.

4.1.2 ITEM 1.2: Additional Km tamped

Once the average equivalent km tamp for the month has been achieved, all additional equivalent km tamp will be paid for under this additional rate. The average quantity for the month will be calculated based on the workdays for the month in relation to the total workdays for the year. Each months payment will provisionally be reconciled with the previous month, allowing for the exchange of the extra km tamped of a preceding month to cover for a shortfall of km tamped for a currant month. A final reconciliation shall be done once per year to ensure that only the planned equivalent km as per item 2.1 is paid for against the rates allowed for under this item. All additional km will only be paid for under item 2.2.The intention is to cover the contractors variable cost only for additional km tamped.

4.1.3 ITEM 1.3: Additional time based use of the machine

If a machine is required to work for a breakdown or emergency call-out during the December break, payment will be made for the use of each day the machine is called out to work, whether the machine is actually working or standing. This call out rate only applies to the December break period and will not apply for any call-outs during the year. Call-outs during the year shall form part of the travel and km tamp as per items 2.2.1. 2.2.2

4.1.4 ITEM 1.4: Turnouts tamped

a) Payment for total number of 1:20 sets for the current month
b) Payment for the total number of 1:12 sets for the current month
c) Payment for the total number of 1:9 sets for the current month
d) Payment for the total number of 1:7 or 1:14 sets for the current month
e) Payment for the total number of scissors for the current month
f) Payment for the total number of single slips for the current month
g) Payment for the total number of double slips for the current month
h) Payment for the total number of splice joints for the current month

(Where tamping actually takes longer than time tendered for per turnout, the actual work time will still be recorded as Tw time and be taken into consideration during the course of the contract to monitor that the contractor had sufficient time to achieve the targeted work load. The payment for the turnout tamped will however still only be limited to rates tendered as indicted above. No conversion of sets will be done, only sets tamped will be paid for)

4.2. ITEM 2 - OVERTIME PAYMENT

Item 2.1

Overtime payment will be made for occupation time during week days (Monday to Friday) in excess of the hours of maximum occupation time (TOM) of 8 (eight) hours per day.

Overtime payment will also be made for work performed on a Saturday or week day when in excess of 5 consecutive days out of every 7-day period or in excess of 10 consecutive days out of every 14-day period.

Overtime will also be paid on weekends of shift working after shift time exceeds the maximum hours allowed for Tom

Item 2.2

Overtime payment will be made for work performed on a Sunday or Paid Public Holiday when in excess of 5 consecutive days out of every 7-day period or in excess of 10 consecutive days out of every 14-day period.

Sunday time will also be paid on weekends of shift working after shift time on a Sunday or PPH exceeds the maximum hours allowed for Tom.

4.3. ITEM 3 - SHIFT ALLOWANCE

Item 3.1
A shift allowance payment will be made for work performed on a Saturday when working 5 days out of every 7-day period or 10 days out of every 14- day period.

Item 3.2
A shift allowance payment will be made for work performed on a Sunday or Paid Public Holiday when working 5 days out of every 7-day period or 10 days out of every 14-day period.

Item 3.3
A night shift allowance payment will be made when an occupation or part thereof falls between 18h00 and 06h00, and will be paid in addition to any other shift or overtime payments.

Item 3.4
A night shift allowance payment will be made for travelling between 18h00 and 06h00, and will be paid in addition to any other shift or overtime payments.

4.4. ITEM 4: Day Labour rates.

When technological development required by Transnet Freight Rail necessitates modifications to the machine, an assessment of the time and cost of such modifications shall be submitted to the Project Supervisor as soon as possible.

Modifications in the field shall only be done on instruction by the Project Supervisor, for which the following shall apply:
.For labour, the rates in item 5 of the Price list and prices.
.a mark-up of 25% will be allowed on landed prices of imported parts or the delivered prices of locally manufactured parts and will be excluded from price adjustment described in clause 23 of Part C3/A

This item shall also be used as a provisional item for any required and approved day labour. (Refer applicable clause of Part C3/B for additional preparation work). The rates are to be for labour (including hand tools), supervision and transport for additional preparation work, approved by the Project Supervisor.

4.5. ITEM 5: Moving and Traveling machines

Payment will be made per track kilometre for moving the machinery between work-site and work-site (See definition of moving time – Part C3/A Definitions). Tendered rates shall include for fuel as well as wear and tear while moving. No payment will be made when the machinery is hauled by TFR locomotive.

4.6. ITEM 6: Moving Camp

Payment will be made per track kilometre for moving the camp between work-site and work- site (See definition of moving time – Part C3/A Definitions). Tendered rates shall include for fuel as well as wear and tear while moving.

4.7. ITEM 7: Provisional lump sum (accommodation and plant)

Lump sum item for payment of specific costs not covered in the existing specification. This Lump sum item is included for items such as:

a) Payment of material and or services such as may be required for level crossing repair work during tamping or interim accommodation payments for which TFR may be responsible.
b) Payment of plant hire or day labour not specifically covered by rates in the contract.

c) Payment for temporary and emergency accommodation shall only apply if agreed on and specifically instructed by the Technical Officer.

d) Any agreement for the supply of an additional service required by TFR shall be between the contractor and supplier of the service. Transnet will only pay the contractor for this service on acceptance of the invoice, under the condition that the service and price was approved beforehand by the Technical Officer.

e) Any approved invoice payable, shall clearly qualify the supplier, rate, quantity, cost and delivery detail, certified by the contractor for what purpose used, including reference to minutes or instruction from Technical Officer

4.8 ITEM 8: Provisional lump sum (cellphone and material)

Provisional sum: Excess for Cell phone:
Payment will be made for the actual excess minutes used by authorised Transnet Freight Rail personnel for official use over and above the initial free minutes allowed on the Cell-phone contract as specified in clause 13.5.1 of the Part C3/A and the Schedule of Cell-phone contract.

4.9 ITEM 9: standby for machine crew

In the event that a Project Manager requires a machine to be on standby during the December break, arrangements will be made for such standby for the core crew, operator, technician and direct support or as qualified by the tender. Payment will apply for each day for which the crew is required to be on standby. If an actual call out is however made, no standby will be payable for the days for which the machine is called out as all cost for actual call outs are to be part of the call out cost as per item 2.3. A travel allowance shall also be paid per kilometre actually travelled by the crews standby vehicle during the contractors Annual Holidays including travelling to respond to the call out. This item shall exclude travelling between temporary accommodation and work site as this shall include in the normal working rates allowed for under item 2.3.

C2.2 the *price list*

Machine Category:SIC23021CIDB/ HOAC-HO-42986

Dual Purpose Tamping Service

Work Package:

Number of Machine Service Packages Required = 10

NB The Employer reserves the right to reduce the number of Work Packages required prior to the award of contract.*

Item No.	Description	Units	Qty	Rate	Amount
1.	**Tamping payment (based on 8 To-hours)**				
1.1	Total standard track km tamped	km	540		
1.2	Additional km tamped	km	45		
1.3	Additional time based use of machine for emergency call out work over holiday periods (Provisional)	day	60		
1.4	Total 1:20 sets tamped	Each	50		
	Total 1:12 sets tamped	Each	40		
	Total 1:9 sets tamped	Each	40		
	Total 1:7 or 1:14 diamond tamped	Each	10		
	Total scissors tamped	Each	4		
	Total Single slip tamped	Each	4		
	Total Double slip tamped	Each	4		
	Total Splice joint tamped	Each	4		
2	**Overtime**				
2.1	Overtime hours outside Tom of 8 hours per day & Overtime payment for Saturdays when in excess of 5 out of 7 or 10 out of 14 days are worked consecutively & OT on shift days in excess of 8 h	hours	180		
2.2	Overtime payment for Sundays & PPH when in excess of 5 out of 7 or 10 out of 14 days are worked consecutively & ST for shift days on Sunday & PPH in excess of 8h.	Hour	180		

3	**Shift Allowance**				
3.1	Shift payment for Saturdays when working 10 out of 14 days	hours	180		
3.2	Shift payment for Sundays & PPH when working 10/14 shifts.	hours	180		
3.3	Shift payment for night shift work when occupation or part thereof falls between 18:00 and 06:00.	hours	90		
3.4	Shift payment for travelling between 18:00 and 06:00.	hours	40		
4	**Day labour (man day = 8hours)**				
4.1	Supervisor or Artisan (Technician or Track Master)	man hours	Rate only		
4.2	Skilled labour (Trade hand, Trackman, driver)	man hours	Rate only		
4.3	Unskilled labour (Track worker, assistants etc.)	man hours	Rate only		
4.6	LDV to transport additional small work gang if required.	day	Rate only		
4.7	Additional Truck to transport additional day labour (+-10), hand tools and material.	day	Rate only		
5	**Moving and Traveling machines** Moving Machine	km	13500		
6	Moving camp	km	8000		
7	**Provisional lump sum** (accomodation and plant)	Prov. sum	Rate only		
8	**Provisional lump sum** (cell phone excess and materials)	Prov. sum	Rate only		
9	**Standby for crew of machine for emergency call out (Provisional)**	day	30		
				Total Price Excl. VAT	
				VAT (15%)	
				Total Price Incl. VAT	

Stipulate the number of Ballast Tamping Machine Work Packages being bid for..... (enter number here)

_____
Bidder's Signature

Note : The pricing list above is expected to reflect the pricing offer for one Machine Work Package, where the Work Package represents *one machine* and all its associated services.

Part C3: Service Information

Part C3: Service Information

	POSITION	NAME & SURNAME	DATE	SIGNATURE
Compiler	**Contract Manager**	Rhulani Khosa	05.04.2022	
CO-Signatory	**Act. Service Manager**	Tenny Madiba	05.04.2022	

Part C 3.1

Service Information by the Employer

Maintenance of Railway Track with Dual Purpose Ballast Tamper: Countrywide for a Period of 84 Months

CONTENTS

1. DEFINITIONS

The following definitions shall apply in addition to those of the specification attached.

1.1 **Final tamped km:** Kilometre of track section final tamped to the *Employer's* required specification.

1.2 **Single Tamp:** A tamper passes over the track and tamps every sleeper once.

1.3 **Double Tamp:** A tamper passes over the track and tamps every sleeper twice in succession. For every tamp the tines are lifted clear of the ballast.

1.4 **Single Pass:** A tamper passes over the track once and tamps every sleeper (single or double tamp).

1.5 **Double Pass:** A tamper passes over the track, tamps every sleeper (single or double tamp), returns with tines in the raised position and again passes over the track, tamping every sleeper (single or double tamp).

1.6 **Restricted Track:** 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.

1.7 **Tamping position:** Both sides of every sleeper-to-rail fastening.

1.8 **Free- on- rail:** 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*. The *Employer* provides the right of passage and the pilot required, without cost and at times whereby such a passage and pilot can be made available by the *Employer.* 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 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 *Service Manager*. Such a move shall then occur during the *Contractor*s time.

1.9 **E7/1:** Specification for General Work and Works On, Over, Under, Or Adjacent to Railway Lines and Near High Voltage Equipment

1.10 **OEM** refers to the Original Equipment Manufacturer of the Machinery

1.11 **Service Manager**. The person or juristic person appointed by the Employer from time to time as the Service Manager, to administer the contract.

1.12 **Supervisor.** Any person appointed by the Service Manager to deputise for him in supervising and carrying out the contract.

1.13 **Normal Working Hours (NWH).** A continuous shift of 8 hours out of every 24 hours for 5 consecutive days out of every 7 days or for 10 consecutive days out of every 14 days. The Supervisor will determine the starting times, which may vary to suit seasonal changes or train time tables.

1.14 **Maximum Occupation Time (TOM)** means the total occupation time granted by the *Employer* to the *Contractor* to execute the *services* as per the contract agreement.

1.15 **Working time (Tw).** The time between the actual start and end times of an occupation, excluding time on the critical path of the day's relay operations lost which may be attributed by the Employer.

1.16 **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 Service Manager.

1.17 **Normal Shift Working** (not exceeding Normal Working Hours): Shifts (8 hours) worked on Saturdays, Sunday, or on Public Paid Holidays, up to Normal Working Hours.

1.18 **Night Shift Working** (Occupation time between 18h00 to 06h00): Night Shift Working will apply to any part of any shift for which occupation time has been approved and happens to fall between 18h00 and 06h00 on any day of the week inclusive of Public Paid Holidays.

1.19 **Double Shift Working**: A second shift of 8 hours within one particular 24 hour day.

1.20 **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. The 2 hour break may be changed to suit circumstances, provided the *Employer* and *Contractor* agree on the period.

1.21 **Occupation:** The formal closure of the line to normal rail traffic for a specified period of time arranged in accordance with Infrastructure Occupation Management System (IOMS) or any other system and implemented in accordance with the Protection Manual.

1.22 **Total Occupation Time (To):** shall be the total of the time from when the tamping and ancillary machines arrives on site until the last machine leaves the site.

1.23 **Shutdown:** Closure of a specific line, for example the Iron Ore line once a year for limited period of time (e.g. 10 days) to perform a large volume of work. Shutdowns on various lines may be to varying degrees i.e. it may range from total shutdown perhaps requiring Double Shift Working where all normal train traffic on a line is suspended for the duration of the shutdown to a situation utilizing extended occupations with normal train operation windows in between. Some Shutdowns will be partial in the sense that while work is performed on one line and on one section of the line, normal train operations will proceed on adjacent line/s and adjacent sections of the same line.

1.24 **Train Crossing Time (Tx):** means the time for the machine to wait for train crossings.

1.25 **Travelling Time (Tt)**: means the time for the machine to travel on track between work site and the staging site (or vice-versa), or between work sites, or to clear the section.

1.26 **Movement Time (Tm):** Time allowed to move from one staging area to another when machine is required to move to new depot or area.

1.27 **Breakdown time (Tb)**: means all periods during which any machine or any part of a machine is non-available.

1.28 **Standing Time (Ts):** means the loss of Working Time (Tw) incurred by the Contractor due to reasons attributed to the Employer

1.29 **Standing Time Allowance** is the time that the Employer allows for unforeseen disruption in the Working Time.

2. DESCRIPTION OF THE WORKS

2.1 Overview

This contract includes the maintenance of track by the *Contractor* with an on-track ballast tamping machine. The work shall include the provision of all on track machines required, the operation and maintenance of all equipment, the provision of all associated labour, supervision, road vehicles, ancillary tools and equipment, fuels, lubricants, spare parts and consumables and support required to achieve the output.

2.2 General Machine Requirements

2.2.1. The minimum requirements for this contract include:

- One (1) Dual Purpose Ballast Tamper. The ballast tamper shall be capable of tamping open line and turnouts.

2.2.2. The following type of tamping and machine capacity is required:

Machine and/or Type of Machine output required	**Planned depot or area where machine is required to work**	**Estimated Workload to be tamped per year per machine (equivalent track km)**	**Estimated Total Workload to be tamped over 84 months per machine (equivalent track km)**
Dual purpose ballast tamper capable of tamping at 21 – 28 sleepers per minute.	All depots country wide including neighbouring countries	Approximately 400 – 650 track km/ year per ballast tamper	Approximately 2800 – 4550 track km over 84 months per ballast tamper

Length of track tamped is not guaranteed production, i.e. the above workload is estimated for tender purposes only and is therefore not guaranteed by Transnet

2.2.3. The *Contractor* shall give clear details of production rates (in sleepers per minute) offered in his tender referenced to all factors e.g. track curvature, gradient, weather (raining, cold and hot), rail temperature, ballast fouling, tunnels, platform and level crossings, that might have an influence on the production rates.

2.2.4. The rate of tamping for all offers will be considered in the award of contracts. Track possession time and total time required to execute the work load shall therefore be considered for the contract award and be monitored and managed throughout the duration of contracts.

2.2.5. More work than planned may be done per depot per machine per year, only if instructed so by the *Service Manager* and confirmed as allowable within the total value of the contract by the *Service Manager*.

2.2.6. The contract includes the following:

- Corrective tamping of open line;
- Open line production tamping;
- Turnout tamping.

2.2.7. All machines shall be designed and able to work under the following conditions:

- All on-track machines shall fit within the vehicle gauge given in Annexure 2 of the Manual for Track Maintenance. Should any Machinery exceed the vehicle gauge in any respect, this shall be clearly indicated by the Tenderer by means of suitable drawings.
- Travel and work within the structure gauge given in Annexure 1 of the Manual for Track Maintenance, including open lines, lines in tunnels and along platforms.
- Track gauge: 1065 mm.
- The Equipment shall be limited to a maximum of 20 tonnes per axle when fully loaded.
- Single lines or multiple lines with a minimum distance between track centre lines of 3,8m.
- Move over track self-propelled on an uphill gradient of 1 in 30, or flatter
- Machines shall be capable of travelling free on level track at a minimum speed of 60km /h;
- Meet or exceed the minimum specified production rates while working self-propelled on uphill track gradient of 1 in 30, or flatter

- Moved around curves of down to 85 m radius
- Work during ballast tamping on curves of a minimum radius of 125 m.
- Work on rail sizes from 40 kg/m to 60 kg/m (inclusive)
- Work on all types of sleepers in track: steel, wood or monolithic concrete
- Sleeper spacing of 500 mm to 750 mm (inclusive).
- Work site altitude range: 0 to 2000m above sea level.
- Work within rail temperature range: -10ºC to + 60ºC.
- All machines shall have service brakes and independent emergency brakes capable of providing minimum retardation of 12.5% and gravitational acceleration of 6%.
- All machines shall activate colour-light signals at all times whilst on the track.

2.2.8. The driver's cab of all machines shall comfortably accommodate all necessary personnel and shall afford a clear unobstructed view of the track ahead for both the driver and the pilot, in both travel directions.

2.2.9. Off-tracking equipment will normally not be required for this contract. Contractors to however qualify whether machines offered are equipped with this facility.

2.2.10. The contract shall include the provision of, and management of a suitable number of basic crew of qualified operators and *Supervisors* as well as all skilled and unskilled labour to operate all machines safely in line with tendered production rates and within available occupation times.

2.3 Specific Requirements: Ballast Tamper

2.3.1. The machine shall be able to tamp plain track, restricted track, splice joints and all joint assemblies:
a). Signalling and electrical equipment such as axle counters and connecting rods will not be removed.
b). Where the machine may be required to tamp track with "dowty" plungers, the *Employer* will remove this equipment.
c). Bonds and cables will not be removed unless connections are bolted to the rail. Where bolted connections have to be removed for tamping, this shall be done by the *Contractor* where he is permitted to do so. Where removed, the *Contractor* then shall replace the connections after the tamping operation.

2.3.2. The *Contractor* shall specify and state in his submission the optimum tamping process (application of: hydraulic pressure range, tine vibration frequency, squeeze time, tine amplitude, tine size and tamping depth below the sleeper in clean and fouled ballast), that will ensure long-term durability of track geometry.

2.3.3. The machine shall be capable of lifting the track up to 100 mm per pass and of slewing the track up to 75 mm per pass.

2.3.4. The machine shall be capable of tamping between 230mm and 440mm below rail level with the top of the tines adjusted to be 10mm below the underside of the sleeper.

2.3.5. The squeezing time shall be within a range of 0.8 to 1.0 seconds.

2.3.6. The vibration frequency of the tamping tines shall be between 33 and 37 Hz.

2.3.7. The tamping assembly for one sleeper (i.e. both rails) shall consist of at least 16 tines. Individual control of the tamping assembly for each rail must be possible.

2.3.8. *Contractor*s may offer machines of a different tine configuration. Provision shall be made for the outer rows of tines to be replaced by cranked tines for tamping steel sleepers.

2.3.9. The method of tamping shall provide for an equal positive horizontal force between opposing tines. The tine closing force shall be applied hydraulically and the system shall be fitted with an adjustable pressure control.

2.3.10. The machine shall lift the track, tamp the ballast under the sleeper(s) and align the track to an automatically determined line and level, in one continuous action.

2.3.11. The tamping cycle shall be automatic. Once initiated by the operator, the closing and extraction of the tines and synchronisation thereof with the track lifting and levelling operations shall follow automatically. By-pass switches to engage manual operation will not be permitted.

2.3.12. Each tamping tine's tip size (frontal surface area) shall not be less than 7000 mm^2 when using 16 tines/sleeper. The *Supervisor* shall perform measurement by tracing the tine on graph paper and determining the area.

2.3.13. The machine shall have automatic lifting and lining systems for use on all track and in addition shall have "design" lifting and lining instruments for use on tangent track. The *Contractor* shall move, position and align the instruments to beacons provided by the *Employer*.

2.3.14. The non-availability of either the design lining or lifting system will render the machine non-available. The design lifting and lining instruments shall be repositioned during Ts (Standing time caused by *Employer*).

2.3.15. The *Contractor*s shall qualify under what conditions alignment equipment cannot function accurately (eg. misty conditions).

2.3.16. The tamping rate shall be maintained at a rate no less than the nominal tendered rate at all times during tamping. Low service damages will be applicable when the machine's production rate is less than the nominal rate.

2.3.17. The ballast tamper shall be able to tamp the following special trackwork:
- 1:20 turnouts on concrete or wood sleepers;
- 1:12 turnouts on concrete or wood sleepers;
- 1:9 turnouts on concrete or wood sleepers;
- Diamonds on concrete or wood sleepers;
- Scissors crossings on concrete or wood sleepers;
- Double-Slips on concrete or wood sleepers;
- Single-Slips on concrete or wood sleepers.

2.3.18. The turnout portion of a turnout, up to the end of turnout (ES), shall be tamped during the same pass as the straight of the turnout.

2.3.19. The *Contractor* shall indicate which tamping positions his machine cannot tamp, and the extent to which the turnout portion of a turnout can be tamped with the machine during the same pass as the straight of the turnout.

2.3.20. The machine shall be capable of lifting the track up to 100mm per pass and of slewing the track up to 75mm per pass. For tamping of turnouts, the machine shall be capable of at least 50mm lift and 25mm slew per pass.

2.3.21. The *Contractor* shall loosen and after tamping re-instate joints of diamond and scissors crossings, single and double slips, and crossovers between adjacent tracks, if required, to correct the alignment with the tamping machine. Any cutting or welding of the rail will be done by the Employer, if necessary.

2.4 Location of the Works

2.3.1. The contract area will be all track owned, or maintained, by Transnet Freight Rail country wide, in addition to neighbouring countries.

2.3.2. 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. The *Service Manager* reserves the right to deploy the machine wherever it is needed within the borders of Republic of South Africa and neighbouring countries.

2.3.3. The *Employer* shall compile the schedule of work for each Machine as per the workload issued as and when demand arises.

2.3.4. The deployment of the capacity of the Tamper and the priority of work site shall be determined by the *Employer*.

2.3.5. TFR will make available to the *Contractor* lines where the machine may be commissioned and tested. Work done during the commissioning or testing period is not eligible for payment under the Contract unless provided the standards as per Contract specification are met.

2.3.6. Security of all of the *Contractor's* property, equipment, materials, vehicles and workforce shall at all times during the course of the contract be the *Contractor's* sole responsibility.

2.5 Commencement and Duration of Contract

2.4.1. The commencement date will only be finalised after acceptance of tenders. The Contract will therefore commence on the date stipulated in the acceptance letter. The Contractor shall be able to commence with the service within 18 months of contract award.

2.4.2. Bidders shall also qualify their offers stating how soon after the award of the contract they will be able to start with the work. This shall include the provision and operation of any other on-track machines or support equipment. Where equipment offered may only be available at a later date, the date at which this will be available shall be indicated clearly upon submission of tender.

2.4.3. The duration of this contract is eighty four (84) months. The expiry date will therefore depend on the starting date of each part. The work output required shall depend on *Site* conditions and is expected to be carried out over the full duration of the contract period of eighty four (84) months. The Contractor shall Supply, Operate and Maintain the machine.

2.4.4. The Contract can be terminated by mutual agreement should technical or safety problems become evident during the execution of the works.

3. PROCUREMENT

3.1 Subcontracting

No part of the contract may be sub-contracted in any way without written approval from Transnet Freight Rail (TFR).

4. ENGINEERING

4.1 Testing

4.1.1. The *Employer* will test all on-track machines regularly for rail-worthiness before being permitted onto operational tracks. The *Employer's* approval in this regard shall under no circumstances mean to imply that the *Contractor* is released from his liability and/or responsibility for ensuring that all machinery is operationally safe and rail-worthy. The *Contractor* shall remain ultimately responsible for the safety and condition of his machines and equipment. These tests will include:

- Regular testing of braking efficiency. The minimum required braking is measured by Tarpley meter, for the service and emergency brakes respectively. Brake testing shall also include for checking for pressure loss on brake cylinders and circuits, wear and setting of brake shoes;
- Maximum wheel-tread and rim wear, distance between wheel-flanges and ultrasonic testing for flaws in running axles all measured for compliance with the standards of the Employer;
- Speedometer, sirens, drawbars and mechanical locks on hydraulic components to function properly.

4.1.2. Should a joint inspection of the Machinery by representatives of the Employer and the Contractor reveal that any on-track machine is not in a safe working condition, the Service Manager may order the temporary withdrawal of the machine from the service.

4.1.3. A Technical and Safety audit of the machinery and equipment must be done twice a year, and the report must be send to the *Service Manager*.

5. CONSTRUCTION

5.1 Works Specifications

The following additional specifications shall apply:

- TFR Trains Working Rules
- TFR Protection Manual
- TFR Electrical Safety Instructions
- TFR Infrastructure Safety Guidelines.
- TFR S410 Specification for Earthworks
- E10: Specification for Railway Trackwork.
- E10/1: Specification for laying of rails.
- E10/2: Laying of sleepers.
- E10/4: Ballasting and tamping.
- E10/5: Destressing of rails.
- E10/6: Building and Replacement of sets.
- E10/7: Field welding of rail joints.
- E10/9: Slewing and Alignment.
- E10/11: Surveying and setting out of track alignment and referencing.
- E10/12: Installation of insulated rail joints
- E4B (November 1996): Minimum Communal Health Requirements in areas outside the jurisdiction of Local Authority
- E4E SHE Specification for Contractors
- Addendum No 1 to Specification E7/1 (May 2011)
- Specification E7/1 (May 2011): Specification for works on, over, under or adjacent to railway lines and near high voltage
- Manual for Track Maintenance
- Track Welding Manual

- SANS 1921-1-2004 Part 1

5.2 Plant and Materials

5.2.1. The Employer shall supply and control all flags and detonators for protection of the work sites.

5.2.2. Care of material Supplied by the *Employer*: Should lost or damaged material be replaced by the *Employer*, the value of the material plus the cost of transport, including re-railing at the normal tariffs applicable to the public, will be deducted from any moneys payable to the *Contractor*.

5.3 Construction Equipment

The Contractor shall in addition to what is stipulated in this Service Information, provide the following facilities and support:

5.3.1. Lighting of the Work Site

The Contractor shall provide lighting on and with a machine should the machine be required to work at night. Where a machine is required to work at night, the Contractor will be required to provide lighting for the support labour required to work with the machine. This will apply to all workplaces in tunnels and other work places where work is to be taking place during hours between 18:00 and 06:00. The *Employer* will notify the Contractor at least one week prior to lighting arrangements needing to be made. The lighting shall be of intensity and spread to satisfy safe work and efficiency requirements.

The Contractor's lighting will not be required on the workplaces where the *Employer's* labour is employed. The Contractor may also utilise the existing lighting power supplies (where available) to assist him in lighting the workplace.

5.3.2. All tools/equipment, perway, small plant, earthworks plant, cranes, lifting equipment and vehicles of every description necessary for the execution of the works shall be supplied by the Contractor complete with fuel, spares, maintenance, competent operators and legally compliant with all applicable safety legislation. All ancillary and associated equipment together with all transport, accommodations, fuel, lubricants, spare parts for maintenance and repairs and consumables and any other resources necessary for the complete and effective and safe functioning of all Machinery shall be included in this contract to consistently and sustainable operate the machine safely in line with tendered production rates and within available occupation times.

5.4 Labour

5.4.1. The Labour, supervision and vehicle, normally required to do the work must be listed in the "Schedule of labour and plant for preparation for tamping." The labour shall be provided with the necessary hand tools such as measuring equipment, pionjars, beaters, forks, spanners, bars and levers for sleeper clip and spring fastenings. The cost of this labour listed in this schedule shall be included in the machine hire rates tendered. This labour shall be utilised fully for all work related to the items listed above.

5.4.2. Where the volume of work required, exceeds that what can reasonably be done by the labour listed in the schedule, the Service Manager may request the Contractor to provide additional labour and / or supervision and transport for the execution of the additional preparation work. Additional supervision and transport will only be requested where the additional labour exceeds three men. This additional labour shall also be provided with the necessary hand tools such as measuring equipment, beaters, forks, spanners, bars and levers for sleeper clip and spring fastenings. This will be dealt with as a compensation event.

5.4.3. Additional work required by the Service Manager, may also be done by the additional labour as overtime, separate from the machine occupation time or overtime and will be dealt with as a compensation event.

5.4.4. Reasonable work volume for the additional labour will be agreed on between the Contractor and the Employer. (Man hours for each separate labour task).

5.5 Existing Services

5.5.1. The *Contractor* shall take note of all OHTE equipment, red and other electrical bonds on the work Site and shall not interfere, damage or work on them unless under direct supervision of a designated and competent Transnet Freight Rail (TFR) Electrical Officer.

5.5.2. The *Contractor* shall take note of all signalling equipment on the work Site e.g. signals, signal cables, block joints, signal bonds, axle counters, hotbox detectors etc and shall not interfere, damage or work on them unless under direct supervision of designated and competent Transnet Freight Rail (TFR) signal technicians.

5.5.3. Should the Contractor damage the track or any visible equipment, the Supervisor may arrange to rectify such defects. Costs will be recovered from the Contractor

5.6 Site Access

5.5.1. All *Contractor's* personnel shall be inducted before any works commence. Site access certificates will only be issued after all inductions have taken place.

5.5.2. Site access will be denied to the *Contractor* should the site access certificate not be issued.

5.7 Site Establishment

5.6.1. Subject only to the discretion of the Depot Engineering Manager responsible for the area, yard lines within the railway reserve may be made available to the *Contractor* for staging the wagons making up the consist of the machine.

5.6.2. Subject only to the discretion of the *Employer's* Depot Engineering Manager, areas within the railway reserve may be made available to the *Contractor* for accommodation, offices/workshops or stores. Where not allowed, the *Contractor* shall make his own arrangements elsewhere, at the expense of the *Contractor*.

5.6.3. If the *Contractor* is allowed by the *Employer's* Depot Engineering Manager to utilize areas within railway reserve for his purposes of whatever nature, it shall be noted that normally electrical, water supply and sanitation will not be available. The *Contractor* shall be required to make his own provisions for electrical, water supply and sanitation. Additionally, the *Contractor* shall comply with Environmental Health and Safety legislation when utilizing areas within railway reserve. On vacating the site, the site shall be cleared up and re-instated to the acceptance of the Employer's Depot Engineering Manager.

5.6.4. Security of the *Contractor's* property, equipment, materials, vehicles and workforce shall at all times during the course of the contract be his sole responsibility. No claims will be entertained by Transnet Freight Rail (TFR) in this regard.

5.6.5. The *Contractor* shall be required for each work Site to have available for his work force suitable sanitation in accordance with the Act 85 Regulations.

5.6.6. On some lines or for some yards of *Transnet Freight Rail* (*TFR*), the *Contractor*'s staff will be required to obtain security permits from *Transnet Freight Rail* (*TFR*) before being allowed to work there. These permits will be issued free of charge.

5.6.7. The *Contractor* shall note that not all the sites will be accessible via a service road in some instances. The *Contractor* shall have a plan to make the sites accessible to him/her in order to do the work at his own cost.

6. MANAGEMENT

6.1. Management Meetings

6.1.1. Project management meeting must be conducted once every month for the duration of the contract by the *Service Manager* and *Contractor* who must attend these meetings. Project progress and program (revision) must be discussed in these meeting. This meeting shall be for the purpose of discussing machinery moves, actual progress versus construction program, delays, service information, etc.

6.1.2. Operations planning meetings must be done every scheduled day and on Site. The *Contractor, Employer* representative (typically the foreman) and all other supporting staff of both *Contractor* and *Employer* must be part of these meetings. Safety, risk and environmental matters need to be addressed in these meeting. All these will do prior the operation for that particular scheduled day.

6.1.3. Payment meeting must be conducted once every month for the duration of the Contract. Both the *Service Manager* and the *Contractor* must be represented in these meeting. This activity must be done before the 10th of every month, payment submission and assessment must be done according to NEC3 Terms Service Contract (TSC3).

6.1.4. Site meetings: The *Contractor* shall attend meetings as scheduled by the *Service Manager and* such meetings shall be for the purpose of discussing daily challenges experienced with the machine and operational issues.

6.1.5. The *Service Manager* may call ad-hoc meetings any time during the contract period.

6.2. Planning

6.2.1. The following will be determined and recorded jointly by the *Service Manager* and the *Contractor* at a monthly site meeting, scheduled to suit both parties:

- The previous month's production and quantities for payment purposes.
- The next month's detailed program and the necessary inspections required.
- Occupations.

6.2.2. The weekly progress and revisions to the monthly program will be determined by the *Service Manager* and the *Contractor*'s representative at a weekly site meeting. Decisions made will be recorded in a designated site book provided by the *Contractor*. The weekly site meeting will be held during occupation time, but must not interfere with working time (Tw).

6.2.3. The Contractor shall measure and evaluate curves to be tamped; to help him restore the track to the initial design standard or to a new design decided upon by the Service Manager. Curve beacons, indicating beginning and end of circular and transition curves, shall be replaced and fixed by the Employer according to the latest design.

6.2.4. The *Contractor* is responsible for the preparation work with regard to stability and geometry on the turnouts to be tamped. Material replacement to be done by the *Contractor* shall only include bolts, nuts or screws. The *Service Manager* must be informed, one month in advance, of all turnout bolts, nuts or screws required by the *Contractor*.

6.2.5. The *Contractor* shall also inform the *Service Manager* one month in advance when the required standards cannot be met because of fouled ballast or rotten or bent sleepers. The clamp-locks on the turnouts have to be removed, restored and adjusted by the *Employer*.

6.2.6. The Contractor shall also be responsible for the preparation work with regard to the stability of the track to be tamped. Material replacements to be done by the Contractor shall be limited to that what is required to ensure a proper tamping job. The Service Manager shall inform the Contractor one month prior of what work shall be required and what material will be provided. This work may include the repair of off-track platforms and the boxing in of ballast, all within the capacity of the labour listed in the "Schedule of labour and plant for preparation for tamping.".

6.3. Site Records

6.3.1. A *Site* Instruction Book with triplicate pages shall be provided by the *Contractor*. The format for written communication on *Site* shall be the *Site* Instruction Book. A new page shall be used for each *Site* Instruction. *Site* Instructions shall be deemed to have been noted by the other party at the end of each work day. For this purpose the *Site* Instruction Book shall be checked and new *Site* Instructions signed-off by both *Transnet Freight Rail* (*TFR*) and the *Contractor* at the end of each work day.

6.3.2. A Site Diary with triplicate pages shall be provided by the *Contractor* and be available on site at all times. The number of staff and plant on site for every day shall be recorded. The hours of actual work and the accurate amount of work measured per item as in the Schedule of Quantities completed for each day shall also be recorded and signed off by both by the *Employer* and the *Contractor* at the end of each day. The *Contractor* shall record following in the *Site* dairy:

- Occupation and Working time
- Details of performance of the machines as well as the number of sleepers tamped per day per track category.
- An accurate recording of all material received or purchased.
- Details of plant, machinery and labour on Site, clearly indicating the staff used to perform various different functions.
- Minutes of the Site meetings.
- The Site diary shall be signed on a daily basis by both parties.
- Information shall be reported as per the daily report, emailed electronically including train crossing numbers and minutes delayed, the following day before 08h30.

6.3.3. The information in the Site Diary shall be identical to the report generated by the machine. The Employer shall provide a template and it shall be the source document for monthly payment certificates.

6.3.4. The daily report e.g. travel to site, work time, and travel return to staging sites times as well as production figures shall always be recorded and submitted to the *Supervisor* and *Service Manager* daily every morning for the previous day's occupation by email at 08:00.

6.3.5. A Transnet Freight Rail (TFR) Track Inspector shall on completion of each project inspect and measure for purposes of verifying quality for payment purposes. A formal handing over of the completed project shall be signed off by the Depot *Supervisor*, for the project to be eligible for payment.

6.4. Contractor's Documentation

The Contractor shall maintain the following documentation on a regular basis:

6.4.1. A complete maintenance manual and spare parts list must be available on the machine.

6.4.2. The Contractor shall supply the Service Manager with maintenance plans and submit monthly maintenance reports.

6.4.3. A complete operator's instruction manual must be available on the machine.

6.4.4. A complete machine safety and risk file must be available on the machine.

6.4.5. A visitor registration book must be available on the machine.

6.5. Occupations

6.5.1. Although not guaranteed, the *Employer* will realistically arrange occupations according to the approved programme of typically 8 hours for any one occupation.

6.5.2. Travel time from the staging site to the work site and back to staging site will be included in the Occupation Time (To).

6.5.3. During the occupation the line will be closed to normal rail traffic over the section on which the *Contractor* is working. Protection of the site shall be as per the protection manual under direct control and supervision of the *Employer* Platelayer/Track Inspector.

6.5.4. The *Contractor* shall control and be responsible for the movements of all plant including that of the *Employer*, within the confines of the area of the occupation. At all times, the movement of plant will be undertaken as laid down by the *Supervisor*.

6.5.5. The *Contractor* shall however allow that:

- Before midday during any shift the commencement time and duration of the following occupation will be advised in writing.
- Occupations may commence at any hour of the day or night and on any day of the week. The Employer requires that all the on-track machines may work double shifts and therefore the Contractor is expected to price his tender based on similar requirement. The double shift will be paid against the tendered items.

6.5.6. Any adjacent track will run normal train services at normal section speed. The Contractor will be required to apply his Safety Procedure in order to safeguard his employees against the danger of normal rail traffic passing close by on the adjacent line.

6.5.7. Occupations shall be called for on any day of the week or month of the year.

6.5.8. The Contract shall allow in his tender for the normal builder's break from middle December to 2nd week in January every year with the specific provision that in the case of an emergency the process may be called from leave during the builder's break to do work.

TFR shall notify the *Contractor*, 1 month prior to *Contractor*'s Annual Holidays, of the requirement of standby staff for emergency work during *Contractor*s Annual Holidays.

When required, the *Contractor* shall supply standby staff (fitter, operator and plant assistant) for emergency work.

The *Contractor* shall supply 2 contact phone numbers for emergency call out purposes (the standby staff shall be available 24 hours a day, 7 days a week)

The call out reaction time shall not exceed 24 hours from time of the call out to the time the machine is at staging point. Consideration must be given in respect of the standby staff getting sufficient rest before commencing work.

The *Contractor* shall make the necessary arrangements for accommodation and food of standby staff and all costs shall be included in the rates tendered.

6.5.9. The *Contractor*'s Track Master/Track Inspector shall take full charge of the *Contractor*'s resources on the work *Site*. An employee/agent appointed by the *Contractor*, will not act as, or be allowed to take on any responsibility of *TFR Track Master/ Track Inspector.* The function of the *TFR Track Master/ Track Inspector* is restricted to competent *Transnet Freight Rail* (*TFR*) employees only

6.5.10. The *TFR Track Master/ Track Inspector* shall be a competent *Transnet Freight Rail* (*TFR*) employee, reporting to the *Transnet Freight Rail* (*TFR*) Depot Engineering Manager. This *TFR Track Master/ Track Inspector* shall be responsible for the following on a work *Site*:

- Taking occupations
- Placing and controlling the flagmen
- Declaring the track safe for the passage of trains
- Cancelling the occupation and recalling the flagmen
- Communication with train traffic control with regard to occupation matters.
- The issue and control of all flags and detonators

6.5.11. The *Contractor* shall provide and maintain his own communication systems, including walkie-talkie radio transceivers, cell phone communication, plus public announcement system. These systems shall comply with any South African legislation as well as the *Employer* rules for walkie-talkie radio communication. All systems shall be approved by the *Employer*.

6.5.12. The *Contractor* shall provide a cell phone to the worksite for the exclusive use of Transnet Freight Rail (TFR) for logistical and operational arrangements.

6.6. Protection

6.6.1. The method of work shall be such that work may proceed either under “total occupation” or “between trains occupation” and shall at all times comply with *Transnet Freight Rail* (*TFR*) Specification E7/1

6.6.2. Normal protection measures in accordance with the *Transnet Freight Rail* (*TFR*) Train Working Rules shall apply

6.6.3. All protection arrangements shall at all times remain under the supervision and responsibility of a *Transnet Freight Rail* (*TFR*) Track Master/ Track Inspector.

6.6.4. The *Contractor* shall supply at least two flagmen per work *Site* for protection duties. The cost for these flagmen will be deemed included in the rates tendered and no separate payment shall be made.

6.6.5. The *Contractor* will be required to supply six of his employees to be trained and certificated in performance of protection duties. The *Contractor* shall appoint at each work *Site* a person whose sole task shall be to be on the lookout for approaching rail traffic. This employee shall operate an audible warning device to timeously warn all people on the work *Site* of approaching rail traffic.

6.6.6. The *Contractor* shall not allow any persons on the work *Site* to venture within the structure gauge when this warning procedure is not operating effectively.

6.6.7. The warning device shall be such that its sound can be clearly and effectively heard above the noise on the work *Site* by all personnel within a radius of 100m around the centre of each work *Site*. The cost to the *Contractor* of providing the lookout as well as the warning device shall be deemed to be included in the rates tendered and no separate payment shall be made.

6.6.8. An effective safety procedure to be followed by all personnel on any work *Site* in the case of approaching rail traffic on adjacent lines shall be compiled by the *Contractor* and implemented before any work commences. This procedure shall be updated whenever the need arises and any changes shall be communicated to all employees on a *works Site* before work proceeds.

6.6.9. *Transnet Freight Rail* (*TFR*) shall make available a Track Master to be in charge of the protection arrangements on *Site* and to declare the track safe for the passage of trains during the work and on completion of work. He may use flagmen provided either by *Transnet Freight Rail* (*TFR*) or the *Contractor*.

6.7. Traction and Signal Bonds

6.7.1. The *Contractor* shall repair all bonds / cables removed or damaged or broken off during tamping or ballast regulating operations during the period of the occupation.

6.7.2. The *Employer* shall supply all the material required for repairing of broken bonds and cables on a one to one exchange basis (used material for new material.)

6.7.3. The *Contractor* shall provide labour and equipment (inclusive of expanded collar fastening consumables and lugs) required to remove, repair new bonds where required and replace signals and electrical bonds.

6.7.4. If holes are required for bonds on tamping contracts, a rail drill shall either be supplied by the *Employer* or the holes shall be drilled by *Employer*.

6.7.5. Where cables are required to be cut, the cut cable shall be cut to the correct lengths and be the crimping of lugs onto cables be done by the *Contractor*. No splices will be allowed in bonding cables.

6.7.6. This shall include track feeder bonds (painted red), which may only be worked upon under supervision of a Competent Electrical Officer. The *Employer* shall only provide the cable for bonding. All bonding shall be completed during the period of the occupation.

6.7.7. Bonding shall be performed by a bonder qualified to the Employer's standard manual for "Earthing and Bonding for 3kV DC, 25kV and 50kV AC bonding" B_023 Issue 3 and B_028 Issue and subsequent instructions which includes the steel wire standard in lieu of existing copper bonds, and the expanded collar fastening system. The cables shall be correctly buried in the ballast as per instruction.

6.7.8. Signalling bonds may not be removed without the consent of the *Employer* or the authorised *Employer's* Signalling representative. Where signalling bonds are damaged or removed, the *Contractor* shall provide the support labour to re instate the bonds. The *Employer* will however be responsible to ensure the correct method of re-connection so as to ensure the correct functioning of the signalling system.

6.7.9. The Supervisor will check the condition of the bonds/cables at the end of each occupation, and should the condition or quality of weld not be acceptable, repairs shall be carried out at the expense of the Contractor.

6.8. Level Crossings

6.8.1. The *Contractor* shall open up level crossings in front of the machine and restore it after tamping.

6.8.2. Repair of level crossings may include replacement of damaged sleepers and fastenings.

6.8.3. Where required, the *Employer* will arrange, beforehand, with the road authority, for permission for the opening up of paved level crossings and for the final repair of the damaged paved part thereof.

6.8.4. The *Contractor* will be required to repair paved level crossings by an approved method, using an approved type of bagged pre-mix bitumen. The method and material will be subject to the approval of the *Supervisor*. The repair shall provide sufficient compaction of the damaged area and allow for an evenly adjusted alignment of the road surface to ensure safe passage of road traffic. Where required, the final alignment and repair of the road surface may be arranged by *Employer* to be done by the road authority.

6.8.5. Material required for the level crossing repair will either be provided by the *Employer* or may be provided by the *Contractor*. Where material is to be provided by the *Contractor*, such as bagged bitumen pre-mix, payment for such material shall be made under the item included in the schedule of quantities with the provisional lump sum.

6.8.6. An inspection before work and thereafter shall be done of the level crossing including the cattle guards. A list of material needed shall be handed to the *Service Manager*. Each level crossing including the cattle guards shall be signed off by the *Employer.*

6.8.7. The *Contractor* shall take appropriate control measures for the period when a level crossing is opened and provide sufficient traffic warning signage.

6.9. Track Lubricators

The Contractor shall remove all track lubricators (“greasepots”) in front of the machine and replace these after tamping. The Employer will be responsible for adjustment of the lubricators after replaced by the Contractor.

6.10. Stoppages

6.10.1. Temporary stoppage, which may result from a non-continuous flow of the work, as and when required and shall be allowed for in the tendered rate.

6.10.2. TFR will advise the *Contractor* of any temporary stoppage in the work, 30 days’ notice will be given of such an impending stoppage. Thirty days (30 days) notice will also be given to commence work when the Machinery was standing due to a temporary stoppage.

6.10.3. No Payment for De-establishing from *Site* when temporary stoppage begin as well as Re-establishment on commencing of the work after a temporary stoppage will be made.

6.10.4. The *Contractor* shall allow that weather conditions may adversely affect his rate of progress and plan his progress as well as plant and labour capacity accordingly.

6.10.5. Should rain or snow falling during the period of occupation, make it impossible for the *Contractor* to make use of such occupation no claims for Standing Time will be entertained by *TFR*.

6.10.6. The *Contractor* shall not claim any Standing Time against *Employer* for any force majeure and no penalties shall be imposed by the *Employer* to the *Contractor* for the same

6.11. Recording of Activity Times

6.11.1. The mutually agreed time the machine shall be available at its staging point, shall be the start of the

occupation time (To) for the task order, therefore arriving late shall be deemed as breakdown time (Tb).

6.11.2. During the work activity the productivity, availability and utilization of the machine shall be recorded.

6.11.3. The time shall continuously be recorded for all work performed. The following types of time activity shall continuously be recorded so as to clearly define what time is available for working.

To = Total Occupation time for the day.
Ts = Standing time because of *Employer* reasons, not related to any fault of the *Contractor*.
Tx = Standing time due to Train crossing time
Tt = Travel time from staging site to work site and back to staging site or to clear the section.
Tm = Time allowed to move from one staging area to another when machine is required to move to new depot or area.
Tp = Time required to for preparation of track to allow working. (Only preparation that is purely related to machine on site that could not be phased apart from machine can be recorded for this purpose. This item may not be used for any problem related to the machine or staff inefficiency)
Tb = Breakdown of machine

Daily production report must be e-mailed to the *Service Manager* at 08:00 am in the morning of the next day after each shift, and must be in excel format.

Tw = Working time (As specified below)

Where: (Totals for the month)

$T_w = T_{wps} + T_{wpns} + T_{wr} + T_{w20} + T_{w12} + T_{w9}$

T_{wp} = Time spent on tamping plain track (Standard 700mm spacing).
T_{wpns} = Time spent on tamping plain track (Spacing different).
T_{wr} = Time spent on tamping restricted track

T_{w20} = Time spent on tamping 1:20 turnouts.
T_{w12} = Time spent on tamping 1:12 turnouts.
T_{w9} = Time spent on tamping 1:9 turnouts.

S_{aps} = Actual number of plain track sleepers tamped.(700mm spacing) (Excluding all sleepers tamped in turn-outs)
S_{apns} = Actual number of plain track sleepers tamped. (Spacing different)(Excluding all sleepers tamped in turn-outs)

W_{20a} = Actual number of 1:20 turnouts tamped.
W_{12a} = Actual number of 1:12 turnouts tamped.
W_{9a} = Actual number of 1:9 turnouts tamped.

A productivity factor, P shall be calculated every month to continuously monitor whether the machine consistently produces at the rates of production tendered.

Monitoring of machine availability will be calculated as: Availability (A) = $\frac{To - Tb}{To}$

Monitoring of machine utilization will be calculated as: Utilization (U) = $\frac{Tw}{To}$

Monitoring of machine productivity will be calculated as: Productivity (P) = $\frac{AR}{TR}$

AR = Actual Rate (Sleepers/minute)
TR = Tendered Rate (Sleepers/minute)

6.11.4. The tendered nominal production rate in sleepers per minute shall be maintained over a calendar month for the ballast tamper.

6.11.5. All Tb shall be recorded at all times. Where a machine becomes unreliable and continues breaking down and results in train delays or occupations having been taken with insufficient production, the *Service Manager* may decide on placing a machine on breakdown until such time that the *Contractor* can prove that the machine can be consistently available. The machine will always be required to produce the required standard of work required at full production rate.

6.11.6. Double tamping may be required as instructed by the Supervisor, for instance (and not limited to) when the ballast is extremely fouled and /or a lift exceeding 40mm is required:
- If the Service Manager requires double tamping over sections longer than 700 sleepers, the number of sleepers counted towards Sa will be 0.75 x Sd, where Sd is the number of tachograph registrations.
- If the Service Manager requires double tamping over sections shorter than 700 sleepers, the number of sleepers counted towards Sa will be equal to Sd, where Sd is the number of tachograph registrations.

6.12. Provision of Electronic Production Report to the Employer.

6.12.1. The *Contractor* shall provide the *Employer* with the daily production statistics of the work.

6.12.2. The production report shall be in an agreed on format providing the following basic type of information:

a) To, Tw, Tt, Ts, Tb, etc. of each machine applicable.
b) Length of work or number of turnouts completed for the day.
c) Start & final km tamped and GPS coordinates with the length and description of the rail line.
d) Reasons / comments on production shortfall including minutes per reason.
e) Train numbers and minutes delays per train number.
f) CTC names and CTC panel member details.
g) Graphical presentation of data as and where agreed on.

6.12.3. The report shall be e-mailed daily to the *Service Manager, Supervisor* and nominated *Employer's* representatives.

6.12.4. Where problems exist of actually transmitting the data, the *Contractor* shall state what measures shall be taken to ensure transmission of data as soon as possible.

6.12.5. All data shall be summarised per week and then per month. Data may be used as a preliminary indication of payment but shall not be used specifically for payment purposes. Final payment data shall be dealt with as specified elsewhere.

6.13. Quality

6.13.1. Standards for acceptance of track shall be in accordance with the Manual for Track Maintenance.

6.13.2. Geometry measurements done by the *Contractor* ahead of and behind the tamper in accordance with Appendix C, shall be handed in hard copy to the ***Employer's*** representative on the same day that the work has been performed. Labour for these measurements must be included as part of the compulsory support of the machine and not extra labour.

6.13.3. Measurements shall be done manually and/or electronically before the passage of the first train.

6.13.4. The standards for structural gauge shall be adhered to (See E7/1 specification). The *Contractor* shall verify the structural gauge parameters himself and adhere to the specified standards.

6.14. Standards of Workmanship and Accuracy

6.14.1. The A-standard given in the Manual for Track Maintenance and summarised in Appendix A hereof shall apply at all measuring stations, except if, prior to tamping:

- Any one of the TOP, CANT or LINE measurements at the measuring station exceed the C standard, or if the measuring station is one of more than three consecutive VERSINE measurements which exceed the B-standard to one side in a curve, or
- The running top is such that the depth of the worst slack is more than the required lift, or
- The lift for a single pass or the final lift of a multiple pass is less than 10mm or exceeds 25mm, or
- The amount of slew, due to LINE or VERSINE errors is more than the maximum slew the machine can achieve per pass, or
- The rail temperature is above the maximum temperature in the working (B) range as determined from Annexure 16 of the Manual for Track Maintenance; or
- Due to bent sleepers in a turnout, the required standards for vertical alignment cannot be achieved on both the straight and turnout lines. (In such cases the required cant on the straight (through) portion of the turnout will be specified, or
- The horizontal alignment of the curved (turnout) line of a turnout cannot be corrected by the machine, in such cases the straight (through) line of the turnout shall be aligned correctly, or
- The composition of the turnout is such that the required geometric standards cannot be achieved.

6.14.2. The standards of workmanship and accuracy apply to the tamping and aligning of established track and the final tamp of multiple passes on all track. The *Service Manager* will inform the *Contractor* when a different standard shall apply.

6.14.3. On transition curves the cant is to be increased proportionately along the length of the transition curve, or as otherwise directed, to the required cant of the butting circular curve.

6.14.4. The cant to be applied to curves will be as determined from the radius of the curve or as directed by the *Service Manager*.

6.14.5. On tangent track, reference points will be installed by *Employer* where repeatable alignment is important. These will be a maximum of 200m apart.

6.14.6. The running top of the track and the alignment may need adjustment where adherence to the minimum structure gauge is essential or at tie points such as platforms and level crossings. Details of adjustments, which may be required, will be provided by the *Service Manager*.

6.14.7. The straight (through) line of a turnout shall normally be tamped first. Should it be necessary, to obtain the required standards, the curve butting to the turnout portion of a turnout, will be referenced by the *Employer* at

5m intervals. (The obtainable accuracy is influenced by the direction of travel during tamping, and this will only apply if the machine is working in the direction from ETO towards the crossing).

6.14.8. Turnout sleepers longer than 3 meter must be supported on the far end during tamping.

6.14.9. Measurement of the standards of workmanship and accuracy for turnouts will be taken over the lengths of track from:
- 25 m from the Stock Rail Joint (SRJ), through the straight of the turnout, to 25 m from the End of Set (ES); and
- 25 m from the Stock Rail Joint (SRJ), through the turnout portion of the turnout, to 25 m from the End of Turnout (ET).

6.15. Evaluation of Machine Performance

6.15.1. Machine performance will be evaluated by measurement of the track geometry behind the machine operation. Defective machine performance is indicated by a measurement that fails to meet the specified geometry standard i.e. a failed measurement.

6.15.2. The performance of the machine will be acceptable if the number of failed measurements does not exceed the specified number shown in Appendix A. Plain track and restricted track will for this purpose be divided into 500m sections.

Turnouts will be assessed over the following lengths:
- 25 m from the Stock Rail Joint (SRJ), through the straight of the turnout, to 25 m from the End of Set (ES); and
- 25 m from the Stock Rail Joint (SRJ), through the turnout portion of the turnout, to 25 m from the End of Turnout (ET).

6.15.3. Should the structure gauge be violated, the fault shall immediately be rectified by the machine.

6.15.4. Should any geometry measurement exceed the B-standard, the fault shall immediately be rectified by the machine.

6.15.5. The *Service Manager* will decide (before completion of the next 500m section or turnout) if re-tamping shall be done in case of non-conformance. In all instances where re-tamping is required, the working time will be recorded as part of the total work time allocated to the *Contractor* to execute the work load.

6.15.6. Should re-tamping not be possible because of a lack of occupation time, and it is acceptable for the Track Master or Track Inspector to leave the line as it is as being safe for the running of trains, the track km tamped for payment shall be 50% of the length of track actually tamped.

6.15.7. The Track inspector however retains the right to have the section of track re-tamped to standard whereby the total time used will be recorded as time allowed for tamping but only the final length of track correctly tamped be accepted for payment.

6.15.8. The tachograph or event recorder will be marked and/or set and certified by the *Service Manager* to indicate:

- Sections that are double tamped (Twd),
- Where re-tamping was done (Tbr),
- Other tamping functions.

6.15.9. The Service Manager will do a daily check of the machine's performance

6.15.10. Should any measurement deviate from the accepted standard, the machine will be non-available and booked on Tb until the fault is corrected.

6.16. Measurement of Contact Wire Height and Stagger

6.16.1. The height of the contact wire shall be measured on both sides of all overhead bridges as well as level crossings after the final tamp. Heights below or above the allowable limit quoted in the E7/1 specification will be unacceptable.

6.16.2. The stagger of the contact wire, (offset from the perpendicular on the track centre line) shall be measured at all support structures, pull-off and knuckle points, as well as at mid-span on all curves, after the final tamp. Where more than one contact wire exists, the stagger of the innermost wire shall be measured. When sets of points are tamped, the stagger on both the through and the turnout contact wire shall be checked.

6.16.3. Contact wire height and stagger measurements shall be reported to the *Supervisor* in writing (or computer printout) at the end of each shift.

6.16.4. The accuracy of contact wire height measurements shall be 10mm and contact wire stagger measurements shall be 20mm.

6.16.5. Measurements exceeding the allowable limits quoted in the E7/1 specification shall be immediately reported to the *Employer* for rectification or adjustment by the *Employer's* electrical staff. Each measurement shall indicate the mast location number as well as the relevant track section number.

6.16.6. The *Contractor* will not be allowed to use a contact system for the measurement of the electrical overhead wire height and stagger. All contact wire height and stagger measurements are to be measured electronically. The measuring equipment must be calibrated with a validation period of 12 months unless found to be inaccurate. Failure of this measurement equipment will render the Tamping machine unavailable and therefore on breakdown.

7. HEALTH AND SAFETY The *Contractor* shall comply with all applicable legislation as well as Transnet Safety requirements. The cost for such compliance shall be borne by the *Contractor* and shall be deemed to have been allowed for in the rates and prices of the Contract. Specifically important in this regard is compliance with**:**

- TFR Safety Guidelines for Infrastructure (Latest Edition).
- The Compensation for Occupational Injuries and Diseases Act (Act 130 of 1993).
- The Occupational Health and Safety Act (Act 85 of 1993).
- TFR Specification E.4E, SHE Specification for Contractors
- Basic Conditions of Employment Act as well as all other relevant labour legislation.
- TFR Specification for Work on, under or adjacent to Railway Lines and near high Voltage Equipment – E7/1.

7.2. The Contractor 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 Service Manager.

7.3. A formal risk assessment on the machine process has been conducted by *TFR* and the under mentioned safety critical risks have been identified. The *Contractor* shall conduct his own formal risk assessment on the machine offered by him and add any additional risks identified by him, to this list.

7.4. The *Contractor* is required to prepare and submit with his tender a comprehensive safety case in accordance with the requirements of Act 85 and the Construction Regulations.

7.5. The *Contractor* shall specify in his safety case the list of all risks identified by *TFR* together with any additional risks identified by his own risk assessment and indicated specific rules, processes, methods and designs of how he intend to mitigate these risks should he be awarded the contract.

7.6. Safety Critical Risks identified by *TFR* for the contract are:

- Occupation - double line occupation
- Executing work on one line while a normal train service is running on adjacent line/s
- Excessive Working hours
- Working at night
- Emergency procedure – to stop process due to wagon or equipment failure
- Material handling and working near or under live OHTE equipment: 50kV, 25 kV and 3.3kV
- Staging in yards in proximity of live OHTE and lines on which rail traffic runs continuously.
- Danger area
- Competent operators
- Train driver/operator/ interaction/competency
- Site conditions
- Infrastructure equipment damage
- Machine working on sharp curves and steep gradients
- Machine working on embankments and in cuttings
- Machine working on fouled ballast
- Clearances
- Maximum and minimum temperatures
- Precipitation
- Integrity, i.e. Rolling stock structure, drawgear, brakes, wheels; and machine structural integrity
- Unauthorised access
- Use of various petrol and electrically driven small plant within team context i.e. disk cutters, MP12 and MC2 rail grinders, rail drills, hand held tampers, generators and associated electric equipment, joggle plates and joggle clamps etc.
- Environmental pollution/damage

7.7. Safety Compliance

7.7.1 The *Contractor* shall prepare and implement a comprehensive health and safety plan covering all relevant legal safety aspects for their work teams. It shall include details of the *Site* management structures, all safety legal appointments as well as the written safe working procedures for all equipment used on *Site* taking into account the above risk assessments.

7.7.2 The *Contractor* shall be responsible to ensure the use of only technically competent trained staff on all types of work.

7.7.3 The Health and Safety plan together with all supporting documentation shall at all times be available in a health and safety file on site for compliance audit.

7.7.4 The *Contractor* shall ensure that all *Site* staff are trained and inducted in the written safe working procedures for all equipment used on *Site*.

7.7.5 The *Contractor* shall ensure that all workers are appropriately equipped and wearing Personal Protective Equipment (PPE) and that Safety Talks are conducted and noted in the *Site* Diary before the start of every shift.

7.7.6 The *Contractor* shall be responsible to ensure that *Site* staff is always competently trained with regards to Electrical Awareness Training and such training material should be acknowledged and approved by the

Employer's School of Rail.

7.7.7 The *Contractor* shall be responsible to ensure that workers working on machines (high risk areas), operators, machine fitters, area supervisors and contract supervisor's *Site* staff are always competently trained with regards to PWC Electrical Educational Training.

7.7.8 The *Contractor* shall also be responsible to ensure that contract managers in charge of *Site*s are always competently trained with regards to COM Competency Electrical Training (to follow onto PWC Training).

7.7.9 Non-compliance with safety requirements will result in an immediate suspension of work without payment.

7.7.10 Non-compliance with environmental requirements such as oil spillages, waste, will result in penalties being levied against the *Contractor*. The *Employer* will appoint a private company to make the situation good and claim compensation from the *Contractor.*

8. TRAINING

8.1. The *Contractor* shall ensure that all staff working on or with the contract is adequately trained, so as to comply with any relevant safety and quality requirements. The *Contractor* will be liable for any costs related to the training of all the staff.

8.2. It is the *Contractor*'s responsibility to ensure that his staff is trained. At the commencement of the contract, *Transnet Freight Rail* (*TFR*) shall assist the *Contractor* with the initial on-the-job training for the staff as specified below, so as to assist the *Contractor* to qualify the worker's / staff. The *Contractor* shall ensure that he has a core group of workers with sufficient previous experience to take the lead in undertaking maintenance tasks.

8.3. Where training is required by the *Contractor* and *Transnet Freight Rail* (*TFR*) is committed to provide training, the *Contractor* shall qualify his tender as to what and how many staff, training will be required for. After award of the contract, the *Contractor* shall then arrange with the appropriate *Transnet Freight Rail* (*TFR*) Perway Production manager, through the *Supervisor*, for this training / testing.

8.4. Training of Track Workers

At the commencement of the contract, assistance with the training, to qualify the *Contractor*s workers to perform the following tasks shall be given:

- Track work (Level crossing blocks, cattle guards, sleeper & clip replacement / fastening, lubricators, flagmen, ballast boxing etc.).
- Quality measurements as required for track work.

8.5. Training of Track Inspectors, Track Masters and or Trade hands (Perway)

Training of Track Inspectors, Track Masters and or Trade hands (Perway) shall be solely the responsibility of the *Contractor*. Only fully qualified people shall be used by the *Contractor* for these positions. The *Contractor* shall ensure that staff used, do comply with requirements for the industry.

8.6. Training of Flagmen

8.6.1. The appropriate training for the flagmen provided by the *Contractor* can be provided by *Transnet Freight Rail (TFR)* at the start of the contract.

8.6.2. Where *Transnet Freight Rail* (*TFR*) requires flagmen to be trained, the pre-requisites for such persons to qualify to be trained, shall be basic literacy skills and Basic English language ability.

8.6.3. *Flagmen* shall be officially trained, evaluated and certified competent, (*Transnet Freight Rail* (*TFR*) 407 – Item Number 37/270451 - "Certificate of Competency") by a designated competent person, before being used on protection duties. This certificate of competency shall remain valid for one (1) year only after, which re-testing and re-certification of competency will be required.

8.6.4. In cases where a person was not performing flagmen duties for a period of 6 months or longer, he shall be re-tested and again be re-certified competent, before he may be re-used for Protection Duties.

8.6.5. The *Transnet Freight Rail* (*TFR*) Depot Engineering Manager remains ultimately responsible in terms of the requirements of Act 85 for the safe working environment of his own personnel as well as *Contractor*'s personnel within the track maintenance environment on his depot.

8.6.6. The Depot Engineering Manager is therefore also responsible for ensuring that any changes in the Protection Procedures that may occur over time are effectively communicated to any flagmen prior to them being used for Protection Duties.

8.7. Training of Bonders

8.7.1. Bonders removing, replacing or repairing damaged bonds, shall be trained to ensure that only work, which they are trained and allowed to do, is done by them.

8.7.2. The initial training of bonders for this contract can be arranged for with the Employer's accredited electrical trainer, through the Supervisor as specified above in this clause.

8.7.3. Bonders shall be required to be trained for Electrical Permanent Way Competency and be trained to do WHAM bonding and bonding according to electrical specifications, instructions and drawings manual CEE 0059.84 and CEE0060.84, where applicable.

8.7.4. Follow up training of bonders shall be responsibility of the Contractor.

8.8. Electrical Awareness, Educational and Competency Training

8.8.1. The electrical awareness training shall be arranged for before any work commences.

8.8.2. The electrical educational and competency training may be arranged for at either a depot's lecture room (*Transnet Freight Rail* (*TFR*) property), or at a venue of the *Contractor*s choice (*Contractor*s cost).

8.8.3. The Accredited Electrical trainer from *Transnet Freight Rail* (*TFR*) will be provided by *Transnet Freight Rail* (*TFR*) at *Contractors* cost, an arrangement for the training session required, is done beforehand and will fit in with the trainers training program for the year.

8.9. The following training shall be arranged for the following Contractors staff:

Type of Training	**Staff required to undergo training**	**Estimated duration of training**	**Location of training**	**Trainer to conduct training at start of contract**	**Alternative trainer to conduct training at contract start**	**Future Refreshment training**
Induction	All contract staff including new entrants. Start of work at any new depot	+/- 2 hours	Depot where work starts	*Employer's Service Manager* or Track inspector	New recruits: *Contractor*s accredited representative	*Contractor*s accredited representative.
Electrical awareness	All contract staff including new entrants	+/- 2 hours	Depot where work starts	*Employer's* Depot's electrical officer or accredited trainer	New recruits: *Contractor*s accredited representative	*Contractor*s accredited representative.
PWC (Electrical)	*Service Manager*s, Operators, fitters, Technicians & Workers supporting fitters, working in risky OHTE areas.	2 days	Depot where work starts	*Employer's*, Esselen Park or Depot accredited trainer, or *Employer's* hired accredited trainer : By appointment at depot*	Replacement/ new staff: *Contractor*s accredited representative	*Contractor*s accredited representative.
Competency (Electrical)	*Service Manager*s (Follow up training in PWC)	1 day	Depot where work starts	*Employer's* accredited trainer, or *Employer's* hired accredited trainer : By appointment at depot*	Replacement/new staff: *Contractor*s accredited representative	*Contractor*s accredited representative.
Flagmen Training	Flagmen and standby flagmen	5 days		*Employer's* accredited trainer, or *Employer's* hired accredited trainer : By appointment at depot	Replacement/new staff: *Contractor*s accredited representative	*Contractor*s accredited representative.
Bonder Training	Bonder	5 days		*Employer's* accredited trainer, or *Employer's* hired accredited trainer : by appointment at depot*	Replacement/new staff: *Contractor*s accredited representative	*Contractor*s accredited representative.

8.10. The crew time, transport and accommodation cost related to training will be for the Contractor's account. The crew members proposed to for this training shall as minimum requirement be literate in terms of reading, writing and speaking of Basic English.

TRACK STANDARDS

APPENDIX A

Track Geometry Measurements

Number of permissible disallowed measurements

Type	Position	Method	Frequency	Before train traffic: 500m sections	Before train traffic: Each set	Under a train: 500m sections	Under a train: Each set	A Standard	B Standard	C Standard	Unit
VERTICAL PLANE											
TOP	All track	Geismar	Any position	3	1	3	1	1:1000	1:250	1:180	-
CANT	All track	Geismar	5m intervals	10	10%	3	10%	3	12	16	mm
TWIST	Transition curves	Calculated from cant	5m intervals	5	10%	3	10%	1:500 (" 5.5)	1:400 (" 6.86)	1:288 (" 9.50)	- mm
TWIST	All other track	Calculated from cant	5m intervals	5	10%	3	10%	1:1000 (" 2.75)	1:400 (" 6.86)	1:288 (" 9.50)	- mm
HORIZONTAL PLANE											
VERSINE	Curves :	10m chord	5m intervals	8	10%	-	-	2,5 mm + 5% of the correct/ave. versine.	2,5 mm + 20% of the correct/ave. versine	2,5 mm + 30% of the correct/ave. versine	mm
LINE	Tangent track : All	10m chord	any deviation	8	10%			1:2000	1:500	1:360	-
	Between beacons	70 - 250m optical baseline	1/instrument set up	0	0	-	-	1:5000	n.a.	n.a.	-
CURVE LOCATION	Curve markers Longitudinal Transverse	Survey	4 each curve	-	-	-	-				

* These standards are the difference between specified (design) and actual measurements, except for TWIST, which are absolute values.
* Sets will be measured for TOP, CANT, TWIST and LINE at the positions indicated in Appendix B.

PART 4: SITE INFORMATION

Core clause 11.2(16) states

"Site Information is information which

- describes the Site and its surroundings and
- is in the documents which the Contract Data states it is in."

In Contract Data, reference has been made to this Part 4 of the contract for the location of Site Information.

1. Description of the Site and its surroundings

1.1. General description

The contract area will be all track owned, or maintained, by Transnet Freight Rail country wide, in addition to neighbouring countries. 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. The railway tracks are located in areas of varying horizontal and vertical dimensions of the land surface. In some areas, tracks fall in deep cuttings as well as in high embankments. Security of all of the Contractor's property, equipment, materials, vehicles and workforce shall at all times during the course of the contract be the Contractor's sole responsibility.

1.2. Existing buildings, structures, and plant & machinery on the Site

There are fixed assets that are situated are alongside the linear state of the railway infrastructure. These structures are but not limited to; bridges, platforms, culverts and track side components. The Contractor shall ensure that all the works being carried out does not deform the existing structures.

1.3. Subsoil information

The project at hand does not interfere with the formation or earthworks. Should there be a need to work on the formation; the employer shall supply the contractor will relevant information.

1.4. Hidden services

There are underground services that were previously erected and the as-built data to locate such services will be utilised. There are situations where the as-built data cannot be traced and in such situations, activities must be carried out with caution .During the execution phases of the project, there is a possibility of disruption of such hidden services. These services include conduits (oil, water and sewage), electrical cables and any other structure that may be present. The employer shall inform the contractor through a baseline risk assessment of any possibilities in anticipation.

1.5. Scheduling and commissioning

The Employer shall compile the schedule of work for each Machine as per the workload issued as and when demand arises.

TFR will make available to the Contractor lines where the machine may be commissioned and tested. Work done during the commissioning or testing period is not eligible for payment under the Contract unless provided the standards as per Contract specification are met.

2. Site Establishment

2.1. Site Access

All Contractor's personnel shall be inducted before any works commence. Site access certificates will only be issued after all inductions have taken place. Site access will be denied to the Contractor should the site access certificate not be issued. On some lines or for some yards of Transnet Freight Rail (TFR), the Contractor's staff will be required to obtain security permits from Transnet Freight Rail (TFR) before being allowed to work there. These permits will be issued free of charge.

2.2. Utilization of the Employer's property

Subject only to the discretion of the Depot Engineering Manager responsible for the area, yard lines within the railway reserve may be made available to the Contractor for staging the wagons making up the consist of the machine. If the Contractor is allowed by the Employer's Depot Engineering Manager to utilize areas within railway reserve for his purposes of whatever nature, it shall be noted that normally electrical, water supply and sanitation will not be available. The Contractor shall be required to make his own provisions for electrical, water supply and sanitation. Additionally, the Contractor shall comply with Environmental Health and Safety legislation when utilizing areas within railway reserve. On vacating the site, the site shall be cleared up and re-instated to the acceptance of the Employer's Depot Engineering Manager. Where not allowed, the Contractor shall make his own arrangements elsewhere, at the expense of the Contractor.

2.3. Other requirements and information

The Contractor shall be required for each work Site to have available for his work force suitable sanitation in accordance with the Act 85 Regulations. Security of the Contractor's property, equipment, materials, vehicles and workforce shall at all times during the course of the contract be his sole responsibility. No claims will be entertained by Transnet Freight Rail (TFR) in this regard.

SANKOFA
Insurance Brokers

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To Whom It May Concern,

CERTIFICATE OF INSURANCE: TRANSNET (SOC) LIMITED – PRINCIPAL CONTROLLED INSURANCE

In our capacity as Insurance Brokers to the Transnet Group of Companies, we hereby certify that the undermentioned insurances are currently in place:

INSURED:	Transnet (SOC) Limited
PERIOD:	1 April 2021to 31 March 2022 (Both days inclusive)
DIVISION:	Transnet Freight Rail, Transnet Engineering, Transnet Properties, Transnet Pipelines, Transnet National Ports Authority and Transnet Port Terminals
THE INSURED'S VAT NO:	4720103177
THE INSURED'S COMPANY REGISTRATION NO:	1990/000900/30
POSTAL ADDRESS (Head Office)	P O Box 72501, Parkview, 2122

CONTRACT WORKS INSURANCE

Cover Provided :	Contract Works - Physical loss or damage to the Property Insured which being materials, plant and other things for incorporation into the permanent works.
Insurer :	Mirabilis (Santam Limited)
Policy Number :	MZAR35023-CAR
The Contract Site :	Any location within the Territorial Limits upon which The Insured Contract is to be executed or carried out as more fully defined in The Insured Contract documents together with so much of the surrounding area as may be required or designated for the performance of The Insured Contract.
Territorial Limits :	The Republic of South Africa.
Additional Co-Insureds:	
The Contractor:	All Contractors undertaking work in connection with The Insured Contract including the Employer to the extent that the Employer undertakes work in connection with The Insured Contract;
Sub-Contractors:	All Sub-Contractors employed by the Contractor and all other Sub- Contractors (whether nominated or otherwise) engaged in fulfilment of The Insured Contract; and to the extent required by any contract or agreement; transporters, suppliers, manufacturers, vendors, other persons, persons providing storage facilities, plant

owners and/or operators in respect of liability loss or damage arising out of The Insured Contract; project managers, architects, land surveyors, quantity surveyors, engineers and other advisors or consultants or sub-consultants appointed in the performance of the Insured Contract activities arising at the Contract Site provided always that any such person shall not be insured hereunder in respect of liability loss or damage arising out of such person's error or omission in the performance of the professional services for which he was appointed;

Provincial & Government: any Local Provincial or Government Department with which the Insured enters into any contract or agreement for the performance of The Insured Contract;
all for their respective rights and interests.

Insured Contracts : All Contracts (including any undertaking awarded or commenced prior to Inception of the Period of Insurance) involving design, construction, Performance Testing and Commissioning in respect of the Works and shall Include capital expenditure, upgrade, modification, maintenance or overhaul, refurbishment, renovation, retrofitting or alterations and additions to existing facilities undertaken by the Insured or other Insured Parties acting on their behalf but **excluding;**

a) contracts which at award stage have a value in excess of R 1,000,000,000;

b) contracts with an estimated construction period exceeding 48 months but increasing to 60 months in respect of rail maintenance contracts and Transnet Freight and Rail contracts for logistical support for inline inspections and identification of defects over a 5 year period in respect of Transnet's pipeline assets (excluding Defects Liability/Maintenance period);

c) contracts involving construction or erection of petrochemical manufacturing plant(s) but this exclusion shall not apply to pipelines and other associated works undertaken by or on behalf of the Insured;

d) contracts in or on any aircraft;

e) Off-shore contracts;

f) Wet Risk Contracts which at award exceeds R500,000,000;

g) Dam Contracts

h) Tunnel contracts which at award exceeds R50,000,000;

i) Tunnel contracts using tunnel boring machines;

j) Underground Mining Contracts;

k) Horizontal Directional Drilling Contracts which at award exceeds R50,000,000;

l) Horizontal Directional Drilling Contracts where total drilling exceeds 1 km;

m) Horizontal Directional Drilling Contracts for pipe diameters greater than 76 cm.

Definitions

1. *"Off-shore contracts" means all works and installations in the sea or on the seabed including dredging which are accessible only by ship boat barge or helicopter and do not constitute normal wet works like harbours moles bridges wharves or sewage or cooling water intake or outlet facilities. "OffShore Contracts" shall include oilrigs and oil platforms (but not including oil platforms when connected to the land on completion). The term shall not apply to pre-fabrication works on land associated with an Off-Shore Contract.*

2 *"Wet Risk Contracts" shall mean any Contract and/or Works where more than thirty-five (35) percentile of its value is in a permanent body of water or is below the high water mark of any tidal body of water. The term shall include contracts for the construction of wharves, piers, marinas, causeways, breakwaters, jetties, dry docks and offshore pipelines when connected directly to on-shore facilities and canal developments. Wet Risks shall exclude Off- Shore Contracts;*

3 *"Dam Contracts", which term shall include weirs and hydroelectric projects involving the construction of dams or weirs;*

4 *"Horizontal Directional Drilling Contracts", means micro-tunnelling work for the construction of tunnels utilising surface based horizontal directional drilling equipment.*

5 *Tunnels" means Tunnels (Including declines) involving all of the following;*
- *(a)* Works below ground level; and
- *(b)* Tunnelling machinery below ground level; and
- *(c)* A tunnelling crew operating the machinery below ground level;
- *(d)* But shall not include Horizontal Directional Drilling Contracts

6 *"Horizontal Directional Drilling Contracts", means micro-tunnelling work for the construction of tunnels utilising surface based horizontal directional drilling equipment.*

7 *"Underground Mining Contracts", which shall mean any contract involving underground mining.*

Testing Period: 120 Days not consecutive.

Maintenance Period : 12 Months

Main Policy Extensions :

- Costs & Expenses - Limited to maximum of R50,000,000.
- Expediting Measures – Limited to a maximum of R50,000,000.
- Professional Fees In Reinstatement Of Property Insured - Limited to a maximum of R50,000,000.
- Costs & Expenses For Removal Of Debris No Damage - Limited to a maximum of R50,000,000.
- Surrounding Property in care custody or control of the contractor – Limited to a maximum of R55,000,000.
- Fire Brigade & Public Authorities - Limited to a maximum of R10,000,000.
- Public Authority Reinstatement Costs - Limited to a maximum of R20,000,000
- Public Relationship Costs - Limited to a maximum of R1,000,000.
- Records - Limited to a maximum of R2,000,000.
- Removal to Gain Access - Limited to a maximum of R20,000,000

- Road Reserve and Servitude Extensions - Limited to a maximum of R10,000,000
- Search & Locate Costs - Limited to a maximum of R20,000,000.
- Borrowing Of Plant For Commissioning Purposes - Limited to a maximum of R10,000,000
- Escalation during Construction – 30%
- Marine Contribution Clause
- Claim Preparation Costs – Limited to a maximum of R10,000,000

Main Policy Exclusions :

- War
- Nuclear Energy Risks
- Terrorism
- Computer Loss General Exception
- DE4 (All types of Works) for defective material workmanship design plan or specification.
- LEG 3 (Mechanical or Electrical Engineering Works only) for defective material workmanship design plan or specification. Limited to maximum of 15% of the total estimated contract value.
- Loss or damage arising during air transit or any ocean voyage or whilst in storage thereafter.
- Occurring during any defects/maintenance period unless cause occurred prior to such defects/maintenance period
- Disappearance or by shortage revealed during routine inventory or periodic stocktaking.
- Consequential loss of whatsoever nature.
- Normal wear and tear, normal atmospheric conditions, rust, erosion, corrosion or oxidisation.
- Due to its own explosion breakdown or derangement occurring after the Testing Period which has operated under load conditions.
- Second hand property due to its own electrical or mechanical breakdown or explosion.

Deductibles: In respect of loss or damage:

Major Perils shall mean damage caused by storm, rain, tempest, wind, flood, theft, malicious damage, subsidence, collapse, earthquake, testing or commissioning and the consequences of defective design, specification, materials or workmanship (DE4).

Minor Perils shall mean damage caused by a peril no defined as Major Perils defined above.

Contracts with a contract value :	Major perils	Minor perils
0 to R100,000,000	R25,000	R 15,000
R100,000,001 to R250,000,000	R50,000	R15,000
R250,000,001 to R500,000,000	R100,000	R25,000

R500,000,001 to R1,000,000,000	R150,000	R25,000

Minimum wet risk deductible of R100,000 per occurrence to apply.

LEG 3 Deductible (Only in respect of Mechanical and Electrical contracts);

Contracts with a contract value	Deductible
0 to R500,000,000	R1,000,000 per occurrence
R500,000,001 to R1,000,000,000	R1,500,000 per occurrence

PUBLIC LIABILITY

Cover Provided : Contract Works Public Liability – cover the Insured's legal liability in respect of loss or damage or injury to third parties arising out of work performed in respect of the Insured Contracts.

Insurer : Stalker Hutchinson (Santam Limited)

Policy Number: 6000/132335

Territorial Limits : The Republic of South Africa.

Insured Contracts: All contracts (including any undertaking awarded or commenced prior to inception of the period of Insurance) involving design, construction, performance testing and commissioning in respect of the works and shall include capital expenditure, upgrade, modification, maintenance or overhaul, refurbishment, renovation, retrofitting or alterations and additions to existing facilities undertaken by the Insured or other Insured Parties acting on their behalf but **Excluding**:

a) Contracts which at award stage have a value in excess of R 1,000,000,000.
b) Contracts with an estimated construction period at award exceeding 48 months but 60 months in respect of contracts awarded prior to 1 April 2020 for rail maintenance contracts For Transnet Freight & Rail and for Transnet Pipeline's logistical support for inline inspections and identification of defects in respect of Transnet's pipeline assets (all excluding Defects Liability/Maintenance period).
c) Contracts with a Contractual Defects Liability Maintenance Period exceeding 24 months.
d) Contracts involving construction or erection of petrochemical manufacturing plant(s) but this exclusion shall not apply to pipelines and other associated works undertaken by or on behalf of the Insured.
e) Contracts in or on any aircraft.
f) Off-shore contracts - "Off-shore contracts" means all works and installations in the sea or on the seabed and do not constitute normal Wet Risk Contracts like harbours, moles, bridges, wharves or sewage or cooling water intake or outlet facilities, piers, marinas, causeways, breakwaters, jetties, dry docks and offshore pipelines when connected directly to onshore facilities and canal developments. "Off-Shore contracts" shall include oilrigs and oil platforms.

Policy Limits:

Contractors Public Liability	R100,000,000 any one occurrence / unlimited during the Period of Insurance
Contractors Negligent Removal or weakening of Support	R100 000 000 any one occurrence and R100,000,000 per site in the aggregate during the Period of Insurance.
Statutory Legal Defence Costs	*R5 000 000 in the aggregate during the Period of Insurance.
Arrest / Assault / Defamation	*R5 000 000 in the aggregate during the Period of Insurance.
Emergency Medical Expenses	R5 000 000 any one occurrence
Prevention of Access	*R5 000 000 in the aggregate during the Period of Insurance.
Trespass / Nuisance	*R5 000 000 in the aggregate during the Period of Insurance.
Claims Preparation Costs	R5 000 000 any one occurrence

*Where the limits are noted as in the aggregate during the policy period of insurance, that such aggregated limit is applicable to all Transnet Insured Contracts collectively and in total and does not apply to each contract separately.

Deductible(s) : R50,000 per occurrence but increased to R5,000,000 in respect of Spread of Fire and/or Hot Works and R250,000 in respect of Sudden and Accidental Pollution and/or Goods on the Hook.

General Policy Exclusions :

The policy does not cover:

- deliberate, conscious and intentional disregard to take reasonable precautions.
- fines, penalties, punitive and exemplary damages.
- Pollution unless caused by a sudden, unintended and unexpected occurrence.
- cost of removing, nullifying or cleaning up the effects of pollution unless caused by a sudden, unintended and unexpected occurrence.
- the hazardous nature of asbestos.
- War And Terrorism Risks.
- Nuclear Risks.
- Actual or alleged unlawful competition, unfair practices, abuse of monopoly power, cartel activities
- Compulsory Insurance
- Loss or damage and any consequence therefrom to any Data. •
- Sanctions Exclusion

PROFESSIONAL INDEMNITY

Cover Provided :	Professional Indemnity a) In respect of damages which the Insured shall become legally liable to pay in consequence of neglect, error or omission by or on behalf of the Insured in the conduct or execution of their Professional Activities and Duties as defined. b) Prior To Handover/Rectification - against loss arising out of any defect in the works discovered prior to the issue of any practical completion or take-over certificate provided that any such defects are caused by a negligent breach of a Professional Activity or Duty by the Insured in consequence of neglect, error or omission by or on behalf of the Insured.
Insurer :	Stalker Hutchinson (Santam Limited)
Policy Number:	6000/132337
Jurisdiction :	Worldwide excluding North America
Insured Contracts:	All contracts (including any undertaking awarded or commenced prior to inception of the period of Insurance) involving design, construction, performance testing and commissioning in respect of the works and shall include capital expenditure, upgrade, modification, maintenance or overhaul, refurbishment, renovation, retrofitting or alterations and additions to existing facilities undertaken by the Insured or other Insured Parties acting on their behalf but **Excluding**: a) Contracts which at award stage have a value in excess of R 1,000,000,000. b) Contracts with an estimated construction period at award exceeding 48 months (excluding Defects Liability/Maintenance period). c) Contracts with a Contractual Defects Liability Maintenance Period exceeding 24 months. d) Contracts involving construction or erection of petrochemical manufacturing plant(s) but this exclusion shall not apply to pipelines and other associated works undertaken by or on behalf of the Insured. e) Contracts in or on any aircraft. f) Off-shore contracts - “Off-shore contracts” means all works and installations in the sea or on the seabed and do not constitute normal Wet Risk Contracts like harbours, moles, bridges, wharves or sewage or cooling water intake or outlet facilities, piers, marinas, causeways, breakwaters, jetties, dry docks and offshore pipelines when connected directly to onshore facilities and canal developments. "Off-Shore contracts" shall include oilrigs and oil platforms.
Limit Of Indemnity:	Professional Indemnity - *R100,000,000 in the aggregate during the policy period of insurance.

*Where the limit is noted as in the aggregate during the policy period of insurance, that such aggregated limit is applicable to all Transnet Insured Contracts collectively and in total and does not apply to each contract separately.

Policy Extension Limits Of Indemnity:	Claims Preparation Costs -	*R7,500,000 in the aggregate during the policy period of insurance.
	Loss of Documents -	*R2,000,000 in the aggregate during the policy period of insurance.
	Statutory Defence Costs -	*R5,000,000 in the aggregate during the policy period of insurance.
	Defamation -	*R5,000,000 in the aggregate during the policy period of insurance. R 10,000 R 5,000,000 R 5,000,000
	Infringement of Copyright -	*R5,000,000 in the aggregate during the policy period of insurance.

*Where the limits are noted as in the aggregate during the policy period of insurance, that such aggregated limit is applicable to all Transnet Insured Contracts collectively and in total and does not apply to each contract separately.

Deductibles: R5,000,000 each and every but R10,000 in respect of Claims Preparation Costs, Loss of Documents, Statutory Defence Costs, Defamation and Infringement Of Copyright.

Policy Special Conditions : Condition precedent to liability that the Insured is fully qualified and registered with the relevant Industry Body/Association in terms of legislation as applicable.

Prior to hand over/rectification – the insured must give prior written notice to the Insurers of the intention to take remedial action to rectify such defect and obtain the Insurers' written agreement to such action being taken and the costs and expenses expected to be expended.

Policy Main Exclusions:

- Excludes all consequential loss other than cost of re-design, rectification and replacement as a consequence of the defect.
- Excludes Supervision.
- Excludes liability arising out of environmental impairment / pollution
- Excludes the cost of removing, nullifying or cleaning-up the effects of environmental impairment/ pollution.
- Excludes war, invasion, acts of foreign enemies, hostilities or warlike operations (whether war be declared or not), civil war, rebellion, revolution, insurrection, civil commotion assuming the proportions of or amounting to an uprising, military or usurped power, any act of terrorism and nuclear risks.
- Excludes fines, penalties, punitive and exemplary damages, multiplication of compensatory damages and/or any other noncompensating damages of any kind.
- Excludes liability from the hazardous nature of asbestos.
- Excludes medical malpractice.

- Excludes failure to meet contractual requirements relating to efficiency, output or durability.
- Excludes failure to meet completion dates
- Excludes the estimation of probable costs other than cost advice and cost planning services normally provided by a Quantity Surveyor or Project manager.
- Excludes incorrect authorisation of payment.
- Excludes breach of any statutory regulation.
- Excludes liability from the insolvency, liquidation or judicial management of the Insured.
- Excludes the certification of value of work executed by any contractor where the Insured has an equity interest in such contractor;
- Excludes liability due to unlawful competition, unfair practices, abuse of monopoly power, cartel activities or breach of a competitions ac
- Sanctions Exclusion

This certificate of the insurance cover arranged is issued as a matter of information only and confers no rights upon the certificate holder. This certificate does not amend, extend or alter the coverage afforded by the policies issued by Insurers.

Dennis Govender

Chief Broking Officer

Mandatary Agreement

OCCUPATIONAL HEALTH AND SAFETY ACT 85 of 1993 (AS AMENDED)

AGREEMENT WITH MANDATORY
In terms of Section 37(1) & (2)

WRITTEN AGREEMENT ENTERED INTO AND BETWEEN

Transnet SOC Ltd
(Hereinafter referred to as the Employer)

AND

(Hereinafter referred to as Mandatory (Principal Contractor)

Compensation Fund Number :

Project Name :

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28. HEADING

PREAMBLE

WHEREAS section 37(1) & (2) of the Occupational Health and Safety Act No 85 of 1993 ("the Act") requires that parties have an agreement in writing to ensure compliance by a mandatory in line with the provisions of the Act.

AND WHEREAS Transnet SOC Ltd requires the services of the Contractors to execute certain projects within its workshops.

AND WHEREAS TRANSNET SOC LTD can be better served by Contractors who have the infrastructure, specialist employees and expertise to execute such projects at the highest level of efficiency on short notice.

NOW THEREFORE the parties agree as follows;

1. DEFINITIONS

For the purpose of this agreement, unless the context indicates otherwise, the following definitions are set out for the terms indicated:

1.1 "**Act**" means the Occupational Health and Safety Act No 85 of 1993;

1.2 "**Agreement**" means this Mandatary agreement;

1.3 **"Contractor "** means the Mandatory;

1.4 **"COID Act"** means the Compensation for Occupational Injuries and Diseases Act No 130 of 1993.

1.5 "**Effective Date**" means the date of signature of this Agreement by the last party signing hereto;

1.6 "**Employer**" refers to TRANSNET SOC LTD;

1.7 "**Mandatary**" means an agent, Contractor or sub-contractor for work, but without derogating from the status in his own right as an employer or user;

1.8 "**Parties**" means TRANSNET SOC LTD and the Contractor, and "**Party**" shall mean either one of them, as the context indicates;

1.9 **"Principal Contract"** means the appointed contractor whereby such contractor has to provide goods and or services to TRANSNET SOC LTD.

1.10 "**Regulations**" means regulations promulgated in terms of the relevant legislation.

1.11 "**Section**" means the relevant section of the Occupational Health and Safety Act No 85 of 1993

1.12 "**Services**" means the services to be provided by the Contractor to TRANSNET SOC LTD.

1.13 "**TRANSNET SOC LTD**" means Transnet Group and all its operating divisions and Specialist units with (Registration No. **1990/000900/06),** a public company incorporated in accordance with the company laws of the Republic of South Africa;

2. INTERPRETATION

2.1 Clause headings in this Agreement are included for ease of reference only and do not form part of this Agreement for the purposes of interpretation or for any other purpose. No provision shall be construed against or interpreted to the disadvantage of either Party hereto by reason of such Party having or being deemed to have structured or drafted such provision.

2.2 Any term, word or phrase used in this Agreement, other than those defined under the clause heading "Definitions" shall be given its plain English meaning, and those terms, words, acronyms, and phrases used in this Agreement will be interpreted in accordance with the generally accepted meanings accorded thereto.

2.3 A reference to the singular incorporates a reference to the plural and vice versa.

2.4 A reference to natural persons incorporates a reference to legal persons and vice versa.

2.5 A reference to a particular gender incorporates a reference to the other gender.

3. REPORTING

3.1 The Mandatary and/or his designated person appointed in terms of Section 16(2) of the Occupational Health and Safety Act 85 of 1993 ("the OHS Act") shall report to the Risk Manager and/or a Project Manager and/or a representative designated by the Employer prior to commencing the work at the premises of the Employer.

4. WARRANTY OF COMPLIANCE

4.1 In terms of this Agreement the Mandatary warrants that he agrees to any of the arrangements and procedures as prescribed by the Employer and as provided for in terms of Section 37(2) of the OHS Act for the purposes of compliance with the OHS Act.

4.2 The Mandatary further warrants that he and/or his employees undertake to maintain such compliance with the OHS Act. Without derogating from the generality of the above, nor from the provisions of the said Agreement, the Mandatary shall ensure that the clauses as hereunder described are at all times adhered to by himself and his employees.

4.3 The Mandatary hereby undertakes to ensure that the health and safety of any other person on the premises is not endangered by the conduct of his activities and that of his employees.

5. APPOINTMENTS AND TRAINING

5.1 The Mandatary shall appoint competent persons as per Section 16(2) of the OHS Act. Any such appointed person shall be trained on any occupational health and safety matter and the OHS Act provisions pertinent to the work is to be performed under his responsibility. Copies of any appointments made by the Mandatary shall immediately be provided to the Employer.

5.2 The Mandatary shall further ensure that all his employees are trained on the health and safety aspects relating to the work to be done on the premises of the Employer and that they understand the hazards associated with such work being carried out on the premises. Without derogating from the foregoing, the Mandatary shall, in particular, ensure that all his users or operators of any materials, machinery or equipment are properly trained in the use of such materials, machinery or equipment.

5.3 Notwithstanding the provisions of the above, the Mandatary shall ensure that he, his appointed responsible persons and his employees are at all times familiar with the provisions of the OHS Act, and that they comply with the provisions of the Act.

6. SUPERVISION, DISCIPLINE AND REPORTING

6.1 The Mandatary shall ensure that all work performed on the Employer's a premise is done under strict supervision and that no unsafe or unhealthy work practices are permitted. Discipline regarding health and safety matters shall be strictly enforced against any of his employees regarding non-compliance by such employee with any health and safety matters.

6.2 The Mandatary shall further ensure that his employees report to him all unsafe or unhealthy work situations immediately after they become aware of such conditions and that he in turn immediately reports these to the Employer and/or his representative.

7. ACCESS TO THE OHS ACT

7.1 The Mandatary shall ensure that he has an updated copy of the OHS Act on site at all times and that this is accessible to his appointed responsible persons and employees, save that the parties may make arrangements for the Mandatary and his appointed responsible persons and employees to have access to the Employer's updated copy/copies of the Act.

8. COOPERATION

8.1 The Mandatary and/or his responsible persons and employees shall provide full co-operation and information if and when the Employer or his representative inquires into any occupational health and safety issues concerning the Mandatary. It is hereby recorded that the Employer and his representative shall at all times be entitled to make such inquiry.

8.2 Without derogating from the generality of the above, the Mandatary and his responsible persons shall make available to the Employer and his representative, on request, all and/or any checklists and inspection registers required to be kept by him in respect of any of his materials, machinery or equipment.

9. WORK PROCEDURES

9.1 The Mandatary shall, after having established the dangers associated with the work performed, develop and implement mitigation measures to minimize or eliminate such dangers for the purpose of ensuring a healthy and safe working environment. The Mandatary shall then ensure that his responsible persons and employees are familiar with such mitigation measures.

9.2 The Mandatary shall implement any other safe work practices as prescribed by the Employer and shall ensure that his responsible persons and employees are made conversant with such other safe work practices as prescribed by the Employer and that his responsible persons and employees adhere to such safe work practices.

9.3 The Mandatary shall ensure that work for which any permit is required by the Employer is not performed by his employees prior to the Employer obtaining such permit from the Mandatary.

10. HEALTH AND SAFETY MEETINGS

10.1 If required in terms of the OHS Act, the Mandatary shall establish his own health and safety committee(s) and ensure that his employees, being the committee members, provide health and safety representatives to attend the Employer's health and safety committee meetings.

11. COMPENSATION REGISTRATION

11.1 The Mandatary shall ensure that he has a valid proof of registration with the Compensation Commissioner, as required in terms of **COID Act**, and that all payments owing to the Commissioner are discharged. The Mandatary shall further ensure that the cover remain in force while any such employee is present on the premises.

12. MEDICAL EXAMINATIONS

12.1 The Mandatary shall ensure that all his employees undergo routine medical examinations and that they are medically fit for the purposes of the work they are to perform.

13. INCIDENT REPORTING AND INVESTIGATION

13.1 All incidents referred to in Section 24 of the OHS Act shall be reported by the Mandatary to the Department of Labour and to the Employer. The Employer shall further be provided with copies of any written documentation relating to any incident.

13.2 The Employer retains an interest in the reporting of any incident as described above as well as in any formal investigation and/or inquiry conducted in terms of section 32 of the OHS-Act into such incident.

14. SUBCONTRACTORS

14.1 The Mandatary shall notify the Employer of any subcontractor he may wish to perform work on his behalf on the Employer's premises. It is hereby recorded that all the terms and provisions contained in this clause shall be equally binding upon the subcontractor prior to the subcontractor commencing with the work. Without derogating from the generality of this paragraph:

14.1.1 The Mandatary shall ensure that training as discussed under appointments and training, is provided prior to the subcontractor commencing work on the Employer's premises.

14.1.2 The Mandatary shall ensure that work performed by the subcontractor is done under his strict supervision, discipline and reporting.

14.1.3 The Mandatary shall inform the Employer of any health and safety hazards and/or issue that the subcontractor may have brought to his attention.

14.1.4 The Mandatary shall inform the Employer of any difficulty encountered regarding compliance by the subcontractor with any health and safety instruction, procedure and/or legal provision applicable to the work the subcontractor performs on the Employer's premises.

15. SECURITY AND ACCESS

15.1 The Mandatary and his employees shall enter and leave the premises only through the main gate(s) and/or checkpoint(s) designated by the Employer. The Mandatary shall ensure that employees observe the security rules of the Employer at all times and shall not permit any person who is not directly associated with the work from entering the premises.

15.2 The Mandatary and his employees shall not enter any area of the premises that is not directly associated with their work.

15.3 The Mandatary shall ensure that all materials, machinery or equipment brought by him onto the premises are recorded at the main gate(s) and/or checkpoint(s). Failure to do this may result in a refusal by the Employer to allow the materials, machinery or equipment to be removed from the Employer's premises.

16. FIRE PRECAUTIONS AND FACILITIES

16.1 The Mandatary shall ensure that an adequate supply of fire-protection and first-aid facilities are provided for the work to be performed on the Employer's premises, save that the Parties may mutually make arrangements for the provision of such facilities.

16.2 The Mandatary shall further ensure that all his employees are familiar with fire precautions at the premises, which includes fire-alarm signals and emergency exits, and that such precautions are adhered to.

17. ABLUTION FACILITIES

17.1 The Mandatary shall ensure that an adequate supply of ablution facilities are provided for his employees performing work on the Employer's premises, save that the parties may mutually make arrangements for the provision of such facilities.

18. HYGIENE AND CLEANLINESS

18.1 The Mandatary shall ensure that the work site and surround area is at all times maintained to the reasonably practicable level of hygiene and cleanliness. In this regard, no loose materials shall be left lying about unnecessarily and the work site shall be cleared of waste material regularly and on completion of the work.

19. NO NUISANCE

19.1 The Mandatary shall ensure that neither he nor his employees undertake any activity that may cause environmental impairment or constitute any form of nuisance to the Employer and/or his surroundings.

19.2 The Mandatary shall ensure that no hindrance, hazard, annoyance or inconvenience is inflicted on the Employer, another Mandatary or any tenants. Where such situations are unavoidable, the Mandatary shall give prior notice to the Employer.

20. INTOXICATION NOT ALLOWED

20.1 No intoxicating substance of any form shall be allowed on site. Any person suspected of being intoxicated shall not be allowed on the site. Any person required to take medication shall notify the relevant responsible person thereof, as well as the potential side effects of the medication.

21. PERSONAL PROTECTIVE EQUIPMENT

21.1 The Mandatary shall ensure that his responsible persons and employees are provided with adequate personal protective equipment (PPE) for the work they may perform and in accordance with the requirements of General Safety Regulation 2 (1) of the OHS Act. The Mandatary shall further ensure that his responsible persons and employees wear the PPE issued to them at all material times.

22. PLANT, MACHINERY AND EQUIPMENT

22.1 The Mandatary shall ensure that all the plant, machinery, equipment and/or vehicles he may wish to utilize on the Employer's premises is/are at all times of sound order and fit for the purpose for which it/they is/are attended to, and that it/they complies/comply with the requirements of Section 10 of the OHS Act.

22.2 In accordance with the provisions of Section 10(4) of the OHS Act, the Mandatary hereby assumes the liability for taking the necessary steps to ensure that any article or substance that it erects or installs at the premises, or manufactures, sells or supplies to or for the Employer, complies with all the prescribed requirements and will be safe and without risks in terms of health and safety when properly used.

23. NO USAGE OF THE EMPLOYER'S EQUIPMENT

23.1 The Mandatary hereby acknowledges that his employees are not permitted to use any materials, machinery or equipment of the Employer unless the prior written consent of the Employer has been obtained, in which case the Mandatary shall ensure that only those persons authorized to make use of such materials, machinery or equipment, have access thereto.

24. TRANSPORT

24.1 The Mandatary shall ensure that all road vehicles used on the premises are in a roadworthy condition and are licensed and insured. The Mandatary shall ensure that all drivers shall have relevant and valid driving licenses and the Mandatary shall ensure that no vehicle/s shall carry passengers unless it is specifically designed to do and that all drivers shall adhere to the speed limits and road signs on the premises at all times.

24.2 In the event that any hazardous substances are to be transported on the premises, the Mandatary shall ensure that the requirements of the Hazardous Substances Act 15 of 1973 are complied with fully all times.

25. CLARIFICATION

25.1 In the event that the Mandatary requires clarification of any of the terms or provisions of this Agreement, he should take the necessary steps to contact the Risk Manager of the Employer to obtain such clarification.

26. DURATION OF AGREEMENT

26.1 This Agreement shall remain in force for the duration of the work to be performed by the Mandatary and/or while any of the Mandatary's employees are present on the Employer's premises.

27. NON COMPLIANCE WITH THE AGREEMENT

27.1 If the Mandatory fails to comply with any provisions of this Agreement, the Employer shall be entitled to give the mandatory 7 (seven) days written notice to remedy such non-compliance and if the Mandatory fails to comply with such notice, then the Employer shall forthwith be entitled but not obliged, without prejudice to any other rights or remedies which the mandatory may have in law,

271.1 to suspend the main Agreement; or

27.1.2 To claim immediate performance and/or payment of such obligations.

27.2 Should mandatory continue to breach the contract on three occasions, then the Employer is authorised to suspend the main contract without complying with the condition stated in the clause above.

28. HEADINGS

The headings as contained in this Agreement are for reference purposes only and shall not be construed as having any interpretative value in them or as giving any indication as to the meaning of the contents of the paragraphs contained in this Agreement.

Thus done and signed

at _____on the _____ day of _____ 201__

_____
For and on behalf of the Employer

Witnesses:

1. _____

2. _____

at _____on the _____ day of _____ 201__

_____
for and on behalf of the Mandatary

Witnesses:

3. _____

4. _____

TRANSNET FREIGHT RAIL CONTRACTOR HEALTH AND SAFETY COMPLIANCE SPECIFICATION

CONTRACT NAME:	Maintenance of Railway Track with dual purpose ballast tamper.	
CONTRACT NUMBER:		
CONTRACT SCOPE:	Dual Purpose Ballast Tamper. The ballast tamper shall be capable of tamping open line and turnouts. Dual purpose ballast tamper capable of tamping at 21 – 28 sleepers per minute.	
CONTRACT LOCATION:	Country wide.	
CONTRACT DURATION:	12 months.	
CONTRACT MANAGER:		
TFR CONTRACT REPRESENTATIVE / TECHNICAL OFFICER:		
CHS AGENT:		
SHE SPECIFICATION APPROVAL		
	NAME:	**SIGNATURE:**
TFR CONTRACT MANAGER / CONTRACT REPRESENTATIVE		…… **DATE:**
RISK SPECIALIST /MANAGER	Elekanyani Phundulu	…… **DATE:**
CHS AGENT / SAFETY SPECIALIST / MANAGER	Mabalele Mathe	…… **DATE:**

Contractor Health and Safety Specification

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1. Purpose

This specification identifies and encompass the working behaviours and safe work practices that are expected of all Transnet SOC Ltd employees, Contractors, Consultant, Visitors and Suppliers, engaged on Transnet managed contracts as required by Occupational Health and Safety Act 85 of 1993, Construction Regulation of 2014, National Railway Safety Regulator Act 16 of 2000 (including applicable SANS standards) and Transnet Contractor Management Procedure.

All contractors and service providers must take careful note of these requirements and must ensure that adequate provision has been made to ensure compliance. This Specification has been compiled to cover a wide range of construction/ work activities. In order to determine which requirements are applicable, the contractor must conduct a health and safety risk assessment specific to the project and specific to the contractor's scope of work. All applicable requirements must be addressed in the Contractor's Health and Safety Management Plan.

This Specification will be reviewed and updated periodically as and when necessary to address and / or include:

- Changes in legislation;
- Client requirements;
- Leading practices; and
- Lessons learnt from incidents.

The specification provides the minimum site-specific specification requirements.

2. Scope

This Specification applies to all work sites, and to all persons working on or visiting the Transnet managed work sites. The requirements specified in this document are applicable to the contractor as well as any sub-contractors, EPCM Contractors, Consultant, Vendors and Visitors that may be appointed by Transnet as an Employer. It is the contractor's responsibility to ensure that all subcontractors comply fully with all legal requirements as well as the requirements of this health and safety specification.

3. Definitions

Acceptable Risk
A risk that has been reduced to a level that can be tolerated having regard for the applicable legal requirements and the Health and Safety Policy adopted for the project.

ALARP (As Low as Reasonably Practicable)
The concept of weighing a risk against the sacrifice needed to implement the measures necessary to avoid the risk. With respect to health and safety, it is assumed that the measures should be implemented unless it can be shown that the sacrifice is grossly disproportionate to the benefit.

Applicant (Permit to Work)
A person requesting permission to perform work for which a Permit to Work is required. Applicants must be authorised (in writing) to receive (or accept) Permits to Work and must be competent to do so by virtue of their training, experience and knowledge of the area or plant in which the work is to be performed.

Authorised Person (Permit to Work)
A person (typically a Project employee or an employee of the client) who has been authorised (in writing) by the Transnet Contract Manager to issue Permits to Work within the scope of his designation. A person may only be appointed to issue Permits to Work if he has undergone training and has been assessed and found competent in systems, plant and equipment operation within the scope of his designation.

Barricade
A temporary structure that is erected as a physical barrier to prevent persons from inadvertently coming into contact with an identified hazard.

Consequence
The outcome of an event expressed qualitatively or quantitatively.

Contractor
An employer (organisation) or a person who performs **ANY** work and has entered into a legal binding business agreement contract to supply a product or provide services to Transnet. This applies to the Suppliers, Vendors, and Consultants, Service providers or Contractors performing construction work (includes Principal Contractor) **NB:** A Contractor is an employer in his/her own right.

Contract Manager
Transnet employee appointed to liaise with the contractor to ensure that the specifications of the contract are met (with special emphasis on safety, technical specifications, inspection of quality and quantity of work). It includes a Technical Officer, Depot Engineering Manager, Engineering Technician, Engineer, Maintenance Supervisor's etc.

Competent Person
A person who has in respect of the work or task to be performed the required knowledge, training, experience, and qualification (as per Construction Regulation, 2014).

Confined Space
An enclosed, restricted, or limited space in which because of its construction, location or contents, or any work activity carried on therein, a hazardous substance may accumulate, or an oxygen deficient atmosphere may occur, and includes any chamber, tunnel, pipe, pit sewer, container, valve, pump, sump, or similar construction, equipment, machinery, or object in which a dangerous concentration of gas, vapour, dust or fumes may be present.

Construction Supervisor
A competent person responsible for supervising construction activities on a construction site

Clearance Certificate
A signed declaration by an Isolation Officer that a specified hazardous energy source associated with a particular system, plant or item of equipment has been isolated in accordance with an approved Isolation and Lockout Procedure.

Discipline Lock (many locks with a restricted number of identical keys)
Attached at a Lockout Station or at a Local Isolation Point in order to lock out a system, plant or equipment. A Discipline Lock (e.g. A Low Voltage Electricity Discipline Lock) is owned by an Isolation Officer who has been authorised in writing to isolate and lockout a particular hazard (e.g. Low voltage electricity).

Equipment Lock (many locks with one unique key)
Attached directly to pieces of equipment in order to lock them out. Equipment Locks may only be used by Isolation Officers who have been authorised in writing to perform isolation and lockout procedures. The key must have a solid key ring that fits over an Isolation Bar.

First-Aid Injury (FA)
A first-aid injury is any one-time treatment and any follow up visit for observation of minor scratches, cuts, burns, splinters and the like which do not normally require medical care. Such treatment is considered to be first aid even if administered or supervised by a medical practitioner. First aid includes any hands-on treatment given by a first aider. (E.g. Band-Aid, washing, cleansing, pain, relief).

Railroad Vehicle
Means a vehicle that can travel on rail and road

Hazard
A source of potential harm in terms of human injury or ill health, or a combination of these.

Hierarchy of Controls
A sequence of control measures, arranged in order of decreasing effectiveness, used to eliminate or minimise exposure to workplace health and safety hazards:

- Elimination – Completely removing a hazard or risk scenario from the workplace.
- Substitution – Replacing an activity, process or substance with a less hazardous alternative.
- Isolation (Engineering) Controls – Isolating a hazard from persons through the provision of mechanical aids, barriers, machine guarding, interlocks, extraction, ventilation or insulation.
- Administrative Controls – Establishing appropriate policies, procedures and work practices to reduce the exposure of persons to a hazard. This may include the provision of specific training and supervision.
- Personal Protective Equipment – Providing suitable and properly maintained PPE to cover and protect persons from a hazard (i.e. Prevent contact with the hazard).

