TRANSNET SOC LTD

[Registration Number 1990/000900/30]

REQUEST FOR PROPOSAL (RFP)

REPAIR AND REPLACEMENT OF HIGH MAST LIGHTS AT DURBAN BBC TERMINALS (DURBAN MPT, DURBAN CAR, MAYDON WHARF) FOR TRANSNET SOC LTD (REG. NO 1990/000900/30) OPERATING AS TRANSNET PORT TERMINALS (HEREINAFTER REFERRED TO AS "TPT")

RFP NUMBER	**: TPT/2022/05/0171/3688/RFP**
ISSUE DATE	**: 21 October 2022**
CLOSING DATE	**: 25 November 2022**
CLOSING TIME	**: 12h00**
TENDER VALIDITY PERIOD	**: 12 weeks from Closing Date**

The Tender

Contents

Number Heading

Annexures

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Part T1: Tendering Procedures

T1.1 Tender Notice and Invitation

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	**REPAIR AND REPLACEMENT OF HIGH MAST LIGHTS AT DURBAN BBC TERMINALS (DURBAN MPT, DURBAN CAR, MAYDON WHARF) FOR TRANSNET SOC LTD (REG. NO 1990/000900/30) OPERATING AS TRANSNET PORT TERMINALS (HEREINAFTER REFERRED TO AS "TPT")**
TENDER DOWNLOADING	**This Tender may be downloaded directly from the National Treasury eTender Publication Portal at www.etenders.gov.za FREE OF CHARGE.**

NON COMPULSORY TENDER CLARIFICATION MEETING	A non-compulsory Tender Clarification Meeting will be conducted on Microsoft Teams on the 01st November 2022, Tuesday at 10:00am [10 o'clock]. The Clarification Meeting will start punctually, and information will not be repeated for the benefit of Tenderers arriving late. Tenderers who wish to participate in the briefing session must send request via email to Rochelle.isaacs@transnet.net before end of business on Monday 31st October 2022. Tenderers are advised to download Microsoft Teams App to their PC or Mobile to be able to participate.
CLOSING DATE	**12:00pm on** Friday 25th November 2022 Tenderers must ensure that tenders are uploaded timeously onto the system. If a tender is late, it will not be accepted for consideration.

2. 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.

3. 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.

4. 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:

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

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

4.3. Go to the open market if the quoted rates (for award of work) are deemed unreasonable;

4.4. 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;

4.5. Request audited financial statements or other documentation for the purposes of a due diligence exercise;

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

4.7. 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;

4.8. 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);

4.9. 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.

4.10. 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.

4.11. 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 [clause 12 on T2.2-18], [**Breach of Law**] whether or not they have been found guilty of a serious breach of law during the past 5 [five] years.

4.12. Transnet reserves the right to perform a risk analysis on the preferred tenderer to ascertain if any of the following might present an unacceptable commercial risk to the employer*:*

- *unduly high or unduly low tendered rates or amounts in the tender offer;*
- *contract data of contract provided by the tenderer; or*
- *the contents of the tender returnables which are to be included in the contract.*

5. 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.

6. 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)

Transnet urges its clients, suppliers and the general public

to report any fraud or corruption to

TIP-OFFS ANONYMOUS: 0800 003 056 OR Transnet@tip-offs.com

T1.2 Tender Data

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 C2.2 Bill of Quantities
	Part C3: Scope of work	C3.1 Works Information

	Part C4: Site information	C4.1 Site information
C.1.4	The Employer's agent is:	Procurement Officer
	Name:	Rochelle Isaacs
	Address:	Transnet Port Terminals 2nd Floor, 202 Anton Lembede Street, Durban Central Durban 4001
	Tel No.	+27 401 401 5 / +27 65 963 241 2
	E – mail	Rochelle.isaacs@transnet.net

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

1. **Stage One - Pre-qualification criteria for preferential procurement in terms of the Preferential Procurement Regulations, 2017:**

    a) A tenderer having a stipulated minimum B-BBEE status level of contributor of 1, 2, 3 and 4

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

2. **Stage Two - Local Production and Content in terms of the Preferential Procurement Regulations, 2017:**

2.1. COMPULSORY LOCAL CONTENT THRESHOLD

In terms of section 8(1) of the Preferential Procurement Regulations, 2017, and the Instruction Note issued by National Treasury on the "Invitation and Evaluation of Bids based on a stipulated minimum threshold for local content and production for **the Electrical cable products, Steel Power Pylons, Monopole Pylons, Powerline Structures, Powerline Hardware Street Lighting Steel Poles and Steel Lattice Towers and Masts and Steel products and components for construction**", Transnet is required to set a stipulated minimum threshold for this RFP

2.1.1 Local Content Threshold

A Local Content threshold of 90% [ninety percent] for Electrical cable products, 100% [one hundred percent] for Steel Power Pylons, Monopole Pylons, Powerline Structures, Powerline Hardware Street Lighting Steel Poles and Steel Lattice

Towers and Masts and 100% [one hundred percent] for Steel products and components for construction will be required for the goods specified in SBD 6.2, to be manufactured by a successful Respondent for the remainder of the contract term.

Only locally produced or locally manufactured material with a minimum threshold for local production and content will be considered. If the quantity of materials and/or products required cannot be wholly sourced from South African based manufacturers and/or at the designated local content threshold at any particular time, a bidders should obtain written approval from the dtic to supply the remaining portion at a lower local content threshold. Such approval application should be submitted and obtained prior to the closing of the bid. The dtic, in consultation with Transnet, will grant such approval on a case-by-case basis and will consider the following:

- required volumes in the particular bid;
- available collective South African industry manufacturing capacity at that time;
- delivery times;
- availability of input materials and components;
- technical considerations including operating conditions;
- materials of construction; and

2.2. LOCAL CONTENT NOTES

2.2.2 The exchange rate to be used for the calculation of local production and content must be the exchange rate published by the South African Reserve Bank (SARB) on the date of the advertisement of the tender;

2.2.3 Only the South African Bureau of Standards (SABS) approved technical specification number SATS 1286:2011 must be used to calculate local content;

2.2.4 The local content (LC) expressed as a percentage of the bid price must be calculated in accordance with the following formula which must be disclosed in the bid documentation:

LC = [1 – x/y] * 100

Where

x is the imported content in Rand

y is the bid price in Rand excluding value added tax (VAT)

Prices referred to in the determination of x must be converted to Rand (ZAR) by using the exchange rate published by the SARB at 12:00 on the date of advertisement of the bid.

2.2.5 The SABS approved technical specification number SATS 1286:2011 and the Guidance on the Calculation of Local Content together with the Local Content Declaration Templates [Annex C (Local Content Declaration: Summary Schedule), D (Imported Content Declaration: Supporting Schedule to Annex C)

and E (Local Content Declaration: Supporting Schedule to Annex C)] are accessible to all potential tenderers on the DTI's official website; http://www.the dti.gov.za/industrial development/ip.jsp at no cost.

2.2.6 Declaration Certificate for Local Production and Content (SBD 6.2) together with the Annex C (Local Content Declaration: Summary Schedule) must be completed, duly signed and submitted at the closing date and time of the bid;

2.2.7 Tenderers must familiarise themselves with all the information provided in the Local Content instruction notes with particular reference to paragraph 4 of the instruction notes.

2.2.8 Respondents are to ensure that they complete the local content annexures in line with the provisions made in the Guidance Document for the calculation of Local Content. Failure to comply will lead to disqualification.

2.3. Mandatory RFP Annexures

23.1 The regulatory and mandatory RFP Annexures, which must be completed by all Respondents in order to declare Local Content, are as follows:

Annexure B – Declaration Certificate for Local Production and Content [SBD 6.2]
Annexure C – Local Content Declaration: Summary Schedule
Annexure B and C must be completed and submitted even if a complete Local Content exemption letter from DTI has been obtained.
To the extent that an exemption from Local Content has been granted by the DTI, the exemption letter from DTI will be a mandatory returnable document.
Annexures D and E are Supporting Schedules to Annexure C. They are named as follows:

- Annexure D – Imported Content Declaration: Supporting Schedule to Annexure C
- Annexure E – Local Content Declaration: Supporting Schedule to Annexure C

Annexure F - Guidance Document for the calculation of Local Content

After completing Declaration D, bidders should complete Declaration E and then consolidate the information on Declaration C. Declaration C should be submitted with the bid documentation at the closing date and time of the bid. Declarations D and E should be kept by Respondents for verification purposes for a period of at least 5 years. The successful Respondent is required to continuously update Declarations C, D and E with the actual values for the duration of the contract. In addition to what is stated above regarding Annexures D and E, please note that these declarations are to be submitted as part of the Essential Returnable Documents.

2.4. Challenges meeting the Local Content Threshold

Should, after the award of a Bid, the Supplier experience challenges in meeting the stipulated minimum threshold for Local Content, Transnet is required to inform the DTI accordingly in order for the DTI to verify the circumstances and provide directives in this regard.

2.4.1 Exchange Rate Verification
The rate of exchange quoted by the Respondent in the declaration certificates (Annexure B – Declaration Certificate for Local Production & Content [SBD 6.2] and Annexure C – Local Content Declaration: Summary Schedule) will be verified for accuracy as per the requirement of National Treasury Instruction Notes and Circulars.

2.4.2 Local Content Obligations
Respondents are to note that the Local Content commitments made by the successful Respondent(s) will be incorporated as a term of the contract and monitored for compliance. Should the successful Respondent fail to meet its Local obligations, non-compliance penalties shall be applicable as per the contract or Standard Terms and Conditions of Contract. Breach of Local Content obligations also provide Transnet cause to terminate the contract in certain cases where material non-compliance with Local Content requirements are not achieved.

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

3. Stage Three - 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 **6EP 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:
1. every member of the joint venture is registered with the CIDB.
2. the lead partner has a contractor grading designation of **5EP or higher** class of construction work; and
3. 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 **6EP 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

4. The tenderer shall provide a certified copy of its signed joint venture agreement.

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

4. Stage Four - Functionality:

Only those tenderers who obtain the minimum qualifying score for functionality will be evaluated further in terms of price and the applicable preference point system. The minimum qualifying for score for functionality is **60 points.**

The evaluation criteria for measuring functionality and the points for each criteria and, if any, each sub-criterion are as stated in C.3.11 below.

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

C.2.7	The arrangements for a non -compulsory clarification meeting are as stated in the Tender Notice and Invitation to Tender. **Tenderers must complete and sign the attendance register.** Addenda will be issued to and tenders will only be received from those tendering entities including those entities that intends forming a joint venture appearing on the attendance register.
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 are as follows: Identification details: The tender documents must be uploaded with: ▪ Name of Tenderer: (insert company name) ▪ Contact person and details: (insert details) ▪ The Tender Number: **TPT/2022/05/0171/3688/RFP** ▪ The Tender Description: **Repair and Replacement of High Mast Lights at Durban BBC Terminals (Durban MPT, Durban Car, Maydon Wharf) for Transnet Soc Ltd (Reg. No 1990/000900/30) Operating as Transnet Port Terminals (Hereinafter Referred to as "Tpt")** Documents must be marked for the attention of: ***Employer*'s Agent: Rochelle Isaacs**

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 **25th November 2022** Location: The Transnet e-Tender Submission Portal: www.transnet.net **NO LATE TENDERS WILL BE ACCEPTED**
C.2.16	The tender offer validity period is **12 weeks from 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
C3.11	The minimum number of evaluation points for functionality is: **60 points** The procedure for the evaluation of responsive tenders is Functionality, Price and Preference: **Only those tenderers who attain the minimum number of evaluation points for Functionality will be eligible for further evaluation, failure to meet the minimum threshold will result in the tender being disqualified and removed from any further consideration.**

Functionality Criteria

The functionality criteria and maximum score in respect of each of the criteria are as follows:

Functionality criteria	Sub-criteria	Sub-criteria points	Maximum number of points
T2.2-02 Programme	Ability to Provide the Works in terms of the Scope as detailed under C3: *Works Information* and within the required timeframe, indicating, in a logical sequence, the order and timing of the activities that will take place in order to Provide the Works and detailed at an appropriate level of decomposition to support the scope and associated duration estimates.	6	**20**
	Dates when the *Contractor* will need access to any part of the Site/s and/or persons, as well as submission, approval process and timing for Health & Safety, Environmental and Quality pre-requisites / requirements. In addition, the Programme must clearly demonstrate adequate provision for the review and approval processes. Moreover, the Programme must clearly demonstrate adequate provision for the process and timeframes associated with undertaking procurement processes, inductions, permits and medicals.	3	
	The *Contractor* indicates how he plans in achieving the following dates and clearly demonstrates them on the schedule - Starting Date, Access Date, Planned Completion and Completion Dates. In addition, the Programme clearly demonstrates adequate provisions for Time Risk Allowance (TRA).	3	
	The Programme shall be aligned to the C3: *Works Information* and detailed at an appropriate level of decomposition to support the scope and associated duration estimates.	3	
	The Programme must clearly support and demonstrate alignment to the Approach Paper as contained under T.2.2-06. In addition, the programme needs to have a basis of a schedule not limited to assumptions, constraints and approach to providing the Works and construction monitoring as detailed in the programme.	5	

T2.2-03 Management & CVs of Key persons:	Comprehensive CV's should be attached to schedule T2.2-03: As a minimum each CV should address the following, but not limited to; 1. Personal particulars 2. Qualifications (degrees, grades of membership of professional societies and Professional registrations, all these certificates are to be attached); 3. Skills 4. Name of current employer and position 5. Overview of post graduate experience (year, organisation, position and responsibilities); and 6. Outline of recent assignments / detailed experience that has a bearing on the scope of work. 7. CV's for people proposed for all identified posts **Management = 50%**		**20**
	Contracts Manager 20% Construction Manager 20% Electrical Foreman 30% Installation Electrician 30% **Site Officers = 50%**		
	Planner 20% Quality Officer 25% H & S Practitioner 30% Document Controller 10% Environmental Officer 15%		
	Relevant Technical experience	5	
	Education, training and skills	5	
	Knowledge of issues pertinent to the project	10	
T2.2-04 Quality Management	**Project Quality Plan:** For the contract which satisfies the technical and quality requirements of the Scope of Works, identifying all procedures, reviews, audits, controls and records used to control and verify compliance with the specified Contractual requirements.	10	**15**
	Quality Control Plans: Specific to the Works Information is not limited to the following: • A guarantee period on the corrosion protection of no less than seven years.	5	

	• These QCP's shall identify all inspections, tests and verification requirements to meet Contractual obligations, specifications, drawings and related details including destructive and non-destructive testing, witnessing and hold points.		
T2.2-05 Previous Experience	1. A list of past / current comparable projects. 2. Execution of similar works as detailed in the Works Information with reference to: • Previous Experience of carrying out repairs or replacement of high mast lights or other electrical infrastructure projects by tenderer, or their partner/ subcontractor over the past five years with a minimum value of R6 000 000. References to provide letter of reference, to be traceable and contactable to allow verification of track record provided. • Sufficient references to substantiate experience indicated (Client name and contact details, project description, duration and contract value).	20	**20**
T2.2-06 Method Statement	The Method statement must sufficiently demonstrate the approach/methodology that will be employed to cover the scope of the project and MUST cover the following aspects. • Execution Approach (including limitations due to required occupations to carry out work in operational areas) • Resource Allocation • Health and Safety (including security) • Quality Control • Structural Work • Civil Work • Electrical Work • Traffic Control	25	**25**
Maximum possible score for Functionality			**100**

Functionality shall be scored independently by not less than 3 (three) evaluators and averaged in accordance with the following schedules:

- T2.2-02 Programme
- T2.2-03 Management & CVs of Key Persons
- T2.2-04 Quality Management
- T2.2-05 Previous Experience
- T2.2-06 Method Statement

Each evaluation criteria will be assessed in terms of scores of 0, 20, 40, 60, 80 or 100

The scores of each of the evaluators will be averaged, weighted and then totalled to obtain the final score for functionality, unless scored collectively. (See CIDB Inform Practice Note #9).

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

C.3.11. Only tenders that achieve the minimum qualifying score for functionality 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 equal to or below R50 million, inclusive of all applicable taxes

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 BBBEE rating not be provided, tenderers with no verification will score zero points for preferencing.**

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).

Part T2: Returnable Documents

T2.1: List of Returnable Documents

T2.1 List of Returnable Documents

2.1.1 These schedules are required for eligibility purposes:

T2.2-01 **Stage One: Eligibility Criteria Schedule -** Pre-qualification criteria for preferential procurement in terms of the Preferential Procurement Regulations, 2017: B-BBEE status level of contributor of 1, 2, 3 or 4

T2.2-28 **Stage Two: PPPFA: Eligibility Criteria Schedule -** Local Production and Content in terms of the Preferential Procurement Regulations, 2017

- Annexure B: Declaration Certificate of Local Production and Content (SBD 6.2) and
- Annexure C - Local Content Declaration: Summary Schedule
- A Local Content exemption letter from DTI (where applicable)
- Annexure F - Guidance Document for the Calculation of Local Content

Annexure B & C must be completed and submitted even if a complete Local Content exemption letter from DTI has been obtained)

T2.2-29 **Stage Three as per CIDB: Eligibility Criteria Schedule -** CIDB Registration

2.1.2 Stage Four as per CIDB: these schedules will be utilised for Functionality evaluation purposes:

T2.2-02 **Evaluation Schedule:** Programme
T2.2-03 **Evaluation Schedule:** Management & CV's
T2.2-04 **Evaluation Schedule:** Quality Management
T2.2-05 **Evaluation Schedule:** Previous experience
T2.2-06 **Evaluation Schedule:** Method Statement

2.1.3 Returnable Schedules:

General:

T2.2-07 Authority to submit tender
T2.2-08 Record of addenda to tender documents
T2.2-09 Letter of Good Standing
T2.2-10 Risk Elements
T2.2-11 Availability of equipment and other resources
T2.2-12 Site Establishment requirements
T2.2-13 Capacity and ability to meet delivery schedule
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Agreement and Commitment by Tenderer:

T2.2-15 CIDB SFU ANNEX G Compulsory Enterprise Questionnaire

T2.2-16 Non-Disclosure Agreement

T2.2-17 RFP Declaration Form

T2.2-18 RFP – Breach of Law

T2.2-19 Certificate of Acquaintance with Tender Document

T2.2-20 Service Provider Integrity Pact

T2.2-21 Supplier Code of Conduct

T2.2-22 Agreement in terms of Protection of Personal Information Act, 4 of 2013 ("POPIA")

2.1.3 Bonds/Guarantees/Financial/Insurance:

T2.2-23 Insurance provided by the Contractor

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

T2.2-25 Forecast Rate of Invoicing

T2.2-26 Three (3) years audited financial statements

2.1.4 Transnet Vendor Registration Form:

T2.2-27 Transnet Vendor Registration Form

2.2 C1.1 Offer portion of Form of Offer & Acceptance

2.3 C1.2 Contract Data

2.4 C1.3 Forms of Securities

2.5 C2.1 Pricing Instructions (Bill of Quantities)

2.6 C2.2 Bill of Quantities

T2.2: Returnable Schedules

These Schedules are required for Eligibility purposes

T2.2-01 Pre-qualification Criteria Schedule – Preferential Procurement

In an endeavour to grow and develop Black Owned (BO) companies as well as to ensure that Transnet meets its Shareholder Compact Objectives, Potential Tenderers are required to meet the Pre-qualification criteria for preferential procurement in terms of the Preferential Procurement Regulations, 2017:,

- It is a specific tendering condition that tenderers must meet the pre-qualifying criteria required below. Only respondents falling within the following categories may respond to this Tender:

    I. Entities having a B-BBEE status level 1 to 4

Tenderers are to indicate their B-BBEE status by filling in the table below;

B-BBEE Level	**% black ownership**	**Expiry Date**	**Valid B-BBEE Certificate from an accredited verification agency (e.g. SANAS)/Sworn Affidavit Attached**	
			Yes	**No**
----------	----------	----------		

Company registration documents and Identity Document copies of the Directors of the company are to be attached in order to verify the B-BBEE Certs or Sworn Affidavits attached.