Isolation and Lockout Procedure
A plant or equipment-specific procedure that describes the method, and sequence to be followed, for rendering equipment, plant and systems safe to work on.

Isolation Bar
A device used at a Lockout Station to which anyone is able to attach a Personal Lock making it impossible for an Isolation Officer to remove the key to the Equipment Locks, thus preventing the de-isolation of a system, plant or equipment while it is still being worked on. A Discipline Lock must always be the first lock attached to an Isolation Bar and last to be removed.

Isolation Officer
A person (typically a Project employee or an employee of the client) who has been authorised (in writing) by the Transnet Contract Manager to perform isolation and lockout procedures. A person may only be appointed as an Isolation Officer if he has undergone training and has been assessed and found competent in the isolation and lockout of systems, plant and equipment within the scope of his designation.

Incident

An event (or a continuous or repetitive series of events) that results or has the potential to result in a negative impact on people (employees, contractors, and visitors), the environment, operational integrity, assets, community, process, product, legal liability and / or reputation.

Likelihood
A description of probability or frequency, in relation to the chance that an event will occur.

Lost Time Injury (LTI)
Any occurrence that resulted in a permanent disability or time lost from work of one day/shift or more.
If an employee is injured and cannot return to work in the next shift (will ordinarily miss one whole shift), and the department brings the employee in to only receive treatment by the Supervisor/ Return to Work Coordinator in that shift, this is still considered an LTI.
Lost Time Injury Frequency Rate (LTIFR) - Number of LTI's multiplied by 1 million or 200,000 and divided by labour hours worked.

Light Vehicle
A vehicle that:
- Can be licensed and registered for use on a public road;
- Has four or more wheels, and seats a maximum of 12 adults (including the driver);
- Requires the driver to hold only a standard civil driving licence; and
- Does not exceed 4.5 tonnes gross vehicle mass (GVM), which is the maximum loaded mass of the motor vehicle as specified by:
  - The vehicle's manufacturer; or
  - An approved and accredited automotive engineer, if the vehicle has been modified to the extent that the manufacturer's specification is no longer appropriate.

Examples of light vehicles include passenger cars, four-wheel drive vehicles, sports utility vehicles (SUVs), pick-ups, minibuses, and light trucks.
Any vehicle falling outside of this definition must be considered mobile equipment.

Medical Treatment Injury (MTI)
A work injury requiring treatment by a Medical Practitioner, and which is beyond the scope of normal first aid including initial treatment given for more serious injuries. The procedure is to be of an invasive nature (e.g. Stitches, removal of foreign body).

Mobile Equipment
A vehicle (wheeled or tracked) that generally requires:
- The driver to hold a specific state or civil license.

Examples of mobile equipment include, but are not limited to, dump trucks, water trucks, graders, dozers, loaders, excavators, forklifts, tractors, back-actors, bobcats, mobile cranes, tele-handlers, drill rigs, buses and road-going trucks.

Near Hit
An incident that has occurred that did not result in any injuries, illnesses, environmental or property damage but had the potential to cause an injury, illness, environmental or property damage.

Occupational Health Practitioner
An occupational medicine practitioner or a person who holds a qualification in occupational health recognised as such by the South African Medical and Dental Council as referred to

in the Medical, Dental and Supplementary Health Service Professions Act, 1974 (Act No. 56 of 1974), or the South
African Nursing Council as referred to in the Nursing Act, 1978 (Act 50 of 1978)

Personal Lock
A single lock with one unique key controlled by the owner. Used for personal protection.

Regulation
In the context of this guideline, 'Regulation(s)' refers to the Construction Regulations, 2014 required by Section 43 of the Occupational Health and Safety Act 85 of 1993, published under Government Notice R 84 in Government Gazette 37305 of February 2014.

Risk
A combination of the likelihood of an occurrence of a hazardous event or exposure and the severity of injury or ill health that can be caused by the event or exposure.

Risk Assessment
A process of evaluating the risk arising from a hazard, taking into account the adequacy of any existing control measures, and deciding on whether or not the risk is acceptable.

Risk Management
The systematic application of management policies, processes and procedures to identifying hazards, analysing and evaluating the associated risks, determining whether the risks are acceptable, and controlling and monitoring the risks on an ongoing basis.

4. Abbreviations

DSTI - Daily Safety Task Instruction
CR – Construction Regulations
EPCM - Engineering Procurement and Construction Management
HIRA - Hazard Identification and Risk Assessment
HEALTH AND SAFETY - Integrated Management System
MS - Management System
OHS Act - Occupational Health and Safety Act
SOC - Safety Observation and Conversation
VFL - Visible Felt Leadership
OHS - Occupational Health and Safety
SACPCMP - The South African Council for Project and Construction Management Professions,

5. SHE Management Plan

The contractor must prepare, implement, and maintain a contract specific SHE Management Plan. The plan must be based on the requirements set out in this specification, risk assessment as well as all applicable legislation. It must cover all activities that will be carried out on the project site(s), from mobilisation and set-up through to rehabilitation and decommissioning.
The plan must demonstrate the contractor's commitment to HEALTH AND SAFETY and must, as a minimum, include the following:

- A copy of the contractor's **Health and Safety Policy**;

- Procedures concerning **Hazard Identification and Risk Assessment**, including both Baseline and Task-Based Risk Assessments;
- Arrangements concerning the identification of applicable **Legal and Other Requirements**, measures to ensure compliance with these requirements, and measures to ensure that this information is accessible to relevant personnel;
- Details concerning **Health and Safety Objectives** – a process must be in place for setting objectives (and developing associated action plans) to drive continual improvement;
- Details concerning **Resources, Accountabilities and Responsibilities** – this includes the assignment of specific health and safety responsibilities to individuals in accordance with legal or project requirements, including the appointment of a Project Manager, Health and Safety Officers, Supervisors, Health and Safety Representatives, and First Aiders;
- Details concerning **Competence, Training and Awareness** – a system must be in place to ensure that each employee is suitably trained and competent, and procedures must be in place for identifying training needs and providing the necessary training;
- **Communication, Participation and Consultation** arrangements concerning health and safety, including Safety Observations and Coaching, Toolbox Talks, Daily Safe Task Instructions, project health and safety meetings, and notice boards;
- **Documentation and Document Control** – project-specific documentation required for the effective management of health and safety on the project must be developed and maintained, and processes must be in place for the control of these documents;
- Processes and procedures for maintaining **Operational Control**, including rules and requirements (typically contained in Safe Work Procedures) for effectively managing health and safety risks, particularly critical risks associated with working at heights, confined spaces, mobile equipment and light vehicles, lifting operations, hazardous chemical substances, etc.;
- **Emergency Preparedness and Response** procedures;
- **Management of Change** – a process must be in place to ensure that health and safety risks are considered before changes are implemented;
- **Sub-contractor Alignment** procedures – a process must be in place for the assessment of sub-contractors and suppliers with regard to health and safety requirements and performance (before any contract or purchase order is awarded);
- **Measuring and Monitoring** plans, including a plan for the measuring and monitoring of employee exposure to hazardous substances or agents (e.g. Noise, dust, etc.) In order to determine the effectiveness of control measures;
- **Incident Reporting and Investigation** procedures describing the protocols to be followed with regard to incident reporting, recording, investigation and analysis;
- **Non-conformance and Action Management** procedures concerning the management of
  corrective actions;
- **Performance Assessment and Auditing** procedures concerning health and safety performance reporting, monthly internal audits to assess compliance with the project health and safety requirements, and daily site health and safety inspections; and
- Details concerning the **Management Review** process followed to assess the effectiveness of health and safety management efforts.

Prior to mobilisation, the SHE Management Plan must be forwarded to the Transnet Contract Manager for review. The plan will be audited for completeness and, if found to be

adequate, will be accepted (typically "with comments"). Work may not commence until the plan has been accepted.

Any proposed amendments or revisions to the contractor's SHE Management Plan must be submitted to the TFR Contract Manager for acceptance.
Should it be identified that the contractor has overlooked a high-risk activity, and as a result has omitted the activity and associated control measures from the SHE Management Plan, the plan will not be approved.

6. Policy

The contractor must develop, display, and communicate a Health and Safety Policy that clearly states the contractor's values and objectives for the effective management of health and safety as required by OHS Act of 1993, 7(3) and SANS 3000-1:2016.
The policy must be signed, dated, and must be reviewed annually. The policy must commit to:

- Compliance with all applicable legal requirements;
- The effective management of health and safety risks;
- The establishment of measurable objectives for improving performance, and the provision of the necessary resources to meet these objectives;
- The prevention of incidents; and
- Achieving continual improvement with regard to health and safety performance.

All employees of the contractor as well as the employees of any sub-contractors that may be appointed by the contractor must be made aware of the policy. This must be done through Health and Safety Induction Training and Toolbox Talks.
A copy of the policy must be displayed.

7. Hazard Identification and Risk Assessment.

Detailed hazard identification and risk assessment processes must be followed for all work to be performed as well as for all associated equipment and facilities as required by legislation.

7.1 Baseline Risk Assessments

The client must conduct a detailed Baseline Risk Assessment identifying foreseeable hazards and risk scenarios associated with the contractor's scope of work on the work site(s) as required by legislation and Transnet Contractor Management Procedure. The baseline risk assessment shall be used to develop this specification.

7.2 Task-Based Risk Assessments

The contractor must ensure that effective procedures and risk assessment processes are in place to control hazards and to mitigate risks to levels that are as low as is reasonably practicable.
The contractor must carry out detailed project-specific Task-Based Risk Assessments which must be facilitated by a competent person who has been appointed in writing. The contractor's site management representatives, supervisory personnel, technical experts (as required) and workforce personnel directly involved with the task being examined must

participate in the risk assessment process. An attendance register must be completed and retained.

A Task-Based Risk Assessment must at least:

- Be accompanied by a Work Method Statement (describing in sufficient detail how the specific job or task is to be performed in a logical and sequential manner);
- Provide a breakdown of the job or task into specific steps;
- Identify the hazards and potential risk scenarios associated with each step;
- Include consideration of possible exposure to noise, heat, dust, fumes, vapours, gases, chemicals, radiation, vibration, ergonomic stressors, or any other occupational health hazard or stressor;
- Describe the control measures that will be implemented to ensure that the risks are managed to levels that are as low as is reasonably practicable; and
- Assign an initial risk rating (without taking any control measures into consideration) and a residual risk rating (taking the identified control measures into consideration) to each risk scenario.

A Task-Based Risk Assessment must be reviewed and, if necessary, updated:

- On an annual basis (as a minimum);
- When changes are made to the associated Work Method Statement;
- Legislative changes; and
- Following an incident.

7.3 Pre-Task Hazard Assessments

A pre-task hazard assessment must be completed before commencement of a task or whenever a change is identified while carrying out an activity. Before carrying out the particular task that involves the identified change, a few minutes must be spent identifying the hazards and risks associated with that task as well as suitable control measures. Any deviation from what was discussed during the Daily Safe Task Instruction (prior to the activity commencing), or anything that was not discussed, constitutes a change.

8. Legal and Other Requirements

The Contractor must comply with the requirements of all applicable legislation as well as Transnet and contract-specific standards and procedures as amended from time to time.
The Contractor must compile and maintain a register of all legal and other requirements applicable to the work that will be carried out and / or services that will be provided. This register must be updated regularly to ensure that it remains relevant.

Applicable laws and standards must be appropriately communicated to all employees of the contractor (as well as the employees of any sub-contractors that may be appointed by the contractor) through training, Toolbox Talks, and Daily Safe Task Instructions.
The Contractor shall submit proof of registration and Letter of Good Standing with the compensation fund or with a licensed compensation insurer as contemplated in the Compensation for Occupational Diseases Act, 1993 (Act No. 130 of 1993) for his company and each of his subcontractors'.

No contractor may do any work for TFR without a valid letter of good standing. The Contractor must ensure that the Letter of Good Standing remains valid for the duration of

the contract period. The letter of good standing must reflect the name of the Contractor and/or Sub-contractor, registration number and, expiry date.

9. Objectives

In order to drive continual improvement, the contractor must set contract-specific and measurable objectives and develop improvement action plans to achieve these objectives. These objectives must be aligned with the objectives set for the contract as a whole. Eliminating hazards, minimising risks, preventing incidents, injuries, and illnesses, and ensuring legal compliance must be the primary considerations for setting objectives.

When setting objectives, consideration must be given to the following:

- Leading indicators such as inspection findings, audit findings, hazard reporting, and observations;
- Lagging indicators (i.e. Incidents including Near Hits);
- Leading practices and lessons learnt; and
- Injury frequency rates with due understanding that the goal is "no harm".

The improvement action plans must specify adequate resources required to achieve the objectives, the person's responsible, and realistic timeframes for completion.
The objectives and associated improvement action plans must be documented and communicated to all contractor employees. Furthermore, to ensure that the objectives remain relevant, they must be reviewed on a yearly basis and whenever significant change has taken place (i.e. Changes to activities, scope of work, operating conditions, etc.).
Performance reviews must be carried out at quarterly intervals to assess and document performance against these personal or team objectives.
If a reward or incentive scheme is introduced, it must be designed in such a manner that health and safety performance is not compromised in order to maximise financial reward.

10. Resources, Accountabilities and Responsibilities

The Contractor must adequately allocate resources, responsibility, and accountability to ensure the effective implementation, maintenance and continual improvement of the contractor's HEALTH AND SAFETY management system for the contract. The contractor must comply with the requirements of all applicable legislation concerning health and safety related appointments and delegations for the contract.

An organogram specific to the contract must be documented and maintained. All roles that carry HEALTH AND SAFETY accountability and / or responsibilities must be included, and all individuals that carry health and safety appointments must be clearly identified and appointed in writing.

Documented proof of each appointment must be retained.

The contractor's managers and supervisors at all levels must demonstrate their commitment and support by adopting a risk management approach to all health and safety issues. These individuals must consistently take immediate and firm action to address violations of health and safety rules and must actively participate in day-to-day activities with the objective of preventing harm.

The contractor's management representatives are responsible and accountable for health and safety performance. All costs associated with meeting these responsibilities shall be borne by the contractor.

Any cost associated with any work stoppage due to non-compliance with a health and safety requirement shall be for the contractor's account.

10.1 Contractor Construction Manager

The Contractor must appoint a competent Construction Manager who shall be responsible for the successful and safe completion of all work to be carried out by the contractor, including the duty of ensuring occupational health and safety compliance.
The appointed Construction Manager may not manage any work on or in any site other than the site in respect of which he or she has been appointed.
The contractor must upon having considered the size of the project, in writing appoint one or more Assistant Construction Managers for different sections thereof: Provided that the designation of any such person does not relieve the Construction Manager of any personal accountability for failing in his or her management duties in terms of this regulation.

10.2 Contractor Health and Safety Officers

The contractor must appoint a full-time Construction Health and Safety Officer for the duration of the contract who is registered with the SACPCMP (The South African Council for Project Construction Management Professions).
The Construction Health and Safety Officer shall have sound knowledge of the Occupational Health and Safety Act and its regulations, SANS 3000-1:2016, National Environmental Management Act, and associate environmental requirements such as Waste and Water Acts and Hazard Identification and Risk Management processes.
The contractor must ensure that each Construction Health and Safety Officer is adequately equipped to enable him to perform his duties effectively.

10.3 Contractor Supervisors

The contractor must ensure that all works are supervised at all times by an adequate number of qualified, competent and appointed supervisors who have experience in the type of work being carried out.
No work may be carried out without an appointed supervisor being physically present in the work area and daily safety task instruction. The Construction Supervisor appointed may not supervise any work on or in any site other than the site in respect of which he or she has been appointed: Provided that if a sufficient number of competent employees have been appropriately designated under on all the relevant sites, the appointed construction supervisor may supervise more than one site.
Each supervisor must accept these responsibilities in writing as part of his appointment and must be provided with all the necessary equipment to enable him/her to perform his responsibilities.
The contractor must, upon having considered the size of the work to be performed, in writing appoint one or more competent employees for different sections thereof to assist the construction supervisor, and every such employee has, to the extent clearly defined by the contractor in the letter of appointment, the same duties as the construction supervisor: Provided that the designation of any such employee does not relieve the construction

supervisor of any personal accountability for failing in his or her supervisory duties in terms of this regulation

10.4 Health and Safety Representatives

The team of employees on site must have a health and safety representative deployed on the work site(s), a Health and Safety Representative must be elected and appointed. Taking into consideration the number of employees deployed, the geographical area in which the work is taking place, the different work disciplines, and the shift pattern (if applicable), the contractor must ensure that an adequate number of Health and Safety Representatives (at a minimum ratio of one Health and Safety Representative per 50 employees) are elected and appointed to effectively represent all site personnel as required by the OHS Act 85 of 1993, section 17 - 18.
Each Health and Safety Representative must attend a training course for health and safety representatives. The cost of this training shall be for the contractor's account.
The contractor must make the necessary allowances for the Health and Safety Representatives to carry out their duties as specified in the applicable legislation.
The contractor must ensure that an appropriate method of identification of each Health and Safety Representative by employees on site.

10.5 First Aiders

The Contractor shall ensure that their employees receive prompt first aid treatment in case of injury or emergency. The Contractor must have the necessary equipment and/or facility on site for treatment of injured persons.
If 10 or more employees are deployed on the work site(s), at least one trained and competent First Aider must be in place and appointed. Taking into consideration the number of employees deployed, the geographical area in which the work is taking place, the different work disciplines, and the shift pattern (if applicable), the contractor must ensure that an adequate number of First Aiders (at a minimum ratio of one First Aider per 50 employees) are in place and have been appointed to administer first aid treatment should this be required.
First Aid training must be done through an accredited training institution. The cost of this training shall be for the contractor's account.
The contractor must ensure that an appropriate method of identification of each First Aider by employees.

10.6 Duties of Client

Transnet shall perform the duties of a client as per the Construction Regulations of 2014, National Safety Regulator Act 16, SANS 3000-1:2016 and Transnet Contractor Management Procedure.

Transnet shall appoint a Construction Health and Safety Agent who is registered with the SACPCMP who shall ensure that the duties of Transnet as the client as per Construction Regulation 5 are performed and complied with. The Construction Health and Safety Agent must be involved in all stages of contract management and take charge of all the health and safety related matters on behalf of Transnet.

10.7 Operational legal appointment letters

The contractor must ensure other legal appointment letter are compiled and be submitted with the Contractor compliance plan. Below is some appointment required as per the legislation, the appointment letters varies based on the scope of work;

- OHSA Sec 16(2)
- Sec 17,18,19 SHE Representative
- GSR 3(4) First Aider
- GAR 9(2) Incident investigator
- GMR 2(1) Supervisor of machinery
- GMR 2(7) Assistant Supervisor of machinery
- CR 4(1)(c) Principal Contractor
- CR 8(1) Construction Manager
- CR 8(2) Assistant Construction Manager
- CR 8(7) Construction Supervisor
- CR 8(8) Assistant Supervisor of construction work
- CR 8(5) Construction Health and Safety Officer
- CR 9(1) Construction Risk Assessor
- CR 10(1)(a),(b) Fall protection plan
- Developer
- CR 10(2)(d) Inspector of fall arrest system
- CR 14(2) Scaffolding Supervisor
- DMR 17(2),18 Inspector of lifting machinery
- CR17(8) Material hoist Inspector
- CR 19(2)(g)(i) Explosive powered tool issuer
- CR 23(1)(k) Construction vehicle and mobile plant Inspector
- CR 24(d) Temporary Electrical Installation Controller
- CR 24(e) Temporary Electrical Installation Inspector
- CR 28(a) Stacking and storage Supervisor
- CR 29(h) Fire extinguisher inspector
- EMR 8(8) Appointment for electrical installation in hazardous location- Master Electrician (Inspector)
- EIR 9 Installation Electrician appointment

11. Cost of health and safety

The Contractor shall ensure that it has made adequate provision for the cost of health and safety measures in the tender offer. The Contractor shall ensure that its subcontractors have made adequate provision for the cost of health and safety measures in the tender offer.

12. Competence, Training and Awareness

Each employee (including sub-contractor employees) must be suitably trained and competent, and must understand the health and safety hazards, risks and control measures associated with his work.
The contractor must implement systems and procedures to ensure that the necessary competencies required by employees are identified (by occupation), along with selection, placement and any training requirements;

Please Note: Specific competency profiles and selection criteria (fitness for work) must be developed for all roles where significant health or safety risk exists.
Please Note: A formal training needs analysis must be carried out based on the competency profiles and a training matrix must be developed for the scope of work.
Roles requiring technical certification, registration or licensing are identified and documented, and these roles are filled only by suitably qualified personnel;

All employees hold and maintain the required competencies and are under competent supervision. Refresher training is carried out as required. Records of education, qualifications, training, experience and competency assessments are maintained on site for all employees. The effectiveness of training is reviewed and evaluated;

Prior to the commencement of any work, including mobilisation and site set-up activities, the contractor must provide, to the satisfaction of the nominated contract management representative, current documentation verifying that the contractor's employees, as well as the employees of any appointed sub-contractors, are competent and have the necessary qualifications, certificates, licences, job skills, training and experience (as required by this specification and applicable legislation) to safely carry out the work that is to be performed.
The Contractor and sub-contractor must ensure that all identified training as per training matrix takes place.
A contractor must at all times keep on his or her work site, records of the health and safety induction training and such records must be made available on request to an inspector, the client, the client's agent or the principal contractor;
An Employee Profile (dossier) must be completed for each employee who will be performing work on site. All documentation pertaining to an employee's competence (i.e. certified copies of qualifications, certificates and licences as well as proof of job skills, training and experience) must be maintained in this dossier.
If it is determined through observation that an employee is not yet competent to carry out a particular task in a safe and capable manner, the employee will be required to cease work immediately and must either be reassigned or be retrained at the contractor's expense.
The contractor must ensure that the training institutions and trainers that are used are appropriately registered with a governing authority. Foreign qualifications held by employees in health and safety critical roles must be verified against the requirements of local legislation.

12.1 Induction Training

Each employee must attend all mandatory induction Training applicable to the work activities and Health and safety induction training pertaining to the hazards prevalent on the site at the time of entry. No employee will be permitted to enter any work site until he has attended this training. The contractor must keep the proof of induction on the contractor compliance file.
Furthermore, employees must attend (where applicable) Area/job-Specific Training pertaining to the particular hazards identified in the area(s) where the employees will be working. No employee will be permitted to enter a work area until he has attended the relevant area/job-specific training.

12.2 Specific Training and Competency Requirements

An employee must be trained, assessed and found competent before he will be given authorisation to perform certain tasks or fill certain roles.

The contractor shall make arrangements with the Transnet Contract Manager for training that are only offered or unique to Transnet. Such training shall be for the cost of the contractor.

13. Communication, Participation and Consultation

The contractor must establish and maintain effective communication and consultative processes for the duration of the contract to ensure that employees are kept up to date with regard to critical, health and safety related information and prompt feedback is provided.

13.1 Toolbox Talks

The contractor must prepare a Toolbox Talk on a weekly basis and must share it with all personnel for which the contractor is responsible (including all sub-contractors). Toolbox Talks must address health and safety issues that are relevant to the work performed on the work site(s) and must include information and / or knowledge sharing, lessons learnt from incidents that have occurred, information concerning specific hazards and / or risks and control measures to prevent injury, etc.
Attendance records must be kept and maintained in the contractor's compliance file.

13.2 Daily Safe Task Instructions (DSTI's)

At the start of each day or shift, prior to the start of any work, each appointed supervisor must inspect the work area for which he is responsible and ensure that it is safe. He must then conduct a Daily Safe Task Instruction (DSTI) with his work team specifically concerning the tasks that they will be performing during the course of the day or shift. The relevant Task-Based Risk Assessment for the activity must be used as the basis for the discussion. The correct work method must be reiterated, and the identified hazards, risks and control measures must be discussed with the team.
If the work method changes after activities have already begun, the DSTI must be revisited and updated with the team, and the changes must be signed off by the relevant contractor Construction Manager.
Every member of the work team must sign the DSTI attendance register, and records must be kept and maintained in the contractor's health and safety file.
The contractor's Health and Safety Officer must evaluate the content of the DSTI's to ensure that they are task specific.

13.3 Suggestions

All employees must be encouraged to submit suggestions to enhance health and safety management on the work site(s). A process must be in place for documenting, evaluating, implementing (as appropriate), archiving and recognising the improvement ideas.

13.4 Meetings

13.4.1 Contractor health and safety (OHS Act Section 19)

The contractor must schedule and hold health and safety meetings at least quarterly and keep minutes of each meeting and attendance records in the contractor compliance file.

The meeting must address the following as a minimum:

- New incidents for the period and corrective actions taken or to be taken;

- Implementation status of outstanding actions associated with previous incidents;
- SOC's, PTO's and DSTI's carried out for the period and action required to correct trends identified;
- Results of any audits, inspections (including H&S Rep inspections) or site visits carried out;
- A look ahead to ensure that appropriate health and safety planning and preparation is done for upcoming work;
- Risk Assessments, Safe Work Procedures, etc. That are outstanding or due for review (as well as the quality of these documents); and
- Any other health and safety related matter.

13.4.2 Site Meetings

In addition to the contractor health and safety meetings, the Transnet Contract Manager will schedule and chair monthly Site Meetings that the contractor must attend.

The meeting will address the following as a minimum:
- Feedback from the contractor concerning health and safety performance for the period;
- New incidents for the period and corrective actions taken or to be taken;
- Implementation status of outstanding actions associated with previous incidents;
- SOC's, PTO's and DSTI's carried out for the period and action required to correct trends identified;
- Results of any audits, inspections or site visits carried out;
- A look ahead to ensure that appropriate health and safety planning and preparation is done for upcoming work;
- Risk Assessments, Safe Work Procedures, etc. That are outstanding or due for review (as well as the quality of these documents); and
- Any other health and safety related matter.

13.5 Health and Safety Notice Boards

The contractor must where practicable, provide and maintain a Performance Board that must display the health and safety performance indicators, and a site plan indicating evacuation routes and emergency assembly point locations.

13.6 Involvement (Other)

The participation of all contractor (and sub-contractor) employees in activities that promote improvements in health and safety performance must be encouraged. In particular, this must include their appropriate involvement in:
- Hazard identification, risk analysis and determining control measures;
- Incident investigation; and • Reviewing policy and objectives.

14. Documentation and Document Control

The contractor must establish a process for the systematic control of health and safety records and related data. Controls must be in place for the creation, receipt, secure storage, maintenance, accessing, use and disposal of such records and data.
The document control process must:
- Provide for the review, revision and version control of documents;
- Uniquely identify documents (as appropriate) to control their use and function;
- Require approval of the documents for adequacy prior to issue;

- Clearly identify changes and record the status of any revisions to documents; and
- Provide for the effective distribution of documents to, and where necessary the timely removal of obsolete documents from, all points of issue and use.

Each record must be legible, identifiable and traceable, and must contain adequate information and data for its purpose. The retention, confidentiality and security of records and data must be maintained in a manner that is appropriate for the nature of the records and data, and in accordance with any applicable data or privacy protection legislation.

Personal information originating from medical surveillance and occupational hygiene monitoring must be reported in a form that respects the privacy of the individual but enables management to fulfil their duty of care obligations to employees.

14.1 Contractor compliance File Requirements (Health and Safety File)

The contractor must compile and maintain a file containing all necessary compliance related documentation. Transnet should provide construction work permit and to be kept on site at all times. The contents of the file will be audited by a Transnet Contract Manager or any person delegated by him on a monthly basis.

Required documentation includes, but is not limited to, the following:

- Letter of Good Standing from the Compensation Commissioner or Licensed Insurer;
- Proof of Public Liability Insurance;
- Scope of Work under the contract;
- List of Contacts and their Telephone Numbers;
- Health and Safety Policy;
- SHE Management Plan;
- Client Health and Safety Specification
- Section 37(2) Mandatory Agreement
- Legal Register;
- Organisational Chart for the contract;
- Appointment Letters (appointment of the contracting company, and appointments for all persons with health and safety related responsibilities);
- Notifications to the relevant authorities that construction work is in progress;
- Task-Based Risk Assessments;
- Health and Safety Objectives, and associated Improvement Action Plans;
- Safe Work Procedures, Work Instructions and Work Method Statements;
- Planned Task Observations;
- Fall Protection Plan (for work at height);
- A dossier (Equipment Profile) for each fuel-driven vehicle or machine;
- Inspection Registers, Forms and Checklists;
- PPE Issue Registers;
- Material Safety Data Sheets;
- Emergency Response Procedures;
- Incident Records;
- A dossier (Employee Profile) for each employee containing: a copy of the employee's Identity Document or Passport, Valid Medical Certificate of Fitness, Training Records, Certificates of Competency; and Copies of Licences;
- Meeting Minutes;
- HEALTH AND SAFETY Performance Reports;
- Copies of Inspection and Audit Reports; and
- Daily Safe Task Instructions (DSTI's) and Toolbox Talks.

The contractor must ensure that an equivalent file is compiled and maintained by each appointed sub-contractor. A copy of the compliance file must be provided to the Transnet at the end of the contract.

15. Notification of Construction Work

A contractor who intends to carry out any construction work other than work contemplated in Construction Regulation 3(1), must at least 7 days before that work is to be carried out notify the provincial director in writing in a form similar to Annexure 2 if the intended construction work will—

- include excavation work;
- include working at a height where there is risk of falling;
- include the demolition of a structure; or
- include the use of explosives to perform construction work.

A contractor who intends to carry out construction work that involves construction of a single storey dwelling for a client who is going to reside in such dwelling upon completion, must at least 7 days before that work is to be carried out notify the provincial director in writing in a form similar to Annexure 2 of the CR regulations.

16. Operational Control

For contract operations and activities, the contractor shall implement and maintain:

- Operational controls, as applicable to the organization and its activities;
- The organization shall integrate those operational controls into its overall OH&S Management System;
- Controls related to purchased goods, equipment and services;
- Controls related to contractors and other visitors to the workplace;
- Documented procedures, to cover situations where their absence could lead to deviations from the OH&S policy and the objectives;
- Stipulated operating criteria where their absence could lead to deviations from the OH&S policy and objectives.

16.1 Safe Work Procedures

The contractor must develop, document and implement Safe Work Procedures for all activities involving significant health or safety risk. These procedures must detail the control measures required to effectively manage the health and safety risks associated with the work activities.
Each Safe Work Procedure must be consistent with the Task-Based Risk Assessment completed for the activity.
Every person engaged in an activity for which a Safe Work Procedure has been developed must receive suitable training on the procedure.
Furthermore, the contractor must develop, document, communicate and implement formal procedures, work instructions and / or programmes for the operation, maintenance, inspection and testing of all plant and equipment (including protective systems and devices) brought onto the project site(s).

16.2 National Railway Safety Regulator Act / Railway Safety

The Contractor shall ensure that its equipment, machinery and employees when on TFR premises complies fully with all applicable railway safety requirements and/or regulations of the National Safety Regulator Act 16 of 2002 and the relevant SANS Codes of Practice.

The Contractor when engaging subcontractor must review the capability of the proposed contractor to comply with specified railway safety requirements and/or regulations.

The Contractor and/or his subcontractors must grant TFR access, during the term of the contract, to review any railway safety related activities, including the coordination of such activities across all parts of the organisation.

The Contractor shall ensure that where applicable, such work is performed by person who has the necessary competencies as required in terms of any applicable railway safety standard or code of practice

The Contractor shall ensure that all his employees are protected from the risk of being hit by moving trains.
The Contractor shall ensure that on track machines are only operated with the Transnet Track inspector/Track master in charge of on-track machine present on the machine. Transnet Track inspector/Track master in charge of on-track machine must have passed the appropriate road knowledge, theoretical and practical examinations and must be licenced competent.

16.3 Planned Task Observations

All contractor, management supervisors must perform Planned Task Observations (PTO's) to verify that the control measures that have been identified in Safe Work Procedures (and associated Risk Assessments) are being adhered to and are being properly implemented, and to provide guidance where deviations are noted.
Each supervisor must complete at least one PTO per day involving one or more employees in his work team.
When an unsafe act or condition is identified, the supervisor must coach the work team to correct the act or condition in line with the Safe Work Procedure.
Where valid changes to the work method are identified, the supervisor must ensure that the Safe Work Procedure and Risk Assessment are updated to reflect the current practice.
Transnet Contract Manager may carry out PTOs on contractor employees on an ad hoc basis. Should deviations from the contractor's Safe Work Procedures be observed, the work may be stopped until these deviations are rectified.

16.4 General Rules of Conduct

All persons are required to conform to the following rules of conduct while on the site.
The following acts are prohibited:

- Engaging in practical jokes, horseplay, scuffling, wrestling, fighting, or gambling;
- Assault, intimidation, or abuse of any person;
- Insubordination towards any supervisor or manager;
- Refusing to carry out a reasonable and lawful instruction concerning health and safety;
- Entry into any restricted area (including barricaded areas), unless authorised to do so by the responsible person;
- Unauthorised use / operation of any equipment or machinery;
- Negligently, carelessly or wilfully causing damage to any property;
- Destroying or tampering with safety devices, signs, or signals;

- The use of water from fire hydrants or hose reels for any purpose other than extinguishing a fire;
- The wilful and unnecessary discharging of fire extinguishers;
- Refusing to give evidence or deliberately making false statements during incident investigations;
- Bringing alcohol, drugs, or any other intoxicating substance onto site;
- Bringing a firearm, ammunition, or any other offensive weapon onto site;
- Bringing animals onto site;
- Running, except in an emergency;
- The use of an iPod (or similar) whilst working on site;
- Sleeping on the job;
- Building fires on site, unless in a suitably constructed barbequing facility; and
- Pouring / pumping / flushing any substance (chemical / hydrocarbon / wastewater) into a storm water drain, onto bare soil, or into any area where the substance is not effectively contained.
- Walking, sitting or sleeping on the rail
- Touching of any loose lying electric wires
- Coming into close proximity to live OHTE (maintain clearance of 3 metres)

Any of the above actions may result in the temporary or permanent removal of the offending person(s) from site, as well as possible prosecution. The decision of the Transnet Contract Manager shall be final and binding in respect of any dispute that may arise from the interpretation of these requirements.

16.5 Site Access

The Contract Manager shall issue a site access certificate to the contractor after he has evaluated and is satisfied with the contractor compliance file.

16.5.1 Access Control and Security

The contractor must comply with all access control, procedures and systems applicable to the work site. Failure to comply with these requirements will be viewed as a serious safety breach and may result in the permanent removal of the individual(s) / contracting company from site or suspension without payment.
No access card will be issued unless valid proof of identification is provided. For foreign labour, an access card will only be issued if a valid work visa is produced.
The contractor must assess the security risks and implement appropriate measures. Where such measures include hiring of contract security services, the Contractor must inform the Transnet Contract Manager and obtain written authorisation. All contractors are to strictly adhere to all security requirements on the premises.

16.5.2 Trespassing

The contractor must ensure that no employee (including sub-contractor employees) trespasses on any land lying beyond the boundaries of the work site. The contractor's activities must be confined to the specified work areas, and access to these areas may only be by means of specified routes.
If instructed by a Transnet Contract Manager to do so, the contractor must remove any employee who fails to comply with this requirement from the work site.

16.5.3 Visitors

Visitors (including reps and suppliers) must be advised in advance of the mandatory Personal Protective Equipment (PPE) requirements for the site and must arrive with all of this PPE.

All visitors must sign in the visitor's register and undergo a visitor induction briefing before entering the site. A visitor access card will be issued to each visitor on conclusion of the induction briefing.

Whilst on site, visitors must be accompanied at all times by an appropriately senior employee who has been inducted fully.

When leaving the site, each visitor must return his or her visitor access card to the security personnel posted at the entrance / exit. A visitor will not be permitted to leave the site until he or she produces the access card that was issued.

Note: Any request (typically made by a government official) to carry out a site inspection must be referred to the Transnet Contract Manager. The contractor must not arrange any such inspection without prior approval from the Transnet Contract Manager.

16.5.4 Alcohol, Drugs and Other Intoxicating Substances

The contractor must ensure that all personnel under his authority do not at any time enter the site or perform any work whilst under the influence of alcohol, a drug, or any other intoxicating substance. Selling or possessing drugs, alcoholic beverages or any other intoxicating substance on the site is strictly prohibited.

A drugs and alcohol testing program will be implemented. Persons entering the site will be randomly tested. Any person who tests positive for alcohol or drug consumption will be subject to disciplinary action and shall be permanently removed from the site.

Any person have the opportunity to rather report that he/she is under the influence before accessing the work site – in these cases the employee may only be send home for the day but will then be tested for the following five days (each day) on his return to the site. If it is found that the same person is frequently reporting that he/she is under the influence before even accessing the work site. It shall be the responsibility of the Transnet Contract Manager to take disciplinary action and remove such a person's form the site.

Should the actions and / or demeanour of an employee suggest possible narcosis or drunkenness, the employee must be removed from the site. This may be done without testing.
Note: All personnel involved in an incident / accident must immediately be subjected to an alcohol test and a drug test as part of the investigation.

16.5.5 Firearms, Ammunition and Offensive Weapons

Firearms, ammunition, and offensive weapons of any kind are strictly prohibited. No person may enter /shall not be permitted to enter the site carrying any such item.

16.5.6 Vehicles

All vehicles brought onto site must meet the safety requirements. All road-going vehicles used by the contractor on the site must be roadworthy and registered with the relevant traffic authority. A vehicle will not be permitted to enter the site in an un-roadworthy condition.

No vehicle shall be permitted to enter the site unless it is duly authorised. Access permits are vehicle-specific and may not be transferred between vehicles.

The contractor must allow any vehicle that is brought onto site (including privately owned vehicles) to be searched at any time while on the premises, or when entering or leaving the premises. The contractor is solely responsible for the safety and security of all vehicles (including private vehicles) that he brings onto the site.

The driver / operator of any vehicle / mobile equipment must carry a copy of his appointment with him at all times. Each driver / operator must:

- Comply with all site rules and regulations pertaining to traffic and the safe operation of vehicles / mobile equipment;
- Obey all road signs;
- Obey all instructions given by security or emergency services personnel;
- Remain within the boundaries of the site; and
- Ensure that the vehicle that he is operating is never overloaded, and that loads are always properly secured.

In the interest of safety, only the minimum number of vehicles required by the contractor to complete the work under the contract will be permitted to enter the site.

When not in operation, the contractor's vehicles / mobile equipment must be parked within the boundaries of his lay-down area or yard. Parking is only permitted in designated parking areas. All cars are parked on site at the owner's risk.

In the event of a vehicle accident on site, the driver(s) must report the incident immediately and must remain at the scene until a Transnet Contract Manager arrives, or until a Transnet Contract Manager authorises him to leave (unless, of course, the driver requires medical attention).

16.6 Mobile Equipment and Light Vehicles

Contractor must ensure all light vehicles and mobile equipment to be used (including, but not limited to, lift and carry cranes (or mobi-lifts), mobile cranes, forklifts, mobile elevating work platforms (e.g. Cherry pickers), tractors, dozers, dump trucks, haul trucks, graders, excavators, loaders, back-actors, drill rigs, and road-going cars, light delivery vehicles, and trucks) comply with the requirements of all applicable legislation. The contractor remains responsible for meeting this requirement even if the equipment to be used is leased or provided by a sub-contractor (i.e. not owned directly by the contractor).

An Equipment Profile (dossier) must be compiled for each light vehicle and each item of mobile equipment to be used on the site.

All mobile equipment and light vehicles (used for work purposes) must be subject to a risk assessment. The assessment must involve operators and maintenance personnel and address all aspects of safe operation including handling, vehicle selection, vehicle journey, driver vision, brake failure, tyre blow out, and access and egress for operators and maintenance personnel.

Each light vehicle and each item of mobile equipment must be serviced and maintained as prescribed by the manufacturer of the vehicle or equipment.

No major repairs or services may be carried out on site. No repairs may be carried out by a driver or operator. Only suitably qualified and competent persons may carry out repair work.

An appropriate pre-operation safety check based on a risk assessment must be carried out for each light vehicle or item of mobile equipment driven or operated for work purposes. For each vehicle or equipment type, an approved checklist must be in place (and must be used). The pre-operation check must include, but not be limited to, inspection and / or testing of the following safety critical features:

- Brakes (testing method must be provided);
- Wheels and tyres (including the spare);
- Lights and indicators;
- Steering;
- Seats and seat belts; and
- Windscreen and windows, including windscreen wipers and washers.

Should any critical feature be defective or damaged, the vehicle or equipment may not be operated until it has been fully repaired.

Supervisors must review the completed checklists on a daily basis to satisfy themselves that there are no major deficiencies that could place a driver or operator at risk and that faults are attended to immediately. Records of inspections must be kept in vehicle or mobile equipment.

No person may drive or operate any light vehicle or item of mobile equipment without authorisation. All drivers and operators must be appointed in writing by the contractor's Construction Manager. No driver or operator may be appointed without proof that the individual has been trained, tested and found competent, or is currently licensed. Contractor must implement a system for renewal of licences.

The appointment letter must specify the type of vehicle or equipment for which authorisation is being given and must clearly confirm that the driver or operator:

- Is 18 (eighteen) years of age or older;
- Has undergone a medical examination and has been declared fit for work by an occupational health practitioner; and
- Has received suitable training and has been found competent or is in possession of a valid driving licence issued by a state, provincial or civil authority that is applicable to the class of vehicle or equipment that is to be driven or operated.

The principal accountability for preventing accidents and incidents lies with the driver or operator of a light vehicle or item of mobile equipment, as he is in full control of any given situation at any given time. It must be stressed to each driver and each operator that safety is his prime responsibility – this must be clearly instructed and understood.

Drivers and operators must be empowered to stop driving or operating immediately should an unsafe condition arise and refuse to drive or operate any light vehicle or item of mobile equipment that is defective and / or has any inoperative safety features. Similarly, a supervisor must never force a driver or operator to drive or operate a defective vehicle or item of equipment.

If a driver or operator does not adhere to the site rules and regulations, his appointment must be withdrawn, and he must not be permitted to continue with his duties. If necessary,

site access will be denied (either temporarily or permanently) to any driver or operator who is deemed to not be adhering to site requirements.

No person may drive or operate a light vehicle or item of mobile equipment if he suffers from a medical condition that places both him and those around him at risk of injury. A fit-for-work policy must be in place, incorporating clearly defined maximum levels of drugs (including prescribed medication) and alcohol permitted in the system of a driver or operator. Daily alcohol testing and random drug testing must be carried out.

Supervisors must regularly check on the physical condition of drivers and operators during the course of a shift. A system must be in place to manage driver fatigue.

No eating or drinking is permitted while driving or operating a light vehicle or item of mobile equipment.

A mobile phone, whether hands-free or not, may only be used by the driver or operator of a light vehicle or item of mobile equipment when the vehicle or equipment is stationary and in a safe location.

Behaviour-based observations and coaching must include the operation of light vehicles and mobile equipment.

A site-specific traffic management plan must be compiled and submitted to the Transnet Contract Manager for approval. The design and layout of the road system (including entrance and exit points, intersections and other potential points of interaction between pedestrians, light vehicles and mobile equipment) must be reviewed periodically. A risk assessment must be carried out prior to any changes being made to traffic movements or road systems.

Designated walkways (both indoors and outdoors) must be provided for pedestrians, and pedestrians must make use of these walkways. Good lighting must be provided along all walkways, particularly at road junctions. Wherever possible, rigid barricading must be used to separate pedestrians from moving light vehicles and / or mobile equipment.

No pedestrians are permitted on haul roads (or as far as this can reasonably be achieved in situations where a haul road runs through an area occupied by a local community). All personnel must be transported to site and must be dropped off at a designated area. Pedestrians and cyclists must give way to light vehicles and / or mobile equipment except at pedestrian crossings.

Controls must be in place to ensure the safety of people working on roads, including those working on broken-down vehicles.

Speed limits and traffic rules must be reviewed regularly and must be rigorously enforced. Local traffic rules must be complied with at all times.

All light vehicles and mobile equipment must give way to emergency vehicles.
Pedestrians and light vehicle drivers must be made aware of the blind spots associated with mobile equipment.

The driver or operator of a light vehicle or item of mobile equipment must stop the vehicle or equipment and sound the horn before proceeding at blind corners, where his view of the path or intended path is obstructed, and when entering or leaving a building.

Whenever a light vehicle or item of mobile equipment is stopped or parked, the handbrake (if applicable) must be applied. Measures (such as chocking or the use of ditches or trenches) must be in place for the immobilisation of parked mobile equipment. A parked light vehicle must be chocked in situations where the vehicle would roll forwards or backwards if placed in neutral with the handbrake disengaged.

No light vehicle or item of mobile equipment may be left unattended with the engine running or with a key in the ignition.

No light vehicle or item of mobile equipment may be parked so as to cause an obstruction to any roadway, passage or access way. No light vehicle or item of mobile equipment may be parked within 50 metres of a loading or off-loading point.

Light vehicles and mobile equipment must be loaded safely. All loads must be secure and must be within the load limit of the vehicle or equipment. A load must be properly secured before the vehicle or equipment is set in motion. Adequate precautions must be taken for any overhanging load.
No unauthorised light vehicle or item of mobile equipment may enter a restricted area or building.

16.6.1 Light Vehicles

All Contractors must ensure that Light vehicles have the following minimum safety features:
- Fixed seats and suitable seat (safety) belts for all occupants (i.e. Driver and all passengers);
- Roll-over protection for all vehicles intended to be driven on dirt or steep roads;
- Cargo barriers and load restraints for all vehicles designed for carrying loads other than passengers), or that are unable to have cargo separated from the occupant carrying space of the vehicle; and
- An air bag on the driver's side, and where available as a manufacturer fitted item, a passenger's air bag;
- A Reverse Alarm.

All Contractors must ensure that Light vehicles that interact with mobile equipment are equipped or fitted with:
- Systems that enable positive communication with the equipment operators (e.g. a two-way radio);
- A high visibility flag (e.g. A whip flag or buggy whip);
- An amber flashing light (revolving or strobe);
- Reflective taping; and
- High visibility signage (i.e. Vehicle call numbers) facilitating easy and positive identification from a reasonable distance.

All Contractors must ensure that Light vehicles carry:
- Emergency roadside triangles or beacons (three of either);
- Chock blocks for preventing uncontrolled movement of the vehicle when parked;
- A flashlight;
- A fire extinguisher (2.5kg DCP);
- A first aid kit; and
- Survival or emergency equipment (e.g. a vehicle recovery kit) suitable for the operating environment.

A change management process must accompany all vehicle modifications, including the attachment of any equipment.

Should any safety critical feature be defective or damaged, the vehicle must be withdrawn from service until it has been fully repaired. Inspection and maintenance must be undertaken on critical features such as: • Wheels and tyres (including the spare);

- Steering, suspension and braking systems;
- Seats and seat belts;
- Lights, indicators and reflectors;
- Windscreen and windows, including windscreen wipers and washers;
- The vehicle structure itself; and
- Other safety-related items on the vehicle body, chassis or engine, including instrumentation.

Persons may only be transported in vehicles equipped with manufacturer fitted or approved seats and seat belts. Seat belts must be worn by all occupants of a light vehicle (i.e. the driver and all passengers) at all times.

Only the driver and one passenger are permitted in the cab (front) of a light delivery vehicle. No personnel may be transported in the load-bin of a light delivery vehicle, even if the vehicle is fitted with a canopy. Only tools and equipment may be transported in the load-bin. Furthermore, no persons may be transported in a trailer behind a vehicle.

Light vehicle running lights (low-beam headlights) must be switched on at all times when the vehicle is in operation.

All Contractors must have a system is in place to ensure that drivers receive adequate training to ensure that the vehicle intended to be operated or driven can be operated or driven safely.

16.6.2 Mobile Equipment

All Contractors must ensure that Mobile equipment have the following minimum safety specifications:

- Fixed seats and seat belts for all occupants;
- Adequate lighting, including headlights, tail, turn and brake lights, and an amber flashing light (revolving or strobe);
- An identified isolation and lockout point;
- Adequate walkways, railings, steps and grab handle combinations, and boarding facilities including an alternative path of disembarking in the event of an emergency;
- Collision-avoidance technology and / or procedures;
- A reversing alarm or warning device;
- Chock blocks for preventing uncontrolled movement of rubber-tyred equipment when parked;
- A horn;
- Effective windscreen wipers;
- Effective guarding on accessible moving parts;
- A speedometer (if the mobile equipment is capable of exceeding the lowest applicable speed limit);
- High visibility signage (i.e. Mobile equipment call numbers) facilitating easy and positive identification from a reasonable distance; and
- A security system to prevent unauthorised operation.

Mobile equipment must have the following minimum safety specifications, unless a risk assessment stipulates otherwise:

- Approved or certified roll-over protection;
- Fail-to-safe brakes;

- A fire detection and suppression system capable of being activated from both ground level and cabin level (for certain types of mobile equipment, a suitably sized fire extinguisher may be adequate);
- A non-handheld two-way radio or another form of communication;
- Falling object protection (a protective structure over the operator cabin);
- An enclosed and tight-sealing air-conditioned cabin with suitable protective glass; and
- A means of moving supplies and personal items into and out of the operator cabin that enables an operator to continuously maintain three points of contact while boarding and disembarking the equipment (e.g. A backpack or shoulder strap bag).

When purchasing or hiring equipment, the ergonomics of the cabin must be considered, specifically with regard to the seating, operator controls and retrofitted devices.

Fleet and control consistency must be considered in order to minimise the possibility of operator error when changing machines.

Procedures must be in place to ensure that mobile equipment is only operated on sufficiently stable surfaces and on gradients that are within the limits of safe operation.

Seat belts must be used in all cases, by all occupants. Apart from the driver or operator, only an appointed flagman may be transported in mobile equipment (with the exception of buses) and **only if** the equipment is fitted with a passenger seat. No passengers are permitted on a lift and carry crane (or mobi-lift), mobile crane, forklift, mobile elevating work platform (e.g. A cherry picker), tractor, dozer, dump truck, grader, excavator, loader, back-actor, drill rig, or similar.
Procedures must be in place for the safe isolation and lockout of mobile equipment.

Where two or more items of mobile equipment must be operated in proximity to each other, or where an item of mobile equipment must be operated in proximity to persons on foot, a risk assessment involving all persons who will be working in the area must be conducted prior to the work commencing. In such a work area:

- No item of mobile equipment may be driven to within 5 metres of another item of mobile equipment without the operator first making eye contact with, and signalling his intentions to, the other operator who must acknowledge that he understands and that it is safe to proceed.
- No person on foot may work or be positioned within 5 metres of an item of mobile equipment that is in operation. Before approaching mobile equipment on foot, a person must make eye contact with, and clearly signal his intentions to, the operator of the equipment. The operator must cease to operate the equipment and must indicate that he understands and that it is safe to approach.

In certain circumstances (determined through risk assessment), mobile equipment may only move and operate with dedicated flagmen in place:

- Where flagmen are used, it must be ensured that the flagmen, mobile equipment operators, and all other personnel working in the vicinity of the mobile equipment, receive suitable training with regard to signals and signalling to ensure effective communication. The training must be formal and recorded, and competency must be tested.
- A flagman and the mobile equipment operator that he is directing must maintain eye contact. The flagman must never position himself where the equipment operator cannot see him.
- Should a mobile equipment operator lose sight of his flagman, he must stop his activities immediately until contact has been re-established.

Operators must report conditions and practices that do not conform to procedure.

16.6.3 Tyre and Rim Safety

A Tyre Management Plan must be established to address issues including fire, heating, explosion, electrical contact, separations, maintenance, tyre changes, etc. and reviewed every twelve months. Safe Work Procedures must be in place for all tyre maintenance and servicing activities and for tyre fire emergency response.

16.6.4 Roads

Roads with high risks activities and traffic interface shall be controlled by trained flagman, no road may be closed without permission from a Transnet Contract Manager.

A dust control plan must be in place for the site and, in particular, for all roads. Any spillage in a roadway must be cleaned up immediately. Ground pollution (e.g. Oil, diesel or hydraulic fluid spillages) must not, and will not, be tolerated. If substances are spilled on a road or any other portion of the site, the contaminated ground must be dug out and the resulting hole backfilled with clean material which must be suitably compacted. The contaminated soil must be disposed of as required by the applicable legislation.

16.7.6 Railroad Vehicles (RRV)

The Contractor shall ensure that Road-rail Vehicle (RRV) is only operated by a person who is competent and licensed to operate such RRV.

The Contractor shall ensure that the RRV is operated with the Transnet Track Inspector/Track Master in charge of on-track machine present on the RRV. Transnet Track Inspector/Track Master in charge of on-track machine must have passed the appropriate road knowledge, theoretical and practical examinations and must be licenced competent.

The Contractor shall ensure that the RRV is properly maintained and in a serviceable condition to operate on road and railway line.

16.7 Signs and Notices

The contractor must ensure that all required safety signs and notices comply and are prominently displayed in accordance with the applicable legislation, national standards and good safety practice.

No person may deface or damage any safety sign or notice. No person may remove or alter any safety sign or notice unless authorised to do so.

16.8 Machinery

The contractor must ensure that all plant and equipment brought onto the site is:

- Appropriate for the type of work to be performed
- Approved, inspected, tested, numbered and tagged (if appropriate) before being brought onto site
- Properly maintained in accordance with the manufacturer's recommendations; and
- Placed on a register and checked at least once per month or as required by the applicable legislation.

- Only operated by persons who have been trained to operate such machinery.

The contractor must supply, at his cost, all items of plant and equipment necessary to perform the work and must maintain all items in good working order. Should any plant or equipment become inoperable for a period that is having or will have a significant impact on the work schedule, the contractor must, on instruction from the Transnet Contract Manager, remove the out of service plant or equipment and replace it with similar fully operational plant or equipment at no additional cost.

No item of plant or equipment delivered to site for use on the contract may be removed from the site prior to the completion of the contract without approval in writing from the Transnet Contract Manager.

Items of plant or equipment brought onto site by the contractor or his sub-contractors may be inspected by a Transnet Contract Manager. Should the Transnet Contract Manager determine that any item is inadequate, faulty, unsafe or in any other way unsuitable for the safe and satisfactory execution of the work for which it is intended, the contractor must, on instruction from the Transnet Contract Manager, immediately remove the item from the site and replace it with a safe and adequate substitute. In such a case, the contractor or his sub-contractor shall not be entitled to additional payments or deadline extensions in respect of any delay caused.

16.9 Barricading

All applicable legislation concerning barricading must be complied with at all times.
Each contractor required to erect barricading on the work site(s) must develop, document and implement Safe Work Procedures that are aligned with the requirements of this specification.
Barricading must be erected to:

- Prevent persons from making contact with an identified hazard;
- Provide warning of the existence of a hazard;
- Prevent unauthorised access (by people, vehicles and mobile equipment) into an area where a hazard exists or where a hazardous activity is being carried out;
- Define the boundaries of a hazardous location and / or restricted area; and
- Allow a work team to perform hazardous tasks without persons unfamiliar with the hazard(s) accessing the area.

Although not limited to these situations, barricading must be erected or installed:

- Around excavations (trenches, pits, etc.) (refer to the Excavation Standard);
- To protect openings and edges (to prevent persons from falling, all openings and edges associated with floors, stairs, and the open sides of buildings and structures during the course of construction must be protected by sturdy, rigid barriers capable of withstanding a force of at least 110 kilograms applied in any direction at any point) (refer to the Working at Heights Standard);
- To prevent access into areas where overhead work is in progress;
- To route vehicles safety through (or around) construction areas; and
- To protect members of the public who may be in the vicinity of a work or construction site (by preventing access).

A barricade must present a sturdy physical barrier to entering an area. Therefore, plastic cones, post and chain systems, "danger tape" and "snow netting" will not be accepted as barricading and may only be used for the purposes of low-risk demarcation.

Regardless of the type of barricade used, the following requirements must be met:

- The installation, alteration and removal of barricades must be supervised by a competent person;
- The barricading must be uniformly and intelligently configured;
- The barricading must be stable, conspicuous and effective;
- The barricading must completely surround the work or hazardous area;
- General access requirements around the work or hazardous area (such as pedestrian walkways, operational access, or general thoroughfares) must be taken into consideration when erecting a barricade;
- The extent of the area that is barricaded must be kept to a minimum so as not to unnecessarily restrict access to other areas. If access routes to other areas are blocked by the barricade, alternative routes must be identified and signposted
- All barricaded areas must have properly designated points of entry and exit for persons and / or vehicles. Each pedestrian access point must be fitted with a self-closing gate. A sign indicating, "DESIGNATED ACCESS POINT – AUTHORISED PERSONNEL ONLY", must be fitted to each gate;
- Additional signage providing warning of specific hazards (e.g. falling objects, electricity, etc.) Including, "NO UNAUTHORISED ENTRY", must be attached to all gates and, where required, to the barricading itself. The signage must be visible from all angles and must be large enough to be read from a distance of 10 metres;
- Barricading must be clearly visible at all times (day and night). If necessary, flashing warning lights must be used;
- Tags must be attached to the barricading displaying the name and cell phone number of the person responsible for the barricade, and specifying the reason for the barricading and the date on which it is scheduled to be removed;
- Should a person require access to a barricaded area, authorisation must be obtained from the person responsible for the erection of the barricade. The hazards that are present and the Personal Protective Equipment that must be worn within the barricaded area must be communicated to the person seeking access;
- Each barricade must be listed in a register, and each must be inspected daily to ensure that it is still intact and that its positioning is still effective;
- All barricades must be properly maintained and repaired as required;
- When the work has been completed and the hazard has been eliminated, all barricading must be removed without delay. A barricade may not be left in place if no hazard exists;
- Before a barricade is removed (allowing general access), the area must be inspected by the person responsible for the work that was carried out, to ensure that the area is once again safe. If applicable, the person accepting the area back for general use shall do so on completion of his own safety inspection;
- Authorisation to remove (or modify) a barricade may only be granted by the person responsible for the erection of the barricade.

16.10 Working from fall risk position (working at heights)

All applicable legislation concerning work performed from a fall risk position must be complied with at all times. Fall prevention or fall protection measures must be in place whenever the potential exists for a person to fall from a fall risk position.

16.10.1 Fall protection

Whenever there is a risk of falling from a fall risk position, whenever there is a risk of falling onto dangerous equipment or machinery even if the potential fall distance is less than 2 metres, or whenever work must be carried out within 2 metres of an opening through which (or an edge over which) a person could fall, no work may commence unless:

- a fall protection (and rescue) plan is in place (prepared by a competent person, and implemented by the contractor);
- A detailed task-specific risk assessment has been carried out;
- A safe work procedure is in place for the task to be performed;
- A permit to work has been obtained; and
- Each person has been provided with suitable fall protection equipment.

Fall protection equipment (either fall restraint or fall arrest equipment) must be used at all times whilst the work is being carried out.
To prevent persons from falling, fall restraint equipment must be used whenever work must be carried out within 2 metres of an opening through which (or an edge over which) a person could fall. Fall arrest equipment must be used whenever the potential exists for a person to fall 2 metres or more.

A person has been provided with suitable fall protection equipment if he is secured by means of an approved full body harness (well fitted) with two shock absorbing lanyards or an inertia reel (when fall arrest equipment is required) or two short restraining lanyards (when fall restraint equipment is required), double or triple action snap hooks (or karabiner type rings), and secure anchorage points (a person's lanyard may be attached either directly to an anchorage point or indirectly through the use of a variety of systems that incorporate a lifeline).

A dual lanyard system must be used to ensure that at least one connection point is maintained at all times.
Note: When selecting fall arrest equipment, care must be taken to ensure that the potential fall distance is greater than the height of the person plus the length of the lanyard with its shock absorber deployed (taking the height of attachment into account).

Anchorage points must, where practical, be above the head of the person, and must ensure that in the event of a fall the person will neither swing nor touch the ground.
All permanent anchorage points must be designed and approved by a professional structural engineer.

All anchorage points must be periodically inspected and tested by a competent person to ensure that they are secure and can support the required load. A system must be in place to identify anchorage points as authorised for use. Temporary anchorage points (and lifeline systems) may only be used if a competent person has certified them safe to use.

If an elevating work platform is used, such equipment must be fitted with a fixed anchorage point for the attachment of fall protection equipment.

The use of fall protection (fall restraint or fall arrest) systems must be avoided wherever and whenever possible through design, the installation of physical barriers that protect persons from falling and employing alternative methods of working.
Only if physical barriers protecting against free falls cannot be installed must fall protection equipment be used.

Fall protection (fall restraint or fall arrest) systems are items of personal protective equipment and, if required, must be purchased, installed and provided to employees.
Prior to commencing with any work at height, an assessment must be conducted to determine if the work requires the use of fall protection equipment, and if so, which fall protection system is the most appropriate for the work.

There must be a system for ensuring that fall protection equipment is:

- Tested and certified for use;
- Inspected by the user before use; and
- Destroyed following a fall or where inspection has shown evidence of excessive wear or mechanical malfunction.

All persons that are required to work at height (in order to carry out routine or non-routine tasks) must first be trained and certified competent to do so. Furthermore, each person must be in possession of a valid medical certificate of fitness specifically indicating that the person is fit to work at height.

All persons required to use personal fall protection equipment must be trained and certified competent in the correct selection, use, maintenance and inspection of such equipment.

All fall protection equipment must be thoroughly inspected on a monthly basis by competent persons appointed in writing and each item of equipment must be tagged to show when it was last inspected. All inspections must be recorded in a register. On finding defective or damaged equipment, appropriate action must be taken by the competent person (i.e. the destruction of the equipment to prevent further use).

Persons making use of personal fall protection equipment must do so in strict accordance with the instructions or requirements specified by the manufacturer or supplier of the equipment or system.
Specific pre-use inspection, maintenance and fitting protocols must be established in accordance with the manufacturer's requirements or guidelines and these protocols must be followed by all users of the fall protection equipment.

Solvents may not be used to clean fall protection equipment. Only manufacturer-approved cleaning solutions may be used.

No person required to use personal fall protection equipment may work in isolation (a minimum of two persons working together is required).
Competent supervision must be in place at all times for all work carried out at height. Supervisors must be appointed in writing.

Emergency response (rescue) procedures for the rapid retrieval of suspended persons in the event of a fall from height must be prepared and tested.

Note: Even though there is no risk of free fall, fall protection equipment may be required in situations where there is a risk of falling, slipping or sliding down a slope of more than 45 degrees.

Note: The maximum service life of fall protection equipment manufactured of synthetic fibre shall be 5 years from the date of first use and / or manufacture unless otherwise specified by the manufacturer.

A person may climb or descend a ladder without fall protection provided that he is able to use both hands and legs to do so, faces the ladder, and uses one step at a time. The ladder must be tied off or supported at its base.

Prior to any roof work being performed, or prior to persons accessing a roof, a structural engineer must verify that the roof is of sound construction and that it is capable of supporting the weight of the persons as well as any equipment that may be required. Should the engineer's findings be to the contrary, alternative methods of performing the

work must be found. Particular care must be taken when work is carried out on an asbestos cement roof or a fibreglass roof.

16.10.2 Falling Objects

In the process of planning work activities, the risks associated with falling objects (i.e. materials, tools or equipment) must be assessed and appropriate control measures must be identified, implemented, and monitored taking the following hierarchy of controls into consideration:

- Preventing objects from falling – by using containment sheeting, toe boards, lanyards to secure tools (to a person or to the structure), ropes or chains to secure equipment (to the structure), lift boxes, brick cages, etc. and by properly securing loads when lifted by crane or hoist;
- Protecting people from falling objects – by establishing barricaded exclusion zones, installing catch platforms or catch nets, displaying warning signage, and posting safety watchers and / or traffic controllers; and
- Personal Protective Equipment (particularly safety helmets and safety boots) – protective equipment is a last line of defence and must be worn.

Where overhead work is being carried out, barricading must be erected around the work area (at the level at which the work is taking place and at every level below including ground level) to prevent persons from entering such an area and potentially being struck by falling objects.
Wherever hazards related to falling objects exist, appropriate warning signage (i.e. "Overhead Work In Progress" and "No Unauthorised Access") must be prominently displayed.

No items are permitted to lie loose in elevated positions (e.g. nuts and bolts must be securely stored) and good housekeeping standards must be maintained at all times. No tools, equipment, material, debris, waste, etc. may be dropped from height. Objects must be lowered or chuted to ground level in a safe and controlled manner.

16.10.3 Ladders

All ladders used on site must be of sound construction and adequate strength.
Only non-conductive ladders made of wood or fibreglass may be used for electrical work or work being performed in proximity to energised electrical equipment. Metal ladders and ladders with metal reinforcing may not be used.

The use of makeshift ladders is forbidden.
All ladders must be numbered, listed in a register, and inspected by a competent person on a monthly basis (the results of each inspection must be recorded in the register).

Before using a ladder, the user must inspect it for damage. Ladders with missing, broken, cracked or loose rungs, split stiles, missing or broken spreaders (stepladders) or any other form of damage or defect may not be used. A damaged ladder must be removed from service (and tagged, "Out of Service") without delay and must then either be repaired (if possible) or destroyed to prevent further use.

Persons must receive instruction in the correct use and proper care of ladders.

Ladders may only be used as a means of access and egress. The use of ladders as working platforms is prohibited, except for inspection and carrying out minor tasks (i.e. light work and short duration) such as changing a light bulb.

Ladders may not be positioned horizontally and used as walkways or runways or as scaffolding.

All portable ladders must be fitted with non-skid safety feet (or some other means to prevent the base of the ladder from slipping) and the feet must always be placed (stand) on a firm level surface. The use of bricks, stones, wood or any other material to level the stiles of a ladder is prohibited. Ladders may not be placed on movable bases such as boxes, tables, trucks, etc. The base or foot of a ladder must always be secured to prevent it from slipping. The ladder must be held by an assistant if the base cannot be secured in any other way (e.g. tied off).

A straight ladder must extend at least one metre above its support (or above the working platform that it is providing access to). The top of the ladder must be tied off (or otherwise secured to its support) to prevent accidental movement. A straight ladder must be placed at a safe angle, i.e. tilted at a ratio of approximately 4:1, meaning that the base of the ladder must be one metre away from the wall (or other vertical surface) for every four metres of height to the point of support.

A stepladder may never be used as a straight ladder. A stepladder must be opened fully, and the spreaders must be locked securely.

When using an extension ladder, at least four rungs must always overlap at the centre of the ladder.

Ladders may not be joined together unless they have been specifically designed and manufactured for that purpose.

A suspended ladder (i.e. not standing on a base) must be attached in a secure manner to prevent undue swinging or swaying, and to ensure that it cannot be displaced.

A ladder may not be placed against a window, glass or any other material which is unlikely to withstand the force exerted on it by the top of the ladder.

A ladder may not be placed in front of a door or window that opens towards the ladder unless the door or window has been locked or barricaded. When a ladder is used near an entrance or exit, the base of the ladder must be barricaded.

Materials and / or equipment may not be placed in close proximity to the base or landing of any ladder.

When ascending or descending a ladder, a person must always face the ladder and use both hands (i.e. maintain three points of contact). Nothing may be carried up or down a ladder if it prevents the person from holding on to the ladder with both hands. Tools must always be properly secured. This can be achieved by attaching them to the wrist using lanyards or placing them in a tool belt around the waist. Tools and materials may also be carried in a bag over the shoulder or hoisted to the landing using a tool bag and rope.

Only one person at a time may use (i.e. be positioned on) a ladder.

No person may stand or step above the third rung from the top of a straight ladder or above the second highest step of a stepladder.

Overreaching from a ladder is prohibited. If the target is not within comfortable reach, the person must climb down and reposition the ladder. No person may run up or down a ladder or jump from the lower rungs or steps to the ground.

All ladders must be properly maintained and cared for. Ladders must be stored under cover and should be hung in a horizontal position from several brackets. No ladder may be left lying on the ground or be left exposed to the weather. A ladder left lying on the ground presents a tripping hazard and it may be damaged by vehicles running over it. No ladder may be left in such a position where it may fall over, be accidentally knocked over, or be blown over by the wind.

Ladders may not be painted, as the paint may conceal damage, defects, labels or other markings. Instead of paint, clear varnish or wood oil may be used to preserve wooden ladders. Ladders must be kept clean, as dirt may conceal damage or defects. Oil or grease accumulation on the rungs of a ladder may cause a person to slip.

Before making use of a ladder, each person must make an effort to remove mud, oil, grease, etc. from his boots.

16.11 Permit to Work

All personnel must comply with the Permit to Work system applicable to the scope of work.
A Permit to Work must be obtained before carrying out any work that involves:

- A hazardous energy source or system, including electricity, compressed fluids (e.g. hydraulics and pneumatics), chemical substances (e.g. toxic, corrosive, flammable or explosive gases and liquids), heat (e.g. steam), radiation, and machinery or materials with potential energy (gravitational and elastic) – isolation and lockout may be required;
- Confined space entry;
- Working at height;
- A critical lift;
- Hot work outside of designated workshops;
- Excavation; or
- A service (e.g. water supply, fire suppression systems, etc.).

Note: A Permit to Work may only be issued by an Authorised Person and may only be received (or accepted) by an appointed Applicant (see Definitions).

Each Permit to Work that is issued must make reference to an approved Task-Based Risk Assessment for the work that is to be carried out.

The Permit to Work system that is employed must incorporate the following basic procedures:

- Prior to meeting with the Authorised Person, the Applicant must familiarise himself with all of the hazards associated with the system, plant, equipment, structure or area on or in which the work must be performed. He must also consider the risks that may arise as a result of the tasks that will be carried out. A Task-Based Risk Assessment must be in place;
- The Applicant must then request permission to carry out the work and must meet with the Authorised Person to discuss and document the scope of the work as well as the hazards, risks and associated control measures. Isolation and lockout requirements must be identified (if applicable). The isolation and lockout process must be initiated by the Authorised Person who must contact the necessary Isolation Officers.

Note: The Applicant must ensure his own safety and that of his team and has the right to accompany the Isolation Officers to verify that all of the necessary locks have been fitted to all of the isolation and lockout points in accordance with the applicable plant or equipment-specific Isolation and Lockout Procedure.

- Once all of the necessary isolations have been completed and the necessary Clearance Certificates have been issued by the Isolation Officer(s) (if applicable), and the Authorised Person is satisfied that the system, plant, equipment, structure or area is safe to work on or in provided all identified precautions are observed by the Applicant, then he must issue (sign) the Permit to Work to the Applicant;
- The Applicant must accept (sign) the Permit to Work. If equipment has been isolated, the Applicant must attach his Personal Lock to the relevant Isolation Bar (or Local Isolation Point) and must ensure that every other person working on the isolated equipment also attaches his or her Personal Lock to the Isolation Bar (or Local Isolation Point) before starting any work;
- Before commencing with any work, the Applicant must discuss the hazards, risks, control measures, precautions and limitations as stated in the Permit to Work (and associated Task-Based Risk Assessment) with all personnel who will be carrying out the work. A register must be kept, and all persons must sign the register once they have been briefed by the Applicant;
- The work performed must be limited to what is described in the Permit to Work;
- When a particular employee has completed his work, he must sign the personnel register to this effect and (if applicable) must remove his Personal Lock from the Isolation Bar (or Local Isolation Point);
- Once all work is complete, the Applicant must:
  - Ensure that all machine guards have been replaced;
  - Ensure that all tools and materials have been removed from the work area; o Ensure that the work area is clean and tidy;
  - Ensure that all Personal Locks (including his) have been removed from the Isolation Bar or Local Isolation Point (if applicable); o Inform the Authorised Person that the work has been completed; and o Sign off the Permit to Work.
- Once the work is complete and the Applicant has signed off the Permit to Work, the Authorised Person must: o Ensure that the relevant Isolation Officers perform all of the necessary de- isolations (if applicable);
  - On completion of the de-isolations, sign off the Permit to Work accepting the system, plant, equipment, structure or area back for service; and
  - Inform all relevant personnel that the system, plant, equipment, structure or area is ready to use.
  - Where the work must continue over more than one shift, the Permit to Work must be reviewed at every shift change by an Authorised Person. If the scope of work has changed, the permit must be cancelled and a new permit must be issued.

If any of the original conditions or precautions pertaining to the work is not being complied with, is no longer adequate or is no longer applicable, the Authorised Person must cancel the Permit to Work and must ensure that all work stops until full compliance with either the original or amended (as required) conditions and precautions is achieved and a new permit has been issued.

The Applicant must ensure that the Permit to Work (including the personnel register) is kept where the work is being carried out (i.e. posted on a portable Health and Safety Notice Board) and that the work is monitored against the permit conditions.

All Permit to Work records must be retained and must be made available for inspection when required.

The implementation of the Permit to Work system applicable to the project must be audited on a regular basis by a Transnet Contract Manager. Furthermore, planned task observations must be carried out periodically.

Note: In addition to obtaining Permits to Work as and when required for specific hazardous activities (identified in this specification), each contractor must obtain a General Work Authorisation from a Transnet Contract Manager on a monthly basis. A General Work Authorisation is valid for one calendar month and authorises the contractor's planned work activities. In order to obtain a General Work Authorisation, the contractor must provide a documented work plan for the month together with the necessary Task-Based Risk Assessments.

16.12 Isolation and Lockout

Isolation and lockout procedures that make it impossible to inadvertently energise any system, plant or equipment so isolated, must be in place for all work where hazardous energy sources exist, including electricity, compressed fluids (e.g. hydraulics and pneumatics), chemical substances (e.g. toxic, corrosive, flammable or explosive gases and liquids), heat (e.g. steam), radiation, and machinery or materials with potential energy (gravitational and elastic). These procedures must be strictly enforced and complied to by all personnel.

All Isolation and Lockout Procedures must incorporate the following basic requirements:

- The issuing of a formal Permit to Work for any work that requires the isolation of any system, plant or equipment;
- The use of defined Equipment, Discipline and Personal Locks (see Definitions), and multiple lockout systems (i.e. Isolation Bars and lockout hasps);
- Clear identification of all isolation and lockout points ensuring there is no duplication;
- Isolation of the main energy source;
- The use of slip plates or the blanking off of pipelines or ducting, in addition to the chaining and locking of valves, as determined by a risk assessment;
- Suitable methods of preventing the movement of equipment; and • Methods to test the effectiveness or completeness of the isolation.

Note: No work may commence on a system, plant or equipment until a Permit to Work has been issued by an Authorised Person.

Note: A Permit to Work may only be issued by an Authorised Person once all required Clearance Certificates have been issued by appointed Isolation Officers.

The isolation and lockout system that is employed must incorporate the following basic procedures:

- In accordance with a system, plant or equipment-specific Isolation and Lockout Procedure, an appointed Isolation Officer(s) must isolate all points that need to be isolated in order to render the system, plant or equipment safe to work on. An Equipment Lock (and a suitable, highly visible warning tag) must be attached to each isolation point;
- On completion of an isolation (and lockout), the Isolation Officer must clear the area of all persons and must then carry out tests to ensure that the isolation is effective. This may be done by pressing a start button or by asking a control room operator to try to start the equipment. Special care must be taken to ensure that the attempted starting of the equipment has not been deactivated by another interlock forming part of the

system, or by a different up-stream isolation. Alternatively, appropriate equipment may be used to test for energy (e.g. voltage verification or continuity tests).

Note: In the case of electrical isolation, a test for voltage must be carried out, after the switching device, to ensure the absence of voltage.

- The Isolation Officer must place the key to the Equipment Locks on an Isolation Bar (at a Lockout Station) and must then attach a Discipline Lock (to prevent the key from being removed) before issuing a Clearance Certificate;
- The Discipline Lock must remain in place when handing over to subsequent shifts. All Discipline Locks for a particular discipline (e.g. low voltage electricity) must be keyedalike so that any Isolation Officer appointed for that discipline (and issued with a key) can open any of the Discipline Locks used for that discipline.
  This enables an Isolation Officer to de-isolate equipment that may have been isolated by another Isolation Officer during an earlier shift. Appointed Isolation Officers for a particular discipline are the only persons permitted to hold keys to the Discipline Locks used for that discipline.

Note: Local isolations do not require the use of Equipment Locks (a Discipline Lock may be attached to the Local Isolation Point by the Isolation Officer, followed by the necessary Personal Locks).

Note: For local isolations, if the Isolation Officer is the only person who will be working on the isolated equipment, then he must attach his Personal Lock to the Local Isolation Point.

- Once all required Discipline Locks are in place (i.e. attached to the Isolation Bar) and all Clearance Certificates have been issued, the Permit to Work may be issued by the Authorised Person;
- Each person who will be working on the isolated system, plant or equipment must then attach his or her Personal Lock to the Isolation Bar before starting any work (including the Isolation Officer, if he intends to work on the isolated unit);
- The attachment of a Personal Lock to the Isolation Bar prevents the removal of the key to the Equipment Locks even if the Discipline Lock is removed;
- When called (by an Authorised Person) to de-isolate the system, plant or equipment (on completion of the work under the Permit to Work), the Isolation Officer must ensure that all Personal Locks have been removed from the Isolation Bar before removing the Discipline Lock and the key to the Equipment Locks;
- Before removing the Equipment Locks and de-isolating the energy source, the Isolation Officer must inspect the system, plant or equipment that was worked on to ensure that it is safe to perform the de-isolation. This includes guard inspections, housekeeping, ensuring that all doors and covers are in place, and most importantly, ensuring that no persons are present;
- Once all Equipment Locks have been removed and the system, plant or equipment is safe for use, the Isolation Officer must cancel the Clearance Certificate and inform the Authorised Person that the unit has been de-isolated.

Where a system, plant or equipment is sequence interlocked and a hazard could be created through the inadvertent start up or shut down of a system, plant or equipment lying before or after the unit to be worked on, then that system, plant or equipment must also be isolated and locked out.
Redundant or out of service equipment must, in addition to being isolated and locked out using the relevant Discipline Lock, be fitted with a tag indicating why it is out of service, who performed the lockout, and the hazards associated with that equipment.

Where it is necessary to work on live equipment for the purposes of commissioning, testing, adjusting and sampling, such work must be carried out in accordance with a written Safe Work Procedure and controls must be in place to prevent unauthorised access into the work area.
The implementation of the isolation and lockout system and procedures applicable to the project must be audited on a regular basis by a Transnet Contract Manager. Furthermore, planned task observations must be carried out periodically.

16.12.1 Personal Locks

A Personal Lock must be such that it can only be unlocked by the person to whom it belongs. Combination locks may not be used. A Personal Lock, as well as the key(s) to the lock, must be kept under the exclusive control of the person to whom the lock belongs.

A Personal Lock must be issued to each person who requires one, and the person's details must be clearly and permanently engraved directly onto his Personal Lock. Alternatively, a thick durable plastic identification tag may be used that clearly displays the company's name, the employee's name, the employee's company number, and a contact telephone number (the tag must be securely fastened to the Personal Lock). Where the above is handwritten, it must be done using a permanent marker pen and it must be legible.

Each person issued with a Personal Lock must be trained and certified competent in the correct use of such a lock.

A Personal Lock may NEVER be removed by anyone other than the person to whom it belongs, except if the removal (cutting) of the lock is authorised by the Transnet Contract Manager (in the absence of this person, authorisation can only escalate upwards). Furthermore, the removal of the lock must be done under the personal supervision of the Transnet Contract Manager, and in accordance with a written procedure. The removal (cutting) of a Personal Lock may be required if the person who applied the lock is unable or unavailable to remove it on completion of the work (e.g. lost his key, failed to remove his lock before going home, etc.).

16.13 Electrical Safety

The contractor must ensure compliance with Electrical Installation Regulations, Electrical Machinery Regulations, OH&S Act, TFR Electrical Safety Instructions, TFR E7/1 Specification for Works On, Over, Under or Adjacent to Railway Lines and Near High Voltage Equipment and all applicable SANS Codes and Practices.

All electrical work must be carried out by competent personnel in accordance with all legal requirements, codes, design criteria and safety standards applicable to the scope of work.

Each contractor carrying out electrical work on the site(s) must develop, document and implement Safe Work Procedures that are aligned with the requirements of this standard.

All persons who will be carrying out electrical work must be certified against the requirements of job and equipment-specific electrical competency standards for the project, which must address job and equipment-specific Safe Work Procedures.

Each person potentially exposed to electrical hazards must receive electrical hazard training at the commencement of his employment on site and thereafter on an annual basis. The training must address the equipment and conditions specific to the area where the

individual will be working. The training material must be documented, and training records must be kept.

16.13.1 Electrical Installations

Each electrical installation (temporary or permanent) installed or worked on by a contractor must be inspected by a Transnet Contract Manager to ensure that the installation complies with all statutory requirements, codes, design criteria and safety standards applicable to the project.

A Transnet Contract Manager must approve all electrical work before the installation is energised. Any installation deemed unsatisfactory by a Transnet Contract Manager must be removed, repaired or modified by the contractor at his expense.

For every permanent or temporary electrical installation, a certificate of compliance must be issued by a competent and appropriately qualified electrician. These certificates must be available for inspection.

Single line diagrams (with supporting documentation) must be produced and maintained for all electrical installations. This information must include system fault calculations, equipment details, electrical protection discrimination curves, and cable ratings.

Work on electrical installations (new installations, and modifications or repairs to existing installations) may only be carried out by qualified and authorised personnel (i.e. electricians).
Electrical safety devices (specifically, earth leakage protection and overcurrent protection) must be installed on all distribution circuits and the settings must be established by suitably qualified personnel.

A suitable numbering and / or labelling system must be used so that each circuit breaker or earth leakage device can be clearly and readily matched with the outlet or equipment that it protects.

To ensure the safety of the user, each distribution panel must be completely enclosed, must be of the dead-front type, and must be properly constructed and earthed.

All electrical cabling must be covered (e.g. in cable trenches) or elevated (in cable trays) to protect it from damage and to eliminate tripping hazards.

All permanent and temporary electrical installations (cabling, sockets, distribution panels, transformers, switchgear, etc.) must be inspected and tested by a competent and suitably qualified electrician on a monthly basis. The testing must include a grounding (earthing) continuity test and testing of the electrical safety devices. Details of these inspections and tests must be recorded in a register which must be made available to the Transnet Contract Manager for inspection.

A rigorous Isolation, Lockout and Permit to Work system must be applied to all electrical work (i.e. work on electrical installations, machinery or equipment). All personnel must comply with the system and procedures applicable to the project.

Before any work on an electrical installation or equipment is carried out, the installation or equipment must be de-energised.

No electrical work may be performed live, regardless of the voltage, unless written approval is obtained from the Transnet Contract Manager (a justification as to why it is necessary for the work to be carried out with the equipment in an energised state must be provided).

For all energised electrical work, a Safe Work Procedure must be in place and, with the exception of voltage testing and where no tools are used, a Permit to Work (specifically authorising energised electrical work) must be issued. When carrying out any energised electrical work, approved electrically insulated gloves, blankets, mats and other protective equipment must be used.

Control centres, switchgear rooms, substations, generators, transformers, capacitor banks, and other similar electrical plant and equipment must be appropriately guarded and labelled and, with the exception of emergency shut-off mechanisms, must be made inaccessible to unauthorised personnel (i.e. plant or equipment of this nature must be positioned within rooms or fenced enclosures which must be kept locked).

Appropriate warning signage must be prominently displayed within, and at all entrances to, these rooms or enclosures. The signage must indicate that unauthorised persons are prohibited from entering, that unauthorised persons are prohibited from handling or interfering with any electrical plant or equipment, the procedure to be followed in the event of a fire, and the first aid procedure to be followed should a person suffer electric shock. Suitable fire-fighting equipment must be provided in all such rooms or enclosures.

All electrical panels must be kept locked (using keyed-alike padlocks). Keys may only be issued to authorised personnel.

All un-insulated (bare) or partially insulated conductors must be enclosed and protected to prevent accidental contact therewith. Measures must be taken to prevent unauthorised access and appropriate warning signage must be conspicuously displayed.

Only authorised persons may enter rooms or enclosures housing electrical plant or equipment, and only authorised persons may access electrical panels or cabinets, and cable ducts or trenches. If any work must be carried out in such an area or on such equipment, a Permit to Work must first be obtained from the Transnet Contract Manager.

No connection to any electrical system may be made without prior approval and a valid Permit to Work from the Transnet Contract Manager.

No electrical equipment or apparatus may be modified without written authorisation from the Transnet Contract Manager.

Conductive ladders may not be used in proximity to non-insulated electrically energised lines or equipment.
All permanent and temporary electrical cables, whether energised or not, must at all times be handled as if they are energised.

Only appropriately certified intrinsically safe electrical equipment may be used in flammable or potentially explosive atmospheres such as in confined spaces. Any equipment or structure on which electric charges may accumulate (such as storage tanks) must be grounded (earthed).

Lightning protection must be provided on all tall structures and buildings. Grounding (earthing) and lightning protection systems and devices must be designed, engineered, selected and installed based on site-specific requirements.

Before carrying out any excavation work, a Permit to Work (specifically authorising the excavation activities) must be obtained from the Transnet Contract Manager. Such a permit must not be issued until it has been verified that no buried hazards or services exist where the excavation work is to be carried out (refer to the Excavation Standard).

16.13.2 Arc Flash Safety

Depending on the scope and nature of the work, a documented arc flash protection programme must be in place that specifies:

- The methodology for calculating incident energies and determining flash protection boundaries; and
- The PPE required (specific to a task and the equipment on which the task is performed) and associated procedures to mitigate the hazard.

The method of calculation must be based on regional electrical code requirements, or if none exist, the Institute of Electrical and Electronics Engineers (IEEE) Standard 1584, or the United States National Fire Protection Association "Standard for Electrical Safety in the Workplace" (NFPA 70E), or published equivalent.

An Arc Flash Hazard Assessment must be carried out based on accurate and current data. All electrical cabinets where the potential for an arc flash hazard exists must be labelled in accordance with the hazard assessment and the potential incident energies calculated.

A process must be in place for updating the Arc Flash Hazard Assessment and labelling as changes and electrical upgrades occur that might affect the available short circuit current on the system.
In order to mitigate the hazard, Safe Work Procedures must be in place and all persons potentially exposed to arc flash hazards must be trained in these Safe Work Procedures and must be supplied with appropriate arc flash PPE.

16.13.3 High Voltage Power Lines

Before any mobile equipment (such as a crane, bulldozer, back-actor, boom truck or drill rig) is mobilised to a work site, an assessment must be carried out (including a thorough inspection of the work site and the access route) in order to clearly identify any overhead or underground power lines.

A system must be in place to mitigate the risks associated with working in close proximity to power lines and suitable measures must be taken to prevent personnel or equipment from coming into contact with power lines. Extreme caution must be exercised.

Where possible, exclusion zones (based on minimum clearance distances specified by the electrical power utility or the Transnet Contract Manager) must be created with rigid barriers and warning signs.

Only in exceptional circumstances, and then only after a detailed method statement and risk assessment has been approved, all necessary mitigation or control measures are in place (including the use of a spotter), and a Permit to Work has been issued by the Transnet Contract Manager, may equipment be operated within one boom length of energised overhead power lines. Suitable protective insulating barriers may need to be used.

If possible, the power lines must be de-energised and isolated while the work is carried out.

All equipment operators and rigging personnel must be trained in the hazards and the applicable safe approach distances (exclusions zones) associated with overhead power lines.
A procedure must be in place for the evacuation of mobile equipment or a vehicle in the event of accidental contact with power lines. All operators must be trained in this procedure and must follow it implicitly.

Scaffolding may not be erected within 5 metres of power lines or overhead track equipment.

16.13.4 Portable Electrical Equipment

Prior to site establishment, each contractor must provide a complete inventory of all portable electrical equipment that he and his sub-contractors intend to use on the site (including plant, machines, appliances, generators, hand tools, lighting, extension cords, etc.). The nameplate data for each item of equipment must be included.

All portable electrical equipment to be used on the site must be supplied and maintained in a serviceable condition.

Any electrical equipment that is in poor condition or is not in proper operating order may not be used. Any electrical equipment that a Transnet Contract Manager deems to be unsafe or unsuitable must be removed from site.

Electrical repair work or diagnostic work on electrical equipment may only be performed by personnel who are competent and authorised to perform this work (i.e. qualified electricians).

With the exception of double-insulated equipment, all electrical equipment must have an equipment grounding (earthing) conductor that connects the frame of the equipment being utilised to the grounding (earthing) conductor of the electricity supply system.

All electrical equipment and all electricity supply systems used (including generators) must be inspected and tested by a registered and competent electrician to ensure that all equipment is properly grounded (earthed).

All electrical equipment used on site must be supplied electricity through (i.e. must be protected by) an approved and tested residual current device (or earth leakage device or unit). If a socket outlet does not have a residual current device in the circuit, a portable residual current device must be used. Outlets without residual current device protection must be labelled as such.

Any electrical equipment that causes an earth leakage device to trip or deactivate the circuit may not be used again until an electrician has inspected and tested the equipment and has recorded in a register that the equipment is safe to use.

Interlocks may never be removed or modified, and fuse terminals may never be bypassed to keep current flowing in any circuit.

All generators must be fitted with suitable overcurrent protective devices (i.e. circuit breakers or fuses).

All generators must be used in compliance with the manufacturer's requirements. Any proposed modification to a generator must be authorised in writing by the manufacturer prior to the modification being made.

Each welding machine used on site must be fitted with a Voltage Reduction Device (VRD). If this is not practical (i.e. for arc welding processes other than stick welding), a dead man's (isolation) switch in the electrode circuit (operated by a trained observer) may be used as an alternative. All welding machines must be properly grounded (earthed).

All portable electrical hand tools used on the site must be double insulated.

Electrical equipment must be disconnected or unplugged when not in use.

Portable lights must be stable, and each light bulb must be protected by a substantial guard.

Temporary festoon lighting must be double-insulated and must be supported at least 2.5 metres above the floor, if possible.

Handheld lights must be of the all-insulated type and must be extra low voltage (i.e. not exceeding 32V). 120V or 240V handheld lights are not permitted.
Any lighting used in hazardous locations (i.e. potentially explosive atmospheres, confined spaces, and damp or wet areas) must be operated at a maximum of 32 volts, unless earthed and protected by earth leakage devices.

No person may wear a watch or any jewellery or carry any metal objects such as a lighter or keys, while working on any electrical system or equipment.

No person may work on or use electrical equipment if his clothing is wet, or any part of his body is in contact with water.

No person may handle electrical equipment, equipment cords or extension cords with wet hands or if the floor or ground surface is wet.

Fire extinguishers filled with carbon dioxide must be used to fight electrical equipment fires (water may never be used). If possible, the electrical equipment should be deenergised before fire-fighting activities commence (refer to the Fire Protection and Prevention Standard).

When cleaning or performing maintenance work on an item of electrical equipment, the equipment must be unplugged.

Equipment may not be unplugged while that equipment is switched on. Nor may equipment be plugged into a receptacle (socket) with the equipment's switch turned on.

Electrical equipment that has a defective plug or wiring may not be used. Repair work to defective or damaged electrical equipment may only be carried out by a qualified electrician.
Extension cords may be used for temporary applications only. Permanent cabling must be installed for long-term needs. Extension cords may not be run through doors, windows, ceilings or holes in walls. An extension cord must be uncoiled completely before it is used. An extension cord must be of sufficient current-carrying capacity to power the equipment that it is supplying electricity to. Cords must not be overloaded.

Extension cords must be unbroken and continuous (i.e. no joins or splices in the cord are permitted). Extension cords may not be daisy-chained (i.e. one extension cord plugged into another extension cord). Extension cords and equipment cords may not be modified to fit a receptacle (socket).

Two-conductor extension cords may not be used. A three-conductor extension cord (i.e. a grounded or earthed cord) must be used even if the equipment that it is supplying electricity to uses a two-prong plug.

Extension cords that are frayed, have insulation tears, cracks or abrasions, have exposed conductors, or have bent, broken or "spread" plug prongs may not be used.
Extension cords that will be used outdoors must have heavy duty insulation and must be weather and UV resistant.

All electrical equipment cords and extension cords must be covered or elevated to protect them from damage and to eliminate tripping hazards.
Each contractor is responsible for protecting his electrical equipment from the weather and from possible mechanical damage.

All portable electrical equipment (including generators) must be inspected, tested and tagged by a competent and appropriately qualified electrician on a monthly basis. Details of these inspections and tests must be recorded in a register which must be made available to the Transnet Contract Manager for inspection.

The inspection and testing must include a continuity test of the grounding (earthing) conductor (as applicable) and a complete examination of the equipment or system to assure safe use.

A colour coding system must be used for the tagging of all electrical equipment.

The tag placed on a piece of equipment must be traceable to an entry in a register where the following information concerning the inspection and testing of that piece of equipment must be recorded:

- Date of inspection and testing;
- Equipment description;
- Equipment owner;
- Equipment location;
- Name, signature and licence number of the electrician who carried out the inspection and testing; and
- Comments concerning the inspection and testing, and details of any repair work carried out or required.

Any item of electrical equipment that does not pass an inspection or test must be removed from service (and tagged, "Out of Service") immediately and must then either be repaired (if possible) or removed from site.
Any item of electrical equipment without a tag or with an out-of-date inspection or test may not be used.

Any item of electrical equipment found without a tag or with an out-of-date inspection or test must be removed from service until it has been inspected and tested. If it is found that more than one item of equipment being used by a contractor has not been inspected and tested as required, all work with electrical equipment must be stopped until it can be demonstrated to the satisfaction of the Transnet Contract Manager that the contractor's systems and controls are adequate and fully implemented.

In addition to the formal monthly inspections and testing carried out by an electrician, electrical equipment (particularly extension cords, portable hand tools, welding machines, compressors and pumps) must be visually inspected by the user on a daily basis prior to use. Users must be trained to look for cracks in casings, loose casings, outer cord sheathing that is not being held firmly in position at the equipment, cuts or cracks in cord or cable insulation, exposed conductors, damaged plugs or sockets, and missing covers. Damage and / or defects must be reported immediately.

Personnel must immediately stop using and report any electrical equipment or machinery that is shocking, sparking, overheating or smoking. Corroded outlets, switches and junction boxes must also be reported.

16.14 Confined Spaces

The contractor shall comply to the requirements of General Safety Regulation 5 with regard to confined space entry and working inside confined spaces. This includes working inside tunnels.

Entry into a confined space occurs when a person's whole body, upper body or head is within the confined space. This is not intended to prevent an authorised, competent person from inserting only his arm into the space to test for hazards using appropriate monitoring equipment. Precautions must be taken to prevent persons from being overcome by atmosphere escaping from the confined space.

Before any person enters a confined space, a detailed risk assessment must be carried out, including the need for an authorised person to assess such things as oxygen levels, contaminants, temperature extremes and concentration of flammable substances.

As a minimum the risk assessment shall address the following:

- Isolation and lockout procedures required for chemical substances, mechanical or electrical energy, steam, pressure, heat, gases, liquids and solids;
- Venting, purging, draining and cleaning prior to entering the confined space;
- Hazards created by carrying out particular tasks or through the use of chemical substances in the confined space. Task-Based (or Issue-Based) Risk Assessments and/or Written Safe Work Procedures must be available for work in confined spaces - in particular for abrasive blasting, welding, flame cutting, grinding, chemical/steam cleaning, rubber lining and painting;
- Entry, exit and escape routes as well as barricading;
- The electrical safety, intrinsic safety and other safety specifications of equipment to be used in the confined space (explosive atmospheres must be considered);
- The need to test for presence of toxic/asphyxiant substances, radioactivity, oxygen, temperature extremes and flammable substances prior to entry and during the performance of work;
- Provision of suitable mechanical ventilation and personal protective equipment e.g. lifejackets etc. and in particular the use of respiratory protection such as compressed air breathing apparatus; and
- A ventilation rate suitable for general use must take into account factors such as air contaminant type, rate of generation, rate of oxygen depletion, temperature, efficiency of ventilation distribution and contaminant removal from the breathing zone. Therefore, each situation needs to be evaluated on its own merit by a risk assessment that will select a combination of ventilation method and respiratory protection that suits the particular circumstances. This must be achieved by consultation between competent operations personnel, engineers and a ventilation specialist.

- Lighting

Entry and work inside a permitted confined space must be controlled and regulated by the project Isolation / Lockout and Permit to Work control systems. The Authorised Person issuing the Permit to Work may only do so if the conditions applying to the specific confined space entry have been satisfied and documented.

As a minimum, the following must be included in the permitting process:
- Access barriers to prevent unauthorised entry;
- Isolation procedures for contaminants and other energy sources;
- The need for breathing apparatus / ventilation requirements;
- The sign-in and sign-out of all persons entering the confined space;
- Display of the permit;
- Communication procedures and/or equipment;
- Safety specifications of equipment to be taken into the confined space;
- Barricading of entrances and exits;
- Rescue plan and equipment;
- Standby person(s); and
- A completion and lock-in procedure (to ensure that space is evacuated and adequately secured).

The Permit to Work process must require competent rescue persons with suitable communication, rescue and firefighting equipment to be present where any of the following may exist:
- Compressed air breathing apparatus is required;
- There is a high risk of fires or explosions;
- The atmosphere can rapidly become unsafe for breathing purposes if the mechanical ventilation fails;
- There is a high risk of flooding or engulfment;
- Narrow tunnels or pipes are entered or where exit or escape routes cannot readily be accessed
- Work is done in remote areas; and
- A single person, who cannot be observed directly or is isolated from other workers, does the work.

Where testing for toxic/asphyxiate substances, radioactivity, oxygen, temperature extremes and other health hazards as well as for flammable substances is carried out, it may only be done by persons trained, tested and certified competent in writing to do so.

The ventilation method and quantity must be adequate to ensure oxygen levels and explosive or toxic gas levels remain within acceptable defined limits. Where ventilation is required, this must be covered by an approved documented procedure.

As a minimum standard, the volume of air pumped in and circulated in a confined space needs to be equivalent to 20 times the volume of the space per hour.

Where breathing apparatus or respiratory equipment is required, the contractor's Health and Safety Officer must be consulted with regard to the specification and selection of suitable equipment.
All persons required to use respiratory protection must be medically fit and trained in the correct use of the equipment.

Safe and convenient entry exit and escape routes from the confined space must be provided where possible and practical. Where this cannot be achieved effectively, the risk

assessment must determine if a competent rescue person must be on duty at the confined space when work is in progress.

Where a standby/rescue person is required, they will have no other duties and will be positioned outside the confined space entry point at all times while personnel are within the space.

16.15 Electrically Powered Tools and Equipment

All powered hand tools, such as circular saws, drills, chainsaws, percussion tools, jigsaws etc., must be equipped with a constant pressure switch that will shut off the power when the pressure is released. (Exception: this requirement does not apply to concrete vibrators, concrete breakers, powered tampers, jack hammers, rock drills, and similar hand operated power tools).

Electrical power tools must be of the approved double-insulated type. The electric cord, pneumatic or hydraulic supply line of powered tools must not be used for hoisting or lowering of the tool.

Loose clothing, jewellery or gloves that could get caught in the tool must not be worn when operating powered tools. Operators of powered tools who have long hair must keep their hair tied up.

The power source must be disconnected from the tool before making any repairs, servicing, adjustments, or replacing attachments such as drill bits.

16.16 Pneumatically Powered Tools and Equipment

Pneumatic powered tools must only be driven by filtered compressed air with an in-line lubrication system or be lubricated prior to use if there is no in-line lubrication system. When using pneumatic powered tools, the designated tool pressure must be attained by the use of a regulator.

Pneumatic powered tools must be disconnected when not in use. They must not be disconnected from the air supply until all the residual pressure has been released or contained by a shut-off device. Hoses must not be kinked as a means of containment.

Employees operating pneumatic powered tools, and any potentially affected employee in the vicinity of use, must wear suitable personal protective equipment.
All rotary compressed air tools (e.g. drills) must have the rated revolution per minute (RPM) permanently marked on the casing. Only attachments of compatible RPM must be used with these machines.

The actual RPM of the tool must be checked every three months to ensure that the speed is as rated to manufacture specifications.

Pneumatic powered tools must be secured to the air supply hose by an approved positive means to prevent the tool from becoming accidentally disconnected. Safety clips or retainers must be securely installed and maintained on pneumatic impact (percussion) tools to prevent attachments from being accidentally expelled.

All pneumatically driven nailers, staplers, and other similar equipment provided with automatic fastener feed, which operate at more than 100 kPa pressure at the tool, must have a safety device

on the muzzle to prevent the tool from ejecting fasteners unless the muzzle is in contact with the work surface.

Compressed air must not be used for cleaning purposes except where reduced to less than 30 kPa, and then only with effective chip guarding and personal protective equipment in place. The 30 kPa requirement does not apply to concrete form, mill scale and similar cleaning purposes. Compressed air must not be pointed at any part of the body or used for cleaning clothing.

Airless spray guns of the type which atomize paints and fluids at high pressures must be equipped with automatic or visible manual safety devices which will prevent pulling of the trigger to prevent release of the paint or fluid until the safety device is manually released. A diffuser nut which will prevent high pressure, high velocity release while the nozzle tip is removed, plus a nozzle tip guard which will prevent the tip from coming into contact with the operator, or other equivalent protection must be provided in lieu of the above.

Abrasive cleaning nozzles must be equipped with an operating valve, which must be held open manually to enable operation. A support must be provided on which the nozzle may be mounted when it is not in use.

16.17 Hydraulically Powered Tools and Equipment

Hydraulic powered tools must use only approved fluid that retains its operating characteristics at the most extreme temperatures to which it will be exposed. The manufacturer's stated safe operating pressures for hoses, valves, pipes, filters and fittings must not be exceeded.
Only manufacturer approved hoses, valves, pipes, filters and fittings must be used.

16.18 Hand Tools

Employees required to use hand tools must receive training relevant to the tool and have their competency assessed in the operation, inspection and maintenance of the tool. Where necessary, additional applicable personal protective equipment must be worn when using hand tools.

Wrenches, including adjustable, pipe, end, and socket wrenches, must not be used when the jaws are sprung to a point where slippage occurs. Impact tools such as drift pins, wedges and chisels, must be kept free of mushroomed heads. The wooden handles of tools must be kept free of splinters or cracks.

Adjustable wrenches must not be used in lieu of ring or open-end type spanners, unless a risk assessment has been conducted and the use of the adjustable wrench is approved by the Transnet Contract Manager. Wherever possible, ring spanners must be used in preference to open end spanners.

Correct hand tools for the job must be used, e.g. screwdrivers must not be used as chisels, and pliers must not be used as hammers.

All wedges and drifts that may spring, fly or fall to lower levels upon impact must be fitted with an attachment which attaches a safety "lanyard" to a solid structure to restrain the impact tool from becoming a projectile.

All hand tools used in elevated areas, that may be dropped or fall to lower levels must be fitted with safety lanyards and attached to solid structures or in the case of podges, scaffold keys etc., attached by wrist lanyard to the user.

Purpose built tools and equipment may not be used unless a risk assessment has been conducted and authorised by the Transnet Contract Manager.

16.18.1 Stanley Knives / Utility Knives

A utility knife must be used as a last resort, when it is the safest tool to use. Always consider alternatives that pose less of a risk to the operator.

Whenever a utility knife is used, ensure that a complete risk assessment is done and that all possible hazards have been addressed.

Only utility knives with retractable blades are to be used. The blade is to be retracted at all times when the knife is not in use or is being stored.

Before using the utility knife, ensure that the tool is in a good condition and the blade is secure in the holder (seated correctly and that there is no play). Ensure that the blade is always sharp and in good condition. This will prevent the use of excessive force.

Always wear cut resistant gloves and safety glasses when using a utility knife. There is always a risk of the blade breaking under tension and becoming a projectile.
Always ensure that you cut away from your body, and that no part of your body is in the firing line.
Always ensure cleanliness of all equipment in use during the cutting operations.

16.19 Inspection of Equipment and Tools

All tools must be inspected by the user before, during and after use. If any faults are identified, the tool must be taken out of service and not used until repaired. Faulty tools that are not able to be repaired must be tagged "out of service" and removed from site.

16.20 Manual Handling and Vibration

Any handling or lifting task that can only be done manually must be planned and rehearsed before the task is done.

If more than one person is involved in a task a communication procedure must be agreed in advance. Lowering the load must be done in a controlled manner. Dropping a load is dangerous and must be avoided.

As a guideline 25 kg is considered to be the limit of what a person can safely handle. Where there are loads exceeding 25 kg the risk of handling the load must be mitigated to assure minimal potential for any injury. When mechanical lifting aids are provided, they should be used. Extra care should be taken when lifting awkwardly shaped objects.

Position the feet correctly. The feet should be placed hip-width apart to provide a large base. One foot should be put forward and to the side of the object, which gives better balance. Bend or 'unlock' the knees and crouch to the load. The weight will then be safely taken down the spine and the strong leg muscles will do the work.

Get a firm grip. The roots of the fingers and the palm of the hand should grip the load. This keeps the load under control and permits it to be distributed more evenly.

Risk Assessment with regards Manual Handling must be conducted and also take into consideration the task factors, physical demands and tools involved in the task.

As far as possible, exposure to vibration must be eliminated. However, if this is not possible, short-term solutions to decrease exposure include:

- Reducing the vibration levels;
- Removing the person from the vibrating equipment / tools;
- Reducing the period of time that the person works with the vibrating equipment / tools (at least 40 minutes break after 20 minutes working with a machine that vibrates excessively).

In order to reduce exposure to vibration:

- Consider buying equipment that operates effectively at lower speeds;
- Buy equipment with built-in damping materials;
- Buy lighter tools if they are available - they require less of a grip;
- Maintain the equipment;
- Make sure equipment is balanced and there are no worn parts;
- Use remote controls when they are available;
- Reduce your grip on the equipment when it is safe. The less time you actually have your hands on the equipment the better. Relax your hands during these brief breaks;
- Take scheduled breaks; and
- Do other tasks that allow you to move away from vibrating tools and equipment.

The workplace must be assessed by a competent person for compliance with good design, layout and practice, to avoid or minimise adverse health consequences due to manual handling and vibration issues.

Quantitative evaluations of vibration produced by specific equipment must include the following measurement parameters: direction of movement, frequency, intensity, and variation with time and duration, as per documented methods.

Employees and contractors must be informed of the results of assessments and instructed in appropriate manual handling techniques, where the risk assessment indicates a need.

Workplace vibration sources that could contribute to the exceedance of an Occupational Exposure Limit (hence potential for impact on worker Musculo-skeletal fitness) must be identified and adequately characterised.

Manual handling tasks assessed as having the potential to cause a Lost Time Injury (i.e. with potential for impact on worker Musculo-skeletal fitness) must be identified and adequately characterised.
Workplace manual / materials handling tasks risk rated as "significant" must be assessed and recorded to include biomechanical factors (e.g. posture, bending, twisting, repetitive motions, working overhead, and exerting force away from the body).

16.21 Personal Protective Equipment

PPE requirements for a particular job or for a particular area must be determined through a risk assessment for that job or area. Each contractor must provide each of his employees with all required PPE (at no cost to the employee). The specific PPE that is provided to a particular employee must be based on the nature of that employee's work and the location

in which the work is performed (i.e. must be based on the hazards to which the employee is exposed).All applicable legislation concerning Personal Protective Equipment (PPE) must be complied with at all times.

As a minimum, the following PPE must be worn by all persons (including visitors) at all times whilst on site:

- Safety footwear with steel toe protection;
- Safety helmet (hard hat); and
- High visibility protective clothing with reflective taping (long trousers and long-sleeved shirts with collars and cuffs).
- Additional PPE requirements must be determined through hazard identification and risk assessment. This hazard-specific PPE (such as hand protection, hearing protection, hard hat, safety goggles, safety glass, face shield and respiratory protection) must be worn as required (e.g. when in a certain area, when performing a certain task, or when working with a certain substance);
- The correct PPE must always be worn:
- In accordance with site requirements (as indicated at the entrances to a site and at the entrances to buildings and / or designated areas on the premises);
- In zoned areas (e.g. noise zones and respirator zones); or
- As required by a Safe Work Procedure, or a Material Safety Data Sheet (MSDS).

Any employee who refuses to wear PPE or does not have all of the required PPE to perform his duties safely, will not be permitted to work.

Each employee must care for his PPE, maintain it in good condition, and inspect it on a daily basis. If an item of PPE has worn out, has become damaged, or is found to be defective in any way, it must be replaced by the contractor.

PPE must be stored in accordance with the manufacturer's requirements and / or recommendations.

Each employee must receive training in the use, maintenance and limitations of the PPE that is provided to him, and must be made aware of why the PPE is necessary as well as the consequences of not wearing it as instructed (i.e. the potential for injury and / or disciplinary action). Training records must be retained.

Symbolic signs indicating mandatory PPE requirements must be prominently displayed at the entrances to the work site and at the entrances to buildings and / or designated areas on the premises where additional PPE is required. These signs must comply with the applicable national standard (if one exists).

Each contractor must appoint an employee to control the issuing and replacement of PPE, keep an up-to-date register as proof of PPE issued (an employee must sign for the items that he receives, maintain PPE stock levels on site and carry out regular inspections to ensure that PPE is being used correctly and maintained in a good, serviceable and hygienic state, and is not being shared between employees.

16.21.1 Head Protection

A safety helmet (or hard hat) worn correctly will help protect the head in the event of:

- An employee being struck on the head by a falling or flying object; • An employee striking his head against a fixed or protruding object; or
- Accidental head contact being made with an electrical hazard.

A safety helmet must be worn in accordance with the manufacturer's requirements. A safety helmet must be worn directly on the head. The wearing of a cap or other headgear beneath a safety helmet is prohibited unless the items have been specifically designed to be used in combination (i.e. the arrangement is approved by the safety helmet manufacturer).

The suspension system inside a safety helmet (that acts as a shock absorber) may not be removed.

The painting of safety helmets is prohibited.

Safety helmets may only be cleaned using a mild detergent and water. No solvents may be used.

16.21.2 Eye Protection

If an employee is carrying out, assisting with, or working adjacent to any activity where sparks or projectile particles are being generated, where chemical mists or fumes are being generated, where liquids may splash or spray, where harmful electromagnetic radiation (heat or light) is being generated, or where there is a risk of wind-blown particles entering the eyes, then suitable protective eyewear must be worn at all times (i.e. safety glasses, safety goggles, a face shield, a welding helmet, or a combination of these).

Such activities include:
- Working with rotating equipment (e.g. grinders, drills, mills, lathes, and saws);
- Welding and cutting;
- Chipping, chiselling or caulking;
- Using explosive powered tools;
- Abrasive blasting;
- Sanding; and
- Working with chemical substances (e.g. drilling fluids, acids, solvents, paints, pesticides, etc.).

For certain activities, special eye protection is required (e.g. a heat-resistant face shield is required when working near molten metal).
Double eye protection is required for activities such as:
- Grinding, cutting, chipping, chasing and reaming (employees must wear both a full-face shield and safety glasses or goggles); and
- Arc welding (welders must wear both safety glasses and a welding helmet).

16.21.3 Hearing Protection

Regulations concerning occupational exposure to noise and the use of hearing protection must be complied with as a minimum. "Low noise" tools and machinery must be used wherever possible to reduce noise levels.

Where noise cannot be reduced to an acceptable level through engineering and work practice controls, measures must be put in place to minimise the exposure of employees to the noise (i.e. administrative controls and personal hearing protection).

Areas where it is likely that the 95% upper confidence limit of an eight-hour L_{eq} mean exceeds 85dB(A), or areas where impulse noise exceeds 140dB(C), must be designated as noise zones. These noise zones must be clearly demarcated and mapped, signs must be posted, and all employees must be made aware of the requirements for working in such an area.

Suitable hearing protection must be worn in all designated noise zones and when carrying out (or working in the vicinity of) any activity where the noise level exceeds 85dB(A).

Where hearing protection is required, a hearing conservation programme (applicable to all personnel and visitors) must be implemented. The programme must include training in the correct use and proper storage of hearing protection devices as well as replacement requirements. Training must be provided when hearing protection is first issued to an employee and refresher training must be carried out at least annually thereafter. Training records must be retained.

At least two types of personal hearing protection must be made available to employees.
The hearing protection devices provided must have adequate noise reduction ratings (i.e. must be able to attenuate the noise level to below 85dB(A)).

Personal hearing protection must be issued on an individual basis and must not be shared.
In addition to personally issued hearing protection, suitable disposable hearing protection must be made available at the entrances to all noise zones.

All Hearing Protection Devices (except for disposable hearing protection) must be properly inspected and cleaned on a regular basis.

16.21.4 Respiratory Protection

Designated areas (respirator zones) must be established where:

- It is likely that the 95% upper confidence limit of a Similar Exposure Group's mean exposure concentration exceeds the relevant Occupational Exposure Limit (OEL) for agents resulting in chronic effects, such as total inhalable dust, respirable dust, respirable crystalline silica, PAH, fluorides, lead, mercury, asbestos or non-asbestos fibrous materials; or
- The concentration of an agent (particulate, vapour or gas) with an acute effect exceeds 50% of the relevant OEL.

Note: For a particular hazardous agent, the OEL to be adopted must be either the client's OEL or the OEL specified in legislation, whichever is the most stringent.

These areas must be clearly demarcated and mapped, signs must be posted, and all employees must be made aware of the requirements for working in such an area.

Suitable Respiratory Protection Devices (RPDs) must be worn in all designated respirator zones and when carrying out (or working in the vicinity of) any activity where the risk assessment has identified the need for respiratory protection.

Compatibility with the work tasks and other PPE, comfort (as it affects wear-time), and the ability to communicate adequately, must also be considered.

The risk assessment and method statement for the work to be performed, the information contained in the relevant Material Safety Data Sheets (MSDSs), and the results of any air monitoring associated with the substances to be worked with or activities to be carried out, must be used to ensure that the most suitable RPD is selected.

Only RPDs certified to a recognised standard and approved by the Transnet Contract Manager may be used.

Where respiratory protection is required, a respiratory protection programme (applicable to all personnel and visitors) must be implemented.

The respiratory protection programme must include:

- Periodic inspection of RPDs, including before each use;
- Periodic evaluation (by competent persons) of cleaning, sanitising, maintenance and storage practices;
- Performance of positive pressure and negative pressure fit checks by RPD wearers before each use to ensure that the respirator is functioning properly; and
- Training at first issue of a RPD and regular refresher training thereafter in accordance with regulatory requirements or at least once every two years (the training must cover fit testing, use, cleaning, maintenance, filter cartridge replacement, and storage). Training records must be retained.

RPDs must be used, maintained, and stored in compliance with the manufacturer's requirements as well as the respiratory protection programme.

Suitable facilities must be provided for the cleaning and sanitary storage of RPD's.

As a minimum, qualitative and documented fit testing must be carried out (although quantitative fit testing is preferred) to ensure that the use of negative pressure RPDs (including disposable RPDs) is effective. Fit testing must be performed by a competent person when an RPD is first issued and must be repeated periodically in accordance with legal requirements or every two years as a minimum. A policy must be in place requiring a clean-shaven face when using a negative or neutral pressure RPD for routine tasks (otherwise a positive pressure RPD must be used). A medical evaluation including a pulmonary function test may be required to determine whether or not an individual is medically fit to wear a respirator.

For air supplied RPDs, breathing air must be effectively filtered and / or isolated from plant and instrument air, and isolated from sources of potential contaminants. The supplied air must be tested to determine if the air quality complies with the requirements of applicable standards for breathing air.

For nuisance dust, dust masks with a protection level of at least FFP2 must be worn.

16.21.5 Hand and Arm Protection

Gloves must be worn when handling or working with equipment, materials or substances with the potential to cause injury or illness.
Suitable gloves must be selected based on the task to be performed and the specific hazard against which the employee requires protection, such as:

- Sharp edges;
- Sharp points and splinters;
- Abrasive surfaces;
- Hazardous chemical substances (toxic, corrosive, sensitising, etc.);
- Extreme temperatures; and • Viruses, bacteria and parasites.

16.21.6 Foot Protection

Safety boots must be worn at all times whilst on site, with the exception of offices and office or administration buildings in which closed athletic, business or similar shoes may be

worn. Sandals, slops, slippers, open-toed and high-heeled shoes are not permitted on any work premises.

Safety boots must provide the following protection:
- Steel toe cap to protect against crushing (impact and compression forces);
- Leather uppers that provide resistance against water penetration and water absorption;
- Slip resistant soles;

And where a risk assessment identifies the need:
- Puncture resistant soles (i.e. steel midsoles) for protection against sharp objects;
- Chemical resistant soles for protection against spilt chemical substances (such as solvents, hydrocarbons, acids, and alkalis);
- Heat resistant soles for protection against hot surfaces or molten metal; or
- Electrical shock resistant soles for protection (insulation) against live electrical conductors.
- Gumboots with steel toe caps must be worn when working in water or very wet conditions.

16.21.7 Clothing

All employees working on a work site must wear high visibility protective clothing with reflective taping. Trousers must be long, and shirts must be long-sleeved. Shirts must be buttoned at the neck and wrists.

Protective clothing must preferably be made of natural fibres.

Short pants, short-sleeved shirts, sleeveless shirts, and vests are prohibited as outer garments (with the exception of a high visibility vest worn over a long-sleeved shirt). Loose clothing may not be worn where it may become caught in moving machinery or equipment.

For hot work (e.g. welding, cutting, etc.), work in the vicinity of molten metal, and any work carried out in the vicinity of an open flame, the protective clothing worn (shirt and trousers) must be made of a suitable fire retardant fabric. Underwear and socks must be made of natural fibres (preferably wool) or fire-retardant fabric.

No employee may tuck his trousers into his boots when working in the vicinity of molten metal.

16.21.8 Body Protection

Suitable body protection must be provided as required to protect employees against specific hazards. A range of work activities require body protection in one form or another, including but not limited to:
- Working in extremes of temperature, such as firefighting, attending to a heating furnace, working with molten metal, working in refrigerated environments, etc.;
- Hot work (e.g. welding, burning, cutting and grinding);
- Working with hazardous chemical substances (e.g. acids, solvents, pesticides, etc.); and
- Clean up and disposal of hazardous materials and wastes (e.g. asbestos, hydrocarbons, etc.).

A wide variety of protective garments are available, such as firefighting suits, furnace suits, freezer jackets, leather aprons, leather spats, laboratory coats, chemical resistant aprons, chemical resistant (or hazmat) suits, and disposable coveralls.

16.21.9 Electrical Protective Equipment

To reduce the risk of electric shock, electrical insulating equipment appropriate for the voltage that may be encountered must be worn when working on energised electrical installations and when working within two metres of exposed energised conductors.

All rubber electrical insulating equipment (including gloves, sleeves, matting, covers, blankets, and line hoses) must be inspected for damage prior to and after each use, and immediately following any incident that can reasonably be suspected of having caused damage.

Rubber insulating equipment with defects and / or damage may not be used.

Rubber insulating gloves must be electrically tested before first issue and every 12 months thereafter as a minimum. Insulating gloves must also be given an air test along with the daily inspection. Essentially, this involves filling a glove with air and checking for any holes or leakage.

Insulating equipment that fails an inspection or electrical test may be repaired only as follows:

- Rubber insulating line hose may be used in shorter lengths with the defective portion(s) cut off;
- A rubber insulating blanket may be repaired using a compatible patch that results in the patched area having electrical and physical properties equal to those of the blanket;
- A rubber insulating blanket may be salvaged by cutting the defective area off the undamaged portion of the blanket;
- Rubber insulating gloves and sleeves with minor physical defects, such as small cuts, tears, or punctures, may be repaired by applying compatible patches. The patched areas must have electrical and physical properties equal to those of the surrounding material.

Repairs to gloves are permitted only in the area between the wrist and the reinforced edge of the opening.

Repaired insulating equipment must be retested before it is put back into use.
Insulating equipment must be cleaned as required to remove foreign substances (using a mild detergent).

Insulating equipment must be stored in such a location and in such a manner so as to protect it from light, temperature extremes, excessive humidity, ozone, and other damaging substances and conditions.

Leather protective gloves must be worn over rubber insulating gloves to provide mechanical protection against cuts, abrasions, and punctures.

Suitable arc flash PPE (e.g. voltage rated gloves, fire retardant clothing, arc rated face shield, arc flash hood, arc flash suit, etc.) must be worn whenever an employee is potentially exposed to an

arc flash hazard. The appropriate level of PPE must be worn depending on the task and the potential energy exposure. These PPE requirements must be clearly specified as part of arc flash protection programme (refer to the Electrical Safety Standard).

16.21.10 Jewellery

Necklaces, dangling earrings, and bracelets may not be worn on a work site. No ring or watch may be worn where there is a risk that it may become caught in machinery or equipment. No jewellery or other conductive apparel (such as a key chain or watch) may be worn when carrying out energised electrical work.

16.21.11 Hair

Scalp hair that is longer than the top of the shoulders must be tied up and restrained within the person's safety helmet or within the collar of his or her overalls, shirt or jacket.

For negative or neutral pressure Respiratory Protection Devices, facial hair must not cause the seal between the respirator and facial skin to be broken (or prevent a seal from being formed in the first place).

16.21.12 Task-Specific PPE

In addition to the standard PPE required for a work site (including a safety helmet, safety glasses, safety boots, and high visibility protective clothing), the following task-specific PPE must be used as a minimum by any person carrying out or assisting with such a task:

Grinding – safety glasses or goggles and full-face shield (i.e. double eye protection), hearing protection, respiratory protection where dust or fumes may be generated, leather gloves, leather apron, and leather spats;

- Spray Painting – respiratory protection (air-supplied hood for confined spaces), safety goggles (if the respirator design does not provide this protection), hearing protection (where air compressors are used), chemical resistant gloves, and chemical resistant disposable coveralls.

16.22 Sun Protection

The contractor must ensure that all personnel are protected in sunlight through the use of long sleeve shirts, long trousers, brims, helmets and UV factored sunscreen. Shade structures must also be made available to all employees.

The contractor must conduct training and awareness sessions with his employees, advising on the risks associated with working in the heat (including dehydration) and the precautions to be taken (e.g. ensuring adequate fluid intake).

16.23 Fuel / Flammable Liquid Storage and Refuelling

No fuel (diesel, petrol, paraffin, etc.) or any other flammable liquid (paints, solvents, etc.) may be stored on site unless approved in writing by the Transnet Contract Manager.

If the on-site storage of a fuel or a flammable liquid is approved, the contractor must ensure the following:

- The quantity of fuel / flammable liquid to be stored on site must be kept to the minimum that is required;
- The storage area must be located in a well-ventilated area at least 10 metres away from any building, drain, boundary or any combustible material;

- If more than 200 litres of fuel / flammable liquid is to be stored, the tank must be installed / the containers must be positioned within a bund (see Definitions);
- If the fuel / flammable liquid are to be stored in bulk tanks / vessels, then the minimum capacity of the bund must be 110% of the volume of the largest tank / vessel. If many small containers (e.g. 210 litre drums) are to be stored, the bund must be able to contain 25% of the total volume of the stored products;
- The bund must be impermeable. It must have a solid concrete floor and the walls must be constructed out of brick and must be plastered on the inside;
- The bund must be fitted with a lockable drain valve (for draining away rainwater), which must remain locked in the closed position. The valve may only be opened under supervision and in accordance with a written procedure;
- The fuel / flammable liquid storage area may not be used for the storage of any other materials / equipment, and must be kept completely free of all combustible materials (including rubbish, brush and long grass) at all times;
- Access to the storage area must be controlled (wire mesh fencing and gate);
- Appropriate warning signage (i.e. "Flammable Liquid", "No Smoking" and "No Naked Flames") must be prominently displayed at the storage area. The contents and volume of each tank must be indicated;
- In order to contain spillages, the offloading / refuelling bay at the fuel / flammable liquid storage area must have a solid concrete base surrounded by bund walls, ramps or humps and / or spill trenches (covered with steel grating) that lead into a sump;
- Fuel dispensing pumps must be protected against impact damage;
  All fuel / flammable liquid storage tanks and dispensing equipment must be electrically bonded and properly earthed;
- All electrical installations and fittings must be of an approved intrinsically safe type;
- Two 9kg dry chemical powder fire extinguishers must be mounted in an easily accessible position near the entrance gate to the fuel / flammable liquid storage area. Depending on the size of the storage area, additional fire extinguishers may be required to ensure that an extinguisher is no further than 15 metres away from any point on the perimeter of the storage area;
- A fire extinguisher must be at hand wherever refuelling is carried out;
- Smoking or open flames within 10 metres of a fuel / flammable liquid storage / refuelling area is strictly prohibited;
- No petrol- or diesel-powered vehicle or equipment may be refuelled while the engine / motor is running;
- Cellular phones must be switched off in fuel / flammable liquid storage / refuelling areas;
- Spill clean-up kits (containing a suitable absorbent fibre product) must be provided;
- Any spillages must be cleaned up immediately and all contaminated cleaning materials must be disposed of in accordance with the applicable legislation;
- If a flammable liquid is spilt or is leaking from a container / vessel, the area must be cordoned off and appropriate warning signage must be displayed to keep unauthorised personnel away from the affected area. Every effort must be made to contain the spillage. All hot work in the vicinity must be stopped immediately. If the spilt product is volatile and the possibility exists that a vapour cloud may form, or if the leak or spillage cannot be contained or stopped, then appropriate emergency response procedures must be activated (refer to Section 14) including the evacuation of all persons in the vicinity. Suitable firefighting equipment must be positioned ready for use should the spilt product ignite;
- The manual decanting of fuel or a flammable liquid from a large container should only be done using a stirrup pump (or similar) or a purpose-made frame which allows the container / drum to tilt for decanting and then return to the upright position;
- Drip trays must be used wherever required;
- All tanks, drums, cans, etc. containing flammable liquids must be tightly closed and properly sealed except for when a container is being filled or when a product is being decanted;

- The transport or storage of corrosive or flammable liquids in open containers is strictly prohibited
- Daily-use quantities of fuel (up to a maximum of 20 litres) must be handled in an approved safety can with a flash arresting screen, spring closing lid and spout cover that will safely relieve internal pressure if the can is exposed to fire;
- Where safety cans may be impracticable, only approved metal containers with screw caps may be used. Each container must be clearly labelled to indicate its contents;
- Only small quantities of flammable liquids (paints, solvents, etc.) may be stored within a building. Each product must be kept either in its original container or in an approved container which must be properly sealed. Each container must be clearly labelled to indicate its contents. When not in use, all such containers must be stored in a well-ventilated steel cabinet which must be kept locked to prevent unauthorised access;
- Not even small quantities of flammable liquids may be stored or dispensed in buildings or places of public assembly, in general warehouses, or in buildings containing sources of ignition such as space heaters, cooking devices, open electric motors, motor vehicles, or where welding, cutting, or grinding activities are being carried out;
- Safe Work Procedures must be compiled for the transportation (including delivery), offloading, storage, handling and use of any fuel / flammable liquid on site;
- All personnel that will be required to work with or may come into contact with a flammable liquid must be made aware of the hazards associated with the product and must be thoroughly trained in the safe transportation, use, handling and storage thereof.

16.24 Fire Protection and Prevention

The contractor must compile a Fire Protection and Prevention Plan for the work that will be carried out on site.

The contractor must assess / survey his area of responsibility and identify locations where the risk of fire is high. Cognisance must be taken of the fact that certain locations may need to be designated as high risk due to the presence of large quantities of flammable or combustible materials / substances. For all high risk areas, the contractor must ensure that additional precautions are taken to prevent fires and strict control is exercised over any hot work (i.e. welding, cutting, grinding, etc.) that is carried out.

The contractor must supply and maintain all required firefighting equipment. The type, capacity, positioning, and number of firefighting appliances must be to the satisfaction of the Transnet Contract Manager and must meet the requirements of the applicable legislation. Fire mains, hydrants and hose reels will rarely be available on site, so use must primarily be made of portable fire extinguishers.

Firefighting equipment, fixed and portable, must be strategically located with a view to being able to rapidly deploy the equipment in order to bring potentially dangerous and destructive fires under control while still in their infancy.

All fire extinguishers (and any other firefighting equipment) placed on site must be:

- Conspicuously numbered;
- Recorded in a register;
- Visually inspected by a competent person on a monthly basis (the results of each inspection must be recorded in the register and the competent person must sign off on the entries made); and
- Inspected and serviced by an accredited service provider every six months (the Transnet Contract Manager may require that this frequency be increased depending on the

environmental conditions (e.g. high dust levels, water, heat, etc.) to which the fire extinguishers are exposed).

Any fire extinguisher that has a broken seal, has depressurised, or shows any sign of damage must be sent to an accredited service provider for repair and / or recharging. Details must be recorded in the register.

Firefighting equipment may not be used for any purpose other than fighting fires. Disciplinary action must be taken against any person who misuses or wilfully damages any firefighting equipment.

Access to firefighting equipment, fixed or portable, must be kept unobstructed at all times.

Approved signage must be in place to clearly indicate the location of each permanently mounted fire extinguisher, fire hose reel, etc.

The contractor must ensure that all persons working in / entering his area of responsibility are made aware of where all firefighting appliances and alarm points are located.

The contractor must ensure that his employees (and those of any appointed subcontractors) are trained in firefighting procedures and the use of firefighting equipment.

The contractor must compile an emergency response procedure detailing the actions that must be taken in the event of a fire or a fire / evacuation alarm (see Section 14). All personnel working within the contractor's area of responsibility must be trained, and all visitors must be instructed, on this procedure. Copies of the procedure must be prominently displayed in the workplace in all languages commonly used on the site.

A person discovering a fire must extinguish the fire if he can do so safely, and then immediately report the incident to his supervisor. If the person cannot extinguish the fire, he must raise the nearest alarm and then report the fire as quickly as possible to his supervisor, the person responsible for the area, and / or Security.

On hearing a fire / evacuation alarm, all persons must make any operational plant or equipment safe, and then proceed to the nearest emergency assembly point and await instructions.

All incidents of fire (including the use or misuse of any firefighting equipment) must be reported to the Transnet Contract Manager immediately. Used fire extinguishers must be replaced by the contractor without delay.

No hot work (i.e. welding, cutting, grinding, etc.) or any other activity that could give rise to a fire may be performed outside of a designated workshop without a Permit to Work having been issued.

Wherever hot work is being carried out, a fire extinguisher must be at hand. Where the risk assessment determents that it is necessary, a fire watch must be stationed.

Supervisors must carry out workplace inspections regularly to ensure adherence to fire prevention measures and procedures.

At the end of every working period (i.e. before each tea / lunch break and at the end of every shift / day), the workplace must be thoroughly inspected to ensure that no material is left smouldering and no condition / situation exists that could give rise to a fire.

The contractor must ensure that all supervisors and all employees carrying out or assisting with any hot work or any other activity that could give rise to a fire have been trained in firefighting

procedures and the use of firefighting equipment. The training must be conducted by an accredited training provider.

When using electrical equipment, all cables must be in good condition and the nearest convenient socket must be used.

No power socket may be loaded beyond its rated capacity through the use of adaptors, etc.

Makeshift electrical connections are not permitted under any circumstances.

Water-based firefighting equipment must not be used on electrical equipment or burning liquids. Each vehicle used on site for work purposes and each item of mobile equipment with a diesel or petrol engine must be fitted with a permanently mounted fire extinguisher.

Smoking is only permitted in designated smoking areas. Cigarette ends / butts must be properly stubbed out in the ashtrays provided and never thrown into waste bins.

The contractor must ensure that good housekeeping practices are enforced, as this is crucial to the prevention of fires.

All combustible waste materials must be removed from the workplace on a daily basis (at the end of each shift) and placed in waste receptacles located at least 5 metres away from any structure.

The accumulation of waste materials in out-of-the-way places is prohibited. Offices, desks, cabinets, etc. must always be kept tidy and uncluttered. Wastepaper bins must be emptied regularly.

The storage of combustible materials under stairways or in attics is prohibited. The storage of any materials against the exterior of a building or any other structure is prohibited.

All walkways, passages and stairways must be kept clear (i.e. must be unobstructed) at all times, as they may need to be used as a means of escape. The areas around and the routes to all exits, fire escape doors, fire hydrants, fire hose reels and fire extinguishers must be kept clear (i.e. must be unobstructed) at all times.

"No Smoking" signs must be conspicuously displayed in and around all storage areas / rooms.

Waste may not be burned under any circumstances.

No flammable liquid (such as petrol, acetone, alcohol, benzene, etc.) may be used for starting fires or as a solvent for cleaning clothes, tools, equipment, etc. Only solvents approved by the Transnet Contract Manager may be used for cleaning purposes.

Whenever any work is carried out involving the use of a flammable substance / material, the area must be cordoned off and appropriate warning signage (i.e. “No Unauthorised Entry”, “No Smoking” and “No Naked Flames”) must be displayed.

16.25 Smoking

The contractor must not permit smoking on site except within designated smoking areas selected in accordance with the applicable legislation. Such an area must be clearly demarcated, and the required signage must be displayed.

Any person found smoking or discarding a cigarette butt outside of a designated smoking area may be removed (temporarily or permanently) from site. In all designated smoking areas, adequate non-combustible commercial ashtrays and / or cigarette butt receptacles (butt cans) must be provided.

Ashtrays and other receptacles provided for the disposal of smoking materials must not be emptied into rubbish bins or any other container holding combustible materials.

"No Smoking" signs must be strictly observed.

16.26 Housekeeping

The contractor must maintain all work areas in a tidy state, free of debris and rubbish. Unless directed otherwise, the contractor must dispose of all debris, rubbish, spoil and hazardous waste off site in a designated and authorised area or facility. The contractor must familiarise himself with the waste management plan for the site including collection and disposal arrangements and must align his waste management activities accordingly.

In cases where an inadequate standard of housekeeping has developed and compromised safety and cleanliness, a Transnet Contract Manager may instruct the contractor to cease work until the area has been tidied up and made safe.

Neither additional costs nor contract deadline extensions will be allowed as a result of such a stoppage. Failure to comply will result in a clean-up being arranged through another service provider at the cost of the non-complying contractor.

The contractor must carry out housekeeping inspections on a weekly basis to ensure maintenance of satisfactory standards. The contractor must document the results of each inspection. These records must be maintained and must be made available to the Transnet Contract Manager on request.

The contractor must implement a housekeeping plan for the duration of the contract ensuring that the site housekeeping is maintained. Furthermore, at the end of every shift, the contractor must ensure that all work areas are cleaned, all tools and equipment are properly stored, and construction rubble is removed.

Where the contractor fails to maintain housekeeping standards, the Transnet Contract Manager may instruct the contractor to appoint a dedicated housekeeping team at the contractor's expense. Littering is prohibited.

16.27 Waste Management

Waste may not be disposed of unless the disposal of that waste is authorised by law. The contractor must therefore ensure that all waste that is generated is handled, stored, transported and disposed of in accordance with the requirements of the applicable legislation / local authority.

No waste may be removed from the site to a waste storage or disposal facility unless that facility has been approved or licenced waste facility. Approved/licensed waste disposal service providers must be used for any waste removed from site. These service providers must be audited on a two-yearly basis (or more frequently if deemed necessary based on risk) in order to ensure compliance with legislation and to help ensure that no liabilities accrue to the contract.

An adequate number of waste bins and skips must be provided by the contractor and suitable arrangements must be made to ensure that these bins and skis are emptied regularly. Hazardous wastes must be kept separate from general wastes.

16.28 Stacking and Storage

All irregular shaped items will be stacked at floor / ground level in designated stacking areas on a level, firm base capable of withstanding the weight of the commodities being stacked and stacked in such a manner that the items do not topple over or change position due to subsidence or weight transfer when being moved.

Where these commodities are stacked on shelves or racks, the shelves or racks must be designed to carry the weight of the commodity being stacked.
All racks or shelves where heavy material or commodities are stacked will have a weight carrying limitation clearly marked on the structure and have a safety factor of at least +10% of maximum total carrying capacity.

All materials, commodities or articles, which could be damaged due to inclement weather, must be stored under cover.

Waste material that is combustible must not be allowed to accumulate in sufficient quantities to create a hazard.

No commodities or equipment may be stacked or stored within 500mm of rolling stock tracks or where mobile equipment travels.

The storage of material, small equipment, tools, files and general items in cupboards and on shelves must be neat and controlled at all times. Incompatible substances must not be stored in or on the same cupboard or shelf.

No equipment, tools, files or documents may be stored or stacked on top of cupboards which are higher than 1.5 metres in height.

16.29 Demarcation

Temporary demarcation in the form of hazard tape (red and white) may be used to demarcate areas where there is, for relatively simple reasons, restricted access.

Where hazards exist and entry must be specifically excluded for safety or health reasons, hazard tape in any form must not be used in isolation. A robust and substantial barrier of timber, rope or other material must be used in conjunction with barrier tape, to prevent entry to unauthorised persons.

Outside storage areas where it is impractical to use floor demarcation, demarcation may take the form of creosote poles and wire rope or similar. Spans between uprights should be painted yellow.

16.30 Facilities

The Contractor must in addition to Facilities Regulations 2004, provide at or within reasonable access of every site, clean, hygienic and maintained facilities.

Sanitary conveniences must be provided and maintained at a rate of at least one shower facility for every 15 workers, at least one sanitary facility for each sex and for every 30 workers, separate male and female changing facilities and sheltered eating areas. (Check SANS 10400 Part F).

Where chemical toilets are provided, one toilet for every twenty-five employees must be allocated.

All toilets must be cleaned daily, disinfected and provided with toilet paper. All employees making use of these facilities have the responsibility to help keep the facilities neat, clean and hygienic.

Washing facilities, including soap and towels, must be made available for use by the contractor's employees.

Drainage from all washing / toilet facilities must be properly designed and constructed to prevent employee exposure to wastewater (and the associated biological hazards). Wastewater may not accumulate or stand in pools at any location on the project site.

Change rooms must be provided and must be kept clean and free from odours at all times.

No chemicals or equipment or items (other than those normally associated with for cleaning of these hygiene facilities) may be stored in the facilities.

All entrances must be constructed in a way to afford privacy to users.

Drinking water must be provided.

A sheltered (covered) area must be set aside on site to be used as a dining facility (eating area). Adequate seating must be provided for the maximum number of employees. The facility must be kept clean and tidy. Food may only be consumed in authorised sheltered areas.

A suitably sized, impervious receptacle (bin) must be provided for the disposal of waste food and other refuse generated at the dining facility. This bin must be emptied and cleaned regularly (i.e. promptly after meal times).

Adequate storage must be provided to the contractor's employees for the storage of food and drinks. Where fridges are provided, they must not be overstocked and must maintain sufficiently low temperatures.

16.31 Occupational Hygiene

The contractor must ensure that the exposure or potential exposure of his employees to any of the following stressors is assessed and measured to determine the effectiveness of control measures as well as compliance with legal and other requirements, particularly Occupational Exposure Limits.

- Noise;
- Thermal stress (heat and cold);
- Particulates (dust);
- Silica (free crystalline silica);
- Asbestos;
- Gases or vapours;
- Lead;
- Chemicals;
- Ionising radiation;
- Non-ionising radiation;
- Vibration (hand / arm vibration and whole-body vibration); • Ergonomics; and

- Illumination.

A baseline survey must be carried out by an Approved Inspection Authority: A plan for measuring and monitoring occupational exposure must be developed by the contractor.
All monitoring results obtained must be analysed on a regular basis to:
• Identify trends and potential exceedances of legal or other requirements (such as Occupational Exposure Limits);
• Identify inconsistent or unusual results;
• Evaluate the effectiveness of existing control measures;
• Measure performance against stated objectives; and identify continual improvement opportunities.

Each exceedance of a specified requirement or limit must be recorded, investigated and reported. Appropriate corrective actions must be identified and implemented.

16.32 Lighting

For all work areas and access ways, if the natural lighting available is inadequate it must be supplemented by artificial lighting to meet the minimum levels required.

A lighting survey to determine luminance must be conducted for all work areas, at least once every two years and prior to work commencing for the first time in any area.
Measurements do not need to be conducted by an Approved Inspection Authority for Occupational Hygiene

Emergency lighting must be provided in all indoor workplaces that do have adequate natural lighting or in which persons work at night. The emergency sources of lighting that are provided must be such that, when activated, an illuminance of not less than 0.3 lux is obtained at floor level, to enable employees to evacuate safely.

Where it is necessary to stop machinery or shut down plant or processes before evacuating the workplace, or where dangerous materials are present or dangerous processes are carried out, the illuminance must be not less than 20 lux.

Windows and translucent sheeting must be kept adequately clean and clear of obstructions as far as reasonably practicable. Light fittings, i.e. lenses and reflectors must be kept clean.

If a light intensity meter is used, a valid calibration certificate must be available.

Neon lights must not be installed in areas where moving parts of machinery or equipment cannot be fully guarded, i.e. lathes, bench grinders, etc. in order to eliminate the stroboscopic effect.

No person may use a portable electrical light where the operating voltage exceeds 50 volts, unless:
- It is fitted with a non-hydroscopic, non-conducting handle;
- All metal parts which may become live are protected against accidental contact; • The lamp is protected by means of a guard firmly attached to the handle; and
- The cable can withstand rough use.

No person may use a portable electric light in damp or wet conditions or in closely confined spaces, inside metal vessels or when in contact with large masses of metal, unless: • The lamp is connected to a source incorporating an earth leakage; and • The operating voltage of the lamp does not exceed 50 volts.

16.33 Hearing Conservation

A hearing conservation program must be implemented and protection against the effects of noise exposure must be provided when the noise exposures equal or exceed an 8-hour time-weighted average sound level of 85 decibels measured on the A-weighted scale of a standard sound level meter at slow response.

For the hearing conservation program to be effective it must include as a minimum:

- Monitoring of the workplace to determine the representative exposure of employees to excessive noise levels;
- An audiometric testing program for employees, which must include:
  - A baseline audiogram for all employees exposed to noise levels equal to or in excess of the standard;
  - Annual audiograms for each overexposed employee;
  - Analysis of audiogram results with retesting and/or referral to an otolaryngologist or qualified physician when a significant threshold shift (STS) occurs; and · Written employee notification of the STS.
- A training program for all employees exposed to noise;
- Provision of personal protective equipment to all affected employees when administrative or engineering controls fail to reduce sound levels to within the levels of the standards.

Monitoring of employee exposures to noise shall be conducted by an Approved inspection Authority. The monitoring requirement may be met by either area monitoring or personal monitoring that is representative of employee exposures. Personal monitoring is preferred and may be required based on the type(s) of noise sources.

For purposes of the hearing conservation program, employee noise exposures shall be computed in accordance with legislation.

A person-task specification shall be available for every job category and shall be submitted with an employee for audiometric testing.

Audiometric testing and an annual audiogram shall be conducted by a competent person and provided as part of the regular medical examinations. Audiometric test results obtained from the pre-employment medical examination for a new employee shall be used as the baseline audiogram. Testing to establish a baseline audiogram shall be preceded by at least 14 hours without exposure to workplace noise.

Hearing protectors shall not be used as a substitute for the requirement that baseline audiograms be preceded by 14 hours without exposure to workplace noise. Employees shall be notified of the need to avoid high levels of non-occupational noise exposure during this 14-hour period.

Record-keeping for the audiogram shall include:

- Name and job classification of the employee;
- Date of the audiogram;
- The examiner's name;
- Date of the last acoustic or exhaustive calibration of the audiometer;
- Employee's most recent noise exposure assessment.

Audiometric test results shall be maintained in the employee's medical file.

Personal protective equipment shall be provided and replaced as necessary at no cost to employees. Supervisors shall ensure that hearing protective devices are worn by all employees who are exposed

to a time-weighted average of 85 decibels or greater and who have experienced a significant threshold shift. Employees shall be given the opportunity to select their hearing protectors from a variety of suitable protectors.

Noise zones shall be indicated my means of signs at every entrance to such zones. When noise levels exceed 100 dB(A), a combination of earplug and earmuff may be required to achieve protection of the worker. Hearing Protection Devices should be worn for the full noise exposure period.

16.34 Particulate and Gas / Vapour Exposures

The concentration of an HCS in the air is, or maybe, such that the exposure of employees working in that workplace exceeds the recommended limit without the wearing of respiratory protective equipment, is zoned as a respirator zone.

Designated areas must be created where:

- It is likely that the 95 per cent upper confidence limit of a Specific Exposure Group's (SEG) mean exposure concentration for agents resulting in chronic effects (such as total inhalable dust, respirable dust, respirable crystalline silica, PAH, fluorides, lead, mercury, asbestos or non-asbestos fibrous materials) exceeds the relevant OEL; and
- Agents with an acute effect, such as particulate hazards, or gases (e.g. CO, SO2, NH3, HF, etc.), or vapours exceed 50 per cent of the relevant OEL.

Designated areas must:

- Be identified and mapped, signposted or otherwise clearly communicated to employees working in the area. Signposting, where necessary, must use appropriate wording or symbols on signs to identify the hazard;
- Have a documented respiratory protection programme based on suitable risk assessment and standards, which is applied to employees, contractors and visitors;
- Have regular monitoring of SEGs working in the area; and
- Have a formal review of the practicality of engineering controls at least every two years, or less where it is a critical control for a significant risk.

Particulate and gas / vapour monitoring must be appropriate to the exposure conditions and toxicants and based on the use of equipment approved by local regulatory authorities, as per documented methods.

Where risk assessment indicates the possible presence of levels of gas or vapour sufficient to cause health effects in less than one shift (e.g. confined space entry), continuous monitoring is required as long as the potential for harm exists.
Employees and contractors must be covered by a medical surveillance programme when: • Their Specific Exposure Group TWA mean exposure to respirable crystalline silica, total inhalable dust, respirable dust, lead or asbestos is greater than 50 per cent of the relevant OEL;

- The medical adviser considers that it is advisable; or • There is a legal requirement for medical monitoring.

Where risk assessment indicates a risk of a respiratory condition, assessment programmes must include chest x-rays and / or lung function tests. The test or tests chosen must enable the earliest detection of adverse effects from the exposure of concern. Where indicated, they must meet the following standards:

- High quality chest x-rays will be taken every five years, unless local legislation requires these to be more frequent;

- All chest x-rays for pneumoconiosis surveillance will be read to International Labour Organisation (ILO) standards by an ILO B reader, wherever possible, and if not, by a competent radiologist using verifiable quality criteria;
- Any progression of more than one step on the ILO extended scheme to a reading above 1/0 will be reviewed by a physician;
- Any reading suggesting active lung disease will be reviewed by a physician; and
- All spirometry will be performed by trained staff following the American Thoracic Society guidelines or equivalent and be offered at a frequency determined by the likely rate of detectable change in lung function.

Controls must be of an adequate standard such that surfaces are adequately cleaned to avoid:
- Dust generation due to material dislodgment (e.g. windblown), where practicable; or • Fume generation from accumulated dust during welding / heating or cutting operations.

Where risk assessment indicates the need to reduce exposures to toxic substances for employees or their families, good personal hygiene must be enforced. The programme must include:
- No smoking, eating or drinking in designated hazard areas;
- Washing of hands and face prior to drinking, eating or smoking; • Showering at work post shift or after exposure to 'dirty' conditions; and
- Laundering of contaminated clothing by the contractor.

Abrasive blast cleaning must be conducted so as to protect worker health and minimise dust emissions. Substitutes must be used whenever practicable for abrasives containing crystalline silica. However, if such abrasives are used, workers must be aware of the hazards and exposure monitoring conducted. The hazardous properties of alternative materials must be considered before use.

Where required, training in the recognition of signs and symptoms of hazardous particulate and gas / vapour exposure, emergency procedures and preventative measures must be provided.

16.34.1 Respiratory Protection Devices

The selection of Respiratory Protection Devices (RPD's) must be based on:
- The potential particulate size distribution, gas / vapour types, substance toxicity and likely concentrations;
- Compatibility with the work tasks and other PPE; and
- Comfort (as it affects wear-time) and allowance for adequate communication.
- The type(s) of airborne contaminants that are present (gases, vapours, and particulates and aerosols including dusts, fumes, sprays, mists, and smoke);

Only RPD's approved by the Transnet Contract Manager may be used. Suitable facilities must be available for cleaning and sanitary storage of RPD's.

Half-mask and full-face air-purifying respirators must NOT be used where:
- The atmosphere is oxygen deficient (< 19.5 per cent);
- The atmosphere is immediately dangerous to life or health (e.g. in areas where CO concentrations are > 1500 ppm, HF > 30 ppm or NH4 > 300 ppm);
- Gases and vapours are more than ten times their OEL or greater than 1000 ppm for half-mask respirators, or more than 100 times their OEL for full-face respirators; or • Particulates are more than five times their OEL for half-mask respirators, or more than 50 times their OEL for full-face respirators.

For atmospheres that are oxygen deficient, or contain unknown hazards, or have concentrations of gases and vapours that are unknown or could potentially exceed levels that are immediately dangerous to life or health, an air-supplied type respirator must be worn.

For effective use of negative pressure RPD's (including disposable RPD's), fit testing must be qualitative and documented as a minimum, although quantitative fit testing is preferred. Fit testing must be performed by a competent person when RPD's are first issued and must be repeated periodically according to legal requirements or two-yearly as a minimum frequency. There must be a policy requiring a clean-shaven face when using a negative or neutral pressure RPD for routine tasks, or the use of a positive pressure RPD will be required. A pulmonary function test and medical evaluation may be required to determine whether or not an individual is medically fit to wear a respirator.

For air supplied RPD's, breathing air must be effectively filtered and / or isolated from plant and instrument air, and isolated from sources of potential contaminants. The quality of the breathing air must be checked for conformance with applicable standards.

The respiratory protection programme must include:

- Periodic inspection of RPD's, including before each use;
- Periodic evaluation of cleaning, sanitising, maintenance and storage practices by competent persons;
- Performance of positive and negative fit checks before each use by RPD wearers to ensure that the respirator is functioning properly; and
- Training at first issue of a RPD and regular refresher training thereafter in accordance with regulatory requirements or at least once every two years.

16.34.2 Asbestos and Non-asbestos Fibrous Silicates

This section applies to asbestos and bio-persistent non-asbestos fibrous silicates that may display asbestos-like toxicity, related to fibre diameter and length. Local regulations must be followed as a minimum. The following requirements must be met: • A management program must be in place and actively pursued;

- No new products containing these materials may be purchased;
- Installed materials of this type must be identified and assessed annually for current safety. Where 'safe in place', it should not be removed, unless there is an opportunity for removal during renovation or construction of buildings or equipment;
- Work areas must be barricaded off and signposted to restrict entry; and
- Contaminated material must be promptly placed in appropriate marked plastic disposal bags or covered containers for disposal to an approved landfill.

All workers exposed to these materials must be on a register. "Exposed" means working on or near such material that has been disturbed, abraded or cut. The register must contain details of their annual medical examination and the results of occupational hygiene monitoring.
Asbestos contractors must be competent, registered and have adequate equipment, procedures and monitoring.

Where required, the asbestos / bio-persistent non-asbestos fibrous silicates management programme must cover work practices, training, monitoring, medical surveillance, and waste handling and disposal.

Maintenance operations must be made aware of potential cristobalite exposure hazards when disturbing non-asbestos fibrous silicates that have undergone high temperature conditions.

The potential for occurrence of naturally occurring asbestos materials in exploration or mining production activities must be assessed, the risk of exposure determined, and appropriate control measures implemented where required.

16.35 Hazardous Chemical Substances

No chemical substance may be brought onto site unless it appears on the Chemical Substances Register which will be developed and kept by the contractor.
The register will contain the following information:

- Trade name / product name of substance;
- Manufacturer / supplier of substance;
- Maximum inventory;
- Storage requirements and precautions;
- Inventory of special emergency items held for handling spillages, fires, etc. (e.g. reagents to neutralise spillages, firefighting foam, etc.); and
- Approved disposal methods.

The contractor must ensure that a Material Safety Data Sheet (MSDS) is obtained for each chemical substance brought onto site. A file, or files, containing all of the MSDS's must be maintained and must be readily available to all personnel on site (particularly first aiders) as well as other potentially affected parties (e.g. emergency services personnel, persons from the local community, etc.). The MSDS's must be in the language(s) commonly used on site.

The contractor must appoint a trained and competent Hazardous Chemical Substances Coordinator who understands and is able to evaluate the risks associated with a wide variety of substances. This person shall be responsible for:

- Assessing the hazardous properties and risks associated with all chemical substances brought onto site by the contractor and appointed sub-contractors (using the MSDS's);
- Determining precautions and safe practices for transportation, use, handling, storage and disposal (including PPE requirements) (using the MSDS's);
- Determining first aid and emergency response requirements / procedures (using the MSDS's);
- Maintaining the MSDS file;
- Managing and monitoring the consumption of inventory; and • Providing an "as needed" service to site personnel and suppliers.

The risks associated with the transportation, use, handling, storage and disposal of all hazardous chemical substances brought onto site must be assessed and managed by the contractor through a process that incorporates risk reduction using the hierarchy of controls. The contractor must provide Safe Work Procedures for the transportation, use, handling, storage and disposal of all hazardous chemical substances to be used on site.

Whenever a task-based risk assessment is carried out, consideration must be given to the use of chemical substances (e.g. greases, solvents, etc.).

The contractor must provide his employees with all of the Personal Protective Equipment that is necessary to prevent exposure / injury while handling / using the hazardous chemical substances that they will be required to work with. Appropriate PPE must be selected with consideration given to the potential hazards, permeability, penetration, resistance to damage and compatibility with the work tasks.

The contractor's employees must be trained in the safe transportation, use, handling, storage and disposal of the hazardous chemical substances that they will be required to work with or may come

into contact with. The training must specifically address PPE requirements (including the correct selection, fitment and use thereof).

All personnel must be trained to understand the potential health effects associated with exposure to hazardous chemical substances and therefore the importance of Safe Work Procedures and PPE. All personnel must be trained on emergency response procedures and first aid measures.

Behaviour-based observations and coaching must include the use / handling of hazardous chemical substances.

An appropriate occupational exposure monitoring and medical surveillance programme must be in place for all personnel potentially exposed to hazardous chemical substances which have the potential to cause immediate or long-term harm.

Emergency showers and eyewash stations must be provided where required by law, or where a risk assessment indicates a need. The emergency showers and eyewash stations must be appropriately located, signposted, and regularly tested and maintained. Employees must receive training on the location and use of the showers / eyewash stations.

An emergency response plan for incidents involving hazardous chemical substances must be in place. Regular and appropriately staged emergency drills (possibly involving external spill response and ambulance support services) must be held and lessons learnt must be incorporated into the emergency response plan.

The contractor must provide appropriate storage facilities for all hazardous chemical substances to be used on site. The storage facilities must be secure and protected from damage. They must also be designed for easy access for firefighting purposes. Where applicable, the storage facility must protect chemical containers from physical damage due to temperature extremes, moisture, corrosive mists or vapours, and vehicles.

The inventory of hazardous chemical substances stored on site must be kept to a minimum. The quantity of each chemical stored must be justifiable.

Storage and segregation requirements for all hazardous chemical substances to be used on site must be based on:

- The quantities of the substances stored;
- The physical state of the substances (solid, liquid or gas);
- The degree of incompatibility; and • The known behaviour of the substances.

Access to areas where hazardous chemical substances are stored and handled must be limited and controlled.

Every chemical substance container must be adequately and clearly labelled to identify its contents, to indicate precautionary requirements for the substance, and to indicate the date of expiry (if applicable). Pipes used to transfer / convey / distribute chemical substances must be clearly identified (e.g. colour coding). Directional flow must be indicated where practical.

Before any item, equipment or empty container containing a chemical residue is disposed of as general waste, it must be properly decontaminated (where applicable). Before being disposed of, empty chemical containers must also be rendered unusable for carrying water (by puncturing, cutting or crushing them).

Hazardous chemical substance waste (i.e. redundant / expired hazardous chemical substances, containers containing residues, contaminated items / materials, etc.) must be disposed of in accordance with the applicable legislation.

Maintenance, inspection and testing schedules and procedures must be in place for critical equipment associated with hazardous chemical substances. A system must be in place to ensure that the risks are assessed before any changes are made to equipment and / or processes for the transportation, storage, handling, use or disposal of a hazardous chemical substance.

A programme must be in place to continually investigate possibilities / opportunities for replacing hazardous substances with safer alternatives.

16.36 Radiation

The risks associated with ionising (from naturally occurring radioactive minerals (NORM), radon, and man-made sources), ultraviolet (UV) and electromagnetic field (EMF) radiation exposure must be assessed by a competent person.

There must be an inventory of all radiation sources that have the potential to cause adverse health effects. For each radiation source, the type of radiation (e.g. radioisotope, radon, x-ray, EMF, laser, etc.), the strength of the radiation, and the location must be recorded.

Where risk assessment indicates the need, a documented radiation management programme must be developed such that:

- All types of radiation sources are adequately characterised and described;
- Exposures are eliminated or reduced to as low as reasonably practicable (ALARP);
- A clearly defined chain of responsibility (with duties) is provided; and
- Education is provided for employees regarding radiation safety, including the radiation management programme elements.

The ionising radiation management programme must meet all applicable regulatory requirements, and as a minimum must include the following elements (as applicable): • Surveyed radiation areas and quantification of exposure sources / levels;

- Exposure and medical monitoring programmes based on established investigation levels;
- Transport of radioactive materials in compliance with international radiation transport regulations, when no local regulations are in place;
- Waste monitoring and disposal programmes;
- Feedstock and equipment checks for naturally occurring ionising radiation;
- Clearance and control procedures for all contaminated materials and equipment leaving or arriving at site (including scrap);
- Leak (wipe) tests on sealed radioactive containment equipment;
- Lock-out procedures for vessels and equipment containing radioactive sources and radon decay product measurement prior to entry;
- Emergency procedures;
- Environmental impact risk assessment (air, water, waste, foods, etc.);
- Product / waste life cycle control; and
- Dose assessment for employees and critical exposure groups, according to documented methods and by a competent person.

Areas with ionising radiation with annual doses greater than 5 milli Sieverts (mSv) must be designated as restricted access or controlled areas. These areas must be identified and mapped, signposted or otherwise clearly communicated to employees working in the area.

Each person whose potential exposure exceeds 5 mSv per annum or who is a designated radiation worker must undergo periodic personal radiation monitoring and medical surveillance designed to show continued fitness for radiation work.

All sources of ionising radiation must be managed in use and when they are either disposed of or securely stored in accordance with local regulations. Each operation where individual worker's exposures could exceed 5 mSv per annum must have a trained radiation protection adviser or ready access to a trained protection consultant.

There must be documented procedures for the inspection, assessment and maintenance of the controls, and emergency procedures to deal with incidents involving ionising radiation sources (including fire and explosions). All controls must be reassessed annually to ensure their continued effectiveness and that operating practices are in accordance with written procedures.

16.37 Thermal Stress

Hot areas or activities where employees have experienced or could experience excessive fatigue, muscle cramp, dehydration, dizziness and other symptoms of heat stress must be identified and described.

Where a risk of thermal stress is determined, a competent person must conduct monitoring surveys on site, in consultation with workers.

For defined extreme thermal conditions and job activities, medical examinations must include information about the operator's physiological and biomedical aspects, and an assessment of fitness for the working conditions.

Cold areas or activities where employees have experienced or could experience pain or loss of feeling in extremities, frostbite, severe shivering, excessive fatigue and other symptoms of cold stress must be identified and described.

Workplace thermal stress levels (temperature, air movement, humidity, etc.), activities (work level, etc.) and conditions (clothing, health, etc.) that have the potential to exacerbate thermal stress effects must be adequately characterised and described. Workplace exposure assessment must be repeated according to regulatory requirements or whenever there is a change in production, work organisation, process or equipment which may impact thermal stress levels.

Detailed heat stress assessment of identified tasks or jobs must be tiered to:

- Commence with the use of a simple heat stress index as a screening tool; then, if necessary;
- Use rational heat stress indices in an iterative manner to determine the 'best' control methods for alleviating potential heat stress; and
- Undertake physiological monitoring when exposure times are calculated to be less than 30 minutes, or where high-level PPE that limits heat loss must be worn.

Detailed cold stress assessment of identified tasks or jobs must be conducted according to current appropriate guidelines that incorporate a cold stress index, to determine the 'best' control methods for alleviating potential cold stress.

When a risk of thermal stress is identified, the following exposure controls must be implemented:

- An acclimatisation period for new workers and those returning from extended leave or sickness;
- Training in the recognition of signs and symptoms of heat or cold stress, emergency procedures and preventative measures;

- Protective observation (buddy system or supervision); and
- A requirement for self-paced working.

The following exposure controls must be considered by a competent person:
- Work / rest regimes and job rotation based on measurements conducted;
- Suitable rest areas with a provision of cool drinking water and cool conditions for high temperatures, or provision of warm drinks and warm conditions for cold temperatures;
- Selection of appropriate clothing or other PPE for extreme temperature conditions;
- The use of engineering controls; and
- Undertake hot / cold tasks during a cooler / warmer time of the day.

Where thermal stress is assessed to be a risk, the operation must develop a suitable emergency response plan.

16.38 Fitness for Work and Fatigue Management

The contractor must develop and implement a programme to manage employee fitness for work. All employees working on site for whom the contractor is responsible (i.e. direct employees of the contractor as well as the employees of any appointed sub-contractors) must be subject to this programme.

All safety critical jobs (i.e. roles where fatigue or other causes of reduced fitness for work could lead to serious injury, illness or death to employees, significant equipment / plant damage, or significant environmental impact) must be identified and the risks associated with reduced fitness for work in these roles must be assessed.

A programme to manage these risks must be implemented, and it must include:
- Mechanisms for managing fatigue, stress and lack of fitness;
- An alcohol and other (including prescription, pharmaceutical or illicit) drugs policy that includes testing;
- An Employee Assistance Programme providing confidential access to resources and counsellors; and
- Training and awareness programmes.

Each employee has an obligation to present himself fit for work at the start of the day / shift, and to remain fit for work throughout the work period. Reporting for work under the influence of alcohol or any other intoxicating substance will not be tolerated. Any transgression concerning the alcohol and other drugs policy applicable to the project may result in the offending employee's access to the project premises being temporarily or permanently withdrawn.

Alcohol and drug testing on the project premises will be carried out randomly (as employees report for duty and during the course of the day / shift), following significant incidents (all persons involved), and whenever there is reasonable suspicion. Alcohol and drug testing may also be carried out as part of a Pre-Employment Medical Examination.

The Contractor must ensure that it complies to the requirements of RSR 00-4-1.2016 Edition 1, Part 4-1 Human Factors Management-Fatigue Management standard, Transnet Fatigue Risk Management Plan (FRMP) and Fatigue Risk Management System (FRMS).

The Contractor shall document, implement and maintain processes and procedures to identify, assess and mitigate the risks associated with fatigue's contributory factors.

The Contractor shall collect data and report on their management of fatigue as outlined in Clause 8.3 of Part 4-1 Human Factors Management-Fatigue Management standard.

Sleep deprivation during shift work or from excessive working hours is a known cause of fatigue. Fatigued employees are at increased risk of accidents. Shift system design must consider:

- The effect on worker fatigue;
- The effects of activities carried out during scheduled and overtime hours; • The impact on sleep cycles of activities such as commuting to and from site; and
- The monitoring and control of working hours.

The contractor is responsible for the administration of the working hours of his employees and of any appointed sub-contractors. The maximum working hours per day and the minimum rest times between shifts must be specified in the contractor's SHE Management Plan and must comply with all applicable legislation.

All employees engaged in safety critical jobs must undergo fitness assessments (medical examinations) which must be carried out prior to the commencement of employment on the contract, prior to a change in role, periodically based on an employee's individual risk profile, and on termination of employment on the contract:

Note: The results of an Exit Medical Examination from previous employment will not be accepted as a Pre-Employment Medical Examination.

Note: The medical examinations described above may only be carried out by an occupational health practitioner.

A detailed job (role) description and an exposure profile (noise, dust, heat, fumes, vapours, etc.) must be provided for each employee or group of employees. The medical examinations that an employee undergoes must be based on (i.e. the employee's fitness must be assessed against) the information contained in these documents as well as the baseline risk assessment for the work. This information must be made available to the occupational health practitioner performing the medical examination.

For each role, the medical criteria for fitness must be documented and these must be based on an evaluation of the physical and medical requirements for the role.

Depending on the circumstances, certain vaccinations may need to be provided to employees.

The medical examinations carried out for all drivers and operators must include testing / assessment for medical conditions that could affect the safe operation of vehicles or equipment.

Specific testing / questioning must be carried out to determine if an individual:

- Suffers from epilepsy or any other medical condition deemed to be a risk by the occupational health practitioner;
- Makes use of chronic medication that could affect performance;
- Is colour-blind; or
- Has poor day or night vision.

The medical examinations carried out for employees that are required to work at height must include testing / questioning to determine if an individual suffers from epilepsy, hypertension (high blood pressure) or any other medical condition deemed to be a risk (with regard to working at height) by the occupational health practitioner. Electricians must be tested for colour-blindness.

With regard to the placement of new employees:

- Prospective employees must be referred to a suitable occupational medical practitioner (doctor) for a "Pre-Employment Medical Examination";
- If an individual is found to be medically "unfit for placement", the doctor will indicate which work activities cannot be performed by the person;
- The individual may still be employed on the project if his medical restrictions can be accommodated and provided that no legislation is transgressed.

A process must be established to manage medical restrictions that may be placed on an employee. For every employee with a medical restriction, regular follow up visits with the occupational health practitioner must be arranged to ensure that each case is proactively managed.

An employee in a safety critical job must report (to his supervisor) any condition that might impair his ability to safely perform the duties associated with his role. A mechanism must be in place for such reports to be referred to an occupational health practitioner to determine if the employee is fit to continue with his work.

Proof of all medical examinations (i.e. certificates of fitness signed by an occupational health practitioner) must be kept on site and these records must be readily available for inspection by the Transnet Contract Manager. An employee's certificates of fitness must be included in his Personal Profile (dossier). If an Employee Personal Profile (dossier) hasn't already been compiled for a particular employee, then this must be done without delay following the employee's Pre-Employment Medical Examination. No employee in a safety critical role may commence work on site without proof that he has undergone a Pre-Employment Medical Examination.

Occupational medical examinations and data interpretation may only be carried out by medical practitioners that are appropriately qualified and certified to do so. Occupational medical data contained in reports to management must be grouped and summarised to ensure that the confidentiality rights of each individual employee are maintained. All occupational medical data and records must be retained for at least 40 years.

16.39 Legionnaires Disease

All equipment with the potential for generating Legionella (such as cooling towers and associated equipment, air-handling systems, hot water services and showers) must be identified and the risks of contamination and aerosol generation assessed.

Where there is an assessed risk that Legionella could grow in the system and cause harm, a programme must be in place such that:

- All such equipment is identified on a register. The register must contain details of the regular maintenance, cleaning and checking programmes;
- Control measures are in place to minimise aerosol emissions;
- There must be a documented water treatment programme, including procedures for inspection, assessment and maintenance of the controls; and
- New or retrofitted equipment is designed and constructed to minimise the risk of Legionella growth.

Where available, the Legionella plate count test should be used if more effective methods are not available.

Good maintenance procedures must be followed to minimise the risk of significant contamination of equipment with other bacteria and microbial organisms.

Adequate procedures must be available for disinfecting systems if significant concentrations of Legionella bacteria are present. Once disinfected, systems must be retested to confirm effectiveness of treatment.

16.40 HIV / AIDS

The contractor must assess the risks posed by HIV. Appropriate mitigation strategies must be implemented as required.

Discrimination towards employees on the basis of actual or perceived HIV status is forbidden.

All information on the HIV status and condition of employees and community members, including that relating to counselling, care and treatment and receipt of benefits, must be maintained in medical confidence.

HIV / AIDS screening may not be a requirement for recruitment or a condition of employment.

16.41 Ballast Screeners

The contractor must assess the risks posed by the activities associated with ballast screening. Appropriate mitigation strategies must be implemented as required, including the control of silica dust.

The contractor shall ensure that the ballast screening is undertaken in such a manner that it does not pose a risk to the health and safety of employees, members of the public or damage to property.

All employees involved in the ballast screening are trained on the risks to their health and safety, appropriate mitigation strategies to be implemented.

The contractor shall ensure that the operator of any equipment/machine used during the ballast screening is trained to operate such an equipment.

The contractor shall ensure that any equipment/machine used during the ballast screening are properly maintained and inspected at appropriate intervals. General machine safety checks including brake tests shall be done once a month and reports shall be available on the contractor compliance file/safety file.

The contractor shall ensure that technical and safety audits of the machinery and equipment must be done at least twice a year and a report of such an audit is available in the contractor's compliance file. Appropriate mitigation strategies must be implemented as required.

The contractor shall ensure that the welding activities in connection with the ballast screening are undertaken in such a manner that it does not pose a risk to the health and safety of employees, members of the public or damage to property.

17. COVID-19 Compliance

The contractor shall complete and submit to the TFR Contract Manager a declaration stating that the contractor is permitted to operate in terms of the provisions of the Disaster Management Act 2002 (Act No 57 of 2002) and Regulations, Transnet COVID-19 Guidelines and COVID-19 Occupational Health and Safety Measures in Workplaces, COVID-19 (C19 OHS), 2020 and have prepared a COVID-19 Workplace Readiness Plan and shall operate within the regulated permissions and restrictions of applicable lockdown level.

The contractor must ensure that all its employees are trained on the health risks and hazards associated with COVID-19 and what precautionary measures they must follow for the protection of their health, including the proper use and maintenance of PPE. They are prepared and informed regarding updated rules, hygiene and behavioural practices, complete a "return to work interview" with their line manager and sign commitment to maintain social distancing.

The contractor shall ensure that every employee reporting for duty is screened to ascertain whether they have any observable symptoms associated with COVID-19 and require such employee to immediately inform the contractor if he/she experiences such symptoms.

Non-essential physical work that requires close contact between workers should be avoided where it is possible to do so.
Where it is practicable, every employee must be issued with own tool for use for the duration of the shift. Tools and equipment in stores should be sanitised before issued and on return to the stores.
Washing hands facilities must be provided on site, and where it is not available, employees should be provided with hand sanitisers. Employees should be encouraged to regularly wash their hands.
Alcohol testing on site should be managed in such a way that no employee is exposed to the virus and contractors must promote personal hygiene. Breathalyzer equipped with disposable mouthpieces shall be used and shall be cleaned and/or disinfected after every use.

All non-essential visitors to site are not allowed, only suppliers are allowed. Suppliers must be advised in advance of the COVID-19 site screening tests and required COVID-19 PPE requirements for the site.

Where site meetings are held, only absolutely necessary meeting participants should attend. Social distancing should be maintained.

The contractor shall when transporting his employees to TFR premises comply with the regulations which outlines that 70% of the vehicle capacity can be utilised.

The contractor shall inform the TFR Contract Manager when any of its employees working on TFR premises has been diagnosed with COVID-19. The contractor shall investigate the cause and control failure and review its risk assessment to ensure that the necessary controls and PPE requirements are in place.

18. Structure

The contractor must ensure that,

- all reasonably practicable steps are taken to prevent the uncontrolled collapse of any new or existing structure or any part thereof, which may become unstable or is in a temporary state of weakness or instability due to the carrying out of construction work;
- No structure or part of a structure is loaded in a manner which would render it unsafe; and
- all drawings pertaining to the design of the relevant structure are kept on site and are available on request to an inspector, other contractors, the client and the client's agent or employee.

19. Emergency Preparedness and Response

The contractor must develop, implement, test and maintain an Emergency Response Plan (incorporating emergency evacuation procedures) that focuses specifically on the contractor's team and work activities. The plan must be risk-based and must detail the procedures that must be followed when responding to all potential emergency scenarios such as a medical emergency

(including first aid response), a fire, an explosion, a hazardous substance spill, flooding, rescue from height, rescue from a confined space, etc.

The contractor's Emergency Response Plan must be aligned with the Emergency Response Plan developed by Transnet.
Potential off-site emergency scenarios must be included (e.g. emergency scenarios related to the transport of personnel, the transport of hazardous materials, and personnel performing work in remote locations).

Consideration must be given to neighbours, and to the availability and capability of local emergency services. Details of any arrangements with external emergency response service providers must be included.

The Emergency Response Plan must satisfy and comply with all applicable legal requirements. The plan must be adequately resourced to ensure effective implementation. These resources must include appropriate personnel, external emergency response service providers, emergency response equipment, and warning devices. All equipment and warning devices must be identified, maintained and tested to ensure availability at all times.

Accountability for the Emergency Response Plan must be clearly defined. An Emergency Response Team (ERT) responsible for the implementation, management and execution of the Emergency Response Plan must be established. The roles and responsibilities of each team member must be clearly defined in the plan. Each team member must receive appropriate training to ensure that each role is performed competently.

The process for managing incident communication, notification, and reporting must be incorporated into the Emergency Response Plan. The responsible person(s) must be clearly identified, and the protocols for communicating with internal and external stakeholders must be defined.

Emergency evacuation procedures must be developed and included in the Emergency Response Plan. A copy of the plan must be provided to the Transnet Contract Manager for approval prior to site establishment.

The Emergency Response Plan must be formally reviewed (and amended if necessary) on at least an annual basis, and following any emergency situation, to ensure that it remains appropriate and effective.

At each work site:

- A suitable evacuation alarm (siren) must be provided. If work is to be carried out in proximity to an existing operational plant, the alarm provided by the contractor must be distinctly different (in terms of the sound that it generates) to any alarm installed in the operational plant. All persons working in an area where an evacuation alarm is sounded must respond to it immediately.
- Suitable fire-fighting equipment must be provided and maintained, and personnel must be trained in fire-fighting procedures and the use of fire-fighting equipment.
- Suitable first aid equipment and supplies must be provided and maintained, and an adequate number of appropriately trained First Aiders must be in place (refer to Section 14.2).
- Emergency assembly points positioned in safe locations away from buildings, plant and equipment must be designated (and conspicuously signposted). In the event of an evacuation, all persons (i.e. personnel and visitors) must assemble and be accounted for at these emergency assembly points.
- All personnel must receive awareness training on the applicable emergency response procedures, and all visitors entering the site must be properly instructed in these procedures.
- The emergency response procedures must be displayed on each notice board.

- A diagram (site plan) indicating evacuation routes, emergency assembly point locations, and the positioning of emergency equipment (fire extinguishers, first aid boxes, etc.) must be prominently displayed in all buildings and plants, in all offices, on all notice boards, and in other locations on the site as may be required.
- An up-to-date list of emergency telephone numbers must be compiled and maintained. A copy of this list must be posted at each site entrance, in each office, near each telephone, and on every notice board.
- Emergency response drills must be conducted to test the effectiveness of the emergency procedures and equipment, as well as the knowledge and proficiency of the response personnel. Where appropriate, drills must include liaison with and the involvement of external emergency response service providers. A variety of emergency scenarios must be tested including, but not limited to, medical emergencies, fires, rescues, and hazardous substance spills. A drill must be carried out one month after site establishment and six-monthly thereafter.

Each drill must be monitored, and the outcomes (highlights and shortcomings) must be documented. Corrective actions must be identified and implemented to address the shortcomings, and the Emergency Response Plan and associated procedures must be amended as required.

19.1 First Aid Kits

A suitable first aid kit (i.e. appropriate to the level of training) must be readily available to each First Aider. All kits must be provided and maintained by the contractor.

Taking into account the type of injuries that are likely to occur in the workplace, each first aid kit must contain suitable equipment and supplies. First aid equipment and supplies required by applicable legislation must be provided as a minimum. Additional items / supplies may need to be provided depending on the nature of the workplace (specific hazards) and the level of training of the first aider in position of the kit.

The contents of each first aid kit must be kept clean and dry. Access to first aid equipment / supplies must be limited to train First Aiders only. Access to portable kit bags must be controlled and steel first aid boxes in the workplace must be kept locked.

Approved signage must be in place to indicate the locations of the first aid boxes / bags.

A record of each treatment administered must be kept in a suitable register.

20. Management Review

A review of the contractor's Health and Safety Management System must be completed annually to ensure that the system continues to be effective in managing health and safety performance and meeting project requirements.

The review must evaluate if there is any need for change and must identify actions to improve the system. The review must be led by senior management and the following must be considered:

- The suitability of the policy adopted for the project;
- The impact of changing legislation;
- The management of risk;
- Health and safety objectives and performance indicators;
- Changing expectations and requirements of relevant stakeholders;
- Changes to the contractor's scope, schedule, designs, etc.;
- Changes to the contractor's organisational structure;

- Communication and feedback (particularly from employees, Project representatives, and client representatives);
- The effectiveness of the management of change process;
- Workplace exposure monitoring and medical surveillance;
- The status of corrective actions;
- Performance statistics, including an annual summary of safety statistics, and occupational hygiene monitoring and medical surveillance results;
- Non-conformances (findings) from completed audits;
- Follow up on actions from previous management reviews; and
- Recommendations and opportunities for improving the effectiveness of the management system.

A record of each completed management review must be retained, and it must include all decisions and identified actions concerning alterations, modifications or improvements to the management system that demonstrate a commitment to continual improvement.

21. Management of Change

To ensure that proposed changes do not give rise to unacceptable health or safety risk, the contractor must develop and implement a process for identifying and managing change in the workplace (e.g. changes to scope, schedule, procedures, work methods, site conditions, designs, plans, plant and equipment, materials, processes, etc.) that may impact on health or safety performance.

The management of change process must take into consideration that changes may be planned or unplanned, sudden or gradual, temporary or permanent.

The process must aim to ensure that:
- Changes are identified and assessed before they are implemented;
- Careful consideration is given to managing the risks associated with any change;
- Due diligence can be shown to have taken place;
- The number of unsatisfactory or unnecessary changes is minimised; • The right people are involved in the change process; and • All statutory requirements are met.

All risks associated with a proposed change must be evaluated and ranked. The risks that are ranked as moderate or higher must be managed to prevent serious injury or illness.

It must not simply be assumed that a change will not result in significant risks. All proposed changes must be formally evaluated. The evaluation or review must include:
- An appropriate level of technical expertise;
- The involvement of the workforce potentially affected by the proposed change; and
- Approval of the change by a person with at least the same level of authority as those who control the existing process or item being changed.

22. Sub-contractor Alignment / Stakeholder management

Processes must be in place to ensure that the health and safety risks associated with the procurement of materials, equipment, services, and labour are identified, evaluated and effectively managed.

A process for evaluating a sub-contractor's (or supplier's) ability to provide materials, equipment, services, and labour that meet defined specifications must be in place. A prospective sub-contractor's health and safety management expertise, experience, and capability (including

previous health and safety performance) must be formally assessed prior to any contract or purchase order being awarded.

Each appointed sub-contractor must develop and implement a detailed SHE Management Plan based on the requirements of the contractor's SHE Management Plan and the Health and Safety Specification for the contract. This plan must be reviewed and approved by the contractor prior to the commencement of any work.

The properties of all materials provided to the project must be adequately understood, documented, and integrated into operating procedures where exposure to these materials presents a significant health or safety risk.

Procedures, commensurate with the evaluated risk, must be in place for the receiving, storing, dispatching and transporting of all equipment and materials.

Before work commences on any contract, all sub-contractor personnel must receive comprehensive orientation and induction training

All work carried out by a sub-contractor must be managed (activity supervised) throughout the contract period and performance must be reviewed (audited) on a monthly basis.

23. Section 37(2) Mandatary Agreement

Transnet and the Contractor shall enter into an agreement in terms of section 37(2) of the Occupational Health and Safety Act to the arrangements and procedures between them to ensure compliance by the contractor with the provisions of the OHS Act.
The agreement shall be completed and signed by the contractor mandated representative as soon as possible and returned to the relevant Transnet Contract Manager for his/her signature on behalf of Transnet.
The contractor shall enter into a Section 37(2) Agreement with their respective subcontractors. Signed copy of such agreement must be kept on the contractor's compliance file.

24. Incident Reporting and Investigation

All incidents referred to in Regulation 9 of General Administration Regulations of the OHS Act and in terms of National Railway Safety Act 6 of 2002 (and applicable SANS Codes) involving the contractor and his subcontractor on TFR premises, shall be reported to the TFR Contract Manager and Department of Labour as prescribed by the OHS Act
The contractor must establish a procedure for the management of all health and safety incidents. This procedure must define the responsibilities, methodologies and processes that must be followed for: • Reporting an incident;

- Investigating an incident;
- Analysing an incident to determine the root cause;
- Identifying and implementing corrective actions to prevent a recurrence; and
- Communicating information concerning an incident to relevant persons and / or groups.

An incident may have multiple impacts. For each impact, the Actual Consequence and the Maximum Reasonable Outcome must be evaluated. Each impact must be evaluated independently, with the most significant classification forming the primary rating of the incident.

A Near Hit is an incident. All Near Hits must be reported.

An incident must be reported on the same workday or shift on which it occurs and preliminary details must be recorded. Depending on the Actual Consequence and Maximum Reasonable Potential Outcome of the impact(s), the relevant internal and external parties must be notified in accordance with specified protocols and timeframes, and legislative requirements.

In the event of a significant incident (i.e. an incident with an Actual Consequence of Moderate, Major or Catastrophic, or a Maximum Reasonable Potential Outcome of High or Extreme, work must cease and must only resume once the necessary actions (including the re-evaluation of any relevant risk assessments) have been taken to eliminate or reduce the risk of recurrence.

Work must only be permitted to recommence once formal authorisation has been granted by the Transnet Contract Manager. In the case of incidents with an Actual Consequence of Major or Catastrophic, work must not be permitted to recommence until authorisation has been granted by the relevant government authorities (i.e. the South African Police, the Department of Labour or the Department of Mineral Resources).

The Construction Manager must ensure that an investigation is completed within 7 calendar days for each incident that occurs, and that appropriately senior personnel participate in, and authorise the outcomes of, each investigation. Incident investigations must be facilitated by competent and experienced persons who have been trained in the appropriate methodology.

Each incident (including Near Hits) must be investigated to a level of detail that is appropriate for the Maximum Reasonable Potential Outcome of the incident. Each incident must be analysed to determine the root cause, and corrective actions must be identified and prioritised for implementation to eliminate or reduce the risk(s) in order to prevent recurrence of the incident.

For each corrective action, a responsible person must be designated and an appropriate timeframe (target date) for completion of the corrective action must be specified. Progress on implementing corrective actions (i.e. closing incidents) must be monitored and reported on. The implementation of corrective actions must be verified during monthly audits by the Health and Safety Officers but also no later than 30 calendar days after the conclusion of the incident investigation.

The contractor must document the results of each investigation and a report must be submitted to the Transnet Contract Manager within five working days of the incident occurring.

As a minimum, each incident report must include:

- The date, time and location of the incident;
- A detailed description of the incident, including photographs;
- The names of any injured persons;
- Injury details (if applicable);
- A summary of the first aid and / or medical treatment provided (if applicable);
- The current status of any injured persons;
- The root causes of the incident; and
- Detailed corrective actions, including responsible persons and target dates for implementation.

Each significant incident must be summarised for its lessons learnt following the investigation. This information must be reviewed by the contractor's Construction Manager to assure completeness, accuracy and relevance before it is shared with (communicated to) all project personnel.

25. Non-conformance and Action Management

The contractor must establish a process for identifying and recording corrective actions arising from:

- Incident investigations;
- Hazard identification and risk assessment;
- Measurement and monitoring;
- Improvement plans and suggestions;
- Managing change;
- Audits and inspections; and
- Safety observations and coaching (safety interactions).

The contractor must establish a procedure for managing actions that addresses:
- Identification, categorisation and prioritisation of actions;
- Formal evaluation and approval of actions (management of change process);
- Assignment of responsibilities, resources and schedules for implementation;
- Implementation of actions;
- Tracking and reporting on implementation status; and • Monitoring and verifying the effectiveness of the actions.

26. Performance Assessment and Auditing

The contractor must establish and maintain programmes for measuring and monitoring HEALTH AND SAFETY performance on a regular basis. Metrics must include leading and lagging indicators and be based on qualitative and quantitative data.

26.1 Reporting on Performance

Reports summarising the contractor's health and safety performance on the contract must be compiled and reported to the Transnet Contract Manager on a monthly basis.

The contractor must be prepared to discuss the content of these reports at scheduled health and safety meetings.

The reports must contain the following information:
- Number of contractor and sub-contractor employees on site;
- Total hours worked on site by contractor and sub-contractor employees (by company);
- Number of incidents by category (i.e. Near Hit, FAI, MTI and LTI);
- Lost Time Injury Frequency Rate (LTIFR) (project to date and 12-month rolling);
- Details of all new incidents for the reporting period and the corrective actions taken or to be taken;
- Feedback (progress updates) on all open incidents and outstanding corrective actions;
- Status and feedback on any employee that may have been injured and has not yet returned to work;
- Details of all health and safety training carried out during the reporting period;
- Number of SOC's (Safety Observations and Coaching) carried out during the reporting period;
- SOC trends identified and proposed action for the coming week or month to maintain positive trends and / or address negative trends;
- Details of all audits, inspections and site visits carried out during the reporting period, and the corrective actions taken (or to be taken) to address all non-conformances;
- Feedback (progress updates) on all open non-conformances and outstanding corrective actions;
- Number of Toolbox Talks conducted during the reporting period (monthly);
- Number of Planned Task Observations (PTO's) carried out during the reporting period (monthly);

- Details of all active risk assessments and Safe Work Procedures highlighting those that are due for review in the coming month (monthly);
- A look ahead (to the coming week, month or quarter) to ensure that appropriate health and safety planning and preparation is done for upcoming work;
- Challenges faced with regard to health and safety; and
- Any other health and safety related information specific to the project that may be required.

Leading indicators (e.g. audit findings, observations, etc.) must be analysed, and any negative trends identified with regard to unsafe behaviour or conditions must be appropriately addressed to prevent incidents.

Lagging indicators (e.g. injuries, illnesses, near hits, etc.) must be investigated in detail to determine the root causes. Corrective actions must be identified, implemented and integrated into Safe Work Procedures to prevent recurrences.

26.2 Audits and Inspections

On a monthly basis, the health and safety management system and workplace activities of the contractor will be audited by the Transnet Contract Manager, any person delegated by him or Transnet Health and Safety Specialist to assess compliance with the project health and safety requirements. Any deviation from these requirements (i.e. nonconformance) that places the health or safety of any person in immediate danger will result in the specific activity being stopped until the non-conformance is corrected.

For each non-conformance determined during any audit, the contractor must identify and implement appropriate corrective actions.

For each corrective action, a responsible person must be designated and an appropriate timeframe (target date) for completion of the corrective action must be specified. Progress on implementing corrective actions (i.e. closing non-conformances) must be monitored and reported on. The implementation of corrective actions will be verified during the monthly audits.

Should it be determined that the contractor's level of compliance is unsatisfactory, all work being performed by the contractor on the project site may be stopped (at the contractor's expense) until an investigation into the reasons for the poor performance has been carried out, a corrective action plan has been developed, and corrective actions have been implemented.

In addition to the audit carried out by the Transnet Contract Manager or Health and Safety Specialist, the contractor must carry out an internal audit on a monthly basis to assess compliance with the project health and safety requirements (including the requirements of this specification and the contractor's Health and Safety Management Plan). Furthermore, the contractor must ensure that each appointed sub-contractor is audited and measured to the same standard. Copies of these audit reports must be submitted to the Transnet Contract Manager on a monthly basis.

The contractor must carry out internal health and safety inspections as follows:
- General site health and safety inspections on a daily basis; and
- Inspections of plant, tools and equipment prior to establishment or use on site, and at least monthly thereafter.

All audits and inspections must be carried out by competent persons who have been appointed in writing.

A schedule of planned audits and inspections must be compiled and maintained ensuring that:

- All work areas and all activities are covered at regular intervals;
- All applicable legal requirements are complied with; and
- Areas or activities with significant associated hazards or risks receive greater attention.

Transnet SOC Limited Registration Number 1990/00900/06

TRANSNET SPECIFICATION

E7/1 - SPECIFICATION FOR GENERAL WORK AND WORKS ON, OVER, UNDER OR ADJACENT TO RAILWAY LINES AND NEAR HIGH VOLTAGE EQUIPMENT

(This specification shall be used in network operator contracts)

Circulation Not Restricted

(This page not to be issued with contract)

SPECIFICATION FOR GENERAL WORK AND WORKS ON, OVER, UNDER OR ADJACENT TO RAILWAY LINES AND NEAR HIGH VOLTAGE EQUIPMENT

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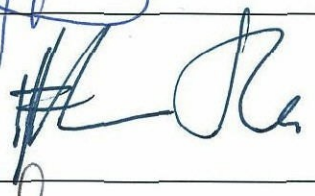
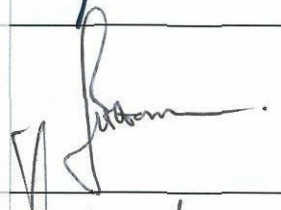
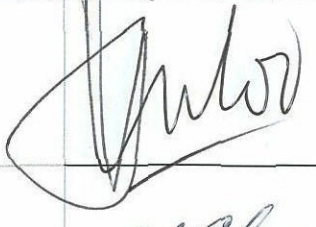
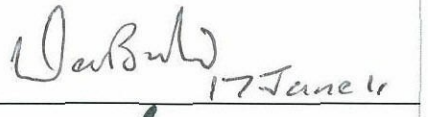
"	Principal Engineer Infra Engineering (Track)	M. Marutla	
"	Principal Engineer Infra Engineering (Structures)	J. Homan	
"	Principal Engineer Infra Engineering (Electrical)	J. Vosloo	
"	Principal Engineer Technology Management (Electrical)	W. Coetzee	
"	Chief Engineer Transport Telecoms	D. Botha	
Authorised:	Chief Engineer Infrastructure Engineering	J. van Aardt	

Date: May 2011

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CONTENTS

1.0 SCOPE

1.1 This specification covers the network operator's requirements for general work and works on, over, under or adjacent to railway lines and near high voltage equipment.

2.0 DEFINITIONS

The following definitions shall apply:

"Authorised Person" - A person whether an employee of the network operator or not, who has been specially authorised to undertake specific duties in terms of Transnet' publication Electrical Safety Instructions, and who holds a certificate or letter of authority to that effect.

"Barrier" Any device designed to restrict access to "live" high-voltage electrical equipment.

"Bond" - A short conductor installed to provide electrical continuity.

"Contractor" - Any person or organisation appointed by the network operator to carry out work on its behalf.

"Contract Supervisor" - The person or juristic person appointed by the network operator from time to time as the Contract Supervisor, to administer the Contractor's performance and execution of the Works according to the powers and rights held by and obligations placed upon the Contract Supervisor in terms of the Contract.

"Dead" - Isolated and earthed.

"Electrical Officer (Contracts)" - The person appointed in writing by the Project Manager in terms of this specification as the person who shall be consulted by the Contractor in all electrical matters to ensure that adequate safety precautions are taken by the Contractor.

"Executive Officer" - The person appointed by the network operator from time to time as the Executive Officer to act according to the rights and powers held by and obligations placed upon him in terms of the Contract.

"High-Voltage" - A voltage normally exceeding 1000 volts.

"Live" - A conductor is said to be "live" when it is at a potential different from that of the earth or any other conductor of the system of which it forms a part.

"Near" - To be in such a position that a person's body or the tools he is using or any equipment he is handling may come within 3 metres of "live" exposed high-voltage electrical equipment.

"Occupation" - An authorisation granted by the network operator for work to be carried out under specified conditions on, over, under or adjacent to railway lines.

"Occupation Between Trains" - An occupation during an interval between successive trains.

"Optical Fibre Cable" - Buried or suspended composite cable containing optical fibres used in:

- telecommunication networks for transmission of digital information and
- safety sensitive train operations systems.

"Project Manager" – As defined in the special conditions of the contract. The person or juristic person appointed by the network operator from time to time as the Project Manager, to administer the Contract according to the powers and rights held by and obligations placed upon him in terms of the Contract.

"Responsible Representative" - The responsible person in charge, appointed by a contractor, who has undergone specific training (and holds a certificate) to supervise (general or direct) staff under his control who perform general work or to work on, over, under or adjacent to railway lines and in the vicinity of high-voltage electrical equipment.

"Total Occupation" - An occupation for a period when trains are not to traverse the section of line covered by the occupation.

"Work on" - Work undertaken on or so close to the equipment that the specified working clearances to the "live" equipment cannot be maintained.

"Work Permit" - A combined written application and authority to proceed with work on or near dead electrical equipment.

"Works" – The contractual intent for the work to be done as defined in the contract at a defined work site.

PART A - GENERAL SPECIFICATION

3.0 AUTHORITY OF OFFICERS OF TRANSNET

3.1 The Contractor shall co-operate with the officers of the network operator and shall comply with all instructions issued and restrictions imposed with respect to the Works which bear on the existence and operation of the network operator's railway lines and high-voltage equipment.

3.2 Without limiting the generality of the provisions of clause 3.1, any duly authorised representative of the network operator, having identified himself, may stop the work if, in his opinion, the safe passage of trains or the safety of the network operator's assets or any person is affected. **CONSIDERATIONS OF SAFETY SHALL TAKE PRECEDENCE OVER ALL OTHER CONSIDERATIONS**.

4.0 CONTRACTOR'S REPRESENTATIVES AND STAFF

4.1 The Contractor shall nominate Responsible Representatives of whom at least one shall be available at any hour for call-out in cases of emergency. The Contractor shall provide the Contract Supervisor with the names, addresses and telephone numbers of the representatives.

4.2 The Contractor guarantees that he has satisfied himself that the Responsible Representative is fully conversant with this specification and that he shall comply with all his obligations in respect thereof.

4.3 The Contractor shall ensure that all contractor staff receives relevant awareness, educational and competence training regarding safety as prescribed.

5.0 OCCUPATIONS AND WORK PERMITS

5.1 Work to be done during total occupation or during an occupation between trains or under a work permit shall be done in a manner decided by the Contract Supervisor and at times to suit the network operator requirements.

5.2 The Contractor shall organise the Works in a manner which will minimise the number and duration of occupations and work permits required.

5.3 The network operator will not be liable for any financial or other loss suffered by the Contractor arising from his failure to complete any work scheduled during the period of an occupation or work permit.

5.4 The Contractor shall submit to the Contract Supervisor, in writing, requests for occupations or work permits together with details of the work to be undertaken, at least 21 days before they are required. The network operator does not undertake to grant an occupation or work permit for any particular date, time or duration.

5.5 The network operator reserves the right to cancel any occupation or work permit at any time before or during the period of occupation or work permit. If, due to cancellation or change in date or time, the Contractor is not permitted to start work under conditions of total occupation or work permit at the time arranged, all costs caused by the cancellation shall be born by the Contractor except as provided for in clauses 5.6 to 5.8.

5.6 When the Contractor is notified less than 2 hours before the scheduled starting time that the occupation or work permit is cancelled, he may claim reimbursement of his direct financial losses caused by the loss of working time up to the time his labour and plant are employed on other work, but not exceeding the period of the cancelled occupation or work permit.

5.7 When the Contractor is notified less than 2 hours before the scheduled starting time, or during an occupation or work permit, that the duration of the occupation or work permit is reduced, he may claim reimbursement of his direct financial losses caused by the loss of working time due to the reduced duration of the occupation or work permit.

5.8 Reimbursement of the Contractor for any loss of working time in terms of clause 5.6 and 5.7, shall be subject to his claims being submitted within 14 days of the event with full details of labour and plant involved, and provided that the Contract Supervisor certifies that no other work on which the labour and plant could be employed was immediately available.

5.9 Before starting any work for which an occupation has been arranged, the Contractor shall obtain from the Contract Supervisor written confirmation of the date, time and duration of the occupation.

5.10 Before starting any work for which a work permit has been arranged, the Responsible Representative shall read and sign portion C of the Work Permit, signifying that he is aware of the work boundaries within which work may be undertaken. After the work for which the permit was granted has been completed, or when the

work permit is due to be terminated, or if the permit is cancelled after the start, the same person who signed portion C shall sign portion D of the Work Permit, thereby acknowledging that he is aware that the electrical equipment is to be made “live”. The Contractor shall advise all his workmen accordingly.

6.0 SPEED RESTRICTIONS AND PROTECTION

6.1 When speed restrictions are imposed by the network operator because of the Contractor's activities, the Contractor shall organise and carry out his work so as to permit the removal of the restrictions as soon as possible.

6.2 When the Contract Supervisor considers protection to be necessary the Contractor shall, unless otherwise agreed, provide all protection including flagmen, other personnel and all equipment for the protection of the network operator's and the Contractor's personnel and assets, the public and including trains.

6.2.1 The network operator will provide training free of charge of the Contractor's flagmen and other personnel performing protection duties. The Contractor shall consult with the Contract Supervisor, whenever he considers that protection will be necessary, taking into account the minimum permissible clearances set out in the Manual for Track Maintenance (Document no. BBB0481):

- Drawing no. BE-97 Sheet 1: Horizontal Clearances: 1065mm gauge (Annexure 1 sheet 1)
- Drawing no. BE-97 Sheet 2: Vertical Clearances: 1065mm gauge (Annexure 1 sheet 2)
- Drawing no. BE-97 Sheet 3: Clearances: Platform (Annexure 1 sheet 3)
- Drawing no. BE-97 Sheet 5: Clearances: 610mm Gauge (Annexure 1 sheet 5)

6.3 The Contractor shall appoint a Responsible Representative to receive and transmit any instruction which may be given by the network operator personnel providing protection.

7.0 ROADS AND ROADS ON THE NETWORK OPERATOR’S PROPERTY

7.1 The Contractor shall take every reasonable precaution to prevent damage to any roads or bridges used to obtain access to the site, and shall select routes, use vehicles, and restrict loads so that any extraordinary traffic as may arise from the moving of plant or material to or from the site shall be limited as far as is reasonably possible.

7.2 The Contractor shall not occupy or interfere in any way with the free use of any public or private road, right-of-way, path or street unless the Contract Supervisor has obtained the approval of the road authority concerned.

8.0 CLEARANCES

8.1 No temporary works shall encroach on the appropriate minimum clearances set out in the Manual for Track Maintenance (Document no. BBB0481):

- Drawing no. BE-97 Sheet 1: Horizontal Clearances: 1065mm gauge (Annexure 1 sheet 1)
- Drawing no. BE-97 Sheet 2: Vertical Clearances: 1065mm gauge (Annexure 1 sheet 2)
- Drawing no. BE-97 Sheet 3: Clearances: Platform (Annexure 1 sheet 3)
- Drawing no. BE-97 Sheet 5: Clearances: 610mm Gauge (Annexure 1 sheet 5)

9.0 STACKING OF MATERIAL

9.1 The Contractor shall not stack any material closer than 3m from the centre line of any railway line without prior approval of the Contract Supervisor.

10.0 EXCAVATION, SHORING, DEWATERING AND DRAINAGE

10.1 Unless otherwise approved by the Contract Supervisor any excavation adjacent to a railway line shall not encroach on the hatched area shown in Figure 1.

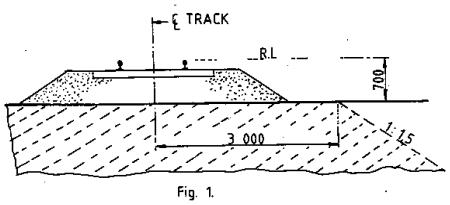

Fig. 1.

10.2 The Contractor shall provide, at his own cost any shoring, dewatering or drainage of any excavation unless otherwise stipulated elsewhere in the Contract.

10.3 Where required by the Contract Supervisor, drawings of shoring for any excavation under or adjacent to a railway line shall be submitted and permission to proceed, obtained before the excavation is commenced.

10.4 The Contractor shall prevent ingress of water to the excavation but where water does enter, he shall dispose of it as directed by the Contract Supervisor.

10.5 The Contractor shall not block, obstruct or damage any existing drains either above or below ground level unless he has made adequate prior arrangements to deal with drainage.

11.0 FALSEWORK FOR STRUCTURES

11.1 Drawings of falsework for the construction of any structure over, under or adjacent to any railway line shall be submitted to the Contract Supervisor and his permission to proceed obtained before the falsework is erected. Each drawing shall be given a title and a distinguishing number and shall be signed by a registered professional engineer certifying that he has checked the design of the falsework and that the drawings are correct and in accordance with the design.

11.2 After the falsework has been erected and before any load is applied, the Contractor shall submit to the Contract Supervisor a certificate signed by a registered professional engineer certifying that he has checked the falsework and that it has been erected in accordance with the drawings. Titles and numbers of the drawings shall be stated in the certificate. Notwithstanding permission given by the Contract Supervisor to proceed, the Contractor shall be entirely responsible for the safety and adequacy of the falsework.

12.0 PILING

12.1 The Contract Supervisor will specify the conditions under which piles may be installed on the network operator’s property.

13.0 UNDERGROUND SERVICES

13.1 No pegs or stakes shall be driven or any excavation made before the Contractor has established that there are no underground services which may be damaged thereby.

13.2 Any damage shall be reported immediately to the Contract Supervisor, or to the official in charge at the nearest station, or to the traffic controller in the case of centralised traffic control.

14.0 BLASTING AND USE OF EXPLOSIVES

14.1 When blasting within 500m of a railway line, the Contractor shall observe the requirements stipulated in this specification.

14.2 No blasting shall be carried out except with the prior written permission of the Contract Supervisor and under such conditions as he may impose.

14.3 On electrified lines the Contractor shall also obtain the permission of the Electrical Officer (Contracts) before blasting, and shall give at least 21 days notice of his intention to blast. No blasting shall be done in the vicinity of electrified lines unless a member of the network operator's electrical personnel is present.

14.4 The Contractor shall arrange for the supply, transport storage and use of explosives.

14.5 The Contractor shall have labour, tools and plant, to the satisfaction of the Contract Supervisor, available on the site to clear immediately any stones or debris deposited on the track or formation by blasting, and to repair any damage to the track or formation immediately after blasting. Repairs to the track shall be carried out only under the supervision of a duly authorised representative of the network operator.

14.6 The Contractor shall notify the Contract Supervisor of his intention to blast at least 21 days before the commencement of any blasting operations.

14.7 Before any blasting is undertaken, the Contractor and the Contract Supervisor shall jointly examine and measure up any buildings, houses or structures in the vicinity of the proposed blasting to establish the extent of any existing cracking or damage to such structures, etc. The Contractor, shall, subject to the provisions stipulated in the Contract Insurance Policy, make good any deterioration of such buildings, houses, or structures, which, in the opinion of the Contract Supervisor, was directly caused by the blasting.

14.8 After completion of the blasting the Contractor shall obtain a written clearance from each landowner in

the vicinity of the blasting operations to the effect that all claims for compensation in respect of damage caused by the blasting operations to their respective properties, have been settled.

14.9 The Contractor shall provide proof that he has complied with the provisions of clauses 10.17.1 to 10.17.4 of the Explosives Regulations (Act 26 of 1956 as amended).

14.10 Blasting within 500m of a railway line will only be permitted during intervals between trains. A person appointed by the Contract Supervisor, assisted by flagmen with the necessary protective equipment, will be in communication with the controlling railway station.

Only this person will be authorised to give the Contractor permission to blast, and the Contractor shall obey his instructions implicitly regarding the time during which blasting may take place.

14.11 The flagmen described in clause14.10, where provided by the network operator, are for the protection of trains and the network operator's property only, and their presence does not relieve the Contractor in any manner of his responsibilities in terms of Explosives Act or Regulations, or any obligation in terms of this Contract.

14.12 The person described in clause 14.10 will record in a book provided and retained by the network operator, the dates and times:-

(i) when each request is made by him to the controlling station for permission to blast;

(ii) when blasting may take place;

(iii) when blasting actually takes place; and

(iv) when he advises the controlling station that the line is safe for the passage of trains.

14.13 Before each blast the Contractor shall record in the same book, the details of the blast to be carried out. The person appointed by the Contract Supervisor and the person who will do the blasting shall both sign the book whenever an entry described in clause 14.12 is made.

15.0 RAIL TROLLEYS

15.1 The use of rail trolleys or trestle trolleys on a railway line for working on high voltage equipment will be permitted only if approved by the Contract Supervisor and under the conditions stipulated by him.

15.2 All costs in connection with trolley working and any train protection services requested by the Contractor shall, be borne by the Contractor, unless otherwise agreed.

16.0 SIGNAL TRACK CIRCUITS

16.1 Where signal track circuits are installed, the Contractor shall ensure that no material capable of conducting an electrical current makes contact between rails of railway line/lines.

16.2 No signal connections on track-circuited tracks shall be severed without the Contract Supervisor's knowledge and consent.

17.0 PENALTY FOR DELAYS TO TRAINS

17.1 If any trains are delayed by the Contractor and the Contract Supervisor is satisfied that the delay was avoidable, a penalty will be imposed on the Contractor as stipulated in the contract, for the period and number of trains delayed.

18.0 SURVEY BEACONS AND PEGS

18.1 The Contractor shall not on any account move or damage any beacon, bench mark, reference mark, signal or trigonometrical station in the execution of the Works without the written approval of the Contract Supervisor.

Should the Contractor be responsible for any such occurrence, he shall report the circumstances to the Contract Supervisor who will arrange with the Director-General of Surveys for replacement of the beacon or mark at the cost of the Contractor.

18.2 The Contractor shall not move or damage any cadastral or mining beacon without the written approval of the Contract Supervisor and before it has been referenced by a registered land surveyor. Any old boundary beacon, which becomes an internal beacon on creation of new boundaries, shall not be moved without the written approval of the Contract Supervisor.

Should the Contractor move or damage any cadastral or mining beacon without authority, he shall be responsible for having it replaced, at his cost, by a land surveyor.

18.3 The Contractor shall preserve all pegs and bench marks. Such survey points shall not be removed without the written approval of the Contract Supervisor. Should any peg or benchmark be removed without authority, the Contract Supervisor will arrange for its replacement and the cost will be recovered from the Contractor. No claim will be considered for delay in replacing any such peg or bench mark. Each peg replaced shall be checked by the Contractor.

18.4 Where a new boundary has been established, beacons on the fence line shall not be disturbed, and fence posts or anchors may not be placed or excavations made within 0,6 m of any beacon without the prior written approval of the Contract Supervisor.

19.0 TEMPORARY LEVEL CROSSINGS

19.1 The Contract Supervisor may, on request of the Contractor, and if necessary for the purpose of execution of the Works, permit the construction of a temporary level crossing over a railway a line at a position approved by the Contract Supervisor and at the Contractor's cost. The period for which the temporary level crossing is permitted will be at the discretion of the Contract Supervisor.

19.2 The Contractor will provide protection and supervise the construction of the road over the track(s) and within the railway servitude at the level crossing, as well as the erection of all road signs and height gauges. All cost to be borne by the applicant.

The Contractor shall exercise extreme caution in carrying out this work, especially in respect of damage to tracks, services, overhead power and communications routes and prevent contact with “live” overhead electrical equipment.

Unless otherwise agreed, the Contractor will provide the service deviations or alterations to the network operator’s track-, structure-, drainage-, electrical-, telecommunications- and train authorisation systems to accommodate the level crossing.

19.3 The Contractor shall take all necessary steps including the provision of gates, locks and, where necessary, watchmen to restrict the use of the temporary level crossing to himself and his employees, his subcontractors and their employees, the staff of the network operator and to such other persons as the Contract Supervisor may permit and of whose identity the Contractor will be advised. If so ordered by the Contract Supervisor, the Contractor shall provide persons to control road traffic using the temporary level crossing. Such persons shall stop all road traffic when any approaching train is within seven hundred and fifty (750) metres of the temporary level crossing, and shall not allow road traffic to proceed over it until the lines are clear.

19.4 The Contractor shall maintain the temporary level crossing within the railway servitude in good condition for the period it is in use. A temporary agreement with the road authority to be concluded for the maintenance of the level crossing outside the railway servitude.

19.5 When the temporary level crossing is no longer required by the Contractor, or permitted by the network operator, the Contractor shall at his own cost remove it and restore the site and the network operator’s track-, structure-, drainage-, electrical-, telecommunications- and train authorisation systems to its original condition. Work over the tracks and within the railway servitude will be supervised by the network operator.

20.0 COMPLETION OF THE WORKS

20.1 On completion of the works, the Contractor shall remove all the remaining construction plant and material from the site, other than material which is the property of the network operator, and leave the site in a clean, neat and tidy condition. If material and plant is required for the liability and maintenance period the Contract supervisor must authorise it’s retention on site.

21.0 PROTECTION OF PERSONS AND PROPERTY

21.1 The Contractor shall provide and maintain all lights, guards, barriers, fencing and watchmen when and where necessary or as required by the Contract Supervisor or by any statutory authority, for the protection of the Works and for the safety and convenience of the public.

Red, yellow, green or blue lights may not be used by the Contractor as they can be mistaken for signals. Red, yellow, green or white flags shall only be used for protection by the Contractor. Within the precincts of a port the Contractor shall obtain the permission of the Port Captain before installing any light.

21.2 The Contractor shall take all the requisite measures and precautions during the course of the Works to:

(i) protect the public and property of the public,

(ii) protect the property and workmen of both the network operator and the Contractor,

(iii) avoid damage to and prevent trespass on adjoining properties, and

(iv) ensure compliance with any instruction issued by the Contract Supervisor or other authorised person, and with any stipulation embodied in the contract documents which affects the safety of any person or thing.

21.3 The network operator will provide, at its own cost, protection for the safe working of trains during such operations as the Contract Supervisor may consider necessary. Protection by the network operator for any purpose whatsoever, does not absolve the Contractor of his responsibilities in terms of the Contract.

21.4 The Contractor shall take all precautions and appoint guards, watchmen and compound managers for prevention of disorder among and misconduct by the persons employed on the Works and by any other persons, whether employees or not, on the work site and for the preservation of the peace and protection of persons and property in the direct neighbourhood. Any relocation of camps because of disorder shall be at the Contractor's expense.

21.5 All operations necessary for the execution of the Works, including the provision of any temporary work and camping sites, shall be carried out so as not to cause veldt fires, ground and environmental pollution, soil erosion or restriction of or interference with streams, furrows, drains and water supplies.

If the original surface of the ground is disturbed in connection with the Works, it shall be made good by the Contractor to the satisfaction of the land owner, occupier or responsible authority.

21.6 The Contractor shall take all reasonable steps to minimise noise and disturbance when carrying out the Works, including work permitted outside normal working hours.

21.7 Dumping of waste or excess materials by the Contractor shall, in urban areas, be done under the direction and control of, and at sites made available by the local authority. Dumping outside local authority boundaries shall be done only with the express permission and under the direction and control of the Contract Supervisor.

21.8 The Contractor shall comply with environmental protection measures and specifications stipulated by the Contract Supervisor and/or local and environmental authorities.

22.0 INTERFERENCE WITH THE NETWORK OPERATOR'S ASSETS AND WORK ON OPEN LINES

22.1 The Contractor shall not interfere in any manner whatsoever with an open line, nor shall he carry out any work or perform any act which affects the security, use or safety of an open line except with the authority of the Contract Supervisor and in the presence of a duly authorised representative of the network operator.

22.2 The Contractor shall not carry out any work or operate any plant, or place any material whatsoever nearer than three metres from the centre line of any open line except with the written permission of the Contract Supervisor and subject to such conditions as he may impose.

22.3 Care must be taken not to interfere with or damage any services such as overhead wire routes, cables or pipes and optical fibre cable, except as provided for the work specified. The Contractor will be held responsible for any damage to or interruption of such services arising from any act or omission on his part or of any of his employees, or persons engaged by him on the Works. The cost of repairing, replacing or restoring the services, as well as all other costs arising from any damage to services, shall be borne by, and will be recovered from the Contractor.

22.4 Authority granted by the Contract Supervisor and the presence of an authorised representative of the network operator in terms hereof, shall not relieve the Contractor of his duty to comply with this specification.

23.0 ACCESS, RIGHTS-OF-WAY AND CAMPSITES

23.1 Where entry onto the network operator's property is restricted, permission to enter will be given only for the purpose of carrying out the Works and will be subject to the terms and conditions laid down by the network operator.

23.2 The Contractor shall arrange for campsites, workplaces and access thereto as well as for any right-of-

way over private property to the site of the Works, and for access within the boundaries of the network operator's property. The owners of private property to be traversed shall be approached and treated with tact and courtesy by the Contractor, who shall, if necessary, obtain a letter of introduction to such property owners from the Contract Supervisor.

The Contractor shall be responsible for the closing of all gates on roads and tracks used by him or his employees. Except with the prior approval of the Contract Supervisor and the owner or occupier of any private land to be traversed, the Contractor shall not cut, lower, damage, remove or otherwise interfere with any fence or gate which is either on the network operator's property or on private property and which restricts access to the Works. Where such approval has been given, the Contractor shall prevent entry of animals or unauthorised persons onto the network operator's or private property, and shall make the fences safe against trespass at the close of each day's work.

23.3 The Contractor shall take all reasonable steps to confine the movement of vehicles and plant to the approved right-of-way to minimise damage to property, crops and natural vegetation.

23.4 When access is no longer required, and before completion of the Works, the Contractor shall repair, restore or replace any fence or gate damaged during execution of the Works to the satisfaction of the Contract Supervisor and shall furnish the Contract Supervisor with a certificate signed by the owner and occupier of land over which he has gained access to a campsite, workplace and the Works, certifying that the owner and occupier have no claim against the Contractor or the network operator arising from the Contractor's use of the land. Should the Contractor be unable to obtain the required certificate, he shall report the circumstances to the Contract Supervisor.

24.0 SUPERVISION

24.1 The Contract Supervisor will provide overall technical superintendence of the Works, and may direct the Contractor in terms of the provisions of the Contract or in respect of any measures which the Contract Supervisor may require for the operations of the network operator, the safety of trains, property and workmen of the network operator, and for the safety of other property and persons. The Contractor shall carry out the directions of the Contract Supervisor. The superintendence exercised by the Contract Supervisor, including any agreement, approval, refusal or withdrawal of any approval given, shall not relieve the Contractor of any of his duties and liabilities under the Contract, and shall not imply any assumption by the network operator or by the Contract Supervisor of the legal and other responsibilities of the Contractor in carrying out the Works.

24.2 The Contract Supervisor may delegate to any deputy or other person, any of his duties or functions under the Contract. On receiving notice in writing of such delegation, the Contractor shall recognise and obey the deputy or person to whom any such duties or functions have been delegated as if he were the Contract Supervisor.

24.3 The Contractor shall exercise supervision over the Works at all times when work is performed or shall be represented by an agent having full power and authority to act on behalf of the Contractor. Such agent shall be competent and responsible, and have adequate experience in carrying out work of a similar nature to the Works, and shall exercise personal supervision on behalf of the Contractor. The Contract Supervisor shall be notified in writing of such appointment which will be subject to his approval.

24.4 The Contractor or his duly authorised agent shall be available on the site at all times while the Works are in progress to receive the orders and directions of the Contract Supervisor.

25.0 HOUSING OF EMPLOYEES

25.1 The Contractor shall, where necessary, make his own arrangements for suitable housing of his employees. Where temporary housing is permitted by the Contract Supervisor on any part of the site, the Contractor shall provide suitable sanitation, lighting and potable water supplies in terms of the requirements of the local authority or the current network operator’s specification; Minimum Communal Health Requirements in Areas outside the Jurisdiction of a Local Authority - E.4B, as applicable.

25.2 Fouling the area inside or outside the network operator's boundaries shall be prevented. The Contractor will be called upon by the Contract Supervisor to dispose of any foul or waste matter generated by the Contractor.

26.0 OPTICAL FIBRE CABLE ROUTES

26.1 The Contractor shall not handle, impact, move or deviate any optical fibre cable without prior approval.

26.2 Works that in any way affect the optical fibre cable requires prior approval from the Contract Supervisor

who will determine the work method and procedures to be followed.

PART B - SPECIFICATION FOR WORK NEAR HIGH-VOLTAGE ELECTRICAL EQUIPMENT

27.0 GENERAL

27.1 This specification is based on the contents of Transnet's publication ELECTRICAL SAFETY INSTRUCTIONS, as amended, a copy of which will be made available on loan to the Contractor for the duration of the contract.

These instructions apply to all work near "live" high-voltage equipment maintained and/or operated by the network operator, and the onus rests on the Contractor to ensure that he obtains a copy.

27.2 This specification must be read in conjunction with and not in lieu of the Electrical Safety Instructions.

27.3 The Contractor's attention is drawn in particular to the contents of Part I, Sections 1 and 2 of the Electrical Safety Instructions.

27.4 The Electrical Safety Instructions cover the minimum safety precautions which must be taken to ensure safe working on or near high-voltage electrical equipment, and must be observed at all times. Should additional safety measures be considered necessary because of peculiar local conditions, these may be ordered by and at the discretion of the Electrical Officer (Contracts).

27.5 The Contractor shall obtain the approval of the Electrical Officer (Contracts) before any work is done which causes or could cause any portion of a person's body or the tools he is using or any equipment he is handling, to come within 3 metres of any "live" high-voltage equipment.

27.6 The Contractor shall regard all high-voltage equipment as "live" unless a work permit is in force.

27.7 Safety precautions taken or barriers erected shall comply with the requirements of the Electrical Officer (Contracts), and shall be approved by him before the work to be protected is undertaken by the Contractor. The Contractor shall unless otherwise agreed, bear the cost of the provision of the barriers and other safety precautions required, including the attendance of the network operator's staff where this is necessary.

27.8 No barrier shall be removed unless authorised by the Electrical Officer (Contracts).

28.0 WORK ON BUILDINGS OR FIXED STRUCTURES

28.1 Before any work is carried out or measurements are taken on any part of a building, fixed structure or earthworks of any kind above ground level situated within 3 metres of "live" high-voltage equipment, the Electrical Officer (Contracts) shall be consulted to ascertain the conditions under which the work may be carried out.

28.2 No barrier erected to comply with the requirements of the Electrical Officer (Contracts) shall be used as temporary staging or shuttering for any part of the Works.

28.3 The shuttering for bridge piers, abutments, retaining walls or parapets adjacent to or over any track may be permitted to serve as a barrier, provided that it extends at least 2,5 metres above any working level in the case of piers, abutments and retaining walls and 1,5 metres above any working level in the case of parapets.

29.0 WORK DONE ON OR OUTSIDE OF ROLLING STOCK, INCLUDING LOADING OR UNLOADING

29.1 No person may stand, climb or work, whilst on any platform, surface or foothold:

29.1.1 higher than the normal unrestricted access way, namely -

29.1.1.1 external walkways on diesel, steam and electric locomotives, steam heat vans, etc. and

29.1.1.2 walkways between coaches and locomotives.

29.1.2 of restricted access ways in terms of the Electrical Safety Instructions namely -

29.1.2.1 the floor level of open wagons

29.1.2.2 external walkways or decks of road-rail vehicles, on-track maintenance machines and material trains.

29.1.3 Unauthorised staff working on these platforms must be directly supervised by duly authorised persons in terms of clause 607.1.3 of the Electrical Safety Instructions. These persons must attend the relevant electrical safety module training. A letter of training must then be issued by an accredited training authority. A Category C Certificate of Authority must be obtained from the

local depot examining officer.

29.2 When in the above positions no person may raise his hands or any equipment he is handling above his head.

29.3 In cases where the Contractor operates his own rail mounted equipment, he shall arrange for the walkways on this plant to be inspected by the Electrical Officer (Contracts) and approved, before commencement of work.

29.4 The handling of long lengths of material such as metal pipes, reinforcing bars, etc should be avoided, but if essential they shall be handled as nearly as possible in a horizontal position below head height.

29.5 The Responsible Representative shall warn all persons under his control of the danger of being near “live” high-voltage equipment, and shall ensure that the warning is fully understood.

29.6 Where the conditions in clauses 30.1 to 30.4 cannot be observed the Electrical Officer (Contracts), shall be notified. He will arrange for suitable Safety measures to be taken. The Electrical Officer (Contracts), may in his discretion and in appropriate circumstances, arrange for a suitable employee of the Contractor to be specially trained by the network operator and at the Contractor’s cost, as an Authorised Person to work closer than 3 metres from “live” overhead conductors and under such conditions as may be imposed by the senior responsible electrical engineer of the network operator.

30.0 USE OF EQUIPMENT

30.1 Measuring Tapes and Devices

30.1.1 Measuring tapes may be used near “live” high-voltage equipment provided that no part of any tape or a person's body comes within 3 metres of the “live” equipment.

30.1.2 In windy conditions the distance shall be increased to ensure that if the tape should fall it will not be blown nearer than 3 metres from the “live” high-voltage equipment.

30.1.3 Special measuring devices longer than 2 metres such as survey sticks and rods may be used if these are of non-conducting material and approved by the responsible Electrical Engineer of the network operator, but these devices must not be used within 3 metres of “live” high-voltage equipment in rainy or wet conditions.

30.1.4 The assistance of the Electrical Officer (Contracts) shall be requested when measurements within the limits defined in clauses 31.1.1 to 31.1.3 are required.

30.1.5 The restrictions described in 31.1.1 to 31.1.3 do not apply on a bridge deck between permanent parapets nor in other situations where a barrier effectively prevents contact with the “live” high-voltage equipment.