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

SIGNED at _____ on this _____ day of _____20

_____
SIGNATURE OF TENDERER

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SATS 1286:2011

Edition 1

SABS STANDARDS DIVISION

Technical specification

Local goods, services and works — Measurement and verification of local content

This document does not have the status of a South African National Standard.

Published by SABS Standards Division
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SABS

SATS 1286:2011
Edition 1

Table of changes

Change No.	Date	Scope

Foreword

This South African technical specification was approved by National Committee SABS TC 180, *Conformity assessment (CASCO),* in accordance with procedures of the SABS Standards Division, in compliance with annex 3 of the WTO/TBT agreement.

This SATS was published in November 2011.

This document is being issued as a South African technical specification because there is a need for clarity and the ability to measure and validate the local content of goods, works and services in order to implement a procurement system that takes the local content into account.

This document will in future be revised and issued as a national standard.

Reference is made in 1.1 and 2.6 to the "relevant national legislation". In South Africa, this means the Preferential Procurement Policy Framework Act (PPPFA), 2000 (Act No. 5 of 2000).

Reference is made in the note to 2.10 to a "national accreditation body". In South Africa, this means the South African National Accreditation System (SANAS).

Reference is made in 5.1(a) to an "accredited verification body". In South Africa, this means a body accredited by the South African National Accreditation System (SANAS).

Reference is made in 5.1(b) to an "independent registered auditor". In South Africa, this means a registered auditor approved by the Independent Regulatory Board for Auditors (IRBA) in terms of the Auditing Profession Act, 2005 (Act No. 26 of 2005).

Annexes A and B form an integral part of this document.

Introduction

Preferential procurement policies and their associated regulations, such as local content requirements, are mechanisms used by the government and organs of state in the adjudication of tenders, to give consideration to procuring locally manufactured products that comply with specified requirements. Governments may identify specific industries which are deemed to be of critical importance to the economic sustainability and industrial development of their country.

In order to calculate and verify local content, a standardized approach is essential, and this document specifies the approach used in South Africa.

Contents

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Local goods, services and works — Measurement and verification of local content

1 Scope

1.1 This technical specification specifies requirements and procedures to define, measure, declare and verify the local content of goods, services and works when required for procurement and other purposes, in terms of the relevant national legislation (see foreword).

NOTE The product should contain no less than the level of local content as determined by the relevant national legislation (see foreword) and other procurement requirements.

1.2 This technical specification does not specify the required safety, quality or other properties of the product.

The responsibility to include the above requirements rests with the procurement authority.

2 Definitions

For the purposes of this document, the following definitions apply.

2.1
component
elementary part (element or portion) of a product

2.2
imported content
that portion of the tender price represented by

a) the cost of imported components, and

b) the cost of parts or materials which have been or are still to be imported (whether by the suppliers or the suppliers' subcontractors or any other third party) the costs of which are inclusive of the costs abroad,

plus freight and other direct importation costs, such as landing cost, dock duties, import duty, sales duty or other similar tax or duty at the South African port of entry excluding value added tax (VAT)

2.3
local content
that portion of the tender price that is not included in the imported content, provided that local manufacturing takes place and is calculated in accordance with the local content formula (see 3.1)

2.4
manufacture
any kind of working or processing, including assembly or specific operations

2.5
material
ingredient, raw material, component or part used in the manufacture of a product

2.6
products
produced goods, services or works, or manufactured goods as defined in the relevant national legislation (see foreword)

2.7
tender price
price offered by the tenderer, excluding value added tax (VAT)

2.8
tenderer
person or organization that submits a tender offer

[ISO 10845-1:2010]

2.9
verification
confirmation through the provision of objective evidence that the specified requirements have been fulfilled.

2.10
verification body
body that provides assurance of the claims of local content made by the supplier

NOTE In order to provide assurance as to the competence of the verification body, the user may require that the verification body be accredited to perform these functions by a national accreditation body (see foreword).

3 Local content measurement

3.1 Calculation of local content

The local content percentage of the product shall be as specified (see annex A). The local content, *LC*, expressed as a percentage of the tender price, shall be calculated as follows:

$$LC = (1 - x/y)*100$$

where

x is the imported content (see 2.2), in Rand (ZAR);

y is the tender price (see 2.7), in Rand (ZAR).

Prices referred to in the determination of x shall all be converted to Rand (ZAR) by using the exchange rate as specified (see annex A).

3.2 Documentation required for the calculation of local content

3.2.1 Documentation used for the purposes of measuring local content shall include, but is not limited to, details of all imported components, parts or materials indicating origin, manufacturer, freight cost and other direct importation costs, such as landing cost, dock duties, and import duty and sales duty, i.e. landed cost.

3.2.2 Documentary proof used for calculating x in the measurement of local content and proof of the tender price y shall be kept accessible for a period of no less than five years.

3.2.3 The tenderer shall be responsible for the accuracy of the information, including the imported content in the supply chain.

3.2.4 If information on the origin of components, parts or materials is not available, it will be deemed to be imported content.

3.3 Control of documents and records by the tenderer

Documents and records to provide evidence of compliance with the requirements of this technical specification shall be controlled.

A documented procedure to define the controls needed for the identification, storage, protection, retrieval, retention and disposition of records shall be established.

Records shall remain legible, readily identifiable and retrievable.

4 Declaration

The tenderer shall attach the declaration in annex B signed by the Chief Financial Officer or other legally responsible person nominated in writing by the Chief Executive, or senior member/person with management responsibility (close corporation, partnership or individual) to the purchaser stating the local content percentage of the product, calculated in accordance with 3.1, and confirming the final tender price.

5 Verification

5.1 The procurement authority may require that the measurement of local content be verified. The verification shall be conducted by:

a) an accredited verification body (see foreword); or

b) an independent registered auditor (see foreword).

5.2 Those conducting the verification shall have defined and documented procedures for the verification activities.

Annex A
(normative)

Notes to purchasers

In addition to data clearly describing the product ordered, the following requirements shall be specified in tender invitations and in each order or contract:

a) the local content percentage requirements (see 3.1), and

b) the exchange rate requirements (see 3.1).

Annex B
(normative)

Local content declaration

LOCAL CONTENT DECLARATION BY CHIEF FINANCIAL OFFICER OR OTHER LEGALLY RESPONSIBLE PERSON NOMINATED IN WRITING BY THE CHIEF EXECUTIVE OR SENIOR MEMBER/PERSON WITH MANAGEMENT RESPONSIBILITY (CLOSE CORPORATION, PARTNERSHIP OR INDIVIDUAL)

IN RESPECT OF TENDER No. .....
ISSUED BY: (Procurement Authority): .....

NB The obligation to complete and submit this declaration cannot be transferred to an external authorized representative, auditor or any other third party acting on behalf of the tenderer.

I, the undersigned, ... (full names),
do hereby declare, in my capacity as .....
of .....(name of tendering entity),
the following:

(a) The facts herein contained are within my own personal knowledge.

(b) I have satisfied myself that the goods/services to be delivered in terms of the above-specified tender comply with the minimum local content requirements as specified in the tender, and as measured in terms of SATS 1286.

(c) The local content has been calculated using the formula given in clause 3 of SATS 1286 and the following figures:

	Rand (ZAR)
Tender price, excluding VAT	
Less imported content, as calculated in terms of SATS 1286	
Local content	
Local content %	

If the tender is for more than one product, a schedule of the local content by product shall be attached.

(d) I accept that the Procurement Authority has the right to request that the local content be verified in terms of the requirements of SATS 1286.

(e) I understand that the awarding of the tender is dependent on the accuracy of the information furnished in this application. I also understand that the submission of incorrect data, or data that are not verifiable as described in SATS 1286, may result in the procurement authority imposing any or all of the remedies as provided for in Regulation 13 of the Preferential Procurement Regulations promulgated under the Policy Framework Act (PPPFA), 2000 (Act No. 5 of 2000).

SIGNATURE: _____ **DATE:** _____

WITNESS No. 1 _____ **DATE:** _____

WITNESS No. 2 _____ **DATE:** _____

Bibliography

ISO 10845:2010, *Construction procurement – Part 1: Processes, methods and procedures.*

SABS – Standards Division

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SBD 6.2

T2.2-28: Pre-qualification Criteria Schedule: Declaration of Certificate for Local Production and Content for Designated Sectors

This Standard Bidding Document (SBD) must form part of all bids invited. It contains general information and serves as a declaration form for local content (local production and local content are used interchangeably).

Before completing this declaration, bidders must study the General Conditions, Definitions, Directives applicable in respect of Local Content as prescribed in the Preferential Procurement Regulations, 2017, the South African Bureau of Standards (SABS) approved technical specification number SATS 1286:2011 (Edition 1) and the Guidance on the Calculation of Local Content together with the Local Content Declaration Templates [Annex C (Local Content Declaration: Summary Schedule), D (Imported Content Declaration: Supporting Schedule to Annex C) and E (Local Content Declaration: Supporting Schedule to Annex C)].

1. **General Conditions**

1.1. Preferential Procurement Regulations, 2017 (Regulation 8) makes provision for the promotion of local production and content.

1.2. Regulation 8.(1) prescribes that in the case of designated sectors, where in the award of bids local production and content is of critical importance, such bids must be advertised with the specific bidding condition that only locally produced goods, services or works or locally manufactured goods, with a stipulated minimum threshold for local production and content will be considered.

1.3. Where necessary, for bids referred to in paragraph 1.2 above, a two stage bidding process may be followed, where the first stage involves a minimum threshold for local production and content and the second stage price and B-BBEE.

1.4. A person awarded a contract in relation to a designated sector, may not sub-contract in such a manner that the local production and content of the overall value of the contract is reduced to below the stipulated minimum threshold.

1.5. The local content (LC) expressed as a percentage of the bid price must be calculated in accordance with the SABS approved technical specification number SATS 1286: 2011 as follows:

LC = [1 - x / y] * 100

Where
x is the imported content in Rand
y is the bid price in Rand excluding value added tax (VAT)

Prices referred to in the determination of x must be converted to Rand (ZAR) by using the exchange rate published by South African Reserve Bank (SARB) at 12:00 on the date of advertisement of the bid as indicated in paragraph 4.1 below.

The SABS approved technical specification number SATS 1286:2011 is accessible on http:/www.thedti.gov.za/industrial development/ip.jsp at no cost.

1.6. A bid may be disqualified if this Declaration Certificate and the Annex C (Local Content Declaration: Summary Schedule) are not submitted as part of the bid documentation;

2. **Definitions**

2.1. **"bid"** includes written price quotations, advertised competitive bids or proposals;

2.2. **"bid price"** price offered by the bidder, excluding value added tax (VAT);

2.3. **"contract"** means the agreement that results from the acceptance of a bid by an organ of state;

2.4. **"designated sector"** means a sector, sub-sector or industry that has been designated by the Department of Trade and Industry in line with national development and industrial policies for local production, where only

locally produced services, works or goods or locally manufactured goods meet the stipulated minimum threshold for local production and content;

2.5. **"duly sign"** means a Declaration Certificate for Local Content that has been signed by the Chief Financial Officer or other legally responsible person nominated in writing by the Chief Executive, or senior member / person with management responsibility (close corporation, partnership or individual).

2.6. **"imported content"** means that portion of the bid price represented by the cost of components, parts or materials which have been or are still to be imported (whether by the supplier or its subcontractors) and which costs are inclusive of the costs abroad (this includes labour or intellectual property costs), plus freight and other direct importation costs, such as landing costs, dock duties, import duty, sales duty or other similar tax or duty at the South African port of entry;

2.7. **"local content"** means that portion of the bid price which is not included in the imported content, provided that local manufacture does take place;

2.8. **"stipulated minimum threshold"** means that portion of local production and content as determined by the Department of Trade and Industry; and

2.9. **"sub-contract"** means the primary contractor's assigning, leasing, making out work to, or employing another person to support such primary contractor in the execution of part of a project in terms of the contract.

3. **The stipulated minimum threshold(s) for local production and content (refer to Annex A of SATS 1286:2011) for this bid is/are as follows:**

Description of services, works or goods	Stipulated minimum threshold
• **Steel Substation Structures and Street Light Steel Poles;**	**100%**
• **Electrical and Telecom Cables;**	**90%**
• **Steel Value-Added Products**	**100%**

4. Does any portion of the services, works or goods offered have any imported content?

(***Tick applicable box***)

YES		NO	

4.1. If yes, the rate(s) of exchange to be used in this bid to calculate the local content as prescribed in paragraph 1.5 of the general conditions must be the rate(s) published by SARB for the specific currency at 12:00 on the date of advertisement of the bid.

The relevant rates of exchange information is accessible on www.reservebank.co.za

Indicate the rate(s) of exchange against the appropriate currency in the table below (refer to Annex A of SATS 1286:2011):

Currency	**Rates of exchange**
US Dollar	
Pound Sterling	
Euro	
Yen	
Other	

NB: Bidders must submit proof of the SARB rate (s) of exchange used.

5. Where, after the award of a bid, challenges are experienced in meeting the stipulated minimum threshold for local content the dti must be informed accordingly in order for the dti to verify and in consultation with the AO/AA provide directives in this regard.

LOCAL CONTENT DECLARATION
(REFER TO ANNEX B OF SATS 1286:2011)

LOCAL CONTENT DECLARATION BY CHIEF FINANCIAL OFFICER OR OTHER LEGALLY RESPONSIBLE PERSON NOMINATED IN WRITING BY THE CHIEF EXECUTIVE OR SENIOR MEMBER/PERSON WITH MANAGEMENT RESPONSIBILITY (CLOSE CORPORATION, PARTNERSHIP OR INDIVIDUAL)

IN RESPECT OF BID NO. TPT/2022/05/0171/3688/RFP

ISSUED BY: TRANSNET PORT TERMINALS ON BEHALF OF TRANSNET SOC LTD

1 The obligation to complete, duly sign and submit this declaration cannot be transferred to an external authorized representative, auditor or any other third party acting on behalf of the bidder.

2 Guidance on the Calculation of Local Content together with Local Content Declaration Templates (Annex C, D and E) is accessible on http://www.thdti.gov.za/industrial_development/ip.jsp. Bidders should first complete Declaration D. After completing Declaration D, bidders should complete Declaration E and then consolidate the information on Declaration C. **Declaration C should be submitted with the bid documentation at the closing date and time of the bid in order to substantiate the declaration made in paragraph (c) below.** Declarations D and E should be kept by the bidders for verification purposes for a period of at least 5 years. The successful bidder is required to continuously update Declarations C, D and E with the actual values for the duration of the contract.

I, the undersigned, ... (full names), do hereby

declare, in my

capacity as .....of.....(name

of bidder entity), the following:

(a) The facts contained herein are within my own personal knowledge.

(b) I have satisfied myself that:

(i) the goods/services/works to be delivered in terms of the above-specified bid comply with the minimum local content requirements as specified in the bid, and as measured in terms of SATS 1286:2011; and

(c) The local content percentage (%) indicated below has been calculated using the formula given in clause 3 of SATS 1286:2011, the rates of exchange indicated in paragraph 4.1 above and the information contained in Declaration D and E which has been consolidated in Declaration C:

Price of the Designated commodity - **Steel Substation Structures and Street Light Steel Poles – 100%** Ex VAT	R
Imported content (x), as calculated in terms of SATS 1286:2011	R
Stipulated minimum threshold for local content (paragraph 3 above)	
Local content %, as calculated in terms of SATS 1286:2011	

Price of the Designated commodity - **Electrical and Telecom Cables – 90%** Ex Vat	R
Imported content (x), as calculated in terms of SATS 1286:2011	R
Stipulated minimum threshold for local content (paragraph 3 above)	
Local content %, as calculated in terms of SATS 1286:2011	

Price of the Designated commodity - **Steel Value-Added Products – 100%** Ex Vat	R
Imported content (x), as calculated in terms of SATS 1286:2011	R
Stipulated minimum threshold for local content (paragraph 3 above)	
Local content %, as calculated in terms of SATS 1286:2011	

If the bid is for more than one product, the local content percentages for each product contained in Declaration C shall be used instead of the table above. The local content percentages for each product has been calculated using the formula given in clause 3 of SATS 1286:2011, the rates of exchange indicated in paragraph 4.1 above and the information contained in Declaration D and E.

(d) I accept that the Procurement Authority / Institution has the right to request that the local content be verified in terms of the requirements of SATS 1286:2011.

(e) I understand that the awarding of the bid is dependent on the accuracy of the information furnished in this application. I also understand that the submission of incorrect data, or data that are not verifiable as described in SATS 1286:2011, may result in the Procurement Authority / Institution imposing any or all of the remedies as provided for in Regulation 13 of the Preferential Procurement Regulations, 2017 promulgated under the Preferential Policy Framework Act (PPPFA), 2000 (Act No. 5 of 2000).

SIGNATURE: _____ **DATE:** _____

WITNESS No. 1 _____ **DATE:** _____

WITNESS No. 2 _____ **DATE:** _____

NOTE TO TENDERERS: Failure to fully complete, declare, sign & date this SBD6.2 Declaration as well as the accompanying Annexure C "local content declaration - summary schedule" may result in the tender submission being non-responsive and disqualified from any further evaluation.

Schedule A – Non-compliance for Local Content

Non-compliance Penalties for Local Content:

a) If for any reason the *Contractor* is unable to achieve the local content undertaking, the *Contractor* must approach the Department of Trade and Industry ("DTI") to obtain exemption in order to supply the goods at a lower local content threshold. The *Contractor* is obliged to approach DTI for exemption within 10 (ten) days of determining that it is unable to achieve any milestone target or local content threshold.

b) Should the DTI provide exemption, the *Contractor* shall be entitled to provide the goods at the lower local content threshold set by DTI. In such event, the Parties shall in good faith renegotiate the milestone targets or local content undertaking to ensure that the lowered local content thresholds are achieved.

c) Should DTI not provide the necessary exemption, the *Contractor* shall be obliged to meet each milestone target as stated in the Local Content Plan or the local content undertaking.

d) Should the *Contractor* fail to meet any milestone target or the local content undertaking, the following remedies shall apply without limiting any of the *Employer's* other rights in law:

i. The *Employer* shall afford the *Contractor* a period of thirty (30) days to remedy its non-compliance.

ii. Should the *Contractor* fail to meet its obligations within the further 30 day period, the *Contractor* shall pay a Non-Compliance penalty ("Non-compliance Penalty") to the *Employer* in respect of such Non-compliance as set out in clause iv below. The penalties shall be imposed per milestone measurement for non-delivery of committed values in the case of a Local Content Plan or shall be imposed against the non-delivery of committed values where local content undertakings must be met immediately.

iii. To the extent that the Actual Local Content Spend[1] is lower than the Required Local Content Spend[2] (or the Adjusted Required Local Content Spend[3], as the case may be), the *Contractor* shall be liable for Penalties which is the difference in value between the Actual Local Content Spend and the Required Local Content Spend (or the Adjusted Required Local Content Spend, as the case may be) plus an additional percentage of such difference. Such Non-compliance Penalties shall be calculated and levied at the relevant milestones as stipulated in the Local Content Plan or shall be imposed against the non-delivery of committed values where local content undertakings must be met immediately, in accordance with clause iv below.

iv. Non-compliance penalties shall apply at the following rate: the difference in value between the Required Local Content Spend and the Actual Local Content Spend, plus 5% of such difference.

v. In order to guarantee that the *Contractor* meets its obligations in terms of the Local Content Plan or its committed local content undertaking, the *Employer* shall be entitled to retain a Non-compliance Penalty at the rate of 1% of every monthly payment due by the *Employer* to the *Contractor* over the contract period ("the Local Content Retention Amount"). The Local Content Retention Amount shall be set off against any penalties payable by the *Contractor* at any milestone assessment.

e) Should no penalties be imposed during the duration of the contract, the *Employer* shall refund the full value of the Local Content Retention Amount to the *Contractor* at the end of the contract period.

f) Should any unpaid penalties remain at the end of the contract period, then without limiting other rights that the *Employer* may have in law, the *Contractor* shall forfeit the Local Content Retention Amount and shall have no further claim against the *Employer* for the repayment of such amount.

Non-compliance Penalty Certificate:

a) If any Non-compliance Penalty arises, the *Employer* shall issue a Non-compliance Penalty Certificate on the last day of each month during such Non-compliance indicating the Non-compliance Penalties which have accrued during that period.