30.2 Portable Ladders

30.2.1 Any type of portable ladder longer then 2 metres may only be used near “live” high-voltage equipment under the direct supervision of the Responsible Representative. He shall ensure that the ladder is always used in such a manner that the distance from the base of the ladder to any “live” high-voltage equipment is greater than the fully extended length of the ladder plus 3 metres. Where these conditions cannot be observed, the Electrical Officer (Contracts) shall be advised, and he will arrange for suitable safety measures to be taken.

31.0 CARRYING AND HANDLING MATERIAL AND EQUIPMENT

31.1 Pipes, scaffolding, iron sheets, reinforcing bars and other material which exceeds 2 metres in length shall be carried completely below head height near “live” high-voltage equipment. For maximum safety such material should be carried by two or more persons so as to maintain it as nearly as possible in a horizontal position. The utmost care must be taken to ensure that no part of the material comes within 3 metres of any “live” high-voltage equipment.

31.2 Long lengths of wire or cable shall never be run out in conditions where a part of a wire or cable can come within 3 metres of any “live” high-voltage equipment unless the Electrical Officer (Contracts) has been advised and has approved appropriate safety precautions.

31.3 The presence of overhead power lines shall always be taken account of especially when communications lines or cables or aerial cables, stay wires, etc. are being erected above ground level.

32.0 PRECAUTIONS TO BE TAKEN WHEN ERECTING OR REMOVING POLES, ANTENNAE, TREES ETC.

32.1 A pole may be handled for the purpose of erection or removal near high-voltage equipment under the following conditions:

(i) If the distance between the point at which the pole is to be erected or removed and the nearest “live” high-voltage equipment is more than the length of the pole plus 3 metres, the work shall be supervised by the Responsible Representative.

(ii) If the distance described in (i) is less than the length of the pole plus 3 metres, the Electrical Officer (Contracts) shall be consulted to arrange for an Authorised Person to supervise the work and to ensure that the pole is earthed where possible. The pole shall be kept in contact with the point of erection, and adequate precautions shall be taken to prevent contact with “live” high-voltage equipment.

32.2 The cost of supervision by an Authorised Person and the provision of earthing shall, unless otherwise agreed, be borne by the Contractor.

32.3 The provisions of clauses 33.1 and 33.2 shall also apply to the erection or removal of columns, antennae, trees, posts, etc.

33.0 USE OF WATER

33.1 No water shall be used in the form of a jet if it can make contact with any “live” high-voltage equipment or with any person working on such equipment.

34.0 USE OF CONSTRUCTION PLANT

34.1 "Construction plant" entails all types of plant including cranes, piling frames, boring machines, excavators, draglines, dewatering equipment and road vehicles with or without lifting equipment.

34.2 When work is being undertaken in such a position that it is possible for construction plant or its load to come within 3 metres of “live” high-voltage equipment, the Electrical Officer (Contracts) shall be consulted. He will arrange for an Authorised Person to supervise the work and to ensure that the plant is adequately earthed. The Electrical Officer (Contracts) will decide whether further safety measures are necessary.

34.3 The cost of any supervision by an Authorised Person and the provision of earthing shall, unless otherwise agreed, be borne by the Contractor.

34.4 When loads are handled by cranes, non-metallic rope hand lines shall be used, affixed to such loads so as to prevent their swinging and coming within 3 metres of “live” high-voltage equipment.

34.5 Clauses 35.1 to 35.4 shall apply *mutatis mutandis* to the use of maintenance machines of any nature.

35.0 WORK PERFORMED UNDER DEAD CONDITIONS UNDER COVER OF A WORK PERMIT

35.1 If the Responsible Representative finds that the work cannot be done in safety with the high-voltage electrical equipment “live”, he shall consult the Electrical Officer (Contracts) who will decide on the action to be taken.

35.2 If a work permit is issued the Responsible Representative shall-

(i) before commencement of work ensure that the limits within which work may be carried out have been explained to him by the Authorised Person who issued the permit to him, and that he fully understands these limits.

(ii) sign portion C of the permit before commencement of work;

(iii) explain to all persons under his control the limits within which work may be carried out, and ensure that they fully understand these limits;

(iv) care for the safety of all persons under his control whilst work is in progress; and

(v) withdraw all personnel under his control from the equipment on completion of the work before he signs portion D of the work permit.

36.0 TRACTION RETURN CIRCUITS IN RAILS

36.1 DANGEROUS CONDITIONS CAN BE CREATED BY REMOVING OR SEVERING ANY BOND.

36.2 Broken rails with an air gap between the ends, and joints at which fishplates are removed under "broken bond" conditions, are potentially lethal. The rails on either side of an air gap between rail ends on electrified lines shall not be touched simultaneously until rendered safe by the network operator personnel.

36.3 The Contractor shall not break any permanent bonds between rails or between rails and any structure. He shall give the Contract Supervisor at least 7 days written notice when removal of such bonds is necessary.

36.4 No work on the track which involves interference with the traction return rail circuit either by cutting or removing the rails, or by removal of bonds shall be done unless the Electrical Officer (Contracts) is consulted. He will take such precautions as may be necessary to ensure continuity of the return circuit before permitting the work to be commenced.

37.0 HIGH-VOLTAGE ELECTRICAL EQUIPMENT NOT MAINTAINED AND/OR OPERATED BY THE NETWORK OPERATOR

Where the work is undertaken on or near high-voltage electrical equipment which is not maintained and/or operated by the network operator, the Occupational Health and Safety Act No. 85 of 1993, and Regulations and Instructions, or the Mines Health and Safety Act (Act 29 of 1996), shall apply.

Such equipment includes:-

(i) Eskom and municipal equipment;

(ii) The Contractor's own power supplies; and

(iii) Electrical equipment being installed but not yet taken over from the Contractor.

END

TRACK MAINTENANCE MANUAL

TRANSNET
freight rail

A Division of Transnet SOC Limited

INFRASTRUCTURE ENGINEERING

MANUAL FOR TRACK MAINTENANCE

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CHAPTER 1

THE PURPOSE OF THIS MANUAL, IT'S APPLICATION AND ASSOCIATED PUBLICATIONS TO BE READ IN CONJUNCTION HEREWITH

1.0 PURPOSE OF THE MANUAL

This manual describes the responsibilities of all track maintenance personnel and is issued for their guidance. It supersedes the Permanent Way Instructions issued in 1984 and 2000. The male gender form is used throughout this text. This gender form shall however specifically mean to include also the female gender form.

1.1 APPLICATION OF THE MANUAL

1.1.1 Track personnel who are supplied with copies of this manual must acquaint themselves with it and act in accordance with the manual in so far as it concerns them. They must ensure that their copy is updated with any amendments that may be issued from time to time.

1.1.2 Except where provision is made for the contrary, this manual must be read in conjunction with, and not in lieu of the publications listed in **clause 1.2**. The term "Heavy haul lines" refer to S-lines (See Annexure 3 Sheet 1).

1.2 ASSOCIATED PUBLICATIONS

Track personnel must be in possession of the publications listed hereunder (together with any amendments which may be issued), have knowledge of their contents and act in accordance therewith.

- Manual for Track Maintenance
- Train Working Rules
- General Appendix (parts I and II)/General Train Working Rules
- Construction Standards for Private Sidings (part B)
- Track data and curve lists
- Lists of structures, bridges and culverts, tunnels, level crossings and fouling points in relation to Track Structure gauge
- Safety Guidelines for Infrastructure
- Electrical Safety Instructions
- Latest updated section 53 'Perway Material/Price list'
- Applicable operating notices
- Manual for Managing Track Material, Tools and Equipment
- Applicable work codes and decision models/guidelines.
- Protection Manual
- Work Code for Fire Prevention
- Manual for Contingency Plan for Accidents/Derailments.
- Quick Reference for Building of Turnouts.
- Signing of Railway Crossings, chapter 7, SARTSM, Vol2
- Work Code for the Maintenance of Block joints.
- Specification for Track Welding.
- Code 29
- Mica forms (applicable forms from Index BBD5351 and BBC8266)

CHAPTER 2

THE GOAL AND PERFORMANCE OBJECTIVES FOR TRACK MAINTENANCE. SPECIFIC AND GENERAL RESPONSIBILITIES OF MAINTENANCE PERSONNEL WITH RESPECT TO THE TRACK INFRASTRUCTURE

2.0 THE GOAL FOR TRACK MAINTENANCE

The goal for track maintenance is to strive for the most economical but safe balance between resource input, track condition and required levels of operational readiness.

2.1 THE PERFORMANCE OBJECTIVES FOR TRACK MAINTENANCE

2.1.1 Track personnel must ensure that railway lines and associated works are always maintained to a standard which is safe for the passage of trains.

2.1.2 Employees must always regard the safety of the public, goods in transit and the safety and health of other employees as the first consideration.

2.1.3 Employees must not expose themselves to danger and must prevent other employees from exposing themselves and others to danger.

2.1.4 Service level agreements between Infrastructure-Maintenance, Service Execution and Service Planning must be met.

2.1.5 To continually strive for improved productivity to ensure an effectively and efficiently maintained rail network.

2.1.6 All departments involved must work together so as to ensure the long term viability of the track infrastructure and associated works. Care must always be taken to ensure that over or under maintenance of the track structure does not take place.

2.1.7 Infrastructure-Maintenance teams must have regular communication with traffic controllers each day, in order to minimise delays to trains.

2.2 RESPONSIBILITIES OF THE CHIEF ENGINEER (INFRASTRUCTURE-MAINTENANCE)

The Chief Engineer (Infrastructure-Maintenance) is responsible for

2.2.1 The long term viability of the track infrastructure and associated works.

2.2.2 Maintaining and expanding the pool of knowledge and expertise.

2.2.3 Ensuring that personnel are competent to perform their duties.

2.2.4 Formulating policy and initiating strategies to meet objectives and taking corrective action when required.

2.2.5 Performing certain services in respect of training, research and development, material, on-track machines and structures.

2.2.6 Ensuring that the requirements of applicable legislation are complied with.

2.3 RESPONSIBILITIES OF THE INFRASTRUCTURE MANAGER

The Infrastructure Manager is responsible for:

2.3.1 Determining and negotiating for required resources.

2.3.2 Improving productivity on an ongoing basis.

2.3.3 Monitoring safety and the quality of service continually and for initiating corrective actions.

2.3.4 Identifying and utilising excess capacity.

2.3.5 Ensuring that contingency planning has been done and will function smoothly if required.

2.3.6 Ensuring that Depot Engineering Managers are competent to perform their duties.

2.3.7 Ensuring that the requirements of applicable legislation are complied with.

2.4 RESPONSIBILITIES OF THE DEPOT ENGINEERING MANAGER

The Depot Engineering Manager is responsible for:

2.4.1 The safe passage of trains, the safety of the public as well as the safety and health of his personnel.

2.4.2 The quality of service and ensuring that all agreements in this regard are complied.

2.4.3 The effective management of all maintenance activities and resources.

2.4.4 Maintaining and operating reliable systems.

2.4.5 Ensuring that adequate resources are available for all aspects of track maintenance including call-out and emergency procedures.

2.4.6 Carrying out prescribed inspections.

2.4.7 Ensuring that work is properly managed and undertaken in accordance with the relevant work codes.

2.4.8 Ensuring that formal and on the job training takes place and that the requirements of applicable legislation are complied with.

2.4.9 Ensure Warroom planning guidelines are in place.

2.5 RESPONSIBILITIES OF THE MAINTENANCE MANAGER (TRACK) AND THE TRACK INSPECTOR (MAINTENANCE MANAGEMENT)

The Maintenance Manager (Track) focuses on the planning of track maintenance and is responsible for:

2.5.1 The safe passage of trains, the safety of the public as well as the safety and health of his personnel,

2.5.2 The effective maintenance of the track and associated works on his section,

2.5.3 Inspections and the use of approved systems to plan, schedule and control all work

2.5.4 Ensuring that the requirements of applicable legislation are complied with.

2.5.5 The Track Inspector (Maintenance Management) focuses on the planning of track maintenance work and is responsible for the above mentioned on specific sections allocated to him.

2.5.6 Make arrangements with the Production manager if the track personnel and the Engineering
Technicians under his control need training.

2.6 RESPONSIBILITIES OF THE PRODUCTION MANAGER (TRACK)

The Production Manager (Track) is responsible for:

2.6.1 The safe passage of trains, the safety of the public and for the safety and health of his personnel at work sites.

2.6.2 Using approved systems to manage all his work.

2.6.3 The efficient use of resources.

2.6.4 Ensuring that all completed work complies with accepted norms and standards.

2.6.5 Ensuring that the personnel under his control receive the necessary practical training in the correct use of and the efficient handling of material, tools and equipment. He must ensure that they are trained, developed, coached and that they acquire sound experience in all aspects of track maintenance work.

2.6.6 Performing any other duties assigned to him.

2.6.7 Ensuring that the requirements of applicable legislation are complied with.

2.7 RESPONSIBILITIES OF TRACK PERSONNEL IN CHARGE OF HEAVY ON-TRACK MACHINES

The person in charge of the work site (Track inspector or Track master) is responsible for:

2.7.1 The safe passage of trains, the safety of the public as well as the safety and health of his personnel at the work site,

2.7.2 Ensuring that contractors comply with relevant safety measures and instruct their personnel accordingly,

2.7.3 Ensuring that work codes are complied with,

2.7.4 Ensuring that contract conditions are adhered to, according to the contract specifications.

2.7.5 Ensuring that resources are used efficiently,

2.7.6 Ensuring that the quality of service is maintained

2.7.7 That the requirements of applicable legislation are complied with.

2.7.8 Must be in possession of a valid road knowledge certificate.

2.7.9 Ensure that break certificates and road worthiness (of all OTMs) are valid.

2.8 RESPONSIBILITIES OF THE ENGINEERING TECHNICIAN

The Engineering Technician is responsible for:

2.8.1 Performing all the duties assigned to him from time to time.

2.8.2 Assisting with the improvement of the tools for the management of track maintenance.

2.8.3 Assisting the Track Inspectors (Maintenance Management) with the planning, scheduling and controlling processes of track maintenance,

2.8.4 Assisting the Maintenance Manager (Track) with the collection and processing of data

2.8.5 Assisting in the determination of the long-term resource requirements.

2.9 RESPONSIBILITIES OF THE TRACK MASTER

Within his work area the Track master is responsible for:

2.9.1 The safe passage of trains, the safety of the public and for the safety and health of his personnel at the work site.

2.9.2 Performing repair work in accordance with specific procedures and standards.

2.9.3 Communicating regularly each day with traffic controllers and his controlling office.

2.9.4 The efficient use of resources.

2.9.5. Ensuring that the requirements of applicable legislation are complied with.

2.9.6. Develop, coach and mentor junior staff reporting to him.

2.9.7. Must (where applicable) be trained in RRV / MRV / train ruling / contract working and traditional teams, and

2.9.8. Performing any additional duties assigned to him.

2.10 RESPONSIBILITIES OF THE TRACK WELDER

Within his work area the Track Welder is responsible for:

2.10.1 The safe passage of trains, the safety of the public and for the safety and health of his personnel at the work site.

2.10.2 Performing work in accordance with specific procedures and standards.

2.10.3 The efficient use of resources.

2.10.4 Ensuring that the requirements of applicable legislation are complied with.

2.10.5 Develop, coach and mentor junior staff reporting to him.

2.10.6 Performing any other duties assigned to him.

2.11 RESPONSIBILITIES OF THE TECHNICAL SUPERVISOR (WELDING) AND TRACK INSPECTOR (PRODUCTION)

Within their work area the Technical Supervisor (Welding) and the Track Inspector (Production) focus on the execution of track maintenance work and are individually responsible for:

2.11.1 The safe passage of trains, the safety of the public, and for the safety and health of their personnel at the work site.

2.11.2 Using approved systems to manage all their work.

2.11.3 The efficient use of resources.

2.11.4 Ensuring compliance with specific procedures and standards.

2.11.5 Ensuring that material, tools and equipment are neatly kept and that the appropriate records are kept.

2.11.6 Ensuring that the personnel under their control receive the necessary practical training in the correct use of and the efficient handling of material, tools and equipment and to help them in obtaining a comprehensive practical knowledge of track maintenance work.

2.11.7 Ensuring that the requirements of applicable legislation are complied with.

2.12 RESPONSIBILITIES OF THE TRACK MANAGER AND THE TECHNICAL MANAGER (WELDING) IN THE CENTRAL OFFICE

The Track Manager and the Technical Manager (Welding) of the central office are responsible for:

2.12.1 Training, coaching and for transferring their knowledge and expertise to all involved in track maintenance work.

2.12.2 Ensuring that formal and on the job training of personnel conforms to requirements.

2.12.3 Ensuring that the requirements of applicable legislation are complied with.

2.13 RESPONSIBILITIES OF THE TRACK SUPERINTENDENT WELDING

Within their work area the Track Superintendent Welding perform 50% work for the Maintenance Manager and 50% for Production Manager (overall accountability to Maintenance Manager). The Track Superintendent Welding is responsible for:

2.13.1 The safe passage of trains, the safety of the public, and for the safety and health of their personnel at the work site.

2.13.2 Using approved systems to manage all their work.

2.13.3 The efficient use of resources.

2.13.4 Ensure compliance with specific procedures and standards.

2.13.5 Ensure that the personnel under their control receive the necessary practical training an the correctly use of and the efficient handling of material, tools and equipment and to help
them in obtaining a comprehensive practical knowledge of welding maintenance work.

2.13.6 Ensuring that the requirements of applicable legislation are complied with.

2.14 RESPONSIBILITIES OF THE TRACK INSPECTOR TRAINING AND SAFETY (ACT 85)

The Track Inspector Training and Safety supports the Depot Manager / Production Managers and he is responsible for:

2.14.1 Coordinating the Training of Trainee Track Masters in Depot training and record keeping.

2.14.2 Record keeping of all training in depot Track personnel, OHTE Electric, Signal Induction for contract working.

2.14.3 Flagman Training and certification.

2.14.4 Tools and Small plant training and certification.

2.14.5 Assistance at Sub Depot Safety.

2.14.6 Ensuring that the requirements of applicable legislation are complied with.

2.14.7 Performing any other duties assigned to him.

2.15 RESPONSIBILITIES OF THE TRACK INSPECTOR PRIVATE SIDINGS

The Track Inspector Private Siding (at applicable depots) is responsible for:

2.15.1 Performing work in accordance with specific procedures and standards.

2.15.2 Ensuring that the requirements of applicable legislation are complied with.

2.15.3 Performing any other duties assigned to him.

2.15.4 Carrying out inspection as per MICA requirements and Chapter 18.

2.16 RESPONSIBILITIES OF THE TRACK INSPECTOR CONTRACTS

Within his work area the Track Inspector Contracts is responsible for:

2.16.1 Ensuring that the requirements of applicable legislation are complied with.

2.16.2 Performing work in accordance with specific procedures and standards.

2.16.3 The safe passage of trains, the safety of the public as well as the safety and health of his personnel at the work site.

2.16.4 Ensuring that contract conditions are adhered to according to the contract specifications.

2.16.5 Ensuring that resources are used efficiently.

2.16.6 Ensuring that the quality of service is maintained.

2.16.7 Ensuring that Contractors comply with relevant safety measures accordingly and instruct their personnel.

2.16.8 Performing any other duties assigned to him.

2.17 GENERAL RESPONSIBILITIES OF INFRASTRUCTURE-MAINTENANCE PERSONNEL

2.17.1 Protection of trains and safeguarding of employees

2.17.1.1 Where protection of Infrastructure-Maintenance teams at work sites overlaps, all the parties involved must agree beforehand upon a Person in Control (Competent Track Master/Inspector) for the extended work site, who will be responsible for the protection arrangements in terms of the Protection Agreement. The supervisors involved must ensure that all personnel under their control are aware of the applicable protection arrangements at the extended work site.

2.17.1.2 Protection duties may only be undertaken by an employee who has been certified competent by an officially authorised competent person.

2.17.1.3 The names of employees competent to perform protection duties must be kept on record.

2.17.1.4 The Person in Control (Competent Track Master/Inspector) must ensure that work teams are adequately safeguarded. Special care must be taken when safeguarding work teams working in busy station yards, on curved tracks, in cuttings, on multiple tracks or where the view is restricted. Where work teams are working close to mechanised equipment, they must be warned of the approach of a train by means of a hooter, siren or other device, the sound of which must be audible above the noise of the machines.

2.17.1.5 When the track is not safe for the passage of trains the Person in Control (Competent Track Master/Inspector) must instruct the Flagman regarding the warning to be given to train drivers.

2.17.1.6 When the track is not safe for the passage of trains at normal speed, the Person in Control (Competent Track Master/Inspector) must instruct the Flagman regarding the warning to be given to train drivers.

2.17.1.7 In the event of maintenance work being done to or adjacent to the track and the safety of passing trains and/or personnel and equipment could be affected, the Person in Control (Competent Track Master/Inspector) must instruct the hand-signalman regarding the warning to be given to train drivers.

2.17.1.8 The Person in Control (Competent Track Master/Inspector) must show the hand-signalman where hand signals must be displayed and where detonators must be placed and he must ensure that the protection complies with the approved protection procedures.

2.17.1.9 When work on or adjacent to the track can affect the safety of trains, occupation of the track must be taken by the Track inspector or Track master.

2.17.2 Detonators

2.17.2.1 Under no circumstances may tests of detonators be arranged or undertaken by unauthorised persons.

2.17.2.2 In the event of a detonator failing to detonate when a rail vehicle moves over it at an estimated speed of 10 km/h or higher, a detailed report must be submitted to the Depot Engineering Manager's office for further investigation and follow-up. This report must be submitted together with the defective detonator as well as the remaining detonators in the original container from which the defective one was taken. All defective detonators must be sent back to Manufacture.

2.17.2.3 Reports must include the type and estimated speed of the vehicle as well as track and weather conditions.

2.17.2.4 Where detonators are placed on the track, the person responsible must ensure that nobody comes within a 3m radius of the detonators.

2.17.2.5 Detonators may not be placed less than one metre from a block joint.

2.17.3 Safety precautions

2.17.3.1 Track personnel must take precautions to safeguard life and to protect property when working or handling equipment or material.

2.17.3.2 Track personnel are not allowed to have pets with them when they are on duty.

2.17.3.3 Highly visible clothing, reflective braces and other specified Personal Protective Equipment must be worn by all personnel on or alongside the track.

2.17.4 Safety precautions in stations and yards

2.17.4.1 On completion of the day's work, any tracks in a station or shunting yard which have not yet been filled in and the ballast levelled off or where released material has not yet been removed or where new material has been unloaded but not yet installed into the track, the Track master must advise in writing the traffic controller or controlling office accordingly. In the interests of safety of yard officials and other employees, the Track master must, where required, provide white lights to indicate the obstruction.

2.17.4.2 When working at stations, crossing loops, inter sidings or private sidings, track teams must examine the points in the normal and reversed positions. The crossings, points locks and bridles must also be examined. After the examination has been completed, care must be taken that the points are locked in the normal position

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2.17.5 Call outs

The Track Master is responsible for attending promptly to defects communicated to him for repair via the Infrastructure-Maintenance fault control system. These faults can be reported by train drivers, track, signal or electrification personnel, the train control centre/traffic controllers, contractors, public etc.

2.17.6 Breaking of the line

Before breaking a line for alterations or repairs, the Track Master must have authorisation for occupation of the track and must consult with the traffic controller in charge at each end of the section affected, the official in charge of the station/yard or the traffic controller in the train control centre, as the case may be. All relevant safety precautions required must be observed.

2.17.7 Breaking of track circuits

2.17.7.1 On electrified sections or where there are track circuits, a line must not be broken for alterations or repairs unless an authorised representative of Electrical and/or Signals is present or has been consulted. See clause 13.5.4.

2.17.7.2 Any two rails of a line which are track-circuited must not be short circuited, i.e. connected with metal objects such as track gauges, steel tapes or slewing bars, etc.

2.17.8 Accidents and obstructions

2.17.8.1 Any accidents, irregularities or defects observed (of the track, passing trains, the signalling equipment or overhead track equipment) which are likely to interfere with the safe running of trains, must be reported immediately to the train control centre/traffic controller. The train control centre/traffic controller must ensure that the defect is reported to the official fault control system of Infrastructure-Maintenance. The person on duty at the official fault control system of Infrastructure-Maintenance must ensure that the appropriate Infrastructure-Maintenance teams are called out for the maintenance work. If telephone communication fails, the arrival of the first train must be awaited and the problem reported to the driver. If a Track master/Track inspector/production manager (track) is present then such person must instruct the driver of the actions to be taken and accompany the driver over the problem area. If a Track master/Track inspector/production manager (track) is not present, the driver must decide on the best course of action. Everything possible must be done to stop trains where immediate danger exists.

2.17.8.2 Track gangs must proceed promptly to the scene of the accident or obstruction and take the following actions:

2.17.8.2.1 Provide protection in accordance with the Protection Manual irrespective of any protection measures which may have already been provided by others. This must be maintained until the work is completed or alternative arrangements are implemented by the Person in Control (Infra Coordinator).

2.17.8.2.2 The Person in Control (Competent Track Master/Inspector) must ensure that correct protection is maintained until he is sure that the line can be re-opened to traffic.

2.17.8.2.3 All lines that are not safe for the passage of trains must be protected on those sides of the obstruction from where a train might be expected.

2.17.8.2.4 Track personnel may not interfere with, or give instructions or advice to a member of another department who is affording protection.

2.17.8.3 The primary object after an accident is to assist the injured and to get the train service back

to normal as quickly as possible. Track personnel must assist wherever it may be necessary, in order to expedite repairs to the track so that normal working may be resumed as soon as possible. They are not to be used as a source of labour for other departments, especially if expeditious repairs to the track may be adversely affected.

2.17.8.4 The Track Master must restore or assist in restoring normal working as soon as possible and report full particulars of the incident and of any additional assistance or material which may be required in order to re-open the line.

2.17.8.5 The **G140** form must be submitted after all accidents involving trains. The **T458** form (BBD8147 version 1) must be submitted after any accident other than:

- a head-on, rear-end or side-on collision
- an accident due to an obstruction
- where a stop block was hit or a train ran through turnout points or a wheel tyre/broken axle caused the accident and there is agreement, amongst all parties involved on site, that the track condition did not contribute to the cause of the accident, the exact cause of the accident must be determined on site, by consensus amongst all the parties involved. This information may not however be communicated to anybody outside Transnet.

The Depot Engineering Manager must ensure that the track measurements necessary to complete the **T458** form are taken before any work is done on the track. The form must be signed by every person who has a share in completing it.

2.17.8.6 When vehicles are to be re-railed by pulling or propelling, the Track master must take precautions to protect the track against avoidable damage.

2.17.8.7 When trucks conveying explosives or dangerous goods are involved in an accident, the Track master must not unload or interfere with these trucks except as instructed in writing by the responsible senior officer or his deputy (must be in position of an ID card). The responsible senior officer must decide as to the best and most effective action to be taken in accordance with instructions relating to the safe handling of explosive materials involved in accidents. (refer to relevant regulations)

2.17.8.8 Once damage to the track is repaired and it is safe for the passage of trains (at normal or restricted speed), the Person in Control (Infra Coordinator) of repair work (Competent Track master, Track inspector or Production Manager) must advise the traffic controller at one of the adjacent stations or, if applicable, the train control centre/traffic controller, accordingly.

2.17.8.9 Official inquiries into accidents must be conducted as set out in **Circular A.10-1**.

2.17.8.10 In the case of animals injured or killed by trains, the Track master must remove them from the track to a safe distance outside the structure gauge. If the owner(s) is/are known and reasonably available, he/they must be asked to take further responsibility and to remove the animal(s)/carcasses. In all other instances the personnel of Infrastructure-Maintenance must take care and dispose of the animal(s) in accordance with locally prescribed procedures. Any maintenance work that might be required on the track must be done and the track certified safe for the passage of trains.

The Track master must complete and sign form T502/Transnet Freight Rail 410 and forward it to the Depot Engineering Manager's office. This form must be completed only insofar as the apparent or known information is on hand at the place where the incident occurred and at the time of clearing the track.

Other Infrastructure-Maintenance work required at or in the vicinity where the incident occurred, e.g. repairs to fences, must be reported immediately to Infrastructure fault control.

Infrastructure fault control will arrange for all further maintenance work to be undertaken and for any subsequent investigations, administrative matters or claims procedures which may be required. The Track master shall, if called upon to do so, pass on any helpful information to these parties.

2.17.9 Reporting of track defects

2.17.9.1 Track defects that may affect the safe running of trains, must be reported immediately to the train control centre/traffic controller as well as through the official fault control system of Infrastructure-Maintenance. Everything possible must be done to stop trains where immediate danger exists.

2.17.9.2 Track defects which do not affect the immediate safe running of trains, but which if left unattended could further deteriorate and present a danger to rail traffic over the short or medium term, must be reported to the Depot Engineering Manager 's organisation for purposes of planning of maintenance.

2.17.9.3 The person on duty at the fault control system of Infrastructure-Maintenance will ensure that Infrastructure-Maintenance personnel are contacted to undertake maintenance action.

2.17.9.4 The Track master must at start of his shift and at the end of his shift as well as regularly during the course of his shift establish if any track defects have been reported at the infrastructure fault control system. As soon as defects have been repaired, the Track master must notify the relevant party and advise him of the exact kilometre point where the defect was repaired as well as the nature of the repair work and the time it was done as well as further actions required.

2.17.9.5 Any deviation from **clauses 2.13.9.1** to **2.13.9.4** must be recorded in **Chapter 20.**

2.17.10 Goods found next to the track

2.17.10.1. Any foreign items such as luggage, goods or equipment observed on Transnet property must be reported to the nearest Police station and obtain a case number**.** Details of time and place where luggage or goods were observed must be given.

2.17.10.2. When approaching or handling any luggage, goods or equipment found on Transnet property, the instructions set out in the Hazardous Materials Handbooks, must be observed and applied. See also Clause 2.13.15.

2.17.10.3. When approaching or handling asbestos found on Transnet property the instructions as outlined in the Transnet Freight Rail Procedure for Handling of Asbestos, must be adhered to. (refer to written safety procedures)

2.17.11 Taking over a length

2.17.11.1 When a Track inspector or a Track master takes over a section, he must be shown over the length by his predecessor or supervisor.

2.17.11.2 Places requiring attention must be pointed out and details of the current programme of maintenance work must be given.

2.17.11.3 The Track inspector or Track master must systematically examine every feature of the track so that he may become familiar with the types, quantities and condition of the track materials and with the types and condition of bridges and culverts and other structures. He must acquaint himself with the physical features of his section.

2.17.11.4 He must check the stock of track material, tools and equipment. Any shortages must be reported to the controlling office.

2.17.12 Possession of a reliable Time Measurement Instrument

The Track master and the Track inspector must be in possession of a reliable indication of the correct time of day.

2.17.13 Communication means

The Track master and the Track inspector must be in possession of effective communication means for contacting the train control centre/traffic controller and their controlling office. Cell phone charges are expensive and discretion must be exercised when making calls.

2.17.14 Absence from section

Before leaving his place of residence outside working hours, the standby Track master/Track inspector must advise his controlling officer, who will then be responsible for making the necessary relief arrangements.

2.17.15 Dangerous substances

2.17.15.1 Dangerous substances being transported are identified by a sign in the form of a diamond. The colour of the sign indicates the substance and action(s) to be taken in case of an emergency:

2.17.15.2 Orange indicates explosives and that the area must be evacuated to a safe distance.

2.17.15.3 Green indicates compressed gas and that the area must be evacuated to a safe distance and that confined spaces are to be avoided.

2.17.15.4 Red indicates flammable substances and that evacuation to at least a distance of 500m is required if burning should occur.

2.17.15.5 White indicates poison and that contact must be avoided and that the gas must not be inhaled.

2.17.15.6 Black and white indicates corrosive substances and that contact must be avoided.

2.17.15.7 Blue indicates that the substance is dangerous when wet, is flammable and must be stayed clear of.

2.17.15.8 Yellow indicates oxidisers which may be flammable and must be avoided.

2.17.15.9 Yellow and white indicates that the substance is radio active and that no persons must come within 40m of the substance.

CHAPTER 3

EARTHWORKS, THE FORMATION, DRAINAGE, TUNNELS, BRIDGES, CULVERTS AND TEMPORARY TRACK SUPPORTS (TECHNICAL SUPPORT)

3.0 INSPECTION

The inspection of earthworks, the formation, drainage, tunnels, bridges and culverts as well as temporary track supports must be carried out as set out in **clauses 4.0.5** and **4.0.6**.

3.1 EARTHWORKS

3.1.1 Banks and cuttings must be observed for cracks, landslides and rock falls.

3.1.2 Excavations must be carried out to safe batters. Shoring must be provided if it is impractical to work to safe batters. Shoring must always be provided in trenches and similar restricted excavations where the depth exceeds 1,5m, except when the presence of homogeneous solid rock causes the excavations to be absolutely safe without shoring.

3.1.3 Where excavations are carried out in soft material and the vibration of passing trains may cause caving in of earth, safety precautions must be taken and a temporary speed restriction imposed if necessary.

3.1.4 The formation must be maintained at the width and shape shown in **Annexure 4**.

3.1.5 When embankments are being constructed, material must not foul the structure gauge or obstruct the drainage.

3.1.6 Material to be used and the method of compacting must be approved by the Depot Engineering Manager.

3.1.7 Borrow pits must be made on the lower side of the track if practical. The top of the borrow pit must be at least 3m from the toe of an embankment or from the boundary line, and the borrow pit wall must have a batter. Borrow pits must be drained and fenced if necessary.

3.2 THE FORMATION

3.2.1 A dry formation is a pre-requisite for a stable track structure.

3.2.2 Storm and ground water must be quickly and effectively drained away from the formation.

3.2.3 Competent guidance is required when repairs to the formation are undertaken.

3.3 DRAINAGE

3.3.1 All drains must be kept clean to allow water to flow freely.

3.3.2 Vegetation must not be removed from drains on steep inclines unless precautions are taken to prevent erosion.

3.3.3 Steps provided on slopes of banks and cuttings to gain access to the formation must not interfere with drainage.

3.3.4 Drains and catch water mounds must be built to divert storm water where necessary. The Depot Engineering Manager must give his approval before work is started.

3.3.5 The top edge of a catch water drain or the toe of a catch water mound must, if possible, be at least 3m from the boundary of the right of way.

3.3.6 Material excavated from catch water drains must be deposited on the low side of drains to increase the effective depth of the drains.

3.3.7 The Depot Engineering Manager must be advised if Transnet property might be affected where:

3.3.7.1 Storm-water from adjoining land has been diverted from its natural course

3.3.7.2 New drains are being constructed

3.3.7.3 Dams are being constructed that could cause erosion or flooding

3.3.7.4 Soil erosion is taking place on adjoining land

3.3.7.5 Storm water run-off is increasing.

3.4 TUNNELS

3.4.1 When working in tunnels particular care must be taken, because of the dangers involved, to adequately safeguard all personnel. Adequate lighting is essential.

3.4.2 Interiors of refuges and a 1m surround must be painted white.

3.4.3 Attention must be given to the drainage of tunnels and approach cuttings. Any obstruction in the drains must be removed.

3.4.4 In tunnels with ballasted track, reference pegs must be inserted at 20m intervals in both walls, so that a line which is stretched over the tops of the pegs will touch both rails when the track is at the correct level and cant. A list of offsets from the ends of the pegs to the track centre line must be supplied. The track must be lifted and aligned in accordance with these reference marks.

3.4.5 In the case of tunnels longer than 1000m, the letter ‘P’ must be painted with white paint on a black background at both tunnel portals. This must be clearly visible to indicate that protection may be encountered within that tunnel at the protection distance. These letters must be 600mm high by 400mm wide, positioned at a height of 2500mm above rail level. (align with train working rules)

3.5 BRIDGES AND CULVERTS

3.5.1 Track personnel must look out for the following defects:

3.5.1.1 Scour under piers or abutments and at inlets and outlets of culverts.

3.5.1.2 Structural damage, cracks, loose rivets or bolts, corrosion and movement of bedplates.

3.5.1.3 Loose or ineffective handrails and/or walkways and where bridge or culvert openings are inadequate.

3.5.2 See **clauses 6.6.2** and **6.8.3** for laying of rails on un ballasted bridges.

3.5.3 Safety rails, shown in **Annexure 6**, must be provided on unballasted bridges longer than 10m. In other cases the Depot Engineering Manager will decide whether they are necessary. Each safety rail must be fastened by two coach screws to every sleeper.

3.5.4 Only approved sleepers may be used on unballasted bridges. Sleeper spacing may not be more than 610mm.

3.5.5 The distance between the centre lines of the sleepers behind and in front of ballast walls must not be more than 700mm. Cases where this is not possible must be reported to the Depot Engineering Manager. He will arrange for the rails to be supported directly on the ballast walls, in accordance with **drawing BE 75-22**.

3.5.6 The Depot Engineering Manager must be advised where it is necessary to adjust cant or to eliminate camber on bridges. Loose plates or tapered sleepers must not be used, nor may the track be raised by placing sleepers on top of one another.

3.5.7 Fastening of sleepers on bridges must be in accordance with **Annexure 8**.

3.5.8 Parapets, ballast walls, copings and handrails on bridges and culverts, in areas where shunting is done, must be painted white.

3.5.9 Competent guidance is required when steelwork is repaired and painted.

3.5.10 Culvert entrances and outlets must be cleaned annually before the onset of summer rains (or winter rains in the Western Cape) of all shrubs, bushes and trees to allow for an unrestricted flow of water through the culvert opening. (Technical Support Manager)

3.5.11 When constructing a maintenance road through a culvert opening it must be done in such a manner so as not to restrict the flow of water during sudden down pours.

3.6 TEMPORARY TRACK SUPPORTS

3.6.1 Should a line require temporary support, this can be provided by sleeper cribs, steel bridging cribs, trestles or rail girders. Details are shown in **Annexure 7**.

3.6.2 A speed restriction of 15 km/h must be imposed on a track with temporary supports. Alternatively pipe jacking may be considered instead.

3.6.3 Temporary track supports must be inspected at frequent intervals preferably at least daily. All fastenings must be kept tight.

3.6.4 Rail girders

3.6.4.1 The track must be fitted with wood sleepers, placed at 600mm centres.

3.6.4.2 Top-rail girders are used principally when excavations are to be made under open lines. Bolts and rail girder clamps must not project above the top of the running rails. Girders must be laid on sleeper cribs.

3.6.4.3 Bottom-rail girders are principally used in emergencies. They are built on top of sleeper or bridging cribs and provide a working platform on which a new track can be built.

3.6.5 Cribs

3.6.5.1 All sleepers must be sound, square and straight. Wood wedges must be used to eliminate any movement. Wedges must be anchored.

3.6.5.2 The bottom layer of sleepers in cribs must be close-laid and parallel to the track centre line.

3.6.5.3 Rails used with double stack cribs must have the same height (size) and must be sound and free of defects.

CHAPTER 4

INSPECTIONS AND TRACK GEOMETRY

4.0.0 Inspections general

Inspections of the track and associated infrastructure are used as a safety measure also to determine the annual and long term work load.

The responsibilities of individual track maintenance personnel are to ensure that:

- İnspections are carried out by competent personnel, at the required frequencies, and in accordance with the available work codes.
- written inspection reports are prepared and systems are used to ensure action is taken and appropriate records are kept. It must be seen against the specific and general responsibilities described in chapter 2 and elsewhere in this manual.

4.0.1 Patrolling

4.0.1.1 Each depot's patrolling process must be submitted to and approved by the Infrastructure Manager and recorded in **chapter 20**.

4.0.1.2 The Track Inspector (Maintenance Management) must ensure that the approved process of patrolling and defect reporting is carried out.

4.0.1.3 If a track defect or damage to the track which may affect the safety of trains is observed, patrolling must be abandoned and protection afforded according to laid down instructions, first on the side from which the first train is expected and then on the other side. The defect/damage must be reported in accordance with clause 2.13.8.and 2.13.9.

4.0.1.4 In addition to telephonically reporting defects or damage in accordance with **clause 4.0.1.3,** a report must be submitted to the Depot Engineering Manager's organisation, recording information gathered for each day on which patrolling was done. This report must be used for an input for planning track maintenance work.

4.0.1.5 During stormy weather, special patrols must be carried out to ensure that the track, earthworks, formation, drainage and associated structures remain safe for the passage of trains. The maximum flood water level must be recorded (on both sides of the track) during wash-aways.

4.0.2 Trolley Inspections

4.0.2.1. During trolley inspections individual responsibilities must be focused on, as set out in **Chapter 2.**

4.0.2.2. The Chief Engineer (Infrastructure-Maintenance) must inspect S and N1 lines annually, N2-lines every second year and N3-lines once every 3 years.

4.0.2.3. The Infrastructure Manager must inspect S and N1-lines twice a year, N2 lines once a year and N3-lines every second year.

4.0.2.4. The Chief Engineer (Permanent Way Infrastructure) of PRASA should be allowed to annually inspect Transnet Freight Rail lines that carry PRASA traffic.

4.0.2.5. The Depot Engineering Manager must inspect S and N1 lines every month N2 lines every second month and N3 lines once every four months. Fifty percent of these inspections may be delegated to the Maintenance Manager (Track).

4.0.2.6. The Track Inspector (Maintenance Management) must inspect S, and N1 lines every week, N2 and PRASA trafficked lines every second week and N3 lines once per month.

4.0.2.7. Trolley inspections must be pre-planned on an annual basis.

4.0.2.8. Inspections should be carried out at the probable speed of a typical train traversing the section.

4.0.2.9. Footplate inspections may be substituted for trolley inspections.

4.0.2.10. Deviations from the above must be approved by the Infrastructure Manager, and the method(s) adopted and inspection frequencies must be recorded in chapter 20.

4.0.2.11. Track personnel must also be encouraged to take part in trolley inspections at other depots as the process will speed up training and the transfer of skills. Production Manager to be included.

4.0.3 Footplate inspections

4.0.3.1 Attention must be afforded to those aspects that will not emerge from other inspections.

4.0.3.2 The Depot Engineering Manager and Maintenance Manager must respectively inspect all lines twice and four times annually with at least one inspection being undertaken during night time. Half of these inspections may be delegated.

4.0.3.3 The inspection trip should be undertaken on a train representing the most common train running on that section.

4.0.3.4 The driver should be requested to indicate over which sections he usually reduces speed due to poor track conditions. On such sections the reaction of the locomotive must be afforded special attention.

4.0.3.5 The driver's special knowledge of track conditions must be fully utilised.

4.0.3.6 Deviations from the above must be approved by the Infrastructure Manager and must be recorded in **chapter 20**.

4.0.4 Inspections by the track measuring car

4.0.4.1 The track measuring car is used to measure the geometric condition of the track.

4.0.4.2 These track measurements must be used to ensure compliance with responsibilities as set out in **clause 4.0.0** and **chapter 2**.

4.0.4.3 The Track Inspector (Maintenance Management) must accompany the car, take note of defects and if necessary initiate urgent repairs. (Refer to clause 4.1.1.3.7). He must not be used as a pilot. Production track inspector and a pilot must a company the car.

4.0.4.4 The responsible Engineer or Engineering Technician must accompany the car to ensure that contract conditions are met.

4.0.4.5 Measuring frequencies will be determined by the Chief Engineer (Infrastructure-Maintenance). Deviation from the frequencies must be approved by the Infrastructure Manager and recorded in **chapter 20**.

4.0.5 Inspection of structures

4.0.5.1 Bridges, culverts and lined tunnels must be inspected at least once per year. Unlined tunnels must be inspected monthly by the Track Inspector (Maintenance Management).

4.0.5.2 Coal stages, turn tables, pits, retaining walls and water towers must be inspected annually.

4.0.5.3 See **clause 3.6** with regard to temporary track supports.

4.0.6 Inspection of earthworks, the formation and drainage

Earthworks, the formation and drainage must be inspected at least once per year.

4.0.7 Ultrasonic and x-ray inspections (split the two)

The frequency of inspections is determined by the Depot Engineering Manager, in consultation with the Chief Engineer (Infrastructure-Maintenance). Deviation from the work code must be approved by the Infrastructure Manager. Measurement frequencies and deviations must be recorded in **chapter 20**.

4.0.8 Inspection of track material

4.0.8.1 Track material should be inspected annually by the Depot Engineering Manager's organisation.

4.0.8.2 Inspections must be carried out in accordance with the latest MICA document.

4.0.8.3 Deviations from the MICA document or inspection frequency must be approved by the Infrastructure Manager, and recorded in **chapter 20**.

4.0.8.4 Foot inspections must be done annually to see the condition of sleepers, fastenings, rails, ballast. Records must be kept.

4.0.9 Inspection of turnouts, slips and diamond crossings ('sets')

4.0.9.1 These inspections are the responsibility of the Track Inspector (Maintenance Management). Inspections must be carried out in accordance with the latest MICA document.

4.0.9.2 Sets on S and N1 lines must be inspected at least once a month. The frequency of inspections on N2 lines, N3 lines and in yards must respectively not exceed 2, 4 and 6 months.

4.0.9.3 Deviations from the work code or inspection frequency must be approved by the Infrastructure Manager, and recorded in **chapter 20**.

4.0.10 Inspection of signs, level crossings and fences

4.0.10.1 Three monthly inspections of road and track signs, level crossings and fences is the responsibility of the Track Inspector (Maintenance Management).

4.0.10.2 In addition, the items mentioned in clause 4.0.10.1 should be regularly observed by track personnel that work in the area in order to arrange for urgent repairs to be undertaken.

4.0.10.3 Deviations from the MICA document or inspection frequency must be approved by the Infrastructure Manager, and recorded in **chapter 20**.

4.0.11 Inspection of clearances

4.0.11.1 The Depot Engineering Manager must ensure that annual inspections are carried out and that the conditions set out in **chapter 8** are complied with.

4.0.11.2 Deviations from the work code or inspection frequency must be approved by the Infrastructure Manager, and recorded in **chapter 20**.

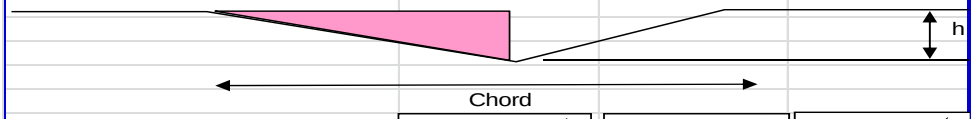
4.1 TRACK GEOMETRY

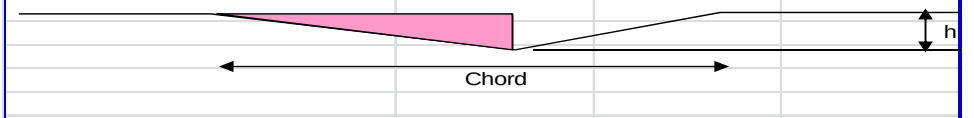
4.1.1 Standards

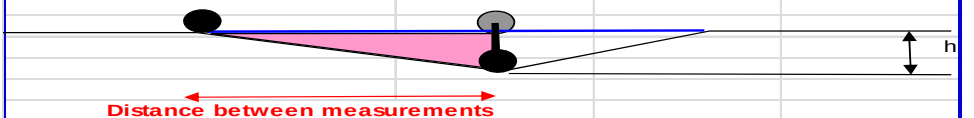
4.1.1.1 The geometric condition of the track has an important influence on the life cycle of the track structure, the cost of track maintenance also with regard to rolling stock.

4.1.1.2 As a result of this influence on costs and the relative ease with which geometry can be measured, general standards have been developed to assist in the process of defining work priorities.

4.1.1.3 The general maintenance standards

Threshold:	A	B	C
PROFILE:	1:1000	1:250	1:180
Chord length (metres):	7	7	7
			
	$h = \frac{(7000/2)}{1000}$	$h = \frac{(7000/2)}{250}$	$h = \frac{(7000/2)}{180}$
From the red triangle:			
h (mm) =	3.5	14.0	19.4

Threshold:	A	B	C
ALIGNMENT:	1:2000	1:500	1:360
Chord length (metres):	10	10	10
			
	$h = \frac{(10000/2)}{2000}$	$h = \frac{(10000/2)}{500}$	$h = \frac{(10000/2)}{360}$
From the red triangle:			
h (mm) =	2.5	10.0	13.9

Threshold:	A	B	C
TWIST (T/C):	1:1000	1:400	1:288
Chord length (metres):	2.75	2.75	2.75
			
	$h = \frac{(2750)}{1000}$	$h = \frac{(2750)}{400}$	$h = \frac{(2750)}{288}$
From the red triangle:			
h (mm) =	2.8	6.9	9.5

4.1.1.3.1 When track work is done, the work must conform to the A-standard.

4.1.1.3.2 Repair work must be considered when the B-standard is exceeded.

4.1.1.3.3 On S lines work must be done before the C-standard is reached.

4.1.1.3.4 On N1 lines work should preferably be done before the C-standard is reached.

4.1.1.3.5 On N2 lines urgent inspection of track outside the C-standard is required and maintenance inputs or speed restrictions must be considered; and

4.1.1.3.6 On N3 lines track outside the C-standard must be inspected regularly and maintenance inputs or speed restrictions must be considered; and

4.1.1.3.7 When the C-standard is exceeded, repair work must be given a higher priority

4.1.1.3.8 A work place is a 50m portion of track where one or more measurements occur that are outside the requirements of the B-standard with regards to the aspect hereafter mentioned

4.1.1.4 Numerical values for geometric parameters:

The standards show permissible deviation from design values, except for twist, which are absolute values.

4.1.1.4.1 Horizontal alignment on straight track:-
A: - 1:2000
B: - 1:500 and
C: - 1:360.

4.1.1.4.2 Horizontal alignment, on curves and on transition curves:-
A :- (5% x Mo) + 2.5mm
B :- (20% x Mo) + 2.5mm
C :- (30% x Mo) + 2.5mm
Mo=**H** being the mid-ordinate, in millimetres, measured with a 10m cord.

4.1.1.4.3 Vertical alignment:-
A: - 1:1000
B: - 1:250 and
C: - 1:180.

4.1.1.4.4 For twist the standards are:

Straights and circular curves	**Transition curves**
A: - 1:1000	A: - 1:500
B: - 1:400 and	B: - 1:400
C: - 1:288.	C: - 1:288

4.1.1.5 For specific application of these standards reference must be made to the work code for geometric track evaluation.

4.1.1.6 Deviations **from clauses 4.1.1.1 to 4.1.1.3** must be approved by the Depot Engineering Manager and recorded in **chapter 20**.

4.1.2 Transition curves

4.1.2.1 A transition curve is a curve of varying radius such that the centrifugal force generated on the track by a train travelling at a constant speed, increases uniformly from the end of the tangent track to the beginning of the circular portion of the curve.

4.1.2.2 On running lines the most appropriate transition curve lengths are 60m for curves less than or equal to 300m and 80m for curves with a radius of more than 300m.

4.1.3 Gauge

4.1.3.1 On straight track the gauge for broad gauge track is 1 065mm and 610mm for narrow gauge track.

4.1.3.2 The gauge for track on curves and the maximum permissible gauge due to wear, is

Standard gauge track (1 065 mm gauge)

Radius (m)	Without check rails Gauge (mm)	
	Normal	Maximum
< 135	1 085	1 105
135 – 150	1 080	1 105
151 – 175	1 075	1 100
176 – 200	1 070	1 095
> 200, tangent track	1 065	1 090
	With check rails Gauge(mm)	
< 135	1 090	1 105
135 – 150	1 085	1 105

Narrow gauge track (610mm gauge)

Radius (m)	Without check rails Gauge (mm)	
	Normal	Maximum
< 200	620	630
200 – 300	615	625
> 300, tangent track	610	620

Summary of track gauge standards

Nominal Gauge	Permissible Deviation from Specified Gauge (mm)					
	A – Standard		B – Standard		C - Standard	
	Min	Max	Min	Max	Min	Max
1 065 mm	-3	+5	-7	+12	-10	+25
610 mm	-3	+3	-4	+7	-6	+10

4.1.3.3 Steel and wood sleeper fastenings, with clips and bolts, are designed to allow gauge adjustments in steps of 5mm. The gauge can vary from 1 065mm to 1 090mm with new rails.

4.1.3.4 Gauge widening must take place in accordance with **Annexure 9, sheets 2 and 3**.

4.1.3.5 When laying track with wood sleepers, the initial gauging should provide widening at a uniform rate.

4.1.3.6 Where rails are laid on wood sleepers with sole plates, or cast iron chairs with keys, re-gauging must not be resorted to. The high leg rails must be renewed before the maximum permissible track gauge has been reached.

4.1.3.7 Where rails are held with clips, re-gauging by changing the clip combination must be undertaken if the limit of gauge is reached before the limit of rail wear. Refer to **Annexure 11** and **clause 17.1.4**.

4.1.3.8 Any deviations from these standards must be documented, approved by the Infrastructure Manager and included in chapter 20 of this manual.

4.1.4 Cant

4.1.4.1 Cant must be provided in accordance with **Annexure 9, sheet 4.** When temporary speed restrictions are introduced on curves, cant must also be adjusted according to Annexure 9, sheet 4 if vertical clearances allow this to be practically possible. Where a temporary speed restriction of 15km/h is applied, half of the cant as for 30km/h must be applied. See also clause 13.4.2 for electrified lines. Speed restrictions on curves must be removed as a matter of priority. Speed restrictions on sharper curves must be treated with higher priority and immediate consideration must be given to reducing the cant as an alternative if the speed restriction is expected to remain in force for a period time. Depot Engineering Manager to certify the cant configuration based on local conditions.

4.1.4.2 The cant of curves in yard tracks must not exceed 10mm.

4.1.4.3 On curves without transitioned ends, two-thirds of the full cant must be applied at the beginning and end of the curve. The cant must be increased to the full amount towards the middle of the curve and decreased to zero into the straight at a rate not exceeding 10mm in 5m (i.e. 1:500, the maximum permissible twist in transitions).

4.1.4.4 On curves with transitioned ends, application of cant must commence at the point where the transition curve joins the straight. Cant must be uniformly applied over the transition

to reach the required value at the point where the transition curve joins the circular curve. Should this not be possible without exceeding the rate of 10mm in 5m, cant must be uniformly applied at the maximum rate over the transition and into the circular curve.

4.1.4.5 On reverse curves where the intervening straight is less than 40m, both rails of the track must be at the same level for a distance of 6m between the two curves.

4.1.4.6 At or near mainline points and crossings and wherever the rate of wear on rails indicates that it is advisable, the specified cant may, on the authority of the Depot Engineering Manager, be increased or decreased by up to 20mm for 1 065mm and 10mm for 610mm gauge lines.

4.1.4.7 When a turnout is situated on a curve, no cant is to be provided over the turnout but a permanent speed restriction of 30 km/h must be imposed.

4.1.5 Gradients

4.1.5.1 Whenever work is performed in yards the track gradient should not be changed.

4.1.6 Sleeper spacing and permissible deviations

4.1.6.1 Sleeper spacing shall comply with:

Track position	Permissible deviation from specified spacing (mm)		
	A – Standard	B – Standard	C - Standard
At rail joints	10	30	40
Rest of Track	25	100	150

4.1.6.2 Sleepers per 50m track

Number of Sleepers	Permissible deviation from specified number of sleepers		
	A - Standard	B – Standard	C - Standard
Insufficient Sleepers	0	2	4
Too many Sleepers	0	4	8

4.1.7 Sleeper and rail fastenings

4.1.7.1 Sleeper fastenings

To comply with the A – B or C – standards the numbers of sleepers with loose, missing or defective fastenings per 50m of track must not exceed the value M in table below. There may further not be more than value N consecutive sleepers with loose missing or defective fastenings.

	A - standard	B – standard	C - standard
Value M	0	4	8
Value N	0	2	3

4.1.7.2 Rail fastenings

To comply with the A – B or C – standards respectively not more than 0, 1 or 2 loose, missing or defective joint bolts may occur on any joint.

4.1.8 Universal Sleeper and Bolts replacement on turnouts

Minimum requirements for installation of universal sleepers with Infra bolts on turnouts (incl. yards and branchlines). Not applicable to heavy haul lines.

4.1.8.1 Once installed the bolts must be torqued to between 240 and 250 Nm and re-torqued a week after installation.

4.1.8.2 All bolts must be greased by applying anticorrosive grease over the whole length of the thread before installation.

4.1.8.3 A HDPE pads with a minimum thickness of 5 mm must be used between the steel hardware and concrete sleeper. HDPE pad comes in a strip of 4.3 m long x 200mm wide and must be cut on site.

4.1.8.4 A Stumec and impact wrench may not be used for the installation of the bolts.

4.1.8.5 Prostruct 35.30 must be used at the bottom of the sleeper on the nut. 2 Litres should be sufficient to do a set. Once the epoxy is mixed it must be used within 30 minutes. The epoxy (Sealed Kits) must under no circumstances be stored or placed in the sun.

4.1.8.6 Careful consideration should be given to make sure that provisions are made to fit the cradle for the point's rodding and the two indicator frame. The cradle may be fastened with a minimum of 3 Infra bolts provided that at least two of the bolts are prevented from turning by installing a locking plate or tag washers. Each contractor must submit his proposed method for approval to Technology Management.

4.1.8.7 The following serves as a guideline on typical fastening methods.

4.1.8.18.1 1mm Cromedeck flat plate with two bolt holes. The ends are bent up and knocked over to prevent the bolts from tuning.

4.1.8.18.2 18 mm Tag washer of suitable thickness and material.

4.1.8.18.3 Under no circumstances may the steel reinforcing be cut off. These holes must be left out.

4.1.8.8 Each sleeper must have a minimum overhang of 200 mm i.e. The length from the side of the plate to the end of the sleepers shall not be less than 200 mm. The first hole in the sleeper must be at least 250 mm from the one side and 250 + 100 from the other side. This will allow for the re-use of the sleepers if new hardware is installed. On the stock and switch panel the 100 mm could be increased to 200 mm. If the sleepers are moved for the new steel hardware the old and new holes must be at least 100 mm apart.

4.1.8.9 If holes will be closer than 150 mm the one hole must be left out. Technology Management to approve deviations accordingly.

4.1.8.10 The holes in the HDPE pad must be between 26-30 mm.

4.1.8.11 Before coring the sleepers must be aligned and positioned to make sure that the holes do not align with the reinforcing. The sleeper has small indents marking the position of the reinforcing within 15 mm.

4.1.8.12 The hole must be cored at a 90 degree angle to the concrete surface wit a maximum error of 3 degrees.

4.1.8.13 All possible bolts must be installed. See guidelines below.

4.1.8.14 Technology management is busy considering reducing the number of bolts. (Details to follow).

4.1.8.15 Preferably all bolts on sleeper 1 to 6 must be installed. If not, a minimum of 3 bolts per rail seat must be installed provided, that this does not happen on consecutive sleepers.

4.1.8.16 The bolts on the rails seats of the stock and switch must be as above.

4.1.8.17 The rest of the set have a minimum of 3 bolts on the 4 hole plates and a minimum of 2 bolts on the 3 hole base plates provided that the minimum number of bolts does not happen on consecutive sleepers.

4.1.8.18 Exceptions to the rules above provide for:

4.1.8.18.1 Places where the holes are in the centre of the sleeper, and
4.1.8.18.2 Skew plates causing holes to overlap on the reinforcing.

4.1.8.19 In order to ensure that the turnouts can be measured accurately and be built to the correct gauge, the metal flow in the gauge corner (Overburden) of the rails should be removed by TFR prior to the Contractor arriving for measurement of the turnout.

4.1.8.20 The Contractor shall only start work on turnouts, which can be repaired to the ‘A’ standard with the installation of the universal sleepers.

4.1.8.21 The holes in the steel hardware must be at least 24 mm. All holes smaller that 24mm must be reamed to a maximum of 25 mm.

4.1.8.22 The steel washer at the top must be at least 6 mm thick with a 4 mm at the bottom of the assembly.

4.1.8.23 When welding needs to be done on the set the E-clips and T-bolts must be loosened and not the Infra bolt.

4.1.8.24 The “Infra bolts” system may only be used to fasten plates with a thickness of between 20 and 35 mm.

CHAPTER 5

SETS (TURNOUTS, SLIPS AND DIAMOND CROSSINGS)

5.0 INTRODUCTION

5.0.1 Turnouts, slips and diamond crossings (collectively called 'sets') are expensive to replace, costly to maintain and are weak links in the track structure.

5.0.2 Unused sets must be removed in collaboration with relevant parties following the prescribed process.

5.0.3 Before sets are replaced, Operating, Electrical and Signals should be consulted to establish whether the layout can be simplified.

5.0.4 Sets must preferably be pre-assembled in a workshop according to the latest Quick Reference for Building of Turnouts. The process must be guided by competent track personnel.

5.0.5 Sets must be built, inspected, evaluated and maintained in accordance with the latest work codes. Before a set is put into the track it must be checked in every detail by the Track inspector, to ensure that it is correctly built.

5.0.6 Maximum allowable speed over and speed restrictions applicable to sets are prescribed in the General Appendix/General Train Working Rules.

5.0.7 Re-usable released turnout components must be correctly cut so as to render maximum re-usability after refurbishment.

5.0.8 Refurbished second hand turnout components may be obtained from the Refurbishment Depot at Beaconsfield for use in lesser trafficked lines instead of new material.

5.1 GENERAL

5.1.1 If unavoidable, one exothermic joint or one flash-butt welded joint is permitted in lead and closure rails, provided the joint positions comply with **Annexure 18 sheet 1**.

5.1.2 Turnouts of 1:6 angle to **drawings E7051, E7075 and E7078** must be built only as equal-split turnouts.

5.1.3 On split 1:12 and 1:9 turnouts (i.e. through line is not straight), 5m and 4,88m guard rails respectively, must be used on both legs of the turnouts.

5.1.4 Where the guard rail projects beyond the end of the guard stock rail, and there is insufficient clearance for the inner 100% joint plate at the stock rail's joint, a flat or angle joint plate must be paired with the outer 100% joint plate.

5.1.5 The alteration of stock rails and points blades from one hand to the other by bending or straightening the stock rail at the vertex is only allowed as follows:

Location	Rail weight	Type of set
Yards and Sidings only	30 kg/m and 40 kg/m	1:8 to 1:12
All lines	30-kg/m and 40-kg/m	1:5 to 1:7
All lines	22-kg/m	All

5.1.6 Gauge for sets must be in accordance with the work code for the building of turnouts, slips and diamond crossings.

5.1.7 Where turnouts are on curves, the gauge must be adjusted (forward from the extreme end of the guard rail and backward from the stock rail joint of the turnout), by 5mm every 6 sleepers, until it matches the gauge of the curve. (Refer to clause 4.1.3.5)

5.1.8 The gauge at the obtuse crossing of diamond crossings must be checked at least every six months, and if less than 1 065mm or more than 1 075mm, must be adjusted to 1070mm.

5.1.9 Working parts must move freely, fit correctly and be kept clear of obstructions. Nuts and bolts securing components must be kept tight. Broken bolts must be replaced.

5.1.10 Whenever any component of a turnout is replaced, the mismatch of the rail running surfaces must be rectified by welding and/or grinding without delay.

5.1.11 Welding and grinding must be performed in accordance with the latest work code.

5.1.12 Heel bolts must be greased over their full length to prevent rusting.

5.2 MAINTENANCE OF STOCK AND POINTS RAILS

5.2.1 General

5.2.1.1. To reduce the wear on switch blades, switch lubricators must be installed. Alternatively lubrication may be affected by applying grease or graphite by hand. (Refer to clause 5.2.1.7)

5.2.1.2. Bolts and/or cotter pins holding stock rails to chairs must be securely in position.

5.2.1.3. Heel bolts must be tightened to prevent undue movement, but without interrupting the easy operation of the points blade. Ferrules must be in position and replaced when worn.

5.2.1.4. Points blades must fit the stock rail closely and accurately with full bearing against the head.

5.2.1.5. Points blades must rest on the slide chair. Should the points blade show a tendency to rise off the sliding surface, the cause must be ascertained and the fault rectified.

5.2.1.6. Burrs/Overlap which interfere with the fit of switch blades against stock rails or with the operation of locking bars, must be removed by grinding. Burrs/Overlap must further be kept in check in order to prevent breakouts on switch blades and stock rails. Grinding must be done in accordance with the Specification for Track Welding.

5.2.1.7. All sliding chairs must be black-leaded/ lubricated over the first 1,25m. Slide chairs (except where teflon slide plates are fitted on concrete sleepers) must be cleaned and black-leaded/ lubricated. Lubricating oil may not be used.

5.2.1.8. Unusual wear of points blades must be reported to the Maintenance Manager, in order to decide on protective measures. (point protector to be inserted 50mm before the blade on the side with most wear)

5.2.1.9. Points blades must be renewed (with welding where permitted) before they become worn to an extent likely to affect safe working.

5.2.2 Hinged points blades

5.2.2.1 Hinged points blades must be replaced under the following conditions:

5.2.2.1.1 Before 300mm of the points blade is worn to a knife edge.

5.2.2.1.2 Before wear creates a knife edge that is more than 15mm below the rail level of the stock rail at any position. (Measured with the points blade well seated on the slide chairs)

5.2.2.1.3 If chips occur that are more than 25mm long or 10mm deep on the points blade and below the rail level of the stock rail (welding repairs can be done in the first metre of the points rail). (Refer to Welding Manual: BBB 8341 or latest).

5.2.2.1.4 Before side-wear occurs on the points stock rail.

5.2.2.1.5 If black spots appear on the crown of the points blade, or shelling or mushrooming occurs.

5.2.2.2 Where heavy crown wear occurs on the stock rail and little or no wear on the corresponding points blade, the stock rail must be renewed with welding and/or grinding, where permitted. Alternatively, the points rail must be ground to fit, before the vertical gap between the running edge of the stock rail and the top of the points blade exceeds:

- 8mm in the area where crown wear is caused by hollow wheels' false flanges
- 2mm at the machined end of the points blade.

5.2.2.3 Points blades and/or stock rails must be replaced together, (if a matching piece is not available) when the crown wear of either exceeds 10mm.

5.2.2.4 Points blade protectors (reversible web-mounted block or lead guard rail) may be used to limit wear of points blades in yards and running lines with low speeds 30kmph. See **Annexure 19 Sheet 2 of 3**.

5.2.2.5 Where points blade protectors or lead guard rails are used, the correct setting of the gap between the open points blade and the stock rail on either side must be ensured.

5.2.2.6 Only one, not both, of the points blades may be protected in this way on a turnout at any time. The points blade protectors or lead guard rails must at all times be properly fastened to the stock rail.

5.2.3 Flexible type points blades and undercut stock rails

Flexible type points blades and undercut stock rails must be replaced together under the following conditions:

5.2.3.1 Before wear creates a knife edge over a distance of:

- 1 000mm for 1:9 turnouts
- 1 100mm for 1:12 turnouts
- 1 300mm for 1:20 turnouts,

measured from the tip of the points blade.

5.2.3.2 Before the top of the points blade, at any position further than 1 000mm from the tip, is worn more than 15mm below rail level of the stock rail (measured with the points blade well seated).

5.2.3.3 If chips occur that are more than 25mm long or 10mm below rail level of the stock rail.

5.2.3.4 Before side-wear occurs on the points stock rail.

5.2.3.5 If black spots appear on the head of the points rail or shelling or mushrooming occurs.

5.2.3.6 If side-wear occurs on the stock rail but not on the points blade. The points blade and stock rail must be replaced before the points blade chips or bends over.

5.2.3.7 Before the crown wear of the points blade or stock rail exceeds 10mm.

5.2.3.8 With a swivel type of tumbler the opening gap for setting is 51mm either side and tumbler arm in the centre of frame. When the blade is closed the gap must not be smaller then 102mm.

5.2.3.9 With a stiff neck type of tumbler the opening gap for setting is 63.5mm either side and tumbler arm in the centre of frame. When the blade is closed the gap must not be smaller then 127mm.

5.3 MAINTENANCE OF FROGS

5.3.1 Rail manufactured frogs

Frogs should be replaced when the top wear (of the point- or splice rail) measured from a straight edge placed across the wing rails one metre from the nose of the frog, reaches:

5.3.1.1 In running lines: - 5mm (for all rail sections).
The frogs' use may be extended by:

- welding and grinding of the frog and the throat-area of the wing rails
- grinding of the throat-area of the wing rails (to relieve wheel hammer).
  The permissible wear may then be increased as indicated in **clause 5.3.1.3**.

5.3.1.2 In loops, sidings and yards the frogs may be allowed to wear until wheel flanges touch the bottom of the flangeway (spacer blocks). This should normally only occur when top (crown) wear exceeds that shown in clause 5.3.1.3.

5.3.1.3 Allowable crown wear of crossing frogs

Rail profile	**Running lines**	**Loops, sidings, yards**
60 kg	**10mm**	**15mm**
≥48 kg	10mm	15mm
40kg	8mm	10mm
≤30kg	5mm	6mm

5.3.1.4 Guard stock rails must be replaced together with frogs if the components' sleeper spacing require it.

5.3.2 Cast 14% manganese frogs (Railbound and Monoblock)

5.3.2.1 Maintenance welding and grinding work must be performed in accordance with the Welding Specification sections SSS13 and SSS14 .

5.3.3 The wing rails of the movable V-type frogs are to be removed by grinding before the wear (measured as in clause 5.3.1) exceeds 3mm. The moveable V piece is to be replaced before the wear exceeds 10mm.

5.3.4 The overlap that forms on frogs must be removed by grinding before chips form in the overlap.

5.3.5 Components must be replaced before the maximum clearance between the guard rail and the guard stock rail opposite the frog is 50mm (57mm for old type 1:7 turnouts).

5.4 POINTS LOCKS AND KEYS

5.4.1. Where signalling gear is not installed, track personnel must replace defective points locks.

5.4.2. Provided the lock itself is sound, a key which cannot open a lock or which can be withdrawn from an open lock must be scrapped.

5.4.3. Defective locks and keys must be returned to the Depot Engineering Manager's office for out repair or replacement.

5.4.4. Missing points locks must be replaced and the circumstances reported to the officer in charge.

5.4.5. Points locks must be black-leaded internally**.**

5.4.6. Patrick locks are used in accordance with operating instructions at some sets, including those at fuel sidings.

5.5 BRIDLE-LOCKED POINTS

5.5.1 The amount of slack in bridles or bridle chains of locked tumbler levers must not exceed 15mm.

5.5.2 At interloops where there is no signalling, counter weight arms must be provided with two bridles, one on each side of the arm. The lock must be placed so that the tumbler may be locked when set for the main line.

5.6 POINTS TUMBLERS

5.6.1 Fitting points tumbler with retaining mechanisms (Racor, Henry Williams, or as shown in **Annexure 27 sheet 4**), will improve safety of train movements over sets.

5.6.2 On running lines, the counter weights or the indicator plates must be painted half white and half red. The white half must be uppermost when the points are set for the main line.

5.6.3 Counter weights of points tumbler not on running lines must be painted white. If the points must be kept locked in a specific position, the centre recess on both sides of the counter weight must, on direction of the yard official in charge, be painted black.

5.6.4 The clearance of the counter weight arm to the track centre line is 2 000mm. Depending on track centres, a points box with arm working parallel to the track may be required. The tumbler on tumbler operated sets equipped with points indicators shall be painted black. **(See BBB1366 Version 3).**

5.6.5 The Track master must ensure that the throw of the stiff-arm type points box is equal for both settings of the points.

5.6.6 The Track master must ensure that pins of the levers are lubricated when the turnouts are cleaned.

5.6.7 Points tumbler components must be renewed before they become so worn that either the tumbler is not easily thrown over, or the points remain partially open.

5.6.8 The Track master must ensure that switch blades lock properly, both in the turnout and mainline setting.

5.6.9 Where derailments tend to occur on sets in yards, the switch Tumblers must be replaced with a Tumbler (stokstyf) with spring loaded linking mechanism. Refer Annexure 27 sheet 4.

5.7 SPIKED POINTS

If it is necessary to restrict movements through a turnout to one track, the points blades must be set for that track and secured with an adjustable points clamp and private lock or with a joint plate and two ‘A’ coach screws. The train control centre/traffic controller must be notified accordingly.

CHAPTER 6

RAILS

6.0 THE TRANSPORT AND HANDLING OF RAILS

6.0.1 Rails must be handled with care.

6.0.2 Rails must be off-loaded (based on approved methods) as close as possible to the time that they are required, and exactly as planned. Special care must be taken to match adjoining rails when re-conditioned, re-profiled and second hand rails are offloaded.

6.0.3 Offloaded rails must be kept clear of the track, electrical and signal equipment and must not be covered with soil or ballast.

6.0.4 Rails must be offloaded clear of level crossings.

6.1 BENDING AND STRAIGHTENING OF RAILS

6.1.1 Because of the danger of fracture, rails must not be straightened or curved in cold weather. (5 degrees and less)

6.1.2 Before rails are placed in the track, all kinks must be removed.

6.1.3 On all curves, rails must be uniformly curved to true radius, as follows:

6.1.3.1 All 36m and shorter rails, throughout their length.

6.1.3.2 Continuous welded rail:

- curve radius $<$ 500m:- curved throughout their length.
- curve radius $\geq$ 500m:- 10m at each end must be curved.

6.1.4 The correct size jim-crow must be used for the mass of rail concerned.

6.1.5 If a mechanical jim-crow is used, the last metre of the rail must be curved with a hand type jim-crow.

6.1.6 When a hand type jim - crow is used, it must be moved by approximately half its length at a time.

6.2 RAIL USAGE

6.2.1. Consideration must be given to transpose the high leg rail to the low leg rail in order to optimise the wear life of rails (authorisation by the Chief Engineer required). Consideration should also be given to exchange the rails on tangent track with rails on curves. Refer decision models clause 16.3.8.(Refer to S.TM.13/13 limits)

6.2.2. Only class C and better rails may be used.

6.2.3. When another type and/or class of rail other than that mentioned in **Annexure 3** is considered for use, it must comply with the requirements of an equivalent rail as indicated below and with **clause 10.3.1.1.3**.

RAIL TYPE AND CLASS	EQUIVALENT RAIL
60 New 60 Class A 60 Class B 60 Class C	 57 New 57 Class A
57 New 57 Class A 57 Class B 57 Class C	60 Class B 60 Class C 48 New 48 Class A
48 New 48 New 48 Class A 48 Class B 48 Class C	57 Class B 60 Class C 57 and 60 Class C 57 and 60 Class C 57 and 60 Class C

6.2.4. When rails are chosen for a specific application, the price and remaining life as well as sleeper compatibility must be taken into account.

6.3 JUNCTION RAILS

6.3.1 Junction rails are used for joining rails of different sections, spanning either two, or alternatively three, rail masses.

6.3.2 Junction joint plates may only be used when the use of junction exothermic welds or junction rails is not possible.

6.3.3 Wherever possible junction exothermic welds must be used in stead of junction rails or joint plates.

6.3.4 When ever junction exothermic welds or junction rails are used, the corresponding welds on the two rail legs shall always be in-between the same two sleepers.

6.4 CLOSURE RAILS

6.4.1 Closure rails may not be less than 4,2m in length and must be secured to all supporting sleepers.

All closure rails must be ultrasonically tested before installation. The wear limit should not exceed 6mm. (refer to CWR)

6.4.2 Closure rails and the adjoining rail ends must be curved as in **clause 6.1.3**.

6.4.3 During rerailing work closure rails may be fastened with joint plates and with two G clamps, or with joint bolts in the outer holes of the joint plates. This is only a temporary measure to allow trains to pass through until the Track master leaves the work site at the end of a work day. **This measure is not applicable to heavy-haul lines**.

6.4.4 When rerailing work stretches over more than one day, closure rails may be fastened with joint plates and with four G clamps, or with joint bolts in all the holes of the joint plates. This is only a temporary measure to allow trains to pass through during the absence of the Track master from the work site in between shifts. This allowance is only valid for a period up to 48hours and 30 kph speed restriction should be imposed. **This measure is not applicable to heavy-haul lines.**

6.4.5 When closure rails are installed in track and left temporarily before exothermic welding the joints, both rail ends must be joined to the adjacent rails by joint plates and four joint bolts.

6.4.6 When closure rails are welded into the track all four rail ends must be free from dipped ends and joint bolt holes. Rails must be cropped and a longer closure used if necessary.

All closure rails to be ultrasonically tested. Mismatch wear should not be more than 6mm.

6.4.7 In the case of continuous welded rails, the closure rail must be welded into track and the rails on that leg must be destressed over at least 80 sleepers either side of each weld position. The first weld may be cast while the rail temperature is outside of the A-range but the last weld must be cast with the rail temperature inside the A-range. The rail stress must be measured on both legs and destressing executed if required. Where a break was caused by tensile stress, both rails must be destressed over a distance of at least 500m on either side.

6.4.8 All fastenings and rail off-cuts must be removed from site.

6.4.9 On electrified lines, jumper cables must be applied before starting work. (Refer to **clauses 2.13.6 and 2.13.7 and 13.5.4 and** Works Code Ref.TFR/I/COA/13/4/1/32)

6.5 CHECK RAILING

6.5.1 Check rails are provided to prevent excessive wear on the high legs of curves and to prevent derailments. See **Annexure 9, sheet 3**.

6.5.2 Check rails must be used on curves with radius 149m and less.

6.5.3 Check rails must start and end where the gauge of the track is 1 075mm.

6.5.4 Where new rails are used as check rails they provide a flange way of 63mm. The maximum permissible flange way is 83mm.

6.5.5 Re-gauging must not be carried out on check-railed track. Check rails must be renewed at the same time as high leg rails.

6.5.6 Reconditioned rails, classes B and C, may be used for check rails. Side-worn rails used as check rails must be placed so that wheelflanges of vehicles bear against the unworn edge.

6.5.7 Joints in check rails must be located between sleepers at least 3m from joints in low leg rails.

6.5.8 A gap 25mm wide must be left in the check rail opposite an insulating joint in the low leg running rail. The wearing edge must be chamfered 5mm over a length of 50mm on both sides of the gap.

6.5.9 Trains must not be allowed to pass over a curve from which a portion of the check railing has been removed, unless the remaining portion of the check rail has been fitted with tapered end pieces at both ends.

6.6 LAYING RAILS IN TRACK

6.6.1 General

6.6.1.1 When loading or off-loading rails, care must be taken to prevent damage to rails. When off-loading rails the height that rails are dropped onto the track must be strictly controlled to prevent damage to the rails and the track infrastructure.

6.6.1.2 Rail temperatures must be measured by placing the thermometer on the flange or web of the rail and shading it from direct sunlight. The thermometer should remain in contact with the rail for at least ten minutes before readings are taken.

6.6.1.3 Rails must be cut square and vertical and with a saw or a disc-cutter.

6.6.1.4 All rails in tunnels must be welded into continuous lengths.

6.6.1.5 Track circuit and other bonds should preferably be bolted to the rails. The Cad-method of welding may not be used with Cr.Mn.-rails.

6.6.1.6 Exothermic welds must as close as possible be positioned halfway between sleepers. No trains to run on Cr.Mn or HH rails before welding.

6.6.2 Jointed track (joint plated rails)

6.6.2.1 Rails must be laid within the temperature ranges specified in **Annexure 16**. Correct expansion gaps must be provided by using shims which must be removed before trains are permitted to pass.

6.6.2.2 If 36m rails are laid outside the temperature ranges specified, the expansion gaps must be adjusted within the specified rail temperature ranges as soon as possible.

6.6.2.3 Rails must be laid with square joints. If stagger develops to more than 60mm owing to variations in rail lengths or track curvature, the rail must be cut. 36m rails with holes in must be cut 100mm from leading end.

6.6.2.4 Should jointed rails occur on unballasted bridges in a section of track with continuous rails, permanent splice joints must be provided: (Refer to clause 6.8.3)

- At both ends of multiple-span bridges.
- At both ends of bridges having a single span greater than 25m.
- At the free end of a bridge having a single span of 25m or less.

The splice joint must be at least 9m from the back of the ballast wall and clear of any safety rail.

6.6.2.5 Rail joints must not be placed less than 3m from deck supports or ballast walls.There must be no rail joints on spans of less than 7m.

6.7 CONTINUOUS RAILS

6.7.1 General

6.7.1.1 Continuous rails are rails longer than 36m.

6.7.1.2 Continuous rails must be 40kg/m or heavier, depending on permitted axle loads.

6.7.1.3 Concrete, wood or 40kg steel sleepers may be used.

6.7.1.4 Ballast must be sufficient and of acceptable standards. Refer to clause 17.1.2

6.7.1.5 In this clause the term ‘re-railing’ includes final jointing of rails, by exothermic welding or other wise. Destressing of rails within the appropriate temperature range forms part of the laying of continuously welded rails.

6.7.1.6 ‘The destressing range’ means the appropriate temperature range, as per clause 6.10.7.

6.7.1.7 The laying and destressing of continuous rails must be managed by an Engineer or an Engineering Technician.

6.7.1.8 A complete record must be kept on form T1286(M) when destressing and/or welding is carried out.

6.7.1.9 On continuous railed track the geometry should be maintained to a standard **equal or better** than the B standard.

6.7.2 Track structure for running lines

6.7.2.1 Crossing loops are classified as running lines.

6.7.2.2 Continuous rails may be used on tangent track and curved track down to 800m radius, provided that the sleeper spacing is not more than 800mm.

6.7.2.3 For concrete sleeper track the radii of curves on which continuous welded rails are used may be reduced to 600m radius provided that the sleeper spacing does not exceed 700mm and 400m radius provided that the ballast profile is at least 3000mm or the sleeper spacing is not more than 600mm.

6.7.2.4 In the case of steel and wood sleepers the radius may be reduced to 600m provided that the sleeper spacing does not exceed 700mm.

6.7.2.5 Where a curve consisting of jointed track is joining unto a section of continuously welded rails, a transition length of jointed track of at least 80 sleepers between where the curve ends/begins and the continuously welded rails begins/ends must be applied.

6.7.2.6 With special written permission from the Chief Engineer (Infrastructure-Maintenance) continuous rails may be used on curves with sharper radii than 400m (see clause 6.7.9).

6.7.2.7 Wood sleepers must be fitted with type E3131 chairs.

6.7.3 Track structure for yard tracks

6.7.3.1. Continuous rails may be used on tangent track and curved track down to 600m radius, provided that sleeper spacing is not more than 800mm.

6.7.3.2. Concrete sleepers with FIST fastenings may be used under locking and safety bars. The open end of the clip must be on the outside of the rail.

6.7.3.3. Steel sleepers of 40 kg may be used at 800mm spacing under continuous rails down to and including 400m radius but 80 sleepers at the turnout ends of the continuous rails must be at 700mm spacing. Steel sleepers may not be used under locking and safety bars.

6.7.3.4. Joint plated joints on turnouts may be exothermic welded if the points blades do not require frequent replacement and the rail mass is 40kg/m or greater.

6.7.4 Laying continuous rails within the destressing range

6.7.4.1 While derailing, trains may be allowed to pass at 30 km/h if every fourth sleeper is fully fastened and temporary rail joints are made with joggle joint plates secured with two clamps, provided the Track master is present on site. Refer clause 6.4.3. and 6.4.4.. The speed of 30 km/h must apply until all the sleepers have been secured and permanent rail joints have been completed. Temporary expansion gaps must be set to facilitate final jointing.

6.7.4.2 Rails must at least be fastened to alternate sleepers within the limits of the destressing range, and the fastenings on all the other sleepers must be tightened before the limit of range B is reached. Re-railing that was not completed as above must proceed as in **clause 6.7.5**.

6.7.4.3 The left and right-hand rails must be fastened down simultaneously.

6.7.4.4 The last 80 sleepers of previously laid track must again be destressed before derailing is resumed.

6.7.4.5 Short track lengths may be destressed at a time, provided the procedures set out herein are adopted.

6.7.4.6 Re-railing more than 20m inside a tunnel is not subject to destressing temperature considerations.

6.7.5 Laying of continuous rails outside the destressing range

6.7.5.1 Re-railing may proceed within the limits of temperature range B. Refer clause 6.7.1.5.

6.7.5.2 While derailing, trains may be allowed to pass at 30 km/h, if every fourth sleeper is fully fastened and temporary rail joints are made with joggle joint plates secured with four clamps.

6.7.5.3 After derailing, all sleeper fastenings and all joint bolts must be tightened and a speed restriction of 30 km/h must be imposed until the track has been destressed.

6.7.6 Laying of continuous rails on new formation

6.7.6.1 The new formation must be approved by an Engineer before track laying is commenced.

6.7.6.2 Traffic may only run on newly laid track after the sleepers have been packed sufficiently to ensure adequate and even bearing and to provide a uniform running top.

6.7.6.3 To ensure the safe use of the track during ballast consolidation, the rails must be destressed after the track has been fully ballasted, packed and aligned. Prior to destressing a speed restriction of 30 km/h must be applied to construction trains.

6.7.6.4 After the ballast has been consolidated the rails must again be destressed. A speed restriction of 50 km/h must be applied from the first destressing up to this point.

6.7.7 Laying of continuous rails on unballasted bridges

Continuous rails may be laid over unballasted single and multiple-span bridges of any length and the splice joints omitted provided that:

6.7.7.1 Type E3131 chairs are fitted on all the sleepers and that all the chairs except those on 5 consecutive sleepers at the fixed end of each span are fitted with type E3205 washers.

6.7.7.2 All bridges with a span less than 10 meter with type E3131 chairs are fitted with type E3205 washers.

6.7.7.3 When laying new rails, exothermic welds on bridges must be avoided, and must be kept as far off the bridge as possible - preferably more than 20m.

6.7.7.4 If exothermic welds cannot be avoided, rail ends must be cropped to eliminate all joint bolt holes.

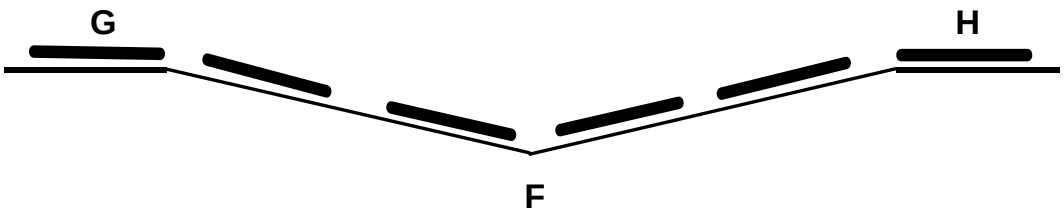
6.7.7.5 On completion of all exothermic welding of joints on the bridge, the rails must be destressed before commencing with the nearest welds off the bridge. On completion of destressing, the clip bolts of the anchoring sleepers at the fixed end(s) of the bridge span(s) must be firmly tightened.

6.7.8 Slacks, kinks and kick-outs

6.7.8.1 Should slacks, kinks or kick-outs occur in continuous rails, prompt protective measures must be taken.

Slacks

To comply with the A - , B- , and C- standards the pairs of track gauge readings on top the rail, with the gauge set at 1065 mm, on both sides of G, F and H in the sketch and table below. The values on the table must not be exceeded.



Both readings of a pair uphill or downhill			
	1:1000	1:250	1:180
	A-Std	B-Std	C-Std
Difference in readings	1mm	4mm	6mm

One reading of a pair uphill and the other downhill			
	A-Std	B-Std	C-Std
Sum of readings	1mm	4mm	6mm

The run – outs of long slacks must meet the requirements of clause 4.1.1.4.3

Before repair work on long slacks is undertaken, the run-outs excluded, the permission of the Depot Engineering Manager must be obtained.

6.7.8.1.1 The comply with the A-, B- or C-standards the track gauge cant readings at G, F and H in figure above must be such that the following requirements are met:

6.7.8.1.2 Cant to the same side – the difference in readings at G and F or F and H respectively must not exceed the values in table 4.

6.7.8.1.3 Cant to different sides – The sum of the readings at G and F of F and H respectively must not exceed the values in table 4.

6.7.8.2 Kick-outs in track with continuous rails must be eased to prevent further deterioration, provided the track is not pulled out from under the traction contact wire. Electrical must be called out when a kick-out occurs on an electrified section. Trains may be allowed to pass over the affected portion of the track if this can be done with safety. Depending on the seriousness of the situation, a temporary speed restriction must be imposed.

6.7.8.3 The track alignment must be restored only when the rail temperature is within the destressing ranges.

6.7.8.4 In all cases where kick-outs occur the rails must be cut and destressed for at least 500m on either side of the kick-out point.

6.7.8.5 The track (both rails) must be destressed over a distance of 500m on either side of where the track has been disturbed i.e. long slacks repaired, track lifted, re-alignment was done or sleepers replaced.

6.7.9 Continuous rails on sharp curves (see clauses 6.7.1. and 6.7.2.)

6.7.9.1 Special destressing temperature ranges (other than those in Annexure 16), specific conditions for tamping and ballast cleaning, as well as specific conditions that apply to each curve, must be recorded in **chapter 20**.

6.8 RAIL JOINTS

6.8.1 Joint plated joints

6.8.1.1. At least once a year, joint plated joints on running lines must be inspected. Where necessary the joint plates must be removed, cleaned, lubricated and reversed before being replaced. The joint plates and rail ends must be examined for cracks.

6.8.1.2. Except for destressing and exothermic welding, joint plates on rails 36m and longer must only be removed when the rail temperature is within the ranges specified in clause 6.10.7. and annexure 16.

6.8.1.3. The fishing surfaces of joint plates and rails must be cleaned and greased, and the threads of joint bolts must be lubricated before being used.

6.8.1.4. Where rails are bonded for electrical track circuits, the nuts of the joint bolts must at all times be on the inside of the track. Reversal must be effected by transferring the joint plates from one rail to the opposite rail.

6.8.1.5. Joint plated joints must at all times be bolted with all its bolts in place and firmly tightened.

6.8.1.6. Joint bolts must be fitted with spring washers or self-locking nuts.

6.8.1.7. Rail fastenings must be kept uniformly tight. Lengthening bars must not be used on joint bolt spanners.

6.8.1.8. Pressed-to-parallel joint plates may be used with new rails and reconditioned second hand rails. They are stamped "P-P".

6.8.1.9. Enlarged joint plates stamped "E" are for replacing joint plates where the wear of the rail fishing surface justifies their use. They must not be used with new or reconditioned rails.

6.8.1.10. Worn joint plates are not to be used in the track.

6.8.1.11. Joint plate holes must be drilled and sharp edges must be removed.

6.8.1.12. The sleepers on either side of joint plated joints must be of the same type and special attention must be afforded to the tamping of these sleepers.

6.8.1.13. The use of a template is recommended when drilling joint bolt holes.

6.8.2 Insulating joints / block joints

6.8.2.1 An insulating joint (commonly called a block joint) is used to insulate one rail from the next for either signalling or electric traction purposes. Signals or Electrical will indicate where block joints are required. The Track master must fit and replace block joints. If possible, Signals or Electrical should be present. If Signals was not present, the Track master must inform the train control centre/traffic controller, as the case may be, once the block joint has been renewed.

6.8.2.2 Block joints for traction purposes are those insulating non-electrified track from electrified track and those provided on sidings on which flammable liquids are handled.

6.8.2.3 When block joints are inserted in curves, **clause 6.1.3** applies. With prefabricated block joints the jim-crow must not be allowed to span the joint. See **clause 6.5.7** for the installation of block joints in check railed curves.

6.8.2.4 The installation of block joints on open lines involves breaking the track. **(**See **clauses 2.13.6 and 2.13.7)**

6.8.2.5 Work on block joints may only be performed within the appropriate destressing or working temperature ranges (see **clause 6.10.7**).

6.8.2.6 Renewal and maintenance of block joints must be performed in accordance with the latest work code.

6.8.2.7 New block joints must be shortened to the minimum length before installation in order to eliminate the need for additional closures during subsequent block joint replacements. Refer clause 6.4.1. (Block joints can be ordered in different lengths)

6.8.2.8 The block joint gap must be limited to between 4mm and 6mm by using one T-piece only.

6.8.2.9 Worn ballast must be screened out and replaced. Fastenings and block joint bolts must be firmly tightened before thorough tamping of the block joint.

6.8.3 Splice joints

6.8.3.1 Splice joints must be provided at unballasted bridges, as set out in **clause 6.6.2.4.**

6.8.3.2 Splice joints may be used to protect sets and curves, if authorised by the Depot Engineering Manager . In cases where the conditions for continuously welded rails cannot be adhered to safely, splice joints must be used.

6.8.3.3 Splice joints must be renewed before crown wear exceeds 6mm. Measurements at splice joint must be taken over the splice of the join.

6.8.3.4 Splice joints must be installed and set as follows:

- Before welding of the continuous rail has taken place the gap at the point must be adjusted to 25mm.
- The gap must be set immediately before welding to the continuous rail. It must be increased or decreased from the mean setting (which is 50mm from the closed position) by 1mm for every 2°C by which the temperature is lower or higher than the lower limit of the destressing temperature range.

- Welding of splice joints to adjoining rails after final setting of the gap must be completed within the destressing temperature range.

6.9 RAIL CREEP

6.9.1 Fastenings securing rails to sleepers must be kept tight. This will help to prevent creep.

6.9.2 Development of creep must be kept under observation and reported to the Depot Engineering Manager .

6.9.3 If creep develops to such an extent as to disturb sleepers and cause wide or tight joints, the rails must be pulled back and expansion gaps adjusted. Sleepers must be adjusted and fastenings replaced if necessary.

6.9.4 Tapered keys must be driven in the direction in which the forces on the rails appear to predominate, or in the direction of obvious creep. Where there is a tendency for keys to work loose, they must be reversed.

6.10 RAIL DESTRESSING

6.10.1 Because of the length of continuous rails, the stresses building up in them as a result of changes in temperature are very high. The lifting frame must be used to measure the stress free temperature. If the stress free temperature is found to be outside the limits of the A range, destressing must be carried out.

6.10.2 Destressing should also be considered after replacing sleepers, after ballast cleaning, when kick-outs have occurred, when the rail breaks or is cut, or when rail creep is observed. Refer to the decision guidelines and relevant work codes for rail destressing.

6.10.3 In all instances that destressing is called for, measuring of the rails' stress free temperature with the lifting frame should be considered. If the stress free temperature of both rails is within the destressing range, and also within 5°C of one another, the track may be considered as sufficiently stress free. In those areas where the lifting frame indicates excessive or unbalanced rail stress, destressing must be done.

6.10.4 Whenever the stress free temperature of the rail is known to be or is expected to be outside the destressing temperature range, a temporary speed restriction of 30km/h (40km/h for Coalline) must be applied until the rails are destressed or shown to be safe by the use of the rail stress lifting frame.

6.10.5 The stress free temperature is always at mid-point of the destressing temperature range. When destressing, the aim should be to have stress free rails. Depending on local conditions (e.g. rails' susceptibility to breaks resulting from tension stress, actual ballast profiles and sleeper spacing) and with written approval of the Depot Engineering Manager , destressing may be aimed at other temperatures - but always within the destressing temperature range.

6.10.6 If that part of the day when the rail temperature is within the destressing range is uneconomically short, rail tensors must be used. Rail tensors provide excellent control over the destressing process.

6.10.7 When laying, destressing or welding continuous rails, the rail temperature must be taken and recorded every half hour on T1528 destressing from.

6.10.8 Destressing temperature ranges are shown in **Annexure 16**.

6.10.8.1 Where the laying of continuous rails on sharper radii was approved (see **clauses 6.7.2.5** and **6.7.9**) special conditions will apply to each individual curve.

6.11 EXOTHERMIC WELDING OF RAIL JOINTS

6.11.1. Most of all rail breaks occur in exothermic welded joints.

6.11.2. The work code for track welding must be followed conscientiously. (Refer to BBB8341: Track Welding Manual version 4 or latest).

6.11.3. All preparatory, finishing and destressing instructions must be complied with.

6.11.4. Occupation time required to complete an exothermic weld in accordance with specification for normal (grade 700 or 900A) rails, is approximately 45 minutes. Additional time is required for the preparation and finishing of the joint. For CrMn (grade 1100) rails and head harden rails more time would be needed.

6.11.5. On electrified sections electrical continuity must first be provided as described in **clause 13.5.4**.

6.11.6. Welding personnel must inspect every exothermic welded joint and keep a record of the following:

- Location of weld.
- Manufacturer's portion number.
- Temperature before work is commenced and on completion of rough grinding.
- Welder's code and weld number
- Date welded

6.11.7. When an exothermic weld fails, the whole weld must be removed and replaced with a wide gap weld where possible. (Refer to the Track Welding Manual: BBB8341 Version 4 or latest).

6.11.8. Sleepers on both sides of an exothermic weld must be of the same type and should receive special attention during tamping.

6.12 REPAIR OF BATTERED AND MISMATCHED RAIL ENDS AND CARE OF WELDED JOINTS

6.12.1 Effective and efficient joint maintenance will reduce battered rail ends.

6.12.2 Battered rail ends must be repaired as soon as possible.

6.12.3 The cropping and repositioning of rails must always be considered.

6.12.4 Rail-end batter must not be welded if bolt holes have deformed.

6.12.5 Block joint rails must not be welded with the insulating joint plates in position.

6.12.6 Once work has been completed joint maintenance must be improved.

6.12.7 The work code for track welding must be followed conscientiously; and

6.12.8 All preparatory, finishing and destressing instructions must be complied with.

6.12.9 Mismatched joints will be reduced if re-conditioned and second hand rails are selected with the aim of improved matching.

6.12.10 Engineers must pay special attention to the maintenance of flash-butt joints on CrMn.-rails.

6.12.11 Cadwelds may not be used with CrMn.-rails. Instead huckbolted connections must be used for cable bond connections.

6.13 REPAIR OF WHEEL SPIN DAMAGE

6.13.1 Severe wheel spin damage must be treated with the same urgency as a rail break.

6.13.2 Wheel spin damage will be reduced if drivers, Operating, Signals and Locomotive and Truck maintenance are involved in solving the problem.

6.13.3 Where wheel spin damage occurs repeatedly the use of reconditioned or second hand rails must be considered.

6.13.4 The work code for track welding work must be followed conscientiously.

6.13.5 All preparatory, fettling, finishing and destressing instructions must be complied with.

6.13.6 If repair of wheel spin damage cannot be effected immediately, the use of special absorbent rubber pads to minimise damage to the track structure must be considered as an interim measure.

6.13.7 Wheel spin burns up to 1mm deep can be repaired by grinding. Wheel spin burns deeper than 1mm but less than 6mm must be repaired by welding and grinding. Wheel spin burns deeper than 6mm must be repaired by cutting the effected rail and replacing it with a closure rail. Wheel spin burns must be repaired in accordance with the Welding Manual BBB8341 version 4. Nests of wheel spin burns must be evaluated by the Depot Engineering Manager to determine the most productive repair method.

6.14 BROKEN AND DEFECTIVE RAILS

6.14.1 Typical rail defects and fractures are illustrated in Annexure 17, sheets 1, 2 and 3.

6.14.2 Broken or defective rails are potentially dangerous and must be thoroughly examined immediately. Trains may, except in the case of heavy-haul lines, be allowed to pass over broken or defective rails under the conditions set out in Annexure 17, sheet 4.

6.14.3 On heavy-haul lines with CrMn rails or Head hardened rails, temporary remedial measures require special conditions, which must be recorded in chapter 20. (Also refer to clause 13.5.4.)

6.14.4 Before permanent repairs are undertaken on track-circuited sections or electrified lines, Electrical or Signals must be advised.

6.14.5 A T447-report, in respect of each broken or defective rail removed from the track, must be sent to the controlling office each month. If no such rails were removed during the month, a nil return must be submitted. An effective system of control, which will ensure that T447-reports are submitted for all rail fractures, must be introduced in conjunction with Operating.

6.14.6 When broken rails, frogs and points cause derailments, the broken sections must be despatched to the Track Testing Centre, where arrangements will be made for the required analysis.
A sample of approximately 0,5m on either side of the break is required. To facilitate identification, a copy of the T447 report must accompany the sample.

6.14.7 Rails in running lines in which defects are detected ultrasonically, must be marked and dealt with as set out in Annexure 17, sheet 5. Defective rails must be cut out and replaced in accordance with Annexure 18.

6.14.8 Any clean vertical break in a rail, a flash-butt weld or an exothermic weld can be repaired by exothermic welding, provided that all existing welding material is removed (refer to the Track Welding Specification BBB8341 latest Version). Such breaks can be repaired as a temporary measure (except in the case of heavy haul lines) by using joggled joint plates for maximum of 24 hours, The joggle joint plates must be kept in place with four firmly tightened bolts, to permit the passage of trains. In such cases a temporary speed restriction of 30 km/h must be introduced. All other broken and defective rails must be cut out and replaced in accordance with Annexure 18.

6.14.9 All defective rails that are removed from the track must be rendered unfit for further service by burning or cutting grooves across the crown at intervals of not more than two metres. The rail ends must be painted red.

6.15 RAIL WEAR

6.15.1 The maximum permissible wear for all types of rail is as for class C rail according to Annexure 15 sheet 2.

6.15.2 All approved rail wear gauges may be used. The method of using a rail wear gauge is shown in Annexure 15 sheet 1.

6.15.3 The Maintenance Manager (Track) must take measurements and keep a progressive record to establish the rate of wear of rails. This will enable corrective maintenance measures to be taken where necessary and new rails to be ordered in good time.

6.16 RAIL LUBRICATORS

6.16.1 Refer to the latest work code and decision guidelines for the positioning, installation and maintenance of rail lubricators.
For additional information refer to Annexure 19, circular 50161 and drawings E1051, E3212, E3213 and E3243.

6.16.2 The exact location of lubricators must be determined by an Engineer or Engineering Technician.

6.16.3 All curves up to a radius of 1 200m should be lubricated.

6.16.4 Lubricators should be placed on a curve where the offset on a 10m chord is 10 to 15mm, or just before the point on the rail where there are signs of contact between wheel flanges and the rail.

6.16.5 Lubricators should not be placed at roll marks or where heavy sanding takes place.

6.16.6 Check rails must be extended to the straight track (where the gauge is 1 065mm) for installation of check rail lubricators.

6.16.7 Rail and flange lubricators or special points lubricators must be used for the lubrication of points blades of turnouts in yards.

6.16.8 Lubricant must not be deposited on the crown of the rail. The greasing plates must be adjusted to 20mm to 22mm below the top surface of the rail.

6.16.9 Rail lubricators must be maintained and adjusted by qualified personnel.

6.16.10 Repairs must be undertaken in a workshop and by qualified personnel.

6.16.11 The Track inspector must arrange for the filling and cleaning of lubricators.

6.16.12 Lubricators must be checked where on-track machines have worked, to ensure that they have been correctly replaced, properly filled and are in good working order.

6.17 STOP BLOCKS

6.17.1 The back end of a sliding stop block should be approximately 3m from the end of the running rail.

6.17.2 Stop blocks must be painted white.

6.17.3 The use of a single leg stop block is not permitted.

6.18 DERAILING DEVICES

6.18.1 Scotch blocks (Rail manufactured derailer), derailers, run-away points, catch points and derail points (collectively called derailing devices), must be fitted at least 2m outside the clearance mark (away from the turnout), to derail vehicles to the side, away from the more important track and clear of any important structures such as electrification masts and signals. Also see clause 8.3.1.5.

6.18.2 Hand operated hinged derailers must be installed in accordance with drawing E853.

6.18.3 Scotch blocks (Rail manufactured derailer) and derailers must be painted white.

6.18.4 Scotch blocks (Rail manufactured derailer) must be fitted on the outside rail with the hinge on the same side as the track which it is required to protect and lie with the points lock one sleeper nearer to the turnout.

6.18.5 Non-compounded derailing devices must be equipped with chains and points locks.

CHAPTER 7

SLEEPERS AND BALLAST

7.0 SLEEPERS AND FASTENINGS

7.0.1 General

7.0.1.1 Sleepers must be off-loaded as close as possible to the time that they are required and in accordance with the maintenance plan.

7.0.1.2 Sleepers must be laid square to the rails.

7.0.1.3 Sleepers must be tamped to the same extent.

7.0.1.4 All sleeper fastenings must be in place and at all times properly fastened. In the case of the Pandrol E2006 the spring must be pulled through utilizing the latest Panpuller for Open track - Item number 53-712880 and Turnout – Item Number 53-010652 until it can go no further. See letter BBB C7615 Version1.

7.0.1.5 The contact areas of clips and rail flanges must be kept free of lubricant.

7.0.1.6 Proprietary fastenings and those using multi-coil spring washers must be tightened in accordance with the relevant instructions.

7.0.1.7 Anti-vandal / Anti sabotage fastenings must be fitted where necessary.

7.0.1.8 Mixing of different types of sleepers in the same sub-section, must be avoided.

7.0.2 Inspections

Refer to clauses 4.0.1, 4.0.2 and 4.0.8.

7.0.3 Wood sleepers

7.0.3.1 Hardwood sleepers must be laid with the heart down. Laminated wood sleepers may be laid either side down.

7.0.3.2 Sleepers must be handled with care so that the outer layer of treated wood is not punctured or damaged.

7.0.3.3 The diameter of holes for coach screws must be 15mm for softwoods and 17.5mm for hardwoods.

7.0.3.4 Holes for coach screws must be drilled square to the sleeper surface holes). The drill must be fitted with a depth indicator/stopper that will ensure that holes are 15mm deeper than the selected coach screw to be inserted. Newly drilled holes or holes still in good condition must be filled with creosote before the coach screws are inserted. In the case of existing worn holes either ‘Vortok’ coils may be used.

7.0.3.5 If sole plates or chairs with tapered keys are to be used and where gauge widening has to be applied, the holes at one end only of the sleeper may be drilled before the sleeper is placed into the track. The holes at the other end of the sleeper must be drilled after the rails have been laid to the correct gauge.

7.0.3.6 If chairs with clip fastenings are to be used, all holes may be drilled by using templates before the sleepers are put into the track.

7.0.3.7 Old holes that will not be used again must be plugged with dowels, 125mm long, dipped in oil or creosote. 'Vortok' coils should be used to regain holding-down force.

7.0.3.8 Coach screws must be screwed home tightly by means of a box spanner or a coach screwing machine, Impact wrench.

7.0.3.9 In curves on running lines and in turnouts and splice joints, unballasted bridges all anchor points of each rail seat must be provided with coach screws. In all other instances two coach screws (placed diagonally) must be provided per rail seat.

7.0.3.10 Different types of coach screws are used as follows:

Type	Shank length	Used with
H	160mm	Concrete slabs and with nylon inserts, on E3282 chairs and concrete sleepers
HC	192mm	With nylon inserts, on E3338 chairs
F	158mm	Hardwood Chairs with ≥ 30mm base thickness, with double-coil spring washers
A	146mm	Chairs with ≥ 30mm base thickness
B	130mm	Sole plates and chairs with base < 30mm
D	130mm	Locking bars
AL	186mm	Softwood (195mm) All chairs/sole plates

7.0.3.11 Released wood sleepers must be classified as follows and marked with a paint spot of the appropriate colour (50mm in diameter) on both ends of each sleeper.

Class	Colour	Application
2	White	Suitable for running lines
3	Blue	Suitable for yards
4	Red	Unsuitable for use

7.0.3.12 Sound sleepers must not be removed because of the number of coach screw holes. Worn holes must be restored. Broken coach screws that cannot be removed must be cut off and the open holes must be plugged. The sleepers must be used with an offset of about 75mm (alternatively to left and right).

7.0.3.13 The combined use of different thickness wooden sleepers in the same turnout set must not be allowed as it leads to uneven support and tamping of the set as a whole.

7.0.3.14 All cast iron and sliding chairs must be fitted as near as possible to the centre of the sleeper over it's width. Coach screw holes must not be drilled within 50mm from the sleeper edge.

7.0.4 Steel sleepers

7.0.4.1 On electrified sections, ballast must consist of stone and must be kept clean.

7.0.4.2 Instructions regarding the installation of insulating pads must be implicitly followed.

7.0.4.3 Clip bolts must be fitted with spring washers or self-locking nuts.

7.0.4.4 Clip bolts must be lubricated before they are tightened.

7.0.4.5 The ballast bed at the end of steel sleepers must be opened up to expose the sleeper ends and the ballast must be loosened before re-alignment is attempted. The sleepers must not be packed until the track has been pulled to true alignment.

7.0.4.6 Released steel sleepers must be classified as follows and marked with a paint spot of the appropriate colour (50mm in diameter) on both ends of each sleeper.

Colour	**Application**
Green	Useable
Yellow	Repairable
Red	Scrap

7.0.4.7 Steel sleepers must not be used within 10 km of the coast.

7.0.5 Concrete sleepers

7.0.5.1 Concrete sleepers may be used on curves with a radius flatter than 150m.

7.0.5.2 Concrete sleepers must be off-loaded as described in the work code, and may not be thrown from trucks or tipped out of tip trucks. After completion of off-loading, track personnel must make sure that all sleepers are clear of the structure gauge.

7.0.5.3 Within 10km of the coast and inside tunnels, sleeper fastenings must be galvanised. Sleepers with Fist fastenings should only be used with stone ballast, and not in yards where moist conditions resulting from infill material can cause rust.

7.0.5.4 Pandrol and Fist clips must only be applied by means of Panpuller or Fist-levers. The use of the incorrect tools leads to a reduction in the clamping force life of the clips. The clamping force life of the Fist clip expires after 7 cycles of loosening and fastening. The unnecessary loosening and fastening of Fist and Pandrol clips must therefore be avoided.

7.0.5.5 Where wheel spin burns cause damage to concrete sleepers with Fist fastenings, the HDPE pads on four consecutive sleepers must be temporarily replaced with rubber pads. The HDPE pads must be replaced as soon as the rail is repaired.

7.0.5.6 Before traffic is permitted over track laid on newly inserted concrete sleepers, the sleepers must be packed sufficiently to ensure adequate and even bearing.

7.0.5.7 Dual-block sleepers' tie bars are to be left exposed for easy inspection. In running lines all sleepers with cracked or broken tie bars must be replaced. In yards it is adequate to replace every fourth sleeper with a sound sleeper to hold the track true to gauge.

7.0.5.8 Where concrete sleepers are damaged to the extent that they cannot maintain gauge, the track may be temporarily repaired by installing wood sleepers, steel sleepers or gauge straps. On sections where track circuits exist only wood sleepers, monoblock concrete sleepers or isolated gauge straps may be used. For purposes of temporary repair every fourth sleeper may be replaced in this way. A temporary speed restriction must be applied until permanent repairs are effected.

7.0.5.9 Sufficient quantities of gauge straps must be kept in stock at strategic locations for emergency use.

7.0.5.10 The re-use of second hand concrete sleepers must be done in accordance with circular number IM/L01 of 11 March 1999.

7.0.6 Resleepering under continuously welded rails (by hand)

7.0.6.1 During resleepering, the speed of trains must be restricted to 30 km/h.

7.0.6.2 After resleepering has been completed, a speed restriction of 50 km/h must be applied until the ballast has consolidated.

7.0.6.3 At least 8 sleepers on both sides of any sleeper being removed must be fully packed and boxed in. Each replacement sleeper must be well packed and boxed in before an adjacent sleeper is removed.

7.0.6.4 When resleepering, the ballast under the sleeper and in the adjacent cribs must be completely removed, cleaned, replaced and tamped before adjacent sleepers are disturbed.

7.0.6.5 In tunnels (to within 20m of tunnel portals), sleepers may be replaced consecutively, at any temperature.

7.0.6.6 On track with continuous rails, resleepering with wood or steel sleepers can take place at any temperature below the maximum of range B. Resleepering with concrete sleepers can be undertaken up to the maximum of temperature range C in accordance with Annexure 16.

7.1 BALLAST

7.1.1 General

7.1.1.1 Ballast must comply with the latest specification.

7.1.1.2 Worn ballast must be replaced without delay.

7.1.1.3 Ballast from quarries must be checked at the source and loading point, and must be tested from time to time, to ensure that specified standards are complied with.

7.1.1.4 The volume of ballast in each truck must be measured before offloading to ensure that specified quantities are loaded at quarries. (Engineering technician)

7.1.1.5 Equal volumes must be off-loaded simultaneously from both sides of trucks. Ballast trucks that have been loaded or off-loaded disproportionately may derail and must not be send off.(Refer to WSWP for off-loading ballast)

7.1.1.6 Dimensions and quantities must be in accordance with **Annexures 3** and **4**.

7.1.1.7 Ballast must be clear of the rail flange and sleeper fastenings (except at level crossings). When off-loading, or whilst cleaning ballast, the top of the ballast must not be left higher than the underside of the crown of the running rail.

7.1.1.8 The flangeways between running rails and guard or check rails and between running rails and points rails, must be kept clear of ballast.

7.1.2 Ballast cleaning

7.1.2.1 The decision guidelines must be used to determine cleaning priorities. On track-circuited sections ballast must be kept clean.

7.1.2.2 All tracks, including turnouts, must be regarded when ballast is cleaned.

7.1.2.3 Special attention must be given to vertical and horizontal clearances.

7.1.2.4 No ballast screening work must be undertaken before level and line pegs have been provided. On completion, the vertical profile and clearances must be checked to ensure that work has been executed according to plan.

7.1.2.5 On track with continuous welded rail with:

- wood or steel sleepers, cleaning of ballast can take place when rail temperature is below the maximum of range B
- concrete sleepers, the work may continue until the maximum temperature of range C is reached.
- Special care must be taken against kick-outs when the temperature falls outside destressing range (range A).

7.1.2.6 A speed restriction of 30km/h must be imposed for the duration of the ballast work (including replenishment, tamping and profiling of ballast). The speed restriction may be increased to 50km/h after the work has been completed. The speed restriction must be maintained until the ballast has consolidated.

7.1.2.7 After the ballast has consolidated and tamping has been completed, the gaps at joint plated joints must be adjusted and continuous welded rails must be destressed.

7.1.3 Ballast cleaning by hand

7.1.3.1 **Clause 7.1.2** applies.

7.1.3.2 Cleaning of ballast 'between trains' (i.e. removing, cleaning and replacing the ballast) must be carried out under one sleeper at a time with 8 sleepers on either side correctly ballasted and tamped at all times. The ballast profile must be correct and must be tamped before work under the next sleeper is commenced.

7.1.3.3 If work cannot proceed as in **clause 7.1.3.2**, cleaning must be done under total occupation.

7.1.4 Ballast cleaning by machine

7.1.4.1 Clause 7.1.2 applies.

During screening of a curve it must be ensured that the whole curve is screened.

7.1.4.2 Work must be done under total occupation.

7.1.4.3 The track must be lifted sufficiently before screening commences if there is a possibility that the cutting chain might cut into the formation.

7.1.4.4 Boxing in of ballast must be done immediately behind the ballast cleaning machine. Additional ballast must be provided if necessary. The track must then be tamped, followed by a final tamp at a later stage, unless a stabiliser is used as part of the ballast screening process.

7.1.5 Ballast tamping

7.1.5.1 Track laid with continuous rails may only be tamped by the heavy ballast tamping machine within temperature range A. The full ballast profile must be maintained at all times when tamping is done above the upper limit of temperature range B.

7.1.5.2 During tamping, the Track Inspector Planning in charge of the section must ensure that there is sufficient ballast before tamping proceeds.

CHAPTER 8

CLEARANCES AND DIMENSIONS

8.0 MINIMUM CLEARANCES BETWEEN TRACK AND STRUCTURES

8.0.1 Structures next to 1 065mm gauge track must be clear of the limits indicated by the full lines in Annexure 1, sheets 1 to 3, except in the case of tunnels, workshop areas and temporary works. These clearances allow additional space for handling of material, for electrification purposes and for reducing the risk to persons working in close proximity to moving trains. These clearances may only be reduced in exceptional circumstances, with the approval of the Depot Engineering Manager .

8.0.2 Structures next to 610mm gauge track must be clear of the limits indicated by the full lines in Annexure 1, sheets 3 and 5.

8.0.3 Structures clear of the limits indicated by the dashed lines shown in Annexure 1, sheets 1 and 2 and clear of the full lines where no dashed lines are shown (i.e. platform level and below), are safely clear of passing trains. Temporary structures, tunnels and structures in workshop areas must not be closer to the track than that.

8.0.4 Horizontal clearances to the dashed lines in Annexure 1, sheet 1 are 300mm less than the tabulated values for horizontal clearance.

8.0.5 A structure, or any part of it which is adjacent to 1 065mm gauge track and which is not clear of the limits indicated by the dashed lines or full lines where no dashed lines are shown in Annexure 1, sheets 1 and 2, must be regarded as foul. Those parts of existing structures which are foul must be painted as described in clause 8.1. The same action must be taken in the case of a structure or any portion of a structure which is adjacent to a 610mm track and not clear of the full lines described in clause 8.0.2. No new structure which is added is allowed to be inside the dashed lines or full lines where no dashed lines are shown in Annexure 1, sheets 1 and 2.

8.0.6 A list of structure gauge fouling points must be obtained from the Depot Engineering Manager . The list will show the kilometre distances and measured clearances and heights of fouling points. The listed clearances may not be reduced.

8.0.7 Wires crossing non-electrified railway tracks must not be less than 6m above rail level.

8.0.8 Clearances for new structures are greater than those tabulated in Annexure 1. Details may be obtained from the Depot Engineering Manager .

8.0.9 The distances from platform edge to track centre line as shown in Annexure 1, sheet 3 are minimum distances and may be exceeded by up to 50mm.

8.0.10 The height indicated for high level platforms is the maximum allowable. Platforms may be no more than 40mm lower than this height. See Annexure 1, sheet 3.

8.0.11 Clauses 8.0.1 to 8.0.6 are also applicable to objects such as rocks protruding from the sides of cuttings.

8.0.12 Movement of rail traffic which could involve any exceedance of the Structure Gauge must be handled strictly in accordance with the Procedure for Approval of Abnormal Loads.

8.1 MARKING OF FOULING POINTS

A fouling point as defined in clause 8.0.5 must be painted with alternate black and yellow diagonal stripes each 200mm wide. The markings should cover an area of approximately 1 000 x 200 mm where practical, and be in the most conspicuous position when seen from an approaching train. In cases such as in tunnels, where the fouling point may be somewhere inside the tunnel, the entrance portals must be painted with stripes on the same side and at the same height as the fouling points.
Where the fouling point is an object such as a rock protruding from the side of a cutting and painting with stripes is impractical, it must be painted white.

8.2 ELECTRIFIED SECTIONS : HEIGHT OF CONTACT WIRE

8.2.1 The minimum height of the contact wire above rail level on 3kV sections is 4,22m. This may occur through old tunnels and at old bridges.

8.2.2 The minimum contact wire height on 25kV and 50kV sections is 4,5m.

8.2.3 At points where the contact wire is at or near minimum height, permanent reference pegs must be provided. The track must not be raised above peg level.

8.2.4 At level crossings the minimum height of the contact wire above rail level and the minimum clearances to be provided by height gauges are:-

Line Voltage KV	Minimum contact wire height Metre	Minimum clearance Mm
3	4,5	300
25	5,0	300
50	6,0	500

8.2.5 Measurement of the contact wire height is the responsibility of Electrical.

8.2.6 Before implementation of any deviation from the above standards, such intended deviation must be documented and approved by the Infrastructure Manager. After approval it must then be included in chapter 20 of this manual.

8.3 TRACK CENTRES

8.3.1 1 065mm gauge

8.3.1.1 Minimum distance between centres of parallel tracks 4m

8.3.1.2 Minimum distance between centres of parallel tracks with traction masts, telegraph poles, water columns, signal poles or parachute tanks 5,5m

8.3.1.3 In yards, up to 4 adjacent tracks may be at 4m centres. Distance to the next track 5,5m

8.3.1.4 Centres of tracks at clearance marks 3,45m

8.3.1.5 Minimum track centres at derailing devices 3,65m

8.3.2 610mm gauge

8.3.2.1 Minimum distance between centres of parallel tracks 3,4m

8.3.2.2 Minimum distance between centres of parallel tracks with telegraph poles, water columns, signal poles or parachute tanks 5m

8.3.2.3 Centres of tracks at clearance marks 2,75m

8.3.3 Also refer to circulars 50102 and 50118.

8.4 CLEARANCE MARKS

8.4.1 Clearance marks are placed between converging tracks to indicate where trains may safely pass.

8.4.2 The track personnel are responsible for providing and placing all clearance marks under all circumstances.

8.4.3 Clearance marks must be at least 1m in length and must be painted white. Scrapped concrete sleepers may, where practical, be used for this purpose. Clearance markers must be installed in such a way that the safety of walk ways are not adversely affected.

8.4.4 The webs of adjoining rails opposite the clearance mark as well as the upper surface of the first 'clear' sleepers must be painted white to serve as points of reference.

8.5 USEFUL DIMENSIONS

8.5.1 1 065mm gauge

8.5.1.1 The distance between wheel flanges varies from 992mm to 990mm. (The smaller dimension will be changed to 987mm in due course).

8.5.1.2 The distance between the two contact points for a new wheel-set on new rails (and on straight track) is 1 137mm. This distance will be changed to 1 151mm in due course.

8.5.1.3 Wheel width varies from 127mm to 135mm.

8.5.1.4 Wheel diameter can vary from 762mm to 1829mm.

8.5.1.5 Wheel flange projection (below rail level) may vary from 35mm to29mm.

8.5.1.6 The average floor height of loaded trucks (above rail level) is 1 030mm.

8.5.1.7 The available length in a DZ-truck is 13 800mm and 19 200mm in a DA-truck.

8.5.1.8 The distance between rail level and coupler centre line may vary from 910mm to 825mm. A 19mm open end spanner can be used to check sharp wheel flans.

8.5.2 610mm gauge

8.5.2.1 Distance between wheel flanges is 540mm.

8.5.2.2 Wheel diameter is 805mm.

8.5.2.3 The permissible wheel flange projection (below rail level) varies from 32mm to 25mm.

8.5.2.4 The average floor height of loaded trucks (above rail level) is 685mm.

8.5.2.5 The distance between rail level and coupler centre-line (for empty trucks) is 560mm.

8.5.3 Permissible axle loads

8.5.3.1 The Chief Engineer Infrastructure-Maintenance sets the permissible axle loads per line. Allowable axle loads is a function of train speed, the track structure and the bridge structures of the line.

8.5.3.2 Before the maximum permissible axle loads on a section is exceeded, the approval of the Chief Engineer(Infrastructure-Maintenance) must first be obtained.

CHAPTER 9

ASSOCIATED WORKS

9.0 TRACK SIGNS

Track signs must not foul the structure gauge and should, if possible, be placed further than the minimum distance from the centre line of the track.

9.1 GRADE AND KILOMETRE POSTS

9.1.1. Grade and kilometre posts should preferably be placed on the left-hand side of the line facing in the direction of increasing kilometre distance. Grade posts should be placed so that the figures can be seen by the driver of a locomotive. Posts should be placed approximately 3m from the centre line of the outermost track.

9.1.2. Kilometre posts must be maintained. Both the half and full kilometre posts must be kept clearly visible and readable.

9.1.3. Where vertical curves are longer than 120m, grade signs must be placed at the beginning and end of the vertical curve. The arm of the sign pointing to the line gradient must indicate this gradient, and the arm pointing to the vertical curve must be marked with a curved line indicating the direction of the curve.

9.2 PERMANENT SPEED RESTRICTION BOARDS

9.2.1 The fronts of the boards must be painted reflective yellow and indicate the permitted speed in black figures. Where there is doubt in regard to which track a board refers to, a black arrow pointing to the relevant track must be painted on the board. The back of the board must be painted reflective white, indicating the end of the speed restriction in the opposite direction. Where the back of a board cannot be clearly seen, it must be painted black and an additional (white) cancellation board must be provided.

9.2.2 Speed restriction boards must be erected as follows:

9.2.2.1 Different methods of displaying track signage (e.g. fixing to electrification masts and placing boards on poles next to the track) may not be combined in one specific track section.

9.2.2.2 Sections where a specific method will be applied must be selected in consultation with Operations.

9.2.2.3 On single and bi-directional lines boards may be fixed to masts on the left or right hand side of the track section.

9.2.2.4 On double lines, boards must be displayed on both sides of the track section and fixed to masts or poles, where no masts exist.

9.2.2.5 Boards must be fixed to the nearest electrification mast and at least 30m from where the speed restriction begins.

9.2.2.6 Boards must be fixed between 2m and 3m above rail level.

9.2.2.7 Electrical must supervise the fixing process.

9.2.3 On sections where boards cannot be fixed to electrification masts, they must be placed 30m before the speed restriction begins and on the right hand side of the track, as seen from approaching trains.

9.2.4 Grouping of speed restrictions on curved track over short distances is permissible, provided that the number of grouped curves does not exceed five, the distance over which the speed restriction applies does not exceed two kilometres, the lowest speed of the group is made applicable and speed restriction boards are erected only at each end of the group. Track in between two places from the speed restriction the cant must be adjusted according to the speed restriction. (refer to discussion on cant 4.1.4.1)

9.2.5 Where it is necessary to restrict the speed of trains through a station or a yard, or over a considerable distance, a rectangular notice board which should indicate or describe the extent to which the restriction applies, should be positioned adjacent to the permanent speed restriction board. The face of this notice board must be painted yellow and the back white. All lettering and figuring must be black. The normal cancellation board must be erected at the end of the restricted length.

9.2.6 Where turnouts are situated on curves and a speed restriction is necessary or where an unequal split turnout exists in a running line, two speed restriction boards must be erected on the same post 30m from the points. The upper board will indicate the maximum permissible speed over the through line, and the lower board the maximum permissible speed for the turnout.

9.2.7 In the case of an equal split turnout in a through line, a single speed restriction board must be erected. In the outgoing direction one board must be provided for each line. The backs of the boards must be painted black.

9.2.8 Where permanent speed restriction boards applicable to a station or yard have been erected as laid down in clause 9.2.5 hereof, speed restriction boards for turnouts may be unnecessary.

9.2.9 Where it is impractical to place permanent speed restriction boards 30m outside the points or place where the speed restriction begins, the boards should be erected in such a position as to give maximum visibility to the driver of an approaching train.

9.2.10 For further details refer to Annexure 10, sheet 1.

9.3 TEMPORARY TRACK SIGNS

9.3.1 Temporary speed restriction boards and associated boards indicating the start of the danger zone must comply with Annexure 10, sheet 2 and must be placed as shown in Annexure 10, sheet 3.

9.3.2 Except on the Coal Line where speed restrictions of 40 km/h may also be used, speed restrictions of 15, 30, 50 and 65 km/h only may be used.

9.3.3 In the case of tandem temporary speed restrictions only 30km/h and 50km/h boards are permitted.

9.3.4 When temporary speed restrictions are introduced on curves, cant must be adjusted according to Annexure 9, sheet 4. See clause 13.4.2 for electrified lines.

9.3.5 Where tamping machines off-track to enable train crossings or stage in section after work (on off-track platforms), tamping machine warning and crossing boards (see Annexure 10, sheet 2) must be used.

9.3.6 When temporary track signs are erected or removed, the train control centre/traffic controller must be informed in writing.

9.3.7 Temporary speed restriction boards which apply only during hours of duty must be completely removed at the end of each shift.

9.4 DISTANCE AND WARNING BOARDS

Distance and warning boards must be sited to give maximum visibility to the personnel of approaching trains. They should be approximately at right angles to the track, clear of the structure gauge and at distances as laid down in the rules applicable to the boards concerned.

9.5 WARNING SIGNS AT LEVEL CROSSINGS

9.5.1. Road warning signs at level crossings must be in accordance with the code, Signing for Railway Crossings, chapter 7, SARTSM, Vol. 2.

9.5.2. Track warning signs at level crossings must be erected in accordance with Clauses 9.2.2 and 9.2.3. The placement of the warning signs relative to the level crossing must be in accordance with Annexure 10 sheet 4.

9.5.3. The signs are ineffective if placed too high or not at the correct angle to the road. Their positions should therefore be checked by personal observation.

9.6 LEVEL CROSSINGS

9.6.1 Level crossings may not be constructed without the necessary authorisation.

9.6.2 At public level crossings, Transnet Freight Rail is responsible for the condition of the track(s) and the Roads Authority for the condition of roads over the track(s). (Also see clause 9.6.6 and 9.6.7)

9.6.3 In the case of pedestrian crossings, private crossings, obligatory private crossings, cattle crossings, unproclaimed or unnumbered public roads or unsurfaced private roads which are not controlled by a roads authority, Transnet Freight Rail is responsible for the maintenance of the section of road within the right of way.

9.6.4 Track at level crossings must be opened up and maintained whenever necessary and at least every two years. Prior arrangements must be made with the Roads Authority.

9.6.5 Unobstructed visibility must be maintained for both road and rail traffic at level crossings.

9.6.6 Where defects on the road surface at a level crossing are considered dangerous to rail or road traffic and require immediate attention, the Track Inspector (Maintenance Management) must inform the Roads Authority concerned and his controlling office immediately. Only if the Roads Authority is unable to undertake the required repairs without delay, must the Track Inspector (Maintenance Management) arrange for the repairs to be done and inform the Roads Authority as soon as possible thereafter of the remedial action taken.

9.6.7 No repairs to the road surface (except emergency work) may be undertaken without suitable prior arrangements. Repairs to the road surface within 3m of the centre line of track may be under taken by the Road Authorities, provided that the work does not affect the flange ways and that prior arrangements have been made with the Depot Engineering Manager ’s office. Whenever machinery (as opposed to hand tools) is to be used within 3m of the track centre line, prior arrangements must be made with the Depot Engineering Manager ’s office.

9.6.8 When maintenance to level crossings is to be undertaken, the supervisory personnel must ensure that all relevant parties involved are in attendance. Each party will bear its own costs.

9.6.9 When work is carried out on the track at a level crossing, care must be taken to interfere as little as possible with the use of the crossing.

9.6.10 Track Inspectors (Maintenance Management) must be supplied with the following information in respect of level crossings:

- Railway route,
- Kilometre distance,
- Name and/or number and status of road,
- Road Authority involved,
- Grades, office addresses and telephone numbers of personnel directly responsible for maintenance.

9.6.11 Roads crossing straight railway tracks should be level with the tops of the rails for a minimum distance of 3m from the outer rails.

9.6.12 The gradient of a road crossing a single curved railway track should follow the cant of the track (but not steeper than 1 in 15) for a minimum distance of 3m beyond the rails on both sides of the track.(see clause 9.6.14)

9.6.13 Where a road crosses two or more curved railway tracks, the grading of the road approaches will depend on local conditions, and should be decided upon on site.

9.6.14 Not withstanding the provisions of clauses 9.6.12 and 9.6.13, the grading of a road over a level crossing must be altered to suit road traffic patterns.

9.6.15 Under no circumstances may the width of the road at any level crossing be less than the width of the road which it serves.

9.6.16 Fishplated joints are not permitted on or within 6m of level crossings.

9.6.17 New level crossings must not be provided with guard rails. Where guard rails are not necessary at existing level crossings, they must be removed.

9.6.18 Precast concrete decks may be provided as a road surface.

9.6.19 The track over level crossings must be laid with rails of at least 48 kg/m and on either timber sleepers with E3131 cast iron chairs or concrete sleepers.

9.6.20 If any loaded vehicle comes into contact with a height gauge, the vehicle must not proceed before the load is lowered sufficiently to clear the height gauge.

9.7 SERVICE ROADS

9.7.1 Roads for maintenance purposes may be constructed as a working charge. Scrap concrete sleepers may be used for building causeways.

9.7.2 The Infrastructure Manager must sanction the construction of bridges, culverts and concrete drains.

9.7.3 Service roads must be maintained in good condition.

9.7.4 Track personnel may carry out minor repairs.

9.8 FENCING

9.8.1 Fences must be built and maintained according to the Transnet Freight Rail Fencing Strategy. New fences must be as per Annexure 29. Existing 6-wire fences must not be changed to 8-wire fences without approval.

9.8.2 Approved pre-fabricated fencing may be used.

9.8.3 Fence posts between cattle guards and the main fence must be of 6kg or 8kg standards.

9.8.4 Barbed wire must not be used where it may cause injury to persons.

9.8.5 Track personnel must close any gate that is found open at any private level crossings and report the circumstances to the controlling office.

9.8.6 Damage to fences and gates must be reported to Infrastructure Fault Control, giving the names and addresses of the responsible persons whenever possible.

9.9 CATTLE GUARDS

9.9.1 Cattle guards must be built to plan type I 124/1. They must be painted white and kept free of silt and vegetation.

9.9.2 Only hardwood sleepers must be used under cattle guards.

9.9.3 On track-circuited and electrified sections there must be no metallic contact between the cattle guards and the running rails. A minimum clearance of 50mm must be maintained between possible points of contact and not higher as the top of rail crown.

9.10 BEACONS

9.10.1 The law provides for severe penalties for interference with any land beacon.

9.10.2 Beacons on boundary lines or within the property of Transnet must not be moved or destroyed without the necessary authority.

9.10.3 Fence posts or fence anchors must not be placed less than 1m from a beacon. Where practical, fencing at corners should be splayed within the property of Transnet.

9.10.4 Excavations must not be closer than 1m to any beacon.

9.11 UNDERGROUND SERVICES

9.11.1 Track personnel must be careful not to damage underground services alongside or beneath railway tracks.

9.11.2 Care must be exercised when digging in the vicinity of buried electric cable routes. These are indicated by cable markers.

9.11.3 Cable markers may not be removed without authorisation.

9.11.4 Cables running parallel to the track must not be buried in the formation or ballast without the authority of the Infrastructure Manager.

9.11.5 Where there is danger of washouts, cables crossing streams may be buried in the bank behind wing walls and head walls of culverts.

9.11.6 Cables must return at right angles to the formation to serve telephones and signals.

9.11.7. New cables will be buried between 400mm and 750mm below the ground surface within a 4,5m wide strip along the fence and will be indicated by cable markers approximately 15m apart and fixed to the fence.

9.11.8 Pegs must not be driven within the cable reserve. Firebreaks and access roads may be made within the reserve. Scrap concrete sleepers must not be left within the cable reserve.

9.11.9 Where cables are required to cross service roads and are to be buried less than 800mm deep, they must be placed in pipes of galvanised iron ducting. At other road crossings the cables will pass through conduits.

9.11.10 Cables may be laid where necessary in station areas.

9.11.11 If a cable is taken through a tunnel, it must be in a conduit and clear of refuges.

9.12 COMMUNICATION ROUTES

If a telegraph pole is found in an unsafe condition, the Track Master must take whatever remedial measures are practical.
Unsafe poles, broken or slack wires and exposed underground cables must be reported without delay.

9.13 COMMUNICATIONS

9.13.1 Track teams must be supplied with the necessary radios, telephones and special keys to be able to communicate with station personnel, Operations or the traffic controller, as the case may be.

9.13.2 Track Inspectors must ensure that their personnel can operate the equipment.

9.14 BLASTING

9.14.1 When blasting is to be undertaken within 500m (protected with a notice issued out) of a railway line the Track inspector or his representative must be present and consult with the person responsible for the blasting work. He must carry out instructions in the notice and be prepared to stop trains and effect any repairs to the track which may be necessary.

9.14.2 If a Track inspector becomes aware that blasting is to take place within 500m of a railway line and he has not been officially advised, he must investigate and take appropriate measures including the stopping of blasting as he considers necessary to protect the property of Transnet.

9.15 FIRES

9.15.1 Track personnel must at all times take effective precautions against the outbreak of fire in accordance with this instruction, the Specification for Track Welding, the Work code for Prevention of Fires and any other relevant instruction.

9.15.2 They must assist in extinguishing uncontrolled fires.

9.15.3 They must report sparks and cinders coming from locomotives.

9.16 FIREBREAKS

9.16.1 The General Manager Rail Network will lay down policy and guidelines in respect of the removal of flammable material and the provision and maintenance of firebreaks. Such policy guidelines will be in accordance to National legislation and the rules of applicable Fire Protection Association.

9.16.2 After a veld fire has occurred:

- Cease all activities and apply all available personnel to assist combatting the veld fire.
- Try to restrict the veld fire to Transnet Freight Rail property.
- Notify the relevant Fire Protection Association, adjoining landowners in case assistance or evacuation is required.
- After the veld fire has been extinguished assemble precise notes of all relevant data pertaining to the veld fire e.g. time, date, probable cause, extent of damage to adjoining property, wind direction and photos.
- Under no circumstances should Transnet employees accept responsibility on behalf of Transnet Freight Rail in the event of veld fires spreading or causing damage to adjacent property. This may lead to differences between Transnet Freight Rail and its insurers, who may even refuse to settle arising claims.

9.16.3 The following precautions must be taken when firebreaks are made on the property of Transnet:

9.16.3.1 Fire break will be made in accordance to the rules of the applicable Fire Protection Association. The Depot Engineer / Engineering Manager must ensure that such a firebreak, with due regard to the weather, climate, terrain and the vegetation of the area:

(a) is wide enough and long enough to have a reasonable chance of preventing a veld fire from spreading from Transnet Freight Rail property or spreading to Transnet Freight Rail property.
(b) it does not cause soil erosion; and
(c) it is reasonably free of inflammable material capable of carrying a veld fire across it.

9.16.3.2 Making of firebreaks:

- Firebreaks may only be made in accordance to Chapter 4 of the National Veld and Forest Fire Act, Act 101 of 1998.
- Abide by the Fire Protection Association's constitution regarding the making of firebreaks irrespective of how and by whom firebreaks are made.

9.16.3.3 Fire may not be used as a vegetation control process in any vegetation control contract, unless it is a contract for the provision of firebreaks.

9.16.3.4 Every endeavour must be made to prevent the view of road users being obscured by smoke. Traffic control can also be contacted to give assistance.

9.17 PLANTS ON OR NEAR THE PROPERTY OF TRANSNET

9.17.1 Vegetation growing on the property or in the vicinity of Transnet must be removed or trimmed where it:

9.17.1.1 Prevents locomotive drivers from obtaining a clear view of track signs, level crossings and/or signals,

9.17.1.2 Prevents the public from obtaining a clear view of approaching trains at level crossings.

9.17.1.3 Obstructs the visibility of signals.

9.17.1.4 Constitute a risk to disrupt, or form a risk, damage or obstruct the railway network.

9.17.1.5 Where growth obstructing the visibility is situated on adjacent private property, permission must be obtained from the owner to trim or remove the obstruction(s).

9.17.2 All problem areas must be reported to the Technical Support Manager.

9.18 ERADICATION OF DECLARED WEEDS AND INVADER PLANTS

Competent guidance is required with the identification and control of declared weeds and invader plants. Report to the Technical Support Manager.

9.19 RODENTS

Track personnel must report the presence of animals burrowing in or near the formation, so that steps may be taken for their eradication. Report to the Technical Support Manager.

CHAPTER 10

TRACK MATERIAL, TOOLS AND EQUIPMENT

10.0 SAFE KEEPING

10.0.1 Track material, tools and equipment must be managed according to the latest manual.

10.0.2 Track Masters are responsible for the security of material, tools, and equipment issued to them. When not in use, tools must be kept under lock and key.

10.0.3 Track Masters must report any loss of material, tools and equipment. Any theft must be reported to the Asset Protection Services and Police (police case number).

10.0.4 Track material must not be left in the section any longer than necessary. It should be stored at an emergency camp or at a depot.

10.0.5 Property of Transnet must not be used for private purposes.

10.0.6 Track personnel must not buy or borrow any goods or property on behalf of Transnet, nor may they dispose of or lend any goods or property belonging to Transnet without written authority from Supply Chain Services in consultation with the Depot Engineering Manager and Infrastructure Manager.

10.1 STORAGE AND CARE OF MATERIAL

10.1.1 Material must be placed clear of the structure gauge, and must not be stacked within 3 metres of the centre line of the track. Stacking methods are described in SI(SMT)16/3/3B of October 1995.

10.1.2 To discourage theft, steel and wood sleepers must be stacked as far away as practical from level crossings and roads.

10.1.3 With the exception of wood sleepers and concrete, track material should not come into direct contact with ash when stacked.

10.1.4 The ground within 6m of a stack of wood sleepers must be cleared of all grass and weeds and the storage area must be well drained.

10.1.5 Wood sleepers, irrespective of condition, must be stacked in lots of no more than 50 and gaps of 40mm between sleepers accordance with Annexure 12. The stacks must be at least 3m apart.

10.1.6 Steel sleepers must be stacked clear of the ground, with alternate layers at right angles to each other. They must be stacked with bottoms facing down, in lots of no more than 100. To prevent the layers from rocking, two sleepers must be nested into one another at both ends of each layer.

10.1.7 Rails must be positioned upright on an even bed clear of traction bonds and supported to prevent kinking, bending and twisting.

10.1.8 Bags containing rail and sleeper fastenings must be stacked clear of the ground and if possible, under cover. Bolts and nuts must be oiled to prevent rust.

10.2 STOCKS

10.2.1 Material and tool stock levels will vary according to local conditions and must be approved by the Infrastructure Manager.

10.2.2 The Depot Engineering Manager (or delegated person) will arrange to order material for planned works and emergencies.

10.2.3 When taking over a length of track, the Track master must check the material, tools and equipment taken over by him, and send a list of these to the Depot Engineering Manager's Office.

10.2.4 Each Track master must control the material, tools and equipment issued to him and check his stock at least once a month.

10.2.5 When a Track master relinquishes a length he must check, the material, tools and equipment on hand, and send a list to the Depot Engineering Manager's office, explaining any discrepancies. A duplicate of this list must be left for the supervisor taking over the length.

10.2.6 Wood or steel sleepers or tie bars must be kept for emergencies. Insulation must be maintained on track-circuited lines.

10.2.7 Special emergency material and equipment must be provided for tunnels with track slabs. (See circular No. 50271).

10.2.8 Planned material must preferably not be used for unplanned work.

10.3 RELEASED TRACK MATERIAL

10.3.1 Rails

10.3.1.1 Classification

10.3.1.1.1 Used or second hand rails released from the track and to be reconditioned in workshops for re-use must comply with the rail classification requirements in Annexure 15, sheet 2 The class of rail is determined by the lowest classification indicator in this Annexure.

10.3.1.1.2 Before rails are removed from the section, they must be cut in accordance with Annexure 15 sheet 3 or longer if need be.

10.3.1.1.3 Second hand rails (other than reconditioned rails) may be used in running lines provided that:

- They have been ultrasonically tested and are found to be sound in all respects.
- They match existing rails for wear or will match after grinding and/or welding.
- The ends of the rails are cropped, by 300mm, to eliminate the old joint bolt holes.
- New joint plates are used if the joints are not welded.

10.3.1.1.4 Rails which are removed from the track because of the existence (or suspected existence) of transverse fissures, piping and rails with rail marks BB COS JAX 2496, 2297, 2497 must not be re-used.(refer to clause 6.14.9)

10.3.1.1.5 The quality of reconditioned rails is the responsibility of the welding workshops.

10.3.1.2 Rails intended for re-use must be transported in the longest possible lengths (or as required by the recipient) and cut accordingly. Depending on their intended future use:

10.3.1.2.1 Rails must be cut at welded joints in lengths as required - the cut must be made adjacent to the edge of the weld collar. Refer to Annexure 18.

10.3.1.2.2 rails consisting of 12m lengths joined by flash-butt welding must be cut through the flash-butt welded joints.

10.3.1.2.3 of 36m or long welded rails must be cut in accordance with Annexure 18, sheet 1.

10.3.1.2.4 may be flame cut only when they are released to welding depots for reconditioning or are scrapped.

10.3.1.3 Rails not required for re-use must be consigned as instructed by a representative of the Supply Chain Services or the depots and as follows:

10.3.1.3.1 No other material may be loaded into trucks with second hand rails.

10.3.1.3.2 The rails loaded into any truck should as far as possible be of the same nominal length. Pieces of rail less than 6,5m long must not be loaded into trucks containing longer rails.

10.3.1.3.3 Scrap rails must be loaded separately from useable material.

10.3.2 Wood sleepers

Refer to clauses 7.0.3.12 to 7.0.3.14.

10.3.3 Steel sleepers

Refer to clauses 7.0.4.6 to 7.0.4.7.

10.3.4 Refer to classification of concrete sleepers

10.4 TRACK GAUGES

10.4.1 Track gauges must be checked every six months via track inspector and log-sheet must be kept. The gauge must be measured against a steel tape, and the bubble adjustment checked by reversing the gauge over two points. Mark fix point take reading and turn gauge around and place at the same point and see if reading are the same. Defective gauges must be repaired or replaced.

10.4.2 All responsible persons using the track gauge must have it inspected before being used. Defective gauges must be repaired or replaced.

10.4.3 Only insulated types of track gauges may be used on electrified and track-circuited lines.

CHAPTER 11

TROLLEYS AND ON-TRACK MACHINES

11.0 NON SELF-PROPELLED TROLLEYS

11.0.1. A non self-propelled trolley is any hand-propelled device designed for the conveyance by rail of workmen, tools, material or equipment and includes push trolleys, trestle trolleys, rail transporters, light rail girders and other light machines or equipment that can easily be removed from the line by hand.

11.0.2. The person in charge of a trolley must be certified competent at School of Rail.

11.0.3. The person in charge of a trolley must also be certified competent in Train Working Rules as applicable to non-self propelled trolleys as well as Protection Rules.

11.0.4. The person in charge of the trolley must arrange work so as not to unnecessarily delay trains.

11.0.5. When a trolley is carrying any load which cannot be easily removed from the track, permission must first be obtained from the train control centre/traffic controller before the trolley may be placed on a running line. In such a case the person in charge of the trolley must obtain authority for an occupation from the train control centre/traffic-controller before placing the trolley on a running line.

11.0.6. Non self-propelled trolleys must not be operated at speeds higher than ordinary walking pace.

11.0.7. Before a non self-propelled trolley is used on track, the person in charge of the trolley must ensure that it is in a track worthy condition and the full serviceability of the handbrake must be ascertained. The person in charge of the trolley must ensure that the trolley is inspected by the Millwright on an approved log-sheet every 3 months.

11.0.8. The person in charge of a non self-propelled trolley must ensure that the flagman providing the protection for the trolley is well conversant with their protection duties and capable of executing them correctly.

11.0.9. A trolley must not be hauled or propelled by a train, except in an emergency. See clauses 11.2.8 en 11.2.13.

11.0.10. The person in charge of a trolley must have it under control at all times. He must warn personnel not to board a moving trolley from the front or the side and to watch for obstructions that may catch their feet.

11.0.11. The number of employees travelling on a trolley must not exceed the actual seating accommodation.

11.0.12. Employees must not stand on a trolley whilst it is in motion. This does not apply to employees operating a pump trolley.

11.0.13. The maximum load is 1800kg for 1065mm gauge and 1400kg for 610mm narrow gauge trolleys and trailers.

11.0.14. Only trolleys with insulated wheels may be used on track-circuited sections. Insulated trolleys must be periodically tested by Signals.

11.0.15. Trolleys not in use must be placed clear of the track structure gauge and adequate precautions must be taken to prevent it from being placed back within the structure gauge by unauthorised persons.

11.0.15. Coupling of trolleys

11.0.15.1. Coupling of trolleys is undesirable and should only be done when essential. Not more than two trolleys may be coupled together.

11.0.15.2. Two trolleys must not be run independently under the control of one person. They must be securely coupled.

11.0.16. Trolleys, level crossings, bridges and tunnels

11.0.16.1. Before attempting to cross a level crossing with a non selfpropelled trolley, the person in charge of that trolley must ensure that the level crossing is clear and that it will remain clear for the safe passing of the trolley and its load.

11.0.16.2. Before crossing a bridge by trolley, the person in charge must satisfy himself that a train is not approaching.

11.0.16.3. When a trolley is used through a tunnel, the person in charge of the trolley must, in addition to the prescribed protection measures, observe special precautions which are contained in clauses 11.0.1 to 11.0.14.

11.1 SELF-PROPELLED TROLLEYS

11.1.1. Self-propelled trolleys shall include motor trolleys, road rail vehicles and all on-track machines. The operating of self-propelled trolleys is covered in the General Trains Working rules/General Appendix and Rail Directives.

11.1.2. The person in charge of a self-propelled trolley must be in possession of effective means of communication for communicating with the train control centre/train traffic controller.

11.1.3. The person in charge of a self-propelled trolley being used on a running line, must be qualified and certificated in train operating as applicable to a train driver and he must be the holder of a valid Road Knowledge Certificate for that section of track.

11.1.4. A person must first be afforded an opportunity to re-acquaint himself with a section of line if he hasn't operated, piloted or worked a self-propelled trolley for a period exceeding 6 months over that section of line. After he has acquainted himself with the section of line and before he is placed in charge of a self-propelled trolley on that section of line, he must record and certify this acquired familiarity in the road knowledge book.

11.1.5. A self-propelled trolley equipped with an approved towage may be used to tow a trailer. (Refer to clause 11.0.12).

11.1.6. Trolleys must be maintained so that the requirements of clause 4.0.2 can be met.

11.1.7. The maintenance of each Self-propelled trolley must be entrusted to a specific individual. (Millwright)

11.1.8. The monthly inspection of Self-propelled trolleys must be carried out in accordance with RMD CODE 29 log-sheet.

11.1.9. Self-propelled trolleys must be inspected before each trip. An inspection manual is provided in the cabin of each Self-propelled trolley.

11.1.10. Self-propelled trolleys must be fitted with an independent emergency brake.

11.1.11. A back marker must be attached to the rear of each Self-propelled trolley and a yellow flashing light must be displayed continuously on its roof while it is operated.

11.1.12. A self-propelled trolley runs on a running line as a train and is therefore operated in accordance with the specific train working rules as applicable to the operation of trains.

11.1.13. Before attempting to cross a level crossing with a Self-propelled trolley, the person in charge of that Self-propelled trolley must ensure that the level crossing is clear and that it will remain clear for the safe passing of the Self-propelled trolley.

11.1.14. A self-propelled trolley may only be turned around after authority has been obtained from the train control centre/traffic controller. The Self-propelled trolley must be turned at a safe place which is free from obstructions, preferably on straight sections of track. The person in charge of that Self-propelled trolley must ensure that adequate protection is provided on all running lines of which the structure profile might be fouled during the turning process.

11.1.15. When a self-propelled trolley travelling, by day or night, on a running line, the headlights of the Self-propelled trolley must be switched on.

11.1.16. When a lighter type self-propelled trolley is used, attempt should not be made to run through a self normalizing turnout when moving through the turnout in the trailing direction without setting the points blades for the appropriate direction by hand. After passing over the turnout, the turnout points must once again be set to the normal position and locked.

11.1.17. A self-propelled trolley when in motion and stopping for inspection must be manned at all times.

11.1.18. A driver of a self-propelled trolley is not allowed to travel on his own (must be accompanied by a qualified assistant appointed for the trip).

11.1.19. When a self-propelled trolley is staged in the station or at depot the self-propelled trolley must be secured by scotch blocks and turnouts on either side and must be clamped.

11.2 OPERATING OF ROAD-RAIL VEHICLES

11.2.1. Before a road-rail vehicle may occupy a running line, that section of line must be clear of trains.

11.2.2. Only a person trained and in possession of a valid certificate for the operation of a road-rail vehicle shall be in charge of a road-rail vehicle when it is used on the track. This shall also apply when any part of the road-rail vehicle approaches within 3 meters from centre of track for placement on or removal from the track as well as for performing work on the track whilst standing adjacent to the track. The driver of an RRV is not allowed to travel on his own (must be accompanied by a qualified assistant appointed for the trip).

11.2.3. Only a person in possession of an appropriate and valid drivers licence and specifically authorized by the Depot Engineering Manager shall be allowed to drive a road-rail vehicle as a normal road vehicle.

11.2.4. For a road-rail vehicle to be used on a running line the person in charge of that vehicle must be qualified in trains operating as applicable to a train driver and he must be the holder of a valid Road Knowledge Certificate for that section off track.

11.2.5. The person in charge of a road-rail vehicle must be in possession of effective means of communication for communicating with the train traffic controller.

11.2.6. On sections where Colour Light Signalling or the Radio Train Order system or the Track Warrant system is used, a road-rail vehicle may be placed on, or be taken off a running line, at a level crossing or any other suitable place within that section of track.

11.2.7. Before the vehicle is placed on a running line, the person in charge of that vehicle must first obtain authorisation from the train control centre/train traffic controller. In the case of colour light signalling, he must then proceed strictly in accordance with the signal indications whilst in the case of the latter two train operating systems, he must be in possession of a valid token for that section of track. Such a token must be arranged between the train control centre/traffic controller and the person in charge of the road-rail vehicle.

11.2.8. In cases of any other trains operating system not mentioned in the preceding clause, the person in charge of the vehicle must obtain a valid token from the station or token-station as the case may be , before he may occupy a running line in that section of track.

11.2.9. Every time a road-rail vehicle is placed on a running line, the person in charge must obtain an instruction from the train traffic controller, which must indicate the time at which the road-rail vehicle must vacate the running line.

11.2.10. A road-rail vehicle fitted with an approved coupler may be used to tow a trailer on a running line.

11.2.11. A trailer/trolley may not be propelled (as opposed to being towed) except in an emergency, in which case special care must be taken. For this reason, a coupler must also be available on the front of the road-rail vehicle (Refer to clause 11.2.13)

11.2.12. When a trailer is towed on a running line by a road-rail vehicle, the total mass of the trailer (inclusive of its load) may not exceed 95% of the licensed gross vehicle mass of the road-rail vehicle. When the total vehicle mass of a trailer (inclusive of it's load), exceeds 50% of the road-rail vehicle's licensed gross vehicle mass, then the trailer may only be towed by the road-rail vehicle on a running line, provided that the trailer is equipped with a braking system which is operationally integrated with the braking system of the road-rail vehicle.

11.2.13. Unless otherwise specified inside the vehicle, the maximum allowable speed for a road-rail vehicle on a running line is 60km/h. The maximum allowable speed for a road-rail vehicle towing a trailer on a running line is 40km/h. Where a road-rail vehicle is used to tow a trailer on a running line of which the gradients are steeper than 1:100, additional safety precautions must be taken and the maximum speed further reduced. Weather conditions must be taken in consideration when travelling to reduce speed.

11.2.14. The rules must be read in conjunction with the rail directives.

11.2.15. A back marker must be attached to the rear of a road-rail vehicle or its trailer and a yellow flashing light must be displayed continuously on its roof while it is operated.

11.2.16. An emergency tow bar must be available on every road-rail vehicle at all times. This tow bar must be suitable for either towing or pushing the road-rail vehicle by a locomotive or other rail/road-rail vehicle in the event of an emergency.

11.3 RAIL TRANSPORTERS

11.3.1 Rail transporters must be protected and secured in the same manner as non self-propelled trolleys.

11.3.2 Loaded rail transporters may only be placed on a running line after authority has been obtained from the train control centre/traffic controller. The train control centre/traffic controller must ensure that the section of line is clear and remain clear of trains until the rail transporters are clear of the track.

11.3.3 For economic reasons, rail transporters should not be worked over long distances.

11.3.4 No person may ride on rail transporters or on the rails being transported.

11.3.5 Rail transporters must be manually propelled at walking pace.

11.3.6 On sections with colour light signalling, only insulated rail transporters may be used.

11.3.7 When two-axle type rail transporters are used:

11.3.7.1 Each unit must be examined by the Track master before use, to ensure that it is in working order and that the brakes are operating efficiently.

11.3.7.2 The load on a single two axle transporter must not exceed 7 250kg.

11.3.7.3 The rail stops provided must be inserted in the cross bearers before the rails are transported.

11.3.7.4 Under all circumstances all units must be equipped with hand brakes.

11.3.7.5 Rails must be centrally loaded on the cross bearer so that the brake handle is easily accessible.

11.3.8. Transporting 18m rails

11.3.8.1. Two rail transporters must be used at approximately one quarter of the rails' length from each rail end.

11.3.8.2. Not more than two layers of rails may be loaded on rail transporters. The rails in the bottom layer must be upright.

11.3.9. Transporting 36m rails

11.3.9.1. The distance between rail transporters must not exceed 9m and the end overhang must not exceed 4,5m.

11.3.9.2. Only one layer of rails may be loaded on rail transporters.

11.3.10. One-axle rail transporters

11.3.10.1. This type of rail transporters may not be used.

11.4 ON-TRACK MACHINES

11.4.1 The person in charge (Track inspector or Track master) must have passed the appropriate road knowledge, theoretical and practical examinations and must be licenced competent. Where a Track inspector/Track master has not worked in charge of the operation of an on-track machine for a period exceeding 1 year, he must first pass the appropriate practical on site re-test in as far as machine working, safe working responsibility and contract specifications are concerned, before he may be put in control of such an on-track machine.

11.4.2 A Track inspector/Track master in charge of an on-track machine must be practically re-tested on site, every 3 years, in so far as the machine working, safe working responsibility and contract specifications for that machine are concerned. The Depot Engineering Manager , in co-operation with the Central Office, must arrange for these tests.

11.4.3 The Production manager track is responsible for the training.

11.4.4 On-track machines must be managed by competent engineering personnel.

11.4.5 Productivity targets must be set for all on-track machines or groups of machines.

11.4.6 The use of these machines must be frequently discussed with all relevant departments.

CHAPTER 12

SIGNALS

12.0 INTRODUCTION

Track personnel must be acquainted with the functions and working of signalling equipment on their sections.

12.1 PROTECTION

When personnel from Track or Signals or Electrical have to work together, the Coordinator in Charge shall decide on who will be responsible for protection when it becomes necessary.

12.2 GENERAL

Special forums must be created at Central Office and at depots to co-ordinate long, medium and short term planning of maintenance activities.

12.3 INSULATING FASTENINGS

All instructions pertaining to the installation of insulating pads and fastenings must be followed implicitly. Care must be taken not to damage insulating materials.

12.4 SIGNALLING EQUIPMENT

12.4.1 Track Masters must keep the working parts of signalling equipment clear of obstructions and ensure that the area is well drained.

12.4.2 Track personnel must not interfere with signalling equipment which has been fastened to the track. (e.g. axle counters, hot box detectors etc)

12.4.3 Track masters must ensure that the routes of surface cables are kept clear of track material.

12.4.4 Defective signalling equipment must be reported without delay. Also see clauses 6.0.3 and 6.6.1.5.

CHAPTER 13

ELECTRICAL

13.0 DANGER OF COMING IN TO CONTACT WITH ELECTRICAL EQUIPMENT

13.0.1 Persons working closer than 3m to live overhead track equipment must be trained to be aware of the dangers involved as well as in the safe working procedures to be applied and the clearance distances they should observe. (Courses PWP 1 and PWP 2 are available).

13.0.2 All electrical equipment and all electric wires may be live and dangerous and must not be touched. Even loose or broken wires lying on the ground may still be live and must not be approached.

13.0.3 No person may climb any pole or structure which supports live overhead wires or electrical equipment.

13.0.4 No person may climb, ride or work on the roof or on top of any load or equipment carried on any rail or road vehicle (or any machine) under live overhead equipment.

13.0.5 Track personnel working on, above or near the track must take precautions to prevent tools, plant or any implements coming into contact with any portion of the overhead equipment or its connections, or making contact between the traction rail and the signal rail simultaneously.

13.1 RESCUE AND TREATMENT OF PERSONS SUFFERING FROM ELECTRIC SHOCK

13.1.1 Persons working near high voltage equipment should be trained to apply first aid in the event of shock cases.

13.1.2 The procedure to be followed in regard to the rescue and treatment of persons suffering from electric shock is contained in clause 103.9 and Annexure 1.1 of the Electrical Safety Instructions.

13.1.3 Personnel trained in the application of artificial respiration are stationed at strategic points throughout electrified areas. The positioning of these artificial respiration posts are indicated by a silver triangular sign with a blue centre.

13.1.4 It is recommended that all track personnel employed in areas where high-voltage electrical equipment is installed, take the first opportunity of qualifying in first-aid.

13.2 WORK UNDER "DEAD" CONDITIONS (power off condition)

13.2.1 Persons working near high voltage equipment must be aware of what work must be done under dead conditions, i.e. within a siding or under the cover of a work permit.

13.2.2 The responsible person in charge of work near high voltage equipment must understand and follow the correct procedures with regard to work permits.

13.3 WORK WHICH MAY BE DONE WHILE ELECTRICAL EQUIPMENT IS "LIVE" AND THE PRECAUTIONS TO BE TAKEN

13.3.1 Persons working near live high voltage equipment must be aware of the dangers and implement the necessary precautions.

13.3.2 Specific precautions are covered in the training courses PWP 1 and PWP 2 and are required for:

13.3.2.1 Handling of rigid material and wires.

13.3.2.2 Erecting of poles.

13.3.2.3 Use of cranes and machinery.

13.3.2.4 Use of measuring devices.

13.3.2.5 Work on the outside of rolling stock.

13.3.2.6 Handling of tarpaulins and

13.3.2.7 Supervision of contractors.

13.3.3 The electrical officer (in charge) must always be consulted on all these matters.

13.4 TRACK/MAST ALIGNMENT

13.4.1 Reference plates on electrification masts should be used to record the correct mast to rail distance. Track personnel must maintain the track in its correct alignment.

13.4.2 Before a track in an electrified section is lifted, lowered or slewed, or before the cant is altered, the responsible electrical officer or his authorised deputy must be notified. (Refer to clause 4.1.4.1)

13.5 TRACTION RETURN RAIL CIRCUIT

13.5.1 General caution

13.5.1.1 Unauthorised alterations to the traction bonding can result in high voltages which will be dangerous to personnel working on or near the track.

13.5.1.2 Connecting bonds must not be tampered with or disconnected. They must be kept clear of ballast, metal objects and tools. Track personnel must report any defect of or damage to electrical track equipment.

13.5.1.3 All jumper cables must be inspected for functionality on a six monthly basis by a competent person and the results of the inspection must be recorded on an official Log Sheet. Only functional jumper cables may be used at any time.

13.5.2 Rail bonds

13.5.2.1 A traction rail-to-rail joint bond consists of a length of flexible cable fixed to each rail at a joint.

13.5.2.2 Parallel tracks are connected at intervals by cross bonds.

13.5.2.3 On electrified sections the mast to rail bonds are part of the return circuit and must not be disconnected by unauthorised personnel, otherwise dangerous conditions may result.

13.5.3 Other bonds

13.5.3.1 These bonds (or parts of them) are normally painted red (except stray current drainage connectors - which are blue, and impedance bonds - which are not painted).

13.5.3.2 A spark gap, consisting of a red-painted dome bolted to a flat steel base plate, occurs at numerous points along an electrified line, (e.g. at steel footbridges, road bridges, water columns, goods sheds, station roof structures and certain traction masts). Spark gaps are connected to structures and to the traction rail by means of bonds.

13.5.3.3 At all substations large conductors connect the power supply to the rails.

13.5.3.4 On some AC-electrified sections the booster transformer's return conductor is carried on the track equipment masts on insulators and is connected to the rail at intervals of about 4km.

13.5.3.5 Stray current drainage connections connect buried pipes and other services to the negative return for electrical protection purposes.

13.5.3.6 Impedance bonds for signalling purposes are sometimes provided on electrified tracks. They are part of the traction return circuit.

13.5.4 Breaking of track circuits

13.5.4.1 No work on the track which involves interference with the traction return rail circuit either by cutting or removing the rails, or by removal of bonds may be done unless Electrical is consulted. Electrical will take such precautions as may be necessary to ensure continuity of the return circuit before permitting the work to commence. Track personnel who have been suitably trained and licensed instructed may apply approved jumpers as permitted in clause 2.13.7 and described herein.

13.5.4.2 Should it be necessary to break the track or disconnect any type of bond, the Depot Engineering Manager or his authorised Electrical deputy, must be advised in advance of this intention. Such work must not be started until an authorised employee of Electrical is available to supervise the work, or until this employee indicates that the work may proceed.

13.5.4.3 Because of the danger of electric shock on electrified sections, electrical continuity must first be provided. Electrical continuity is provided by means of a jumper cable between broken or joint plated rail ends, or by means of two jumper cables connecting the two ends of the closure rail to the running rail. It must be ensured that the jumper cables remain tight, because the return current can be lethal. (Refer to Annexure 20).

13.5.4.4 In emergencies, if no representatives from Electrical or Signals are available or can be consulted, temporary electrical continuity jumper cables must be fixed across the break where a rail has broken, where joint plates or track bonds must be removed or where a closure must be inserted. This must be done strictly in accordance with Annexure 20. Also refer to clause 2.13.6.and 2.13.7.

13.6 PREVENTION OF STRAY RETURN CURRENTS

13.6.1 Metallic objects must not be placed in contact with turnout rods, track equipment structures or any other metal structure attached to the running rails.

13.6.2 No metallic object or equipment in contact with the ground, e.g. fences, water pipes, etc. may be attached or connected to the overhead track equipment structures, to any metallic equipment associated with the track or to the rails.

13.6.3 Jumper cables must have a washer for identification and inspected via electrical department and the Millwright every 6 months (must have a log-sheet).

CHAPTER 14

TRAIN OPERATING

14.0 INTRODUCTION

In order to render a safe, affordable, dependable and predictable service, track personnel must ensure that the railway lines and associated works are always safe for the passage of trains.

14.1 PLANNING

14.1.1 Infrastructure must establish forums to co-ordinate short, medium and long term planning with interested departments.

14.1.2 Over exploitation must be prevented and the creation of excess capacity must not be allowed.

14.2 IRREGULARITIES/DEFECTS

14.2.1 Prompt action must be taken by track personnel when irregularities / defects are reported to them or come to their attention, in order to ensure the safety of trains, of clients, the public, co-workers and the environment.

14.2.2 The procedures for reporting/recording of irregularities/defects must be followed conscientiously by all concerned.

14.3 COMMUNICATION

Regular communication is necessary between track personnel and other employees involved with the running of trains. Track supervisors must ensure that adequate communication is maintained.

CHAPTER 15

WORK CODES TO BE USED BY TRACK PERSONNEL

Applicable work codes to be used by personnel.

15.0 BALLAST

15.0.1 Machine cleaning.
15.0.2 Hand cleaning

15.1 INSULATING JOINTS

15.1.1 Positioning and maintenance.
15.1.2 In-situ assembly

15.2 BRIDGES AND CULVERTS

15.2.1 Bridge code.
15.2.2 Handbook.
15.2.3 Inspection.

15.3 EARTHWORKS, FORMATION AND DRAINAGE

15.3.1 Inspection.
15.3.2 Drainage maintenance

15.4 CIVIL ENGINEERING

15.4.1 Handbook (green book).

15.5 TRACK

15.5.1 Geometric evaluation.
15.5.2 Manual for Managing Track Material.
15.5.3 Evaluation of material and track condition.
15.5.4 Tamping.
15.5.5 Screening machine.

15.6 RAILS

15.6.1 Repair of breaks.
15.6.2 Classification (ANNEXURE 15 Sheet 1 2 and 3)
15.6.3 Destressing.
15.6.4 Welding.
15.6.5 Ultrasonic and X-ray inspections.

15.7 SIGNS, LEVEL CROSSINGS AND FENCES

15.7.1 Inspection

15.8 TURNOUTS, SLIPS AND DIAMOND CROSSINGS

15.8.1 Construction manual.
15.8.2 Inspection.
15.8.3 Tamping.
15.8.4 Welding.
15.8.5 Condition evaluation.

15.9 CLEARANCES

15.9.1 Inspection.

CHAPTER 16

DECISION MODELS/GUIDELINES TO BE USED BY TRACK PERSONNEL

16.0 BALLAST

16.0.1 Determining cleaning priorities. Lowering of ballast (where applicable) and ensuring drainage repairs before screening.

16.0.2 Learner Track Master Training Modules

16.1 CONCRETE SLEEPERS

16.1.1 Treatment of alkaline aggregate reaction.

16.1.2 Replacing of pads, fastenings and gauge clips

16.2 TRACK

16.2.1 Determining of tamping cycles.

16.3 RAILS

16.3.1 Rail usage.

16.3.2 Re-use of second hand rails.

16.3.3 Workshop re-profiling.

16.3.4 In-track re-profiling.

16.3.5 Life span of rails. (Kanak to give guideline)

16.3.6 Destressing.

16.3.7 Replacing.

16.3.8 Transposing.

16.4 Turnout Maintenance Model

16.5 Derailment Investigations

16.6 Track Welding Manual

CHAPTER 17

RAIL / WHEEL INTERACTION

17.0 INTRODUCTION

17.0.1 As a result of the complex nature and high cost attributable thereto, the management of rail / wheel interaction has been placed under the joint management of senior Rolling Stock and Infrastructure personnel.

17.0.2 This chapter must be read in conjunction with relevant clauses in other chapters of this manual.

17.0.3 A few of the factors that influence rail / wheel interaction are briefly discussed in this chapter.

17.1 GEOMETRY

17.1.1 General

An improvement in the condition of track geometry will improve bogie tracking and will reduce the long term costs associated with the maintenance and relaying of the track.

17.1.2 Ballast

The dimensions shown in **Annexure 4** must be regarded as a minimum for critical points, such as the high legs of sharp curves, on bridges, tunnel entrances and sags of vertical curves.

17.1.3 Superelevation / cant

To reduce unbalanced lateral forces that affect the track structure, it is necessary to apply superelevation to the track. It must be applied in accordance with **Annexure 9, sheet 4** and **clause 4.1.4.**

17.1.4 Gauge

The tracking ability of bogies is reduced exponentially as gauge (due to wear) increases. Action must thus be taken well before maximum allowable gauge is reached. See clause 4.1.3

17.2 LUBRICATION

Lubrication is successful when the gauge corner of the high leg is sufficiently covered with an even layer of grease throughout the curve so that the rate at which rail side-wear occurs is reduced and that it takes place evenly over the whole length of a curve.

17.3 TRACKING

17.3.1 As vertical and horizontal irregularities are the main cause of bogie oscillation, special attention must be given to joint maintenance and all work must be performed in accordance with the latest work codes.

17.3.2 Forces transmitted to the track by rolling stock must be measured regularly when high rail wear and bogie oscillation occurs.

17.4 MOTIVE POWER AND SPEED

Although dynamic forces decrease as train speed is reduced, longitudinal forces transmitted to the track structure by locomotives are increased. Speed restrictions must be managed accordingly.

17.5 PROFILING

17.5.1 Rail profiling reduces surface defects and improves bogie tracking which in turn reduces flange contact and internal rail stresses.

17.5.2 A dramatic increase in rail life can be achieved when rail profiling, track geometry, lubrication, tracking and speed are managed optimally.

17.5.3 The rail profiling process is complex and must be managed by experts in this field. The latest decision guidelines / models must be used.

CHAPTER 18

PRIVATE SIDINGS

18.0 BACKGROUND

18.0.1 Seventy percent of Transnet Freight Rail's income can be linked directly to private sidings. The service to these important clients must be managed accordingly.

18.1 INTRODUCTION

18.1.1 Engineers and Engineering Technicians must acquaint themselves with the latest Manual for the **Provision and Maintenance of Private Sidings**.

18.1.2 Track Inspectors concerned with private sidings, must acquaint themselves with **part B** of the document and must be enabled to deliver the required level of service.

18.2 DEFINITIONS

18.2.1 A private siding is a railway track owned by the local authority, a company or a private person and is connected to the track of Transnet Freight Rail or the PRASA.

18.2.2 A siding is that portion of a private siding which is situated on land belonging to Transnet Freight Rail or the PRASA.

18.2.3 A siding extension is that portion of a private siding which is situated on land not belonging to Transnet Freight Rail or the PRASA.

18.3 AGREEMENTS

18.3.1 Each private siding is covered by an agreement between Transnet Freight Rail and the owner.

18.3.2 Location, ownership as well as construction and maintenance details are shown on the agreement plan which forms part of the private siding agreement.

18.3.3 An agreement between Transnet Freight Rail and the PRASA is required for private sidings connected to the PRASA's lines.

18.3.4 Track personnel who are involved with private sidings must be aware of the above and act accordingly.

18.4 MAINTENANCE

18.4.1 If the take-off turnout is leased, Transnet Freight Rail bears the cost of maintenance and the renewal of the turnout.

18.4.2 Where Transnet Freight Rail is responsible for maintenance, the responsible track personnel must ensure that the private siding is adequately maintained.

18.5 MATERIAL

18.5.1 Private siding owners must provide track material for the maintenance of their sidings.

18.5.2 Transnet Freight Rail will supply track material if it is necessary and can be supplied.

18.5.3 Material released from private sidings must be handed over to the siding owner in accordance with the stipulations of the Private Siding Agreement. A receipt is to be obtained and forwarded to the Depot Engineering Manager s office for official record keeping.

18.6 EMERGENCY WORK

Track personnel must complete all relevant documentation pertaining to emergency work undertaken on private sidings and forward it to the Depot Engineering Manager 's Office.

18.7 INSPECTIONS

18.7.1 The inspection of private sidings for renewal of right of access must be undertaken by the Track inspector.

18.7.2 Private sidings over which locomotives of Transnet Freight Rail operate must be inspected annually.

18.7.3 Private sidings over which locomotives of Transnet Freight Rail do not operate must be inspected every five years, prior to the renewal of the private siding agreements, unless -

18.7.3.1 Transnet Freight Rail is relieved of all obligations in respect of any portion of a private siding (this will be shown on the agreement plan);

18.7.3.2 a private siding owner furnishes an annual certificate signed by a Professional Engineer that the portion of the private siding not covered by the preceding paragraph is safe for the passage of vehicles, including locomotives, of Transnet Freight Rail.

18.7.4 The track personnel of Transnet Freight Rail may at all times inspect private sidings to satisfy themselves that they are safe for the passage of trains. Comprehensive inspections must be undertaken in accordance with a pre-determined programme and as far as possible be carried out in co-operation with the siding owner or his representative.

18.8 RAIL WEAR

18.8.1 Maximum permissible rail wear is as shown for class C rails in **Annexure 15, sheet 2**. Technology Management to issue A,B, C rail wear limits in due course.

18.8.2 Rails must be replaced when the maximum track gauge is reached and the gauge cannot be adjusted.

18.9 SLEEPERS

18.9.1 Approved sleepers may be used.

18.9.2 Concrete sleepers may be used in curves on private sidings as follows:

18.9.2.1 In running lines exceeding 1 km in length - minimum radius 240m and in running lines less than 1 km in length - minimum radius 140m.

18.9.2.2 In staging and shunting lines, minimum radius 140m.

18.9.2.3 On curves of radius less than 200m the appropriate gauge widening must be provided.

CHAPTER 19

Using the Lifting Frame to determine the Stress-Free rail temperature of CWR

Responsible person: Engineering Technician

19.1 Background

The lifting frame was developed at the Track Testing Centre (TTC) at George Goch. This frame can be used on 48, 57, S 60 and UIC 60 kg/m rails on concrete sleepers with Fist or Pandrol fasteners.

The lifting frame is used to determine the stress-free rail temperature of rails used in continuous welded sections.

The TTC does not take any responsibility for faulty readings or injuries if the lift frame is used in any other way than explained in this document.

19.2 The lift frame

The safe working load of the frame is 5 tons. The load frame consists of a basic frame of 38 mm square tubing, wall thickness of 2 mm, a hydraulic pump and ram with a gauge indicating tons. Fitted to the ram is a set of grips that hook to the foot of the rail as seen in Fig 19.1 below.

Fig 19.1: The Lifting Frame

19.3 The gauge

The short sub division indicates 0,04 tons, medium subdivisions 0,2 tons and long subdivisions 1 ton.

19.4 Basic principle

The frame can only be used when the rail is in tension. The frame is used to lift the rail 70mm while measuring the force needed to loft the rail. This reading is obtained from the gauge. The higher the tension force in the rail, the greater the force to lift the rail.

The reason why the rail is lifted 70 mm is to overcome the mass of the rail first before the tension force becomes into account. Because the 48, 57 S 60 and UIC 60 kg/m rails have

different masses per metre they are handled separately when the stress-free rail temperature is determined.

19.5 Additional parts of the frame

A rectangular steel block and spacer plates are supplied with the frame. This block and spacer plates are used when the frame is used on Pandrol fastenings. The block is necessary to take up the gap from the grips to the base of the rail on a Pandrol fastening system. On a Fist system the block is not necessary. The ram can extent only 85, 5 mm and therefore the block must be used with Pandrol fastenings to make up the gap between the grips and the base of the rail.

19.6 The 70 mm measuring plate

On the cross bar at the top of the frame, a thin steel plate is fixed with a wing nut. This plate can move up or down. From the bottom of the plate 70 mm up, a thin line is marked. This is used to determine when the rail is lifted 70 mm.

19.7 Tables for determining the stress-free temperature of a rail

Attached to this document tables are given for the 48, 57, S 60 and UIC 60kg.m rails to be used with the loft frame.

19.8 Working procedure

19.8.1 The places where the stress-free temperature of the rail must be determined is marked. This must be between sleepers.

19.8.2 From this mark 10 m is marked out in each direction along the rail. This totals 20 m with the point where the stress-free rail temperature is to be determined, in the middle.

When a 10 m mark fails between two sleepers, the next sleeper must be marked (furthest from the middle).

19.8.3 Two thermometers are placed on the inner and outside of the web of the rail to determine the rail temperature. The average between the two readings is taken as the rail temperature.

19.8.4 After arrangement and conformation for sufficient time between trains (15 min.) the 20m rail is loosened. The rail must be loosened in such a way to make sure that the rail

is lifted freely. The lift frame is positioned as depicted in figure 1 above the rail. For Pandrol fastenings the steel block must be placed on the grips.

19.8.5 The grips are lifted with the hand pump until they touch the base of the rail. The 70 mm measuring plate is then positioned such that the bottom of the plate is lined up with the top cross bar of the grips, and then locked with the wing nut.

19.8.6 The rail then is lifted by means of the hand pump until the top of the cross bar of the grips is in line with the 70 mm reference line. The rail is then lowered into its original position by regulating the valve on the hand pump. This is to distribute the stresses in the rail evenly over the 20 m length of rail. The grips are again lifted until they touch the base of the rail and the measuring plate is positioned as mentioned in 8.5.

19.8.7 The rail is again lifted until the top of the cross bar of the grips is in line with the 70 mm reference line. The needle on the gauge is noted. It will tend to drop backwards and stabilise after a few seconds. When it has stabilised the reading is noted.

19.8.8 The rail temperature is obtained from the average of the two thermometers.

19.8.9 The tables are used to establish the stress-free rail temperature. The following example is given:

Rail temperature:	19º
Rail mass:	57 kg/m
Gauge reading:	1,6 tons

The stress-free rail temperature from the table will be 34ºC.

19.8.10 The different rails will experience the following forces / ºC.

48 kg/m	1,42 tons / ºC.
57 kg/m	1,73 tons / ºC.
S60 kg/m	1,82 tons / ºC.
UIC60 kg/m	1,82 tons / ºC.

19.8.11 The following equations can be used if tests are analysed with a spread sheet program:

$$\text{Stress -free rail temp.} = \frac{P - 1{,}312334}{0{,}022375} + \text{rail temperature} \quad \text{(S60 kg/m)}$$

$$\text{Stress -free rail temp.} = \frac{P - 1{,}432184}{0{,}022151} + \text{rail temperature} \quad \text{(UIC60 kg/m)}$$

$$\text{Stress -free rail temp.} = \frac{P - 1{,}282537}{0{,}020954} + \text{rail temperature} \quad \text{(57 kg/m)}$$

$$\text{Stress -free rail temp.} = \frac{P - 1{,}009323}{0{,}022321} + \text{rail temperature} \quad \text{(48 kg/m)}$$

P = Gauge reading

19.9 Safety

19.9.1 If the load frame is used in a curve the radius of the curve must not be less than 500 m.

19.9.2 The frame must be positioned in such a way that the hand pump is on the outside of the curve. This is to prevent injury if the forces in the rail are so high that the rail will tend to straighten if it is lifted. It is recommended that the rail temperature must be between 5ºC and 20ºC when tests on curves and tangents are done.

19.9.3 According to Transnet safety personnel it is not necessary to check the frame annually. The gauge will be checked annually by the Technology Management (TTC) for calibration.

19.9.4 At all times when the load frame is stored or moved precaution must be taken to make sure that the gauge is not damaged. This will lead to faulty readings.

Table 19.1: Stress Free Temperature (40kg/m)

		RAIL TEMPERATURE (ºC)																	
		5	7	9	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39
P (ton)	0.75	5	7	9	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39
	0.80	9	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39	41	43
	0.85	13	15	17	19	21	23	25	27	29	31	33	35	37	39	41	43	45	47
	0.90	17	19	21	23	25	27	29	31	33	35	37	39	41	43	45	47	49	51
	0.95	21	23	25	27	29	31	33	35	37	39	41	43	45	47	49	51	53	55
	1.00	25	27	29	31	33	35	37	39	41	43	45	47	49	51	53	55	57	59
	1.05	29	31	33	35	37	39	41	43	45	47	49	51	53	55	57	59	61	63
	1.10	33	35	37	39	41	43	45	47	49	51	53	55	57	59	61	63	65	67
	1.15	37	39	41	43	45	47	49	51	53	55	57	59	61	63	65	67	69	71
	1.20	41	43	45	47	49	51	53	55	57	59	61	63	65	67	69	71	73	75
	1.25	45	47	49	51	53	55	57	59	61	63	65	67	69	71	73	75	77	79
	1.30	49	51	53	55	57	59	61	63	65	67	69	71	73	75	77	79	81	83
	1.35	53	55	57	59	61	63	65	67	69	71	73	75	77	79	81	83	85	87
	1.40	57	59	61	63	65	67	69	71	73	75	77	79	81	83	85	87	89	91
	1.45	61	63	65	67	69	71	73	75	77	79	81	83	85	87	89	91	93	95
	1.50	65	67	69	71	73	75	77	79	81	83	85	87	89	91	93	95	97	99
	1.55	69	71	73	75	77	79	81	83	85	87	89	91	93	95	97	99	101	103

P = Force to lift rail 70mm

Table 19.2: Stress Free Temperature (48kg/m)

		RAIL TEMPERATURE (ºC)																	
		5	7	9	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39
P (t)	1.10	9	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39	41	43
	1.15	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39	41	43	45
	1.20	13	15	17	19	21	23	25	27	29	31	33	35	37	39	41	43	45	47
	1.25	15	17	19	21	23	25	27	29	31	33	35	37	39	41	43	45	47	49
	1.30	17	19	21	23	25	27	29	31	33	35	37	39	41	43	45	47	49	51
	1.35	20	22	24	26	28	30	32	34	36	38	49	42	44	46	48	50	52	54
	1.40	22	24	26	28	30	32	34	36	38	49	42	44	46	48	50	52	54	56
	1.45	24	26	28	30	32	34	36	38	49	42	44	46	48	50	52	54	56	58
	1.50	26	28	30	32	34	36	38	49	42	44	46	48	50	52	54	56	58	60
	1.55	28	30	32	34	36	38	49	42	44	46	48	50	52	54	56	58	60	62
	1.60	30	32	34	36	38	49	42	44	46	48	50	52	54	56	58	60	62	64
	1.65	32	34	36	38	49	42	44	46	48	50	52	54	56	58	60	62	64	66
	1.70	34	36	38	49	42	44	46	48	50	52	54	56	58	60	62	64	66	68
	1.75	36	38	49	42	44	46	48	50	52	54	56	58	60	62	64	66	68	70
	1.80	39	41	43	45	47	49	51	53	55	57	59	61	63	65	67	69	71	73
	1.85	41	43	45	47	49	51	53	55	57	59	61	63	65	67	69	71	73	75
	1.90	43	45	47	49	51	53	55	57	59	61	63	65	67	69	71	73	75	77
	1.95	45	47	49	51	53	55	57	59	61	63	65	67	69	71	73	75	77	79
	2.00	47	49	51	53	55	57	59	61	63	65	67	69	71	73	75	77	79	81
	2.05	49	51	53	55	57	59	61	63	65	67	69	71	73	75	77	79	81	83
	2.10	51	53	55	57	59	61	63	65	67	69	71	73	75	77	79	81	83	85
	2.15	53	55	57	59	61	63	65	67	69	71	73	75	77	79	81	83	85	87
	2.20	55	57	59	61	63	65	67	69	71	73	75	77	79	81	83	85	87	98
	2.25	58	60	62	64	66	68	70	72	74	76	78	80	82	84	86	88	90	92
	2.30	60	62	64	66	68	70	72	74	76	78	80	82	84	86	88	90	92	94
	2.35	62	64	66	68	70	72	74	76	78	80	82	84	86	88	90	92	94	96
	2.40	64	66	68	70	72	74	76	78	80	82	84	86	88	90	92	94	96	98

P = Force to lift rail 70 mm

Table 19.3: Stress Free Temperature (57kg/m)

		RAIL TEMPERATURE (ºC)																	
		5	7	9	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39
P (ton)	1.35	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42
	1.40	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39	41	43	45
	1.45	13	15	17	19	21	23	25	27	29	31	33	35	37	39	41	43	45	47
	1.50	15	17	19	21	23	25	27	29	31	33	35	37	39	41	43	45	47	49
	1.55	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52
	1.60	20	22	24	26	28	30	32	34	36	38	49	42	44	46	48	50	52	54
	1.65	22	24	26	28	30	32	34	36	38	49	42	44	46	48	50	52	54	56
	1.70	25	27	29	31	33	35	37	39	41	43	45	47	49	51	53	55	57	59
	1.75	27	29	31	33	35	37	39	41	43	45	47	49	51	53	55	57	59	61
	1.80	29	31	33	35	37	39	41	43	45	47	49	51	53	55	57	59	61	63
	1.85	32	34	36	38	49	42	44	46	48	50	52	54	56	58	60	62	64	66
	1.90	34	36	38	49	42	44	46	48	50	52	54	56	58	60	62	64	66	68
	1.95	36	38	49	42	44	46	48	50	52	54	56	58	60	62	64	66	68	70
	2.00	39	41	43	45	47	49	51	53	55	57	59	61	63	65	67	69	71	73
	2.05	41	43	45	47	49	51	53	55	57	59	61	63	65	67	69	71	73	75
	2.10	43	45	47	49	51	53	55	57	59	61	63	65	67	69	71	73	75	77
	2.15	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74	76	78	80
	2.20	48	50	52	54	56	58	60	62	64	66	68	70	72	74	76	78	80	82
	2.25	50	52	54	56	58	60	62	64	66	68	70	72	74	76	78	80	82	84
	2.30	53	55	57	59	61	63	65	67	69	71	73	75	77	79	81	83	85	87
	2.35	55	57	59	61	63	65	67	69	71	73	75	77	79	81	83	85	87	89
	2.40	57	59	61	63	65	67	69	71	73	75	77	79	81	83	85	87	89	91

P = Force to lift rail 70 mm

Table 19.4: Stress Free Temperature (UIC 60kg/m)

		RAIL TEMPERATURE (ºC)																	
		5	7	9	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39
P (ton)	1.44	5	7	9	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39
	1.48	7	9	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39	41
	1.52	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42
	1.56	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44
	1.60	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46
	1.64	13	15	17	19	21	23	25	27	29	31	33	35	37	39	41	43	45	47
	1.68	15	17	19	21	23	25	27	29	31	33	35	37	39	41	43	45	47	49
	1.72	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50
	1.76	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52
	1.80	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54
	1.84	21	23	25	27	29	31	33	35	37	39	41	43	45	47	49	51	53	55
	1.88	23	25	27	29	31	33	35	37	39	41	43	45	47	49	51	53	55	57
	1.92	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58
	1.96	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60
	2.00	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	62
	2.04	29	31	33	35	37	39	41	43	45	47	49	51	53	55	57	59	61	63
	2.08	31	33	35	37	39	41	43	45	47	49	51	53	55	57	59	61	63	65
	2.12	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66
	2.16	34	36	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66	68
	2.20	36	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66	68	70
	2.24	37	39	41	43	45	47	49	51	53	55	57	59	61	63	65	67	69	71
	2.28	39	41	43	45	47	49	51	53	55	57	59	61	63	65	67	69	71	73
	2.32	40	42	44	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74
	2.36	42	44	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74	76
	2.40	44	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74	76	78
	2.44	45	47	49	51	53	55	57	59	61	63	65	67	69	71	73	75	77	79
	2.48	47	49	51	53	55	57	59	61	63	65	67	69	71	73	75	77	79	81
	2.52	48	50	52	54	56	58	60	62	64	66	68	70	72	74	76	78	80	82
	2.56	50	52	54	56	58	60	62	64	66	68	70	72	74	76	78	80	82	84
	2.60	51	53	55	57	59	61	63	65	67	69	71	73	75	77	79	81	83	85

P = Force to lift rail 70 mm

Table 19.4: Stress Free Temperature (S 60kg/m)

		RAIL TEMPERATURE (ºC)																	
		5	7	9	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39
P (ton)	1.40	9	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39	41	43
	1.44	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39	41	43	45
	1.48	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46
	1.52	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48
	1.56	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50
	1.60	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52
	1.64	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54
	1.68	21	23	25	27	29	31	33	35	37	39	41	43	45	47	49	51	53	55
	1.72	23	25	27	29	31	33	35	37	39	41	43	45	47	49	51	53	55	57
	1.76	25	27	29	31	33	35	37	39	41	43	45	47	49	51	53	55	57	59
	1.80	27	29	31	33	35	37	39	41	43	45	47	49	51	53	55	57	59	61
	1.84	29	31	33	35	37	39	41	43	45	47	49	51	53	55	57	59	61	63
	1.88	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	62	64
	1.92	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66
	1.96	34	36	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66	68
	2.00	36	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66	68	70
	2.04	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66	68	70	72
	2.08	39	41	43	45	47	49	51	53	55	57	59	61	63	65	67	69	71	73
	2.12	41	43	45	47	49	51	53	55	57	59	61	63	65	67	69	71	73	75
	2.16	43	45	47	49	51	53	55	57	59	61	63	65	67	69	71	73	75	77
	2.20	45	47	49	51	53	55	57	59	61	63	65	67	69	71	73	75	77	79

P = Force to lift rail 70 mm

RAIL STRESS MEASUREMENTS RESULTS ANALYSIS AND INTERPRETATION

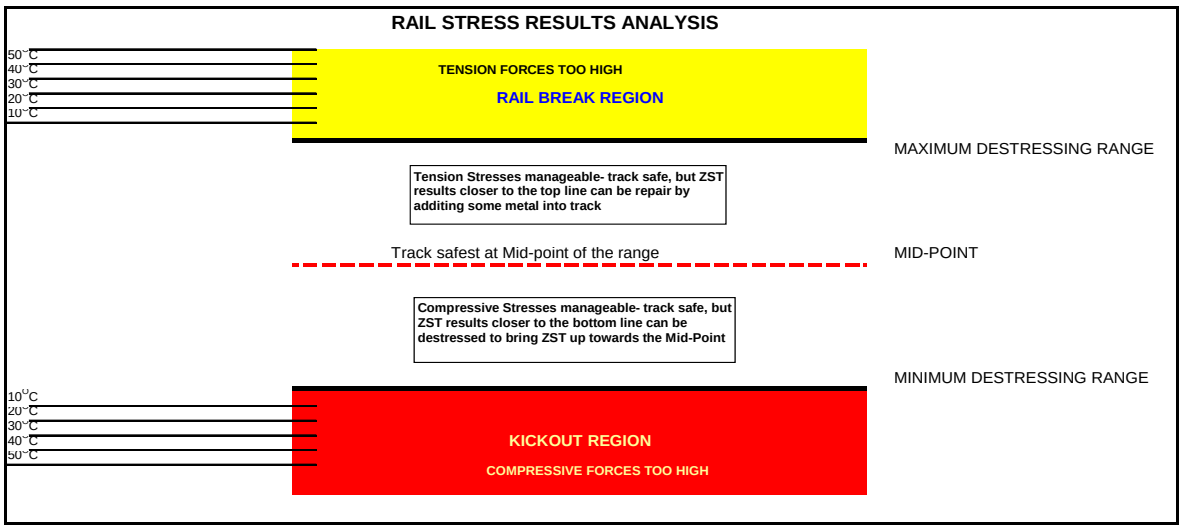


Figure 19.2: Rail Stress Results Analysis

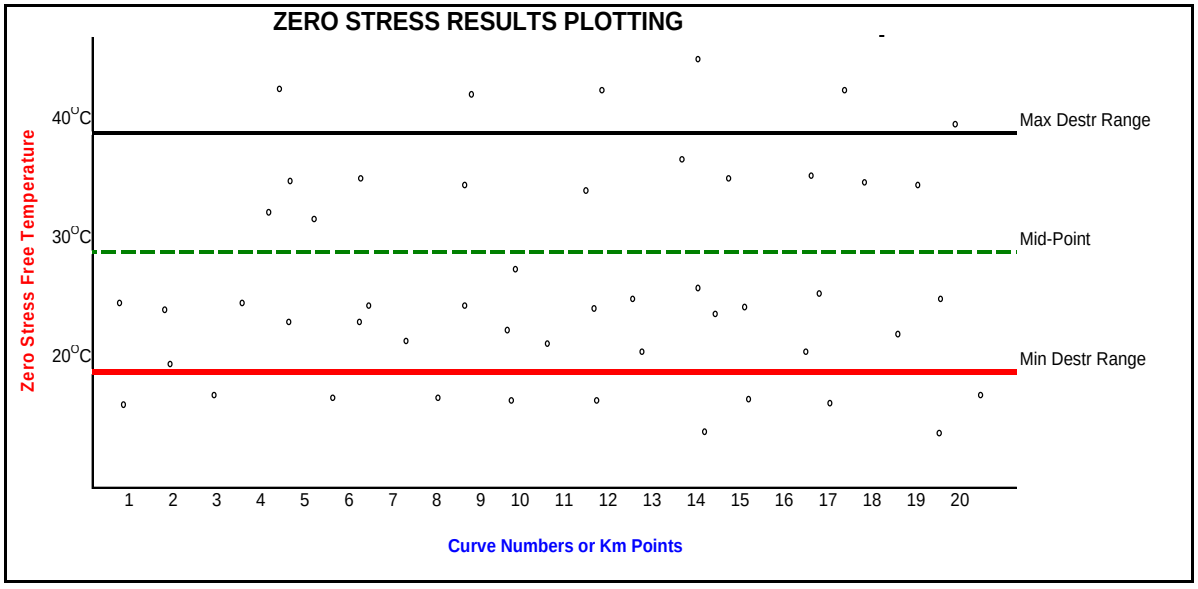


Figure 19.3: Zero Stress Results Plotting

Figure 19.2 & 19.3

(1) Rail is Stress-free at Mid-point of the range and therefore no need to de-stress rail.

(2) Any rail with calculated Zero Stress Temperature below the Minimum Destressing Range must take first priority in the destressing planning programme.

(3) Track is still safe for kickouts when Zero Stress result falls between the mid-point and minimum distressing range, however destressing can be done on all curves with ZST closer to the minimum range so as to bring it up towards the mid-point and make track even safer.

(4) Any result below the minimum range indicates that your track is under compressive forces and therefore the possibility of a kickout is greater.

(5) The results above the mid-point but below the maximum destressing range indicates that the track is still safe against a rail break. However, some steel can be added into the track to make it even safer.

(6) If the ZST is above the maximum destressing range, a rail break possibility is greater, and the track is in dire need of extra steel. You can add steel by cutting the track and putting a closure rail for instance or through tamping by pulling the curve inside a bit.

(7) A curve with ZST below the minimum range is in compression while any curve with ZST above the maximum range will be indicating tensile stresses.

CHAPTER 20

DETAILED MEASUREMENT FOR SLACKS AND KICKOUTS REPAIRS

20. 1 Slacks

Table 20.1A: Minimum distance (m) between two points for a specific difference in cant

	A-standard		B-standard	C-standard
	3 mm		8 mm	12 mm
Difference in readings or sum of readings (mm)	Straight track and circular curves (m) 1:1000	Transition curves (m) 1:500	All track (m) 1:400	All track (m) 1:288
1	1	0,5	0.4	0,3
2	2	1,0	0,8	0,6
3	3	1,5	1,2	0,9
4	4	2,0	1,6	1,2
5	5	2,5	2,0	1,5
6	6	3,0	2,4	1,8
7	7	3,5	2,8	2,0
8	8	4,0	3,2	2,3
9	9	4,5	3,6	2,6
10	10	5,0	4,0	2,9

Table 20.1B

20	20	10	8	5,8
30	30	15	12	8,7
40	40	20	16	11,6
50	50	25	20	14,4
60	60	30	24	17,3
70	70	35	28	20,2
80	80	40	32	23,0
90	90	45	36	26,0
100	100	50	40	28,8

Example : For 44mm difference in cant on straight track the two points must be 40 m (table 20.1B + 4m (Table 20.1A) = 44 m apart to comply with the A-standard, or 16 m (table 20.1B) + 1,6 m (table 20.1A) = 17,6 m apart for the B-standard.

20.1.1 To comply with the A-, B- or C-standard the cant at any point must not differ by more than the following values from the specified cant:

A-standard	3 mm
B-standard	12 mm
C-standard	16 mm

20.2 Kinks

20.2.1 To comply with A- B- or C-standards the middle-ordinate “e” must not exceed the Values in table 1 for a chord length “L” strung between M and N

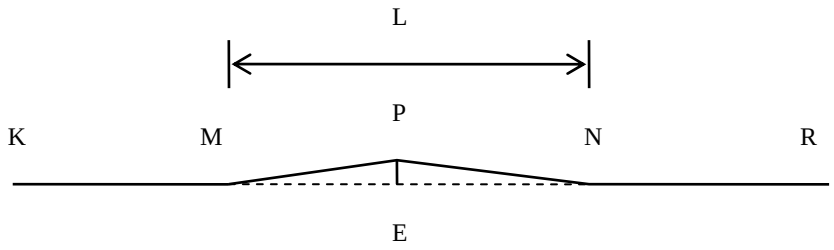


Figure 20.1: Kink

Table 20.2: Kink

L (m)	A - Standard "e" max. (mm) 1:2000	B - Standard "e" max. (mm) 1:500	C - Standard "e" max. (mm) 1:360
1	0	1	1
2	0	2	2
3	0	3	4
4	1	4	5
5	1	5	7
6	1	6	8
7	1	7	9
8	2	8	11
9	2	9	12
10	2	10	14

The kink at the beginning or end of a long horizontal misalignment in a straight track must meet the requirements of clause 4.1.1.4.1.

To comply with the A- B- or C-standards the difference between the average middle-ordinate of a circular and transition curve measured from a 10 m chord and the mid-ordinate of any point on the same curve must not exceed the values shown in table 20.3A – 20.3B – 20.3C

TABLE 20.3A: A-Standard

Average mid-ordinate (mm)	Permissible difference (mm)
1 to 9	+/-2
10 to 29	+/-3
30 to 49	+/-4
50 to 69	+/-5

70 to 89	+/-6
90 and more	+/-7

TABLE 20.3B: B-Standard

Average mid-ordinate (mm)	Permissible difference (mm)	Average mid-ordinate (mm)	Permissible difference (mm)
1 to 2	+/-2	48 to 52	+/-12
3 to 7	+/-3	53 to 57	+/-13
8 to 12	+/-4	58 to 62	+/-14
13 to 17	+/-5	63 to 67	+/-15
18 to 22	+/-6	68 to 72	+/-16
23 to 27	+/-7	73 to 77	+/-17
28 to 32	+/-8	78 to 82	+/-18
33 to 37	+/-9	83 to 87	+/-19
38 to 43	+/-10	88 and more	+/-20
44 to 47	+/-11		

TABLE 20.3C: C-Standard

Average mid-ordinate (mm)	Permissible difference (mm)	Average mid-ordinate (mm)	Permissible difference (mm)
1	+/-2	49 to 51	+/-17
2 to 4	+/-3	52 to 54	+/-18
5 to 8	+/-4	55 to 58	+/-19
9 to 11	+/-5	59 to 61	+/-20
12 to 14	+/-6	62 to 64	+/-21
15 to 18	+/-7	65 to 68	+/-22
19 to 21	+/-8	69 to 71	+/-23
22 to 24	+/-9	72 to 74	+/-24
25 to 28	+/-10	75 to 78	+/-25
29 to 31	+/-11	79 to 81	+/-26
32 to 34	+/-12	82 to 84	+/-27
35 to 38	+/-13	85 to 88	+/-28
39 to 41	+/-14	89 to 91	+/-29
42 to 44	+/-15	92 and more	+/-30
45 to 48	+/-16		

CHAPTER 21

RESPONSIBILITIES AND WORK METHODS APPLICABLE TO SPECIFIC DEPOTS

CHAPTER 22

RECOMMENDED READING FOR TRACK PERSONNEL

19.0 BOOKS

19.0.1 Selig, E.T. and Waters, J.M. (1994). Track Geotechnology and Substructure Management. Thomas Telford Services, London.

19.0.2 Esveld, Coenraad (1989). Modern Railway Track. MRT Productions, Germany.

19.1 CONFERENCES

19.1.1 Conference papers (1987). Related Problems on Wheel/Rail Interface and Railway Systems Capacity. International Heavy Haul Conference, Perth, Australia.

19.1.2 Conference papers (1989). Railways in Action. International Heavy Haul Conference, Brisbane, Australia.

19.1.3 Conference papers (1992). Meeting the Challenge of Increased Tonnage. International Heavy Haul Conference. Colorado Springs U.S.A.

19.1.4 Conference papers (1993). Efficiency and Safety of Heavy Haul Railways. International Heavy Haul Conference, Beijing, China.

19.2 SIMPOSIUMS, LECTURES AND COURSES

19.2.1 Post graduate course (1990). Track Maintenance. University of Pretoria.

19.2.2 Symposium (1991). Mechanised Track Maintenance. University of Pretoria.

19.2.3 Special post graduate course (1992) Fundamentals of Track Structure Design and Maintenance. University of Pretoria.

19.2.4 Special course (1993). Rail/Wheel Interaction. University of Pretoria.

19.2.5 Lectures (1999). Introduction to Multi Disciplinary Concepts in Railway Engineering. University of Pretoria.

19.2.6 Lectures (2010). Management of Continuously Welded Rails (CWR). University of Pretoria.

19.2.7 Lectures (2010). Introduction to Railway Projects and Processes. University of Pretoria.

19.2.8 Lectures (2012). Rail Safety Investigation Course. University of Pretoria.

19.2.9 Lectures (1999). Track Geotechnology. University of Pretoria

19.2.10 Lectures (2010). Railway Infrastructure Maintenance Management. University of Pretoria.

19.2.11 Lectures (2010). Railway Asset Management Course. University of Pretoria.

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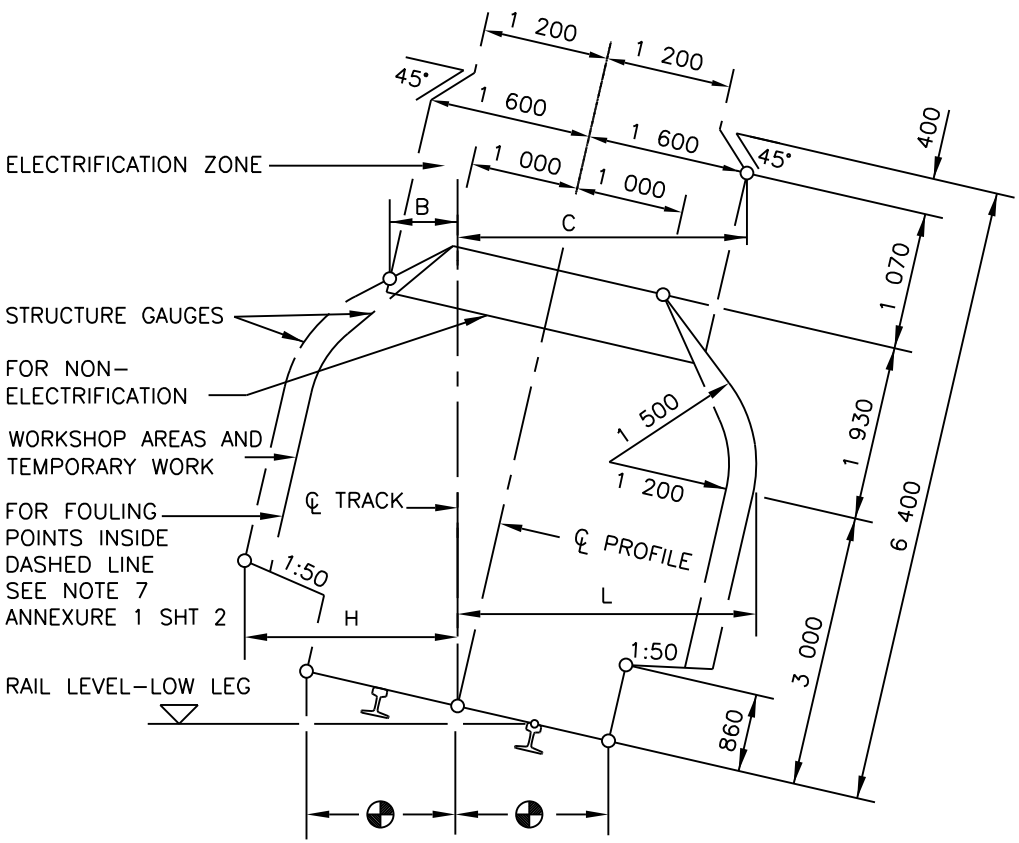
X-ray inspections	4.0.7	32	
	15.6.5	92	

(Start Contents)

HORIZONTAL CLEARANCES : 1 065mm TRACK GAUGE

RADIUS	WITH CANT		NO CANT	WITH CANT	
(m)	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



REMARKS:

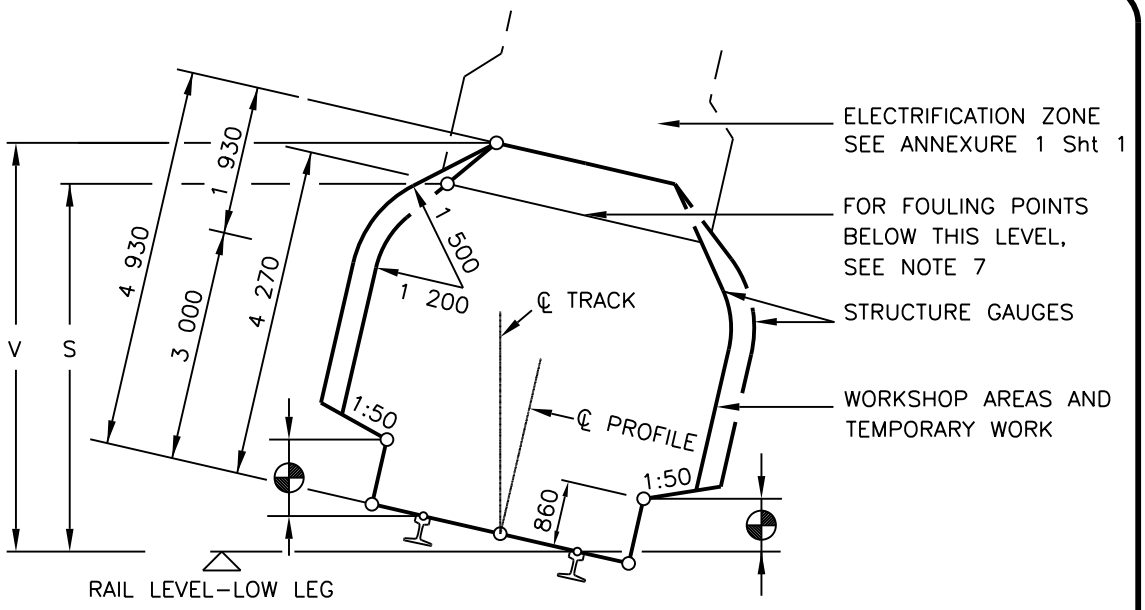
1. H AND B IS THE REQUIRED HORIZONTAL CLEARANCE ON THE HIGH LEG OF THE CURVE BASED ON MINIMUM CANT.
2. L AND C IS THE REQUIRED HORIZONTAL CLEARANCE ON THE LOW LEG OF THE CURVE BASED ON MAXIMUM CANT.
3. INTERMEDIATE VALUES MAY BE INTERPOLATED BY THE ENGINEER IN CHARGE.
4. FOR WORKSHOP AREAS AND TEMPORARY 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.
7. USE SMALLER RADIUS IF RADIUS INBETWEEN

ANNEXURE 1
SHEET 1 of 5

BE 97–01 Sht 1 Version 1

VERTICAL CLEARANCES : 1 065mm TRACK GAUGE

LOCATION		NOT ELECTRIFIED	ELECTRIFIED (PRESENT OR FUTURE)	
			3kV & 25kV	50kV
	RADIUS (mm)	S (mm)	V (mm)	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



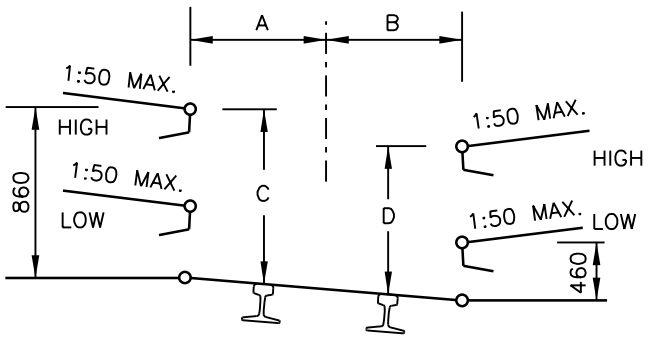
REMARKS:

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 VECHILE BODY LENGTH.
9. ◓ SEE ANNEXURE 1 SHEET 3 FOR PLATFORM CLEARANCES.

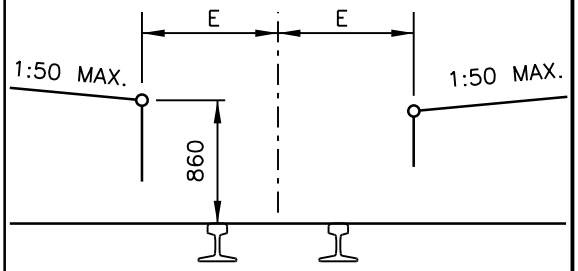
CLEARANCES : PLATFORMS

PLATFORMS : TRACK GAUGE 1 065mm

PASSENGERS



GOODS



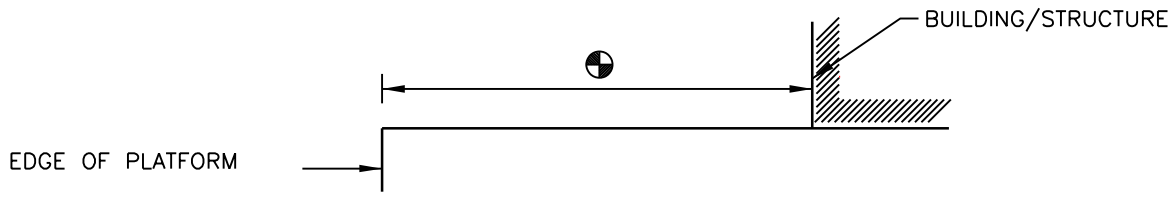
(NO CANT)

RADIUS (m)	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)
90	1 690	1 820	890	810	1 840
100	1 650	1 790	890	810	1 810
120	1 610	1 740	890	810	1 760
140	1 580	1 700	890	810	1 720
170	1 550	1 660	890	810	1 690
200	1 530	1 630	890	820	1 670
250	1 520	1 600	890	820	1 640
300	1 520	1 580	890	830	1 620
350	1 520	1 560	880	830	1 600
400	1 520	1 550	880	840	1 590
500	1 520	1 540	880	850	1 580
600	1 520	1 530	870	850	1 570
800	1 520	1 520	860	860	1 560
1 200	1 520	1 520	860	860	1 550
2 000	1 520	1 520	860	860	1 540
3 000	1 520	1 520	860	860	1 530
STRAIGHT	1 520	1 520	860	860	1 520

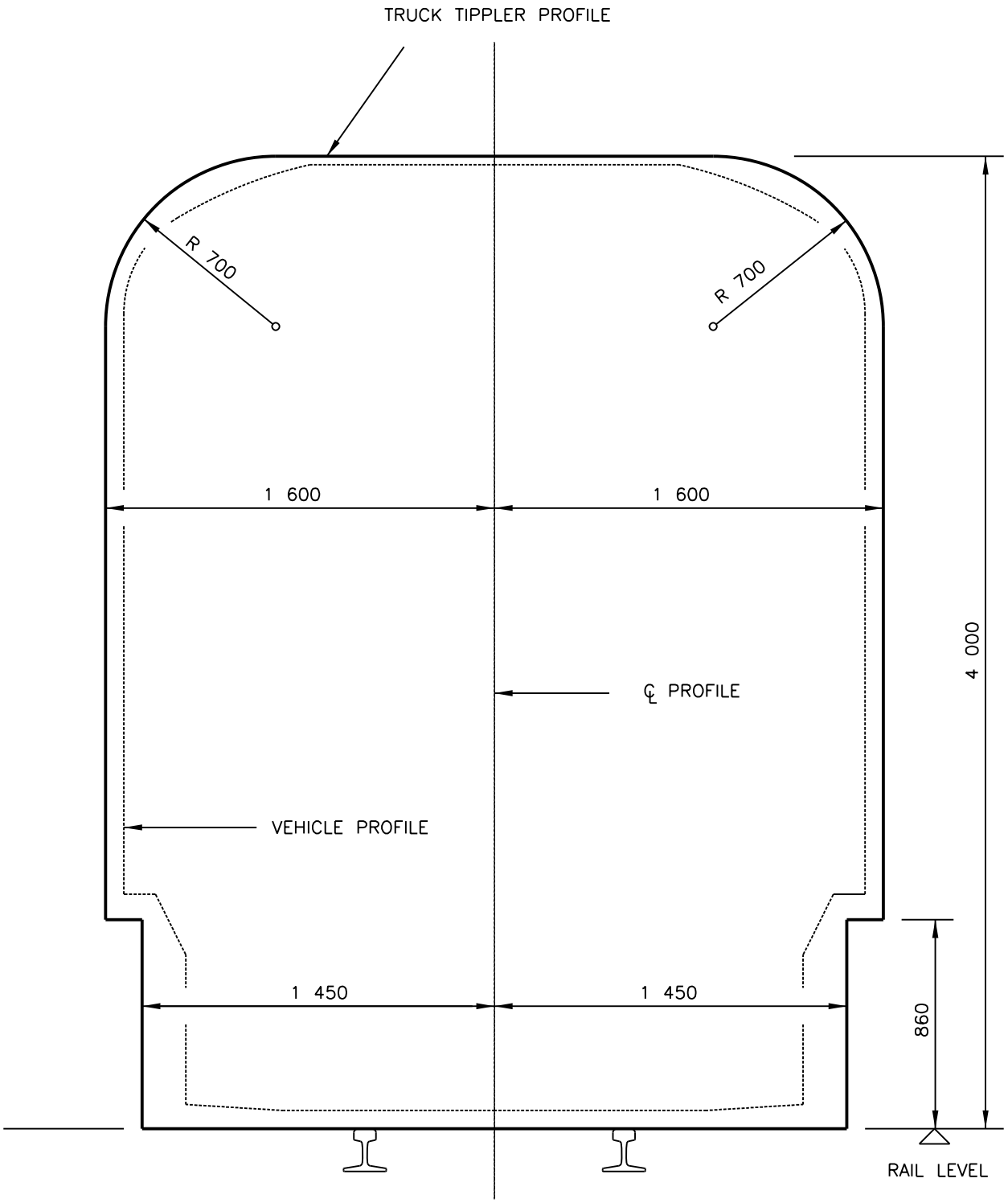
REMARKS:

1. NO CANT TO BE APPLIED EXCEPT WHEN THE GOODS PLATFORM IS ON A RUNNING LINE.
2. INTERMEDIATE VALUES MAY BE INTERPOLATED BY THE ENGINEER IN CHARGE.
3. ⊕ 8m TO MAIN STATION-BUILDINGS AND 3m TO ALL OTHER STRUCTURES.
4. TOLERANCES : SEE CLAUSE 8.0.10.
5. ALWAYS USE THE SMALLEST RADIUS

STRUCTURES ON PLATFORMS : 1 065mm AND 610mm TRACK GAUGE



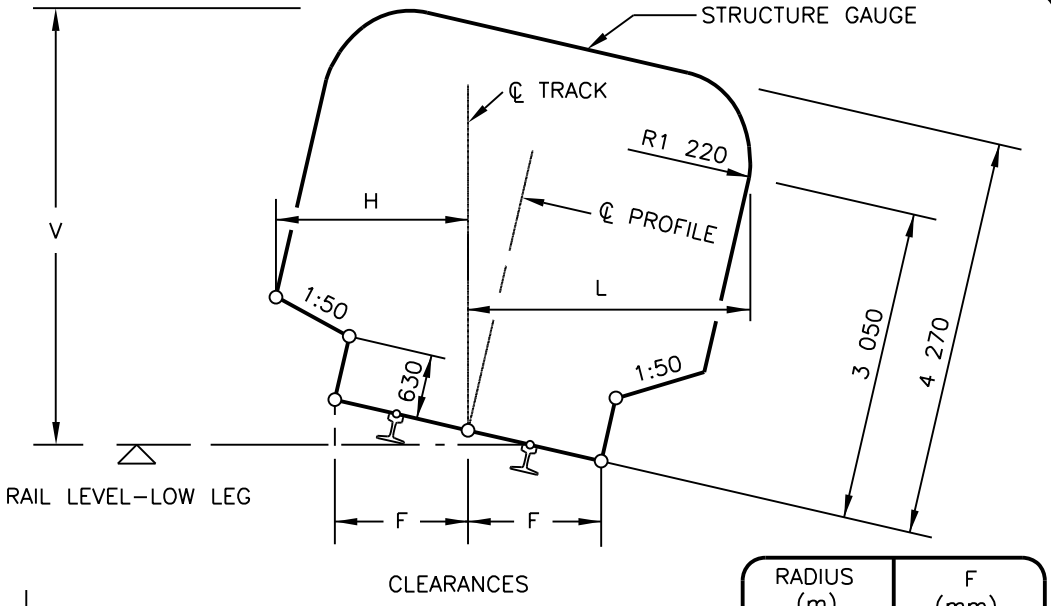
SPECIAL STRUCTURE GAUGE FOR TRUCK TIPPLER



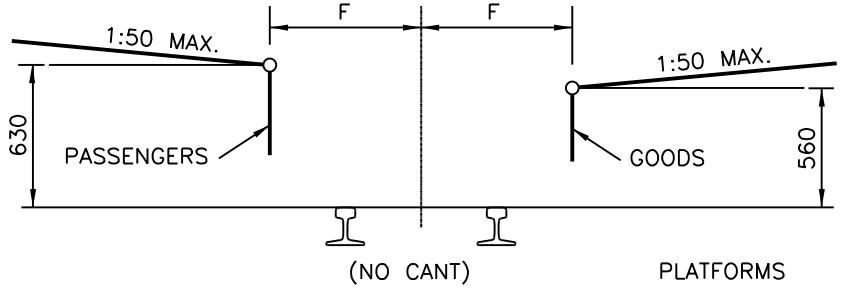
TRACK GAUGE 1 065mm

CLEARANCES : 610mm TRACK GAUGE

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



CLEARANCES



(NO CANT) PLATFORMS

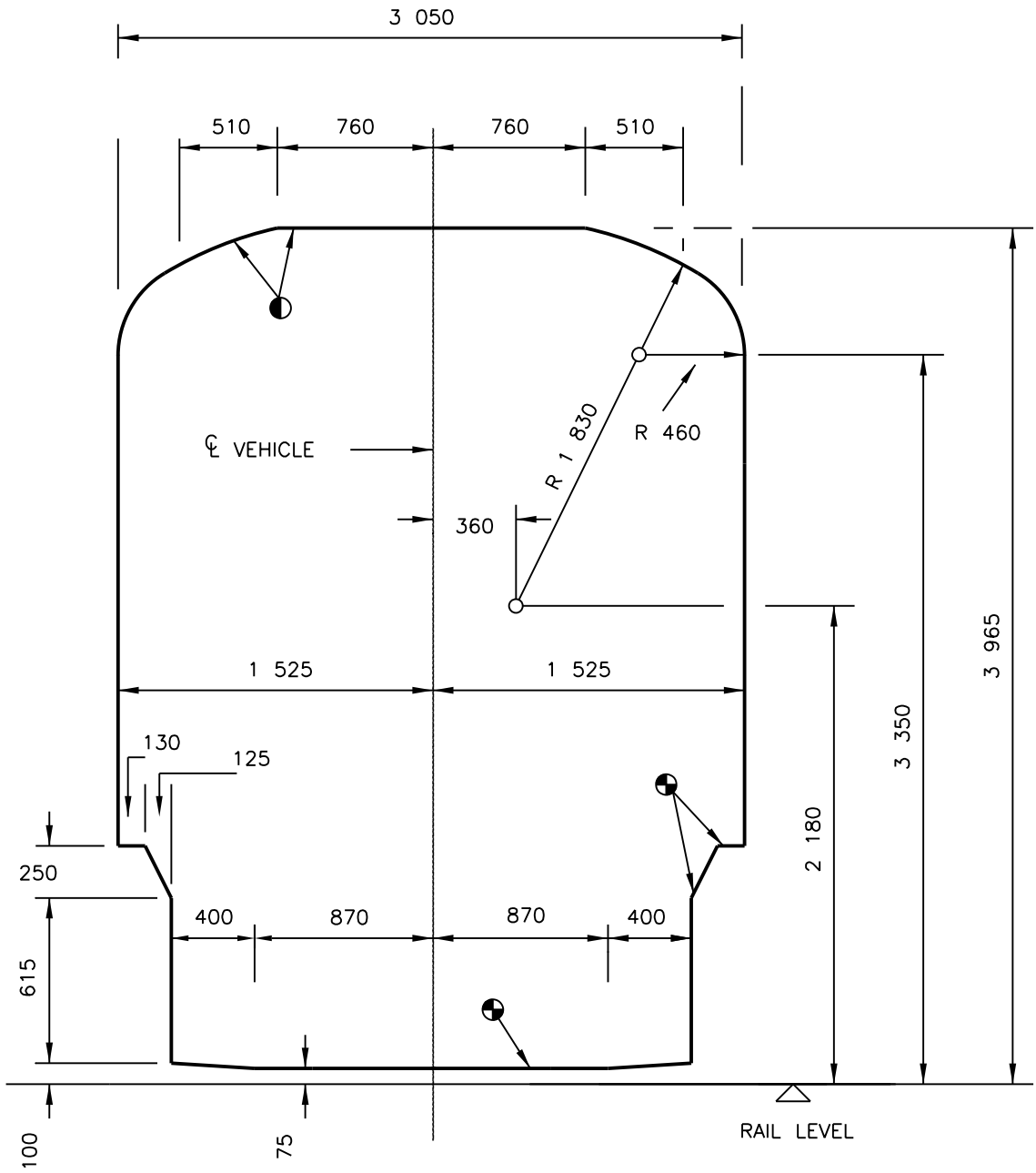
RADIUS (m)	F (mm)
50	1 550
60	1 510
80	1 460
100	1 430
120	1 410
140	1 390
170	1 380
200	1 370
250	1 360
300	1 350
600	1 330
1 000	1 320
>2 000	1 320
STRAIGHT	1 310

REMARKS:

1. H IS THE MINIMUM HORIZONTAL CLEARANCE ON THE OUTSIDE OF THE CURVE BASED ON MINIMUM CANT.
2. L IS THE MINIMUM HORIZONTAL CLEARANCE ON THE INSIDE OF THE CURVE BASED ON MAXIMUM CANT.
3. V IS THE MINIMUM VERTICAL CLEARANCE.
4. 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.
5. INTERMEDIATE VALUES MAY BE INTERPOLATED BY THE ENGINEER IN CHARGE.
6. ALSO REFER TO REMARKS 5, 6 AND 7 OF ANNEXURE 1 SHEET 2.
7. CLEARANCES ARE BASED ON 9 700mm BOGIE CENTRES AND 13 700mm VEHICLE BODY LENGTH.
8. SEE ANNEXURE 1 SHEET 3 FOR STRUCTURES ON PLATFORMS.