[1] Actual Local Content Spend means the monetary value of local content initiatives actually delivered by the Supplier during the period under review.

[2] Required Local Content Spend means the monetary value of local content obligations that the Supplier has agreed to deliver during the period under review.

[3] Adjusted Required Local Content Spend means any adjustment to the Required Local Content Spend as prescribed by DTI through the process of exemption referred to in clause c) above and as agreed to between the parties, reduced to writing and signed by the parties.

b) A Non-compliance Penalty Certificate shall be prima facie proof of the matters to which it relates. If the *Contractor* disputes any of the amounts set out in a Non-compliance Penalty Certificate:
- the dispute shall be resolved in accordance with the provisions of the Contract; and
- if pursuant to that referral, it is determined that the *Contractor* owes any amount to the *Employer* pursuant to the Non-compliance Penalty Certificate, then the *Contractor* shall pay such amount to the *Employer* within 10 (ten) Business Days of the determination made pursuant to such determination and an accompanying valid Tax Invoice.

Payment of Non-compliance Penalties:

a) Subject to Clause i) above, the *Contractor* shall pay the Non-compliance Penalty indicated in the Non-compliance Penalty Certificate within 10 (ten) Business Days of the *Employer* issuing a valid Tax Invoice to the *Contractor* for the amount set out in that certificate. If the *Employer* does not issue a valid Tax Invoice to the *Contractor* for Non-compliance Penalties accrued during any relevant period, those Non-compliance Penalties shall be carried forward to the next period.

b) The *Contractor* shall pay the amount due within 10 (ten) days after receipt of a valid Tax Invoice from the *Employer*, failing which Transnet shall, without prejudice to any other rights of the *Employer* under this Agreement, be entitled to call for payment which may be in any form the *Employer* deems reasonable and appropriate.

c) It is agreed that the *Employer*, the DTI, the South African Bureau of Standards and/or any of their appointed agents shall be entitled to monitor, evaluate and audit the *Contractor's* compliance with its obligations under the Local Content Plan. To this end, the *Contractor* shall provide its full cooperation to the respective bodies referred to in this clause to ensure that effective monitoring, evaluation and auditing takes place.

The Non Compliance Penalties set forth in this Clause are stated exclusive of VAT. Any VAT payable on Non Compliance Penalties will be for the account of the *Contractor*.

Transnet Port Terminals
Tender Number: **TPT/2022/05/0171/3688/RFP**
Description of the Works: **REPAIR AND REPLACEMENT OF HIGH MAST LIGHTS AT DURBAN BBC TERMINALS (DURBAN MPT, DURBAN CAR, MAYDON WHARF) FOR TRANSNET SOC LTD (REG. NO 1990/000900/30) OPERATING AS TRANSNET PORT TERMINALS (HEREINAFTER REFERRED TO AS "TPT")**

SATS 1286.2011

Annex C

Local Content Declaration - Summary Schedule

(C1)	**Tender No.**	**TPT/2022/05/0171/3688/RFP**
(C2)	**Tender description:**	**REPAIR AND REPLACEMENT OF HIGH MAST LIGHTS AT DURBAN BBC TERMINALS (DURBAN MPT, DURBAN CAR, MAYDON WHARF) FOR TRANSNET SOC LTD (REG. NO 1990/000900/30) OPERATING AS TRANSNET PORT TERMINALS (HEREINAFTER REFERRED TO AS "TPT")**
(C3)	**Designated product(s)**	**Steel product and Electrical Cables**
(C4)	**Tender Authority:**	**Transnet Port Terminals**
(C5)	**Tendering Entity name:**	
(C6)	**Tender Exchange Rate:**	Pula EU GBP
(C7)	**Specified local content %**	

Note: **VAT to be excluded from all calculations**

		Calculation of local content						Tender summary			
Tender item no's	**List of items**	**Tender price - each (excl VAT)**	**Exempted imported value**	**Tender value net of exempted imported content**	**Imported value**	**Local value**	**Local content % (per item)**	**Tender Qty**	**Total tender value**	**Total exempted imported content**	**Total Imported content**
(C8)	*(C9)*	*(C10)*	*(C11)*	*(C12)*	*(C13)*	*(C14)*	*(C15)*	*(C16)*	*(C17)*	*(C18)*	*(C19)*
1.	**100% - Steel Value-Added Products**										
1.1	Bolts and Nuts										
1.2	Corrosion Protection										
1.3	Reinforcing Bars										
1.4	Steel Rod										
1.5	Fabricated Steel										
2	**100% - Steel Lattice Towers and Masts**										
2.2	Steel Lattice Towers and Masts										
3.	**90% Electrical Cables**										
3.3	Cbles										

(C20) **Total tender value**	**R 0**	
(C21) **Total Exempt imported content**	**R 0**	
(C22) Total **Tender value net of exempt imported content**	**R 0**	
(C23) **Total Imported content**		**R 0**
(C24) **Total local content**		**R 0**
(C25) **Average local content % of tender**		

Signature of tenderer from Annex B

Date:

Annex D

Imported Content Declaration - Supporting Schedule to Annex C

(D1)	**Tender No.**	**TPT/2022/05/0171/3688/RFP**	**Note:** VAT to be excluded from all calculations
(D2)	**Tender description:**	**REPAIR AND REPLACEMENT OF HIGH MAST LIGHTS AT DURBAN BBC TERMINALS (DURBAN MPT, DURBAN CAR, MAYDON WHARF) FOR TRANSNET SOC LTD (REG. NO 1990/000900/30) OPERATING AS TRANSNET PORT TERMINALS (HEREINAFTER REFERRED TO AS "TPT")**	
(D3)	**Designated Products:**		
(D4)	**Tender Authority:**	**Transnet Port Terminals**	
(D5)	**Tendering Entity name:**		
(D6)	**Tender Exchange Rate:**	Pula	EU GBP

A. Exempted imported content

				Calculation of imported content						Summary	
Tender item no's	**Description of imported content**	**Local supplier**	**Overseas Supplier**	**Forign currency value as per Commercial Invoice**	**Tender Exchange Rate**	**Local value of imports**	**Freight costs to port of entry**	**All locally incurred landing costs & duties**	**Total landed cost excl VAT**	**Tender Qty**	**Exempted imported value**
(D7)	*(D8)*	*(D9)*	*(D10)*	*(D11)*	*(D12)*	*(D13)*	*(D14)*	*(D15)*	*(D16)*	*(D17)*	*(D18)*

(D19) **Total exempt imported value** R 0

This total must correspond with Annex C - C 21

B. Imported directly by the Tenderer

				Calculation of imported content						Summary	
Tender item no's	**Description of imported content**	**Unit of measure**	**Overseas Supplier**	**Forign currency value as per Commercial Invoice**	**Tender Rate of Exchange**	**Local value of imports**	**Freight costs to port of entry**	**All locally incurred landing costs & duties**	**Total landed cost excl VAT**	**Tender Qty**	**Total imported value**
(D20)	*(D21)*	*(D22)*	*(D23)*	*(D24)*	*(D25)*	*(D26)*	*(D27)*	*(D28)*	*(D29)*	*(D30)*	*(D31)*
	`										

(D32) **Total imported value by tenderer** R 0

C. Imported by a 3rd party and supplied to the Tenderer

Description of imported content	Unit of measure	Local supplier	Overseas Supplier	Calculation of imported content: Forign currency value as per Commercial Invoice	Tender Rate of Exchange	Local value of imports	Freight costs to port of entry	All locally incurred landing costs & duties	Total landed cost excl VAT	Summary: Quantity imported	Total imported value
(D33)	*(D34)*	*(D35)*	*(D36)*	*(D37)*	*(D38)*	*(D39)*	*(D40)*	*(D41)*	*(D42)*	*(D43)*	*(D44)*
`											

(D45) **Total imported value by 3rd party** R 0

D. Other foreign currency payments

Type of payment	Local supplier making the payment	Overseas beneficiary	Calculation of foreign currency payments: Foreign currency value paid	Tender Rate of Exchange	Summary of payments: Local value of payments
(D46)	*(D47)*	*(D48)*	*(D49)*	*(D50)*	*(D51)*

(D52) **Total of foreign currency payments declared by tenderer and/or 3rd party**

Signature of tenderer from Annex B

_____

Date: _____

(D53) **Total of imported content & foreign currency payments -** ***(D32), (D45) & (D52)*** **above** R 0

This total must correspond with Annex C - C 23

Annex E

Local Content Declaration - Supporting Schedule to Annex C

(E1)	**Tender No.**	TPT/2022/05/0171/3688/RFP	
(E2)	**Tender description:**	REPAIR AND REPLACEMENT OF HIGH MAST LIGHTS AT DURBAN BBC TERMINALS (DURBAN MPT, DURBAN CAR, MAYDON WHARF) FOR TRANSNET SOC LTD (REG. NO 1990/000900/30) OPERATING AS TRANSNET PORT TERMINALS (HEREINAFTER REFERRED TO AS "TPT")	**Note: VAT to be excluded from all calculations**
(E3)	**Designated products:**		
(E4)	**Tender Authority:**		
(E5)	**Tendering Entity name:**		

Local Products (Goods, Services and Works)	**Description Raw Material items purchased**	**Local Supplier Name**	**Manufacturer Contact Details**	**Value**
	(E6)	*(E7)*		*(E8)*
		s		
	***(E9)* TotalRaw Materials (Goods, Services and Works)**			R 0

(E10)	**Manpower costs**	(Tenderer's manpower cost)	R 0
(E11)	**Factory overheads**	(Rental, depreciation & amortisation, utility costs, consumables etc.)	R 0
(E12)	**Administration overheads and mark-up**	(Marketing, insurance, financing, interest etc.)	R 0
	***(E13)* Total local content**		R 0

This total must correspond with Annex C - C24

Signature of tenderer from Annex B

Date:

the dti
Department:
Trade and Industry
REPUBLIC OF SOUTH AFRICA

Private Bag X84, PRETORIA, 0001, **the dti** Campus, 77 Meintjies Street, Sunnyside, 0002, Tel: (012) 394 0000
the dti Customer Contact Centre local: 0861 843 384 International: +27 12 394 9500, www.thedti.gov.za

Guidance Document for the Calculation of Local Content

1. DEFINITIONS

Unless explicitly provided in this guideline, the definitions given in SATS 1286:2011 apply.

2. GENERAL

2.1. Introduction

This guideline provides tenderers with a detailed description of how to calculate local content of products (goods, services and works) by components/material/services and enables them to keep an updated record for verification requirements as per the SATS 1286:2011 Annexure A and B.

The guideline consists of two parts, namely:

- a written guideline; and
- three declarations that must be completed:
  - Declaration C: “Local Content Declaration – Summary Schedule” (see Annexure C);
  - Declaration D: “Imported Content Declaration – Supporting Schedule to Annex C” (see Annexure D); and
  - Declaration E: “Local Content Declaration – Supporting Schedule to Annex C” (see Annexure E).

The guidelines and declarations should be used by tenderers when preparing a tender. A tenderer must complete Declarations D and E, and consolidate the information on Declaration C.

Annexure C must be submitted with the tender by the closing date and time as determined by the Tender Authority. The Tender Authority reserves the right to request that Declarations D and E also be submitted.

If the tender is successful, the tenderer must continuously update Declarations C, D and E with actual values for the duration of the contract.

NOTE:

Annexure A is a note to the purchaser in SATS 1286:2011; and
Annexure B is the Local Content Declaration IN SATS 1286:2011.

2.2. What is local content?

According to SATS 1286:2011, the local content of a product is the tender price less the value of imported content, expressed as a percentage. It is, therefore, necessary to first compute the imported value of a product to determine the local content of a product.

2.3. Categories: Imported and Local Content

The tenderer must differentiate between imported content and local content.

Imported content of a product by components/material/services is separated into two categories, namely:

- products imported directly by the tenderer; and
- products imported by a third party and supplied to the tenderer.

2.3.1. Imported Content

Identify the imported content, if any, by value for products by component/material/services. In the case of components/materials/services sourced from a South African manufacturer, agent, supplier or subcontractor (i.e. third party), obtain that information and Declaration D from the third party.

Calculate the imported content of components/materials/services to be used in the manufacture of the total quantity of the products for which the tender is to be submitted.

As stated in clause 3.2.4 of SATS 1286:2011: “If information on the origin of components, parts or materials is not available, it will be deemed to be imported content.”

2.3.1.1. Imported directly by the tenderer:

When the tenderer import products directly, the onus is on the tenderer to provide evidence of any components/materials/services that were procured from a non-domestic source. The evidence should be verifiable and pertain to the tender as a whole. Typical evidence will include commercial invoices, bills of entry, etc.

When the tenderer procures imported services such as project management, design, testing, marketing, etc and makes royalty and lease payments, such payments relating to the tender must be included when calculating imported content.

2.3.1.2. Imported by a third party and supplied to the tenderer:

When the tenderer supplies components/material/services that are imported by any third party (for example, a domestic manufacturer, agent, supplier or subcontractor in the supply chain), the onus is on the tenderer to obtain verifiable evidence from the third party.

The tenderer must obtain Declaration D from all third parties for the related tender. The third party must be requested by the tenderer to continuously update Declaration D. Typical evidence of imported content will include commercial invoices, bills of entry etc.

When a third party procures imported services such as project management, design, testing, marketing etc. and makes royalty and lease payments, such payments relating to the tender must be included when calculating imported content.

2.3.1.3. Exempt Imported Content:

Exemptions, if any, are granted by the Department of Trade and Industry (**the dti**). Evidence of the exemptions must be provided and included in Annexure D.

2.3.2. Local Content

Identify and calculate the local content, by value for products by components/materials/services to be used in the manufacture of the total quantity of the products.

3. ANNEXURE C

3.1. Guidelines for completing Annexure C: Local Content Declaration – Summary Schedule

Note: The paragraph numbers correspond to the numbers in Annexure C.

C1. Tender Number

Supply the tender number that is specified on the specific tender documentation.

C2. Tender description

Supply the tender description that is specified on the specific tender documentation.

C3. Designated products

Supply the details of the products that are designated in terms of this tender (i.e. buses).

C4. Tender Authority

Supply the name of the tender authority.

C5. Tendering Entity name

Provide the tendering entity name (for example, Unibody Bus Builders (Pty) Ltd).

C6. Tender Exchange Rate

Provide the exchange rate used for this tender, as per the Standard Bidding Document (SBD) and Municipal Bidding Document (MBD) 6.2.

C7. Specified local content %

Provide the specified minimum local content requirement for the tender (i.e. 80%), as per the Standard Bidding Document (SBD) and Municipal Bidding Document (MDB) 6.2.

C8. Tender item number

Provide the tender item number(s) of the products that have a local content requirement as per the tender specification.

C9. List of items

Provide a list of the item(s) corresponding with the tender item number. This may be a short description or a brand name.

Calculation of local content

C10. Tender price

Provide the unit tender price of each item excluding VAT.

C11. Exempted imported content

Provide the ZAR value of the exempted imported content for each item, if applicable. These value(s) must correspond with the value(s) of column D16 on Annexure D.

C12. Tender value net of exempted imported content

Provide the net tender value of the item, if applicable, by deducting the exempted imported content (C11) from the tender price (C10).

C13. Imported value

Provide the ZAR value of the items' imported content.

C14. Local value

Provide the local value of the item by deducting the Imported value (C13) from the net tender value (C12).

C15. Local content percentage (per item)

Provide the local content percentage of the item(s) by dividing the local value (C14) by the net tender value (C12) as per the local content formula in SATS 1286.

Tender Summary

C16. Tender quantity

Provide the tender quantity for each item number as per the tender specification.

C17. Total tender value

Provide the total tender value by multiplying the tender quantity (C16) by the tender price (C10).

C18. Total exempted imported content

Provide the total exempted imported content by multiplying the tender quantity (C16) by the exempted imported content (C11). These values must correspond with the values of column D18 on Annexure D.

C19. Total imported content

Provide the total imported content of each item by multiplying the tender quantity (C16) by the imported value (C13).

C20. Total tender value

Total tender value is the sum of the values in column C17.

C21. Total exempted imported content

Total exempted imported content is the sum of the values in column C18. This value must correspond with the value of D19 on Annexure D.

C22. Total tender value net of exempted imported content

The total tender value net of exempt imported content is the total tender value (C20) less the total exempted imported content (C21).

C23. Total imported content

Total imported content is the sum of the values in column C19. This value must correspond with the value of D53 on Annexure D.

C24. Total local content

Total local content is the total tender value net of exempted imported content (C22) less the total imported content (C23). This value must correspond with the value of E13 on Annexure E.

C25. Average local content percentage of tender

The average local content percentage of tender is calculated by dividing total local content (C24) by the total tender value net of exempted imported content (C22).

4. ANNEXURE D

4.1. Guidelines for completing Annexure D: "Imported Content Declaration – Supporting Schedule to Annexure C"

Note: The paragraph numbers correspond to the numbers in Annexure D.

D1. Tender number

Supply the tender number that is specified on the specific tender documentation.

D2. Tender description

Supply the tender description that is specified on the specific tender documentation.

D3. Designated products

Supply the details of the products that are designated in terms of this tender (i.e. buses).

D4. Tender authority

Supply the name of the tender authority.

D5. Tendering entity name

Provide the tendering entity name (i.e. Unibody Bus Builders (Pty) Ltd).

D6. Tender exchange rate

Provide the exchange rate used for this tender, as per the Standard Bidding Document (SBD) and Municipal Bidding Document (MBD) 6.2.

<u>Table A. Exempted Imported Content</u>

D7. Tender item number

Provide the tender item number(s) of the product(s) that have imported content.

D8. Description of imported content

Provide a list of the exempted imported product(s), if any, as specified in the tender.

D9. Local supplier

Provide the name of the local supplier(s) supplying the imported product(s).

D10. Overseas supplier

Provide the name(s) of the overseas supplier(s) supplying the exempted imported product(s).

D11. Imported value as per commercial invoice

Provide the foreign currency value of the exempted imported product(s) disclosed in the commercial invoice accepted by the South African Revenue Service (SARS).

D12. Tender exchange rate

Provide the exchange rate used for this tender as per the Standard Bidding Document (SBD) and Municipal Bidding Document (MBD) 6.2.

D13. Local value of imports

Convert the value of the exempted imported content as per commercial invoice (D11) into the ZAR value by using the tender exchange rate (D12) disclosed in the tender documentation.

D14. Freight costs to port of entry

Provide the freight costs to the South African Port of the exempted imported item.

D15. All locally incurred landing costs and duties

Provide all landing costs including customs and excise duty for the exempted imported product(s) as stipulated in the SATS 1286:2011.

D16. Total landed costs excl VAT

Provide the total landed costs (excluding VAT) for each item imported by adding the corresponding item values in columns D13, D14 and D15. These values must be transferred to column C11 on Annexure C.

D17. Tender quantity

Provide the tender quantity of the exempted imported products as per the tender specification.

D18. Exempted imported value

Provide the imported value for each of the exempted imported product(s) by multiplying the total landed cost (excl. VAT) (D16) by the

tender quantity (D17). The values in column D18 must correspond with the values of column C18 of Annexure C.

D19. Total exempted imported value

The total exempted imported value is the sum of the values in column D18. This total must correspond with the value of C21 on Annexure C.

Table B. Imported Directly By Tenderer

D20. Tender item numbers

Provide the tender item number(s) of the product(s) that have imported content.

D21. Description of imported content:

Provide a list of the product(s) imported directly by tender as specified in the tender documentation.

D22. Unit of measure

Provide the unit of measure for the product(s) imported directly by the tenderer.

D23. Overseas supplier

Provide the name(s) of the overseas supplier(s) supplying the imported product(s).

D24. Imported value as per commercial Invoice

Provide the foreign currency value of the product(s) imported directly by tenderer disclosed in the commercial invoice accepted by the South African Revenue Service (SARS).

D25. Tender rate of exchange

Provide the exchange rate used for this tender as per the Standard Bidding Document (SBD) and Municipal Bidding Document (MBD) 6.2.

D26. Local value of imports

Convert the value of the product(s) imported directly by the tenderer as per commercial invoice (D24) into the ZAR value by using the tender exchange rate (D25) disclosed in the tender documentation.

D27. Freight costs to port of entry

Provide the freight costs to the South African Port of the product(s) imported directly by the tenderer.

D28. All locally incurred landing costs and duties

Provide all landing costs including customs and excise duty for the product(s) imported directly by the tenderer as stipulated in the SATS 1286:2011.

D29. Total landed costs excl VAT

Provide the total landed costs (excluding VAT) for each item imported directly by the tenderer by adding the corresponding item values in columns D26, D27 and D28.

D30. Tender quantity

Provide the tender quantity of the product(s) imported directly by the tenderer as per the tender specification.

D31. Total imported value

Provide the total imported value for each of the product(s) imported directly by the tenderer by multiplying the total landed cost (excl. VAT) (D29) by the tender quantity (D30).

D32. Total imported value by tenderer

The total value of imports by the tenderer is the sum of the values in column D31.

Table C. Imported by Third Party and Supplied to the Tenderer

D33. Description of imported content

Provide a list of the product(s) imported by the third party and supplied to the tenderer as specified in the tender documentation.

D34. Unit of measure

Provide the unit of measure for the product(s) imported by the third party and supplied to tenderer as disclosed in the commercial invoice.

D35. Local supplier

Provide the name of the local supplier(s) supplying the imported product(s).

D36. Overseas supplier

Provide the name(s) of the overseas supplier(s) supplying the imported products.

D37. Imported value as per commercial invoice

Provide the foreign currency value of the product(s) imported by the third party and supplied to the tenderer disclosed in the commercial invoice accepted by SARS.

D38. Tender rate of exchange

Provide the exchange rate used for this tender as per the Standard Bidding Document (SBD) and Municipal Bidding Document (MBD) 6.2.

D39. Local value of imports

Convert the value of the product(s) imported by the third party as per commercial invoice (D37) into the ZAR value by using the tender exchange rate (D38) disclosed in the tender documentation.

D40. Freight costs to port of entry

Provide the freight costs to the South African Port of the product(s) imported by third party and supplied to the tenderer.

D41. All locally incurred landing costs and duties

Provide all landing costs including customs and excise duty for the product(s) imported by third party and supplied to the tenderer as stipulated in the SATS 1286:2011.

D42. Total landed costs excluding VAT

Provide the total landed costs (excluding VAT) for each product imported by third party and supplied to the tenderer by adding the corresponding item values in columns D39, D40 and D41.

D43. Quantity imported

Provide the quantity of each product(s) imported by third party and supplied to the tenderer for the tender.

D44. Total imported value

Provide the total imported value of the product(s) imported by third party and supplied to the tenderer by multiplying the total landed cost (D42) by the quantity imported (D43).

D45. Total imported value by third party

The total imported value from the third party is the sum of the values in column D44.

Table D. Other Foreign Currency Payments

D46. Type of payment

Provide the type of foreign currency payment. (i.e. royalty payment for use of patent, annual licence fee, etc).

D47. Local supplier making the payment

Provide the name of the local supplier making the payment.

D48. Overseas beneficiary

Provide the name of the overseas beneficiary.

D49. Foreign currency value paid

Provide the value of the listed payment(s) in their foreign currency.

D50. Tender rate of exchange

Provide the exchange rate used for this tender as per the Standard Bidding Document (SBD) and Municipal Bidding Document (MBD) 6.2.

D51. Local value of payments

Provide the local value of each payment by multiplying the foreign currency value paid (D49) by the tender rate of exchange (D50).

D52. Total of foreign currency payments declared by tenderer and/or third party

The total of foreign currency payments declared by tenderer and/or a third party is the sum of the values in column D51.

D53. Total of imported content and foreign currency payment

The total imported content and foreign currency payment is the sum of the values in column D32, D45 and D52. This value must correspond with the value of C23 on Annexure C.

5. ANNEXURE E

5.1. Guidelines to completing Annexure E: "Local Content Declaration- Supporting Schedule to Annexure C"

The paragraph numbers correspond to the numbers in Annexure E

E1. Tender number

Supply the tender number that is specified on the specific tender documentation.

E2. Tender description

Supply the tender description that is specified on the specific tender documentation.

E3. Designated products

Supply the details of the products that are designated in terms of this tender (for example, buses/canned vegetables).

E4. Tender authority

Supply the name of the tender authority.

E5. Tendering entity name

Provide the tendering entity name (for example, Unibody Bus Builders (Pty) Ltd) Ltd).

Local Goods, Services and Works

E6. Description of items purchased

Provide a description of the items purchased locally in the space provided.

E7. Local supplier

Provide the name of the local supplier that corresponds to the item listed in column E6.

E8. Value

Provide the total value of the item purchased in column E6.

E9. Total local products (Goods, Services and Works)

Total local products (goods, services and works) is the sum of the values in E8.

E10. Manpower costs:

Provide the total of all the labour costs accruing only to the tenderer (i.e. not the suppliers to tenderer).

E11. Factory overheads:

Provide the total of all the factory overheads including rental, depreciation and amortisation for local and imported capital goods, utility costs and consumables. (Consumables are goods used by individuals and businesses that must be replaced regularly because they wear out or are used up. Consumables can also be defined as the components of an end product that are used up or permanently altered in the process of manufacturing, such as basic chemicals.)

E12. Administration overheads and mark-up:

Provide the total of all the administration overheads, including marketing, insurance, financing, interest and mark-up costs.

E13. Total local content:

The total local content is the sum of the values of E9, E10, E11 and E12. This total must correspond with C24 of Annexure C.

T2.2-29: Eligibility Criteria Schedule - CIDB Grading Designation

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 **6 EP 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:

1. every member of the joint venture is registered with the CIDB;
2. the lead partner has a contractor grading designation of not lower than one level one level below the required grading designation in the class of construction works under consideration and possesses the required recognition status; and
3. 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 **6 EP** class of construction work or a value determined in accordance with Regulation 25(1B) or 25(7A) of the Construction Industry Development Regulations
4. the Contractor shall provide the employer with a certified copy of its signed joint venture agreement;
5. and in the event that the joint venture is an 'Incorporated Joint Venture' the Memorandum of Incorporation to be provided within 4 (four) weeks of the Contract Date.

These Schedules will be utilised for Functionality Evaluation Purposes

T2.2-02: Evaluation Schedule - Programme

Programme

The Tenderer details the proposed Programme below or makes reference to his proposed Programme and attaches it to this schedule. The Tenderer's attention is drawn to clause 31.2 of the NEC 3 Engineering Construction Contract regarding the items to be shown on a Programme.

The Tenderer shall provide the proposed Programme showing but not limited to the following:

- Ability to Provide the *Works* in terms of the Scope as detailed under C3: *Works* Information and within the required timeframe indicating, in a logical sequence, the order and timing of the activities that will take place in order to Provide the *Works* and detailed at an appropriate level of decomposition to support the scope and associated duration estimates
- Dates when the *Contractor* will need *access* to any part of the Site/s and/or persons, as well as submission, approval process and timing for Health & Safety, Environmental and Quality pre-requisites/requirements as well as designs. In addition, the Programme must clearly demonstrate adequate provision for the review and approval processes. Moreover, the Programme must clearly demonstrate adequate provision for the process and timeframes associated with undertaking procurement processes, inductions, permits and medicals.
- The *Contractor* indicates how he plans in achieving the following dates and clearly demonstrates them on the schedule - Starting Date, Key Dates, Planned Completion and Completion Dates. In addition the Programme clearly demonstrates adequate provision for Time Risk Allowance (TRA).
- The Programme must clearly support and demonstrate alignment to the Method Statement as contained under T.2.2-06. In addition, the programme needs to have a basis of a schedule not limited to assumptions, constraints and approach to providing the *Works* as detailed in the programme.

The scoring of the Programme will be as follows:

	Ability to Provide the *Works* in terms of the Scope as detailed under C3: *Works* Information and within the required timeframe, indicating, in a logical sequence, the order and timing of the activities that will take place in order to Provide the *Works* and detailed at an appropriate level of decomposition to support the scope and associated duration estimates.	Dates when the *Contractor* will need *access* to any part of the Site/s and/or persons, as well as submission, approval process and timing for Health & Safety, Environmental and Quality pre-requisites/requirements. In addition the Programme must clearly demonstrate adequate provision for the review and approval processes. Moreover, the Programme must clearly demonstrate adequate provision for the process and timeframes associated with undertaking procurement processes, inductions, permits and medicals.	The *Contractor* indicates how he plans in achieving the following dates and clearly demonstrates them on the schedule - Starting Date, Access Date, Planned Completion and Completion Dates. In addition the Programme clearly demonstrates adequate provisions for Time Risk Allowance (TRA).	The Programme shall be aligned to the C3: *Works* Information, and detailed at an appropriate level of decomposition to support the scope and associated duration estimates.	The Programme must clearly support and demonstrate alignment to the Method Statement as contained under T.2.2-06. In addition the programme needs to have a basis of a schedule not limited to assumptions, constraints and approach to providing the *Works* and construction monitoring as detailed in the programme.
Total Points	**6**	**3**	**3**	**3**	**5**
Score 0	The tenderer has submitted no information.				
Score 20	▪ The Programme is not acceptable as it will not satisfy project objectives or requirements. The tenderer has misunderstood the scope of *Works* and does not deal with the critical aspects of the overall Programme.	▪ The tenderer has not addressed critical access requirements. ▪ The tenderer has not allowed timing for undertaking deliverables as stipulated within the *Works Information*. ▪ The tenderer has not allowed approval process and timing for Health & Safety, Environmental and Quality pre-requisites/requirements. ▪ The tenderer has not demonstrated provision for	▪ The tenderer has addressed some but not all date requirements and submission contains critical logic and sequencing errors which renders it unrealistic / unachievable. ▪ The tenderer has not demonstrated Time Risk Allowance (TRA).	▪ No alignment between Programme and the *Works Information*.	▪ No alignment between Programme and Approach Paper. ▪ The Basis of the Schedule document contains insufficient detail, critical errors and omissions. As such it does not support the programme model and the submission does not contain the minimum requirements as stipulated. ▪ No alignment between Basis of Schedule documentation and the programme model.

		the process and timeframes associated with undertaking procurement processes, inductions, permits and medicals.			
Score 40	▪ The Programme is generic, not practical and unrealistic, therefore is unlikely to satisfy project objectives or *Employer's* requirements. The tenderer has misunderstood certain aspects of the scope of the *Works* and does not deal with the critical aspects of the project.	▪ The tenderer has addressed some critical but not all access requirements. ▪ The tenderer has not made an adequate allowance in timing for undertaking deliverables as stipulated within the *Works Information*. ▪ The tenderer has not made an adequate allowance for the approval process and timing for Health & Safety, Environmental and Quality pre-requisites/requirements. ▪ The tenderer has not adequately demonstrated provision for the process and timeframes associated with undertaking procurement processes, inductions, permits and medicals.	▪ The tenderer has addressed most date requirements however submission contains critical logic and sequencing errors which renders it unrealistic/unachievable. ▪ The tenderer has demonstrated inadequate provision for Time Risk Allowance (TRA) i.e. TRA in insufficient quantities and not assigned to specific activities and/or critical components of the scope which are known to be subject to uncertainty.	▪ Some alignment between Programme and *Works Information*.	▪ Critical errors and or omissions in alignment between Programme and Approach Paper. ▪ The Basis of the Schedule document contains sufficient detail, but critical errors exist. As such the Basis of Schedule does not fully support the programme model however the submissions contains some of the minimum requirements as stipulated. ▪ Critical errors in alignment between Basis of Schedule documentation and the programme model.
Score 60	▪ The programme addresses certain specific project objectives but does not adequately deal with all the critical characteristics of the project. ▪ The programme is complete and decomposed, as demonstrated in the project WBS which fully	▪ The tenderer has addressed all access requirements. ▪ The tenderer has made an adequate allowance in timing and scope for undertaking deliverables as stipulated within the *Works Information* and *Employer's* Scope of *Works*. ▪ The tenderer has made an	▪ The tenderer has addressed all date requirements correctly and submission contains logic and sequencing which is accurate, and renders the submission realistic and achievable. ▪ The tenderer has demonstrated inadequate provision for Time Risk Allowance (TRA) i.e. TRA in	Programme and *Works Information* are relatively aligned but the level of decomposition of the Programme is not appropriate to support the scope and associated duration estimates for the phase in question and the project overall.	▪ Minor errors and or omissions in alignment between Programme and Approach Paper. ▪ The Basis of Schedule document contains sufficient detail, but minor errors still exist, however critical aspects of the Programme model are adequately substantiated . ▪ Minor errors and or

	demonstrates the *Provision* of the *Works* and the Scope of *Works* and is in accordance with the *Works Information*; ▪ The programme is adequately predictive in that it contains minor errors or omissions in critical path. ▪ The programme contains minor errors and omissions in logic (i.e. horizontal and vertical traceability) ▪ The programme demonstrates the sequence, methodology and underlying approach to *Provision* of the *Works* and the Scope of *Works*, in line with the requirements of the Contract, as such adequately deals with some but not all of the critical characteristics of overall project.	adequate allowance for the approval process, timing and scope for Health & Safety, Environmental and Quality pre-requisites/requirements. ▪ The tenderer has not adequately demonstrated provision for the process and timeframes associated with undertaking procurement processes, inductions, permits and medicals.	insufficient quantities, and not assigned to specific activities and/or critical components of the scope which are known to be subject to uncertainty.		omissions exist in alignment of the Basis of Schedule document and the Programme model.
Score 80	▪ The programme addresses specific project objectives and critical aspects.	▪ The tenderer has addressed all access requirements.	▪ The tenderer has addressed all date requirements correctly and submission contains logic and sequencing which is accurate, and renders the submission realistic and achievable.	▪ Programme and *Works Information* are fully aligned and the level of decompsotion of the Programme is appropriate to support the scope and associated duration estimates for the phase in question and the project overall.	▪ Programme and Approach Paper are fully aligned and submission contains no critical errors or omissions. ▪ The Basis of the Schedule document contains sufficient detail, no critical errors or omissions and as such fully supports the Programe model. In addition the submissions contains the

	▪ The programme is complete and sufficiently decomposed, as demonstrated in the project WBS which fully demonstrates the *Provision* of the *Works* and the Scope of *Works* and is in accordance with the *Works Information* and /or encompasses project scope as detailed but not limited to the Scope of *Works*. ▪ The programme is adequately predictive in that it provides meaningful critical path(s) and forms an accurate/realistic model of project risk, the latter as demonstrated in activity duration estimates; ▪ The programme contains logic that is horizontally, vertically traceable as supported by realistic duration estimates. ▪ The programme adequately demonstrates the sequence, methodology, and underlying approach to *Provision* of the *Works* and the Scope of *Works*, in line with the requirements of the W*orks information* as such adequately deals with the critical characteristics of overall project.	▪ The tenderer has made an adequate allowance in timing and scope for undertaking deliverables as stipulated within the *Works Information* and *Employer's* Scope of *Works*. ▪ The tenderer has made an adequate allowance for the approval process, timing and scope for Health & Safety, Environmental and Quality pre-requisite/requirements. ▪ The tenderer has adequately demonstrated provision for the process and timeframes associated with undertaking procurement processes, inductions, permits and medicals i.e. all items condiered and sufficient timeframes allowed.	▪ The tenderer has demonstrated adequate provision for Time Risk Allowance (TRA) i.e. TRA in sufficient quantities, correctly assigned to specific activities and/or critical components of the scope which are known to be subject to uncertainty.		minimum requirements as stipulted. ▪ Basis of Schedule document and Programme model are fully aligned.

Score 100	Besides meeting the above "80" rating, the important issues are approached in an innovative and efficient way.	Besides meeting the "80" rating, the tenderer has exceeded the required expectations.	Besides meeting the "80" rating, the tenderer has exceeded the required expectations.	Besides meeting the "80" rating, the tenderer has exceeded the required expectations.	Besides meeting the "80" rating, the tenderer has exceeded the required expectations.

The undersigned, who warrants that he / she is duly authorised to do so on behalf of the enterprise, confirms that the contents of this schedule are within my personal knowledge and are to the best of my belief both true and correct.

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

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

Tenderer .....

T2.2-03: Evaluation Schedule: Management & CV's of Key Persons

Please describe the management arrangements for the *works* and the tenderer is to take note that evaluation of this schedule must contain the following information:

Comprehensive CV's should be attached to this schedule:

As a minimum each CV should address the following, but not limited to;

1. Personal particulars;
2. Qualifications (degrees, grades of membership of professional societies and

   Professional registrations, all these certificates are to be attached);
3. Skills;
4. Name of current employer and position;
5. Overview of post graduate experience (year, organisation, position and responsibilities); and
6. Outline of recent assignments / detailed experience that has a bearing on the scope of work.
7. CV's for people proposed for all identified posts including:

i) **Contracts Manager**

The Contracts Manager should at least have a minimum qualification of a Diploma in Electrical Engineering and at least 10 years of experience in Electrical MV/LV projects. The Contracts Manager must have experience working in at least 3 separate projects, with at least 1 project in excess of R 35M in electrical works.

ii) **Construction Manager**

The Construction Manager should at least have a minimum qualification of a Diploma in Electrical Engineering and at least 10 years of experience in Electrical MV/LV projects. The Construction Manager must have experience working in at least 1 project in excess of R 25M in electrical works.

iii) **Electrical Foreman (MV/LV) x 2**

The Electrical Foreman must have a minimum of NTC 4 Trade Certificate in Electrical Engineering with at least 10 years of experience in Electrical MV and LV projects.

iv) **Installation Electrician x 2**

The Installation Electrician must have at least 10 years of experience in Electrical MV/LV projects and be registered with the Department of Labour.

v) **Planner**

The Planner should have at least 5 years of experience working in Electrical MV/LV projects as a Planner.

vi) **Quality Officer**

The Quality Officer should have a Diploma or certified qualification in quality systems with at least 5 years of relevant quality experience in Electrical MV/LV projects. If staff experience is limited, an indication of relevant training that they have attended would be helpful.

vii) **Health & Safety Practitioner**

The Health & Safety Practitioner must be registered as a Health and Safety Practitioner with SACPCMP with at least 5 years of experience on MV/LV projects and have a SAMTRAC or NEBOSH or modern SHEQ risk management training course as a minimum qualification. Proof of SACPCMP registration as well as competency certificates to be submitted as part of this returnable.

viii) **Document Controller**

The Document Controller should have at least 5 years of experience working in construction related projects.

ix) **Environmental Officer**

The Environmental Officer should have a Bachelor's Degree in Environmental Management/Science or equivalent with at least 5 years of experience in Electrical MV/LV projects.

8. Details of experience for proposed staff working in similar projects in terms of nature, competency and value.

9. An explanation of how you propose to allocate adequate resources to enable you to comply with the requirements and prohibitions imposed on you by or under the statutory provisions relating to health and safety.

10. Details of experience for proposed staff in respect of NEC3 Engineering & Construction Contract option chosen for this Contract. If staff experience is limited, an indication of relevant training that they have attended would be helpful.