VEHICLE GAUGE :
1 065mm TRACK GAUGE

ANNEXURE 2
SHEET 1 of 2

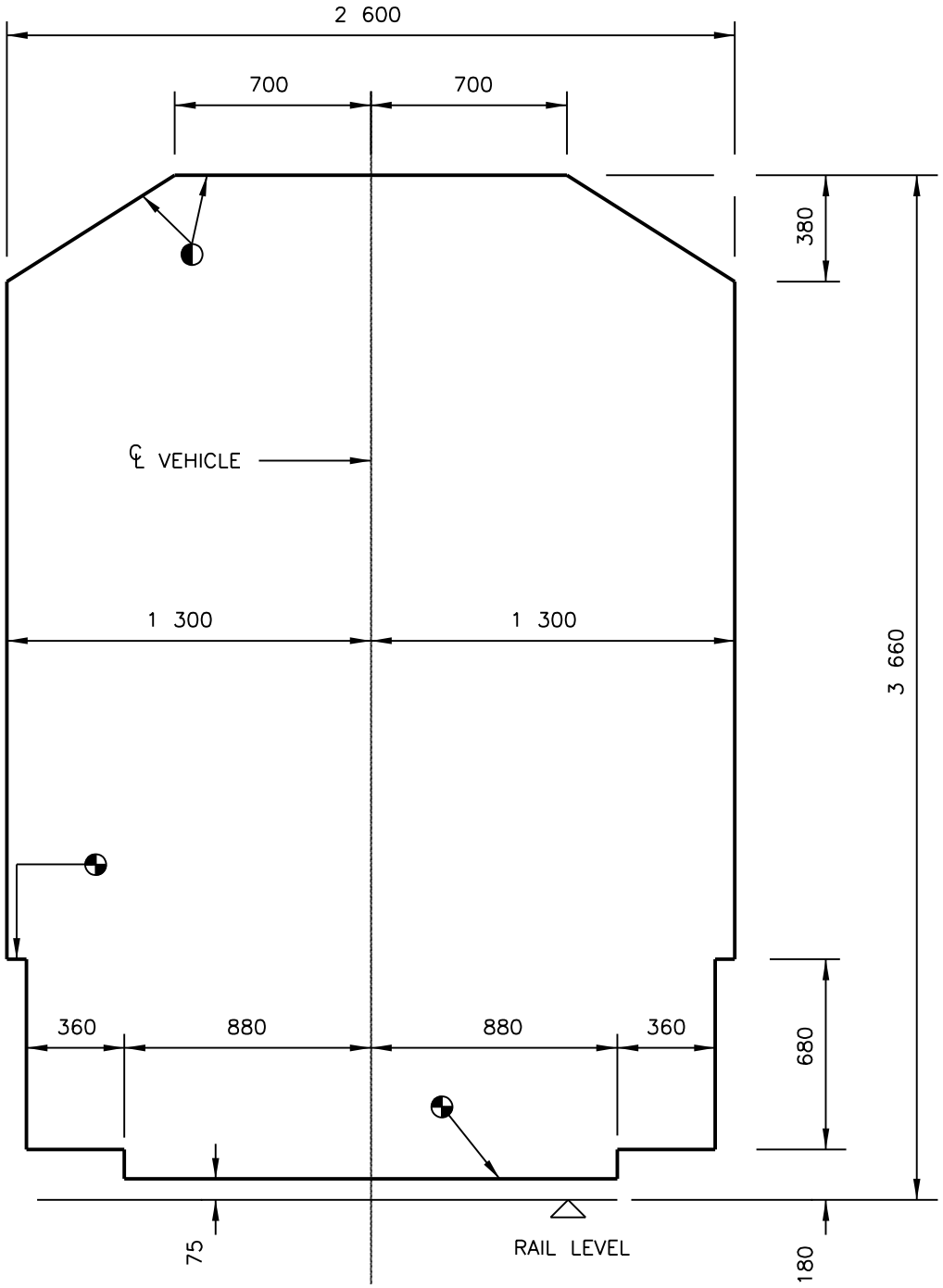


REMARKS:

1. ◐ 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.

VEHICLE GAUGE :
610mm TRACK GAUGE

ANNEXURE 2
SHEET 2 of 2



REMARKS:

1. ◐ 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.

CLASSIFICATION AND STANDARDS FOR RUNNING LINES : 1 065mm TRACK GAUGE

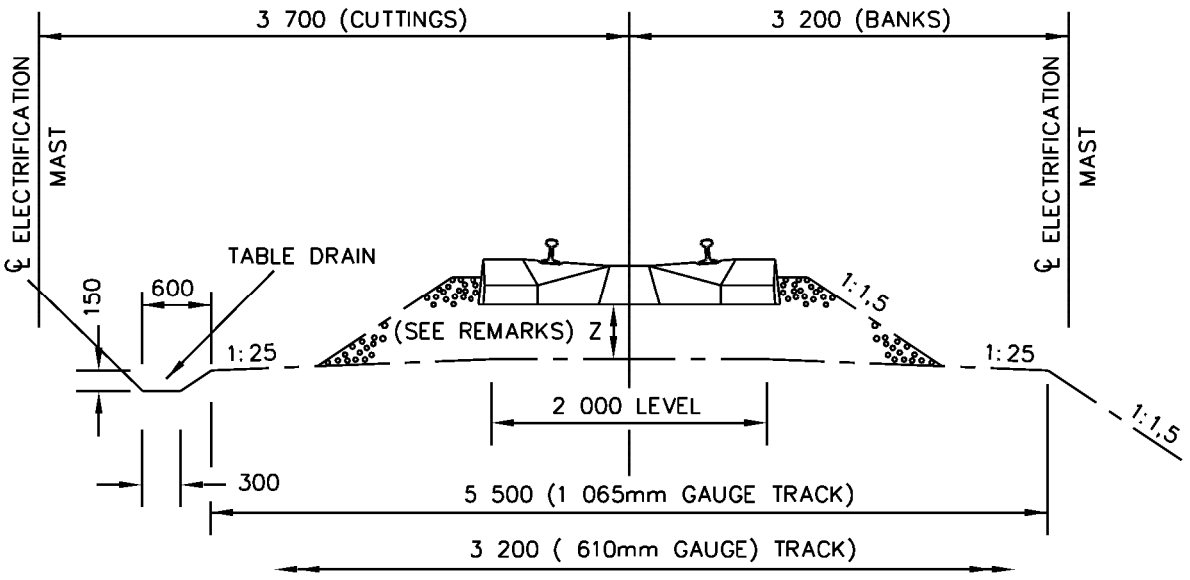
ANNEXURE 3
SHEET 1 of 1

CLASSIFICATION OF RUNNING LINES			TRACK STANDARDS FOR RUNNING LINES				
CLASS OF LINE	MAXIMUM AXLE LOAD (Ton)	GROSS TON PER YEAR (Million)	RAIL TYPE AND MASS	SLEEPER AND SPACING	BALLAST		
					DEPTH (mm)	QUANTITY (m^3 / km)	
						CONCRETE	WOOD / STEEL
S	26	–	60kg/m	FY/PY 650mm	300	1 600	–
N1	20	>15	57kg/m	FY/PY/ #700mm	280	1 500	–
N2	20	5–15	48kg/m	P2/F4 STEEL/WOOD 700mm	200	1 200	1 100
N3	–	<5	REQUIRES THE PRIOR APPROVAL OF THE CJIEF ENGINEER (INFRASTRUCTURE MAINTENANCE).				

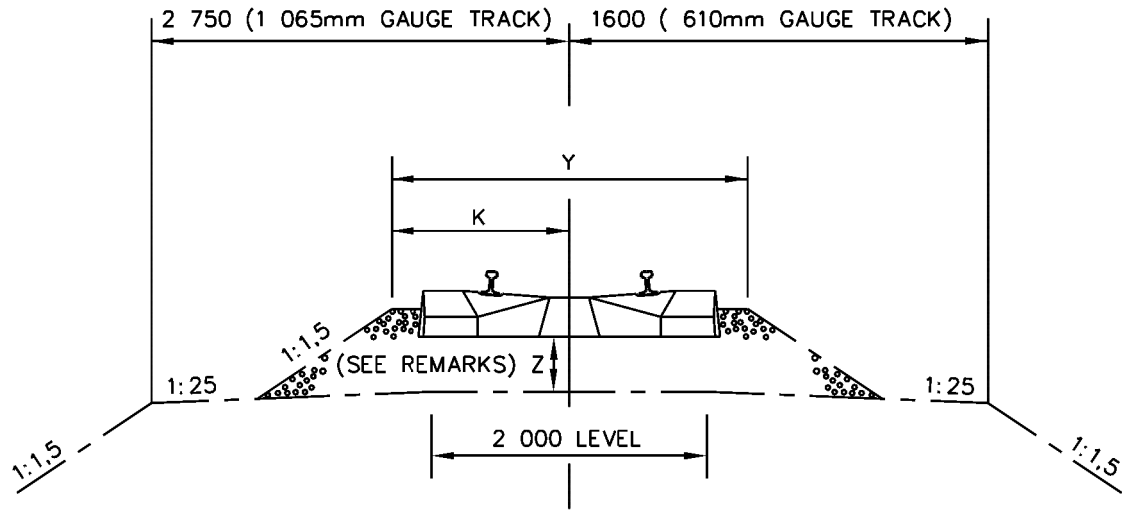
REMARKS:

1. ANY DEPARTURE FROM THESE STANDARDS REQUIRE THE APPROVAL OF THE CHIEF ENGINEER (INFRASTRUCTURE MAINTENANCE).
2. CLAUSES 6.2 AND 6.7, AS WELL AS ANNEXURES 4 AND 15 SHEET 2, MUST BE READ TOGETHER WITH THIS TABLE.
3. # P2, F4 AND WOODEN SLEEPERS ARE ALSO ACCEPTABLE. SEE ANNEXURE 4 SHEET 1 FOR BALLAST QUANTITY.

FORMATION AND BALLAST : MINIMUM REQUIREMENTS



CUTTINGS AND BANKS



BALLAST

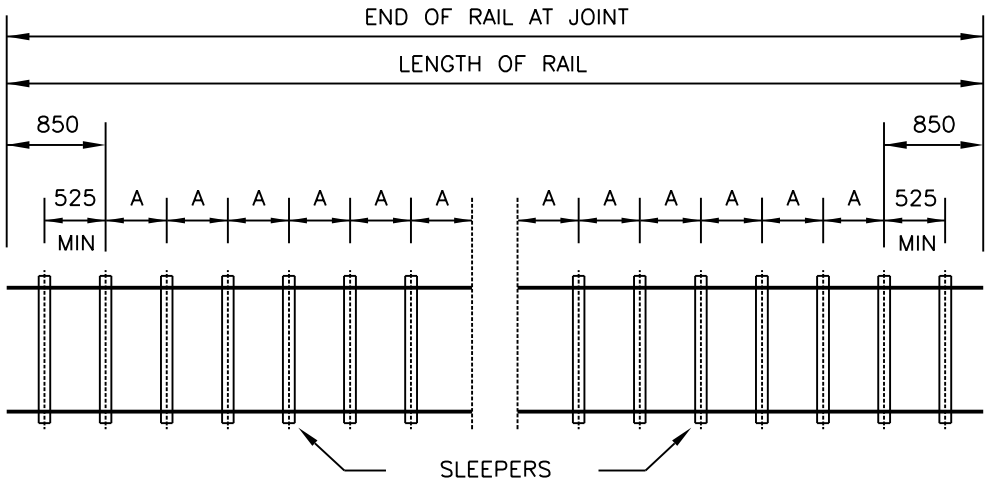
CLASS OF LINE	Z (mm)	Y (mm)	K (mm)	QUANTITY (m^3/km)		
				PY/FY	P2/F4	WOOD
S	300	2 800	1 400	1 600	–	–
N1	280	2 700	1 350	1 500	1 400	–
N2	200	2 700	1 350	–	1 200	1 100

REMARKS:

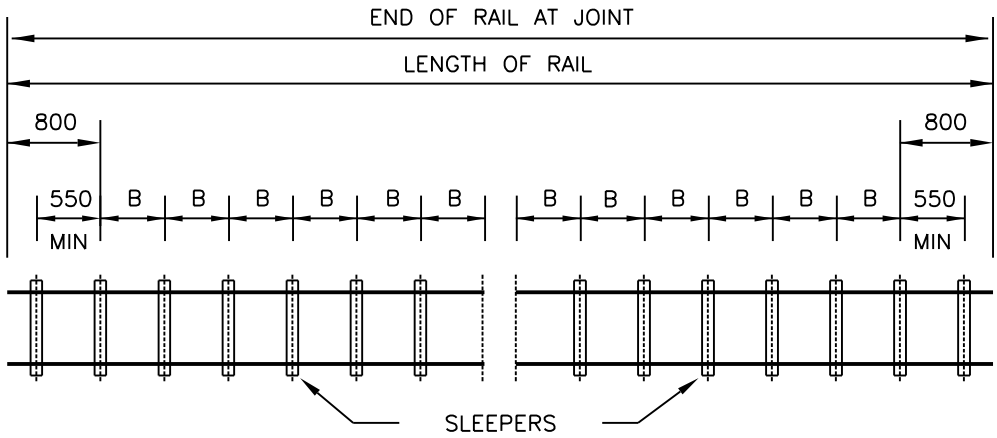
1. Z TO BE MEASURED UNDER THE LOW LEG RAIL ON CURVES.
2. DEPTH OF BALLAST (Z) ARE TO BE MEASURED IN THE CONSOLIDATED STATE, THAT IS AFTER 100 000 GROSS TON TRAIN TRAFFIC.
3. SEE CLAUSE 17.1.2

SLEEPER SPACING

ANNEXURE 5
SHEET 1 of 1



GAUGE 1 065mm

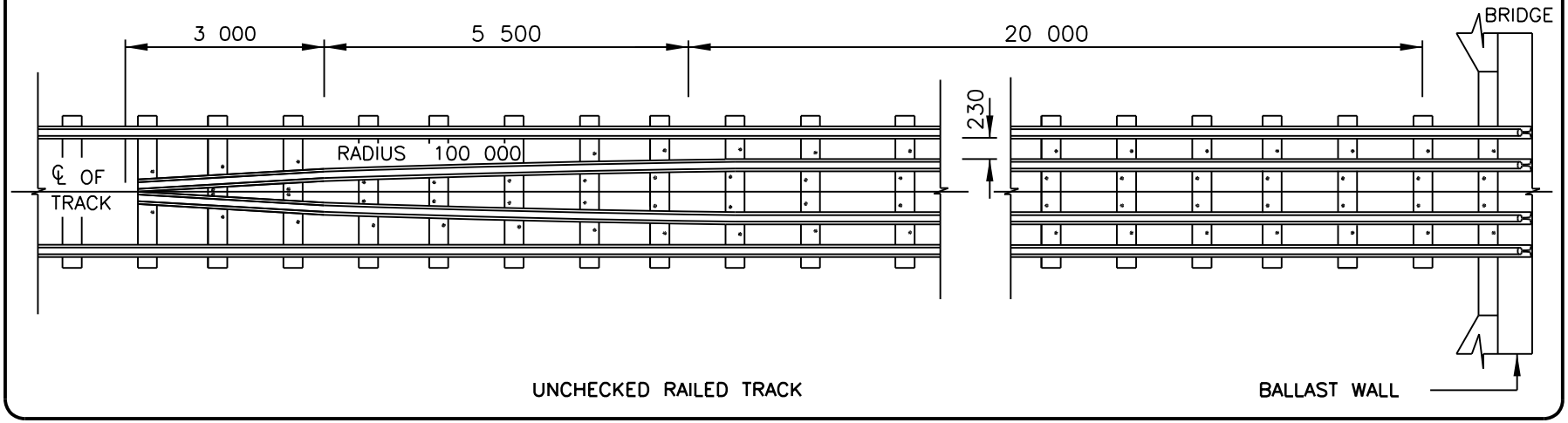


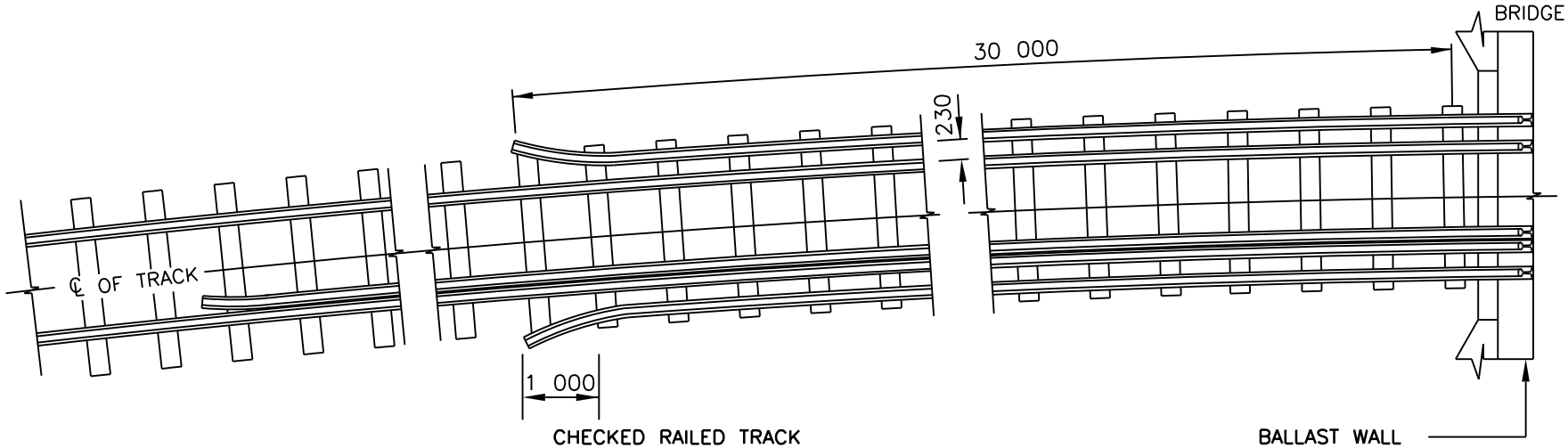
GAUGE 610mm

REMARKS:
1. DISTANCE FROM END OF RAIL TO SECOND SLEEPER SPACING IS FIXED.
2. SLEEPER SPACING FOR SAFETY BARS TO BE THE SAME AS FOR LOCK BARS.

LENGTH OF RAIL	NOMINAL SPACING					
	A = 650mm		A = 700mm		B = 800mm	
	SLEEPERS PER		SLEEPERS PER		SLEEPERS PER	
	RAIL	km	RAIL	km	RAIL	km
36m FOR 1 065mm GAUGE	56	1 555	52	1 444	–	–
CWR FOR 1 065mm GAUGE	–	1 539	–	1 429	–	–
12m FOR 610mm GAUGE	–	–	–	–	16	1 333

SAFETY RAILS FOR BRIDGES





REMARKS:

1. FOR MANUFACTURING DETAILS OF V–PIECE SEE DRAWING TYPE–E–7070.
2. SEE CLAUSE 3.5.3
3. READINGS ARE IN MM

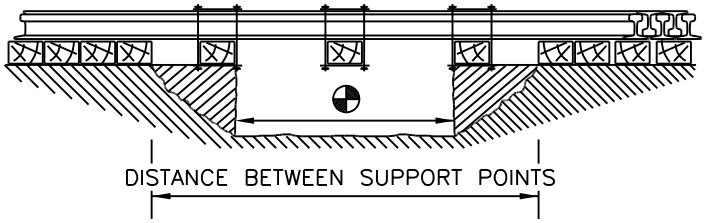
ANNEXURE 6
SHEET 1 of 1

BE 97–06 Sht 1 Version 1

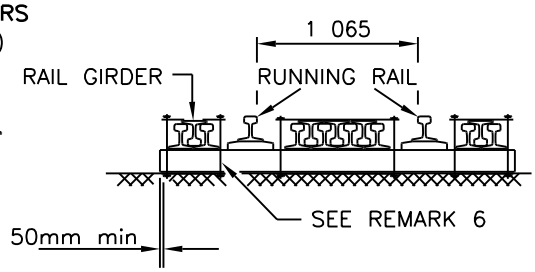
TEMPORARY TRACK SUPPORT : RAIL GIRDERS

ANNEXURE 7
SHEET 1 of 3

TOP RAIL GIRDERS
(SEE NOTE 1)

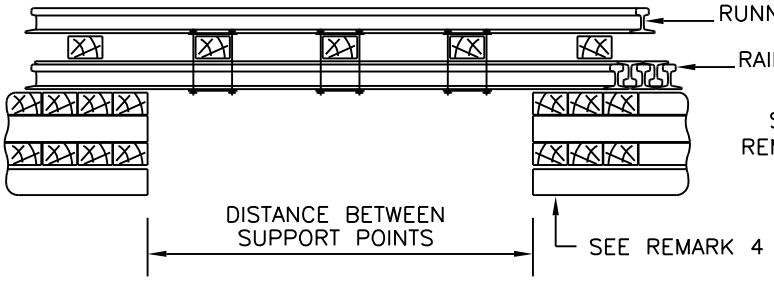


SIDE ELEVATION

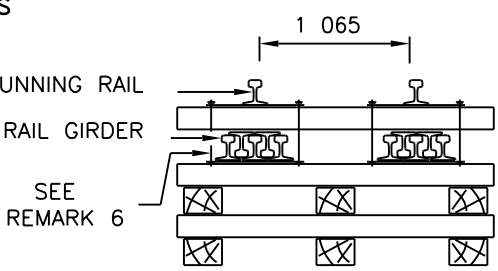


END ELEVATION

BOTTOM RAIL GIRDERS
(SEE NOTE 2)



SIDE ELEVATION



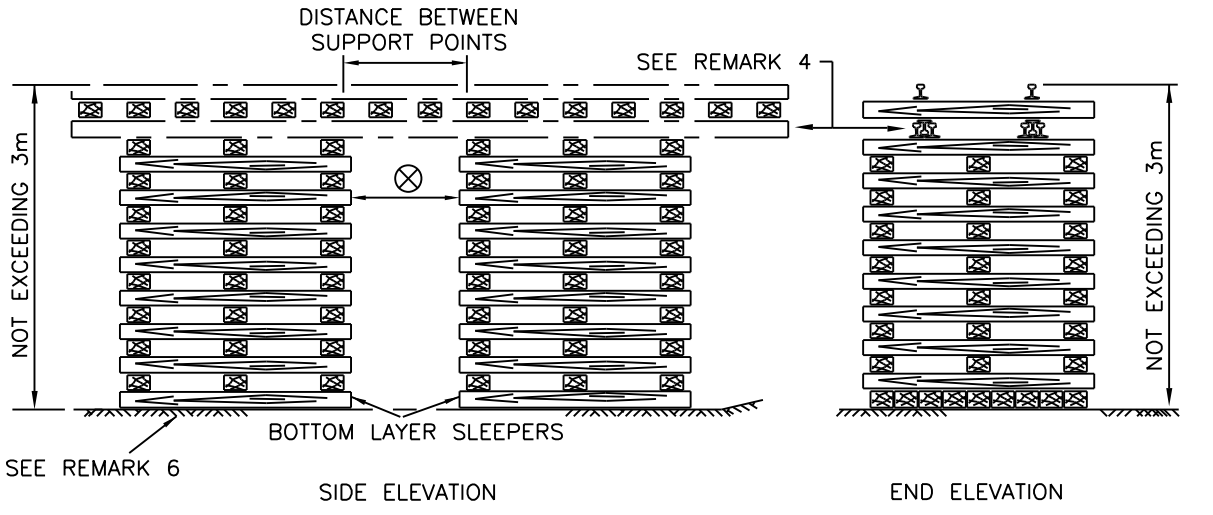
END ELEVATION

TOP RAIL GIRDERS				BOTTOM RAIL GIRDERS			
DISTANCE BETWEEN SUPPORT POINTS	RAIL GIRDER GROUPS			DISTANCE BETWEEN SUPPORT POINTS	RAIL GIRDER GROUPS		
	30–37kg	40–43kg	48kg		30–37kg	40–43kg	48kg
1,5m	3–5–3	3–5–3	3–5–3	1,5m	5–5	5–5	3–3
2,0m	3–7–3	3–5–3	3–5–3	2,0m	7–7	5–5	3–3
2,5m	5–9–5	3–7–3	3–5–3	2,5m	9–9	7–7	5–5
3,0m	–	5–9–5	3–7–3	3,0m	–	9–9	5–5
3,5m	–	7–9–7	3–7–3	3,5m	–	11–11	7–7
4,0m	–	–	5–9–5	4,0m	–	–	9–9
4,5m	–	–	7–9–7	4,5m	–	–	11–11

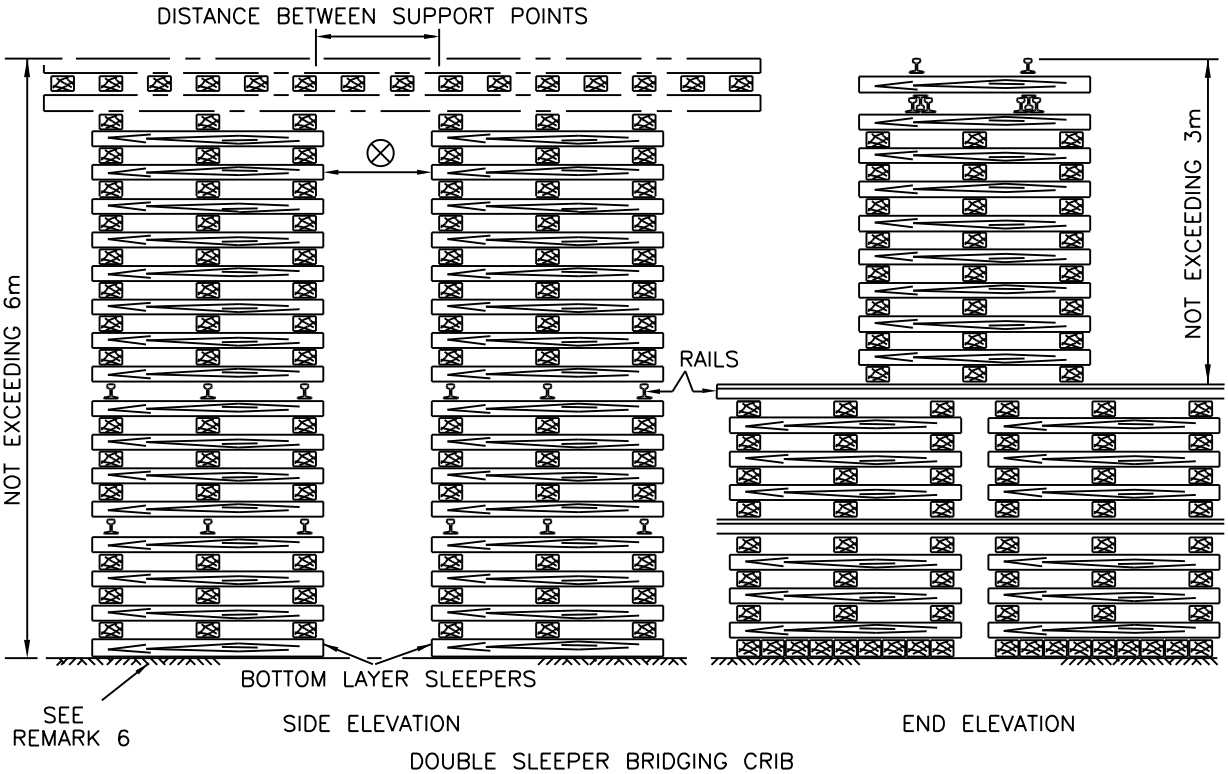
REMARKS:

1. READ IN CONJUNCTION WITH CLAUSE 3.6.
2. TEMPORARY TRACK SUPPORTS HAS TO BE APPROVED BY THE DEPOT ENGINEER. IN EACH CASE, THE SUPPORT POINTS HAS TO BE DESIGNED BY A PROFESSIONAL ENGINEER.
3. CHOOSE RAIL GIRDERS TO SUIT REQUIRED DISTANCE BETWEEN SUPPORT POINTS.
4. ONLY ONE TYPE OF RAIL TO BE USED IN RAIL GIRDER.
5. RAILS TO BE CLASS C, 12m OR LONGER WITHOUT WELDED JOINTS.
6. FOR CLAMPS SEE B.E. 7054/1 M.
7. ⊕ WIDTH OF EXCAVATION.
8. CLAMP EVERY SLEEPER ACROSS THE ENTIRE LENGTH OF THE RAIL GIRDER.
9. MIN. OF 4 SLEEPERS ARE REQUIRED TO BE USED AT SUPPORT POINTS.
10. NOT TO BE USED ON LINES CARRYING HEAVY LOADS.
11. PIPE JACKING MUST BE CONSIDERED AS AN ALTERNATIVE
12. TRACK MUST BE PROPER DESTRESSED BOTH LEGS

TEMPORARY TRACK SUPPORT : SLEEPER CRIBS



SINGLE SLEEPER BRIDGING CRIB

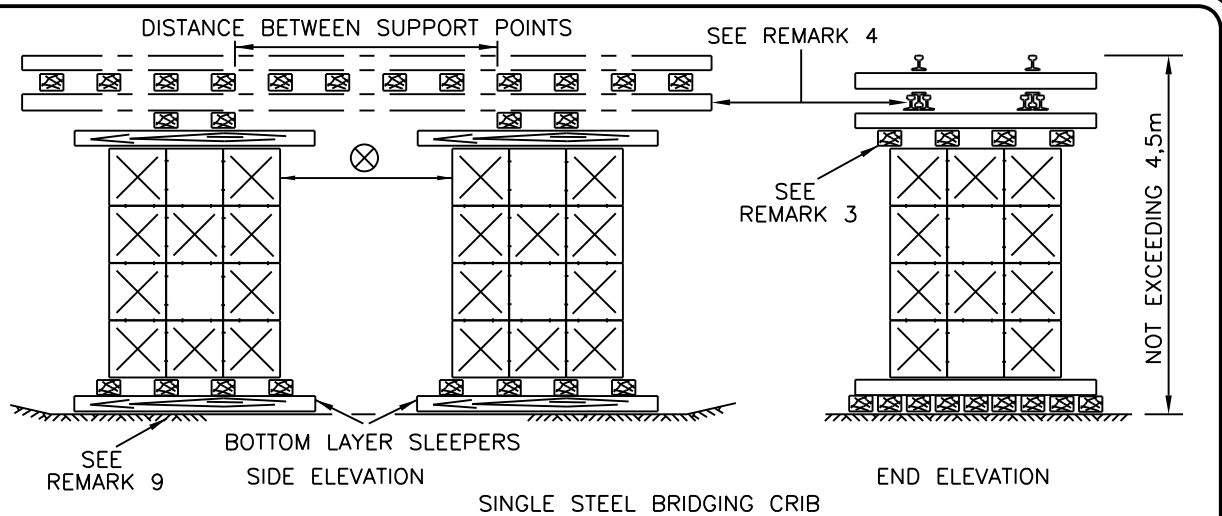


DOUBLE SLEEPER BRIDGING CRIB

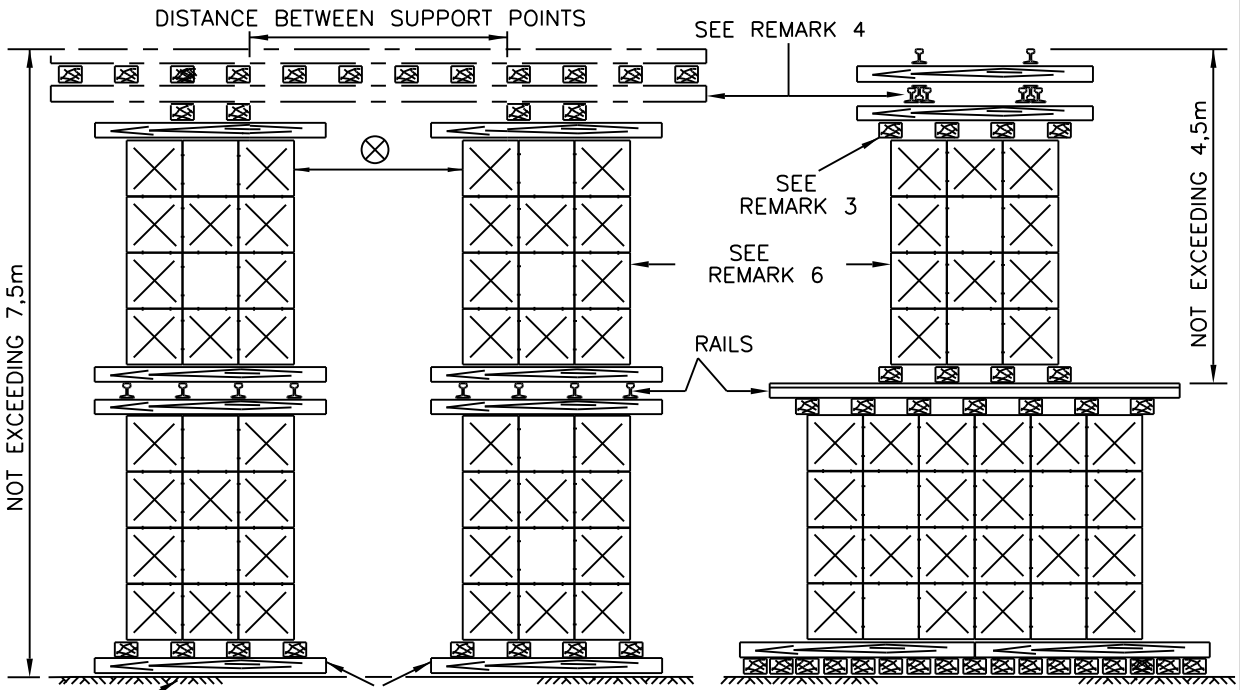
REMARKS:

1. READ IN CONJUNCTION WITH CLAUSE 3.6.
2. ⊗ DENOTES REQUIRED SPAN (SEE ANNEXURE 7 SHT 1).
3. NOT TO BE USED ON LINES CARRYING HEAVY LOADS.
4. FOR BOTTOM RAIL GIRDER SEE ANEXURE 7 SHT 1.
5. IN ALL CASES THE BOTTOM LAYER OF SLEEPERS MUST BE PLACED PARALLEL TO THE TRACK AND CLOSE LAID.
6. A QUALIFIED PROFESSIONAL ENGINEER MUST ENSURE THAT THE SUPERIMPOSED LOAD DOES NOT EXCEED THE BEARING PRESSURE OF THE GROUND.

TEMPORARY TRACK SUPPORT : BRIDGING CRIBS



SINGLE STEEL BRIDGING CRIB
(SEE NOTE 5)

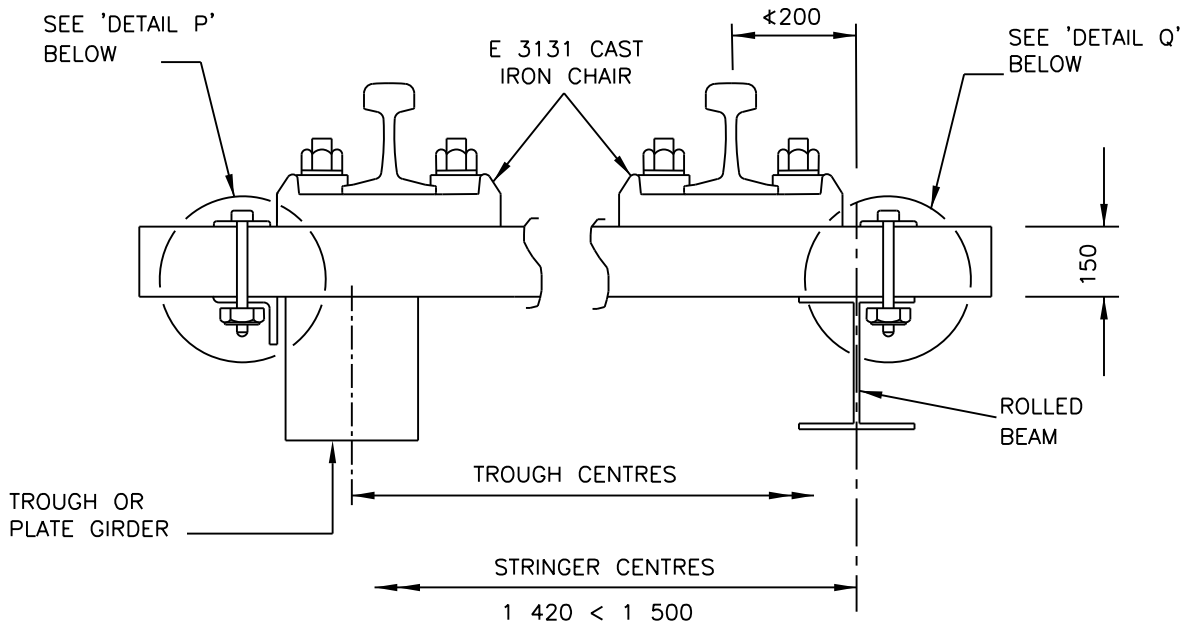


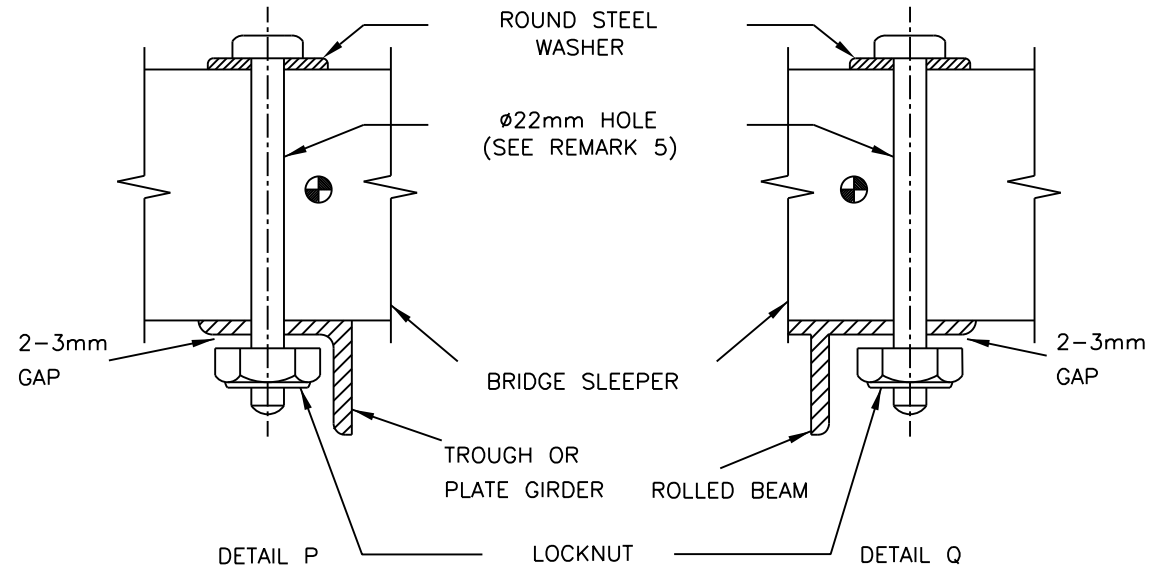
DOUBLE STEEL BRIDGING CRIB

REMARKS:

1. READ IN CONJUNCTION WITH CLAUSE 3.6.
2. IN ALL CASES THE BOTTOM LAYER OF SLEEPERS MUST BE PLACED PARALLEL TO THE TRACK AND CLOSE LAID.
3. SLEEPERS MUST BE PLACED AS SHOWN TO AVOID OVERSTRESSING THE CRIBS.
4. FOR BOTTOM RAIL GIRDER SEE ANEXURE 7 SHT 1.
5. ⊗ DENOTES REQUIRED SPAN. (DISTANCE BETWEEN SUPPORT POINTS MINUS 1 200mm).
6. FOR STEEL CRIBS SEE DRAWING BE 6115 M.
7. SLEEPERS OR SUITABLE TIMBERS.
8. NOT TO BE USED ON LINES CARRYING HEAVY LOADS.
9. A QUALIFIED PROFESSIONAL ENGINEER MUST ENSURE THAT THE SUPERIMPOSED LOAD DOES NOT EXCEED THE BEARING PRESSURE OF THE GROUND.

FASTENING OF HARDWOOD BRIDGE SLEEPERS

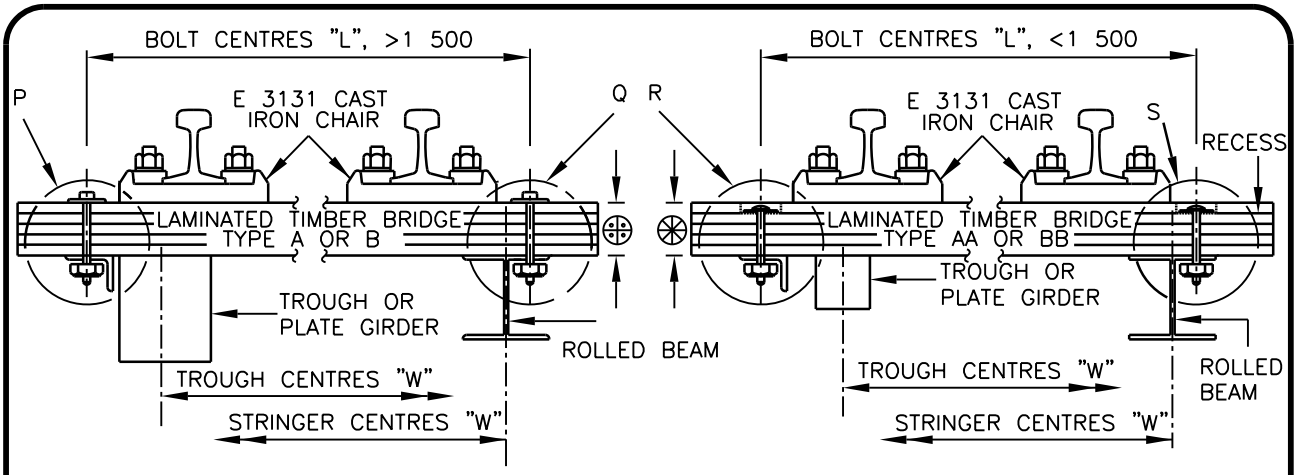


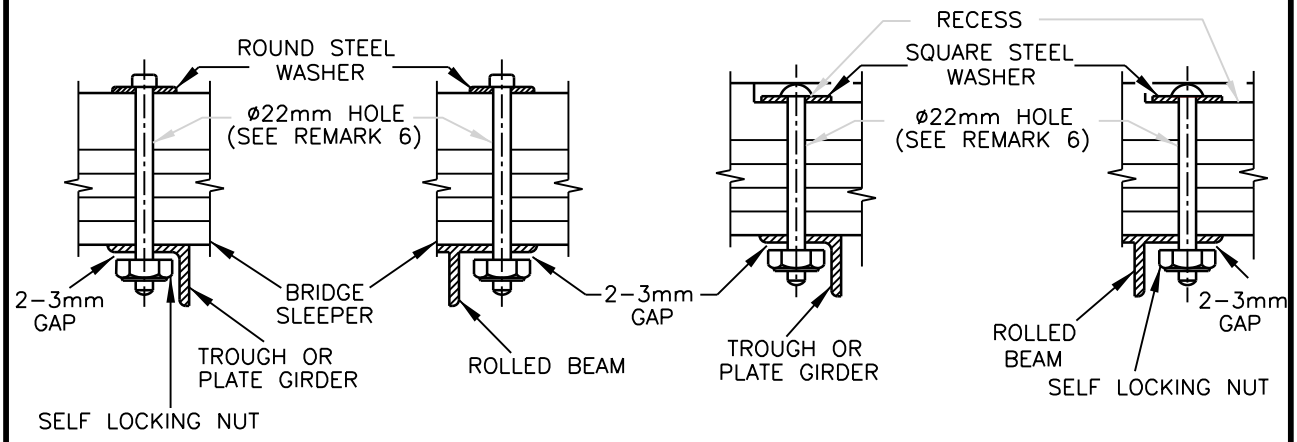


REMARKS:

1. SLEEPER BOLTS ARE INTENDED TO LOCATE THE SLEEPERS LATERALLY AND LONGITUDINALLY BUT NOT VERTICALLY. FOR THIS REASON NUTS SHOULD BE TIGHTENED SO AS TO PROVIDE A 2mm TO 3mm GAP WHICH WILL PERMIT VERTICAL MOVEMENT CAUSED BY THE FLEXING OF THE RAIL UNDER LOAD.
2. SEE CLAUSE 3.5.7.
3. ⊕ BOLT & NUT, M20 SQUARE HEAD, 230mm LONG WITH LOCKNUT ("NYLOCK OR CLEVELOCK").
4. PLACE BOLT WITH NUT AT THE BOTTOM.
5. USE THE DRILLING JIG FOR SLEEPERS ON STEEL BRIDGES. SEE ANNEXURE 8 SHEET 3 FOR DETAIL.

FASTENING OF LAMINATED TIMBER BRIDGE SLEEPERS





W	L	BRIDGE SLEEPER REQUIRED			STORES STOCK ITEM (SECTION 53)
		TYPE	SIZE	RECESS	
LESS THAN 1 200	MORE THAN 1 500	A	2 100x250x160	NO	911 691
	LESS THAN 1 500	AA		YES	911 706
MORE THAN 1 200	MORE THAN 1 500	B	2 100x250x190	NO	or 911 718 911 743
	LESS THAN 1 500	BB		YES	911 731

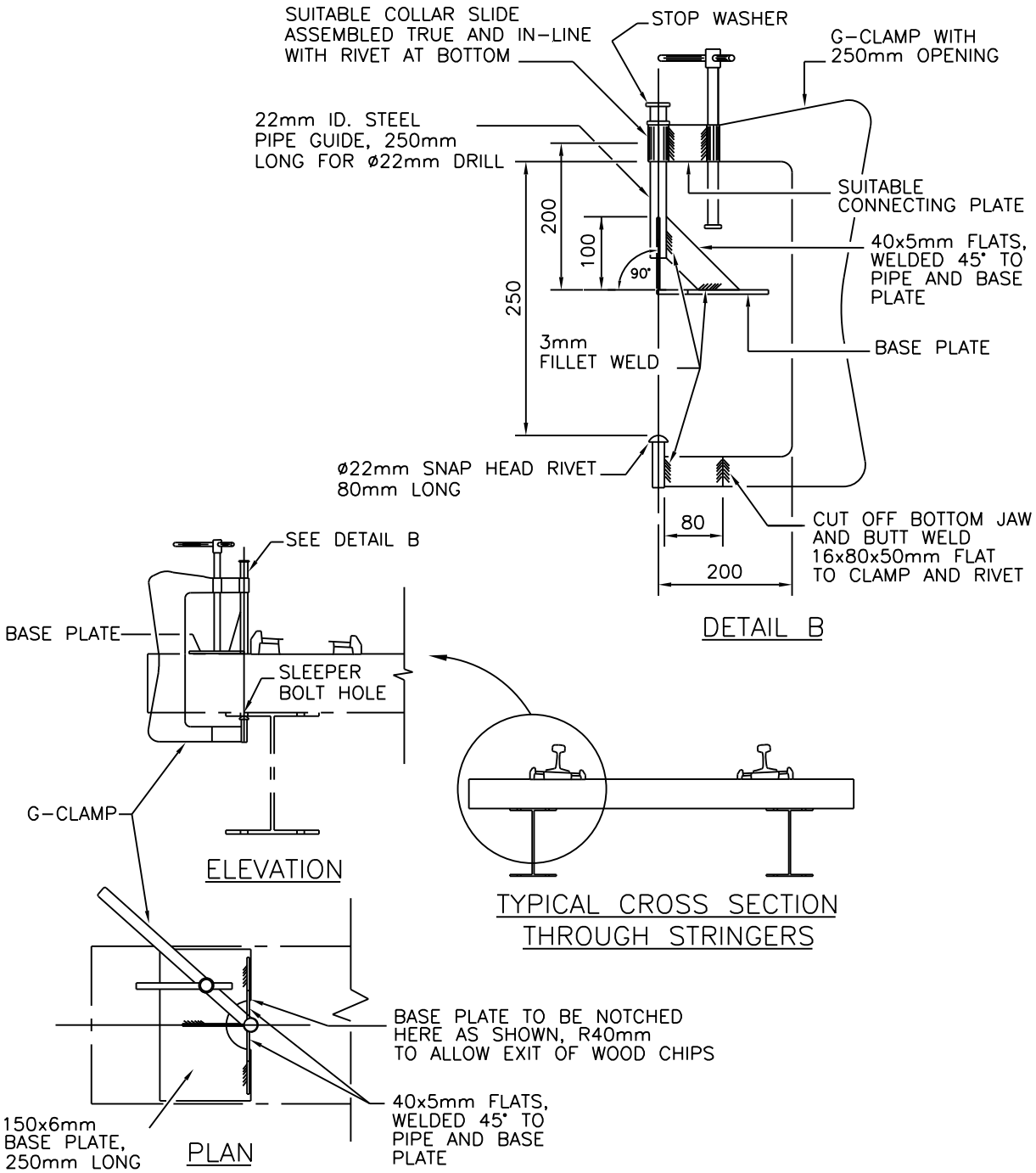
DESCRIPTION	SIZE mm	STORES STOCK ITEM (SECTION 53)
SQUARE STEEL WASHER	75 x 75 x 6	711 550
ROUND STEEL WASHER	OUTSIDE ø=52mm HOLE ø=26mm THICKNESS=5mm	711 776
SELF-LOCKING NUT	–	710 936
M20 SQUARE HEAD	230 LONG	214 831
	255 LONG	214 843
M20 CARRIAGE BOLT	200 LONG	212 249
	230 LONG	212 250

REMARKS:

1. SLEEPER BOLTS ARE INTENDED TO LOCATE THE SLEEPERS LATERALLY AND LONGITUDINALLY BUT NOT VERTICALLY. FOR THIS REASON NUTS SHOULD BE TIGHTENED SO AS TO PROVIDE A 2mm TO 3mm GAP WHICH WILL PERMIT VERTICAL MOVEMENT CAUSED BY THE FLEXING OF THE RAIL UNDER LOAD.
2. BOLT & NUT, M20 SQUARE HEAD, 230mm LONG FOR TYPE A AND 255mm LONG FOR TYPE B LAMINATED SLEEPERS.
3. M20 CUP HEAD (ROUND HEAD) CARRIAGE BOLT, 200mm LONG FOR TYPE AA AND 230mm LONG FOR TYPE BB LAMINATED SLEEPERS.
4. ⊕ 160 (TYPE A) AND 190 (TYPE B).
5. ⊛ 160 (TYPE AA) AND 190 (TYPE BB).
6. USE THE DRILLING JIG FOR SLEEPERS ON STEEL BRIDGES. SEE ANNEXURE 8 SHEET 3 FOR DETAIL.
7. IF ??? RAILS ARE USED ON THE OUTSIDE OF THE RUNNING RAIL, 2,4m SLEEPERS MUST BE USED.

FASTENING OF BRIDGE SLEEPERS : DRILLING JIG FOR SLEEPERS ON STEEL BRIDGES

ANNEXURE 8
SHEET 3 of 3

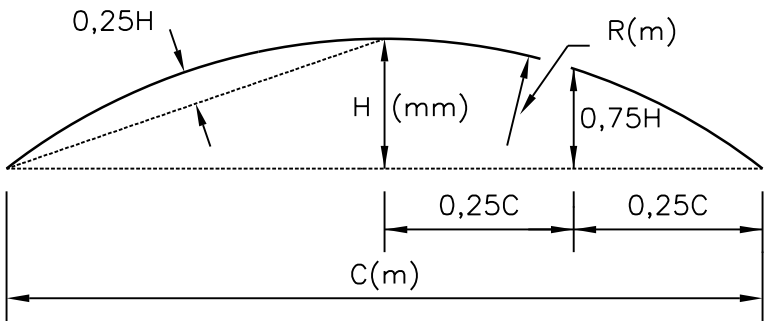


PROCEDURE:

1. REMOVE RAILS AND OLD SLEEPERS.
2. PLACE NEW SLEEPERS IN POSITION.
3. FASTEN E-3131 CHAIRS TO SLEEPERS IN CORRECT POSITIONS.
4. FASTEN RAILS TO CHAIRS.
5. ALIGN TRACK.
6. CLAMP JIG TO SLEEPER WITH THE SNAP HEAD RIVET LOCATING IN THE HOLE IN THE BOTTOM OF THE STRINGER.
7. DRILL HOLE WITH A SPECIAL ø22mm X 500mm LONG DRILL BIT (SOMTA CODE 2592200) FROM THE TOP THROUGH THE COLLAR SLIDE.
8. REMOVE JIG AND FASTEN SLEEPER BOLT.

CURVE OFFSETS

ANNEXURE 9
SHEET 1 of 4



$$H = \frac{125 \times C \times C}{R}$$

$$H = \frac{125C^2}{R}$$

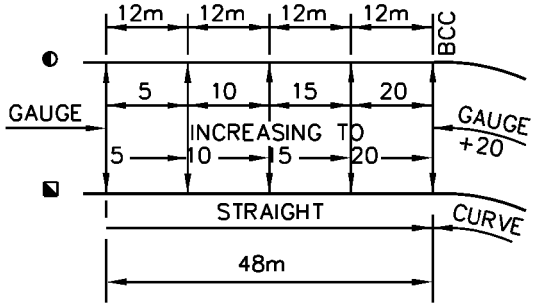
REMARK: DIMENSION H TO NEAREST 5mm (USE FORMULA IF MORE ACCURACY IS REQUIRED.)

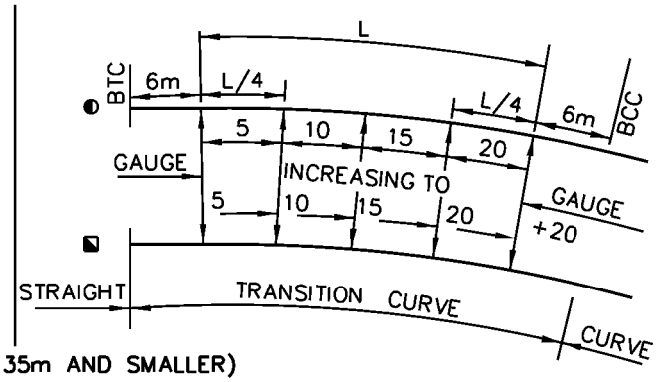
RADIUS (m)	MIDDLE OFFSETS H(mm)							
	CHORDS C(m)							
	6		10		20		12,192	
	H	0,75H	H	0,75H	H	0,75H	H	0,75H
50	90	70	250	190	1 000	750	370	280
55	80	60	230	170	910	680	340	255
60	75	55	210	155	835	625	310	230
70	65	50	180	135	715	535	265	200
80	55	40	155	115	625	470	230	175
90	50	40	140	105	555	415	205	155
100	45	35	125	95	500	375	185	140
110	40	30	115	85	455	340	170	125
120	40	30	105	80	415	315	155	115
130	35	25	95	70	385	290	145	105
140	30	25	90	65	355	270	135	100
150	30	25	85	65	335	250	125	95
175	25	20	70	55	285	215	105	80
200	25	15	65	45	250	190	95	70
225	20	15	55	40	220	165	85	60
250	20	15	50	40	200	150	75	55
275	15	10	45	35	180	135	70	50
300	15	10	40	30	165	125	60	45
350	15	10	35	25	145	105	55	40
400	10	10	30	25	125	95	45	35
450	10	10	30	20	110	85	40	30
500	10	5	25	20	100	75	40	30
600	10	5	20	15	85	65	30	25
700	5	5	20	15	70	55	30	20
800	5	5	15	10	65	45	25	15
900	5	5	15	10	55	40	20	15
1 000	5	5	15	10	50	40	20	15
1 200	5	5	10	10	40	30	15	10
1 500	5	0	10	5	35	25	10	10
2 000	0	0	5	5	25	20	10	5
3 000	0	0	5	5	15	15	5	5

CURVES : GAUGE ADJUSTMENT

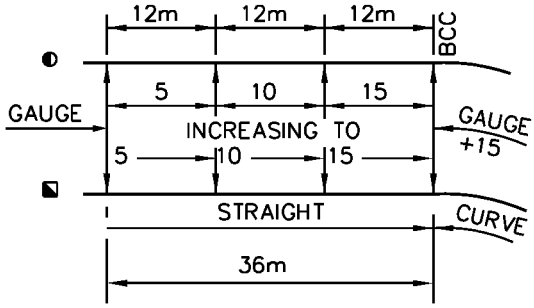
WITHOUT TRANSITION CURVES

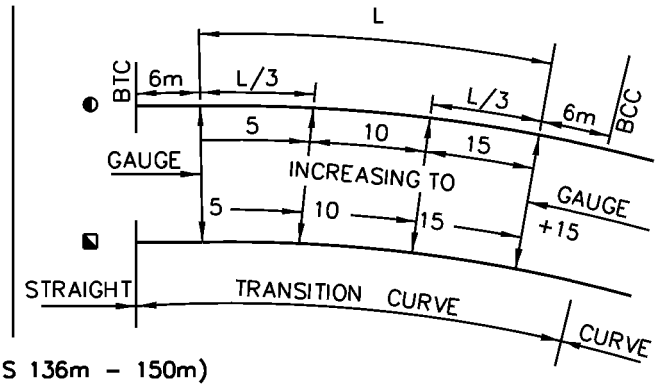
WITH TRANSITION CURVES



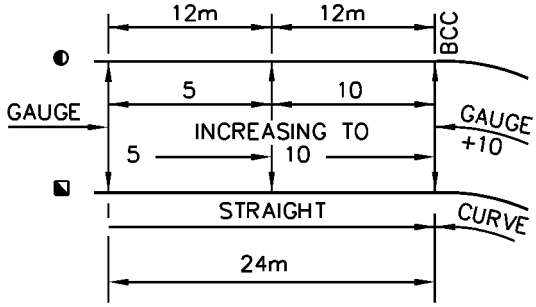


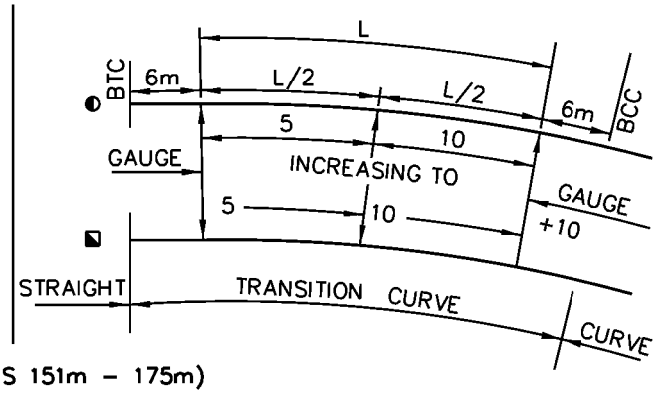
20mm (RADIUS 135m AND SMALLER)



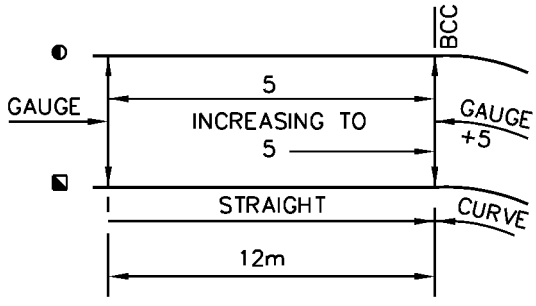


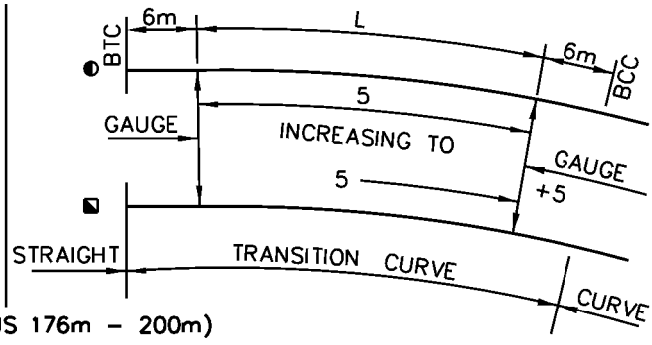
15mm (RADIUS 136m – 150m)





10mm (RADIUS 151m – 175m)





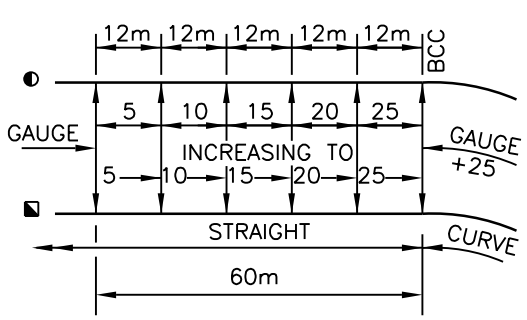
5mm (RADIUS 176m – 200m)

REMARKS:

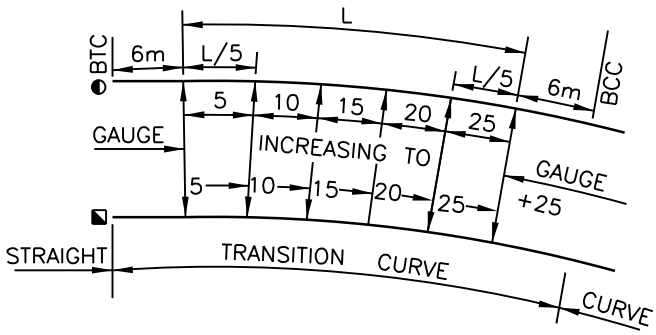
1. FOR REMARKS SEE ANNEXURE 9 SHEET 3.

CURVES : GAUGE ADJUSTMENT, SIDE WEAR AND TEMPORARY TAPERED END PIECE

WITHOUT TRANSITION CURVES



WITH TRANSITION CURVES



25mm

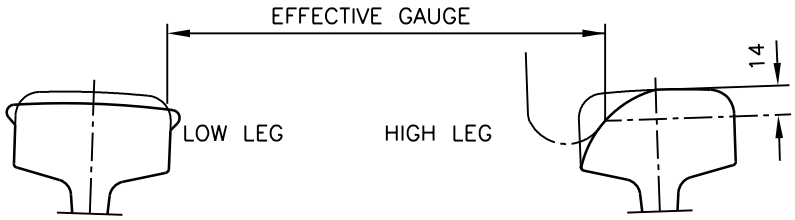
REMARKS:

1. ◐ GAUGE ADJUSTMENT FOR STEEL AND CONCRETE SLEEPERS. FOR LIMITATIONS SEE ANNEXURE 11 SHEETS 1 TO 3.
2. ◪ GAUGE ADJUSTMENT FOR WOODEN SLEEPERS. FOR LIMITATIONS SEE ANNEXURE 11 SHEET 4.

BTC INDICATES BEGINNING OF TRANSITION CURVE
BCC INDICATES BEGINNING OF CIRCULAR CURVE

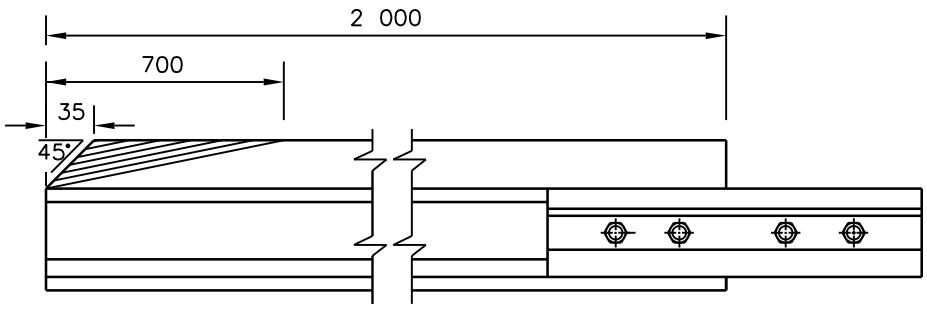
MEASURING GAUGE ON SIDE-WORN RAILS

1. WHEN THE LOW LEG IS SIDEWORN, THE POINT TO MEASURE FROM IS THE SAME AS IN THE CASE OF THE HIGH LEG.
2. CHECK RAILS SHALL BE NOT LOWER THAN CLASS B. IN YARDS CLASS C IS PERMITTED.

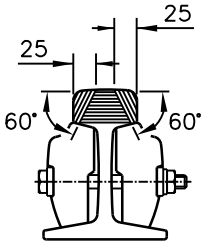


TEMPORARY TAPERED END PIECE

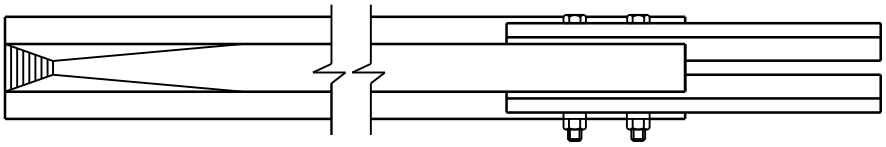
NO TRAIN SHALL BE PERMITTED THROUGH A CURVE WHILE ONLY A PORTION OF THE CHECK RAIL IS IN POSITION, UNLESS A TEMPORARY TAPERED END PIECE IS BOLTED TO THE LOOSE FISHPLATED END OF THE REMAINING CHECK RAIL.



FRONT ELEVATION



END ELEVATION



PLAN

SUPERELEVATION AND MAXIMUM PERMISSIBLE SPEED ON CURVES

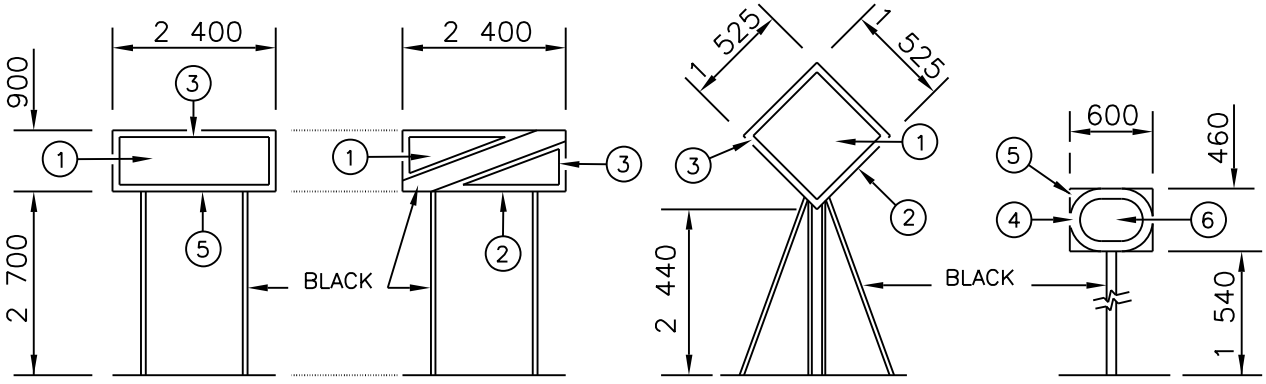
TRACK GAUGE (mm)	1 065																610	
MAXIMUM SPEED (km/h)	160		100		90		80		60		50		40		30		40	
RADIUS OF CURVE (m)	ⓘ	⊟	ⓘ	⊟	ⓘ	⊟	ⓘ	⊟	ⓘ	⊟	ⓘ	⊟	ⓘ	⊟	ⓘ	⊟	ⓘ	⊟
50 – 90	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	15	20
60 – 89	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	15	20
90 – 99	40	100	35	100	35	100	35	100	35	90	30	70	30	60	30	30	20	20
100 – 109	40	100	35	100	35	100	35	100	35	90	30	70	30	60	30	30	20	20
110 – 119	50	90	35	90	35	90	35	90	35	90	30	60	30	60	30	30	20	20
120 – 139	50	90	40	90	40	90	40	90	40	80	30	60	30	60	30	30	20	20
140 – 159	50	90	40	90	40	90	40	80	40	80	40	60	40	60	30	30	20	20
160 – 179	50	80	40	80	40	80	40	80	40	70	40	60	40	50	30	30	25	15
180 – 199	60	80	50	80	50	80	40	70	40	70	40	50	40	50	30	30	25	15
200 – 219	60	80	50	80	50	80	50	70	50	70	40	50	40	40	30	30	30	15
220 – 239	60	80	50	80	50	80	50	70	50	70	50	50	40	40	30	30	30	15
240 – 269	70	70	50	70	50	70	50	70	50	60	50	50	40	30	30	30	30	15
270 – 299	70	70	60	70	60	70	50	60	50	60	50	40	40	30	30	20	35	15
300 – 349	70	70	60	70	60	70	60	60	60	60	50	40	40	30	30	20	35	15
350 – 399	80	60	60	60	60	60	60	60	60	50	50	30	40	20	30	20	40	15
400 – 449	80	60	70	60	70	60	70	60	60	40	50	20	40	20	30	10	40	10
450 – 499	90	60	70	60	70	60	70	50	60	40	50	20	40	20	30	10	40	10
500 – 549	90	60	80	60	80	60	70	50	60	30	50	10	40	20	30	10	40	5
550 – 599	100	50	80	50	80	50	80	50	60	30	50	10	40	20	30	10	40	5
600 – 699	100	50	80	50	80	50	80	50	60	30	50	10	40	10	30	10	40	0
700 – 799	100	50	90	50	90	50	80	40	60	20	50	10	40	10	30	10	40	0
800 – 849	110	40	90	40	90	40	80	40	60	20	50	10	40	10	30	10	40	0
850 – 899	120	40	100	40	90	40	80	40	60	20	50	10	40	10	30	0	40	0
900 – 999	120	40	100	40	90	40	80	30	60	20	50	10	40	10	30	0	40	0
1000 – 1199	130	40	100	40	90	40	80	30	60	20	50	10	40	10	30	0	40	0
1200 – 1499	140	30	100	30	90	30	80	20	60	10	50	10	40	10	30	0	40	0
1500 – 1699	150	20	100	20	90	20	80	20	60	10	50	0	40	0	30	0	40	0
1700 – 1999	160	20	100	20	90	20	80	20	60	10	50	0	40	0	30	0	40	0
2000 – 2999	160	10	100	10	90	10	80	10	60	10	50	0	40	0	30	0	40	0
3000 – – –	160	0	100	0	90	0	80	0	60	0	50	0	40	0	30	0	40	0

REMARKS:

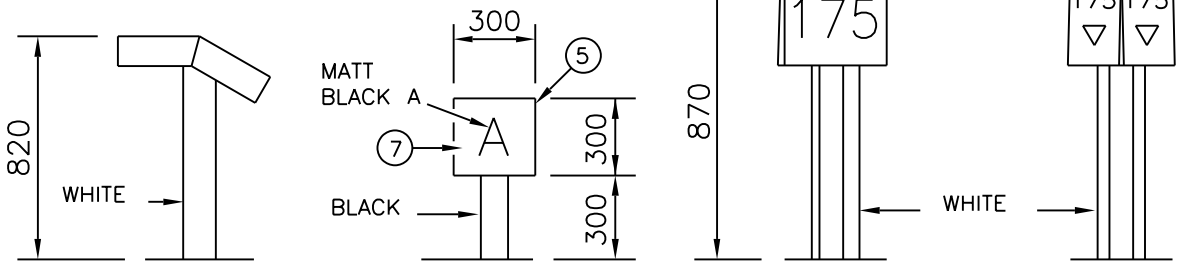
1. NEW LINES MUST NOT BE BUILT FOR MAXIMUM SPEEDS OF 90 AND 50km/h. THIS INFORMATION IS INCLUDED FOR EXISTING LINES WHERE THESE MAXIMUM SPEEDS ARE AT PRESENT IN OPERATION.
2. CANT FOR EACH CURVE IN TUNNELS WILL BE DETERMINED SEPARATELY BY THE ENGINEER IN CHARGE OF TRACK MAINTENANCE.
3. FOR 160km/h SECTIONS, 2 SPEED BOARDS MUST BE ERECTED. THE NORMAL YELLOW BOARD AND A BLUE BOARD WITH WHITE FIGURES DIRECTLY BELOW THE YELLOW BOARD.
4. ⓘ DENOTES SPEED IN km/h.
5. ⊟ DENOTES CANT IN mm.
6. READ TOGETHER WITH SUB–CLAUSE 9.3.4.
7. FOR A SPEED OF 15 km/h (1 065mm GAUGE) HALF THE CANT OF 30 km/h MUST BE USED.

TRACK SIGN BOARDS : PERMANENT

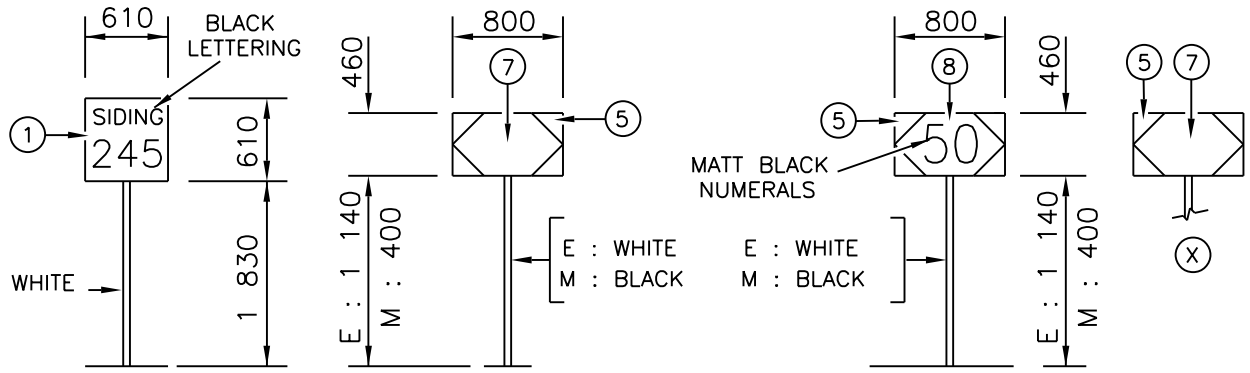
ANNEXURE 10
SHEET 1 of 4



WARNING BOARD | DISTANCE BOARD FOR C.T.C. | WATERING BOARD | WHISTLE BOARD



GRADE POST | APPARATUS INDICATION BOARD (MAY ALSO BE ROUND IN SHAPE) | KILOMETRE POSTS



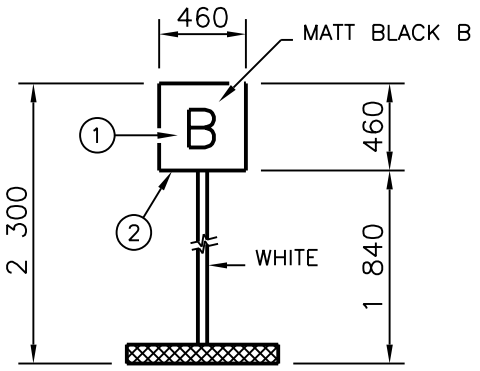
PRIVATE SIDING BOARD | SPEED DE-RESTRICTION BOARD | SPEED RESTRICTION AND DE-RESTRICTION BOARD

REMARKS:

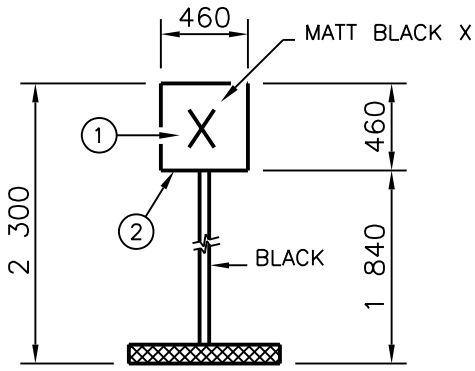
1. (1) WHITE.
2. (2) REVERSE SIDE – BLACK.
3. (3) REFLECTIVE WHITE BORDER OF 100mm.
4. (4) REFLECTIVE WHITE BORDER OF 75mm.
5. (5) DOVE GREY CHROMADEK REVERSE SIDE.
6. (6) PIGMENTED WHITE. (REFLECTED WHITE)
7. (7) REFLECTIVE WHITE.
8. (8) REFLECTIVE YELLOW.
9. (X) DE-RESTRICTION ON REVERSE SIDE.
10. E : SINGLE LINES.
11. M : MULTIPLE LINES.
12. FOR FURTHER DETAILS SEE DRAWING D-184 SHEETS 2 AND 4 AND D-176 SHEETS 2, 3 AND 5.

TRACK SIGN BOARDS : TEMPORARY

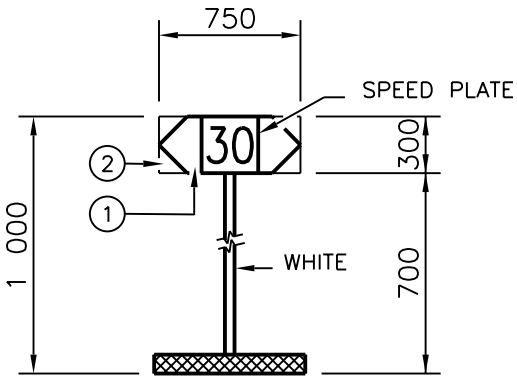
ANNEXURE 10
SHEET 2 of 4



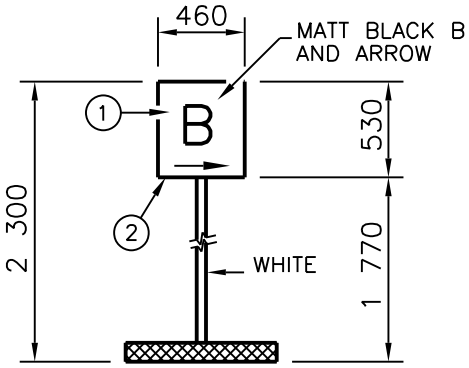
TAMPING MACHINE WARNING BOARD



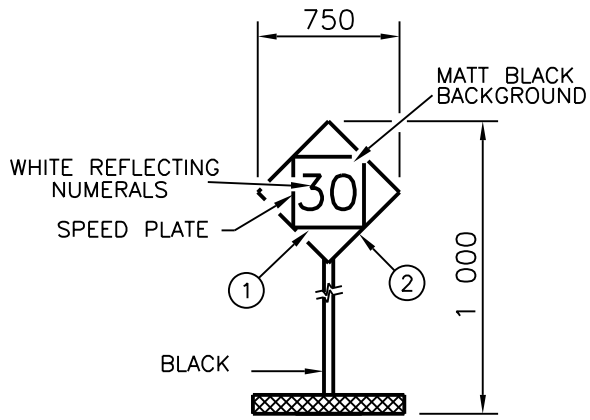
TAMPING MACHINE X BOARD
(SEE REMARK 5)



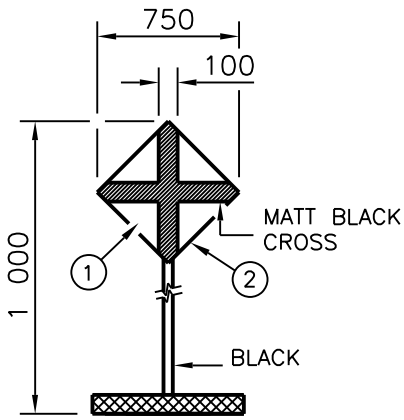
SPEED REDUCTION BOARD
(SEE REMARKS 6 & 8)



TAMPING MACHINE INDICATION BOARD
(SEE REMARK 7)



BEGINNING OF DANGER ZONE
(SEE REMARKS 6 & 8)

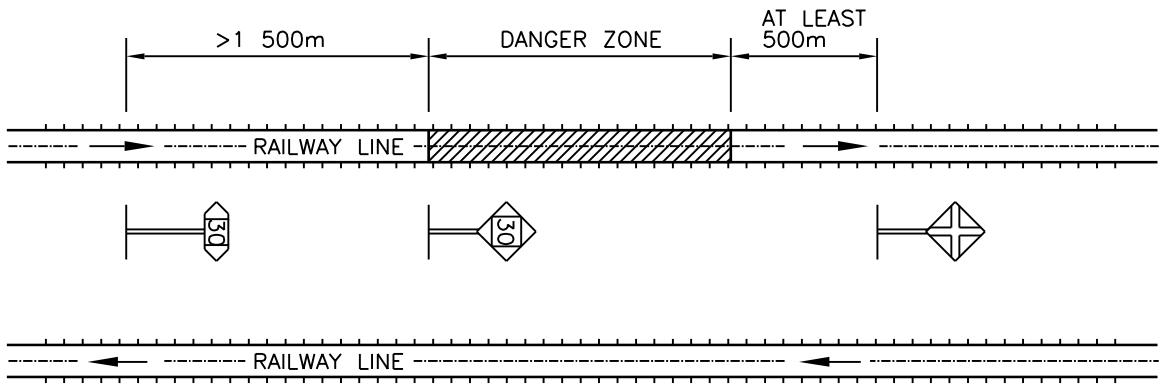


END OF DANGER ZONE
(SEE REMARK 6)

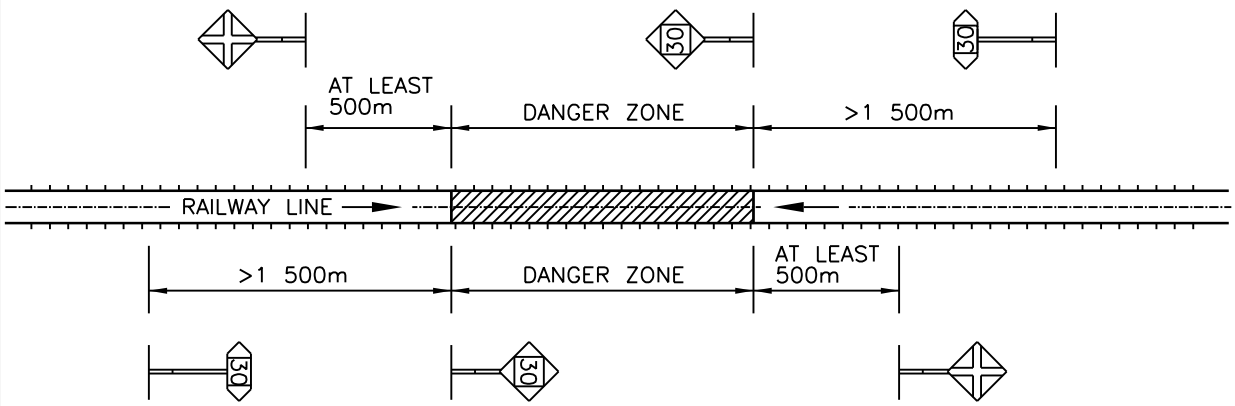
REMARKS:

1. (1) REFLECTIVE YELLOW.
2. (2) DOVE GREY CHROMADEK REVERSE SIDE.
3. FOR SIGN BOARD POSITIONING SEE ANNEXURE 10 SHEET 3.
4. FOR FURTHER DETAILS SEE DRAWING D–184 SHEET 1.
5. AT OFFTRACK PLATFORM.
6. THE TOP OF THESE BOARDS MUST NEVER BE MORE THAN 865mm ABOVE RAIL LEVEL.
7. TO BE PLACED AT ROADSIDE TO INDICATE ACCESS TO WORKING SITE.
8. THE SPEED PLATE INSERT MUST INDICATE THE SAME SPEED ON BOTH SIDES.

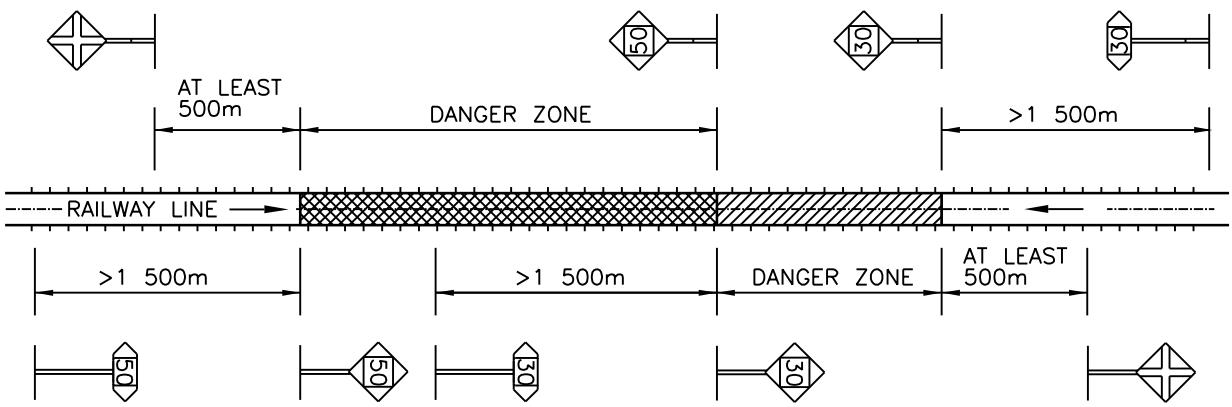
TRACK SIGN BOARDS : LAYOUT



MULTIPLE UNI–DIRECTIONAL LINES

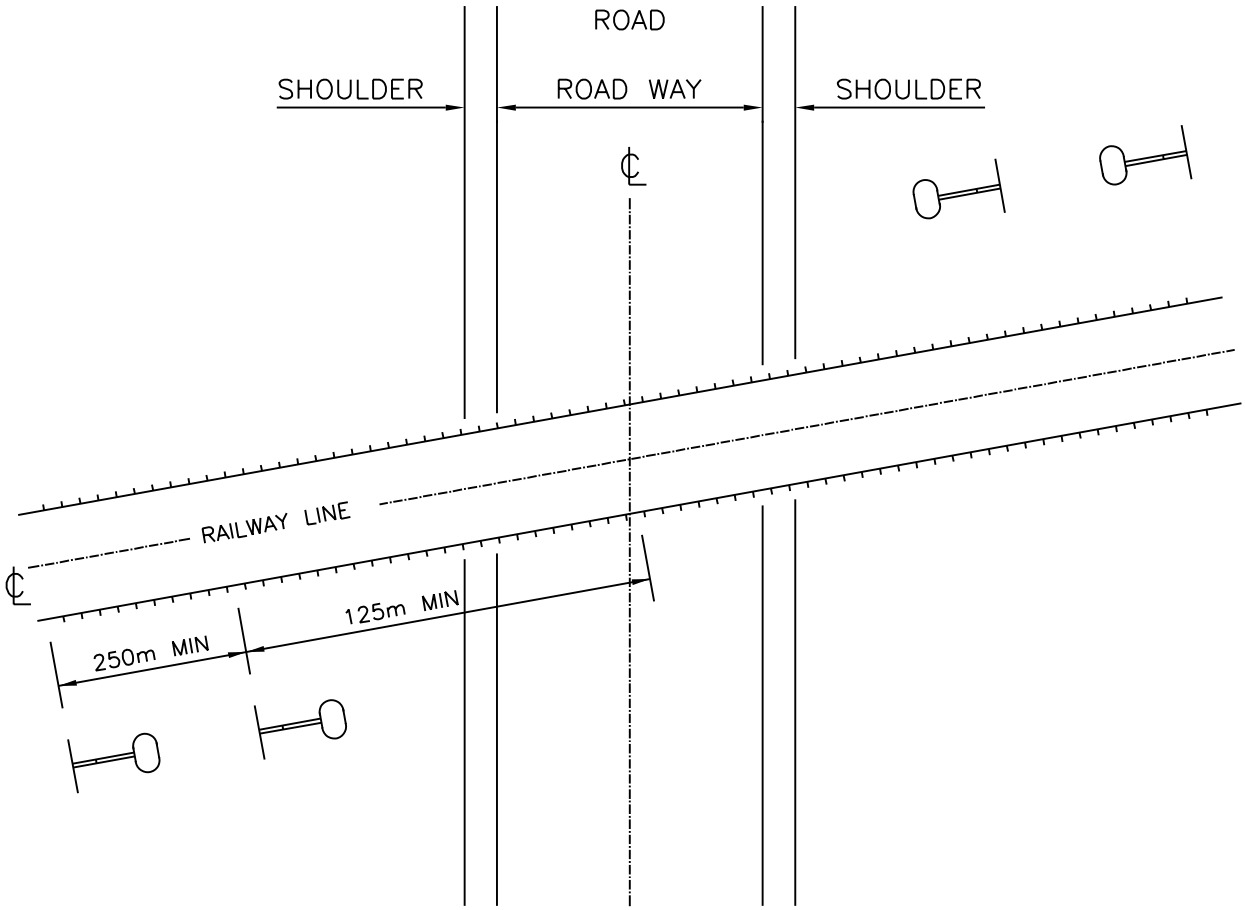


SINGLE OR BI–DIRECTIONAL LINES



TANDEM SPEED REDUCTION ON A SINGLE LINE WITH BI–DIRECTIONAL TRAFFIC

TRACK SIGN BOARDS : LEVEL CROSSINGS



REMARKS:

1. FOR POSITIONING OF SIGNS SEE CHAPTER 9.
2. SEE BBC0930 VERSION 1 FOR TOLERANCES APPLICABLE TO SIGNING AND VISIBILITY DISTANCES AT ROAD–RAIL LEVELCROSSING INSTALLATIONS.

SLEEPER FASTENINGS : FIST BTR.

ANNEXURE 11
SHEET 1 of 4

SLEEPER	RAIL	SPRING CLIP	PIN	GAUGE PLATE COMBINATIONS				
				OUTER	INNER	GAUGE (mm)	INNER	OUTER
FY	UIC-60	FY BROWN	FY BLUE	G	G	1 065	G	G
				G	G	1 070	H1	H2
	S-60	FY BLUE		H2	H1	1 075	H1	H2
	57kg			F	F	1 068	F	F
	48kg	F4 RED	F4 BLACK	L1	L2	1 065	L2	L1
				L1	L2	1 071	L1	L2
				L2	L1	1 077	L1	L2
F4/F1	57kg			E	E	1 065	E	E
				E	E	1 070	D1	D2
				D2	D1	1 075	D1	D2
	48kg			B1	B2	1 065	B2	B1
				B1	B2	1 070	B1	B2
				B2	B1	1 075	B1	B2
	40kg			K1	K2	1 065	K2	K1
				B1	B2	1 070	B2	B1
				B1	B2	1 075	B1	B2
				B2	B1	1 080	B1	B2
F3	57kg			D2	D1	1 067	D1	D2
	48kg			B2	B1	1 067	B1	B2
F2	57kg	F2 BLACK		DD2	DD1	1 067	DD1	DD2
	48kg			BB2	BB1	1 067	BB1	BB2

SLEEPER FASTENINGS : PANDROL

ANNEXURE 11
SHEET 2 of 4

SLEEPER	RAIL	GAUGE PLATE COMBINATIONS				
		OUTER	INNER	GAUGE (mm)	INNER	OUTER
PY	UIC-60	UIC-6-9 UIC-6-9 UIC-0-4 UIC-0-4	UIC-6-9 UIC-6-9 UIC-11-13 UIC-11-13	1 062 1 066 1 071 1 076	UIC-0-4 UIC-6-9 UIC-6-9 UIC-11-13	UIC-11-13 UIC-6-9 UIC-6-9 UIC-0-4
	S-60	T6 T6 T0 T0	T6 T6 T11 T11	1 062 1 066 1 071 1 076	T0 T6 T6 T11	T11 T6 T6 T0
	57kg	T17 T14 T11 T11 T6 T6 T0 T0	T6 T11 T14 T14 T17 T17 T23 T23	1 062 1 065 1 067 1 069 1 073 1 077 1 082 1 087	T11 T11 T11 T14 T14 T17 T17 T23	T14 T14 T14 T11 T11 T6 T6 T0
	48kg	T23 T23 T17	T17 T17 T23	1 067 1 072 1 077	T17 T23 T23	T23 T17 T17
P2	57kg	T11 T6 T0 T0	T0 T6 T11 T11	1 060 1 064 1 069 1 074	T6 T6 T6 T11	T6 T6 T6 T0
	48kg	T17 T17 T11 T11 T6	T11 T11 T17 T17 T23	1 064 1 069 1 074 1 078 1 082	T11 T17 T17 T23 T23	T17 T11 T11 T6 T6
	40kg	T23 T17 T17 T17 T11 T11	T6 T11 T11 T11 T17 T17	1 060 1 065 1 070 1 075 1 080 1 084	T6 T6 T11 T17 T17 T23	T23 T23 T17 T11 T11 T6
P1	57kg	T6 T0	T0 T6	1 062 1 067	T6 T6	T0 T0
	48kg	T17 T11 T6 T6 T0	T6 T11 T17 T17 T23	1 062 1 067 1 071 1 075 1 080	T11 T11 T11 T17 T17	T11 T11 T11 T6 T6
	40kg	T17 T17 T11 T6 T6	T6 T6 T11 T17 T17	1 063 1 068 1 073 1 077 1 081	T6 T11 T11 T11 T17	T17 T11 T11 T11 T6

STEEL SLEEPER FASTENINGS : E-3277

SLEEPER	RAIL	CLIP COMBINATIONS : E-3085 / E-3277				
		OUTER	INNER	GAUGE (mm)	INNER	OUTER
E-3085 E-3277	48kg	B	B	1 060	E	D
		B	B	1 065	A	C
		A	C	1 070	A	C
		A	C	1 075	B	B
		E	D	1 080	B	B
		E	D	1 085	C	A
	40kg	C	A	1 061	E	D
		C	A	1 066	A	C
		B	B	1 071	A	C
		B	B	1 076	B	B
		A	C	1 081	B	B
		A	C	1 086	C	A
	30kg	F2	B	1 065	B	F2
		F	C	1 070	B	F2
		F	C	1 075	C	F
		D	C	1 078	C	F
		C	F	1 083	C	F
		B	F2	1 088	C	F

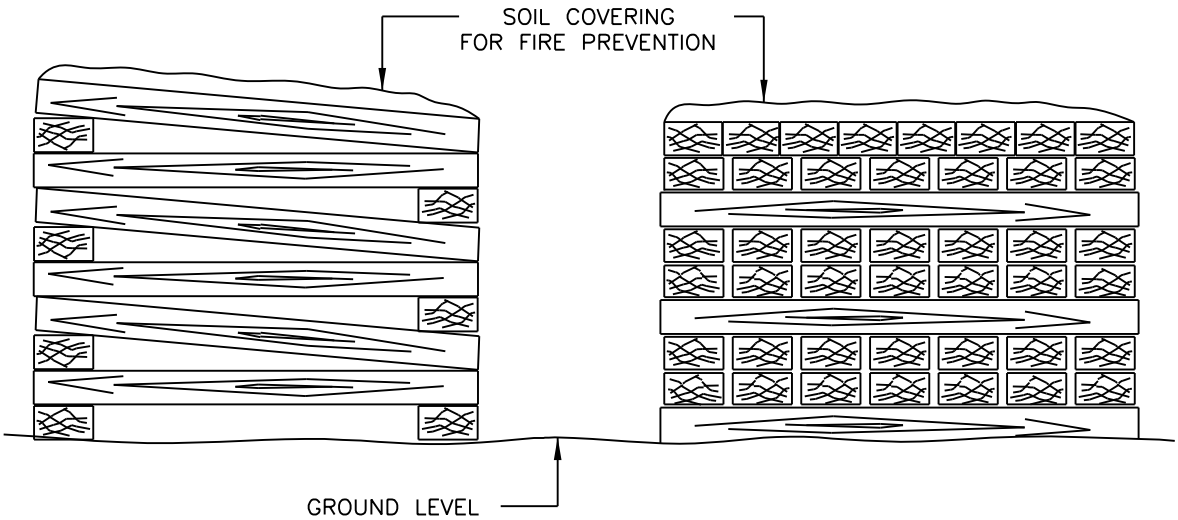
WOOD SLEEPER FASTENINGS : E-3131

SLEEPER	RAIL	GAUGE PLATE COMBINATIONS : E-3131				
		OUTER	INNER	GAUGE (mm)	INNER	OUTER
WOOD WITH E-3131 CAST IRON CHAIRS	57kg	L	J	1 061	K	J
		K	N	1 066	L	J
		N	K	1 071	N	K
		N	K	1 074	K	N
		J	L	1 079	K	N
		J	L	1 084	L	J
	48kg	L	L	1 060	K	M
		K	M	1 065	K	M
		K	M	1 070	L	L
		K	M	1 075	M	K
		K	M	1 080	L	L
		K	M	1 085	M	K
	40kg	L	L	1 060	K	M
		K	M	1 065	K	M
		K	M	1 070	L	L
		K	M	1 075	M	K
		K	M	1 080	L	L
		K	M	1 085	M	K

CAST IRON CHAIRS E-3131 & E3300 NOT ALLOWED / DESIGNED FOR 60KG RAIL MASS. OPEN TRACK

METHOD OF STACKING WOOD SLEEPERS

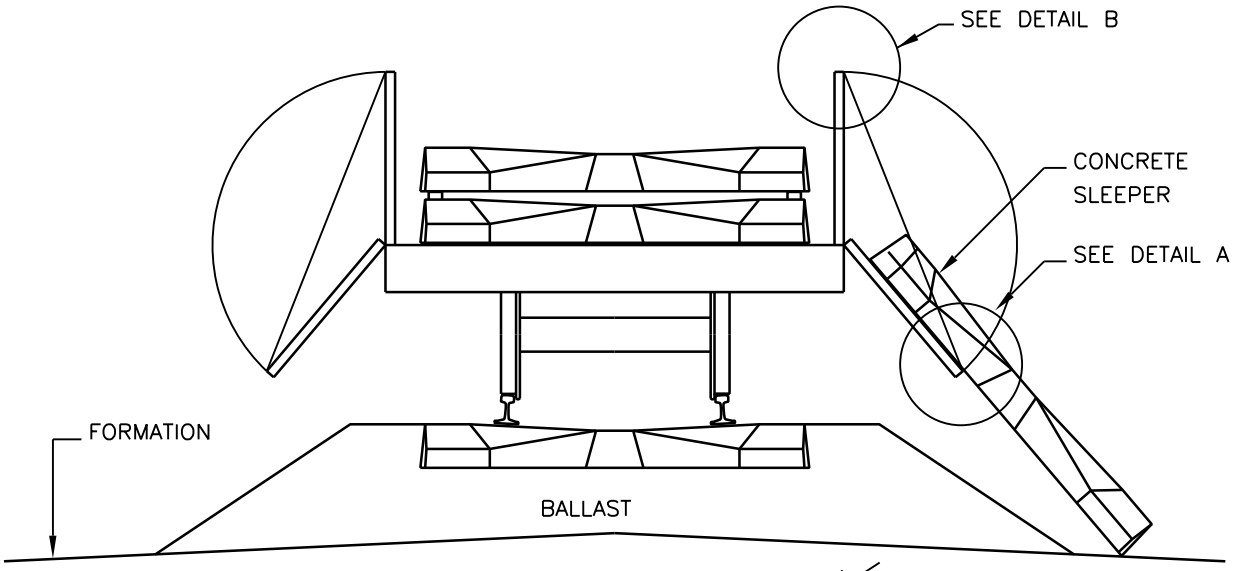
ANNEXURE 12
SHEET 1 of 1



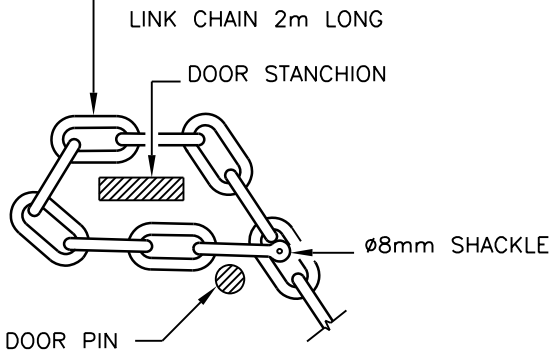
REMARKS:
1. SEE CLAUSE 10.1.5

METHOD OF UNLOADING CONCRETE SLEEPERS

ANNEXURE 13
SHEET 1 of 1

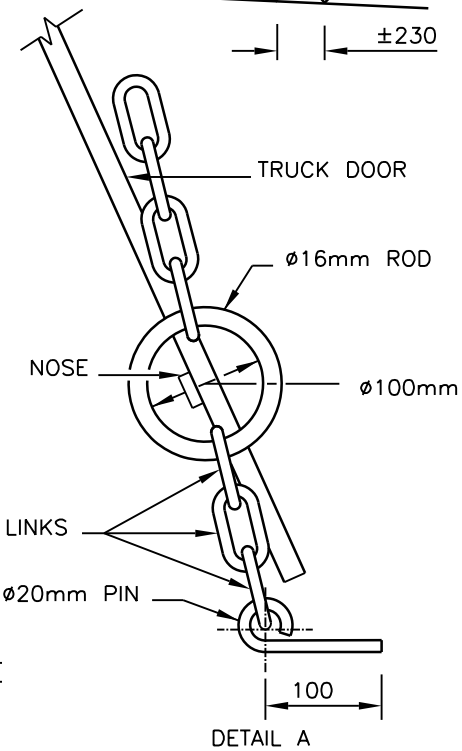


POSITION FOR UNLOADING

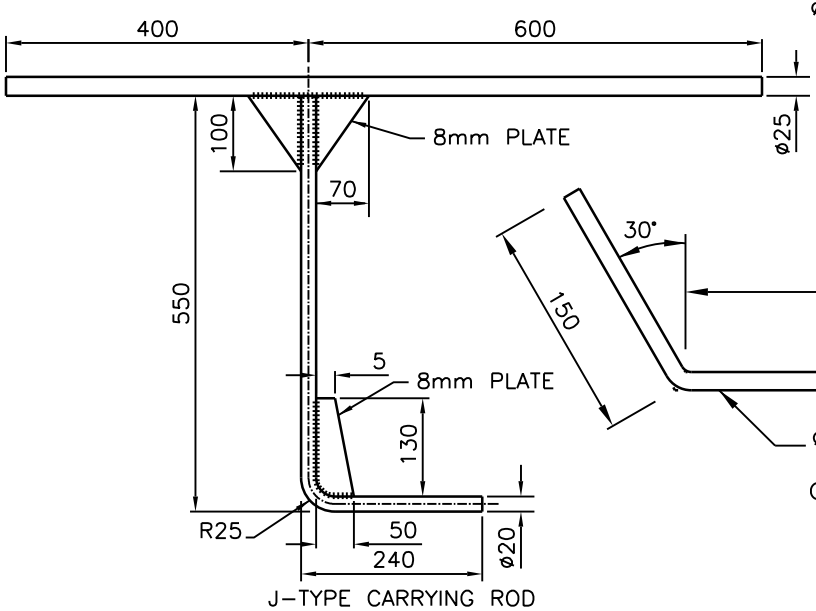


DETAIL B

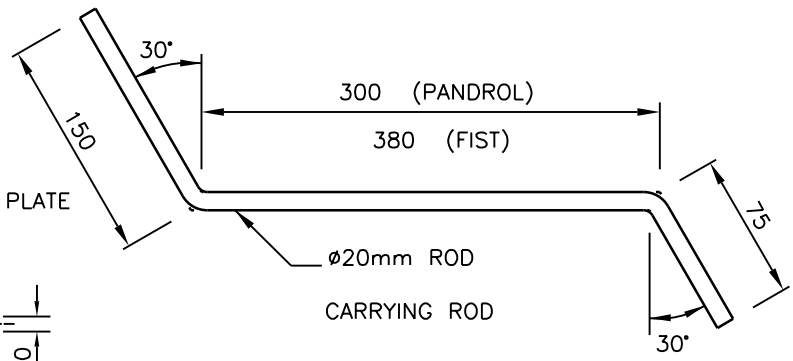
MAKE A LOOP WITH THE SHACKLE AND CHAIN AND HANG AROUND DOOR STANCHION



DETAIL A

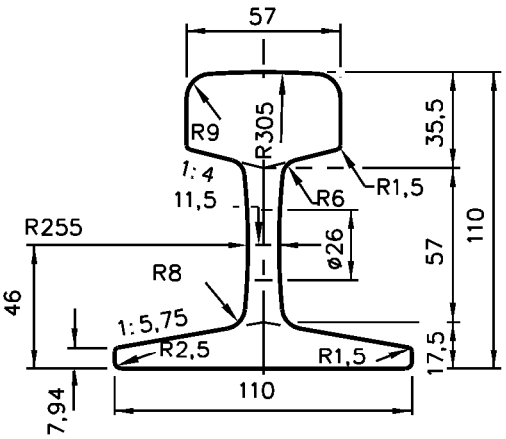


J–TYPE CARRYING ROD
(MAY ONLY BE USED TO MOVE SLEEPERS ON THE GROUND)

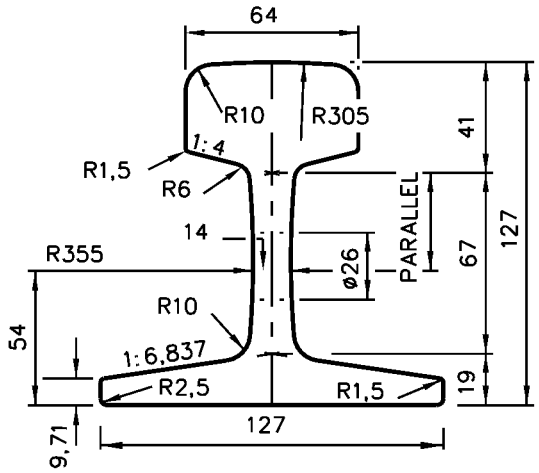


RAIL PROFILES

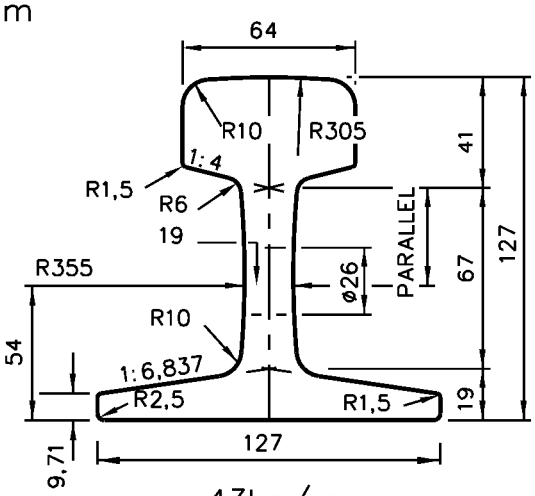
ANNEXURE 14
SHEET 1 of 6



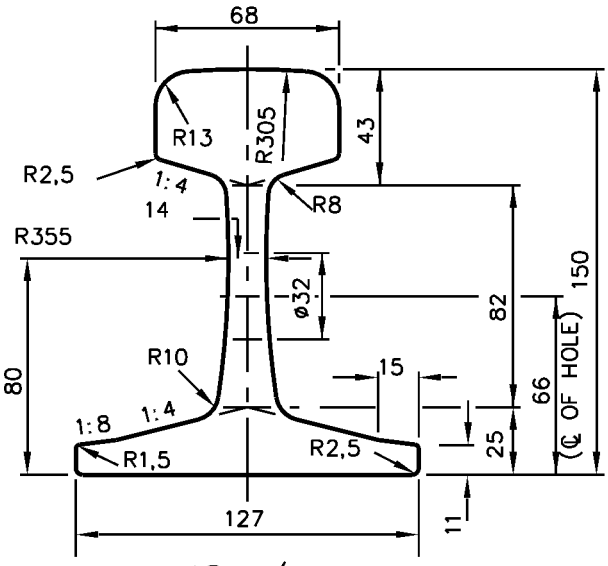
30kg/m



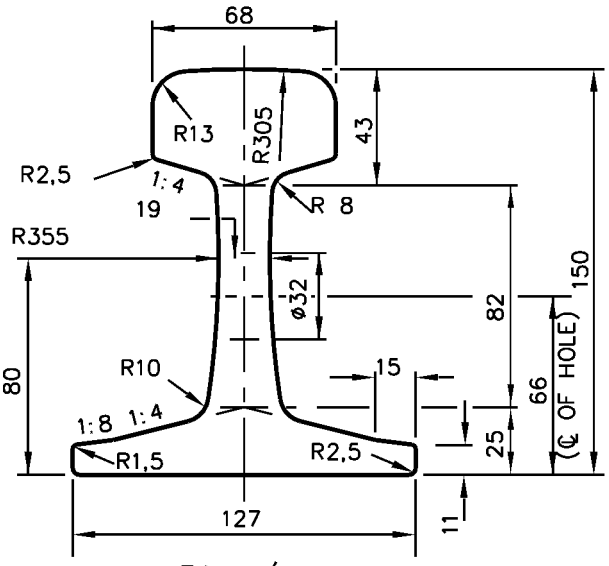
40kg/m



43kg/m
(HARBOUR AREAS)