Attached submissions to this schedule:

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The scoring of the Management & CV's of Key Persons will be as follows:

Weight	**Relevant Technical experience:** **Management = 50%**	**Education, training and skills for the following:** **Management =50%**	**Knowledge of issues pertinent to the project for the following:** **Management = 50%**
20%	Contracts Manager	Contracts Manager	Contracts Manager
20%	Construction Manager	Construction Manager	Construction Manager
30%	Electrical Foreman	Electrical Foreman	Electrical Foreman
30%	Installation Electrician	Installation Electrician	Installation Electrician
	Site Officers = 50%	**Site Officers =50%**	**Site Officers =50%**
20%	Planner	Planner	Planner
25%	Quality Officer	Quality Officer	Quality Officer
30%	H & S Practitioner	H & S Practitioner	H & S Practitioner
10%	Document Controller	Document Controller	Document Controller
15%	Environmental Officer	Environmental Officer	Environmental Officer
Points	**5**	**5**	**10**
(score 0)	Failed to provide information or inadequate information provided to determine a score	Failed to provide information or inadequate information provided to determine a score	Failed to provide information or inadequate information provided to determine a score
(score 20)	Key staff do not have relevant levels of relevant experience.	Key staff does not have project specific education, skills, training and experience as indicated above.	Key staff has no experience of issues pertinent to the project.
	▪ Contracts Manager: **< 5 years** ▪ Construction Manager: **< 5 years** ▪ Electrical Foreman: **< 5 years** ▪ Installation Electrician: **< 5 years** ▪ Planner: **< 1 year** ▪ Quality Officer: **< 1 year** ▪ Safety Practitioner: **< 1 year** ▪ Document Controller: **< 1 year** ▪ Environmental Officer: **< 1 year**		
(score 40)	Key staff have limited levels of general experience	Key staff have limited levels of project specific education, skills, training and experience	Key staff have limited experience of issues pertinent to the project
	▪ Contracts Manager: **≥ 5 < 10 years** ▪ Construction Manager: **≥ 5 < 10 years** ▪ Electrical Foreman: **≥ 5 < 10 years** ▪ Installation Electrician: **≥ 5 < 10 years** ▪ Planner: **< 2 years** ▪ Quality Officer: **< 2 years** ▪ Safety Practitioner: **< 2 years** ▪ Document Controller: **< 2 years** ▪ Environmental Officer: **< 2 years**		

(score 60)	Key staff have reasonable levels of general experience	Key staff have reasonable levels of project specific education, skills, training and experience	Key staff have reasonable experience of issues pertinent to the project
	▪ Contracts Manager: **< 10 years** ▪ Construction Manager: **< 10 years** ▪ Electrical Foreman: **< 10 years** ▪ Installation Electrician: **< 10 years** ▪ Planner: **< 3 years** ▪ Quality Officer: **< 3 years** ▪ Safety Practitioner: **< 3 years** ▪ Document Controller: **< 3 years** ▪ Environmental Officer: **< 3 years**		
(score 80)	▪ Key staff have extensive levels of general experience	Key staff have extensive levels of project specific education, skills, training and experience	Key staff have extensive experience of issues pertinent to the project
	▪ Contracts Manager: **≥ 10 < 15 years** ▪ Construction Manager: **≥ 10 < 15 years** ▪ Electrical Foreman: **≥ 10 < 15 years** ▪ Installation Electrician: **≥ 10 < 15 years** ▪ Planner: **> 4 < 5 years** ▪ Quality Officer: **> 4 < 5 years** ▪ Safety Practitioner: **> 4 < 5 years** ▪ Document Controller: **> 4 < 5 years** ▪ Environmental Officer: **> 4 < 5 years**		
(score 100)	Key staff have outstanding levels of general experience	Key staff have outstanding levels of project specific education, skills, training and experience	Key staff have outstanding experience of issues pertinent to the project
	▪ Contracts Manager: **≥ 15 years** ▪ Construction Manager: **≥ 15 years** ▪ Electrical Foreman: **≥ 15 years** ▪ Installation Electrician: **≥ 15 years** ▪ Planner: **≥ 5 years** ▪ Quality Officer: **≥ 5 years** ▪ Safety Practitioner: **≥ 5 years** ▪ Document Controller: **≥ 5 years** ▪ Environmental Officer**: ≥ 5 years**		

The undersigned, who warrants that he / she is duly authorised to do so on behalf of the enterprise, confirms that the contents of this schedule are within my personal knowledge and are to the best of my belief both true and correct.

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

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

Tenderer .....

T2.2-04: Evaluation Schedule – Quality Management

1. The tenderer is to note that if successful, and awarded the contract, shall execute and complete the contract as per the:

   i. EEAM-Q-009 Quality Management System.

2. The tenderer shall as a minimum submit the following:

   i. Project Quality Plan which satisfies the technical and quality requirements of the works, identifying all procedures, reviews, audits, controls and records used to control and verify compliance with the Works Information.

   ii. Quality Control Plans Specific to the Works Information is not limited to the following:

   - A guarantee period on the corrosion protection of no less than seven years.

Item	Guarantee and Warrantee Period	Description of Guarantee
Guarantee offered on corrosion protection		

These QCP's shall identify all inspections, tests and verification requirements to meet Contractual obligations, specifications, drawings and related details including destructive and non-destructive testing, witnessing and hold points.

Attached submissions to this schedule:

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The scoring will be as follows:

	Warranty and Guarantee Period	**Project specific Quality Control Plan**
Maximum Score is 15	**10**	**5**
	Formulae: $Points = \frac{Score}{100} x10$	**Formulae:** $Points = \frac{Score}{100} x\ 5$
Score 0	Guarantee period < 7 years	No QCP's submitted
Score 20	NA	QCP's are not project specific
Score 40	NA	QCP's are project specific but inadequate to cover project scope
Score 60	Guarantee period > or = 7 years	QCP's shows adequate understanding of project quality requirements.
Score 80	NA	QCP's shows above average understanding of the project quality requirements.
Score 100	Guarantee period > or = 10 years	QCP's cover all and above the project quality requirements of the project scope

T2.2-05: Evaluation Schedule: Previous Experience

Note to tenderers:

Tenderers are required to demonstrate performance in comparable projects of similar size and nature by supplying the following:

1. A list of past / current comparable projects.
2. Execution of similar works as detailed in the Works Information with reference to:
   - Previous Experience of carrying out repairs or replacement of high mast lights or other electrical infrastructure projects by tenderer, or their partner/ subcontractor over the past five years with a minimum value of R6 000 000. References to provide letter of reference, to betraceable and contactable to allow verification of track record provided.
   - Sufficient references to substantiate experience indicated (Client name and contact details, project description, duration and contract value)

Index of documentation attached to this schedule

	DOCUMENT NAME
1.	
2.	
3.	
4.	
5.	

#	Name of Previous Customer	Contact Details	Nature of Electrical work	Value	Year
1.					
2.					
3.					
4.					
5.					

The scoring of the Previous Experience will be as follows:

	CORE
	1. A list of past / current comparable projects. 2. Execution of similar works as detailed in the Works Information with reference to: • Previous Experience of carrying out repairs or replacement of high mast lights or other electrical infrastructure projects by tenderer, or their partner/ subcontractor over the past five years with a minimum value of R6 000 000. References to provide letter of reference, to betraceable and contactable to allow verification of track record provided. • Sufficient references to substantiate experience indicated (Client name and contact details, project description, duration and contract value).
Maximum Score	**20**
	Formulae: $Points = \frac{Score}{100} x20$
Score 0	The Tenderer failed to address the question / issue. Has not submitted the required information.
Score 20	The Tenderer's previous experience presented has no relevance to the scope of this project and did not address any of the required categories. Tenderers generally have experience in **one (1)** project relating to the scope of works. The tenderer has limited or poor evidence of previous experience.
Score 40	The Tenderer's previous experience presented has some relevance to the project but lacks detail i.e. Description of previous projects, value and references. Tenderers generally have experience in **three (3)** projects relating to scope of works. The tenderer lacks convincing evidence of knowledge of previous experience, specific to the works.
Score 60	The Tenderer's previous experience presented demonstrates sufficient knowledge and experience to successfully execute this project scope. Tenderers generally have experience in **four (4)** projects relating to the scope of works. The tenderer has reasonable and relevant previous experience to the particular requirements of the works.
Score 80	The Tenderer's previous experience presented demonstrates a real understanding andsubstantial evidence of the ability meet the stated project requirements. Tenderers generally have experience in **five (5)** projects relating to the scope of works. The tenderer has extensive previous experience in relation to the works.
Score 100	The Tenderer's previous experience presented demonstrates real confidence extensive understanding in all of the categories as required. Tenderers generally have experience in **more than five (5) projects** relating to the scope of works. The tenderer has comprehensive previous experience in projects of a similar nature.

T2.2-06: Evaluation Schedule: Method Statement

Note to tenderers:

Method statement - The tenderers must sufficiently demonstrate the approach/methodology that will be employed to cover the scope of the project and MUST cover the following aspects.

- Execution Approach (including limitations due to required occupations to carry out work in operational areas)
- Resource Allocation
- Health and Safety (including security)
- Quality Control
- Structural Work
- Civil Work
- Electrical Work
- Traffic Control

Please note: Tenderers are required to provide detailed method statements for the categories as listed above. Each sub-category as listed will be scored based on the linear scale below and will be averaged and weighed to provide a final score. Tenderers to note that they will not achieve an "acceptable" score should they not provide the information as required in this Returnable.

The table below will be used as guidelines for scoring / evaluating the method statement submitted by the Tenderer:

CORE	
	• Execution Approach (including limitations due to required occupations to carry out work in operational areas) • Resource Allocation • Health and Safety (including security) • Quality Control • Structural Work • Civil Work • Electrical Work • Traffic Control
Maximum Score is 25	**25**
	Formulae: $Points = \frac{Score}{100} x25$
Score 0	The tenderer has submitted no information or inadequate information to determine a score.
Score 20	The methodology/approach and work alignment to project schedule is poorly presented, generic and not tailored to address the specific project objectivesand methodology.
Score 40	The methodology/approach is generic and not tailored to address the specificproject objectives and methodology. The methodology approach does not adequately deal with the critical characteristics of the project.
Score 60	Satisfactory response/solution to the particular aspect of the requirement and evidence given that the stated employer's requirements will be met.
Score 80	The methodology/approach is specifically tailored to address the specific project objectives and methodology and is sufficiently flexible to accommodate changes that may occur during execution. The methodology/approach to manage activities is specifically tailored to the critical characteristics of the project.
Score 100	Besides meeting the "80" rating, the important issues are approached in an innovative and efficient way, indicating that the tenderer has outstanding knowledge of state-of-the-art approaches. The methodology approach detailsways to improve the project outcomes and the quality of the outputs.

General Returnable Schedules

T2.2-07: 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

T2.2-08: 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		
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6		
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12		
13		
14		
15		

Attach additional pages if more space is required.

T2.2-09 Letter/s of Good Standing with the Workmen's Compensation Fund

Attached to this schedule is the Letter/s of Good Standing.

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4.

Name of Company/Members of Joint Venture:

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T2.2-10: Risk Elements

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.

Tenders to note: Notwithstanding this information, all costs related to risk elements which are at the Contractor's risk are deemed to be included in the tenderer's offered total of the Prices.

T2.2-11: 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 *works* as described in the Works Information.

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

T2.2-12: Site Establishment Requirements

Tenderers to indicate their Site establishment area requirements:

T2.2-13: Capacity and Ability to meet Delivery Schedule

Note to tenderers:

The Tenderer is required to demonstrate to the *Employer* that the tenderer has sufficient current and future capacity to carry out the work as detailed in the Works Information and that the tenderer has the capacity and plans in place to meet the required delivery schedule as required. To this end, the following must be provided by the Tenderer:

A schedule detailing the following:

- Maximum quantity of work concurrently performed by the Tenderer in the recent past in order to illustrate his potential capacity to design, fabricate and/or construct work of a similar nature;
- Current and future work on his order book, showing quantity and type of equipment;
- Quantity of work for which the Tenderer has tenders in the market or is currently tendering on;
- The work as covered in this Works Information, planned and scheduled as per the Tenderer's capacities and methods but meeting the required delivery schedule.

Index of documentation attached to this schedule:

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T2.2-14: Schedule of Proposed Subcontractors

The tenderer is required to provide details of all the sub-contractors that will be utilised in the execution of the *works.*

Note to tenderers:

- In terms of PPPFA Regulation 6 (5), A tenderer may not be awarded points for B-BBEE status level of contributor if the tender documents indicate that the tenderer intends subcontracting more than 25% of the value of the contract to any other person not qualifying for at least the points that the tenderer qualifies for, unless the intended subcontractor is an EME that has the capability to execute the subcontract.

- In terms of PPPFA Regulation 12 (3), A person awarded a contract may not subcontract more than 25% of the value of the contract to any other enterprise that does not have an equal or higher B-BBBEE status level of contributor that the person concerned, unless the contract is subcontracted to an EME that has the capability and ability to execute the contract.

Tenderer to note that after award, any deviations from this list of proposed sub-contractors will be subject to acceptance by the *Project Manager* in terms of the Conditions of Contract.

Provide information of the Sub-contractors below:

Name of Proposed Subcontractor			**Address**		**Nature of work**	**Amount of Work**	**Percentage of work**
% Black Owned	**EME**	**QSE**	**Youth**	**Women**	**Disabilities**	**Rural/ Underdeveloped areas/ Townships**	**Military Veterans**
	☐	☐	☐	☐	☐	☐	☐

Name of Proposed Subcontractor			**Address**		**Nature of work**	**Amount of Work**	**Percentage of work**
% Black Owned	**EME**	**QSE**	**Youth**	**Women**	**Disabilities**	**Rural/ Underdeveloped areas/ Townships**	**Military Veterans**
	☐	☐	☐	☐	☐	☐	☐
Name of Proposed Subcontractor			**Address**		**Nature of work**	**Amount of Work**	**Percentage of work**

% Black Owned	EME	QSE	Youth	Women	Disabilities	Rural/ Underdeveloped areas/ Townships	Military Veterans
	☐	☐	☐	☐	☐	☐	☐

Name of Proposed Subcontractor	Address	Nature of work	Amount of Work	Percentage of work

% Black Owned	EME	QSE	Youth	Women	Disabilities	Rural/ Underdeveloped areas/ Townships	Military Veterans
	☐	☐	☐	☐	☐	☐	☐

Agreement and Commitment by Tenderer:

T2.2-15: 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 Broad-Based Black Economic Empowerment [**B-BBEE**] Status Level of Contribution.

Transnet will award preference points to companies who provide valid proof of their B-BBEE status using either the latest version of the generic Codes of Good Practice or Sector Specific Codes (if applicable).

---

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; and

(b) B-BBEE Status Level of Contribution.

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

	POINTS
PRICE	**80**
B-BBEE STATUS LEVEL OF CONTRIBUTION	**20**
Total points for Price and B-BBEE must not exceed	**100**

1.5 Failure on the part of a bidder to submit proof of B-BBEE status level of contributor together with the bid will be interpreted to mean that preference points for B-BBEE status level of contribution 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 EEnterprise 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.

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. POINTS AWARDED FOR B-BBEE STATUS LEVEL OF CONTRIBUTION

4.1 preference points must be awarded to a bidder for attaining the B-BBEE status level of contribution in accordance with the table below:

B-BBEE Status Level of Contributor	Number of points (80/20 system)
1	20
2	18
3	14
4	12
5	8
6	6
7	4
8	2
Non-compliant contributor	0

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[1]	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

[1] In terms of the Implementation Guide: Preferential Procurement Regulations, 2017, Version 2, paragraph 11.11 provides that in the Transport Sector, EMEs can provide a letter from accounting officer or get verified and be issued with a B-BBEE certificate by SANAS accredited professional or agency as the Transport Sector Code has not been aligned to the generic Codes. EMEs in the Transport Sector are not allowed to provide a sworn affidavit as the generic codes are not applicable to them.

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 Service provider
- ☐ Other 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: ……..

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 interest 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**

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 consortium3 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 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] 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.

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

T2.2-16 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 Transnet Corporate Centre 138 Eloff Street , Braamfontein , Johannesburg 2000

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	.....		

T2.2-17: 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 T2.2-20 "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.

T2.2-18: 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 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

T2.2-20 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/Contractor 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.

1 OBJECTIVES

1.1 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.

2 COMMITMENTS OF TRANSNET

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

2.1 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.

2.2 Transnet will, during the registration and tendering process treat all Tenderers/ Service Providers/Contractor with equity, transparency and fairness. Transnet will in particular, before and during the registration process, provide to all Tenderers/ Service Providers/Contractors 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.

2.3 Transnet further confirms that its employees will not favour any prospective Tenderers/Service Providers/Contractors 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 in a fair manner.

2.4 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.

3 OBLIGATIONS OF THE TENDERER / SERVICE PROVIDER

3.1 Transnet has a '**Zero Gifts'** Policy. No employee is allowed to accept gifts, favours or benefits.

a) Transnet officials and employees **shall not** solicit, give or accept, or from agreeing to solicit, give, accept or receive directly or indirectly, any gift, gratuity, favour, entertainment, loan, or anything of monetary value, from any person or juridical entities in the course of official duties or in connection with any operation being managed by, or any transaction which may be affected by the functions of their office.

b) Transnet officials and employees **shall not** solicit or accept gifts of any kind, from vendors, suppliers, customers, potential employees, potential vendors, and suppliers, or any other individual or organisation irrespective of the value.

c) Under **no circumstances** should gifts, business courtesies or hospitality packages be accepted from or given to prospective suppliers participating in a tender process at the respective employee's Operating Division, regardless of retail value.

d) Gratuities, bribes or kickbacks of any kind must never be solicited, accepted or offered, either directly or indirectly. This includes money, loans, equity, special privileges, personal favours, benefit or services. Such favours will be considered to constitute corruption.

3.2 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.

3.3 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.

3.4 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.

3.5 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/Contractor 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.

3.6 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.

3.7 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/Contractor or detriment of Transnet or other competitors.

3.8 Transnet may require the Tenderer/Service Provider/Contractor to furnish Transnet with a copy of its code of conduct. Such code of conduct must address the compliance programme for the implementation of the code of conduct and reject the use of bribes and other dishonest and unethical conduct.

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

3.10 The Tenderer/Service Provider/Contractor confirms that they will uphold the ten principles of the United Nations Global Compact (UNGC) in the fields of Human Rights, Labour, Anti-Corruption and the Environment when undertaking business with Transnet as follows:

a) Human Rights

- Principle 1: Businesses should support and respect the protection of internationally proclaimed human rights; and
- Principle 2: make sure that they are not complicit in human rights abuses.

b) Labour

- Principle 3: Businesses should uphold the freedom of association and the effective recognition of the right to collective bargaining;
- Principle 4: the elimination of all forms of forced and compulsory labour;
- Principle 5: the effective abolition of child labour; and
- Principle 6: the elimination of discrimination in respect of employment and occupation.

c) Environment

- Principle 7: Businesses should support a precautionary approach to environmental challenges;
- Principle 8: undertake initiatives to promote greater environmental responsibility; and

• Principle 9: encourage the development and diffusion of environmentally friendly technologies.

d) Anti-Corruption

• Principle 10: Businesses should work against corruption in all its forms, including extortion and bribery.

4 INDEPENDENT TENDERING

4.1 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.

4.2 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.

4.3 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.

4.4 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.

4.5 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.

4.6 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.

4.7 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.

5 DISQUALIFICATION FROM TENDERING PROCESS

5.1 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/Contractor 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/Contractor from its database, if already registered.

5.2 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.

5.3 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.

6 TRANSNET'S LIST OF EXCLUDED TENDERERS (BLACKLIST)

6.1 The process of restriction is used to exclude a company/person from conducting future business with Transnet and other organs of state for a specified period. No Tender shall be awarded to a Tenderer whose name (or any of its members, directors, partners or trustees) appear on the Register of Tender Defaulters kept by National Treasury, or who have been placed on National Treasury's List of Restricted Suppliers. Transnet reserves the right to withdraw an award, or cancel a contract concluded with a Tenderer should it be established, at any time, that a tenderer has been restricted with National Treasury by another government institution.

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

6.3 On completion of the restriction procedure, Transnet will submit the restricted entity's details (including the identity number of the individuals and registration number of the entity) to National Treasury for placement on National Treasury's Database of Restricted Suppliers for the specified period of exclusion. National Treasury will make the final decision on whether to restrict an entity from doing business with any organ of state for a period not exceeding 10 years and place the entity concerned on the Database of Restricted Suppliers published on its official website.

6.4 The decision to restrict is based on one of the grounds for restriction. The standard of proof to commence the restriction process is whether a "*prima facie*" (i.e. on the face of it) case has been established.

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

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

6.7 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.

6.8 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.

6.9 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.

7 PREVIOUS TRANSGRESSIONS

7.1 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.

7.2 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 Returnable Form contained in the document.)

8 SANCTIONS FOR VIOLATIONS

8.1 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/Contractor; and
f) Exclude the Tenderer/ Service Provider/Contractor from entering into any Tender with Transnet in future.

9 CONFLICTS OF INTEREST

9.1 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.

9.2 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.

9.3 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.

9.4 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.

10 DISPUTE RESOLUTION

10.1 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 6 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.

11 GENERAL

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

11.2 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.

11.3 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.

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

11.5 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 abide by it. To the best of the Parties' knowledge and belief, the information provided in this Integrity Pact is true and correct.

I …….. duly authorised by the tendering entity, hereby certify that the tendering entity are **fully acquainted** with the contents of the Integrity Pact and further **agree to abide by it** in full.

Signature ……

Date ……..

T2.2-21 : 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

T2.2-22 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 (_____) 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 _____ 2021

Name: _____

Title: _____

Signature: _____

(Operator)

Authorised signatory for and on behalf of _____ who warrants that he/she is duly authorised to sign this Agreement.

AS WITNESSES:

1. Name: _____ Signature: _____

2. Name: _____ Signature: _____

T2.2-23: Insurance provided by the *Contractor*

Clause 84.1 in NEC3 Engineering & Construction 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 84.2 of the ECC)	**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.			
Professional Indemnity Insurance with a minimum indemnity limit of R5 000 000.00			
(Other)			

T2.2-24: Form of Intent to Provide a 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 .....

T2.2-25: Forecast Rate of Invoicing

Tenderer to submit the forecast rate of invoicing (cash-flow) based on the Tender Price and Tender Programme.

Index of documentation attached to this schedule:

.....

.....

.....

.....

.....

.....

.....

.....

T2.2-26: 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:

……

……

……

……

……

……

……

The Contract

Part C1: Agreements and Contract Data

C1.1: Form of Offer and Acceptance

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:

REPAIR AND REPLACEMENT OF HIGH MAST LIGHTS AT DURBAN BBC TERMINALS (DURBAN MPT, DURBAN CAR, MAYDON WHARF) FOR TRANSNET SOC LTD (REG. NO 1990/000900/30) OPERATING AS TRANSNET PORT TERMINALS (HEREINAFTER REFERRED TO AS "TPT")

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 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: .....

(Insert name and address of organisation)

Name & signature of witness .....

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 Acceptance)	Agreements and Contract Data, (which includes this Form of Offer and
Part C2	Pricing Data
Part C3	Scope of Work: Works 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		

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 1 and 2

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	
		B: Priced contract with bill of quantities
	dispute resolution Option	**W1: Dispute resolution procedure**
	and secondary Options	
		X5: Sectional Completion
		X7: Delay damages
		X13: Performance Bond
		X16: Retention
		X18: Limitation of liability
		Z: *Additional conditions of contract*
	of the NEC3 Engineering and Construction Contract June 2005 (amended June 2006 and April 2013)	
10.1	The *Employer* is:	**Transnet SOC Ltd (Registration No. 1990/000900/30)**

	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 Port Terminals** **202 Anton Lembede Street** **Durban** **4000**
10.1	The *Project Manager* is: (Name)	**Nolan Reddy**
	Address	**Transnet Port Terminals** **202 Anton Lembede Street** **Durban** **4000**
	Tel	**+27 31 361 7872**
	e-mail	**Nolan.reddy@transnet.net**
10.1	The *Supervisor* is: (Name)	**Mathapelo Buthelezi**
	Address	**TPT Project Office**
	Tel No.	**063 691 2229,**
	e-mail	**Mathapelo.Buthelezi@transnet.net**
11.2(13)	The *works* are	**REPAIR AND REPLACEMENT OF HIGH MAST LIGHTS AT DURBAN BBC TERMINALS (DURBAN MPT, DURBAN CAR, MAYDON WHARF) FOR TRANSNET SOC LTD (REG. NO 1990/000900/30) OPERATING AS TRANSNET PORT TERMINALS (HEREINAFTER REFERRED TO AS "TPT")**
11.2(14)	The following matters will be included in the Risk Register	➢ **Working in operational areas** ➢ **Working in restricted areas** ➢ **Traffic congestion in Port of Durban and surrounding areas** ➢ **Covid Compliance for future outbreaks** ➢ **Site/HML Occupations**

11.2(15)	The *boundaries of the site* are	**DURBAN BBC TERMINALS (DURBAN MPT, DURBAN CAR, MAYDON WHARF)**	
11.2(16)	The Site Information is in	**Part C4**	
11.2(19)	The Works Information is in	**Part C3**	
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*.**	
3	**Time**		
11.2(3)	The *completion date* for the whole of the *works* is	**25 August 2023**	
11.2(9)	The *key date*s and the *condition*s to be met are:	***Condition* to be met**	***key date***
		1 Kick –Off Meeting	**08 Feb 2023**
		2 SHE file approval	**15 Mar 2023**
		3 Safety inductions	**23 Mar 2023**
		4 Site establishment	**30 Mar 2023**
		5 Issue Completion Certificate	**04 Oct 2023**
30.1	The *access dates* are	**Part of the Site**	**Date**
		1 DURBAN MPT	**24 Mar 2023**
		2 DURBAN CAR	**24 Mar 2023**
		3 MAYDON WHARF	**24 Mar 2023**
31.1	The *Contractor* is to submit a first programme for acceptance within	**2 weeks of the Contract Date.**	
31.2	The *starting date* is	**07 Feb 2023**	
32.2	The *Contractor* submits revised programmes at intervals no longer than	**2 weeks**	

35.1	The *Employer* is not willing to take over the *works* before the Completion Date.	
4	**Testing and Defects**	
42.2	The *defects date* is	**52 (fifty-two) weeks after Completion of the whole of the *works*.**
43.2	The *defect correction period* is	**2 weeks**
5	**Payment**	
50.1	The *assessment interval* is monthly on the	**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 Standard Bank of South Africa.**
6	**Compensation events**	
60.1(13)	The *weather measurements* to be recorded for each calendar month are,	**the cumulative rainfall (mm)**
		the number of days with rainfall more than 10 mm
		the number of days with minimum air temperature less than 0 degrees Celsius
		the number of days with snow lying at 08:00 hours South African Time
		and these measurements:
	The place where weather is to be recorded (on the Site) is:	**The *Contractor*'s site establishment area within the boundaries of the site, refer to C4**
	The *weather data* are the records of past *weather measurements* for each calendar month which were recorded at:	**Durban Weather Station**

	and which are available from:	**South African Weather Service 012 367 6023 or info3@weathersa.co.za.**
7	**Title**	**No additional data is required for this section of the *conditions of contract*.**
8	**Risks and insurance**	
80.1	These are additional *Employer*'s risks	**None**
84.1	The *Employer* provides these insurances from the Insurance Table	
	1 Insurance against:	**Loss of or damage to the *works*, Plant and Materials is as stated in the Insurance policy for Contract Works/ Public Liability.**
	Cover / indemnity:	**to the extent as stated in the insurance policy for Contract Works / Public Liability**
	The deductibles are:	**as stated in the insurance policy for Contract Works / Public Liability**
	2 Insurance against:	**Loss of or damage to property (except the *works*, Plant and Materials & Equipment) and liability for bodily injury to or death of a person (not an employee of the *Contractor)* arising out of or in connection with the performance of the Contract as stated in the insurance policy for Contract Works / Public Liability**
	Cover / indemnity	**Is to the extent as stated in the insurance policy for Contract Works / Public Liability**
	The deductibles are	**as stated in the insurance policy for Contract Works / Public Liability**
	3 Insurance against:	**Loss of or damage to Equipment (Temporary Works only) as stated in the insurance policy for contract Works and Public Liability**
	Cover / indemnity	**Is to the extent as stated in the insurance policy for Contract Works / Public Liability**

	The deductibles are:	**As stated in the insurance policy for Contract Works / Public Liability**
4	Insurance against:	**Contract Works SASRIA insurance subject to the terms, exceptions and conditions of the SASRIA coupon**
	Cover / indemnity	**Cover / indemnity is to the extent provided by the SASRIA coupon**
	The deductibles are	**The deductibles are, in respect of each and every theft claim, 0,1% of the contract value subject to a minimum of R2,500 and a maximum of R25,000.**
	Note:	**The deductibles for the insurance as stated above are listed in the document titled "Certificate of Insurance: Transnet (SOC) Limited Principal Controlled Insurance."**
84.1	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	**The *Contractor* must comply at a minimum with the provisions of the Compensation for Occupational Injuries and Diseases Act No. 130 of 1993 as amended.**
	The *Contractor* provides these additional Insurances	**1 Where the contract requires that the design of any part of the *works* shall be provided by the *Contractor* the *Contractor* shall satisfy the *Employer* that professional indemnity insurance cover in connection therewith has been affected** **2 Where the contract involves manufacture, and/or fabrication of Plant & Materials, components or other goods to be incorporated into the *works* at premises other than the site, the *Contractor* shall satisfy the *Employer* that such plant & materials, components or other goods for incorporation in the *works* are adequately insured during manufacture and/or fabrication and transportation to the site.**

		3 Should the *Employer* have an insurable interest in such items during manufacture, and/or fabrication, such interest shall be noted by endorsement to the *Contractor's* policies of insurance as well as those of any sub-contractor **4 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 5 000 000** **5 The insurance coverage referred to in 1, 2, 3 and 4 above shall be obtained from an insurer(s) in terms of an insurance policy approved by the *Employer*. The *Contractor* shall arrange with the insurer to submit to the *Project Manager* the original and the duplicate original of the policy or policies of insurance and the receipts for payment of current premiums, together with a certificate from the insurer or insurance broker concerned, confirming that the policy or policies provide the full coverage as required. The original policy will be returned to the *Contractor.***
84.2	The minimum limit of indemnity for insurance in respect of loss of or damage to property (except the works, Plant, Materials and Equipment) and liability for bodily injury to 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 the *Contractor* requires in addition to the amount of insurance taken out by the *Employer* for the same risk.**

84.2	The insurance against loss of or damage to the works, Plant and Materials as stated in the insurance policy for contract works and public liability selected from:	**Principal Controlled Insurance policy for Contract for the contract**
9	**Termination**	**There is no additional Contract Data required for this section of the *conditions of contract*.**
10	**Data for main Option clause**	
B	**Priced contract with Bill of Quantities**	**No additional data is required for this Option.**
60.6	The *method of measurement* is	**The Bill of Quantities have been measured in accordance with SANS 1200 unless indicated otherwise.**
11	**Data for Option W1**	
W1.1	The *Adjudicator* is	**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:	**The Chairman of the Association of Arbitrators (Southern Africa)**
	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 Rules for the Conduct of Arbitrations of the Association of Arbitrators (Southern Africa)**
	The place where arbitration is to be held is	**Durban, KwaZulu Natal, 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**	
X7	**Delay damages**	
X7.1	Delay damages for Completion of the whole of the *works* are	**R5000.00 per day**
X13	**Performance bond**	
X13.1	The amount of the performance bond is	**10% of the total of the Prices**
X16	**Retention**	
X16.1	The retention free amount is	**Nil**
	The retention percentage is	**5% on all payments certified.**
X18	**Limitation of liability**	
X18.1	The *Contractor*'s liability to the *Employer* for indirect or consequential loss is limited to:	**Nil**
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 amount of the deductible payable in terms of the Employer's insurance policy or an amount being equal to the total Contract Value inclusive of VAT whichever is applicable**
X18.3	The *Contractor's* liability for Defects due to his design which are not listed on the Defects Certificate is limited to:	**The cost of correcting the Defect inclusive of VAT.**

X18.4	The *Contractor's* total liability to the *Employer* for all matters arising under or in connection with this contract, other than excluded matters, is limited to:	**An amount being equal to the total Contract Value inclusive of VAT.**
X18.5	The *end of liability date* is	**5 years after Completion of the whole of the *works***

Z	***Additional conditions of contract* are*:***	
Z1	**Additional clause relating to Performance Bonds and/or Guarantees**	
Z1.1		**The Performance Guarantee under X13 above shall be an irrevocable, on-demand performance guarantee, to be issued exactly in the form of the Pro Forma documents provided for this purpose under C1.3 (Forms of Securities), in favour of the *Employer* by a financial institution reasonably acceptable to the *Employer.***
Z2	**Additional clauses relating to Joint Venture**	**Insert the additional core clause 27.5**
Z2.1		**27.5. In the instance that the *Contractor* is a joint venture, the *Contractor* shall provide the *Employer* with a certified copy of its signed joint venture agreement, and in the instance that the joint venture is an 'Incorporated Joint Venture,' the Memorandum of Incorporation, within 4 (four) weeks of the Contract Date.** **The Joint Venture agreement shall contain but not be limited to the following:**

- **A brief description of the Contract and the Deliverables;**
- **The name, physical address, communications addresses and domicilium citandi et executandi of each of the constituents and of the Joint Venture;**
- **The constituent's interests;**
- **A schedule of the insurance policies, sureties, indemnities and guarantees which must be taken out by the Joint Venture and by the individual constituents;**
- **Details of an internal dispute resolution procedure;**
- **Written confirmation by all of the constituents:**
  - **i. of their joint and several liabilities to the *Employer* to Provide the Works;**
  - **ii. identification of the lead partner in the joint venture confirming the authority of the lead partner to bind the joint venture through the *Contractor's* representative;**
  - **iii. Identification of the roles and responsibilities of the constituents to provide the Works.**
- **Financial requirements for the Joint Venture:**
  - **iv. the working capital requirements for the Joint Venture and the extent to which and manner whereby this will be provided and/or guaranteed by the constituents from time to time;**

		v. the names of the auditors and others, if any, who will provide auditing and accounting services to the Joint Venture.
Z2.2		**Insert additional core clause 27.6** **27.6. The *Contractor* shall not alter its composition or legal status of the Joint Venture without the prior approval of the *Employer.***
Z3	**Additional obligations in respect of Termination**	
Z3.1		**The following will be included under core clause 91.1:** **In the second main bullet, after the word 'partnership' add 'joint venture whether incorporate 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)**
Z3.2	**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"**
Z3.3		**Amend "R1 – R15 or R18" to "R1 – R15, R18, R22 or R23."**
Z4	**Right Reserved by the *Employer* to Conduct Vetting through SSA**	

Z4.1		**The *Employer* 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.**
Z5	**Additional Clause Relating to Collusion in the Construction Industry**	
Z5.1		**The contract award is made without prejudice to any rights the *Employer* may have to take appropriate action later with regard to any declared tender rigging including blacklisting.**
Z6	**Protection of Personal Information Act**	
Z6.1		**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.**
Z7	**Local Production and Content Obligations**	

Z7.1	**In terms of Local Production and Content (SBD 6.2), Annexure A and Annexure C of the Returnable Schedule T2.2.01 Eligibility Criteria Schedule:** **Declaration Certificate of Local Production and Content, the Contractor has undertaken to fulfil its obligations of the Local Production and Content for the following designated sectors:** **1 Electrical cable products** **2 Steel Value-Added Products** **3 Steel Lattice Towers and Masts**
Z7.2	**The Contractor is required to note that the Employer, the Department of Trade and Industry [DTI] and/or the body appointed by the DTI as the verification authority for local content may conduct compliance audits with regard to the Local Production and Content requirements as prescribed in Regulation 8 of the Preferential Procurement Regulations, 2017 issued in terms of the Preferential Procurement Policy Framework Act no. 5 of 2000.**
Z7.3	**The Contractor is required to continuously update Declarations C, D and E of the Local Production and Content Declaration commitments with the actual local content values for the duration of the contract.**
Z7.4	**The Contractor shall report to the Employer on a monthly basis during the term of the Contract, the amounts spend on Local Production and Content for the designated sectors for the duration of the contract.**
Z7.5	**The Contractor must refer to Schedule A attached to the Returnable Schedule T2.2.28 Eligibility Criteria Schedule: Declaration Certificate of Local Production and Content concerning non-compliance penalties applicable to Local Production and Content.**

C1.2 Contract Data

Part two - Data provided by the *Contractor*

The tendering *Contractor* is advised to read both the NEC3 Engineering and Construction Contract - June 2005 (with amendments June 2006 and April 2013) and the relevant parts of its Guidance Notes (ECC3-GN) in order to understand the implications of this Data which the tenderer is required to complete. An example of the completed Data is provided on pages 156 to 158 of the ECC3 Guidance Notes.

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(18)	The *working areas* are the Site and	_____
24.1	The *Contractor's* 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 T2.2-04
11.2(14)	The following matters will be included in the Risk Register	None
31.1	The programme identified in the Contract Data is	
B	**Priced contract with bill of quantities**	
11.2(21)	The *bill of quantities* is in	**Part C2.2 Bill of Quantities**
11.2(31)	The tendered total of the Prices is	_____ (in figures) _____ _____ (in words), excluding VAT
	Data for Schedules of Cost Components	*Note "SCC" means Schedule of Cost Components starting on page 60 of ECC, and "SSCC" means Shorter Schedule of Cost Components starting on page 63 of ECC.*

B	**Priced contract with bill of quantities**	**Data for the Shorter Schedule of Cost Components**		
41 in SSCC	The percentage for people overheads is:	**_____%**		
21 in SSCC	The published list of Equipment is the last edition of the list published by	**Not applicable**		
	The percentage for adjustment for Equipment in the published list is	**0%**		
22 in SSCC	The rates of other Equipment are:	**Equipment**	**Size or capacity**	**Rate**

61 in SSCC	The hourly rates for Defined Cost of design outside the Working Areas are	**Category of employee**	**Hourly rate**	
62 in SSCC	The percentage for design overheads is	**_____%**		
63 in SSCC	The categories of design employees whose travelling expenses to and from the Working Areas are included in Defined Cost are:			

C1.3: Forms of Securities

C1.3 Forms of Securities

Pro forma Performance Guarantee

For use with the NEC3 Engineering & Construction 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 *Works 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
(Reg no. 1990/000900/30)
Transnet Corporate Centre
138 Eloff Street
Braamfontein
Johannesburg
2000

Date:

Dear Sirs,

Performance Bond for Contract No. TPT/2022/05/0171/3688/RFP

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 *works* from the Contract Data} (the *works*).

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*, *Project Manager*, *works* and Completion Certificate 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 construction 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 *Project Manager* stating that the Completion Certificate for the whole of the *works* 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 *Project Manager*.

5. Always provided that this bond will not lapse in the event the Guarantor is notified by the *Project 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 *Project 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 _____ 201_

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

C2.1 Pricing Instructions – Option B

PART 2: PRICING DATA

Part C2: Pricing Data

C2.1 pricing instructions: Option B

1. The *conditions of contract*

1.1. How the contract prices work and assesses it for progress payments

Clause 11 in NEC3 Engineering and Construction Contract, April 2013 (ECC) Option B states:

Identified and defined terms 11 11.2

(21) The Bill of Quantities is the *bill of quantities* as changed in accordance with this contract to accommodate implemented compensation events and for accepted quotations for acceleration.

(22) Defined Cost is the cost of the components in the Shorter Schedule of Cost Components whether work is subcontracted or not excluding the cost of preparing quotations for compensation events

(28) The Price for Work Done to Date is the total of

- the quantity of the work which the *Contractor* has completed for each item in the Bill of Quantities multiplied by the rate and
- a proportion of each lump sum which is the proportion of the work covered by the item which the *Contractor* has completed except the Preliminary and General Items.

Completed work is work without Defects which would either delay or be covered by immediately following work.

(31) The Prices are the lump sums and the amounts obtained by multiplying the rates by the quantities for the items in the Bill of Quantities.

This confirms that Option B is a re-measurement contract, and the bill comprises only items measured using quantities and rates or stated as lump sums. Value related items are not used. Time related items are items measured using rates where the rate is a unit of time.

1.2 Function of the Bill of Quantities

Clause 55.1 in Option B states, "Information in the Bill of Quantities is not Works Information or Site Information". This confirms that instructions to do work or how it is to be done are not included in the Bill, but in the Works Information. This is further confirmed by Clause 20.1 which states, "The *Contractor* Provides the Works in accordance with the Works Information". Hence the *Contractor* does **not** Provide the Works in accordance with the Bill of Quantities. The Bill of Quantities is only a pricing document.

1.3 Guidance before pricing and measuring

Employers preparing tenders or contract documents, and tendering contractors are advised to consult the sections dealing with the bill of quantities in the NEC3 Engineering and Construction Contract (April 2013) Guidance Notes before preparing the *bill of quantities* or before entering rates and lump sums into the *bill*.