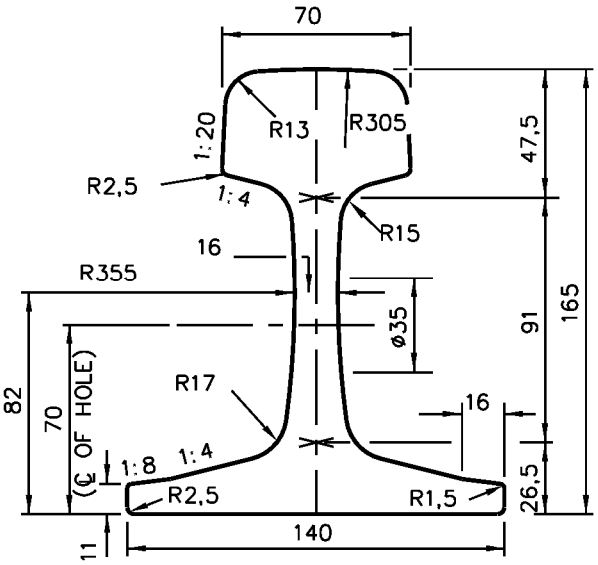
48kg/m



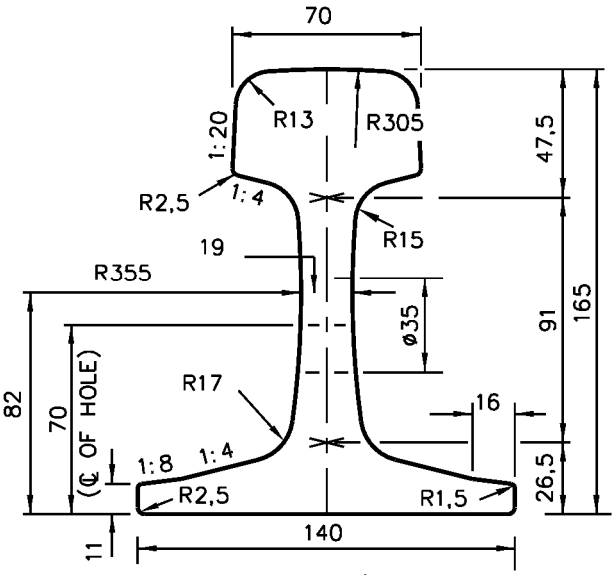
51kg/m
(FLEXIBLE POINTS BLADE
AND UNDERCUT STOCK RAIL)

REMARKS :
1. FOR PROPERTIES AND ROLL MARKS SEE ANNEXURE 14 SHEETS 4 TO 6

RAIL PROFILES

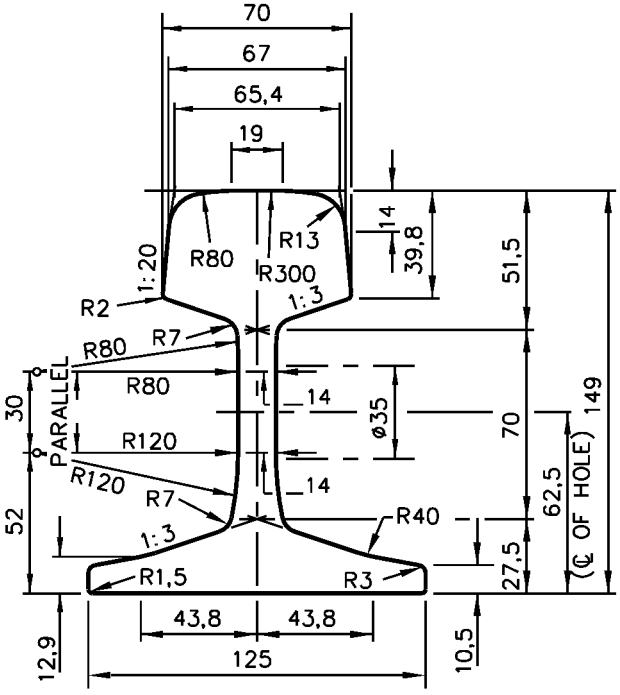


57kg/m

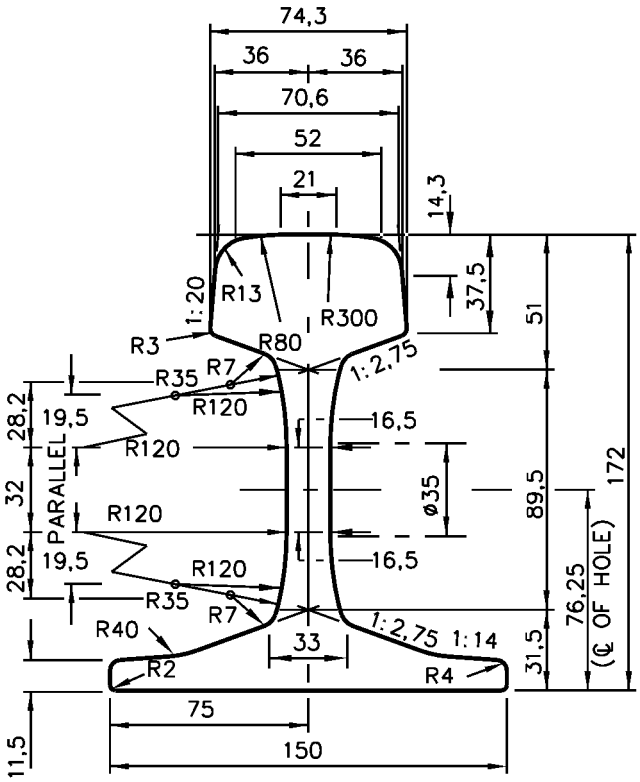


60kg/m

(FLEXIBLE POINTS BLADE
AND UNDERCUT STOCK RAIL)



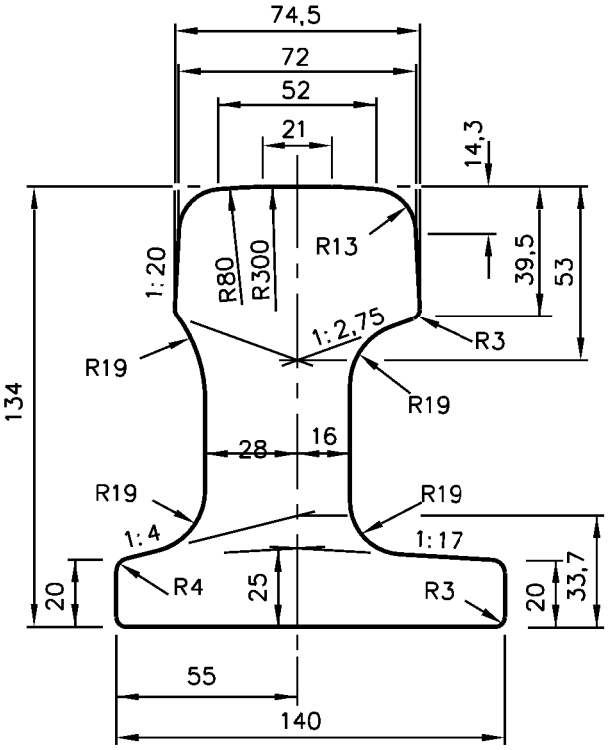
S-49



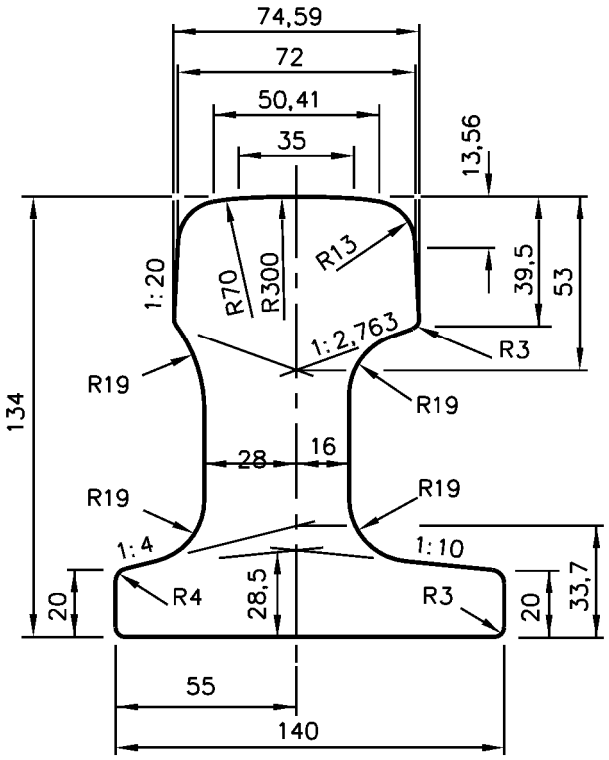
UIC-60

REMARKS :
1. FOR PROPERTIES AND ROLL MARKS SEE
ANNEXURE 14 SHEETS 4 TO 6

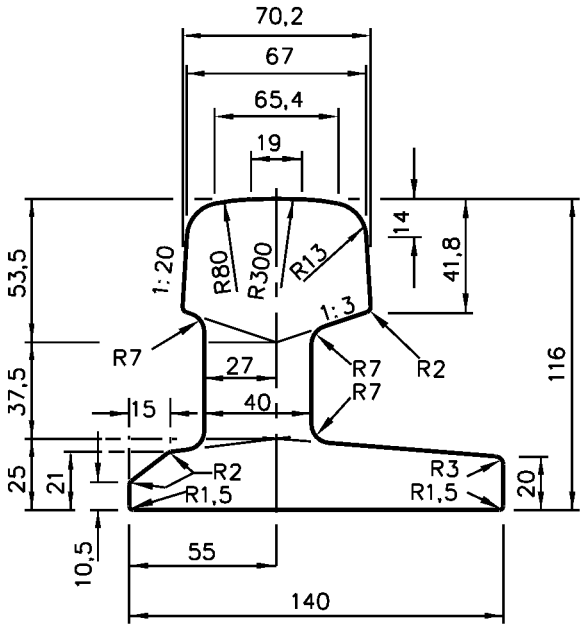
RAIL PROFILES



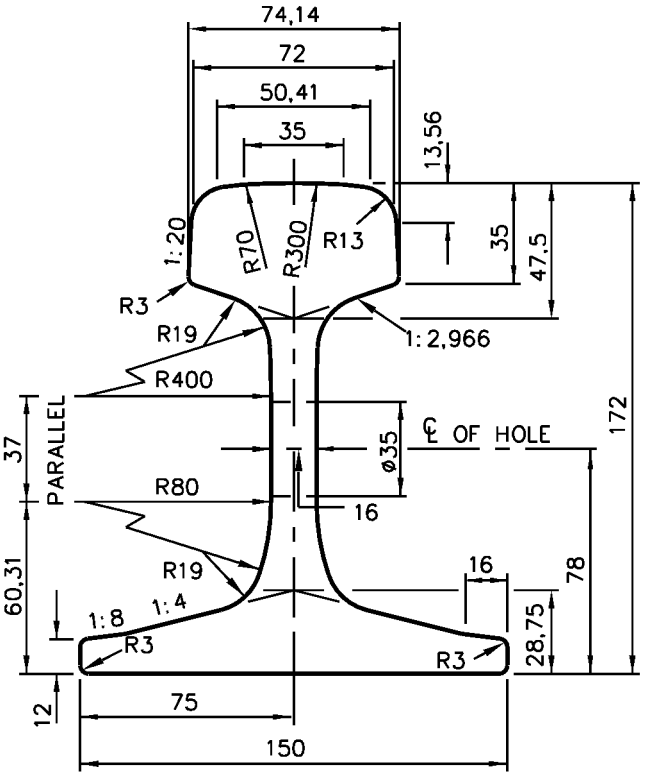
Zu–1–60



Z–S60–SAR

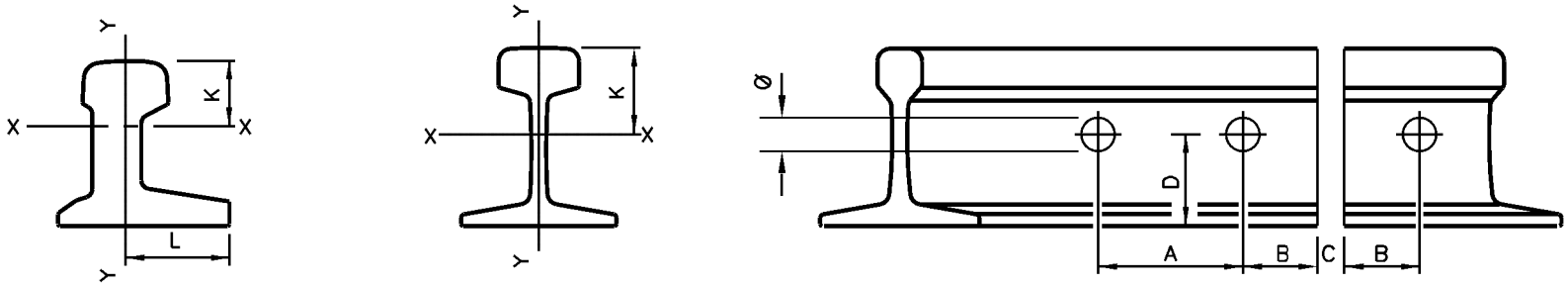


Zu–2–49



S–60–SAR

REMARKS :
1. FOR PROPERTIES AND ROLL MARKS SEE ANNEXURE 14 SHEETS 4 TO 6



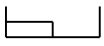
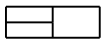
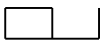
RAIL	MASS (kg/m)	HOLING						AREAS				PROPERTIES					DRAWING
		A	B	C	D	Ø	NUMBER	HEAD (%)	WEB (%)	FLANGE (%)	SECTION (cmý)	I (cm⁴) X – X	I (cm⁴) Y – Y	Z (cmÞ)	K (mm)	L (mm)	
30kg	30	100	47	6	46	26	4	45,11	18,87	36,02	38,537	626,89	158,18	110,94	56,36	–	E–192M
40kg	40	100	47	6	54	26	4	44,86	19,44	35,70	51,715	1 115,38	281,56	169,20	65,92	–	E–346
43kg	43	100	47	6	54	26	4	42,42	24,03	33,55	55,230	1 129,00	280,30	170,10	66,35	–	E–3215M
48kg	48	100	67	6	66	32	4	41,55	22,65	35,80	60,180	1 822,00	316,04	234,18	78,50	–	E–358M
51kg	51	100	67	6	66	32	4	39,00	27,80	33,20	64,850	1 844,00	320,50	234,60	78,60	–	E–358M
57kg	57	100	67	6	70	35	4	41,55	23,02	35,43	73,240	2 650,80	442,00	336,46	86,21	–	E–3232M
60kg	60	100	67	6	70	35	4	40,14	25,69	34,17	76,125	2 703,27	445,39	343,97	86,41	–	E–3232M
S–60–SAR	60,34	100	67	6	78	35	4	37,53	24,02	38,45	77,020	3 097,82	550,40	395,63 FLANGE	93,70	–	E–3326
Z–S60–SAR	72,83	–	–	–	–	–	–	34,88	30,63	34,47	92,980	1 734,40	746,94	292,98 FLANGE	74,80	82,70	
UIC–60	60,34	100	67	6	76,25	35	4	40,22	22,55	37,23	76,860	3 055,00	512,90	335,50 HEAD 377,40 FLANGE	91,05	–	700–E–736
Zu–I–60	73,00	–	–	–	–	–	–	–	–	–	93,000	1 728,00	743,50	229,90 HEAD 293,80 FLANGE	75,15	82,24	
S–49	49,43	100	67	6	62,5	35	4	47,45	17,56	34,99	62,970	1 189,00	320,00	240,00 FLANGE	75,70	–	700–E–722
Zu–2–49	62,20	–	–	–	–	–	–	–	–	–	79,260	1 075,00	700,00	162,00 HEAD	66,30	81,00	

RAIL PROPERTIES

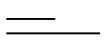
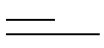
ROLL MARKS ON RAILS

ANNEXURE 14
SHEET 5 of 6

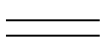
H.C.O.B. RAILS

NOMINAL MASS				9	19 _ _	SAR
NOMINAL MASS	~~2MCC~~			9	19 _ _	SAS
NOMINAL MASS			~~1~~	9	19 _ _	SAR
NOMINAL MASS				9	19 _ _	SAS
NOMINAL MASS	~~2MCC~~		~~1~~	9	19 _ _	SAR
NOMINAL MASS	~~2MCC~~		Z	9	19 _ _	SAS
NOMINAL MASS			Z	9	19 _ _	SAR
NOMINAL MASS			Z	9	19 _ _	SAS

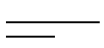
UIC A RAILS

NOMINAL MASS				9	19 _ _	SAR
NOMINAL MASS			~~1~~	9	19 _ _	SAS

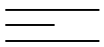
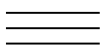
UIC B RAILS

NOMINAL MASS				9	19 _ _	SAR

UIC C RAILS

NOMINAL MASS	2MCC			9	19 _ _	SAS
NOMINAL MASS	2MCC		~~1~~	9	19 _ _	SAR
NOMINAL MASS				9	19 _ _	SAS

Cr–Mn RAILS

NOMINAL MASS				9	19 _ _	SAR
NOMINAL MASS		KRUPP			19 _ _	SAS

ROLL MARKS ON RAILS

HEAD HARDENED RAILS

MANUFACTURER			PROFILE	ROLL MARK	YEAR OF MANUFACTURE
DO	96	1X	UIC 60	— ____ ____	
DO			60E1	— ____ ____ —	04
DO			60E1	— ____ ____	04

REMARKS :

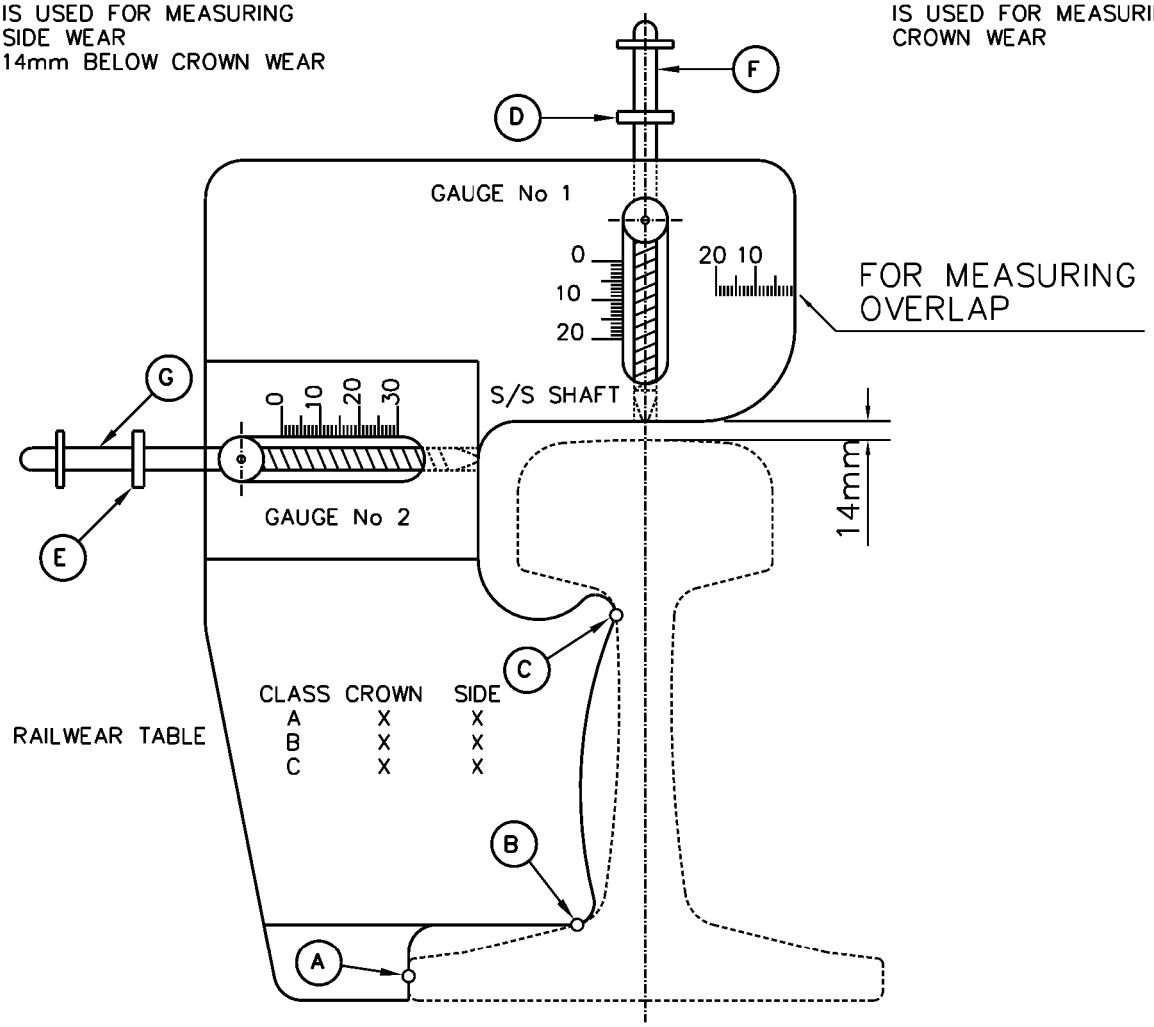
* HOT STAMPED ON OTHER SIDE
* MANUFACTURER'S MARK MAY NOT BE PRESENT ON HEAD HARDENED RAILS

RAIL WEAR GAUGE

ANNEXURE 15
SHEET 1 of 3

GAUGE No 2
IS USED FOR MEASURING
SIDE WEAR
14mm BELOW CROWN WEAR

GAUGE No 1
IS USED FOR MEASURING
CROWN WEAR



REMARKS:

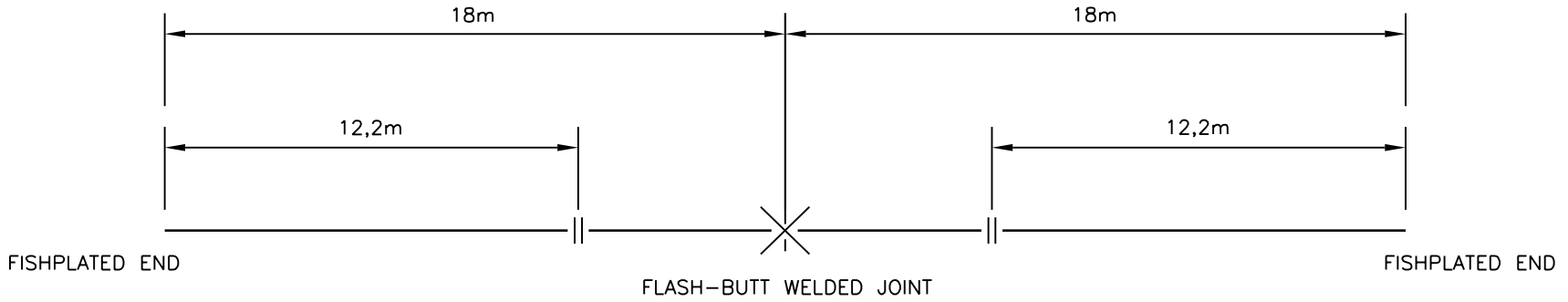
1. POSITION GAUGE, ENSURING THAT POINTS **A, B & C** MAKE CONTACT WITH THE RAIL.
2. ENSURE THAT STOPPERS **D & E** ARE FIRMLY PRESSED AGAINST THE FRAME OF THE GAUGE.
3. ENSURE THAT THE GAUGE IS SQUARE TO THE RAIL, BY CAREFUL POSITIONING OF THE EXTENSION PIECE AT POINT **A**.
4. DEPRESS SPRING-LOADED SHAFTS **F & G** UNTIL CONTACT IS MADE WITH THE RAIL HEAD.
5. REMOVE THE GAUGE, DEPRESS THE SPRING LOADED SHAFTS UNTIL THE STOPPERS TOUCH THE GAUGE FRAME AND TAKE READINGS FOR TOP AND SIDE WEAR.
6. ALWAYS REMEMBER TO PRESS THE STOPPERS FIRMLY AGAINST THE FRAME BEFORE THE NEXT READINGS ARE TAKEN.
7. FOR RAIL CLASSIFICATION TABLES SEE ANNEXURE 15 SHEET 2.
8. THE CORRECT GAUGE FOR EACH RAIL PROFILE MUST BE USED.

RAIL CLASSIFICATION TABLE

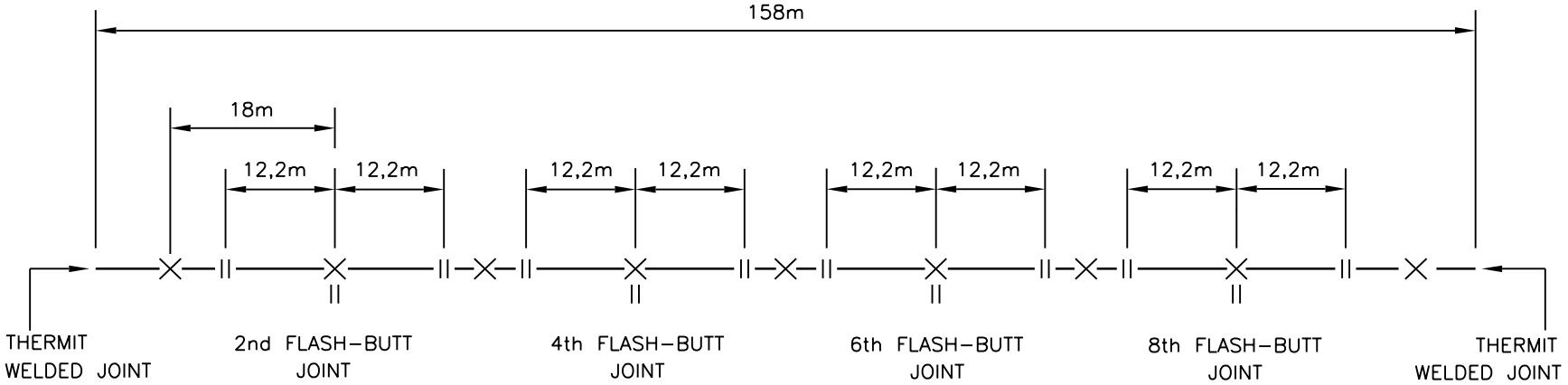
ANNEXURE 15
SHEET 2 of 3

CLASS		A–WHITE		B–YELLOW		C–BLUE		D–GREY	
MINIMUM LENGTH		3m		3m		10m		2m	
KINKS (SHORT TWISTED PARTS AND PARTS WITH EXCESSIVE SIDE WEAR MAY BE CUT OFF OR OUT)		NONE		NONE		NONE		NONE	
CORRUGATIONS (MAXIMUM DEPTH) (1,5m STRAIGHT EDGE)		NONE		1mm		2mm		NO LIMIT	
LONGITUDINAL GROOVE IN CROWN (MAXIMUM DEPTH)		NONE		NONE		2mm		NO LIMIT	
CORROSION IN WEB OR FLANGE		SLIGHT		SLIGHT		ORANGE PEEL		LEMON PEEL	
SKID MARKS		NONE		1/3m AND <1mm DEEP		NO LIMIT <2mm DEEP		NO LIMIT	
BENT WEB		NONE		NONE		SLIGHT		LIGHT	
TWISTED RAIL		NONE		NONE		NONE		NONE	
CHAIR IMPRINTS (MAXIMUM DEPTH)		1mm		2mm		2mm		NO LIMIT	
OLD THERMIT AND FLASH–BUTT WELDED JOINTS (MUST BE CUT OUT)		NONE		NONE		NONE		NONE	
CONVEX OR CONCAVE FLASH–BUTT WELDED JOINTS (1,5m STRAIGHT EDGE)		NONE		NONE		UP TO 1,5mm		UP TO 3mm	
BATTERED ENDS (MUST BE CUT OFF FOR CLASSES A, B AND C)		NONE		NONE		NONE		NO LIMIT	
VISIBLE CRACKS		NONE		NONE		NONE		NONE	
		(kg/m)	(mm)	(kg/m)	(mm)	(kg/m)	(mm)	(kg/m)	(mm)
MAXIMUM CROWN WEAR	S–60	–	–	–	–	8,00	15,5	–	–
	UIC–60	–	–	–	–	8,30	16,6	–	–
	57kg	4,05	8,5	6,15	12,3	8,35	16,3	10,20	19,6
	48kg	3,25	7,4	5,05	10,7	6,80	13,8	8,55	17,0
	40kg	2,68	6,0	4,08	8,8	5,33	11,3	6,55	13,8
	30kg	2,08	4,8	3,05	7,0	4,05	9,3	5,03	11,5
MAXIMUM SIDE WEAR	S–60	–	–	–	–	6,10	26,3	–	–
	UIC–60	–	–	–	–	6,60	28,5	–	–
	57kg	0,85	5,2	3,80	16,2	7,20	27,4	7,55	28,5
	48kg	0,75	4,6	2,60	12,6	5,20	23,2	5,65	25,0
	40kg	0,73	5,0	2,00	11,0	3,80	17,1	4,70	20,0
	30kg	0,50	4,1	1,30	8,0	2,50	12,8	3,28	15,8
MAXIMUM COMBINED WEAR	S–60	–	–	–	–	12,10	–	–	–
	UIC–60	–	–	–	–	11,70	–	–	–
	57kg	–	–	–	–	12,50	–	13,40	–
	48kg	–	–	–	–	10,20	–	11,30	–
	40kg	–	–	–	–	7,40	–	8,80	–
	30kg	–	–	–	–	5,00	–	5,90	–

CUTTING OF RELEASED RAILS FOR RE-USE



36m RAILS FROM 18m RAILS



158m RAILS FROM 18m RAILS

REMARKS:

1. —X— FLASH-BUTT WELDED JOINT.
2. —X— (with ||) SITE CUTTING (THROUGH FLASH-BUTT JOINT).
3. —||— SITE CUTTING (THROUGH RAIL).
4. RE-USABLE RAILS MUST BE CUT IN THE MAXIMUM USABLE LENGTH AS POSSIBLE

ANNEXURE 15
SHEET 3 of 3

BE 97-15 Sht 3 Version 1

EXPANSION GAPS FOR DIFFERENT RAIL LENGTHS AND TEMPERATURES

RAIL LENGTH

9 AND 10m		12m		18m		36m			
						HIGH RULING TEMPERATURE		MODERATE RULING TEMPERATURE	
TEMP. (°C)	GAP (mm)	TEMP. (°C)	GAP (mm)	TEMP. (°C)	GAP (mm)	TEMP. (°C)	GAP (mm)	TEMP. (°C)	GAP (mm)
-5 TO 10	7	-5 TO 10	8	-5 TO 5	12	10 TO 20	15	5 TO 15	15
11 TO 25	5	11 TO 20	7	6 TO 20	9	21 TO 30	12	16 TO 20	12
26 TO 40	3	21 TO 30	5	21 TO 30	6	31 TO 35	9	21 TO 25	9
41 TO 50	1	31 TO 40	3	31 TO 45	3	36 TO 45	6	26 TO 35	6
51 AND HIGHER	0	41 TO 50	1	46 AND HIGHER	0	46 TO 50	3	36 TO 40	3
–	–	51 AND HIGHER	0	–	–	51 TO 60	0	41 TO 50	0

REMARKS:
1. FOR LIST OF SECTIONS OF LINE FALLING WITHIN MODERATE RULING TEMPERATURE AREAS, SEE ANNEXURE 16 SHEET 2.

SECTIONS WITH MODERATE RULING TEMPERATURES

SECTIONS WITH MODERATE RULING TEMPERATURES

MAKWASSIE – VERMAAS
VERMAAS – PUDIMOE
KLERKSDORP – OTTOSDAL
WELVERDIEND – LICHTENBURG
VERMAAS – COLIGNY

BOWKERSPARK – SPRINGFONTEIN
STERKSTROOM – MACLEAR
MOLTENO – JAMESTOWN
STORMBERG – ROSMEAD
SCHOOMBEE – HOFMEYR
DREUNBERG – ALIWAL NORTH
ALIWAL NORTH – BARKLY EAST

NOUPOORT – BLOEMFONTEIN
SPRINGFONTEIN – KOFFIEFONTEIN
HAMILTON – DE BRUG
BLOEMFONTEIN – BETHLEHEM
SANNASPOS – ALIWAL NORTH
MARSAILLES – MASERU
MODDERPOORT – LADYBRAND
BETHLEHEM – HARRISMITH
HARRISMITH – WARDEN
BETHLEHEM – GROOTVLEI
ARLINGTON – WOLWEHOEK
ARLINGTON – MARQUARD
ARLINGTON – GUNHILL
THEUNISSEN – WINBURG
VIRGINIA – GLEN HARMONY
WHITES – ODENDALSRUS
BLOEMFONTEIN – VEREENIGING
ALLANRIDGE – ANCONA
BULTFONTEIN – VIERFONTEIN
WESTLEIGH – ORKNEY
DOVER – VREDEFORT

PORT SHEPSTONE – UMKOMAAS
KELSO – UMZINTO
LIDGETTON – ESTCOURT
INGOGO – VOLKSRUST
FRANKLIN – MATATIELE
ENNERSDALE – BERGVILLE
BRAKWAL – VAN REENEN
COMMONDALE – PIET RETIEF

VOLKSRUST – UNION
VOLKSRUST – BREYTEN
BALFOUR NORTH – DROEBULT
GROOTVLEI – REDAN
KAYDALE – SPRINGS
SPRINGS – BETHAL
SPRINGS – NATALSPRUIT
GERMISTON – KWESINE
GERMISTON – ELSBURG
VEREENIGING – BANK
HOUTHEUWEL – FOCHVILLE
MIDWAY – INDIA
MIDWAY – LANGLAAGTE
NALEDI – NEW CANADA
CITY DEEP – LANGLAAGTE
CITY DEEP – WESTGATE
BOOYSENS – FARADAY
BOOYSENS – TRANSRAND
JUPITER – DRIEHOEK
DRIEHOEK – INDIA
GERMISTON – SPRINGS

GERMISTON – CHACHET
KRUGERSDORP – WOODBINE
GERMISTON – PRETORIA
LERALLA – OAKMOOR
DUNSWART – APEX
DUNSWART – WELGEDAG
SPRINGS – WITBANK
ALLIANCE – DAVEYTON
DELMAS – HAWERKLIP
OGIES – BROODSNYERSPLAAS

PRETORIA – RIVULETS
BELFAST – LYDENBURG
MACHADODORP – PIET RETIEF
SABIE – GRASKOP
POTGIETERSRUS – SOLOMONDALE
HERCULUS – MAGALIESBURG
NYLSTROOM – VAALWATER
BROODSNYERSPLAAS – ERMELO

KALBASKRAAL – SALDANHA
SALDANHA – BAMBOESBAAI

REMARKS:
1. ALL OTHER SECTIONS MUST BE REGARDED AS SECTIONS FALLING WITHIN THE HIGH RULING TEMPERATURE AREAS.

DESTRESSING AND WORKING TEMPERATURE RANGES

SECTION	DESTRESSING RANGES		WORKING RANGES FOR TRACK	
	THROUGH LINES	YARD TRACKS		
	A	D	B	C
CAPE TOWN – BELLVILLE	20 – 50	25 – 45	15 – 55	15 – 60
* BELLVILLE – WORCESTER	25 – 45	30 – 40	20 – 50	20 – 60
* WORCESTER – DE AAR	25 – 40	25 – 35	20 – 50	20 – 55
HUTCHINSON – CALVINIA	25 – 35	25 – 30	20 – 40	20 – 50
KOOTJIESKOLK – SAKRIVIER	25 – 35	25 – 30	20 – 40	20 – 50
KRAAIFONTEIN – BITTERFONTEIN	25 – 45	30 – 40	20 – 50	20 – 60
KALBASKRAAL – SALDANHA	25 – 45	30 – 40	20 – 50	20 – 60
HERMON – PORTERVILLE	25 – 45	30 – 40	20 – 50	20 – 60
WOLSELEY – PRINCE ALFRED HAMLET	25 – 45	30 – 40	20 – 50	20 – 60
PAARL – FRANCHHOEK	25 – 45	30 – 40	20 – 50	20 – 60
EERSTERIVIER – BREDASDORP	25 – 45	30 – 40	20 – 50	20 – 60
VAN DER STEL – STRAND	25 – 45	30 – 40	20 – 50	20 – 60
KLIPDALE – PROTEM	25 – 45	30 – 40	20 – 50	20 – 60
EERSTERIVIER – MULDERSVLEI	25 – 45	30 – 40	20 – 50	20 – 60
* WORCESTER – RIVERSDALE	25 – 40	30 – 35	20 – 45	20 – 55
KENTEMADE – ATLANTIS	25 – 45	30 – 40	20 – 50	20 – 60
TABLE BAY HARBOUR – SIMONSTOWN	20 – 50	25 – 45	15 – 55	15 – 60
CAPE TOWN CENTRAL METRO AREA	20 – 50	25 – 45	15 – 55	15 – 60
* DE AAR – * KIMBERLEY	25 – 40	25 – 30	20 – 45	20 – 50
* KIMBERLEY – MAKWASSIE	25 – 40	30 – 40	20 – 50	20 – 55
* MAKWASSIE – * KLERKSDORP	20 – 40	25 – 35	15 – 50	15 – 55
* KIMBERLEY – * POSTMASBURG	25 – 40	25 – 30	20 – 45	20 – 50
POSTMASBURG – HOTAZEL	25 – 40	30 – 35	20 – 45	20 – 55
DE AAR – NAKOP	25 – 40	30 – 35	25 – 45	25 – 55
GROVEPUT – COPPERTON	25 – 40	30 – 35	25 – 45	20 – 55
UPINGTON – KAKEMAS	25 – 40	30 – 35	25 – 45	20 – 55
BELMONT – DOUGLAS	25 – 40	30 – 35	20 – 45	20 – 55
VEERTIENSTROME – MAFIKENG	25 – 40	30 – 35	20 – 45	20 – 55
PUDIMOE – COLIGNE	25 – 40	30 – 35	20 – 45	20 – 55
* MAKWASSIE – VERMAAS	20 – 40	25 – 35	15 – 45	15 – 55
OTTOSDAL – * KLERKSDORP	20 – 40	25 – 35	15 – 45	15 – 55
LICHTENBURG – WELVERDIEND	20 – 40	25 – 35	15 – 45	15 – 55
PORT ELIZABETH – ALICEDALE	25 – 45	30 – 40	20 – 50	20 – 60
* ALICEDALE – NOUPOORT	25 – 40	30 – 35	20 – 45	20 – 55
NOUPOORT – DE AAR	25 – 40	30 – 35	20 – 45	20 – 55
SWARTKOPS – KLIPPLAAT	25 – 45	30 – 40	20 – 50	20 – 60
KLIPPLAAT – ROSMEAD	25 – 45	30 – 40	20 – 50	20 – 60
ADDO – KIRKWOOD	25 – 45	30 – 40	20 – 50	20 – 60
RIVERSDALE – * MOSSELBAAI	25 – 45	30 – 40	20 – 50	20 – 60
MOSSELBAAI – GEORGE	20 – 45	25 – 40	15 – 50	15 – 60
* GEORGE – OUDTSHOORN	25 – 45	30 – 40	20 – 50	20 – 60
* OUDTSHOORN – * KLIPPLAAT	25 – 40	30 – 35	20 – 45	20 – 55
OUDTSHOORN – CALITZDORP	25 – 45	30 – 40	20 – 50	20 – 60
* GEORGE – KNYSNA	25 – 45	30 – 40	20 – 50	20 – 60
* PORT ELIZABETH – AVONTUUR	25 – 40	30 – 35	20 – 45	20 – 55
GAMTOOS – PATENSIE	25 – 45	30 – 40	20 – 50	20 – 60
COOKHOUSE – SOMERSET EAST	25 – 40	30 – 35	20 – 45	20 – 55
* ALICEDALE – PORT ALFRED	30 – 40	30 – 35	25 – 45	25 – 55
BARKLEY BRIDGE – ALEXANDRIA	25 – 45	30 – 40	20 – 50	20 – 60
EAST LONDON – DOHNE	20 – 45	25 – 40	15 – 50	15 – 60
* DOHNE – QUEENSTOWN	25 – 40	30 – 35	20 – 50	20 – 55
* QUEENSTOWN – BURGERSDORP	20 – 35	25 – 30	15 – 45	15 – 50
* BURGERSDORP – SPRINGFONTEIN	20 – 40	25 – 40	15 – 50	15 – 55
COOKHOUSE – BLANEY	25 – 40	30 – 35	20 – 45	20 – 55
AMABELE – UMTATA	25 – 40	30 – 35	20 – 45	20 – 55
IMVANI – QAMATA	25 – 40	30 – 35	20 – 45	20 – 55
* ROSMEAD – STORMBERG	20 – 30	20 – 25	15 – 35	15 – 45
SCHOOMBEE – HOFMEYR	20 – 30	20 – 25	15 – 35	15 – 45
STERKSTROOM – MACLAER	20 – 30	20 – 25	15 – 35	15 – 45
MOLTENO – JAMESTOWN	20 – 30	20 – 25	15 – 35	15 – 45
BURGERSDORP – BARKLEY EAST	20 – 35	25 – 30	15 – 40	15 – 50

REMARKS:

1. FOR REMARKS SEE ANNEXURE 16 SHEET 5.

DESTRESSING AND WORKING TEMPERATURE RANGES

SECTION	DESTRESSING RANGES		WORKING RANGES FOR TRACK	
	THROUGH LINES	YARD TRACKS		
	A	D	B	C
NOUPOORT – SPRINGFONTEIN	20 – 40	25 – 35	15 – 45	15 – 55
* SPRINGFONTEIN – BLOEMFONTEIN	20 – 35	25 – 30	15 – 40	15 – 50
BLOEMFONTEIN – THEUNISSEN	20 – 35	25 – 30	15 – 40	15 – 50
* THEUNISSEN – KROONSTAD	20 – 40	25 – 35	15 – 45	15 – 55
KROONSTAD – VEREENIGING	20 – 40	25 – 35	15 – 45	15 – 55
BETHLEHEM – ARLINGTON	15 – 35	20 – 30	10 – 40	10 – 50
* ARLINGTON – * KROONSTAD	15 – 40	20 – 35	10 – 45	10 – 55
KIMBERLEY – EMMAUS	25 – 40	25 – 35	20 – 45	20 – 55
* EMMAUS – BLOEMFONTEIN	20 – 35	25 – 30	15 – 40	15 – 50
SPRINGFONTEIN – KOFFIEFONTEIN	25 – 40	30 – 35	20 – 45	20 – 55
ALIWAL NORTH – SANNASPOS	20 – 40	25 – 35	15 – 45	15 – 55
GROOTVLEI – * BETHLEHEM	20 – 35	25 – 30	15 – 40	15 – 50
* BETHLEHEM – BLOEMFONTEIN	20 – 35	25 – 30	15 – 40	15 – 50
HARRISMITH – BETHLEHEM	15 – 35	20 – 30	10 – 40	10 – 50
VREDEFORT – DOVER	20 – 40	25 – 35	15 – 45	15 – 55
WOLWEHOEK – ARLINGTON	20 – 40	25 – 35	15 – 45	15 – 55
* ARLINGTON – MARQUARD	20 – 40	25 – 35	15 – 45	15 – 55
ORKNEY – WESLEIGH	20 – 40	25 – 35	15 – 45	15 – 55
VIERFONTEIN – BULTFONTEIN	20 – 40	25 – 35	15 – 45	15 – 55
ANCONA – WHITES	20 – 40	25 – 35	15 – 45	15 – 55
THEUNISSEN – WINBURG	20 – 40	25 – 35	15 – 45	15 – 55
WARDEN – * HARRISMITH	20 – 40	25 – 35	15 – 45	15 – 55
MASERU – MARSAILLES	20 – 40	25 – 35	15 – 45	15 – 55
LADYBRAND – MODDERPOORT	20 – 40	25 – 35	15 – 45	15 – 55
VIRGINIA – GLEN HARMONY	20 – 40	25 – 35	15 – 45	15 – 55
WONDERFONTEIN – BROODSNYERSPLAAS	15 – 40	20 – 35	10 – 45	10 – 55
ERMELO – MACHADODORP	20 – 40	25 – 35	15 – 45	15 – 55
BUHRMANNSKOP – LOTHAIR	15 – 35	20 – 30	10 – 40	10 – 50
ROSSBURG – * DASSENHOEK	20 – 45	25 – 40	15 – 50	15 – 60
DASSENHOEK – CATO RIDGE	25 – 40	30 – 35	20 – 45	20 – 55
CATO RIDGE – PIETERMARITZBURG	25 – 40	30 – 35	20 – 45	20 – 55
* PIETERMARITZBURG – * VOLKSRUST	20 – 40	25 – 35	15 – 45	15 – 55
ROSSBURG – HILLCREST	20 – 45	25 – 40	15 – 50	15 – 60
* HILLCREST – CATO RIDGE	25 – 40	30 – 35	20 – 45	20 – 55
DURBAN – PORT SHEPSTONE	20 – 50	25 – 45	15 – 60	15 – 65
KELSO – UMZINTO	20 – 50	25 – 45	15 – 60	15 – 65
DURBAN – HLUHLUWE	20 – 50	25 – 45	15 – 60	15 – 65
* HLUHLUWE – GOLELA	25 – 45	30 – 40	20 – 55	20 – 60
EMPANGENI – NKWALINI	25 – 50	30 – 45	20 – 55	20 – 60
DUFFSROAD – KWAMASHU	25 – 50	30 – 45	20 – 55	20 – 60
THORNVILLE – RICHMOND	25 – 40	30 – 35	20 – 45	20 – 55
THORNVILLE – PENTRICH	25 – 40	30 – 35	20 – 45	20 – 55
* PIETERMARITZBURG – KOKSTAD	25 – 35	25 – 30	20 – 40	20 – 50
DONNYBROOK – UNDERBERG	20 – 35	25 – 30	15 – 40	15 – 50
FRANKLIN – MATATIELE	20 – 35	25 – 30	15 – 40	15 – 50
PIETERMARITZBURG – DALTON	25 – 40	30 – 35	20 – 45	20 – 55
* DALTON – KRANSKOP	20 – 40	25 – 35	15 – 45	15 – 55
SCHROEDERS – BRUYNSHILL	25 – 40	30 – 35	20 – 45	20 – 55
* DALTON – GLENSIDE	20 – 40	25 – 35	15 – 45	15 – 55
GREYTOWN – MOUNT ALIDA	20 – 40	25 – 35	15 – 45	15 – 55
ENNERSDALE – BERGVILLE	25 – 40	30 – 35	20 – 45	20 – 55
GLENCOE – VRYHEID	20 – 40	20 – 35	15 – 50	15 – 55
NEWCASTLE – UTRECHT	20 – 40	25 – 35	15 – 45	15 – 55
LADYSMITH – HARRISMITH	20 – 40	25 – 35	15 – 45	15 – 55

REMARKS:

1. FOR REMARKS SEE ANNEXURE 16 SHEET 5.

DESTRESSING AND WORKING TEMPERATURE RANGES

SECTION	DESTRESSING RANGES		WORKING RANGES FOR TRACK	
	THROUGH LINES	YARD TRACKS		
	A	D	B	C
KLERKSDORP – * POTCHEFSTROOM	20 – 35	25 – 30	20 – 40	15 – 50
POTCHEFSTROOM – * KRUGERSDORP	20 – 40	25 – 35	15 – 45	15 – 55
KRUGERSDORP – JOHANNESBURG	15 – 40	20 – 35	10 – 45	10 – 55
JOHANNESBURG – OLIFANTSFONTEIN	15 – 40	20 – 35	10 – 45	10 – 55
POTCHEFSTROOM – VEREENIGING	20 – 40	25 – 35	15 – 45	15 – 55
VEREENIGING – GERMISTON	20 – 40	25 – 35	15 – 45	15 – 55
VOLKSRUST – * STANDERTON	15 – 35	20 – 30	10 – 40	10 – 50
STANDERTON – * HEIDELBERG	20 – 35	25 – 30	15 – 40	15 – 50
HEIDELBERG – GERMISTON	20 – 40	25 – 35	15 – 45	15 – 55
BALFOUR NORTH – * GROOTVLEI	20 – 35	25 – 30	15 – 40	15 – 50
GROOTVLEI – REDAN	20 – 40	25 – 35	15 – 45	15 – 55
FIRHAM – VREDE	20 – 35	25 – 30	15 – 40	15 – 50
VOLKSRUST – BREYTEN	15 – 40	20 – 35	10 – 45	10 – 55
BETHAL – SPRINGS	20 – 40	25 – 35	15 – 45	15 – 55
SPRINGS – KAYDALE	20 – 40	25 – 35	15 – 45	15 – 55
MIDWAY – HOUTHEUWEL	20 – 35	25 – 30	15 – 40	15 – 50
BANK – LANGLAAGTE	20 – 35	25 – 30	15 – 40	15 – 50
MAFIKENG – * KRUGERSDORP	25 – 40	30 – 35	20 – 45	20 – 55
APEX – WITBANK	20 – 35	25 – 30	15 – 40	15 – 50
DELMAS – HAWEKLIP	20 – 35	25 – 30	15 – 40	15 – 50
SENTRARAND AREA	15 – 35	20 – 30	10 – 40	10 – 50
JOHANNESBURG CENTRAL METRO AREA	15 – 40	20 – 35	10 – 45	10 – 55
OLIFANTSFONTEIN – * IRENE	15 – 40	20 – 35	10 – 45	10 – 55
IRENE – PRETORIA	20 – 40	25 – 35	15 – 45	15 – 55
PRETORIA – * WARMBATHS	20 – 40	25 – 35	15 – 45	15 – 55
WARMBATHS – * POTGIETERSRUS	20 – 45	25 – 40	15 – 55	15 – 60
POTGIETERSRUS – BEITBRIDGE	20 – 45	25 – 40	15 – 50	15 – 50
* PRETORIA – * WATERVAL BOVEN	20 – 40	25 – 35	15 – 50	15 – 55
WATERVAL BOVEN – * NELSPRUIT	20 – 45	25 – 40	15 – 55	15 – 60
NELSPRUIT – KOMATIPOORT	25 – 45	30 – 40	20 – 55	20 – 60
HERCULES – MAGALIESBURG	20 – 40	25 – 35	15 – 45	15 – 55
PRETORIA – BRITS	20 – 40	20 – 35	15 – 45	15 – 55
BRITS – RUSTENBURG	20 – 40	25 – 35	15 – 45	15 – 55
RUSTENBURG – * THABAZIMBI	20 – 40	25 – 35	15 – 45	15 – 55
THABAZIMBI – ELLISRAS	25 – 40	30 – 35	20 – 45	20 – 55
BRITS – ATLANTA	20 – 40	25 – 35	15 – 45	15 – 55
NYLSTROOM – VAALWATER	20 – 40	25 – 35	15 – 45	15 – 55
NABOOMSPRUIT – ZEBEDIELA	20 – 40	25 – 35	15 – 45	15 – 55
PIENAARSRIVIER – MARBLE HALL	25 – 40	30 – 35	20 – 45	20 – 55
RAYTON – CULLINAN	20 – 40	25 – 35	15 – 45	15 – 55
GROENBULT – KAAPMUIDEN	25 – 45	30 – 40	20 – 50	20 – 60
HOEDSPRUIT – PHALABORWA	25 – 45	30 – 40	20 – 50	20 – 60
* KAAPMUIDEN – BARBERTON	20 – 45	25 – 40	15 – 50	15 – 60
* NELSPRUIT – GRASKOP	20 – 35	25 – 30	15 – 40	15 – 50
CITRUS – PLASTON	20 – 45	25 – 40	15 – 50	15 – 60
BELFAST – STEELPOORT	20 – 40	25 – 35	15 – 45	15 – 55
DERWENT – ROOSSENEKAL	20 – 40	25 – 35	15 – 45	15 – 55
PRETORIA CENTRAL METRO AREA	20 – 40	25 – 35	15 – 45	15 – 55
SALDANHA – BAMBOESBAAI	20 – 50	25 – 45	15 – 55	15 – 60
* BAMBOESBAAI – SISHEN	25 – 40	30 – 35	20 – 45	20 – 55
RICHARDSBAY – ULUNDI	20 – 45	–	20 – 55	–
* ULUNDI – PIET RETIEF	20 – 40	25 – 35	20 – 50	15 – 55
PIET RETIEF – * SHEEPMORE	20 – 40	25 – 35	20 – 50	15 – 55
SHEEPMORE – ERMELO	15 – 35	20 – 30	15 – 45	10 – 50
* ERMELO – BROODSNYERSPLAAS	15 – 40	20 – 35	15 – 50	10 – 55
BROODSNYERSPLAAS – OGIES	15 – 40	20 – 35	15 – 50	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".

DESTRESSING AND WORKING TEMPERATURE RANGES

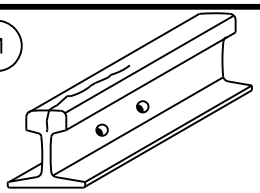
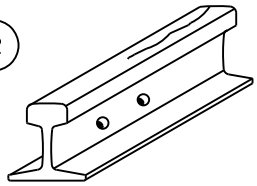
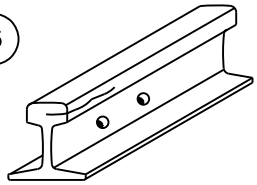
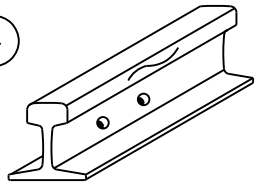
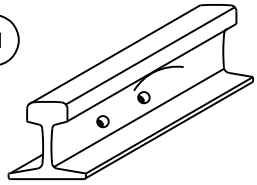
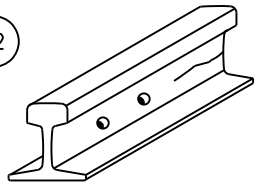
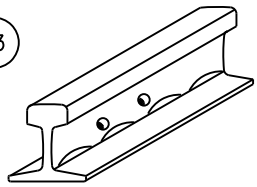
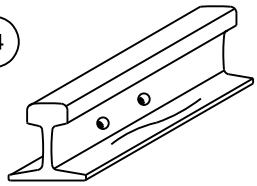
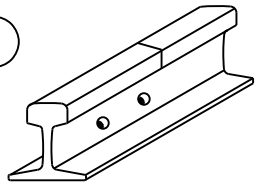
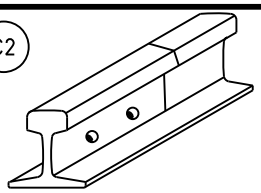
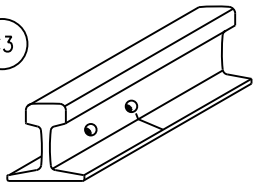
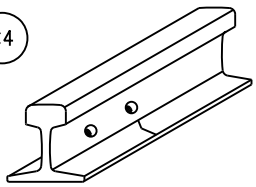
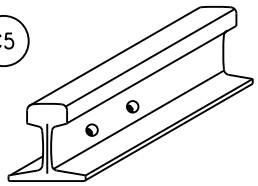
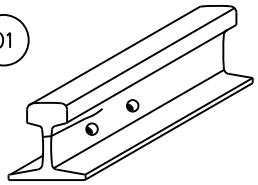
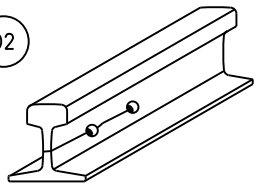
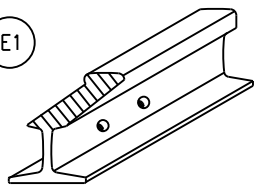
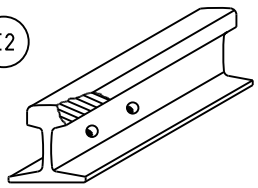
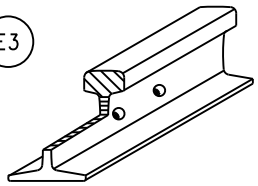
SECTION	DESTRESSING RANGES		WORKING RANGES FOR TRACK	
	THROUGH LINES	YARD TRACKS		
	A	D	B	C
KLERKSDORP – * POTCHEFSTROOM	20 – 35	25 – 30	20 – 40	15 – 50
POTCHEFSTROOM – * KRUGERSDORP	20 – 40	25 – 35	15 – 45	15 – 55
KRUGERSDORP – JOHANNESBURG	15 – 40	20 – 35	10 – 45	10 – 55
JOHANNESBURG – OLIFANTSFONTEIN	15 – 40	20 – 35	10 – 45	10 – 55
POTCHEFSTROOM – VEREENIGING	20 – 40	25 – 35	15 – 45	15 – 55
VEREENIGING – GERMISTON	20 – 40	25 – 35	15 – 45	15 – 55
VOLKSRUST – * STANDERTON	15 – 35	20 – 30	10 – 40	10 – 50
STANDERTON – * HEIDELBERG	20 – 35	25 – 30	15 – 40	15 – 50
HEIDELBERG – GERMISTON	20 – 40	25 – 35	15 – 45	15 – 55
BALFOUR NORTH – * GROOTVLEI	20 – 35	25 – 30	15 – 40	15 – 50
GROOTVLEI – REDAN	20 – 40	25 – 35	15 – 45	15 – 55
FIRHAM – VREDE	20 – 35	25 – 30	15 – 40	15 – 50
VOLKSRUST – BREYTEN	15 – 40	20 – 35	10 – 45	10 – 55
BETHAL – SPRINGS	20 – 40	25 – 35	15 – 45	15 – 55
SPRINGS – KAYDALE	20 – 40	25 – 35	15 – 45	15 – 55
MIDWAY – HOUTHEUWEL	20 – 35	25 – 30	15 – 40	15 – 50
BANK – LANGLAAGTE	20 – 35	25 – 30	15 – 40	15 – 50
MAFIKENG – * KRUGERSDORP	25 – 40	30 – 35	20 – 45	20 – 55
APEX – WITBANK	20 – 35	25 – 30	15 – 40	15 – 50
DELMAS – HAWEKLIP	20 – 35	25 – 30	15 – 40	15 – 50
SENTRARAND AREA	15 – 35	20 – 30	10 – 40	10 – 50
JOHANNESBURG CENTRAL METRO AREA	15 – 40	20 – 35	10 – 45	10 – 55
OLIFANTSFONTEIN – * IRENE	15 – 40	20 – 35	10 – 45	10 – 55
IRENE – PRETORIA	20 – 40	25 – 35	15 – 45	15 – 55
PRETORIA – * WARMBATHS	20 – 40	25 – 35	15 – 45	15 – 55
WARMBATHS – * POTGIETERSRUS	20 – 45	25 – 40	15 – 55	15 – 60
POTGIETERSRUS – BEITBRIDGE	20 – 45	25 – 40	15 – 50	15 – 50
* PRETORIA – * WATERVAL BOVEN	20 – 40	25 – 35	15 – 50	15 – 55
WATERVAL BOVEN – * NELSPRUIT	20 – 45	25 – 40	15 – 55	15 – 60
NELSPRUIT – KOMATIPOORT	25 – 45	30 – 40	20 – 55	20 – 60
HERCULES – MAGALIESBURG	20 – 40	25 – 35	15 – 45	15 – 55
PRETORIA – BRITS	20 – 40	20 – 35	15 – 45	15 – 55
BRITS – RUSTENBURG	20 – 40	25 – 35	15 – 45	15 – 55
RUSTENBURG – * THABAZIMBI	20 – 40	25 – 35	15 – 45	15 – 55
THABAZIMBI – ELLISRAS	25 – 40	30 – 35	20 – 45	20 – 55
BRITS – ATLANTA	20 – 40	25 – 35	15 – 45	15 – 55
NYLSTROOM – VAALWATER	20 – 40	25 – 35	15 – 45	15 – 55
NABOOMSPRUIT – ZEBEDIELA	20 – 40	25 – 35	15 – 45	15 – 55
PIENAARSRIVIER – MARBLE HALL	25 – 40	30 – 35	20 – 45	20 – 55
RAYTON – CULLINAN	20 – 40	25 – 35	15 – 45	15 – 55
GROENBULT – KAAPMUIDEN	25 – 45	30 – 40	20 – 50	20 – 60
HOEDSPRUIT – PHALABORWA	25 – 45	30 – 40	20 – 50	20 – 60
* KAAPMUIDEN – BARBERTON	20 – 45	25 – 40	15 – 50	15 – 60
* NELSPRUIT – GRASKOP	20 – 35	25 – 30	15 – 40	15 – 50
CITRUS – PLASTON	20 – 45	25 – 40	15 – 50	15 – 60
BELFAST – STEELPOORT	20 – 40	25 – 35	15 – 45	15 – 55
DERWENT – ROOSSENEKAL	20 – 40	25 – 35	15 – 45	15 – 55
PRETORIA CENTRAL METRO AREA	20 – 40	25 – 35	15 – 45	15 – 55
SALDANHA – BAMBOESBAAI	20 – 50	25 – 45	15 – 55	15 – 60
* BAMBOESBAAI – SISHEN	25 – 40	30 – 35	20 – 45	20 – 55
RICHARDSBAY – ULUNDI	20 – 45	–	20 – 55	–
* ULUNDI – PIET RETIEF	20 – 40	25 – 35	20 – 50	15 – 55
PIET RETIEF – * SHEEPMORE	20 – 40	25 – 35	20 – 50	15 – 55
SHEEPMORE – ERMELO	15 – 35	20 – 30	15 – 45	10 – 50
* ERMELO – BROODSNYERSPLAAS	15 – 40	20 – 35	15 – 50	10 – 55
BROODSNYERSPLAAS – OGIES	15 – 40	20 – 35	15 – 50	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".

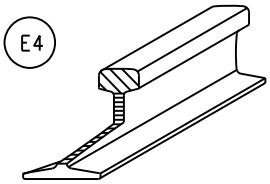
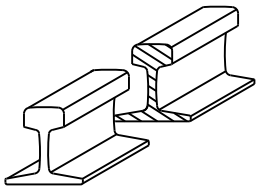
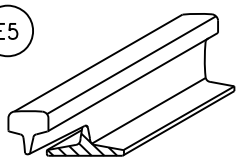
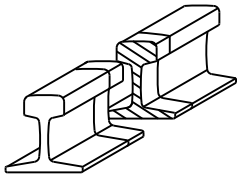
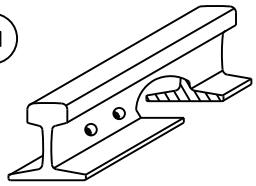
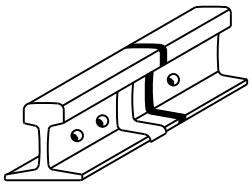
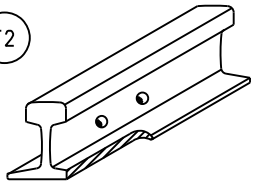
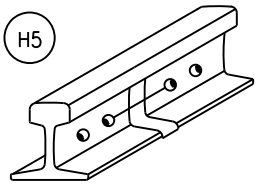
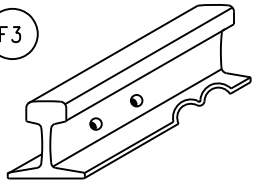
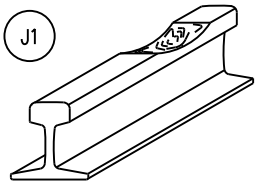
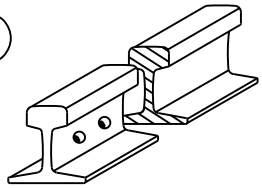
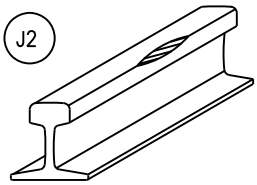
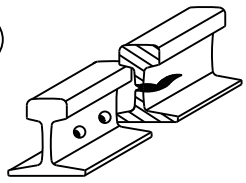
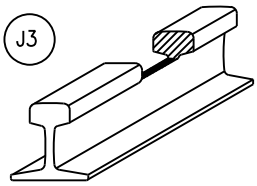
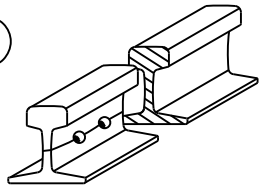
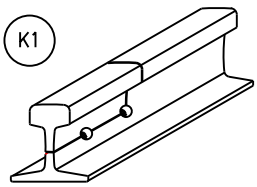
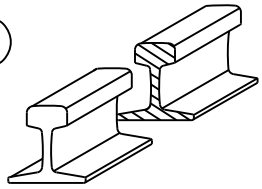
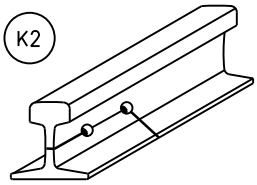
TYPICAL RAIL DEFECTS AND FRACTURES

ANNEXURE 17
SHEET 1 of 7

A1		VERTICAL CRACK THROUGH CROWN AT END.	
A2		CRACK THROUGH CROWN OF RAIL IN RUNNING SURFACE.	
A3		HORIZONTAL CRACK IN HEAD OF RAIL AT END.	
A4		HORIZONTAL CRACK IN SIDE OF HEAD OF RAIL.	
B1		CRACK ALONG RAIL AT JUNCTION OF HEAD AND WEB.	
B2		HORIZONTAL CRACK IN BODY OF WEB.	
B3		CRACKS AT JUNCTION OF WEB AND FLANGE (OVER SLEEPERS).	
B4		CRACK ALONG FLANGE OF RAIL.	
C1		TRANSVERSE CRACK ACROSS HEAD.	
C2		TRANSVERSE CRACK ACROSS HEAD ORIGINATING FROM TRACK BOND.	
C3		TRANSVERSE CRACK ACROSS FLANGE ORIGINATING FROM TRACK BOND.	
C4		TRANSVERSE CRACK ACROSS FLANGE.	
C5		VERTICAL CRACK IN SECTION OF RAIL AT END.	
D1		CRACK IN WEB OF RAIL AT END.	
D2		CRACK IN WEB ALONG FISH-BOLT HOLES.	
E1		PIECE OF CROWN BROKEN AWAY AT END.	
E2		PIECE BROKEN AWAY FROM SIDE OF HEAD AT END.	
E3		HEAD OF RAIL BROKEN AWAY AT END.	

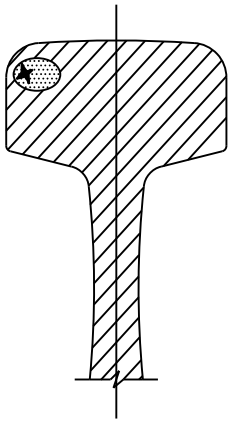
TYPICAL RAIL DEFECTS AND FRACTURES

ANNEXURE 17
SHEET 2 of 7

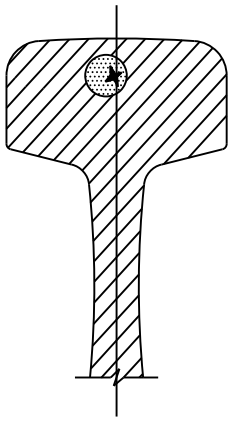
E4		PORTION OF HEAD AND WEB OF RAIL BROKEN AWAY AT END.	 H1 BREAK THROUGH FLASH-BUTT WELD. H4 BREAK THROUGH ARC-BUTT WELD.
E5		PORTION OF WEB AND FLANGE OF RAIL BROKEN AWAY AT END.	 H2 BREAK THROUGH THERMIT WELD. H6 BREAK THROUGH THERMIT WELD AT JUNCTION RAIL.
F1		PORTION OF WEB AND FLANGE OF RAIL BROKEN OUT.	 H3 BREAK THROUGH RAIL ADJACENT TO THERMIT WELD. H7 BREAK THROUGH RAIL ADJACENT TO THERMIT WELD. AT JUNCTION RAIL.
F2		PORTION OF FLANGE BROKEN AWAY AT END.	H5  CRACK ACROSS EXTHERMIT WELD.
F3		PIECE OF FLANGE BROKEN OUT.	J1  RAIL DAMAGED BY SPINNING WHEELS.
G1		BREAK THROUGH SECTION OF RAIL.	J2  PIECE BROKEN OUT FROM SIDE OF CROWN.
G2		BREAK THROUGH SECTION OF RAIL AND LONGITUDINAL CRACK IN WEB.	J3  PORTION BROKEN OUT OF CROWN OF RAIL.
G3		BREAK THROUGH HEAD AND FLANGE OF RAIL WITH CRACKS EXTENDING INTO THE FISH-BOLT HOLES.	K1  PIECE OF HEAD AND WEB BROKEN AWAY THROUGH FISH-BOLT HOLES.
G4		BREAK THROUGH SECTION OF RAIL, ANNEXURE 17 SHEET 3.	K2  PIECE OF WEB AND FLANGE BROKEN AWAY THROUGH FISH-BOLT HOLES.

TRANSVERSE FISSURES (G4)

EARLY STAGE

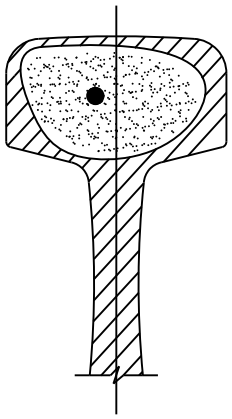


NUCLEUS
OFF-CENTRE

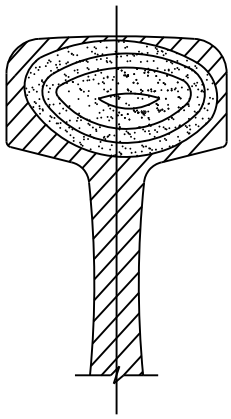


NUCLEUS CENTRAL

LATE STAGE



NUCLEUS OFF-
CENTRE WITHOUT RINGS



NUCLEUS CENTRAL
WITH RINGS

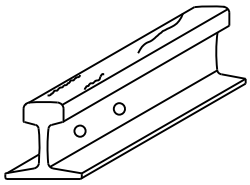
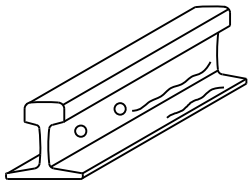
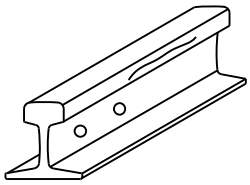
REMARKS:

1. THE TRANSVERSE FISSURE FLAW IS A PROGRESSIVE CROSSWISE FRACTURE STARTING FROM A NUCLEUS INSIDE THE HEAD OF THE RAIL AND SPREADING OUTWARDS UNTIL FRACTURE OF THE RAIL RESULTS. THE FLAW SPREADS MORE QUICKLY AS IT BECOMES LARGER.
2. THE SKETCHES ABOVE INDICATE VARIOUS STAGES OF THE DEVELOPMENT OF TRANSVERSE FISSURES. (USE IN THIS SEQUENCE).
3. THE SKETCHES ABOVE INDICATE VARIOUS STAGES OF THE DEVELOPMENT OF TRANSVERSE FISSURES (THE SKETCHES ARE NOT SPECIFIC IN SEQUENCE AS SHOWN ON THE DRAWING.
4. ULTRASONIC TESTING PROVIDES THE MOST SUCCESSFUL METHOD OF ESTABLISHING THE PRESENCE OF SUCH FISSURES.
5. WHEN CRACKS ACROSS THE CROWN OF A RAIL ARE DISCOVERED, THE RAIL, AFTER REMOVAL FROM THE TRACK, MUST BE BROKEN TO ESTABLISH WHETHER A TRANSVERSE FISSURE FLAW IS THE CAUSE, AND TO WHAT EXTEND IT CORRELATES WITH ULTRASONIC TESTS.

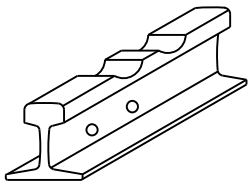
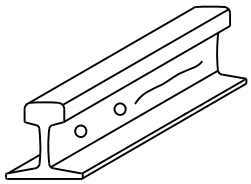
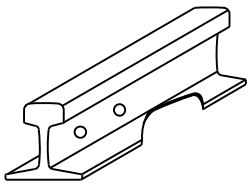
RAIL DEFECTS AND FRACTURES : SAFETY PRECAUTIONS TO BE OBSERVED

NO RESTRICTIONS (EXCLUDING HEAVY HAUL LINES)

DEFECTS AS ILLUSTRATED, BUT NOT LONGER THAN 150mm

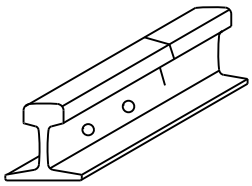
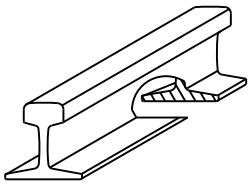
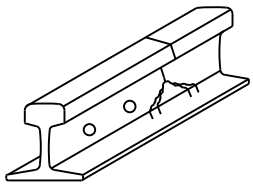
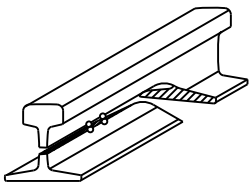
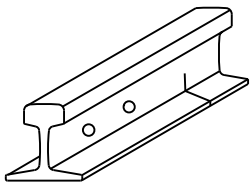




LESS THAN
2mm DEEP

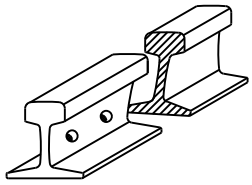
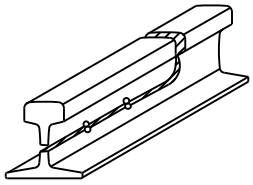
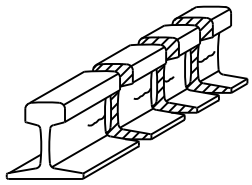
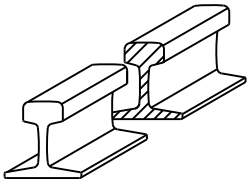
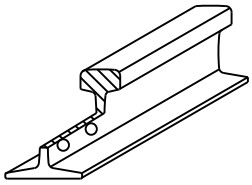
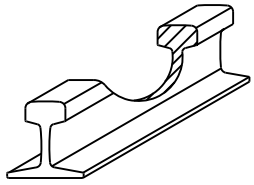
MAXIMUM SPEED 15km/h (EXCLUDING HEAVY HAUL LINES)

DEFECTS AS ILLUSTRATED ABOVE, BUT LONGER THAN 150mm, PLUS THOSE ILLUSTRATED HERE.

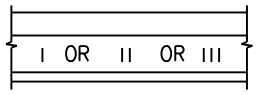
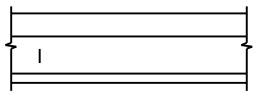
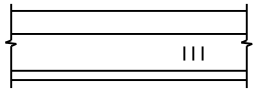
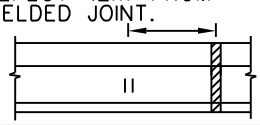
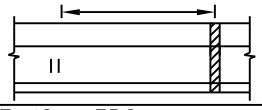
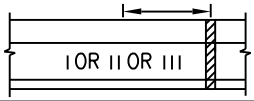
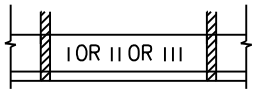
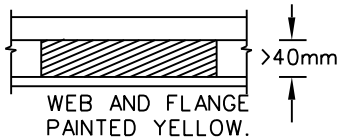
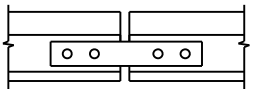
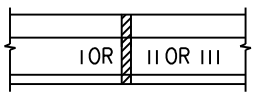
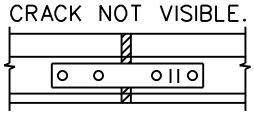
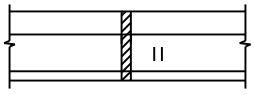
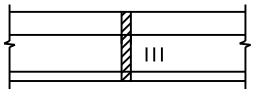
STOP **WAIT FOR PERMANENT WAY STAFF**

DEFECTS AS ILLUSTRATED AND ALL OTHERS NOT SHOWN.

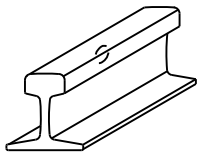
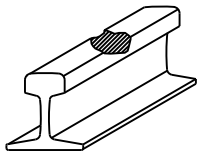
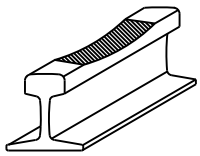
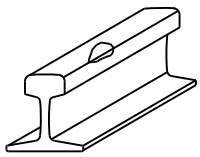
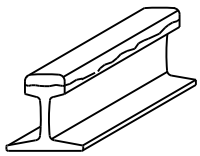
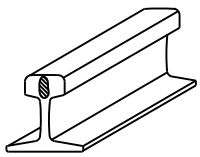
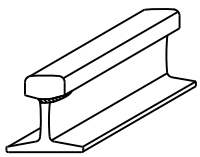
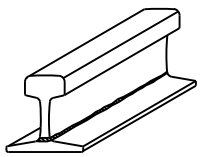







RAILS WITH ULTRASONIC - DETECTED DEFECTS

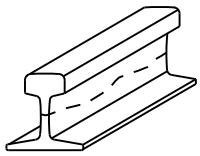
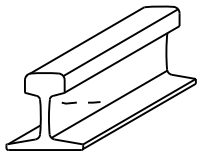
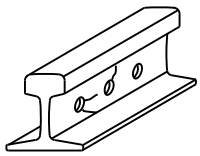
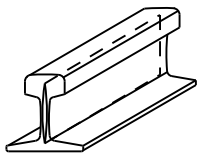
ANNEXURE 17
SHEET 5 of 7

TYPE OF DEFECT	ULTRASONIC MARK	INDICATION OF ULTRASONIC DEFECT	ACTION
TRANSVERSE FISSURE IN RAIL	VERTICAL YELLOW STRIPES PAINTED ON RAIL WEB.  I = DEFECT < 15mm II = 15 ≤ DEFECT < 25mm III = DEFECT ≥ 25mm	S - LINES 	CUT OUT DEFECT IMMEDIATELY AND REPLACE WITH CLOSURE RAIL.
		N1, N2 AND N3 LINES 	CUT OUT DEFECT IMMEDIATELY AND REPLACE WITH CLOSURE RAIL.
		DEFECT <2m FROM WELDED JOINT. 	CUT OUT DEFECT AND REPLACE WITH CLOSURE RAIL.
		DEFECT >2m FROM WELDED JOINT. 	STRENGTHEN TEMPORARILY WITH FISHPLATES AND FISHBOLTS OR JOGGLED FISHPLATES.
		DEFECT <2m FROM WELDED JOINT. 	CUT OUT DEFECT AND DEFECTIVE WELDED JOINT AND REPLACE WITH CLOSURE RAIL.
		>1 DEFECTS BETWEEN FISHPLATED OR WELDED JOINT. 	CUT OUT AND REPLACE TOTAL LENGTH BETWEEN JOINTS.
PIPING IN RAIL	 WEB AND FLANGE PAINTED YELLOW.		CUT TOTAL PIPE LENGTH OUT AND REPLACE WITH CLOSURE RAIL.
DEFECT AT FISHPLATED JOINT	 BOTH FISHPLATES PAINTED YELLOW.		REMOVE FISHPLATES AND IF CRACKS ARE VISIBLE, REPLACE THE WHOLE CRACKED RAIL OR PART OF IT WITH CLOSURE RAIL.
DEFECT AT WELDED JOINT	 WEB OF RAIL PAINTED AT THE WELDED JOINT WITH VERTICAL YELLOW STRIPES. (EXCLUDING HEAVY HAUL LINES. SEE CHAPTER 20).	CRACK NOT VISIBLE. 	STRENGTHEN WITH YELLOW PAINTED JOGGLED FISHPLATES.
		CRACK VISIBLE. 	IF CRACKS IS VISIBLE AFTER REMOVAL OF JOGGLED FISHPLATES, CUT OUT AND REPLACE WITH CLOSURE RAIL.
			CUT OUT DEFECT IMMEDIATELY AND REPLACE WITH CLOSURE RAIL.

CLASSIFICATION OF RAIL DEFECTS FOR ULTRASONIC TEST

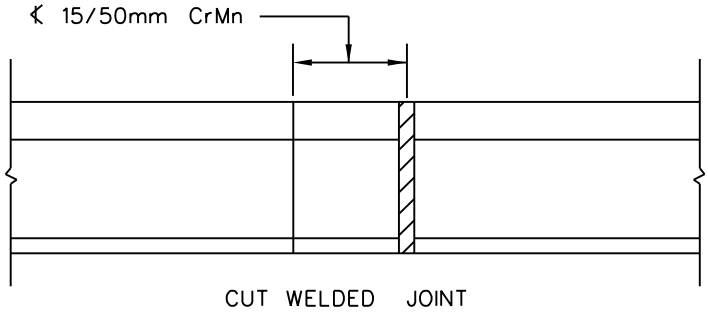
TYPE OF DEFECT	CODE TYPE	CODE SIZE	COMMENTS	
1 TRANSVERSE DEFECTS IN RAIL HEAD (TRANSVERSE FISSURES)	TD	XX	WHERE XX DENOTES SIZE OF DEFECT C2, C1, G4	
2 SURFACE DEFECTS (VISUAL CROWN BREAK OUT) SHELLING, SPALLING, HEAD CHECKS	SD	XX	WHERE XX DENOTES SIZE OF DEFECT J2, J3, K1	
3 ENGINE BURN FRACTURE	TD/EBF	XX	WHRER XX DENOTES SIZE OF DEFECT J1	
4 MULTIPLE TRANSVERSE HEAD DEFECTS	TDX	XX	WHERE XX DENOTES SIZE OF DEFECT C1, C2, G4	
5 HORIZONTAL SPLIT HEAD	HSH	XX	WHERE XX DENOTES SIZE OF DEFECT LENGTH IN RAIL APPLICABLE A3, A4	
6 VERTICAL SPLIT HEAD	VSH	XX	WHERE XX DENOTES SIZE OF DEFECT LENGTH IN RAIL APPLICABLE A1, A2	
7 HEAD AND WEB SEPARATION	HW	XX	WHERE XX DENOTES SIZE OF DEFECT LENGTH IN RAIL APPLICABLE B1	
8 FOOT AND WEB SEPARATION	FW	XX	WHERE XX DENOTES SIZE OF DEFECT LENGTH IN RAIL APPLICABLE B3	

CLASSIFICATION OF RAIL DEFECTS FOR ULTRASONIC TEST

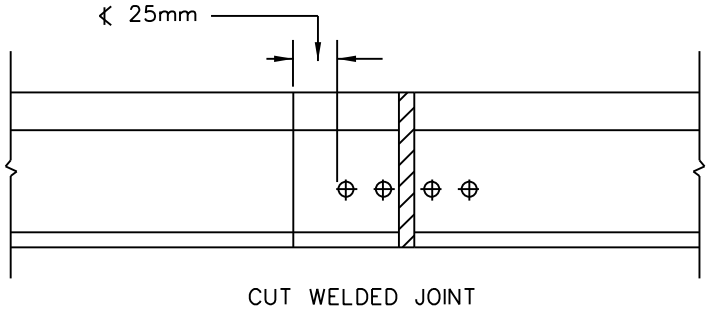
TYPE OF DEFECT	CODE TYPE	CODE SIZE	COMMENTS	
9 HORIZONTAL SPLIT WEB	HSW	XX	WHERE XX DENOTES SIZE OF DEFECT LENGTH IN RAIL APPLICABLE D1, B2	
10 SPLIT WEB VERTICAL TRANSVERSE	SW	XX	WHERE XX DENOTES SIZE OF DEFECT LENGTH IN RAIL APPLICABLE C5	
11 BOLT HOLE CRACK (ALL ANGLES)	BH	XX	WHERE XX DENOTES SIZE OF DEFECT LENGTH IN RAIL APPLICABLE C3, D2, K1, K2, G3	
13 PIPED RAIL	PR	XX	WHERE XX DENOTES SIZE OF DEFECT LENGTH IN RAIL APPLICABLE C5	
14 DEFECTIVE WELD	DW	XX	WELD INFORMATION MUST BE SPECIFIED IN REMARKS COLUMN. SIZES IN WEB AND HEAD MUST BE REPORTED SEPERATELY WHERE XX DENOTES SIZE OF DEFECT. H1 (FLASH BUTT WELD) H2,H3,H5,H6,H7 (THERMIT WELD) H4 (OTHER WELDS)	
17 BROKEN RAIL	BR		SIZE NOTATION NOT APPLICABLE G1,G2,G3,E1,E2,E3,E4,E5,C1,C2,F3	
18 MECHANICAL JOINT SUSPECT	MJS			
19 CORRODED RAIL	CR		SEE MANUAL FOR TRACK MAINTENANCE	

MINIMUM CUT DISTANCE FROM WELDED JOINTS AND MINIMUM DISTANCE BETWEEN JOINTS

MINIMUM CUT DISTANCE FROM WELDED JOINTS

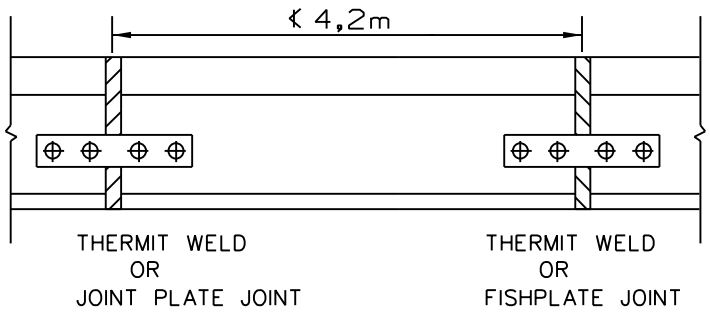


IF WELD IS DEFECTIVE, CUT RAIL NOT CLOSER THAN 15/50mm CrMn FROM THE CENTRE OF AN EXISTING WELDED JOINT. IF WELD IS SOUND, THE CUT MAY BE MADE THROUGH THE WELD.



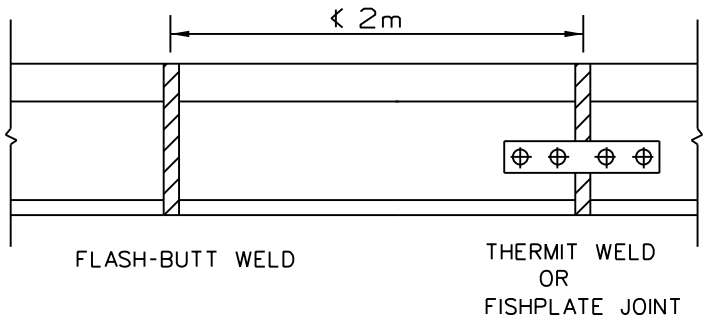
CUT RAIL NOT CLOSER THAN 25mm FROM THE EDGE OF AN EXISTING JOINT PLATE HOLE.

MINIMUM DISTANCE BETWEEN RAIL JOINTS



MINIMUM DISTANCE BETWEEN THERMIT WELD/FISHPLATE JOINT AND THERMIT WELD/JOINT PLATE JOINT MUST BE AT LEAST 4,2m.

EXCEPT IN THE CASE OF INSULATED JOINTS

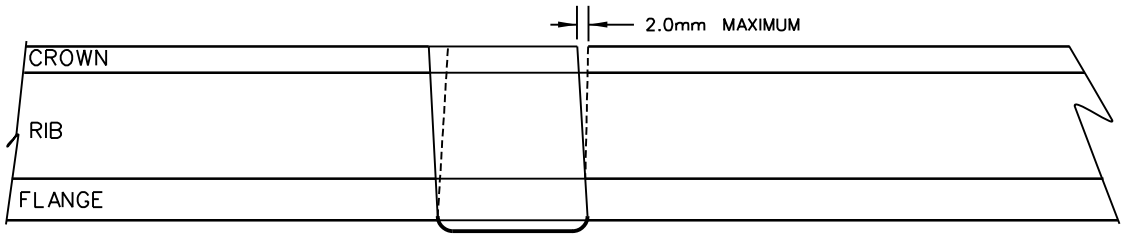


MINIMUM DISTANCE BETWEEN THERMIT WELD/JOINT PLATE JOINT AND FLASH-BUTT WELD MUST BE AT LEAST 2m. ANY DEVIATION MUST BE APPROVED BY THE DEPOT ENGINEER PERSONALLY.

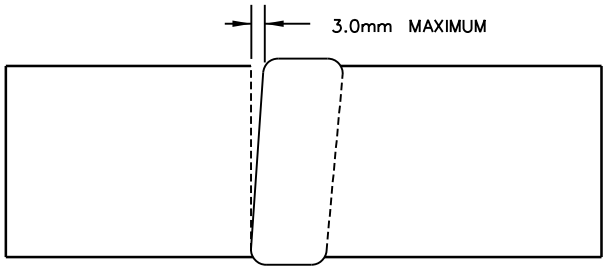
TOLERANCES FOR VERTICAL AND SQUARENESS OF MOULD ALIGNMENT

(All measurements must be done with an engineering square)

Vertical alignment is to be measured at the top of rail.

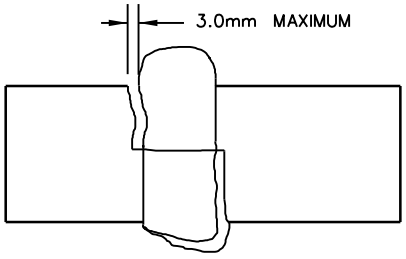


SQUARENESS



MOULD SQUARENESS AND ALIGNMENT ARE MEASURED AT THE WELD COLLAR ON THE UNDERSIDE OF THE RAIL.

MOULD ALIGNMENT

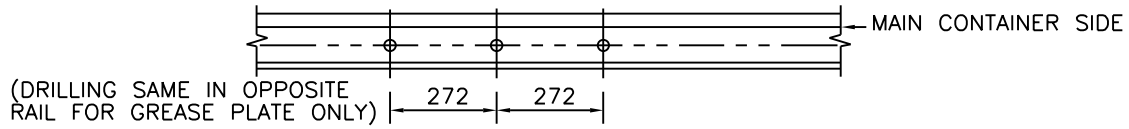


MISALIGNMENT IS MEASURED AT THE WELD COLLAR ON THE UNDERSIDE OF THE RAIL.

RAIL DRILLING FOR METRIC P AND M LUBRICATORS

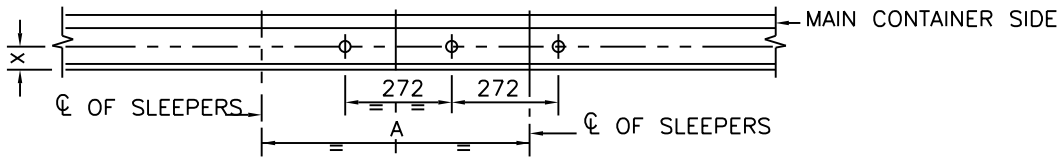
ANNEXURE 19
SHEET 1 of 1

POINTS BLADE LUBRICATORS

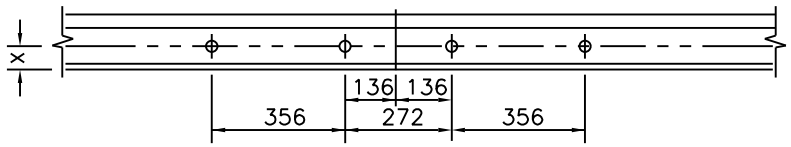


MODEL : C4/DSB

RUNNING RAIL LUBRICATORS

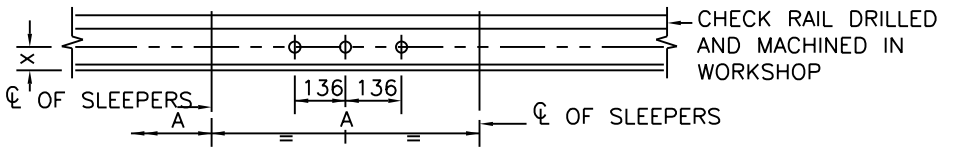


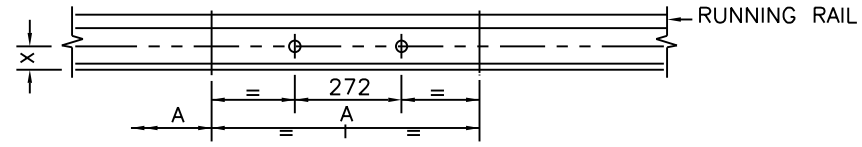
MODEL : C4



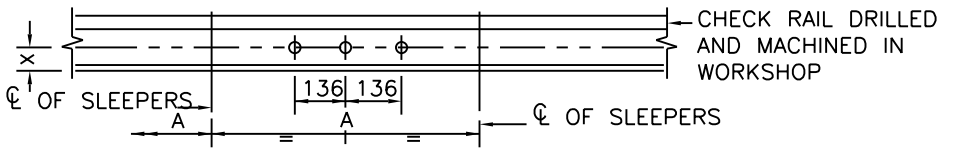
MODEL : C4/LG1

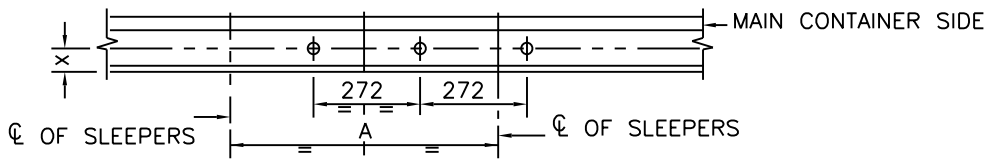
CHECK RAIL LUBRICATOR





MODEL : C4/DCR3





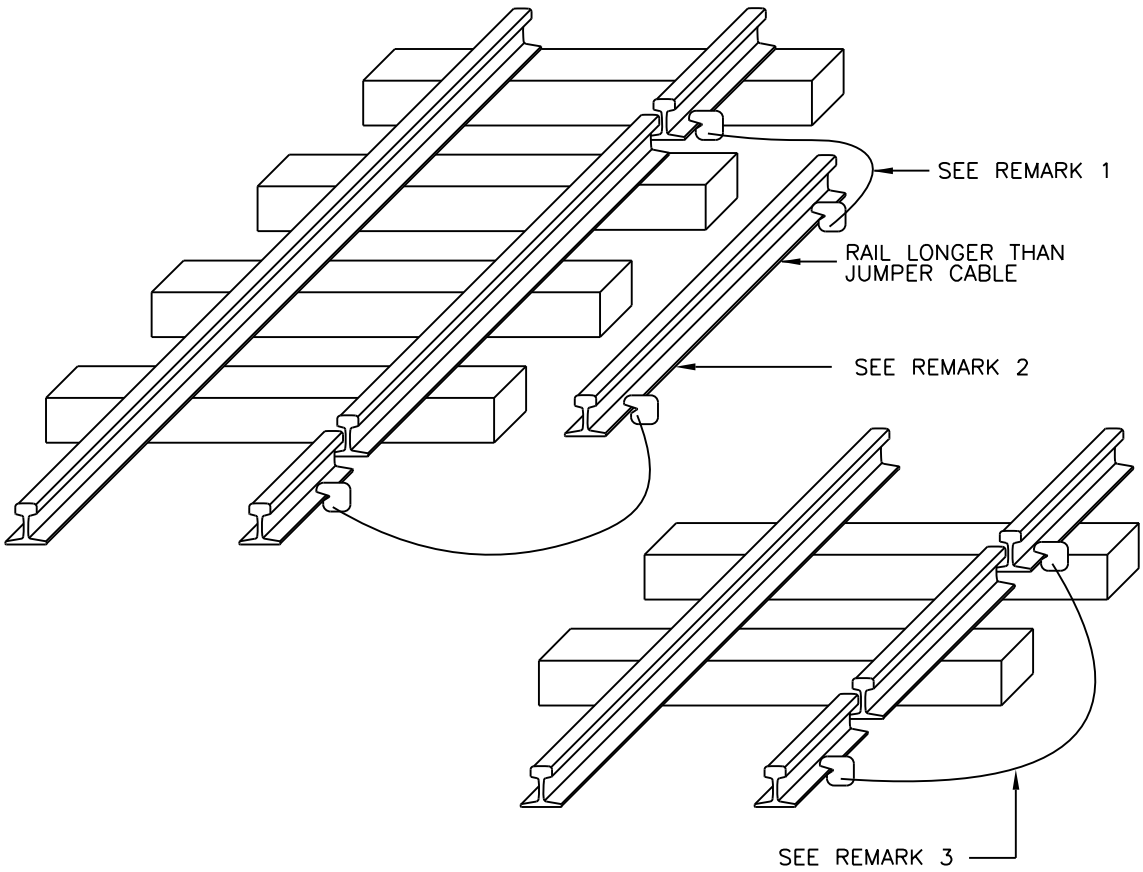
MODEL : C4/DCR

RAIL (kg)	DIMENSIONS	
	A	X
30	800	46
40	700	54
48	650/700	66
57	650/700	80

REMARKS:
1. ALL HOLES MUST BE DRILLED ø22mm.

JUMPERING WHEN TRACTION RAIL IS REPLACED

ANNEXURE 20
SHEET 1 of 1

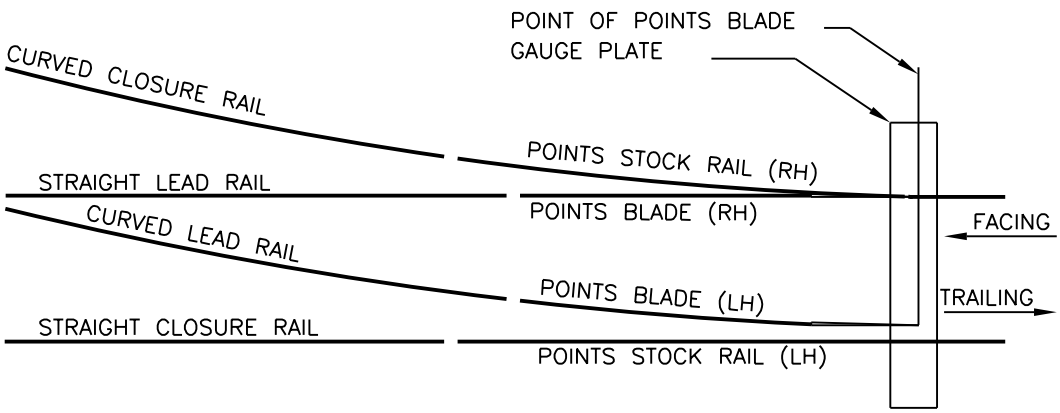


REMARKS:

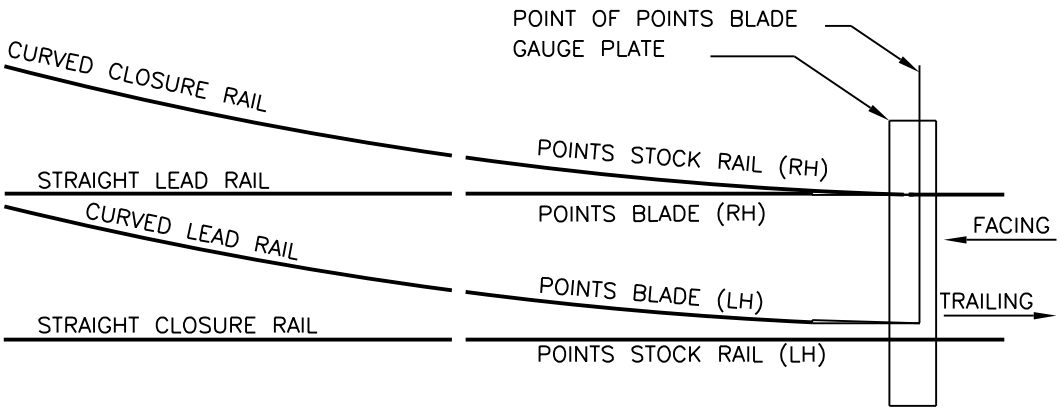
1. SINGLE JUMPER CABLE FOR AC, DOUBLE JUMPER CABLE FOR DC, SEE SPECIFICATION CEE.0079 (LATEST REVISION).
2. USING TWO JUMPER CABLES, ATTACH ONE CLAMP OF EACH JUMPER TO EACH END OF THE NEW RAIL. ATTACH CLAMPS AT THE OTHER END OF EACH CABLE TO THE RAILS ON EITHER SIDE OF THE RAIL TO BE REMOVED. THE BASE OF THE JUMPER CLAMP AND THE RAIL MUST NEVER BE TOUCHED SIMULTANEOUSLY WHEN CONNECTING OR DISCONNECTING. THE CLAMP MUST BE PUSHED ONTO THE RAIL FLANGE BY HOLDING ONTO THE INSULATED CABLE. WHILE MAINTAINING THIS CONTACT, THE CLAMP MUST BE FIXED FIRMLY ONTO THE RAIL TO ENSURE CONTINUOUS ELECTRICAL CONTACT.
3. WHEN REPLACING SHORT LENGTHS OF RAIL OR FITTING FISH PLATES ACROSS A RAIL BREAK, THE JUMPER MAY BE CONNECTED DIRECTLY ACROSS THE GAP BEFORE FITTING OF THE FISH PLATES OR REMOVAL OF THE PORTION OF RAIL.
4. JUMPER CABLES MUST BE USED WHEN INSTALLING OR REMOVING JOGGLED FISH PLATES AT A BROKEN WELD, AS WELL AS DURING TRACK WELDING.
5. ON ALTERNATING-CURRENT SECTIONS BOTH RAILS OF OFF-TRACKING PLATFORMS FOR ON TRACK MACHINES MUST BE CONNECTED TO THE RUNNING RAIL BY MEANS OF JUMPER CABLES BEFORE THE OFF-TRACKING PLATFORMS ARE USED.