Historically bill of quantities-based contracts in South Africa have been influenced by the different approaches of the civil engineering and building sectors of the industry through their respective

discipline based standard forms of contract and methods of measurement. This is particularly apparent in the approach to the Preliminary and General bill. On the other hand, because ECC3 caters for a number of disciplines in the same contract, including electrical works, a different approach not currently found in local methods of measurement to the Preliminary & General bill items may have been used.

The NEC approach to the P & G bill assumes use will be made of method related charges for Equipment applied to Providing the Works based on durations shown in the Accepted Programme, fixed charges for the use of Equipment that is required throughout the construction phase, time related charges for people working in a supervisory capacity for the period required, and lump sum charges for other facilities or services not directly related to performing work items typically included in other parts of the bill.

2 Measurement and Payment

2.2 Symbols

The units of measurement described in the Bill of Quantities are metric units abbreviated as follows:

Abbreviation	Unit
%	percent
h	hour
ha	hectare
kg	kilogram
kl	kilolitre
km	kilometre
km-pass	kilometre-pass
kPa	kilopascal
kW	kilowatt
l	litre
m	metre
mm	millimetre
m^2	square metre
m^2-pass	square metre pass
m^3	cubic metre
m^3-km	cubic metre-kilometre
MN	meganewton
MN.m	meganewton-metre
MPa	megapascal
No.	number
Prov sum	provisional sum
PC-sum	prime cost sum
R/only	Rate only
sum	Lump sum
t	ton (1000kg)
W/day	Work day

2.2 General assumptions

2.2.1 The Preliminary and General Items (Section 1) shall be measured in accordance with the provisions of SABS 1200-A, *General.* Payment of time related P&G will be based on the percentage of work complete in accordance to the contract and not in accordance to SABS 1200-A. The tendered sum is to include for all P&G costs related to the Provisional Sums and Budgetary Allowance Items.

2.2.2 Unless otherwise stated, items are measured net in accordance with the drawings, and no allowance has been made in the quantities for waste.

2.2.3 The Prices and rates stated for each item in the Bill of Quantities shall be treated as being fully inclusive of all work, risks, liabilities, obligations, overheads, profit and everything necessary as incurred or required by the *Contractor* in carrying out or providing that item.

2.2.4 Clause 63.13 in Option B provides that these rates and Prices may be used as a basis for assessment of compensation events instead of Defined Cost.

2.2.5 Where this contract requires detailed drawings, designs or other information to be provided, and no rates or prices are included in the *bill* specifically for such matters, then the *Contractor* is deemed to have allowed for all costs associated with such requirements within the tendered rates and Prices in the Bill of Quantities.

2.2.6 An item against which no Price is entered will be treated as covered by other Prices or rates in the *bill of quantities*. If a number of items are grouped together for pricing purposes, this will be treated as a single lump sum.

2.2.7 The quantities contained in the Bill of Quantities may not be final and do not necessarily represent the actual amount of work to be done. The quantities of work assessed and certified for payment by the *Project Manager* at each assessment date will be used for determining payments due and not the quantities given in the Bill of Quantities.

2.2.8 The short descriptions of the items of payment given in the *bill of quantities* are only for the purposes of identifying the items. More detail regarding the extent of the work entailed under each item is provided in the Works Information.

C2.2 Bill of Quantities

Item	Payment Clause	Discription	Unit	Qty	Rate	Amount
1	**SABS 1200A PSA**	**SECTION 1: PRELIMINARIES AND GENERAL** **PREAMBLES** Fixed preliminaries items will be valuated and paid on a proven cost basis. Time related preliminary items may relate to fixed preliminary items and items not listed and expressed as a sum and will be pro-rated against value of construction items completed.				
1.1		FIXED PRELIMINARY ITEMS Contractual requirements				
1.1.1		Contractual requirements, sureties, insurance, etc.	Sum	1		
1.1.2		Underground testing as per Works Information (WI)	Sum	1		
		Establishment of facilities on site				
1.1.3		Offices for Engineer & staff and notice board	Sum	1		
		Facilities for the contractor				
1.1.4		a) Offices & storage sheds	Sum	1		
1.1.5		b) Workshops	Sum	1		
1.1.6		e) Ablution & latrine facilities	Sum	1		
1.1.7		f) Tools & equipment	Sum	1		
1.1.8		g) Water supplies, electric power & communications	Sum	1		
1.1.9		h) Dealing with water & dust	Sum	1		
1.1.10		I) Access	Sum	1		
1.1.11		j) Equipment	Sum	1		
		Other Fixed-charge Obligations				
1.1.12		Health and safety	Sum	1		
1.1.13		Environmental	Sum	1		
1.1.14		Setting out	Sum	1		
1.1.15		Security	Sum	1		
1.1.16		Dealing with traffic	Sum	1		
1.1.17		As-built surveys	Sum	1		
1.1.18		Removal of site establishment	Sum	1		
		TEMPORARY WORKS				
		Dealing with traffic				
1.1.19		Main access road to works	Sum	1		
1.1.20		Dealing with traffic	Sum	1		
1.1.21		Protection of structure until construction in Vicinity is complete	Sum	1		
		TOTAL CARRIED FORWARD TO SECTION SUMMARY				**R -**

Item	Payment Clause	Discription	Unit	Qty	Rate	Amount
		SECTION 1: PRELIMINARIES AND GENERAL				
1.1.22		Existing Services	Sum	1		
1.1.23		Cost of survey in terms of land survey act	Sum	1		
		ENGINEERING, COMMISSIONING AND AS BUILT REQUIREMENTS				
		As Built Documentation and Operating and Maintenance Manuals:				
1.1.24		As Built Documentation and Operating and Maintenance Manuals	Sum	1		
		TIME RELATED PRELIMINARY ITEMS				
		Time Related Preliminary Items				
1.1.25		Time related obligations	Sum	1		
		Other Fixed Charges				
1.1.26		Environmental compliance	Sum	1		
1.1.27		Health and Safety Compliance	Sum	1		
1.1.28		Cost for the Design	Sum	1		
1.1.29		Contractor costs to comply with regulations of a National Pandemic such as Covid-19	Sum	1		
		TOTAL CARRIED FORWARD TO FINAL SUMMARY				

Item	Payment Clause	Discription	Unit	Qty	Rate	Amount
2		**SECTION 2: CIVIL WORKS**				
		MAIN CAR PARK				
2.1		**40/503**				
		PAINTWORK				
		All painting to be done to Transnet's specification				
		Preparatory Work to Existing Work				
		Surfaces shall be thoroughly washed down and allowed to dry completely before any paint applied.Blistered or peeling paint shall be completely removed and craks shall be opened, filled with a suitable filler and finished smooth				
		All painting to be done to Transnet's specification				
		ON ROUGH CONCRETE				
2.1.1		Open up remove crack material and fill in approved epoxy and smooth over exterior face	No	1		
		PAINTING				
		All painting to be done to Transnet's specification				
2.1.2		Remove and clean existing paint	m²	4		
2.1.3		On external walls (Yellow)	m²	2		
2.1.4		Apply paint similar to existing concrete base (Black)	m²	2		
		Corrosion Protection				
		Bolts, Nuts Etc				
2.1.5		Wire brush Cleaning of Bolts	m²	10		
		Apply prime and coat with an approved epoxy or protective spray				
2.1.6		Bolts	No	10		
2.1.7		Nuts	No	20		
2.1.8		Washers	No	20		
2.2		**46/503**				
		Concrete sundries				
		Removal and Preparing of existing surfaces				
		remove erosion and fill in approved epoxy and smooth over exterior face of the square shaped concrete base	No	1		
		PAINTING				
		All painting to be done to Transnet's specification				
2.2.1		Remove and clean existing paint	m²	4		
2.2.2		Apply paint similar to existing concrete base (Yellow)	m²	2		
2.2.3		Apply paint similar to existing concrete base (Black)	m²	2		
		Corrosion Protection				
		Bolts, Nuts Etc				
2.2.4		Wire brush Cleaning of Bolts	m²	10		
		Apply prime and coat with an approved epoxy or protective spray				
2.2.5		Bolts	No	10		
2.2.6		Nuts	No	20		
2.2.7		Washers	No	20		
2.3		**35/503**				
		Concrete sundries				
		PAINTING				
		All painting to be done to Transnet's specification				
2.3.1		Remove and clean existing paint	m²	4		
2.3.2		Apply paint similar to existing concrete base (Yellow)	m²	2		
2.3.3		Apply paint similar to existing concrete base (Black)	m²	2		
		TOTAL CARRIED FORWARD TO SECTION SUMMARY				R -

Item	Payment Clause	Discription	Unit	Qty	Rate	Amount
		SECTION 2: CIVIL WORKS				
		CAR TERMINAL				
2.4		**35/503**				
		Bolts, Nuts Etc				
2.4.1		Wire brush Cleaning of bolt cage	No	10		
		Supply and install				
2.4.2		Bolts	No	10		
2.4.3		Nuts	No	20		
2.4.4		Washers	No	10		
2.5		**34/503C**				
		Concrete sundries				
		PAINTING				
		All painting to be done to Transnet's specification				
2.5.1		Remove and clean existing paint	m²	4		
2.5.2		Apply paint or similar to existing concrete base (Yellow)	m²	2		
2.5.3		Apply paint or similar to existing concrete base (Black)	m²	2		
		Corrosion Protection				
		Bolts, Nuts Etc				
2.5.4		Wire brush Cleaning of Bolts	No	10		
		Apply prime and coat with an approved epoxy or protective spray				
2.5.5		Bolts	No	10		
2.5.6		Nuts	No	20		
2.5.7		Washers	No	10		
2.6		**503 D**				
		Concrete sundries				
		Removal and Preparing of existing surfaces				
2.6.1		Remove and repair damaged material and fill in approved epoxy and smooth over exterior face	No	1		
		TOTAL CARRIED FORWARD TO SECTION SUMMARY				

Item	Payment Clause	Discription	Unit	Qty	Rate	Amount
		SECTION 2: CIVIL WORKS				
		CAR TERMINAL				
2.6		**503 D**				
		PAINTING				
		All painting to be done to Transnet's specification				
2.6.2		Remove and clean existing paint	m²	4		
2.6.3		Apply paint or similar to existing concrete base (Yellow)	m²	2		
2.6.4		Apply paint or similar to existing concrete base (Black)	m²	2		
		Corrosion Protection				
		Bolts, Nuts Etc				
2.6.5		Wire brush Cleaning of Bolts	No	10		
		Apply prime and coat with an approved epoxy or protective spray				
2.6.6		Bolts	No	10		
2.6.7		Nuts	No	20		
2.6.8		Washers	No	10		
2.7		**49/503E**				
		Concrete sundries				
		Removal and Preparing of existing surfaces				
2.7.1		Remove and repair damaged material and fill in approved epoxy and smooth over exterior face	No	1		
		PAINTING				
		All painting to be done to Transnet's specification				
2.7.2		Remove and clean existing paint	m²	4		
2.7.3		Apply paint similar to existing concrete base (Yellow)	m²	2		
2.7.4		Apply paint similar to existing concrete base (Black)	m²	2		
		Corrosion Protection				
		Bolts, Nuts Etc				
2.7.5		Wire brush Cleaning of Bolts	No	10		
		Apply prime and coat with an approved epoxy or protective spray				
2.7.6		Bolts	No	10		
2.7.7		Nuts	No	20		
2.7.8		Washers	No	10		
2.8		**42/504**				
		Concrete Sundries				
		PAINTING				
		All painting to be done to Transnet's specification				
2.8.1		Remove and clean existing paint	m²	4		
2.8.2		Apply paint similar to existing concrete base (Yellow)	m²	2		
2.8.3		Apply paint similar to existing concrete base (Black)	m²	2		
		Bolts, Nuts Etc				
2.8.4		Wire brush Cleaning of bolt cage	No	10		
		Supply and install				
2.8.5		Bolts	No	10		
2.8.6		Nuts	No	20		
2.8.7		Washers	No	10		
		TOTAL CARRIED FORWARD TO SECTION SUMMARY				R -

Item	Payment Clause	Discription	Unit	Qty	Rate	Amount
		SECTION 2: CIVIL WORKS				
		CAR TERMINAL				
2.9		**33/504**				
		Concrete Sundries				
		PAINTING				
		All painting to be done to Transnet's specification				
2.9.1		Remove and clean existing paint	m²	4		
2.9.2		Apply paint similar to existing concrete base (Yellow)	m²	2		
2.9.3		Apply paint similar to existing concrete base (Black)	m²	2		
		Bolts, Nuts Etc				
2.9.4		Wire brush Cleaning of bolt cage	No	10		
		Supply and install				
2.9.5		Bolts	No	10		
2.9.6		Nuts	No	20		
2.9.7		Washers	No	10		
3		**32/505**				
		Concrete sundries				
		Removal and Preparing of existing surfaces				
3.1.1		Remove erosion and fill in approved epoxy and smooth over exterior face of the square shaped concrete base	No	1		
		PAINTING				
		All painting to be done to Transnet's specification				
3.1.2		Remove and clean existing paint	m²	4		
3.1.3		Apply paint similar to existing concrete base (Yellow)	m²	2		
3.1.4		Apply paint similar to existing concrete base (Black)	m²	2		
		Bolts, Nuts Etc				
3.1.5		Wire brush Cleaning of bolt cage	No	10		
		Supply and install				
3.1.6		Bolts	No	10		
3.1.7		Nuts	No	20		
3.1.8		Washers	No	10		
		TOTAL CARRIED FORWARD TO SECTION SUMMARY				

Item	Payment Clause	Discription	Unit	Qty	Rate	Amount
		SECTION 2: CIVIL WORKS				
		CAR TERMINAL				
3.2		**505**				
		Concrete sundries				
		Removal and Preparing of existing surfaces				
3.2.1		Remove erosion and fill in approved epoxy and smooth over exterior face of the square shaped concrete base	No	1		
		PAINTING				
		All painting to be done to Transnet's specification				
3.2.2		Remove and clean existing paint	m²	4		
3.2.3		Apply paint similar to existing concrete base (Yellow)	m²	2		
3.2.4		Apply paint similar to existing concrete base (Black)	m²	2		
		Bolts, Nuts Etc				
3.2.5		Wire brush Cleaning of bolt cage	No	10		
		Supply and install Similar or Approved				
3.2.6		Bolts	No	10		
3.2.7		Nuts	No	20		
3.2.8		Washers	No	10		
3.3		**44/600**				
		Concrete sundries				
		PAINTING				
		All painting to be done to Transnet's specification				
3.3.1		Remove and clean existing paint	m²	4		
3.3.2		Apply paint similar to existing concrete base (Yellow)	m²	2		
3.3.3		Apply paint similar to existing concrete base (Black)	m²	2		
		Bolts, Nuts Etc				
3.3.4		Wire brush Cleaning of bolt cage	No	10		
		Supply and install Similar or Approved				
3.3.5		Bolts	No	10		
3.3.6		Nuts	No	20		
3.3.7		Washers	No	10		
3.4		**31/600**				
		Concrete sundries				
		Removal and Preparing of existing surfaces				
3.4.1		Open up remove crack material and fill in approved epoxy and smooth over exterior face	No	1		
		PAINTING				
		All painting to be done to Transnet's specification				
3.4.2		Remove and clean existing paint	m²	4		
3.4.3		Apply paint similar to existing concrete base (Yellow)	m²	2		
3.4.4		Apply paint similar to existing concrete base (Black)	m²	2		
		TOTAL CARRIED FORWARD TO SECTION SUMMARY				R -

Item	Payment Clause	Discription	Unit	Qty	Rate	Amount
		SECTION 2: CIVIL WORKS				
		31/600				
		Bolts, Nuts Etc				
3.4.5		Wire brush Cleaning of bolt cage	No	10		
		Supply and install				
3.4.6		Bolts	No	10		
3.4.7		Nuts	No	20		
3.4.8		Washers	No	10		
3.5		**30/600**				
		Concrete sundries				
		Removal and Preparing of existing surfaces				
3.5.1		Open up remove crack material and fill in approved epoxy and smooth over exterior face	No	1		
		PAINTING				
		All painting to be done to Transnet's specification				
3.5.2		Remove and clean existing paint	m²	4		
3.5.3		Apply paint similar to existing concrete base (Yellow)	m²	2		
3.5.3		Apply paint similar to existing concrete base (Black)	m²	2		
		Bolts, Nuts Etc				
3.5.4		Wire brush Cleaning of bolt cage	No	10		
		Supply and install similar or Approved				
3.5.5		Bolts	No	10		
3.5.6		Nuts	No	20		
3.5.7		Washers	No	10		
		TOTAL CARRIED FORWARD TO SECTION SUMMARY				

Item	Payment Clause	Discription	Unit	Qty	Rate	Amount
		SECTION 2: CIVIL WORKS				
3.6		**29**				
		Concrete sundries				
		Removal and Preparing of existing surfaces				
3.6.1		Open up remove crack material and fill in approved epoxy and smooth over exterior face	No	1		
		PAINTING				
		All painting to be done to Transnet's specification				
3.6.2		Remove and clean existing paint	m²	4		
3.6.3		Apply paint similar to existing concrete base (Yellow)	m²	2		
3.6.4		Apply paint similar to existing concrete base (Black)	m²	2		
		Corrosion Protection				
		Bolts, Nuts Etc				
3.6.5		Wire brush Cleaning of Bolts	No	10		
		Apply prime and coat with an approved epoxy or protective spray				
3.6.6		Bolts	No	10		
3.6.7		Nuts	No	20		
3.6.8		Washers	No	10		
3.7		**47**				
		Concrete sundries				
		PAINTING				
		All painting to be done to Transnet's specification				
3.7.1		Remove and clean concrete surfaces	m²	4		
3.7.2		Apply paint similar to existing concrete base (Yellow)	m²	2		
3.7.3		Apply paint similar to existing concrete base (Black)	m²	2		
		Corrosion Protection				
		Bolts, Nuts Etc				
3.7.4		Wire brush Cleaning of Bolts	No	10		
		Apply prime and coat with an approved epoxy or protective spray				
3.7.5		Bolts	No	10		
3.7.6		Nuts	No	20		
3.7.7		Washers	No	10		
		TOTAL CARRIED FORWARD TO SECTION SUMMARY				**R -**

Item	Payment Clause	Discription	Unit	Qty	Rate	Amount
		SECTION 2: CIVIL WORKS				
3.8		**233** **Concrete sundries**				
		PAINTING				
		All painting to be done to Transnet's specification				
3.8.1		Remove and clean concrete surfaces	m²	4		
3.8.2		Apply paint similar to existing concrete base (Yellow)	m²	2		
3.8.3		Apply paint similar to existing concrete base (Black)	m²	2		
		Corrosion Protection				
		Bolts, Nuts Etc				
3.8.4		Wire brush Cleaning of Bolts	No	10		
		Apply prime and coat with an approved epoxy or protective spray				
3.8.5		Bolts	No	10		
3.8.6		Nuts	No	20		
3.8.7		Washers	No	10		
3.9		**45** **Concrete sundries**				
		Removal and Preparing of existing surfaces				
3.9.1		Open up remove crack material, repair and fill in approved epoxy and smooth over exterior face	No	1		
		PAINTING **All painting to be done to Transnet's specification**				
3.9.2		Remove and clean existing paint	m²	4		
3.9.3		Apply paint similar to existing concrete base (Yellow)	m²	2		
3.9.4		Apply paint similar to existing concrete base (Black)	m²	2		
		Corrosion Protection				
		Bolts, Nuts Etc				
3.9.5		Wire brush Cleaning of Bolts	No	10		
		Apply prime and coat with an approved epoxy or protective spray				
3.9.6		Bolts	No	10		
3.9.7		Nuts	No	20		
3.9.8		Washers	No	10		
4		**39** **Concrete sundries**				
		PAINTING **All painting to be done to Transnet's specification**				
4.1.1		Remove and clean existing paint	m²	4		
4.1.2		Apply paint similar to existing concrete base (Yellow)	m²	2		
4.1.3		Apply paint similar to existing concrete base (Black)	m²	2		
		TOTAL CARRIED FORWARD TO SECTION SUMMARY				R -