TYPICAL TURNOUTS : SETS OF POINTS

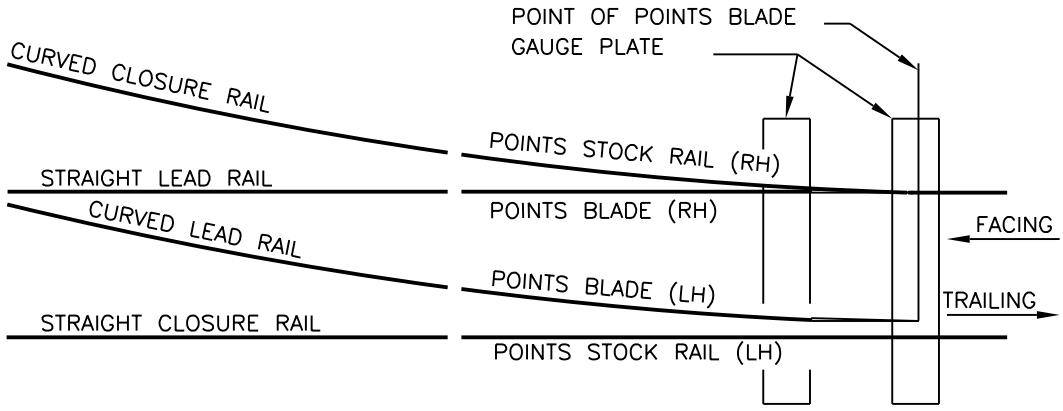
ANNEXURE 21
SHEET 1 of 3



SEMI–CURVED HINGED POINTS BLADE

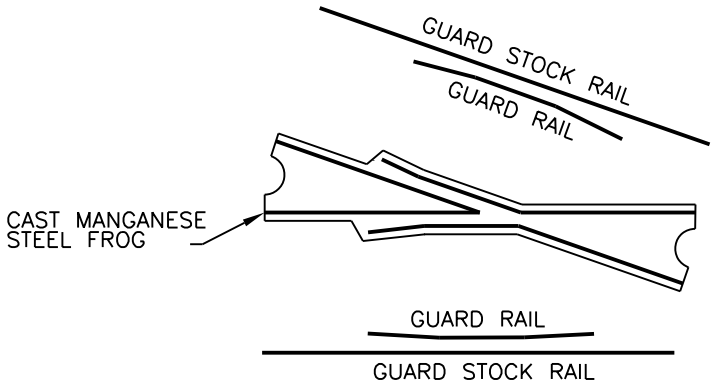


FULLY CURVED FLEXIBLE POINTS BLADE

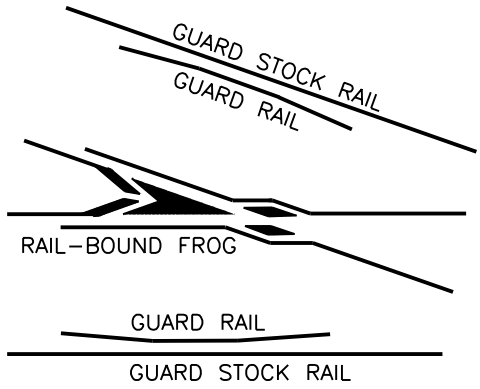


TRAILABLE SELF–NORMALISING POINTS BLADE

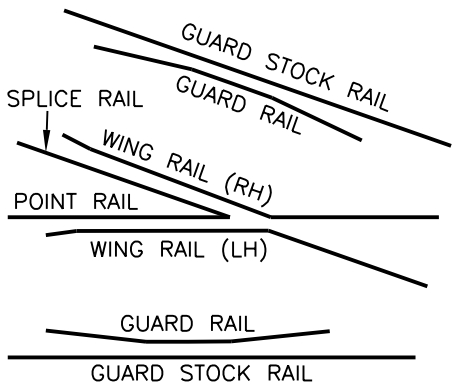
TYPICAL TURNOUTS : CROSSINGS



CROSSING WITH MANGANESE STEEL FROG



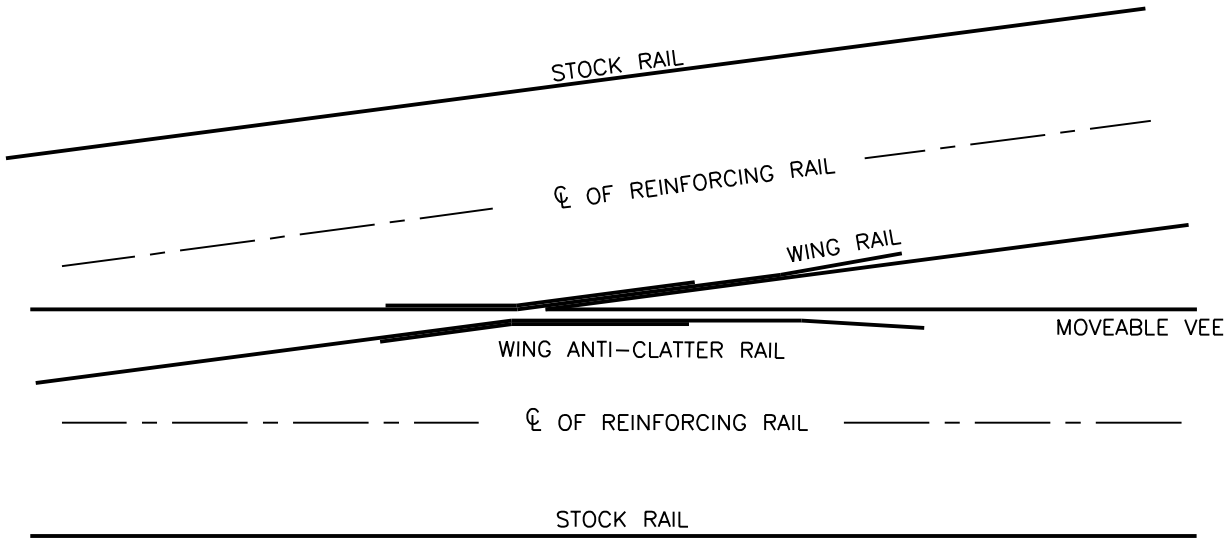
CROSSING WITH RAIL–BOUND FROG



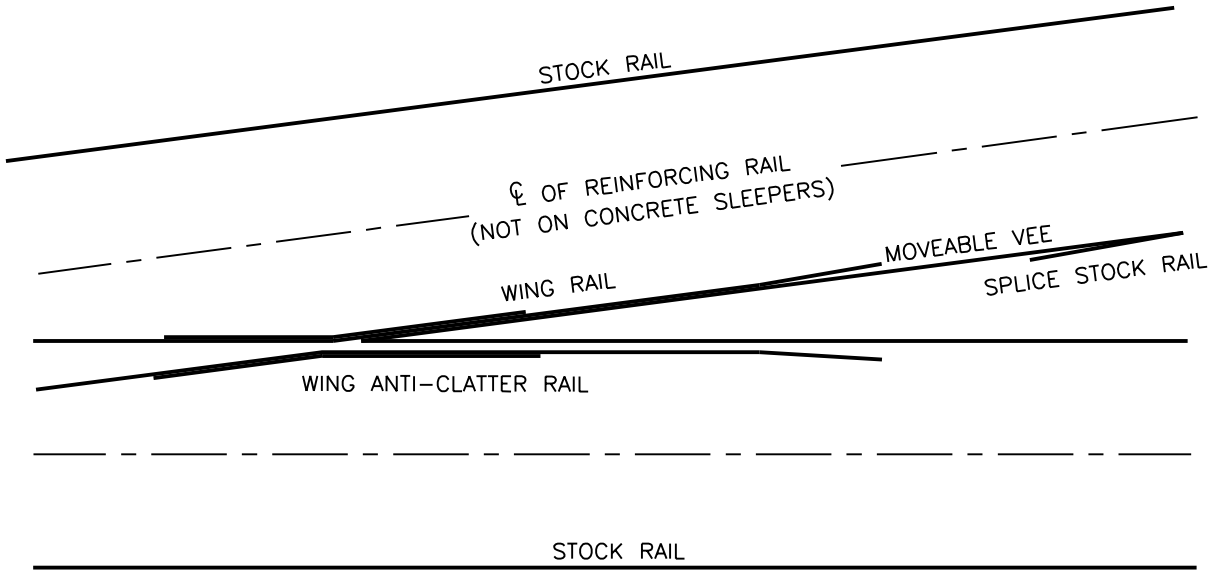
CROSSING WITH RAIL–MANUFACTURED FROG

TYPICAL TURNOUTS : CROSSINGS WITH MOVEABLE VEE

ANNEXURE 21
SHEET 3 of 3



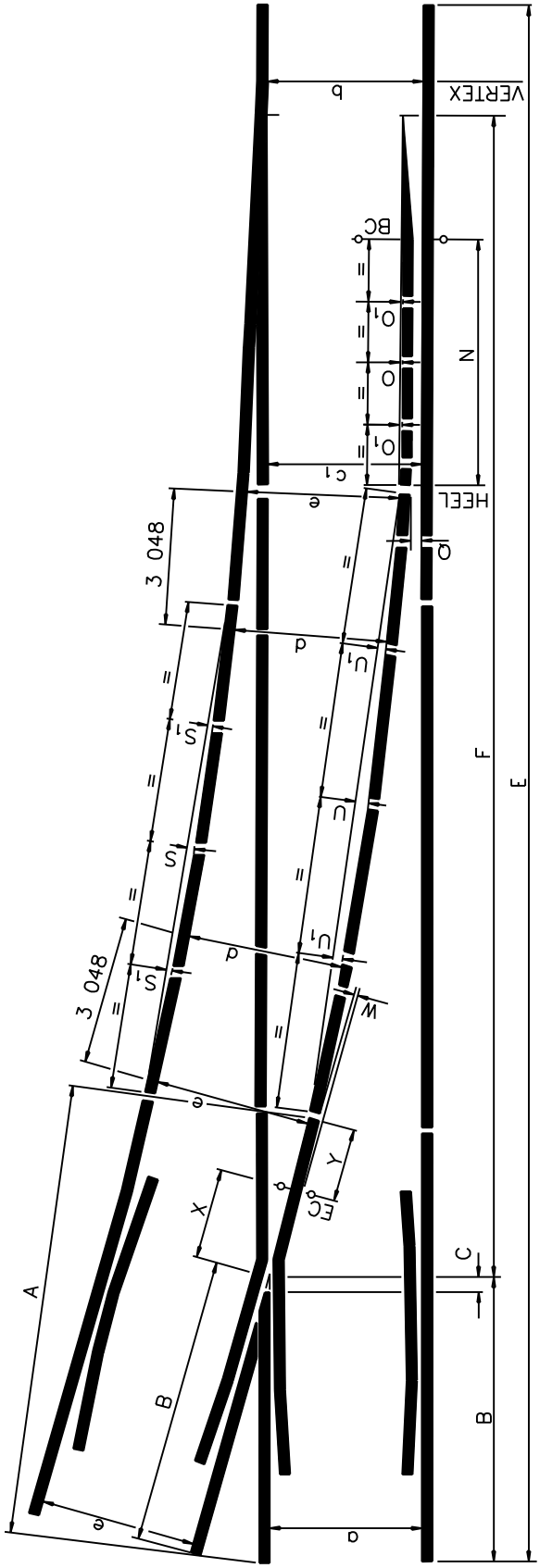
WITH HINGED JOINT



WITH BACK SLIDING JOINT

TURNOUTS WITH SEMI–CURVED HINGED POINTS BLADES : LAYOUT

ANNEXURE 22
SHEET 1 of 7



REMARKS:
1. THE GAUGE OF THE STRAIGHT TRACK WILL BE NOMINAL THROUGHOUT, EXCEPT BETWEEN POINT AND HEEL OF POINTS BLADE.
2. ⊕ THIS DESIGN IS BASED ON ORIGINAL 3'–6" GAUGE.
3. ⊕ EQUAL–SPLIT SET.
4. FOR OTHER DIMENSIONS SEE ANNEXURE 23 SHEETS 1 AND 4.

a	DESIGN	RAIL	ANGLE	GAUGE			
				b	c_1	d	e
1 067 ⊕ 610	HINGED POINTS BLADE	48kg	1:9 AND 1:12	1 073	1 067	1 073	1 070
		48kg	1:8	1 080	1 067	1 080	1 070
		48kg	1:7	1 080	1 073	1 080	1 070
		48kg	1:6 ⊕	1 073	1 073	1 070	1 070
		30kg	1:9	616	613	616	613

TURNOUTS WITH FULLY CURVED FLEXIBLE POINTS BLADES : LAYOUT

REMARKS:

1. THE GAUGE OF THE STRAIGHT TRACK WILL BE NOMINAL THROUGHOUT, EXCEPT BETWEEN POINT AND HEEL OF POINTS BLADE.
2. ◈ THIS DESIGN IS BASED ON ORIGINAL 3'–6" GAUGE.
3. FOR OTHER DIMENSIONS SEE ANNEXURE 23 SHEETS 1 AND 3.

a	DESIGN	RAIL	ANGLE	GAUGE		
				a	b	c_1
1 067 ◈	FULLY CURVED FLEXIBLE POINTS BLADE	48/51kg	1:12	1 067	1 073	1 070
1 065		57/60kg	1:20	1 065	1 070	1 070

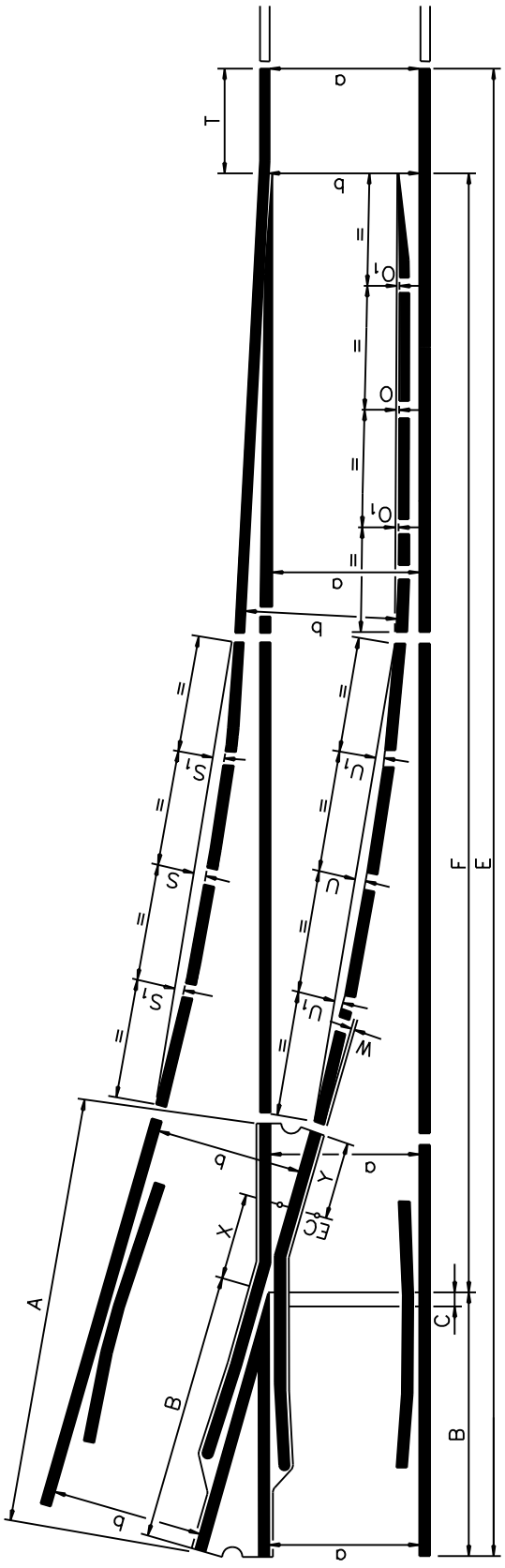
TURNOUTS WITH TRAILABLE SELF–NORMALISING POINTS BLADES : LAYOUT

REMARKS:

1. THE GAUGE OF THE STRAIGHT TRACK WILL BE NOMINAL THROUGHOUT, EXCEPT BETWEEN POINT AND HEEL OF POINTS BLADE.
2. FOR OTHER DIMENSIONS SEE ANNEXURE 23 SHEET 2.

a	DESIGN	RAIL	ANGLE	GAUGE	
				a	b
1 065	TRAILABLE SELF–NORMALISING POINTS BLADE	48kg	1:12	1 065	1 070

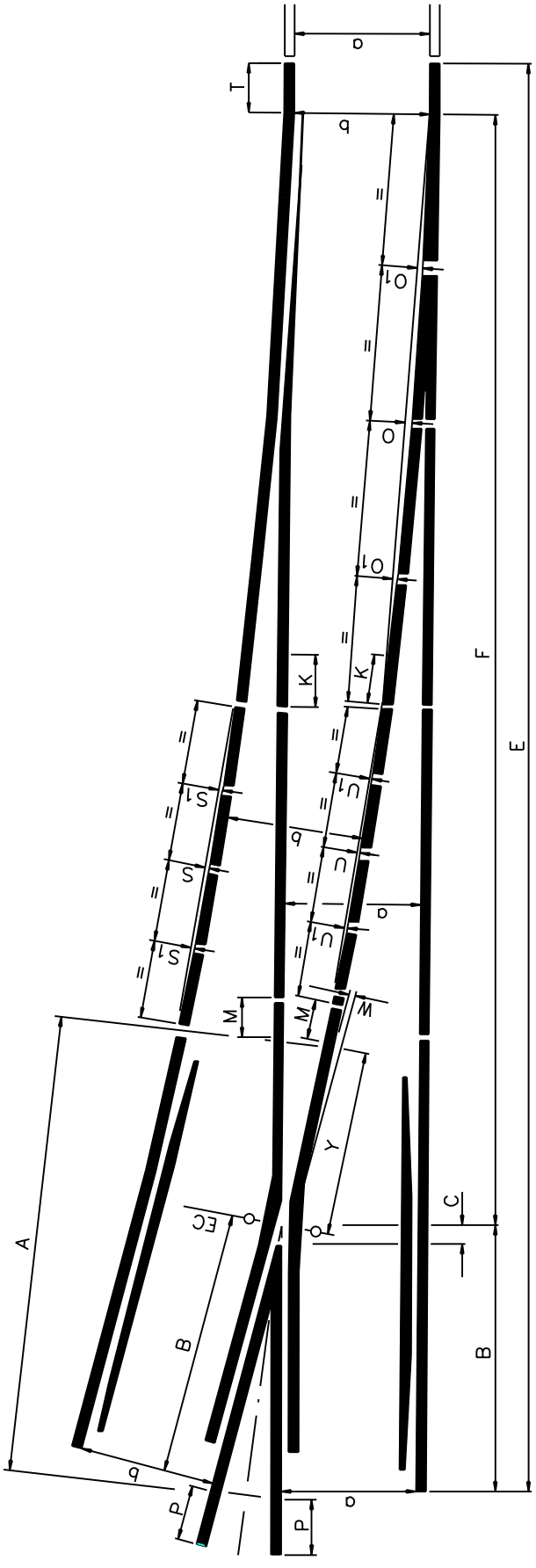
TURNOUTS WITH FULLY CURVED FLEXIBLE POINTS BLADES AND CAST MANGANESE STEEL FROGS : LAYOUT



REMARKS:
1. THE GAUGE OF THE STRAIGHT TRACK WILL BE NOMINAL THROUGHOUT, EXCEPT BETWEEN POINT AND HEEL OF POINTS BLADE.
2. ◆ 1:6 EQUAL–SPLIT SET.
3. FOR OTHER DIMENSIONS SEE ANNEXURE 23 SHEETS 2 AND 3.

a	DESIGN	RAIL	ANGLE	GAUGE a	GAUGE b
1 065	FULLY CURVED FLEXIBLE POINTS BLADE AND CAST MANGANESE STEEL FROG	57/60kg	1:12	1 065	1 070
		48/51kg	1:12	1 065	1 070
		57/60kg	1:9	1 065	1 070
		57/60kg	1:8	1 065	1 070
		57/60kg	1:6 ◆	1 070	1 070
		48/51kg	1:6 ◆	1 070	1 070

TURNOUTS WITH FULLY CURVED FLEXIBLE POINTS BLADES AND RAILBOUND FROGS : LAYOUT

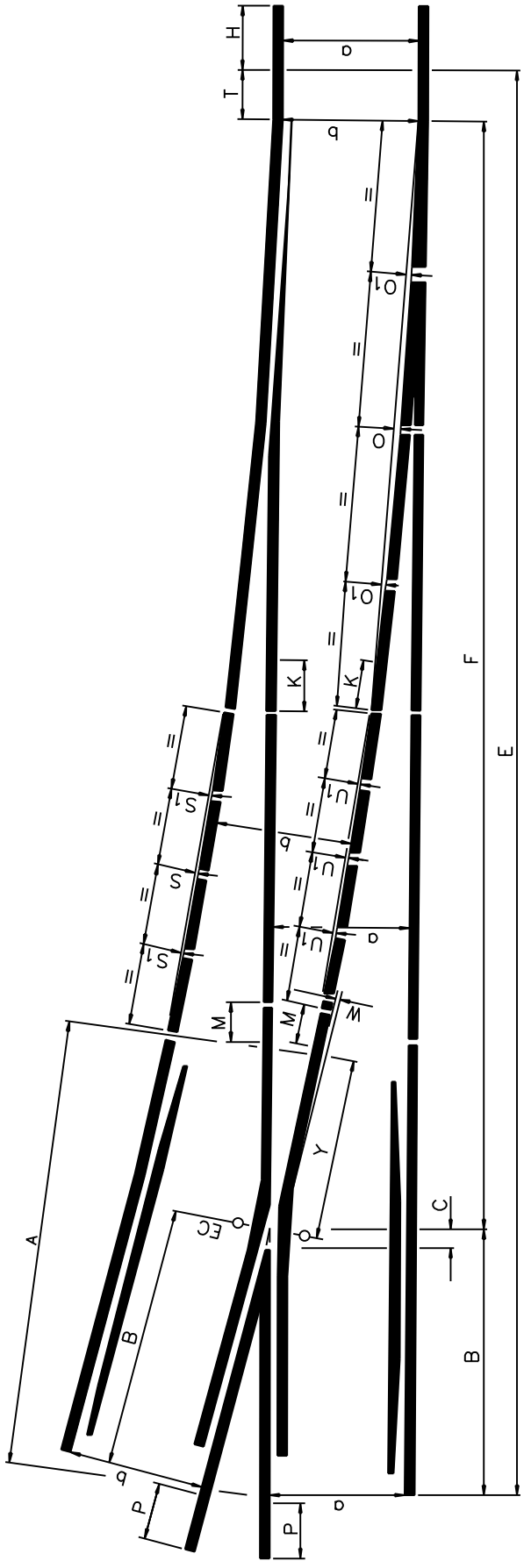


REMARKS:

1. THE GAUGE OF THE STRAIGHT TRACK WILL BE NOMINAL THROUGHOUT, EXCEPT BETWEEN POINT AND HEEL OF POINTS BLADE.
2. FOR OTHER DIMENSIONS SEE ANNEXURE 23 SHEETS 3 AND 7.

a	DESIGN	RAIL	ANGLE	GAUGE a	GAUGE b
1 065	FULLY CURVED FLEXIBLE POINTS BLADE	57/60kg	1:12	1 065	1 070
			1:9	1 065	1 070
		48/51kg	1:12	1 065	1 070

TURNOUTS WITH FULLY CURVED FLEXIBLE COMPOSITE POINTS BLADES AND RAILBOUND FROGS : LAYOUT



REMARKS:

1. ⊕ THE GAUGE OF THE STRAIGHT TRACK WILL BE NOMINAL THROUGHOUT, EXCEPT BETWEEN POINT AND HEEL OF POINTS BLADE.
2. FOR OTHER DIMENSIONS SEE ANNEXURE 23 SHEETS 5 AND 8.

a	DESIGN	RAIL	ANGLE	GAUGE a	GAUGE b
1 065	FULLY CURVED FLEXIBLE COMPOSITE POINTS BLADE	S-60 SAR/ ZS-60 SAR	1:9 ⊕	1 065	1 070
			1:12	1 065	1 065
		UIC-60/ Zu1-60	1:12	1 065	1 065

TURNOUTS WITH FULLY CURVED FLEXIBLE COMPOSITE POINTS BLADES AND MOVABLE V-PIECES WITH BACK SLIDING JOINTS : LAYOUT

ANNEXURE 22
SHEET 7 of 7

REMARKS:

1. FOR OTHER DIMENSIONS SEE ANNEXURE 23 SHEETS 5 AND 8.

a	DESIGN	RAIL	ANGLE	GAUGE	
				a	b
1 065	FULLY CURVED FLEXIBLE COMPOSITE POINTS BLADE	S-60 SAR/ ZS-60 SAR	1:20	1065	1065
		UIC-60/ Zu1-60	1:20	1065	1065

TURNOUTS 48kg : 1 067mm TRACK
GAUGE : DIMENSIONS

	TYPE OF POINTS BLADE			SEMI-CURVED HINGED POINTS BLADE						FULLY CURVED FLEXIBLE POINTS BLADE
	ANGLE OF TURNOUT			1:6 9°-27'-44"	1:7 8°-7'-48"	1:8 7°-7'-30"	1:9 6°-20'-25"	1:9 6°-20'-25"	1:12 4°-45'-49"	1:12 4°-45'-49"
A	LENGTH OF CROSSING			3 990	4 553	4 820	5 347	5 347	6 909	6 909
B	INTERSECTION OF GAUGES TO END			2 487	2 499	2 771	3 145	3 145	3 915	3 915
C	INTERSECTION OF GAUGES TO NOSE			76	89	102	114	114	152	152
	LENGTH OF POINTS BLADES			3 353	3 658	4 064	4 877	5 486	6 096	9 144
D	OVERALL LENGTH OF CROSS-OVER ROADS			–	40 758	45 392	51 518	53 042	66 814	66 859
E	OVERALL LENGTH			13 510	16 526	18 188	20 718	21 480	26 391	26 391
F	POINT OF POINTS BLADE TO INTERSECTION OF GAUGES			10 143	13 138	14 528	16 684	17 447	21 587	21 587
⊗	CLOSURE RAIL (STRAIGHT)			–	6 000	7 000	8 000	8 000	11 000	10 000
⊗	CLOSURE RAIL (CURVED)			4 000	6 000	7 000	8 000	8 000	11 000	10 000
⊗	LEAD RAIL (STRAIGHT)			–	8 000	9 000	10 000	10 000	13 000	10 000
⊗	LEAD RAIL (CURVED)			6 000	8 000	9 000	10 000	10 000	13 000	10 000
	RADIUS			137 160	103 734	137 973	173 431	171 602	300 228	304 800
W	OFFSETS ARE BASED ON ACTUAL DIMENSIONS	CURVED WING RAIL		1,2	21	14,3	13,5	14,2	11	11
O		POINTS BLADE	MIDDLE	4,3	1,7	4,8	5,6	6,8	5	34
O_1			QUARTER	3,2	1,3	3,6	4	5,2	4	26
S		CLOSURE RAIL	MIDDLE	13	35	35	40	42	44	37
S_1			QUARTER	10	26	26	30	31	33	28
U		LEAD RAIL	MIDDLE	25	67	64	67	70	65	37
U_1			QUARTER	19	50	48	50	52	49	28
X	EC TO INTERSECTION OF GAUGES			945	0	74	40	0	425	425
Y	EC TO END OF WING RAIL			572	2 065	1 984	2 170	2 210	2 575	2 575
N	BC TO HEEL			2 165	1 202	2 289	2 746	3 019	3 432	–
Q	HEEL OPENING			132	85	88	90	92	89	–
	VERTEX TO POINT OF POINTS BLADE			132	165	197	238	275	297	–
T	END OF STOCK RAIL TO POINT OF POINTS BLADE			889	889	889	889	889	889	889
	DRAWING NUMBERS TYPE E			7 051	7 015 SHEET 4	7 015 SHEET 3	7 015 SHEET 2	7 015 SHEET 2-003	7 015 SHEET 1	7 047

REMARKS: 1. 1:6 IS AN EQUAL-SPLIT SET.
2. ⊗ CUT TO SIZE FROM LENGTHS SUPPLIED.
3. THESE DESIGNS ARE BASED ON ORIGINAL 1065 GAUGE.
4. FOR LAYOUTS SEE ANNEXURE 22 SHEETS 1 AND 2.
5. OVERALL LENGTH OF CROSS-OVER ROADS IS BASED ON ORIGINAL 4M TRACK CENTRES.

TURNOUTS 48/51kg : 1 065mm TRACK
GAUGE : DIMENSIONS

	TYPE OF POINTS BLADE			FULLY–CURVED FLEXIBLE POINTS BLADE		SELF NORMALISING POINTS BLADE
	ANGLE OF TURNOUT			1:6 9°–27'–44"	1:12 4°–45'–49"	1:12 4°–45'–49"
A	LENGTH OF CROSSING			4 400	6 909	6 909
B	INTERSECTION OF GAUGES TO END			2 531	3 915	3 915
C	INTERSECTION OF GAUGES TO NOSE			85	156	152
	LENGTH OF POINTS BLADES			10 210	9 000	6 000
D	OVERALL LENGTH OF CROSS–OVER ROADS			–	67 288	67 288
E	OVERALL LENGTH			15 500	26 391	26 390
F	POINT OF POINTS BLADE TO INTERSECTION OF GAUGES			12 088	21 586	21 586
⊗	CLOSURE RAIL (STRAIGHT)			–	10 000	11 000
⊗	CLOSURE RAIL (CURVED)			–	10 000	11 000
⊗	LEAD RAIL (STRAIGHT)			–	10 000	13 000
⊗	LEAD RAIL (CURVED)			–	10 000	13 000
	RADIUS			191 231	320 845	321 508
W	OFFSETS ARE BASED ON ACTUAL DIMENSIONS	CURVED WING RAIL		–	11	11
O		POINTS BLADE	MIDDLE	68	32	14
O_1			QUARTER	51	24	10,5
S		CLOSURE RAIL	MIDDLE	–	36	44,5
S_1			QUARTER	–	27	33,4
U		LEAD RAIL	MIDDLE	–	36	62
U_1			QUARTER	–	27	46,5
X	EC TO INTERSECTION OF GAUGES			–1 216	425	425
Y	EC TO END OF WING RAIL			3 100	2 575	2 575
Q	HEEL OPENING			–	–	77
T	END OF STOCK RAIL TO POINT OF POINTS BLADE			890	890	890
	DRAWING NUMBERS TYPE E			7 075	7 084	7 085

REMARKS:
1. 1:6 IS AN EQUAL–SPLIT SET.
2. ⊗ CUT TO SIZE FROM LENGTHS SUPPLIED.
3. FOR LAYOUTS SEE ANNEXURE 22 SHEETS 3 AND 4.
4. OVERALL LENGTH OF CROSS–OVER ROADS IS BASED ON 4 000mm TRACK CENTRES.

TURNOUTS 57/60kg : 1 065mm TRACK GAUGE : DIMENSIONS

	TYPE OF POINTS BLADE			FULLY-CURVED FLEXIBLE POINTS BLADE				
	ANGLE OF TURNOUT			1:6 9°-27'-44"	1:8 7°-7'-30"	1:9 6°-20'-25"	1:12 4°-45'-49"	1:20 2°-51'-45"
A	LENGTH OF CROSSING			4 400	4 820	5 891	7 533	11 574
B	INTERSECTION OF GAUGES TO END			2 530	2 771	3 725	4 540	–
C	INTERSECTION OF GAUGES TO NOSE			85	120	117	156	–
	LENGTH OF POINTS BLADES			10 214	7 075	9 000	9 000	12 000
D	OVERALL LENGTH OF CROSS-OVER ROADS			–	45 688	51 874	67 288	108 194
E	OVERALL LENGTH			15 500	18 188	21 299	27 016	42 251
F	POINT OF SWITCH BLADE TO INTERSECTION OF GAUGES			12 088	14 527	16 684	21 586	34 703
⊗	CLOSURE RAIL (STRAIGHT)			–	6 000	6 000	10 000	18 000
⊗	CLOSURE RAIL (CURVED)			–	6 000	6 000	10 000	18 000
⊗	LEAD RAIL (STRAIGHT)			–	6 000	6 000	10 000	18 000
⊗	LEAD RAIL (CURVED)			–	6 000	6 000	10 000	18 000
	RADIUS			191 231	142 958	178 938	320 845	904 553
W	OFFSETS ARE BASED ON ACTUAL DIMENSIONS	CURVED WINGS RAIL		–	14,6	13,2	14	6,8
O		POINTS BLADE	MIDDLE	68,2	43,8	56,4	31,6	19,9
O_1			QUARTER	51,2	32,8	42,3	23,7	14,9
S		CLOSURE RAIL	MIDDLE	–	26	21,4	36,1	44,8
S_1			QUARTER	–	19,5	16	27,1	33,6
U		LEAD RAIL	MIDDLE	–	26	21,2	35,8	44,8
U_1			QUARTER	–	19,5	15,9	26,9	33,6
X	EC TO INTERSECTION OF GAUGE			-1 216	0	0	0	–
Y	EC TO END OF WING RAIL			3 099	2 058	2 175	3 000	3 514
T	END OF STOCK RAIL TO POINT OF POINTS BLADE			890	890	890	890	760
H	INDICATES POSITIONS AND AREAS WHERE EXOTHERMAL WELD JOINTS ARE LOCATED			–	–	–	–	–
K				–	–	–	–	–
M				–	–	650	600	–
P				–	–	650	650	–
	DRAWING NUMBERS TYPE E			7 078	7 076	7 089	7 088	7 094

REMARKS:
1. 1:6 IS AN EQUAL-SPLIT SET.
2. FOR LAYOUTS SEE ANNEXURE 22 SHEETS 2, 4 AND 5.
3. ⊗ CUT TO SIZE FROM LENGTHS SUPPLIED.
4. INFORMATION FOR 1:9 AND 1:12 IS BASED ON THE USE OF RAILBOUND FROGS.
5. LENGTH OF FROG FOR INITIAL INSTALLATION.
6. TOTAL LENGTH OF CROSS-OVER ROADS BASED ON 4 000 mm TRACK CENTRES.

TURNOUTS 30kg : 610mm TRACK GAUGE : DIMENSIONS

	ANGLE OF TURNOUT			1:9 6°–20'–25"
A	LENGTH OF CROSSING			4 572
B	INTERSECTION OF GAUGES TO END			2 515
C	INTERSECTION OF GAUGES TO NOSE			114
	LENGTH OF POINTS BLADE			3 353
D	OVERALL LENGTH OF CROSS–OVER ROADS			38 760
E	OVERALL LENGTH			12 309
F	POINT OF POINTS BLADE TO INTERSECTION OF GAUGES			8 931
	CLOSURE RAIL (STRAIGHT)			–
	CLOSURE RAIL (CURVED)			–
	LEAD RAIL (STRAIGHT)			3 508
	LEAD RAIL (CURVED)			3 534
	RADIUS			72 314
W	OFFSETS	CURVED WING RAIL		7,7
O	OFFSETS	POINTS BLADE	MIDDLE	1,8
O_1	OFFSETS	POINTS BLADE	QUARTER	1,3
S	OFFSETS	CLOSURE RAIL	MIDDLE	–
S_1	OFFSETS	CLOSURE RAIL	QUARTER	–
U	OFFSETS	LEAD RAIL	MIDDLE	21,6
U_1	OFFSETS	LEAD RAIL	QUARTER	16
X	EC TO INTERSECTION OF GAUGES			1 003
Y	EC TO END OF WING RAIL			1 060
N	BC TO HEEL			1 027
Q	HEEL OPENING			79
	VERTEX TO POINT OF POINTS BLADE			170
T	END OF STOCK RAIL TO POINT OF POINTS BLADE			864
	DRAWING NUMBER TYPE E			566 SHEET 5

REMARKS: 1. THIS DESIGN IS BASED ON ORIGINAL 2' – 0" GAUGE.
2. FOR LAYOUT SEE ANNEXURE 22 SHEET 1.

TURNOUTS S-60/ZS-60 SAR : 1 065mm TRACK GAUGE : DIMENSIONS

	TYPE OF POINTS BLADE			FULLY-CURVED COMPOSITE FLEXIBLE POINTS BLADE		
	ANGLE OF TURNOUT			1:9 6°-20'-25"	1:12 4°-45'-49"	1:20 2°-51'-45"
A	LENGTH OF CROSSING			5 950	6 945	15 813
B	INTERSECTION OF GAUGES TO END (THROAT TO END 1:20)			3 725	3 915	9 888
C	INTERSECTION OF GAUGES TO NOSE			117	156	–
L	END OF VEE TO THROAT			–	–	150
	LENGTH OF POINTS BLADES			9 000	10 150	15 700
D	OVERALL LENGTH OF CROSS-OVER ROADS			51 874	67 350	108 300
E	OVERALL LENGTH			21 299	26 391	44 034
F	POINT OF SWITCH BLADE TO INTERSECTION OF GAUGES (THROAT 1:20)			16 684	21 587	33 386
⊗	CLOSURE RAIL (STRAIGHT)			6 000	9 000	12 000
⊗	CLOSURE RAIL (CURVED)			6 000	9 000	12 000
⊗	LEAD RAIL (STRAIGHT)			6 000	9 000	12 000
⊗	LEAD RAIL (CURVED)			6 000	9 000	12 000
	RADIUS			178 938	320 665	904 553
W	OFFSETS	CURVE WING RAIL		22,3	39	39,4
O		POINTS BLADE	MIDDLE	67,1	47,2	37,6
O_1			QUARTER	50,3	35,4	28,2
S		CLOSURE RAIL	MIDDLE	25,2	31,6	19,9
S_1			QUARTER	18,9	23,7	14,9
U		LEAD RAIL	MIDDLE	25,2	31,6	19,9
U_1			QUARTER	18,9	23,7	14,9
Y	EC TO END OF WING RAIL			2 225	3 000	–
J	END OF VEE TO BACK END OF SPLICE RAIL			–	–	855
T	END OF STOCK RAIL TO POINT OF POINTS BLADE			890	890	760
H	INDICATES POSITIONS AND AREAS WHERE EXOTHERMAL JOINTS ARE LOCATED			710	610	740
K				800	850	800
M				600	2 000	1 200
P				650	1 500	650
	DRAWING NUMBER TYPE E			7 103	7 102	7 101

REMARKS:
1. ⊗ CUT TO SIZE FROM LENGTHS SUPPLIED.
2. ALL DIMENSIONS QUOTED ARE FOR INITIAL INSTALLATION.
3. FOR LAYOUTS SEE ANNEXURE 22 SHEETS 6 AND 7.
4. OFFSETS ARE BASED ON SUPPLIED LENGTHS.

TURNOUTS GERMAN UIC–60 : 1 065mm TRACK GAUGE : DIMENSIONS

	TYPE OF POINTS BLADE	FULLY–CURVED FLEXIBLE COMPOSITE POINTS BLADE	
	ANGLE OF TURNOUT	1:9 6°–20'–25"	1:12 4°–45'–49"
A	LENGTH OF CROSSING	VARIABLE	
B	INTERSECTION OF GAUGES TO END	VARIABLE	
C	INTERSECTION OF GAUGES TO NOSE	117	156
	LENGTH OF POINTS BLADES	11 300	13 650
D	OVERALL LENGTH OF CROSS–OVER ROADS	–	–
E	OVERALL LENGTH	22 650	29 408
F	POINT OF POINTS BLADE TO INTERSECTION OF GAUGES	19 415	23 929
	CLOSURE RAIL (STRAIGHT)	–	–
	CLOSURE RAIL (CURVED)	–	–
	LEAD RAIL (STRAIGHT)	–	–
	LEAD RAIL (CURVED)	–	–
	RADIUS	190 000	300 000
W	OFFSETS: CURVED WING RAIL	–	–
O	OFFSETS: POINTS BLADE: MIDDLE	84	77,6
O_1	OFFSETS: POINTS BLADE: QUARTER	63	58,2
S	OFFSETS: CLOSURE RAIL: MIDDLE	–	–
S_1	OFFSETS: CLOSURE RAIL: QUARTER	–	–
U	OFFSETS: LEAD RAIL: MIDDLE	–	–
U_1	OFFSETS: LEAD RAIL: QUARTER	–	–
X	EC TO INTERSECTION OF GAUGES	929	324
Y	EC TO END OF WING RAIL	–	–
T	END OF STOCK RAIL TO POINT OF POINTS BLADE	700	1 350
	DRAWING NUMBERS	700–E–739	700–E–736

TURNOUTS 48/51kg : 1 065mm
TRACK GAUGE : CONCRETE SLEEPERS :
DIMENSIONS

	TYPE OF POINTS BLADE			FULLY-CURVED FLEXIBLE POINTS BLADE
	ANGLE OF TURNOUT			1:12 4°-45'-49"
A	LENGTH OF CROSSING			7 227
B	INTERSECTION OF GAUGES TO END			4 275
C	INTERSECTION OF GAUGES TO NOSE			156
	LENGTH OF POINTS BLADES			9 000
D	OVERALL LENGTH OF CROSS-OVER ROADS			67 288
E	OVERALL LENGTH			26 751
F	POINT OF POINTS BLADE TO INTERSECTION OF GAUGES			21 586
⊗	CLOSURE RAIL (STRAIGHT)			10 000
⊗	CLOSURE RAIL (CURVED)			10 000
⊗	LEAD RAIL (STRAIGHT)			10 000
⊗	LEAD RAIL (CURVED)			10 000
	RADIUS			320 845
W	OFFSETS	CURVED WING RAIL		27
O	OFFSETS	POINTS BLADE	MIDDLE	31,6
O_1	OFFSETS	POINTS BLADE	QUARTER	23,7
S	OFFSETS	CLOSURE RAIL	MIDDLE	39
S_1	OFFSETS	CLOSURE RAIL	QUARTER	29,2
U	OFFSETS	LEAD RAIL	MIDDLE	39
U_1	OFFSETS	LEAD RAIL	QUARTER	29,2
Y	EC TO END OF WING RAIL			2 960
T	END OF STOCK RAIL TO POINT OF POINTS BLADE			890
H	INDICATES POSITIONS AND AREAS WHERE EXOTHERMAL JOINTS ARE LOCATED			–
K				–
M				1 200
P				800
	DRAWING NUMBER TYPE E			7 129

REMARKS:
1. ⊗ CUT TO SIZE FROM LENGTHS SUPPLIED.
2. ALL DIMENSIONS QUOTED ARE FOR INITIAL INSTALLATION.
3. FOR LAYOUT SEE ANNEXURE 22 SHEET 5.
4. DEVIATIONS FROM STANDARD DUE TO THE PROVISION FOR THERMIT WELDS.
5. OFFSETS ARE CALCULATED ON SUPPLIED LENGTHS.

TURNOUTS UIC-60 : 1 065mm TRACK GAUGE : CONCRETE SLEEPERS : DIMENSIONS

	TYPE OF POINTS BLADE			FULLY-CURVED FLEXIBLE COMPOSITE POINTS BLADE	
	ANGLE OF TURNOUT			1:12 4°-45'-49"	1:20 2°-51'-45"
A	LENGTH OF CROSSING			6 945	15 813
B	INTERSECTION OF GAUGES TO END (THROAT TO END 1:20)			3 915	9 888
C	INTERSECTION OF GAUGES TO NOSE			156	–
L	POINT OF VEE TO THROAT			–	150
	LENGTH OF POINTS BLADES			10 150	15 700
D	OVERALL LENGTH OF CROSS-OVER ROADS			67 350	108 300
E	OVERALL LENGTH			26 391	44 034
F	POINT OF POINTS BLADE TO INTERSECTION OF GAUGES (THROAT 1:20)			21 587	33 386
⊗	CLOSURE RAIL (STRAIGHT)			9 000	12 000
⊗	CLOSURE RAIL (CURVED)			9 000	12 000
⊗	LEAD RAIL (STRAIGHT)			9 000	12 000
⊗	LEAD RAIL (CURVED)			9 000	12 000
	RADIUS			320 665	904 553
W	OFFSETS	CURVED WING RAIL		39	39,4
O		POINTS BLADE	MIDDLE	47,2	37,6
O_1			QUARTER	35,4	28,2
S		CLOSURE RAIL	MIDDLE	31,6	19,9
S_1			QUARTER	23,7	14,9
U		LEAD RAIL	MIDDLE	31,6	19,9
U_1			QUARTER	23,7	14,9
Y	EC TO END OF WING RAIL			3 000	–
J	END OF VEE TO BACK END OF SPLICE RAIL			–	855
T	END OF STOCK RAIL TO POINT OF POINTS BLADE			890	760
H	INDICATES POSITIONS AND AREAS WHERE EXOTHERMAL JOINTS ARE LOCATED			610	740
K				850	800
M				2 000	1 200
P				1 500	650
	DRAWING NUMBERS TYPE E			7 131	7 130

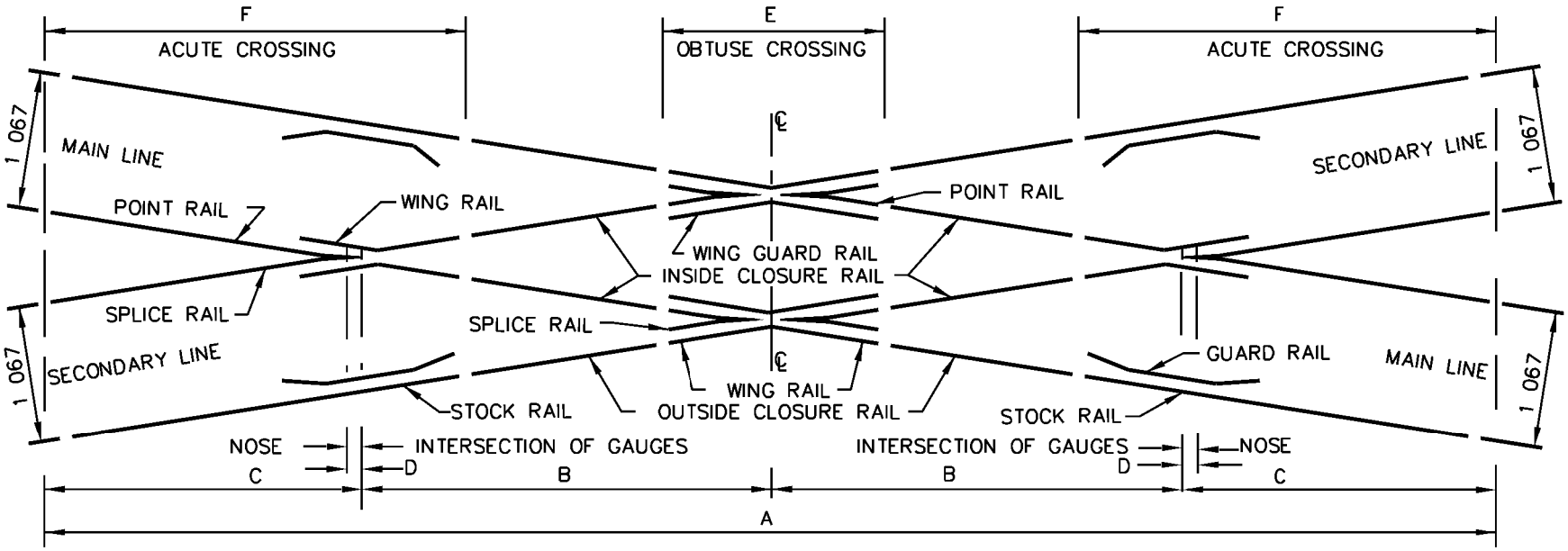
REMARKS:
1. ⊗ CUT TO SIZE FROM LENGTHS SUPPLIED.
2. ALL DIMENSIONS QUOTED ARE FOR INITIAL INSTALLATION.
3. FOR LAYOUT SEE ANNEXURE 22 SHEETS 6 AND 7.
4. OFFSETS ARE CALCULATED ON SUPPLIED LENGTHS.

RADII OF TURNOUTS FROM CURVED TRACK

ANNEXURE 24
SHEET 1 of 1

TRACK GAUGE (mm)	1 065										610	
RADIUS OF THROUGH LINE (m)	CONTRARY FLEXURE (■)					SIMILAR FLEXURE (●)					■	●
	1:7	1:8	1:9	1:12	1:20	1:7	1:8	1:9	1:12	1:20	1:9	1:9
60	–	–	–	–	–	–	–	–	–	–	–	–
75	–	–	–	–	–	–	–	–	–	–	800	–
100	–	–	–	–	–	–	–	–	–	–	257	–
110	907	–	–	–	–	–	–	–	–	–	208	–
120	780	–	–	–	–	–	–	–	–	–	180	–
140	404	–	–	–	–	–	–	–	96	–	148	–
160	297	915	–	–	–	–	–	–	105	–	131	50
180	246	558	–	–	–	–	–	–	113	–	120	51
200	217	426	1 255	–	–	–	–	93	121	–	113	53
250	178	299	551	–	–	–	–	102	137	–	101	56
300	159	249	406	–	–	–	94	110	151	–	95	58
350	148	223	340	2 227	–	–	98	116	163	–	91	60
400	141	207	304	1 251	–	–	102	121	173	–	88	61
450	135	195	280	928	–	–	105	125	181	–	86	62
500	131	187	264	770	–	–	107	129	189	–	84	63
550	128	181	251	675	–	–	109	132	196	–	83	64
600	126	176	242	612	–	–	111	134	202	–	82	64
650	124	172	235	568	–	90	113	137	207	–	81	65
700	122	169	229	535	–	91	114	139	212	–	80	65
750	121	166	224	509	–	91	116	141	216	–	80	66
800	120	164	220	488	–	92	117	142	220	–	79	66
900	118	160	214	457	–	93	119	145	227	–	78	67
1 000	116	158	209	435	–	94	120	147	233	–	78	67
1 200	114	154	202	406	–	96	123	151	242	–	77	68
1 400	112	151	197	387	–	97	124	154	249	–	76	68
1 600	111	149	194	374	–	98	126	156	255	–	75	69
1 800	110	147	191	365	–	98	127	158	260	–	75	69
2 000	110	146	189	357	–	99	128	159	263	–	75	69
3 000	108	143	183	337	–	101	130	164	276	–	74	70
STRAIGHT	104	136	173	303	–	104	136	173	303	–	72	72

DIAMOND CROSSINGS 48kg 1:4½, 1:6, 1:7 AND 1:8 : 1 067mm TRACK GAUGE : LAYOUT AND DIMENSIONS

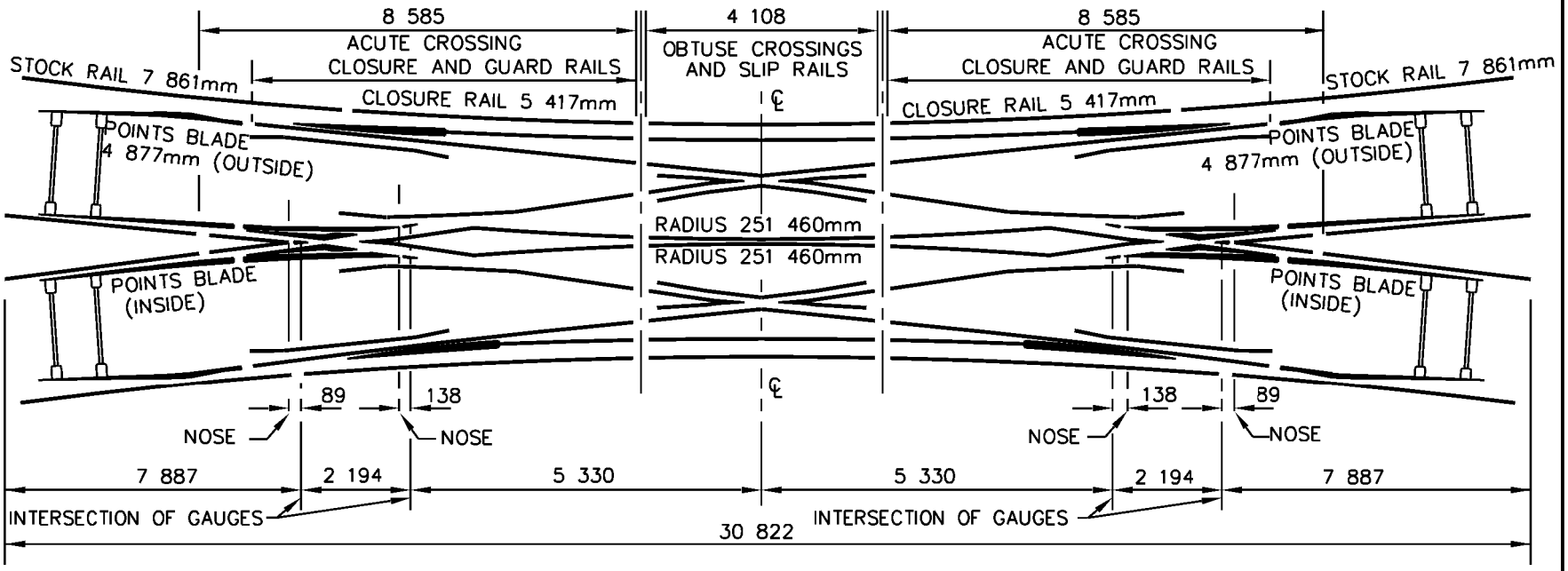


ANGLE OF DIAMOND CROSSING			1:4½ 12°–40'–50"	1:6 9°–31'–38"	1:7 8°–7'–48"	1:8 7°–7'–30"
A	OVERALL LENGTH		13 920	19 608	20 012	22 700
B	INTERSECTION OF GAUGES TO:	CENTRE LINE	4 831	6 423	7 525	8 585
C		END	2 129	3 381	2 481	2 765
D		NOSE	57	76	89	102
E	LENGTH OF OBTUSE CROSSING		4 261	7 398	4 108	4 705
F	LENGTH OF ACUTE CROSSING		4 823	6 099	4 416	4 566
	DRAWING NUMBERS	TYPE E	7 040	7 041	688	7 050

REMARKS:

1. WHEN ORDERING SINGLE ITEMS FOR REPLACEMENT, IT IS ESSENTIAL TO QUOTE STORES ITEM NUMBERS. REFER LIST OF STANDARD PERMANENT WAY MATERIAL, SECTION 53.
2. THIS DESIGN IS BASED ON ORIGINAL 1065 GAUGE.

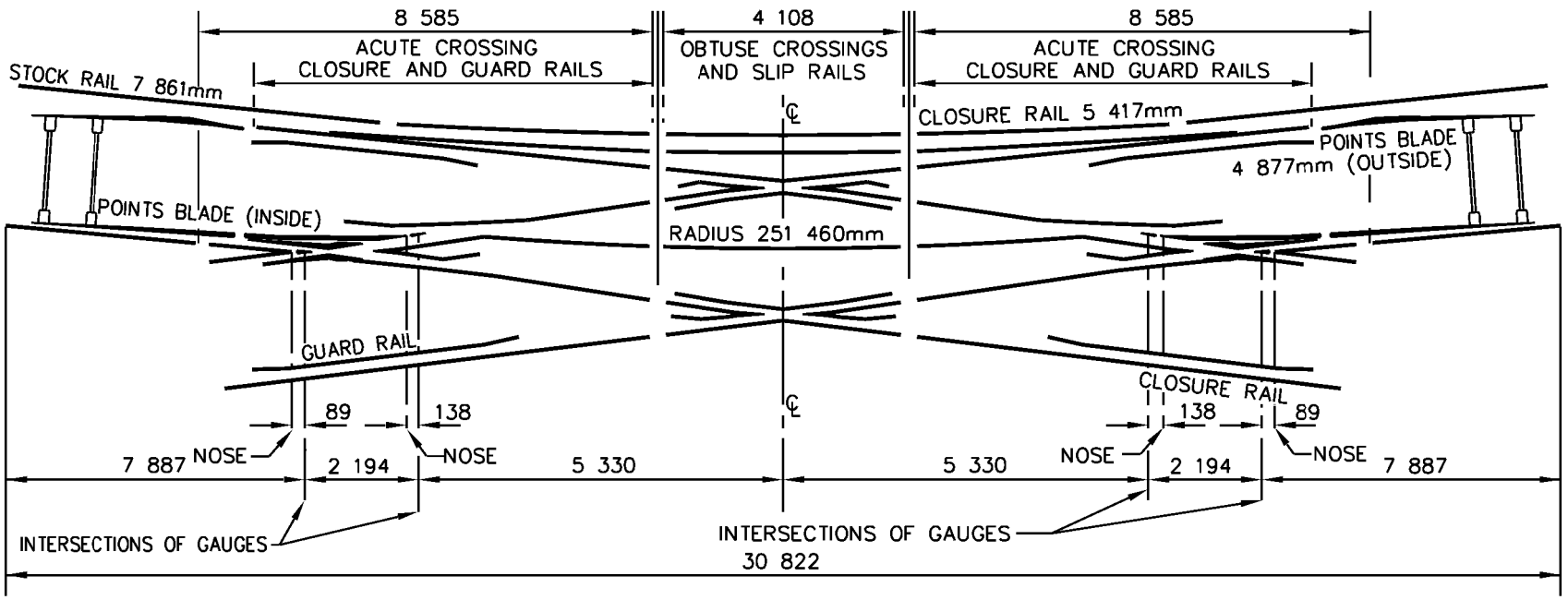
DOUBLE SLIPS 48kg 1:7 : 1 067mm TRACK GAUGE : LAYOUT AND DIMENSIONS



LOCATION	GAUGE
1 524mm BEFORE POINT OF POINTS BLADE	1 067
POINT OF POINTS BLADE	1 073
HEEL OF POINTS BLADE	1 067
ALL OTHER LOCATIONS	1 070

REMARKS:
1. WHEN ORDERING SINGLE ITEMS FOR REPLACEMENT, IT IS ESSENTIAL TO QUOTE STORES ITEM NUMBERS. REFER LIST OF STANDARD PERMANENT WAY MATERIALS, SECTION 53.
2. THIS DESIGN IS BASED ON ORIGINAL 1067 GAUGE.

SINGLE SLIPS 48kg 1:7 : 1 067mm TRACK GAUGE : : LAYOUT AND DIMENSIONS



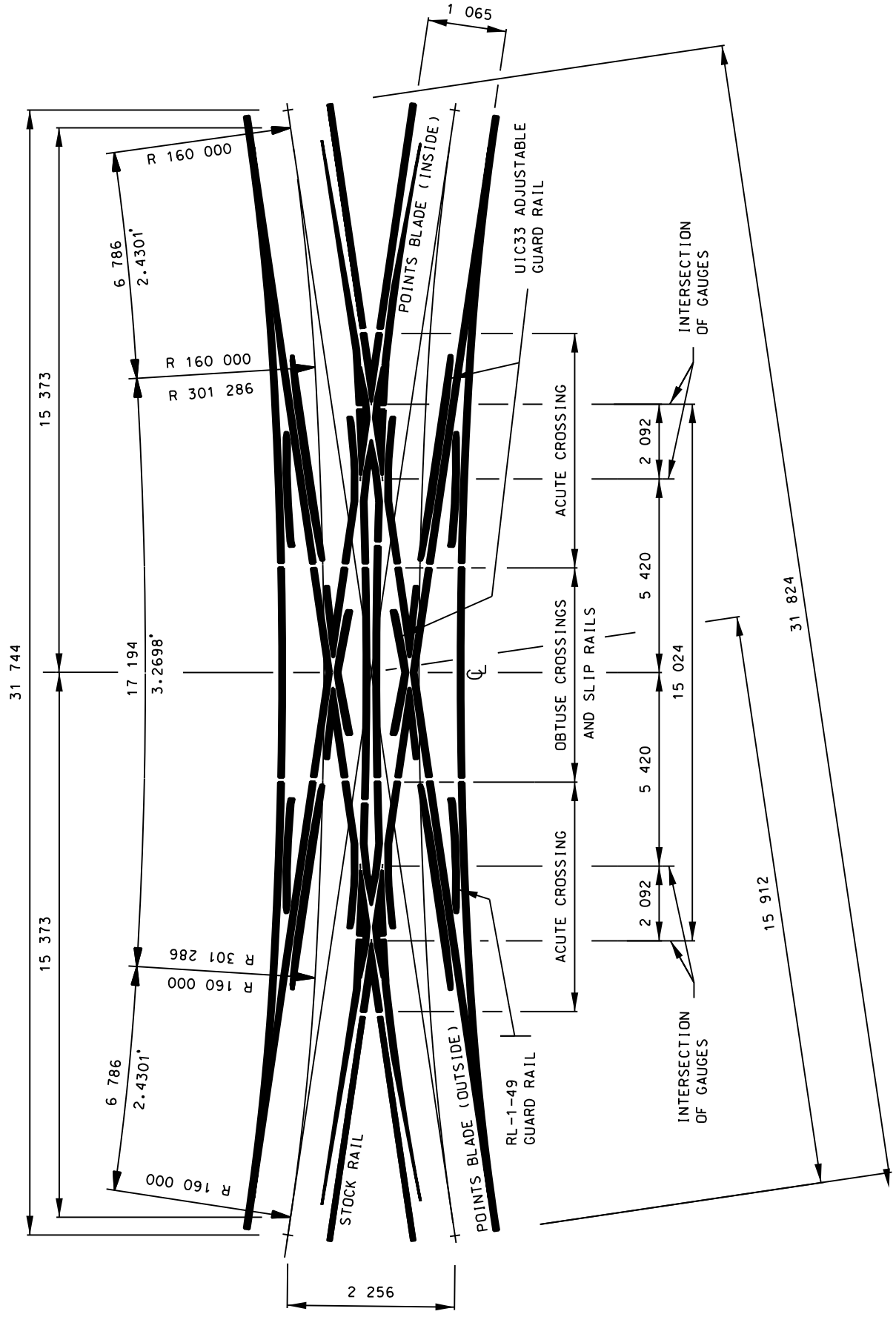
LOCATION	GAUGE
1 524mm BEFORE POINT OF POINTS BLADE	1 067
POINT OF POINTS BLADE	1 073
HEEL OF POINTS BLADE	1 067
ALL OTHER LOCATIONS	1 070

REMARKS:

1. WHEN ORDERING SINGLE ITEMS FOR REPLACEMENT, IT IS ESSENTIAL TO QUOTE STORES ITEM NUMBERS. REFER LIST OF STANDARD PERMANENT WAY MATERIALS, SECTION 53.
2. THIS DESIGN IS BASED ON ORIGINAL 1067 GAUGE.

DOUBLE SLIPS 48kg 1:7 : 1065mm TRACK GAUGE : VAE DESIGN : LAYOUT AND DIMENSIONS

ANNEXURE 25
SHEET 4 of 4



BLOCK JOINTS : TURNOUTS AND DIAMOND CROSSINGS

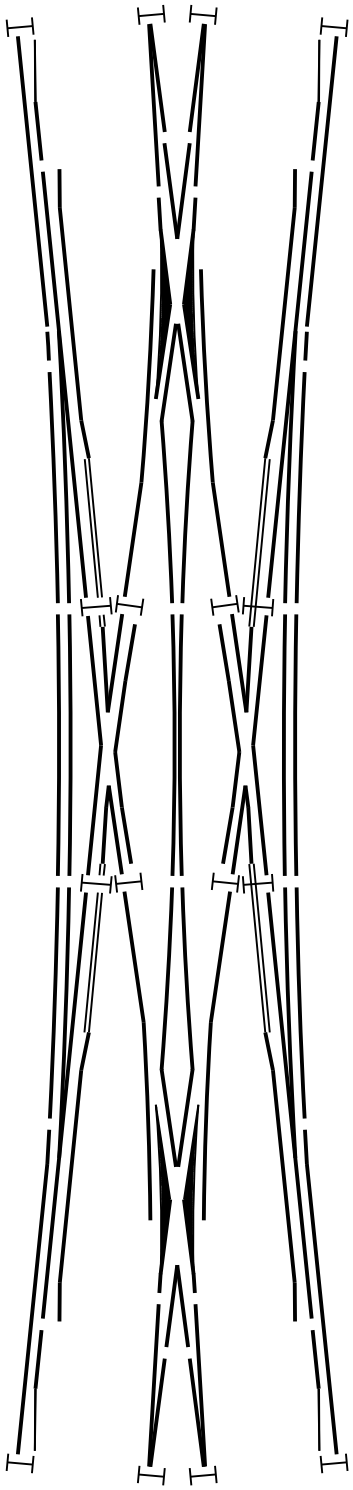
ANNEXURE 26
SHEET 1 of 2

REMARKS:

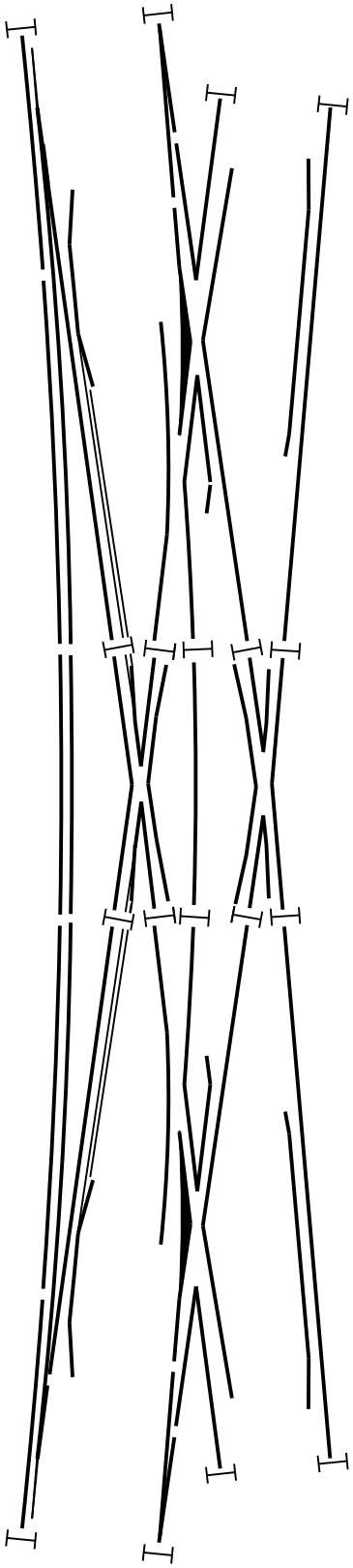
1. ⌶ POSSIBLE BLOCK JOINT POSITIONS IN OR OUTSIDE TURNOUTS.
2. ◓ ⌶ WHERE TURNOUTS ARE PART OF A GATHERING ROAD, BLOCK JOINTS ARE ALSO POSSIBLE.
3. WHEN BLOCK JOINTS ON SETS HAVE TO BE REPLACED CONSIDERATION MUST BE GIVEN TO MOVING THE BLOCK JOINTS TO THE TURNOUT PORTION OF THE SET.

BLOCK JOINTS : SINGLE AND DOUBLE SLIPS

ANNEXURE 26
SHEET 2 of 2



DOUBLE SLIP



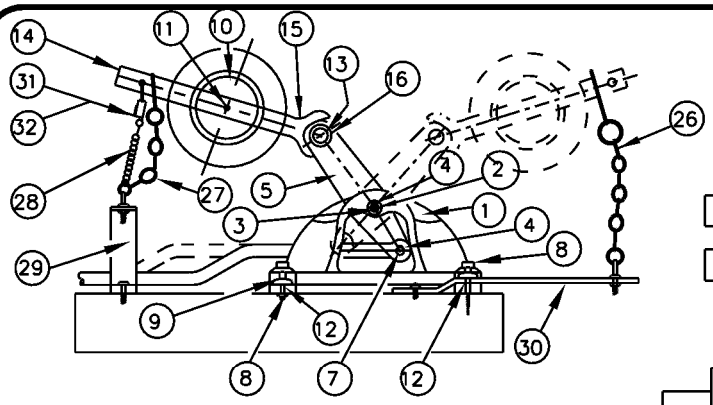
SINGLE SLIP

REMARKS:

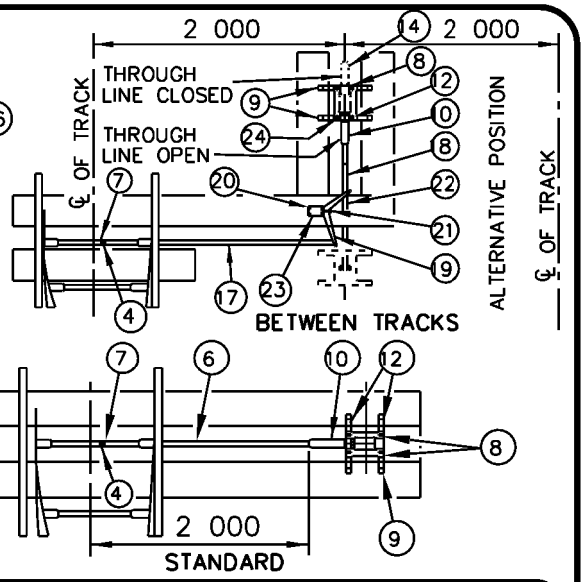
1. I SHOWS POSSIBLE INSULATED JOINT POSITIONS.

TUMBLER WITH LOCKABLE KNUCKLE – JOINTED ARM

ANNEXURE 27
SHEET 1 of 4



TUMBLER ARRANGEMENT

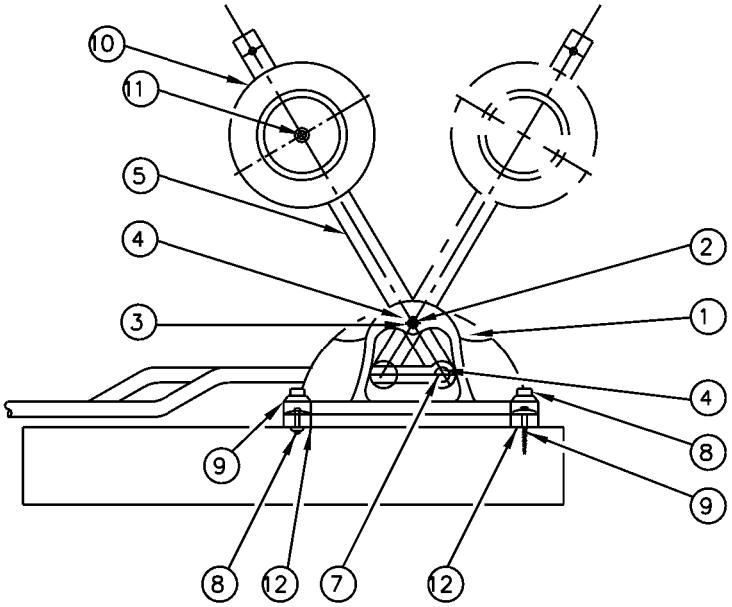


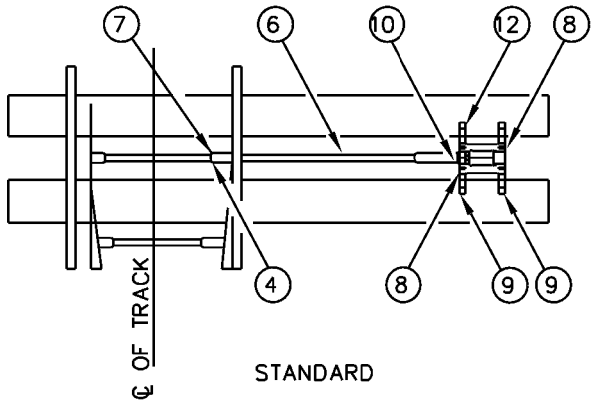
REMARKS:
1. SEE CLAUSE 5.6.7.

ITEM No.	DESCRIPTION	NUMBER PER CASE				DRAWING
		1	2	3	4	
1	SADDLE	1	1	1	1	TYPE E – 3301
2	SADDLE PIN	1	1	1	1	
3	WASHER FOR ITEMS 2 AND 7	6	4	4	4	
4	SPLIT PIN FOR ITEMS 2 AND 7	6	4	4	4	
5	KICK–OVER LEVER	1	1	1	1	
6	PULL ROD (2 285mm LONG)	1	1	1	1	
7	PULL ROD PIN	4	2	2	2	
8	BOLT AND LOCK NUT FOR ITEM 12	4	4	4	4	
9	COACH SCREW TYPE B	4	4	4	4	TYPE E – 239M
10	COUNTERWEIGHT	1	1	1	1	TYPE E – 3301
11	COUNTERWEIGHT BOLT (SHORT)	–	1	1	1	
12	TUMBLER SUPPORT STRAP	2	2	2	2	
13	SPLIT PIN FOR ITEM 15	1	1	1	1	
14	COUNTERWEIGHT ARM	1	1	1	1	
15	KICK–OVER LEVER PIN	1	1	1	1	
16	WASHER FOR ITEM 15	1	1	1	1	
17	PULL ROD (1 475mm LONG)	1	–	–	–	
18	PULL ROD (915 mm LONG)	1	–	–	–	
19	BELL CRANK	1	–	–	–	
20	BELL CRANK SHOE	1	–	–	–	CSEM 51–1–1/4
21	BELL CRANK SHOE PIN	1	–	–	–	
22	SPLIT PIN FOR ITEM 21	1	–	–	–	
23	BOLT (Ø16mm X 180mm LONG) & NUT	4	–	–	–	–
24	INDICATOR PLATE	1	–	–	–	TYPE E – 3301
25	COUNTERWEIGHT BOLT FOR ITEM 24	2	–	–	–	
26	LONG BRIDLE	1	1	–	1	TYPE E – 3157
27	SHORT BRIDLE	–	–	–	1	
28	POINTS LOCK WITH CHAIN	–	–	–	1	TYPE E – 3093
29	BRIDGE	2	1	2	1	TYPE E – 3178
30	SADDLE FOR LONG BRIDGE	–	1	1	1	TYPE E – 3177
31	PATRICK LOCK (R H)	1	1	1	–	CSEM 411
32	PATRICK LOCK (L H)	–	–	1	–	CSEM 412

CASE 1 TURNOUT PROVIDED WITH POINTS INDICATOR, PATRICK LOCK AND LONG BRIDLE.
CASE 2 TURNOUT PROVIDED WITH PATRICK LOCK AND LONG BRIDLE (NO INDICATOR).
CASE 3 TURNOUT AT DETECTOR–LOCKED STATION PROVIDED WITH RIGHT–HAND AND LEFT–HAND PATRICK OR CHUBB LOCKS.
CASE 4 TURNOUT PROVIDED WITH PADLOCK AND LONG BRIDLE.

TUMBLER WITH STIFF COUNTER – WEIGHT ARM





STANDARD

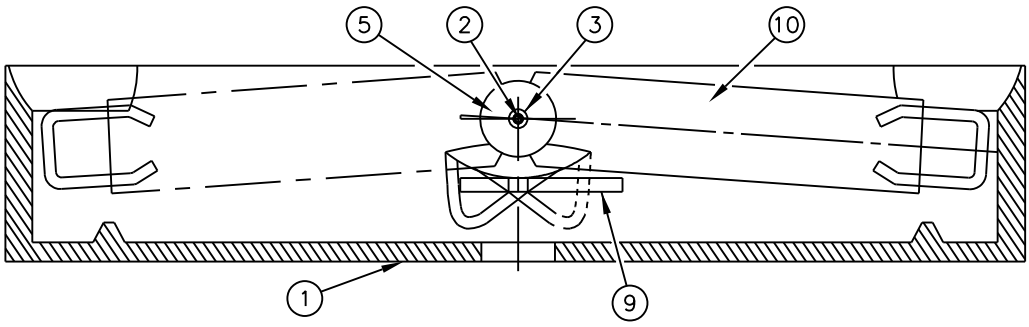
TUMBLER ARRANGEMENT

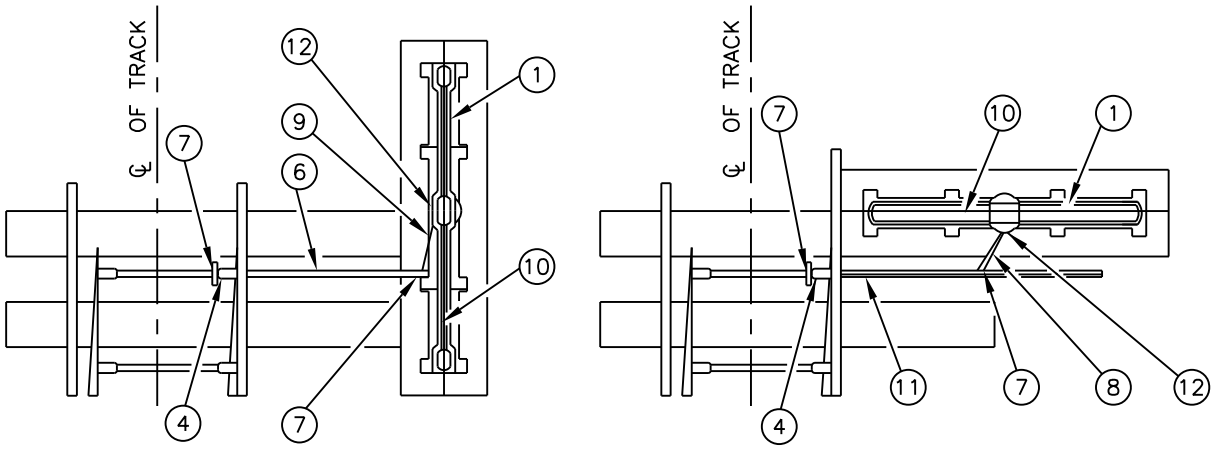
REMARKS:
1. SEE CLAUSE 5.6.7.

ITEM No.	DESCRIPTION	NUMBER OFF	DRAWING TYPE
1	SADDLE	1	E – 3287
2	SADDLE PIN	1	
3	WASHER FOR ITEM 2	2	
4	SPLIT PIN FOR ITEMS 2 AND 7	4	
5	KICK–OVER LEVER	1	
6	PULL ROD (2 285mm LONG)	1	
7	PULL–ROD PIN	2	
8	BOLT AND LOCK NUT FOR ITEM 12	4	
9	COACH SCREW TYPE B	4	E – 239M
10	COUNTERWEIGHT	1	E – 3287
11	COUNTERWEIGHT BOLT (SHORT)	1	E – 3287
12	TUMBLER SUPPORT STRAP	2	E – 3287

TUMBLER (COUNTERSUNK) FOR HARBOURS

ANNEXURE 27
SHEET 3 of 4





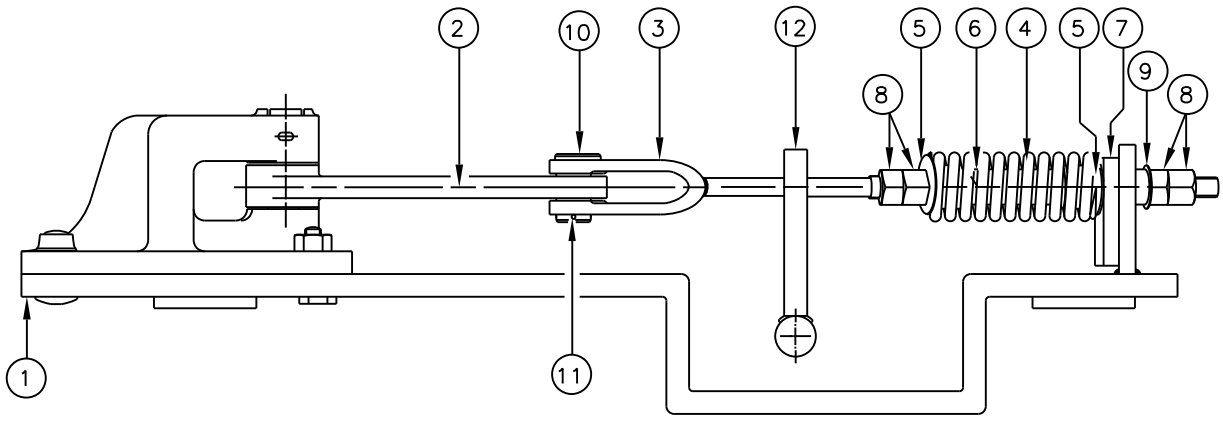
BETWEEN TRACKS ALTERNATIVE

TUMBLER ARRANGEMENTS

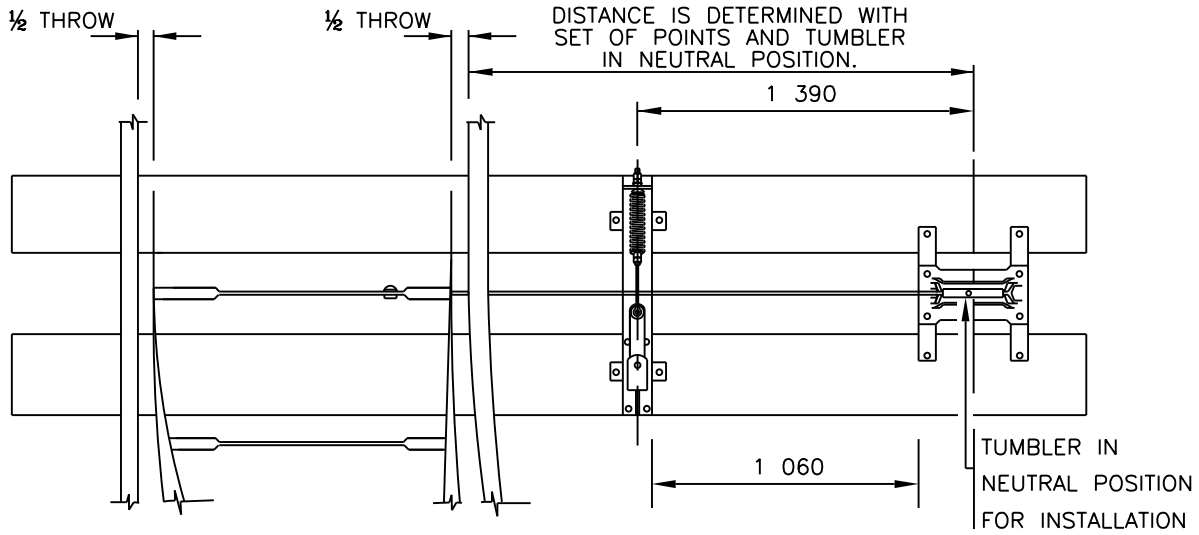
REMARKS:
1. SEE CLAUSE 5.6.7.

ITEM No.	DESCRIPTION	NUMBER OFF	DRAWING TYPE
1	SADDLE	1	E – 3138
2	SADDLE PIN	1	
3	WASHER FOR ITEMS 2, 7 AND 12	4	
4	SPLIT PIN FOR ITEMS 2, 7 AND 12	3	
5	KICK–OVER LEVER	1	
6	PULL ROD (915mm LONG)	1	E – 3301
7	PULL ROD PIN	2	E – 3138
8	SPECIAL CRANK	1	
9	CRANK	1	
10	COUNTERWEIGHT	1	
11	PULL ROD (1 475mm LONG)	1	E – 3301
12	CRANK PIN	1	E – 3138

TUMBLER (STOKSTYF) WITH SPRING LOADED LINKING MECHANISM



ASSEMBLY

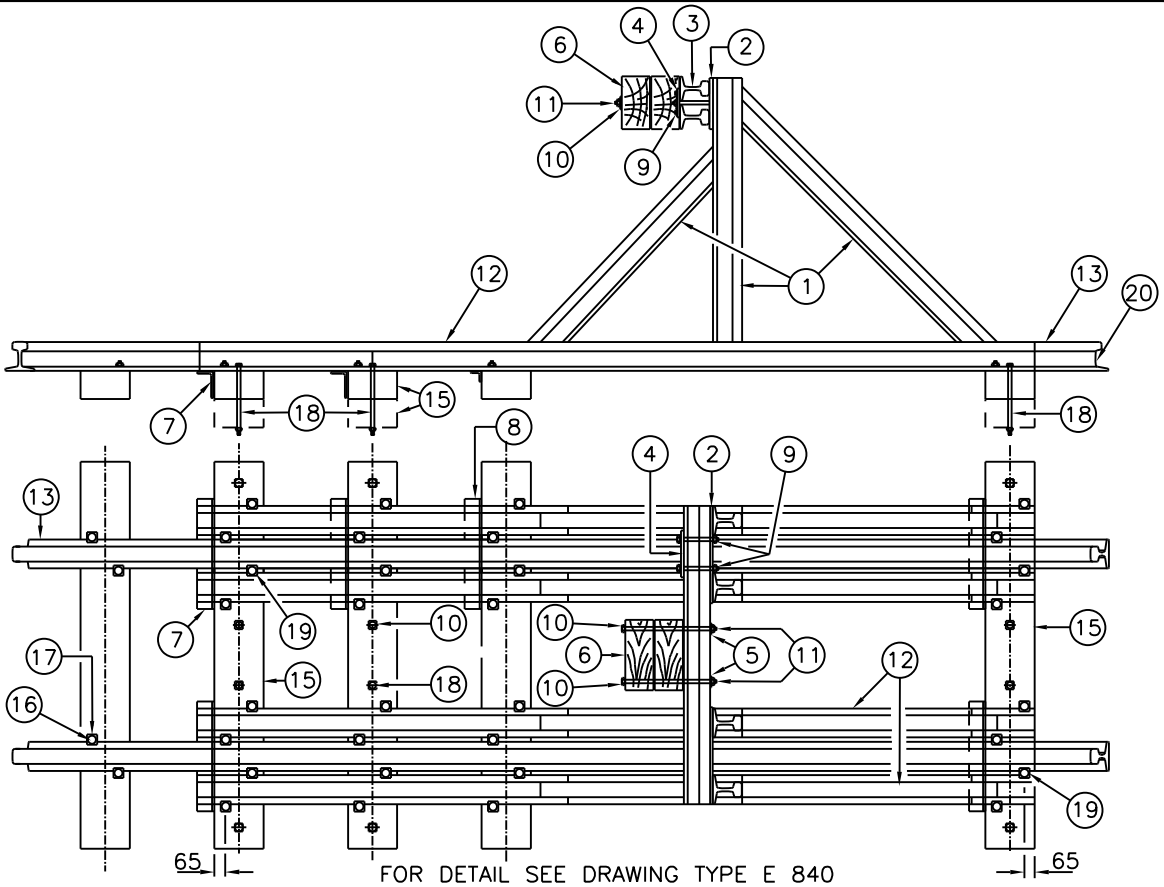


POSITION OF "STOKSTYF" SPRING LOADED LINKING MECHANISM

ITEM No.	DESCRIPTION	QUANTITIES	DRG. No. TYPE	STORES ITEM No.
1	BASE PLATE ASSEMBLY	1	E-3364 SHT 2-007	–
2	CRANK ARM	1	E-3364 SHT 2-004	–
3	PUSH ROD ASSEMBLY	1	E-3364 SHT 2-005	–
4	COMPRESSION SPRING	1	E-3364 SHT 3-002	–
5	SPRING CENTRALIZER	2	E-3364 SHT 3-001	–
6	PUSH ROD SLEEVE	1	E-3364 SHT 3-004	–
7	SWIVEL	1	E-3364 SHT 3-003	–
8	M24 NUT	4	–	01/015 552
9	M24 WASHER	1	–	01/007 275
10	CENTRE PIN	1	CSE M5629	59/009 566
11	SPLIT PIN	1	–	01/010 181
12	PULL ROD ASSEMBLY	1	E-3364 SHT 3-005	–

CUSHION STOP BLOCK / SLIDING TYPE

ANNEXURE 28
SHEET 1 of 1



ITEM	DESCRIPTION	ITEM	DESCRIPTION
1	STRUT (ASSEMBLY)	11	BOLT AND NUT (M24, 455mm LONG)
2	STRUT GUSSET PLATE	12	STRUT FOOT
3	BUFFER BEAM (ASSEMBLY)	13	TRACK
4	LOCK PLATE	14	CUSHION STOP BLOCK (ASSEMBLY OF ITEMS 1–12)
5	BACK PLATE	15	WOODEN SLEEPER (2,1m LONG)
6	BUMPER BLOCK (WOOD)	16	COACH SCREW B
7	ANGLE IRON	17	COACH–SCREW WASHER
8	ANGLE IRON	18	BOLT AND NUT FOR SLEEPER
9	BOLT AND NUT (M24, 200mm LONG)	19	FASTENING PLATE F1
10	WASHERS FOR DRAWING ITEMS NO's 11 & 18	20	END OF STOP BLOCK

REMARKS:

1. CUSHION STOP BLOCK IS SUPPLIED COMPLETE WITH ITEMS 14, 17, AND 19. ITEMS 15 AND 16 TO BE SUPPLIED FROM OWN STOCK.
2. IN YARDS WHERE HEAVY SHUNTING OCCURS AND WHERE CUSHION STOP BLOCKS ARE IN THE VICINITY OF BUILDINGS OR NEAR BOUNDARIES, ITEM 18 AND ADDITIONAL QUANTITIES OF ITEM 10 MUST BE ORDERED. ADDITIONAL SLEEPERS, ITEM 15, TO BE PROVIDED IN POSITIONS SHOWN IN DOTTED LINES.
3. HEAVY SHUNTING:
   - A. GRADIENT – STEEPER THAN 1:100
   - B. SPEED – FASTER THAN WALKING PACE
   - C. DENSITY – HIGH DENSITY (ALL DAY)
   - D. POOR BALLAST – ASH, SOIL, GRAVEL, ETC.

   } DEPOT ENGINEER TO DECIDE
4. AFTER EACH COLLISION, THE CUSHION STOP BLOCK IS TO BE MOVED TO THE NORMAL POSITION, INSPECTED FOR DEFECTS AND REPAIRED IF NECESSARY.

FENCING

REPAIRS TO AND LENGTHENING OF EXISTING FENCES	
TYPE OF FENCE	REFERENCE DRAWING TYPE
8 – WIRE FENCE	I – 41 OR I – 45 SHT 1

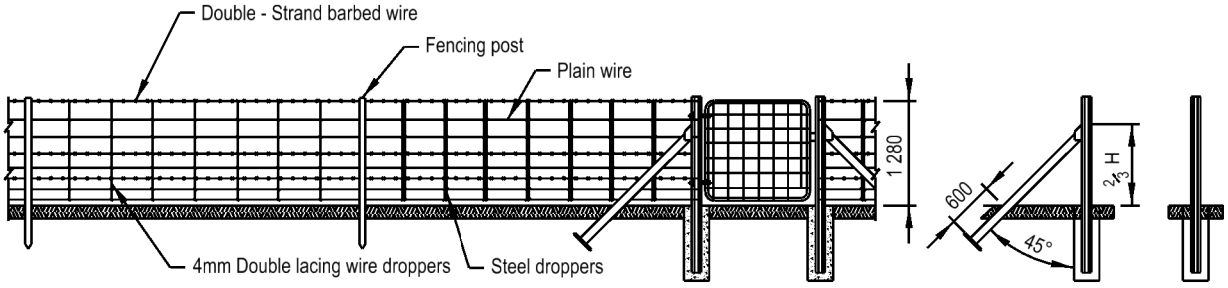
ERECTION OF NEW FENCES	
TYPE OF FENCE	REFERENCE DRAWING TYPE
6 – WIRE LARGE STOCK FENCE	I – 45
8 – WIRE SMALL STOCK FENCE	I – 45

GATES	
GATES FOR	REFERENCE DRAWING TYPE
6 AND 8 – WIRE FENCING	I – 45 SHT 2

GENERAL	
DESCRIPTION	REFERENCE DRAWING TYPE
FENCING AT LAND BEACONS	I – 45
FENCING ALONG CURVED BOUNDARIES	I – 45
FENCING OF ENCLOSED AREAS	I – 45

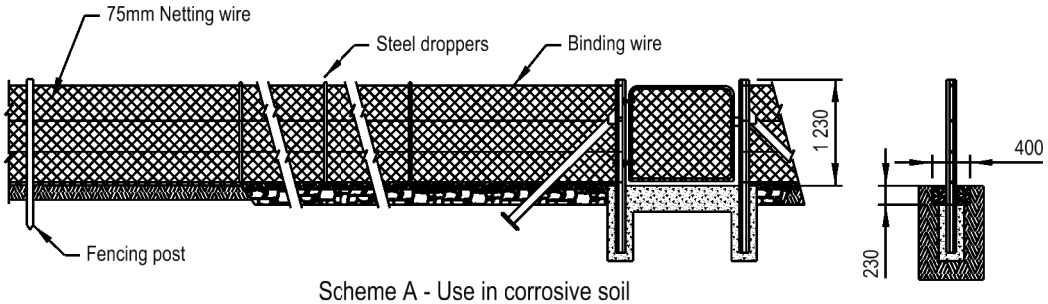
FENCING

ANNEXURE 29
SHEET 2 of 3

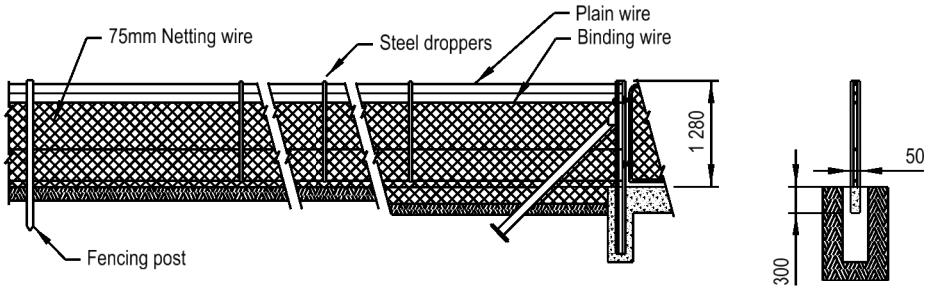


8 WIRE FENCE

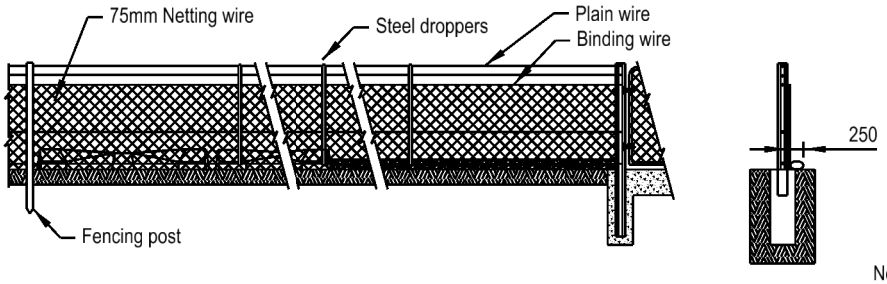
STRAINING POST



Scheme A - Use in corrosive soil



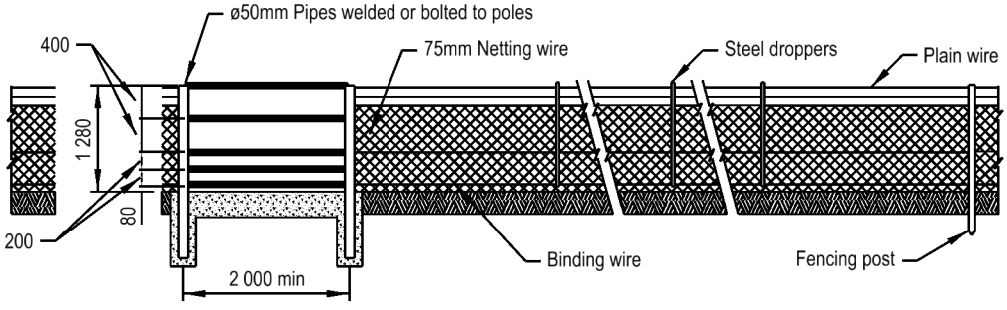
Scheme B - Use in non-corrosive soil



Scheme C - For hard ground where A & B are unsuitable

Note:
For futher detail
see CCE TYPE I-41

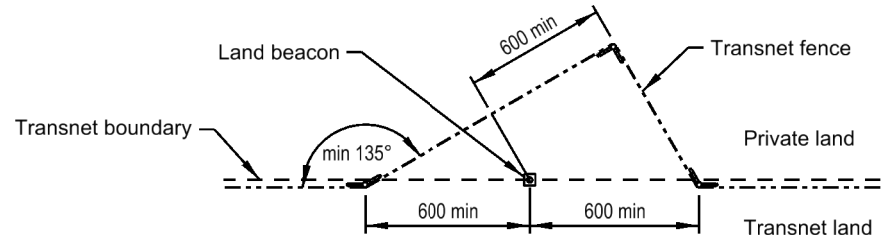
JACKAL - PROOF FENCE

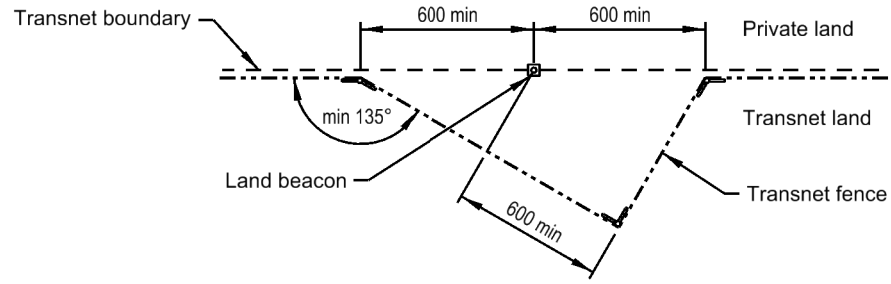


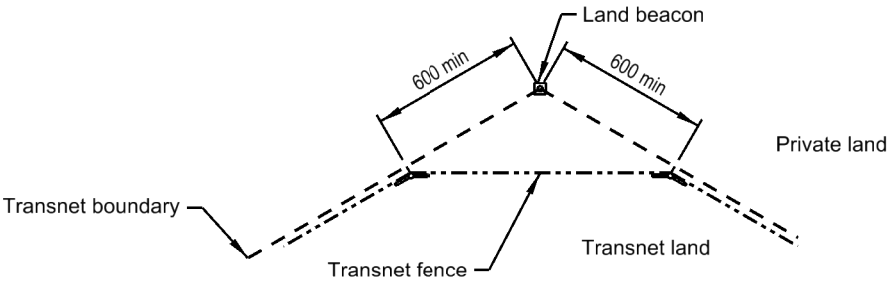
THOROUGHFARE FOR PEDESTRIANS

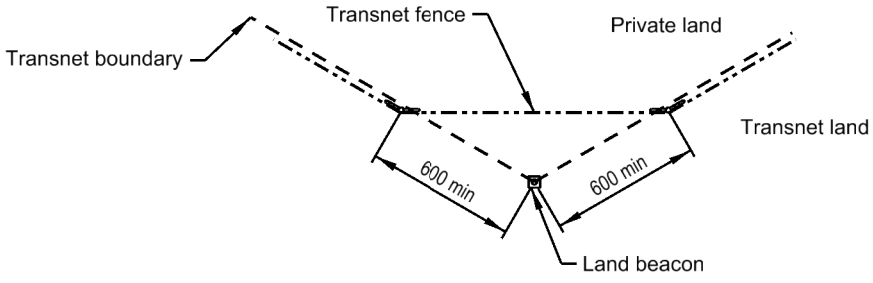
FENCING AT TRANSNET BOUNDARIES AND LAND BEACONS

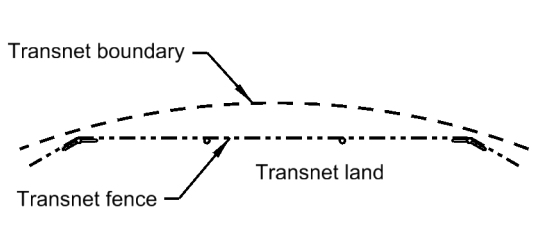
ANNEXURE 29
SHEET 3 of 3



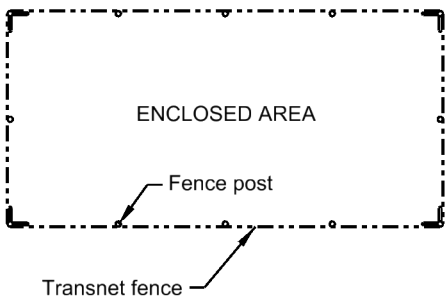








Fence along curved boundary



SLEEPER DETAIL : GENERAL

SLEEPER	TYPE	LENGTH (mm)	WIDTH (mm)	HEIGHT (mm)	MASS (kg)	REFERENCE DRAWING
P2	CONCRETE	2 057	254	230	215	E-3303 SH 1
PY	CONCRETE	2 200	300	232	278	E-3318 SH 1
F4	CONCRETE	2 057	254	244	215	E-3303 SH 2
FY	CONCRETE	2 200	300	258	282	E-3318 SH 2
WOOD	LAMINATED	2 100	250	195	72	————
WOOD	LAMINATED	2 400	250	195	82	————
WOOD	LAMINATED	2 700	250	195	92	————
WOOD	LAMINATED	3 000	250	195	102	————
WOOD	LAMINATED	3 400	250	195	116	————
WOOD	LAMINATED	3 800	250	195	130	————
WOOD	LAMINATED	4 200	250	195	143	————
WOOD	LAMINATED	6 000	250	195	205	————
STEEL	————	2 060	260	87	63	E-3277
UNIVERSAL	CONCRETE	2 100	200			————
WOOD	HARD	2 100		150		————

SLEEPER DETAIL :
48kg 1:12 TURNOUT :
CONCRETE SLEEPERS

SLEEPER NUMBER	USED ON TURNOUT (MARK)	MASS (kg)	LENGTH (mm)	SLEEPER NUMBER	USED ON TURNOUT (MARK)	MASS (kg)	LENGTH (mm)
1P	1 (LH & RH)	334	2 225	19PL	1 (LH)	385	2 565
2P	1 (LH & RH)	430	2 870	19PR	1 (RH)	386	2 570
3PL	1 (LH)	430	2 870	20PL	1 (LH)	390	2 600
3PR	1 (RH)	430	2 870	20PR	1 (RH)	390	2 600
4PL	1 (LH)	337	2 250	21PL	1 (LH)	395	2 635
4PR	1 (RH)	337	2 250	21PR	1 (RH)	395	2 635
5PL	1 (LH)	339	2 260	22PL	1 (LH)	401	2 670
5PR	1 (RH)	339	2 260	22PR	1 (RH)	401	2 670
6PL	1 (LH)	341	2 275	23PL	1 (LH)	406	2 705
6PR	1 (RH)	341	2 275	23PR	1 (RH)	406	2 705
7PL	1 (LH)	344	2 290	24PL	1 (LH)	411	2 740
7PR	1 (RH)	344	2 290	24PR	1 (RH)	412	2 745
8PL	1 (LH)	346	2 310	25PL	1 (LH)	418	2 780
8PR	1 (RH)	346	2 310	25PR	1 (RH)	418	2 785
9PL	1 (LH)	349	2 325	26PL	1 (LH)	423	2 820
9PR	1 (RH)	349	2 325	26PR	1 (RH)	424	2 825
10PL	1 (LH)	352	2 345	27PL	1 (LH)	430	2 865
10PR	1 (RH)	352	2 345	27PR	1 (RH)	430	2 865
11PL	1 (LH)	355	2 365	28PL	1 (LH)	436	2 905
11PR	1 (RH)	355	2 365	28PR	1 (RH)	436	2 910
12PL	1 (LH)	358	2 385	29PL	1 (LH)	443	2 950
12PR	1 (RH)	358	2 385	29PR	1 (RH)	443	2 950
13PL	1 (LH)	361	2 410	30PL	1 (LH)	449	2 995
13PR	1 (RH)	361	2 410	30PR	1 (RH)	449	2 995
14PL	1 (LH)	365	2 435	31PL	1 (LH)	456	3 040
14PR	1 (RH)	365	2 435	31PR	1 (RH)	456	3 040
15PL	1 (LH)	369	2 460	32PL	1 (LH)	462	3 080
15PR	1 (RH)	369	2 460	32PR	1 (RH)	462	3 080
16PL	1 (LH)	373	2 485	33PL	1 (LH)	469	3 125
16PR	1 (RH)	373	2 485	33PR	1 (RH)	469	3 125
17PL	1 (LH)	376	2 505	34PL	1 (LH)	476	3 170
17PR	1 (RH)	377	2 510	34PR	1 (RH)	476	3 170
18PL	1 (LH)	380	2 535	35PL	1 (LH)	483	3 220
18PR	1 (RH)	380	2 535	35PR	1 (RH)	483	3 220

REMARKS:
1. FOR REMARKS SEE ANNEXURE 30 SHEET 3

SLEEPER DETAIL : 48kg 1:12 TURNOUT : CONCRETE SLEEPERS

SLEEPER NUMBER	USED ON TURNOUT (MARK)	MASS (kg)	LENGTH (mm)	SLEEPER NUMBER	USED ON TURNOUT (MARK)	MASS (kg)	LENGTH (mm)
36PL	1 (LH)	491	3 270	44PL	1 (LH)	546	3 640
36PR	1 (RH)	491	3 270	44PR	1 (RH)	546	3 640
37PL	1 (LH)	498	3 320	45PL	1 (LH)	555	3 695
37PR	1 (RH)	498	3 320	45PR	1 (RH)	555	3 695
38PL	1 (LH)	505	3 365	46PL	1 (LH)	563	3 750
38PR	1 (RH)	505	3 365	46PR	1 (RH)	563	3 750
39PL	1 (LH)	512	3 410	47PL	1 (LH)	570	3 800
39PR	1 (RH)	512	3 410	47PR	1 (RH)	570	3 800
40PL	1 (LH)	519	3 460	48PL	1 (LH)	578	3 855
40PR	1 (RH)	519	3 460	48PR	1 (RH)	578	3 855
41PL	1 (LH)	526	3 505	49P	1 (LH & RH)	587	3 910
41PR	1 (RH)	526	3 505	50P	1 (LH & RH)	594	3 960
42PL	1 (LH)	533	3 550	51P	1 (LH & RH)	602	4 015
42PR	1 (RH)	533	3 550	52P	1 (LH & RH)	611	4 070
43PL	1 (LH)	539	3 595	53P	1 (LH & RH)	619	4 125
43PR	1 (RH)	539	3 595	54P	1 (LH & RH)	274	1 825

REMARKS:
1. FOR TURNOUT CLASSIFICATION (TURNOUT MARK) SEE THE PERMANENT WAY MATERIAL MANUAL PART 1.
2. WIDTH OF SLEEPER = 250mm.
   HEIGHT OF SLEEPER = 250mm.

SLEEPER DETAIL : S-60 / UIC-60 1:12 TURNOUT : CONCRETE SLEEPERS

SLEEPER NUMBER	USED ON TURNOUT (MARK)	MASS (kg)	LENGTH (mm)	SLEEPER NUMBER	USED ON TURNOUT (MARK)	MASS (kg)	LENGTH (mm)
1	2, 3(a,b,c,d,e), 4	334	2 225	12F	4	368	2 455
2	2	431	2 870	12P	3, 3a, 3b, 3c, 3d, 3e	358	2 385
2F	4	431	2 870	13	2	361	2 405
2P	3, 3a, 3b, 3d	431	2 870	13F	4	368	2 455
2PH	3c, 3e	431	2 870	13P	3, 3a, 3b, 3c, 3d, 3e	361	2 405
3	2	431	2 870	14	2	365	2 430
3F	4	431	2 870	14F	4	368	2 455
3P	3, 3a, 3b, 3d, 3e	431	2 870	14P	3, 3a, 3b, 3c, 3d, 3e	365	2 430
3PH	3c	431	2 870	15	2	368	2 455
4	2	337	2 245	15F	4	368	2 455
4F	4	351	2 340	15P	3, 3a, 3b, 3c, 3d, 3e	368	2 455
4P	3, 3a, 3b, 3c, 3d, 3e	337	2 245	16	2, 3(a,b,d,e), 4	372	2 480
5	2	339	2 260	16PH	3c	372	2 480
5F	4	351	2 340	17	2, 3(a,b,c,d,e), 4	376	2 505
5P	3, 3a, 3b, 3c, 3d, 3e	339	2 260	18	2, 3(a,b,c,d,e), 4	380	2 535
6	2	341	2 275	19	2, 3(a,b,c,d,e), 4	385	2 565
6F	4	351	2 340	20	2, 3(a,b,c,d,e), 4	389	2 595
6P	3, 3a, 3b, 3c, 3d, 3e	341	2 275	21	2, 3(a,b,c,d,e), 4	395	2 630
7	2	344	2 290	22	2, 3(a,b,c,d,e), 4	400	2 665
7F	4	351	2 340	23	2, 3(a,b,c,d,e), 4	405	2 700
7P	3, 3a, 3b, 3c, 3d, 3e	344	2 290	24	2, 3(a,b,c,d,e), 4	411	2 740
8	2	346	2 305	25	2, 3(a,b,c,d,e), 4	416	2 775
8F	4	351	2 340	26	2, 3(a,b,c,d,e), 4	423	2 820
8P	3, 3a, 3b, 3c, 3d, 3e	346	2 305	27	2, 3(a,b,c,d,e), 4	429	2 860
9	2	349	2 325	28	2, 3(a,b,c,d,e), 4	435	2 900
9F	4	351	2 340	29	2, 3(a,b,c,d,e), 4	442	2 945
9P	3, 3a, 3b, 3c, 3d, 3e	349	2 325	30	2, 3(a,b,c,d,e), 4	449	2 990
10	2	351	2 340	31	2, 3(a,b,c,d,e), 4	456	3 040
10F	4	351	2 340	32	2, 3(a,b,c,d,e), 4	462	3 080
10P	3, 3a, 3b, 3c, 3d, 3e	351	2 340	33	2, 3(a,b,c,d,e), 4	468	3 120
11	2	354	2 360	34	2, 3(a,b,c,d,e), 4	476	3 170
11F	4	368	2 455	35	2, 3(a,b,c,d,e), 4	482	3 215
11P	3, 3a, 3b, 3c, 3d, 3e	354	2 360	36	2, 3(a,b,c,d,e), 4	490	3 265
12	2	358	2 385	37	2, 3(a,b,c,d,e), 4	497	3 315

REMARKS:
1. FOR REMARKS SEE ANNEXURE 30 SHEET 5

SLEEPER DETAIL : S–60 / UIC–60 1:12 TURNOUT : CONCRETE SLEEPERS

SLEEPER NUMBER	USED ON TURNOUT (MARK)	MASS (kg)	LENGTH (mm)	SLEEPER NUMBER	USED ON TURNOUT (MARK)	MASS (kg)	LENGTH (mm)
38	2, 3(a,b,c,d,e), 4	504	3 360	47	2, 3(a,b,c,d,e), 4	570	3 800
39	2, 3(a,b,c,d,e), 4	511	3 405	48	2, 3(a,b,c,d,e), 4	578	3 855
40	2, 3(a,b,c,d,e), 4	518	3 455	49	2, 3(a,b,c,d,e), 4	587	3 910
41	2, 3(a,b,c,d,e), 4	526	3 505	50	2, 3(a,b,c,d,e), 4	595	3 965
42	2, 3(a,b,c,d,e), 4	532	3 545	51	2, 3(a,b,c,d,e), 4	602	4 015
43	2, 3(a,b,c,d,e), 4	539	3 590	52	2, 3(a,b,c,d,e), 4	611	4 070
44	2, 3(a,b,c,d,e), 4	546	3 640	53PH	3c	431	2 870
45	2, 3(a,b,c,d,e), 4	554	3 695	84	2, 3(a,b,c,d,e), 4	274	1 825
46	2, 3(a,b,c,d,e), 4	562	3 745				

REMARKS:
1. FOR TURNOUT CLASSIFICATION (TURNOUT MARK) SEE THE PERMANENT WAY MATERIAL MANUAL PART 1.
2. WIDTH OF SLEEPER = 250mm.
   HEIGHT OF SLEEPER = 250mm.
3. USED ON LEFT HAND AS WELL AS RIGHT HAND TURNOUTS.

SLEEPER DETAIL : S-60 / UIC-60 1:20 TURNOUT : CONCRETE SLEEPERS

SLEEPER NUMBER	USED ON TURNOUT (MARK)	MASS (kg)	LENGTH (mm)	SLEEPER NUMBER	USED ON TURNOUT (MARK)	MASS (kg)	LENGTH (mm)
1	2, 3a, 3b, 3c, 5	334	2 225	19	2	362	2 410
2	2	431	2 870	19P	3a, 3b, 3c	362	2 410
2P	3a, 3b, 3c	431	2 870	19P-1	5	362	2 410
2PH	5	431	2 870	20	2	363	2 420
3	2	431	2 870	20P	3a, 3b, 3c	363	2 420
3P	3a, 3b, 3c, 5	431	2 870	20P-1	5	363	2 420
4	2	336	2 240	21	2	366	2 440
4P	3a, 3b, 3c, 5	336	2 240	21P	3a, 3b, 3c	366	2 440
5	2	343	2 285	21P-1	5	366	2 440
5P	3a, 3b, 3c, 5	343	2 285	22	2	368	2 450
6	2	338	2 255	22P	3a, 3b, 3c	368	2 450
6P	3a, 3b, 3c, 5	338	2 255	22P-1	5	368	2 450
7	2	340	2 265	23	2, 3a, 3b, 3c, 5	370	2 465
7P	3a, 3b, 3c, 5	340	2 265	24	2, 3a, 3b, 3c, 5	372	2 480
8	2	350	2 335	25	2, 3a, 3b, 3c, 5	375	2 500
8P	3a, 3b, 3c, 5	350	2 335	26	2, 3a, 3b, 3c, 5	377	2 515
9	2	343	2 285	27	2, 3a, 3b, 3c, 5	380	2 530
9P	3a, 3b, 3c, 5	343	2 285	28	2, 3a, 3b, 3c, 5	383	2 550
10	2	392	2 610	29	2, 3a, 3b, 3c, 5	386	2 570
10P	3a, 3b, 3c, 5	392	2 610	30	2, 3a, 3b, 3c, 5	389	2 590
11	2	566	3 770	31	2, 3a, 3b, 3c, 5	391	2 605
11P	3a, 3b, 3c, 5	566	3 770	32	2, 3a, 3b, 3c, 5	394	2 625
12	2	348	2 320	33	2, 3a, 3b, 3c, 5	397	2 645
12P	3a, 3b, 3c, 5	348	2 320	34	2, 3a, 3b, 3c, 5	401	2 670
13	2	350	2 330	35	2, 3a, 3b, 3c, 5	404	2 690
13P	3a, 3b, 3c, 5	350	2 330	36	2, 3a, 3b, 3c, 5	407	2 710
14	2	351	2 340	37	2, 3a, 3b, 3c, 5	410	2 730
14P	3a, 3b, 3c, 5	351	2 340	38	2, 3a, 3b, 3c, 5	413	2 755
15	2	354	2 360	39	2, 3a, 3b, 3c, 5	416	2 775
15P	3a, 3b, 3c, 5	354	2 360	40	2, 3a, 3b, 3c, 5	420	2 800
16	2	356	2 370	41	2, 3a, 3b, 3c, 5	424	2 825
16P	3a, 3b, 3c, 5	356	2 370	42	2, 3a, 3b, 3c, 5	428	2 850
17	2	357	2 380	43	2, 3a, 3b, 3c, 5	431	2 870
17P	3a, 3b, 3c, 5	357	2 380	44	2, 3a, 3b, 3c, 5	434	2 895
18	2	359	2 390	45	2, 3a, 3b, 3c, 5	438	2 920
18P	3a, 3b, 3c	359	2 390	46	2, 3a, 3b, 3c, 5	442	2 945
18P-1	5	359	2 390	47	2, 3a, 3b, 3c, 5	446	2 970

REMARKS:
1. FOR REMARKS SEE ANNEXURE 30 SHEET 7

SLEEPER DETAIL : S-60 / UIC-60 1:20 TURNOUT : CONCRETE SLEEPERS

SLEEPER NUMBER	USED ON TURNOUT (MARK)	MASS (kg)	LENGTH (mm)	SLEEPER NUMBER	USED ON TURNOUT (MARK)	MASS (kg)	LENGTH (mm)
48	2, 3a, 3b, 3c, 5	449	2 995	66	2	533	3 555
49	2, 3a, 3b, 3c, 5	454	3 025	66P	3a, 3b, 3c, 5	533	3 555
50	2, 3a, 3b, 3c, 5	458	3 050	67	2	539	3 590
51	2, 3a, 3b, 3c, 5	461	3 075	67P	3a, 3b, 3c, 5	539	3 590
52	2, 3a, 3b, 3c, 5	467	3 110	68	2	542	3 615
53	2, 3a, 3b, 3c, 5	471	3 140	68P-LH	3a, 3b, 3c, 5 (LH)	542	3 615
54	2, 3a, 3b, 3c, 5	476	3 175	68P-RH	3a, 3b, 3c, 5 (RH)	542	3 615
55	2, 3a, 3b, 3c, 5	481	3 205	69	2	547	3 645
56	2	486	3 240	69P-LH	3a, 3b, 3c, 5 (LH)	547	3 645
56P	3a, 3b, 3c, 5	486	3 240	69P-RH	3a, 3b, 3c, 5 (RH)	547	3 645
57	2	587	3 915	70	2	551	3 670
57P	3a, 3b, 3c, 5	587	3 915	70P-LH	3a, 3b, 3c, 5 (LH)	551	3 670
58	2	587	3 915	70P-RH	3a, 3b, 3c, 5 (RH)	551	3 670
58P	3a, 3b, 3c, 5	587	3 915	71	2, 3a, 3b, 3c, 5	556	3 705
59	2	498	3 320	72	2, 3a, 3b, 3c, 5	560	3 735
59P	3a, 3b, 3c, 5	498	3 320	73	2, 3a, 3b, 3c, 5	566	3 770
60	2	503	3 350	74	2, 3a, 3b, 3c, 5	570	3 800
60P	3a, 3b, 3c, 5	503	3 350	75	2, 3a, 3b, 3c, 5	575	3 835
61	2	507	3 380	76	2, 3a, 3b, 3c, 5	580	3 865
61P	3a, 3b, 3c, 5	507	3 380	77	2, 3a, 3b, 3c, 5	585	3 900
62	2	513	3 420	78	2, 3a, 3b, 3c, 5	590	3 930
62P	3a, 3b, 3c, 5	513	3 420	79	2, 3a, 3b, 3c, 5	596	3 965
63	2	518	3 450	80	2, 3a, 3b, 3c, 5	600	3 995
63P	3a, 3b, 3c, 5	518	3 450	81	2, 3a, 3b, 3c, 5	605	4 030
64	2	523	3 485	82	2, 3a, 3b, 3c, 5	610	4 060
64P	3a, 3b, 3c, 5	523	3 485	83	2, 3a, 3b, 3c, 5	615	4 095
65	2	528	3 520	84	2, 3a, 3b, 3c, 5	274	1 825
65P	3a, 3b, 3c, 5	528	3 520				

REMARKS:

1. FOR TURNOUT CLASSIFICATION (TURNOUT MARK) SEE THE PERMANENT WAY MATERIAL MANUAL PART 1.
   MARK 2 = UNIQUE NOS 60209495(LH) AND 60209496(RH).
   MARK 3a = UNIQUE NOS 60209497(LH) AND 60209498(RH).
2. WIDTH OF SLEEPER = 250mm.
   HEIGHT OF SLEEPER = 250mm.
3. USED ON LEFT HAND AS WELL AS RIGHT HAND TURNOUTS, EXCEPT WHERE SHOWN DIFFERENTLY.