Item	Payment Clause	Discription	Unit	Qty	Rate	Amount
		SECTION 2: CIVIL WORKS				
		39				
		Corrosion Protection				
		Bolts, Nuts Etc				
4.1.4		Wire brush Cleaning of Bolts	No	10		
		Apply prime and coat with an approved epoxy or protective spray				
4.1.5		Bolts	No	10		
4.1.6		Nuts	No	20		
4.1.7		Washers	No	10		
4.2		**36/503**				
		Concrete sundries				
		Removal and Preparing of existing surfaces				
4.2.1		Repair errosion and fill in approved epoxy and smooth over exterior face	No	1		
		PAINTING				
		All painting to be done to Transnet's specification				
4.2.2		Remove and clean existing paint	m²	4		
4.2.3		Apply paint similar to existing concrete base (Yellow)	m²	2		
4.2.4		Apply paint similar to existing concrete base (Black)	m²	2		
		Corrosion Protection				
		Bolts, Nuts Etc				
4.2.5		Wire brush Cleaning of Bolts	No	10		
		Apply prime and coat with an approved epoxy or protective spray				
4.2.6		Bolts	No	10		
4.2.7		Nuts	No	20		
4.2.8		Washers	No	10		
5		**Q AND R**				
5.1		**3**				
		Concrete sundries				
		Removal and Preparing of existing surfaces				
5.1.1		Repair errosion and fill in approved epoxy and smooth over exterior face	No	1		
		TOTAL CARRIED FORWARD TO SECTION SUMMARY				

Item	Payment Clause	Discription	Unit	Qty	Rate	Amount
		SECTION 2: CIVIL WORKS				
		Q AND R				
5.1		**3**				
		PAINTING				
5.1.2		**All painting to be done to Transnet's specification**				
5.1.3		Remove and clean existing paint	m²	4		
5.1.4		Apply paint similar to existing concrete base (Yellow)	m²	4		
		Bolts, Nuts Etc				
5.1.5		Wire brush Cleaning of bolt cage	No	10		
		Supply and install similar or Aproved				
5.1.6		Bolts	No	10		
5.1.7		Nuts	No	20		
5.1.7		Washers	No	10		
5.2		**51**				
		Concrete sundries				
		Removal and Preparing of existing surfaces				
5.2.1		Repair errosion and fill in approved epoxy and smooth over exterior face	No	1		
		PAINTING				
		All painting to be done to Transnet's specification				
5.2.2		Remove and clean existing paint	m²	4		
5.2.3.		Apply paint similar to existing concrete base (Yellow)	m²	2		
5.2.4		Apply paint similar to existing concrete base (Black)	m²	2		
		Bolts, Nuts Etc				
5.2.5		Wire brush Cleaning of bolt cage	No	10		
		Supply and install Similar or Approved				
5.2.6		Bolts	No	10		
5.2.7		Nuts	No	20		
5.2.8		Washers	No	10		
5.3		**53**				
		Concrete sundries				
		PAINTING				
		All painting to be done to Transnet's specification				
5.3.1		Remove and clean existing paint	m²	4		
5.3.2		Apply paint similar to existing concrete base (Yellow)	m²	2		
5.3.3		Apply paint similar to existing concrete base (Black)	m²	2		
		TOTAL CARRIED FORWARD TO SECTION SUMMARY				

Item	Payment Clause	Discription	Unit	Qty	Rate	Amount
		SECTION 2: CIVIL WORKS				
		Q AND R				
5.3		**53**				
		Corrosion Protection				
		Bolts, Nuts Etc				
5.3.4		Wire brush Cleaning of Bolts	No	16		
		Apply prime and coat with an approved epoxy or protective spray				
5.3.5		Bolts	No	16		
5.3.6		Nuts	No	32		
5.3.7		Washers	No	16		
5.4		**9 (MPT F-SHED)**				
		Concrete sundries				
		PAINTING				
		All painting to be done to Transnet's specification				
5.4.1		Remove and clean existing paint	m²	4		
5.4.2		Apply paint similar to existing concrete base (Yellow)	m²	2		
5.4.3		Apply paint similar to existing concrete base (Black)	m²	2		
		Bolts, Nuts Etc				
5.4.4		Wire brush Cleaning of bolt cage	No	10		
		Supply and install Similar or Aproved				
5.4.5		Bolts	No	8		
5.4.6		Nuts	No	16		
5.4.7		Washers	No	8		
5.5		**37(REEFERS)**				
		Concrete sundries				
		Removal and Preparing of existing surfaces				
5.5.1		Open up remove crack material, repair erosion and fill in approved epoxy and smooth over exterior face	No	1		
		PAINTING				
		All painting to be done to Transnet's specification				
5.5.2		Remove and clean existing paint	m²	4		
5.5.3		Apply paint similar to existing concrete base (Yellow)	m²	2		
5.5.4		Apply paint similar to existing concrete base (Black)	m²	2		
		Corrosion Protection				
		Bolts, Nuts Etc				
5.5.5		Wire brush Cleaning of Bolts	No	10		
		Apply prime and coat with an approved epoxy or protective spray				
5.5.6		Bolts	No	10		
5.5.7		Nuts	No	20		
5.5.8		Washers	No	10		
		TOTAL CARRIED FORWARD TO SECTION SUMMARY				

Item	Payment Clause	Discription	Unit	Qty	Rate	Amount
		SECTION 2: CIVIL WORKS				
		Q AND R				
5.6		**48 (REEFERS)**				
		Concrete sundries				
		PAINTING				
		All painting to be done to Transnet's specification				
5.6.1		Remove and clean existing paint	m²	4		
5.6.2		Apply paint similar to existing concrete base (Yellow)	m²	2		
5.6.3		Apply paint similar to existing concrete base (Black)	m²	2		
		Corrosion Protection				
		Bolts, Nuts Etc				
5.6.4		Wire brush Cleaning of Bolts	No	10		
		Apply prime and coat with an approved epoxy or protective spray				
5.6.5		Bolts	No	10		
5.6.6		Nuts	No	20		
5.6.7		Washers	No	10		
5.7		**49 (F-STACK)**				
		Concrete sundries				
		PAINTING				
		All painting to be done to Transnet's specification				
5.7.1		Remove and clean existing paint	m²	4		
5.7.2		Apply paint similar to existing concrete base (Yellow)	m²	2		
5.7.3		Apply paint similar to existing concrete base (Black)	m²	2		
		Corrosion Protection				
		Bolts, Nuts Etc				
5.7.4		Wire brush Cleaning of Bolts	No	10		
		Apply prime and coat with an approved epoxy or protective spray				
5.7.5		Bolts	No	10		
5.7.6		Nuts	No	20		
5.7.7		Washers	No	10		
5.8		**36 (G-STACK)**				
		Concrete sundries				
		Removal and Preparing of existing surfaces				
5.8.1		Open up remove crack material, repair erosion and fill in approved epoxy and smooth over exterior face	No	1		
		PAINTING				
		All painting to be done to Transnet's specification				
5.8.2		Remove and clean existing paint	m²	4		
5.8.3		Apply paint similar to existing concrete base (Yellow)	m²	2		
5.8.4		Apply paint similar to existing concrete base (Black)	m²	2		
		TOTAL CARRIED FORWARD TO SECTION SUMMARY				

Item	Payment Clause	Discription	Unit	Qty	Rate	Amount
		SECTION 2: CIVIL WORKS				
		Q AND R				
5.9		**36 (G-STACK)**				
		Corrosion Protection				
		Bolts, Nuts Etc				
5.9.1		Wire brush Cleaning of Bolts	No	10		
		Apply prime and coat with an approved epoxy or protective spray				
5.9.2		Bolts	No	10		
5.9.3		Nuts	No	20		
5.9.3		Washers	No	10		
6		**8 (F-SHED)**				
		Concrete sundries				
		Removal and Preparing of existing surfaces				
6.1.1		Open up remove crack material, repair erosion and fill in approved epoxy and smooth over exterior face	No	1		
		PAINTING				
		All painting to be done to Transnet's specification				
6.1.2		Remove and clean existing concrete surfaces	m²	4		
6.1.3		Apply paint similar to existing concrete base (Yellow)	m²	2		
6.1.4		Apply paint similar to existing concrete base (Black)	m²	2		
		Bolts, Nuts Etc				
6.1.5		Wire brush Cleaning of bolt cage	No	8		
		Supply and Install Similar or Approved				
6.1.6		Bolts	No	8		
6.1.7		Nuts	No	16		
6.1.8		Washers	No	8		
6.2		**34 (G-STACK)**				
		Concrete sundries				
		Removal and Preparing of existing surfaces				
6.2.1		Open up remove crack material, repair erosion and fill in approved epoxy and smooth over exterior face	No	1		
		PAINTING				
		All painting to be done to Transnet's specification				
6.2.2		Remove and clean existing paint	m²	4		
6.2.3		Apply paint similar to existing concrete base (Yellow)	m²	2		
6.2.4		Apply paint similar to existing concrete base (Black)	m²	2		
		Corrosion Protection				
		Bolts, Nuts Etc				
6.2.5		Wire brush Cleaning of Bolts	No	10		
		Apply prime and coat with an approved epoxy or protective spray				
6.2.6		Bolts	No	10		
6.2.7		Nuts	No	20		
6.2.8		Washers	No	10		
		TOTAL CARRIED FORWARD TO SECTION SUMMARY				

Item	Payment Clause	Discription	Unit	Qty	Rate	Amount
		SECTION 2: CIVIL WORKS				
6.3		**45 (G-STACK)**				
		Concrete sundries				
		PAINTING				
		All painting to be done to Transnet's specification				
6.3.1		Prepare and clean existing paint	m²	4		
6.3.2		Apply paint similar to existing concrete base (Yellow)	m²	2		
6.3.3		Apply paint similar to existing concrete base (Black)	m²	2		
		Corrosion Protection				
		Bolts, Nuts Etc				
6.3.4		Wire brush Cleaning of Bolts	No	10		
		Apply prime and coat with an approved epoxy or protective spray				
6.3.5		Bolts	No	10		
6.3.6		Nuts	No	20		
6.3.7		Washers	No	10		
6.4		**44 (G-STACK)**				
		Concrete sundries				
		PAINTING				
		All painting to be done to Transnet's specification				
6.4.1		Prepare and clean existing paint	m²	4		
6.4.2		Apply paint similar to existing concrete base (Yellow)	m²	2		
6.4.3		Apply paint similar to existing concrete base (Black)	m²	2		
		Corrosion Protection				
		Bolts, Nuts Etc				
6.4.4		Wire brush Cleaning of Bolts	No	10		
		Apply prime and coat with an approved epoxy or protective spray				
6.4.5		Bolts	No	10		
6.4.6		Nuts	No	20		
6.4.7		Washers	No	10		
6.5		**33 (G-STACK)**				
		Concrete sundries				
		PAINTING				
		All painting to be done to Transnet's specification				
6.5.1		Prepare and clean existing paint	m²	4		
6.5.2		Apply paint similar to existing concrete base (Yellow)	m²	2		
6.5.3		Apply paint similar to existing concrete base (Black)	m²	2		
		Corrosion Protection				
		Bolts, Nuts Etc				
6.5.4		Wire brush Cleaning of Bolts	No	10		
		Apply prime and coat with an approved epoxy or protective spray				
6.5.5		Bolts	No	10		
6.5.6		Nuts	No	20		
6.5.7		Washers	No	10		
		TOTAL CARRIED FORWARD TO SECTION SUMMARY				

Item	Payment Clause	Discription	Unit	Qty	Rate	Amount
		SECTION 2: CIVIL WORKS				
		O AND R				
6.6		**32 (G-STACK)**				
		Concrete sundries				
		PAINTING				
		All painting to be done to Transnet's specification				
6.6.1		Prepare and clean existing paint	m²	4		
6.6.2		Apply paint similar to existing concrete base (Yellow)	m²	2		
6.6.3		Apply paint similar to existing concrete base (Black)	m²	2		
		Corrosion Protection				
		Bolts, Nuts Etc				
6.6.4		Wire brush Cleaning of Bolts	No	10		
		Apply prime and coat with an approved epoxy or protective spray				
6.6.5		Bolts	No	10		
6.6.6		Nuts	No	20		
6.6.7		Washers	No	10		
6.7		**43 (G-STACK)**				
		Concrete sundries				
		PAINTING				
		All painting to be done to Transnet's specification				
6.7.1		Prepare and clean existing paint	m²	4		
6.7.2		Apply paint similar to existing concrete base (Yellow)	m²	2		
6.7.3		Apply paint similar to existing concrete base (Black)	m²	2		
		Corrosion Protection				
		Bolts, Nuts Etc				
6.7.4		Wire brush Cleaning of Bolts	No	10		
		Apply prime and coat with an approved epoxy or protective spray				
6.7.5		Bolts	No	10		
6.7.6		Nuts	No	20		
6.7.7		Washers	No	10		
6.8		**31 (G-HOLDING YARD)**				
		Concrete sundries				
		PAINTING				
		All painting to be done to Transnet's specification				
6.8.1		Prepare and clean existing paint	m²	4		
6.8.2		Apply paint similar to existing concrete base (Yellow)	m²	2		
6.8.3		Apply paint similar to existing concrete base (Black)	m²	2		
		Corrosion Protection				
		Bolts, Nuts Etc				
6.8.4		Wire brush Cleaning of Bolts	No	10		
		Apply prime and coat with an approved epoxy or protective spray				
6.8.5		Bolts	No	10		
6.8.6		Nuts	No	20		
6.8.7		Washers	No	10		
		TOTAL CARRIED FORWARD TO SECTION SUMMARY				

Item	Payment Clause	Discription	Unit	Qty	Rate	Amount
		SECTION 2: CIVIL WORKS				
		Q AND R				
6.9		**6 (MPT G-SHED)**				
		Concrete sundries				
		Removal and Preparing of existing surfaces				
6.9.1		Open up remove crack material, repair erosion and fill in approved epoxy and smooth over exterior face	No	1		
		PAINTING				
		All painting to be done to Transnet's specification				
6.9.2		Preapare and clean existing paint	m²	4		
6.9.3		Apply paint similar to existing concrete base (Yellow)	m²	4		
		Bolts, Nuts Etc				
6.9.4		Wire brush Cleaning of bolt cage	No	8		
		Supply and Install Similar or Approved				
6.9.5		Bolts	No	8		
6.9.6		Nuts	No	16		
6.9.7		Washers	No	8		
7		**7 (MPT G-SHED)**				
		Concrete sundries				
		Removal and Preparing of existing surfaces				
7.1.1		Open up remove crack material, repair erosion and fill in approved epoxy and smooth over exterior face	No	1		
		PAINTING				
		All painting to be done to Transnet's specification				
7.1.2		Preapare and clean existing concrete surfaces	m²	4		
7.1.3		Apply paint similar to existing concrete base (Yellow)	m²	4		
		Bolts, Nuts Etc				
7.1.4		Wire brush Cleaning of bolt cage	No	8		
		Supply and Install Similar or Approved				
7.1.5		Bolts	No	8		
7.1.6		Nuts	No	16		
7.1.7		Washers	No	8		
7.2		**47 (G-STACK)**				
		Concrete sundries				
		PAINTING				
		All painting to be done to Transnet's specification				
7.2.1		Prepare and clean existing paint	m²	4		
7.2.2		Apply paint similar to existing concrete base (Yellow)	m²	4		
		Corrosion Protection				
		Bolts, Nuts Etc				
7.2.3		Wire brush Cleaning of Bolts	No	10		
		Apply prime and coat with an approved epoxy or protective spray				
7.2.4		Bolts	No	10		
7.2.4		Nuts	No	20		
7.2.5		Washers	No	10		
		TOTAL CARRIED FORWARD TO SECTION SUMMARY				

Item	Payment Clause	Discription	Unit	Qty	Rate	Amount
		SECTION 2: CIVIL WORKS				
		Q AND R				
7.3		**46 (G-STACK)**				
		Concrete sundries				
		PAINTING				
		All painting to be done to Transnet's specification				
7.3.1		Prepare and clean existing paint	m²	4		
7.3.2		Apply paint similar to existing concrete base (Yellow)	m²	4		
		Corrosion Protection				
		Bolts, Nuts Etc				
7.3.3		Wire brush Cleaning of Bolts	No	10		
		Apply prime and coat with an approved epoxy or protective spray				
7.3.4		Bolts	No	10		
7.3.5		Nuts	No	20		
7.3.6		Washers	No	10		
7.4		**10 (D-SHED)**				
		Concrete sundries				
		Removal and Preparing of existing surfaces				
7.4.1		Open up remove crack material, repair erosion and fill in approved epoxy and smooth over exterior face	No	1		
		PAINTING				
		All painting to be done to Transnet's specification				
7.4.2		Preapare and clean existing paint	m²	4		
7.4.3		Apply paint similar to existing concrete base (Yellow)	m²	4		
		Bolts, Nuts Etc				
7.4.4		Wire brush Cleaning of bolt cage	No	8		
		Supply and Install Similar or Approved				
7.4.5		Bolts	No	8		
7.4.6		Nuts	No	16		
7.4.7		Washers	No	8		
7.5		**11 (D-SHED)**				
		Concrete sundries				
		Removal and Preparing of existing surfaces				
7.5.1		Open up remove crack material, repair erosion and fill in approved epoxy and smooth over exterior face	No	1		
		PAINTING				
		All painting to be done to Transnet's specification				
7.5.2		Preapare and clean existing paint	m²	4		
7.5.3		Apply paint similar to existing concrete base (Yellow)	m²	4		
		Bolts, Nuts Etc				
7.5.4		Wire brush Cleaning of bolt cage	No	8		
		Supply and Install Similar or Approved				
7.5.5		Bolts	No	8		
7.5.6		Nuts	No	16		
7.5.7		Washers	No	8		
		TOTAL CARRIED FORWARD TO SECTION SUMMARY				

Item	Payment Clause	Discription	Unit	Qty	Rate	Amount
		SECTION 2: CIVIL WORKS				
		Q AND R				
7.6		**21 (RAIL SUBSTATION)**				
		Concrete sundries				
		Removal and Preparing of existing surfaces				
7.6.1		Open up remove crack material, repair erosion and fill in approved epoxy and smooth over exterior face	No	1		
		PAINTING				
		All painting to be done to Transnet's specification				
7.6.2		Preapare and clean existing paint	m²	4		
7.6.3		Apply paint similar to existing concrete base (Yellow)	m²	4		
		Bolts, Nuts Etc				
7.6.4		Wire brush Cleaning of bolt cage	No	8		
		Supply and Install Similar or Approved				
7.6.5		Bolts	No	8		
7.6.6		Nuts	No	16		
7.6.7		Washers	No	8		
7.7		**20 (CLINIC)**				
		Concrete sundries				
		Removal and Preparing of existing surfaces				
7.7.1		Open up remove crack material, repair erosion and fill in approved epoxy and smooth over exterior face	No	1		
		PAINTING				
		All painting to be done to Transnet's specification				
7.7.1		Preapare and clean existing paint	m²	4		
7.7.2		Apply paint similar to existing concrete base (Yellow)	m²	2		
7.7.3		Apply paint similar to existing concrete base (Black)	m²	2		
		Corrosion Protection				
		Bolts, Nuts Etc				
7.7.4		Wire brush Cleaning of Bolts	No	20		
		Apply prime and coat with an approved epoxy or protective spray				
7.7.5		Bolts	No	20		
7.7.6		Nuts	No	40		
7.7.7		Washers	No	20		
7.8		**19 (CLINIC)**				
		Concrete sundries				
		PAINTING				
		All painting to be done to Transnet's specification				
7.8.1		Preapare and clean existing concrete surfaces	m²	4		
7.8.2		Apply paint similar to existing concrete base (Yellow)	m²	4		
		TOTAL CARRIED FORWARD TO SECTION SUMMARY				

Item	Payment Clause	Discription	Unit	Qty	Rate	Amount
		SECTION 2: CIVIL WORKS				
		Q AND R				
7.1		**19 (CLINIC)**				
		Corrosion Protection				
		Bolts, Nuts Etc				
7.8.3		Wire brush Cleaning of Bolts	No	20		
		Apply prime and coat with an approved epoxy or protective spray				
7.8.4		Bolts	No	20		
7.8.5		Nuts	No	40		
7.8.6		Washers	No	20		
7.9		**BC BERTH CORNER**				
		Concrete sundries				
		PAINTING				
		All painting to be done to Transnet's specification				
7.9.1		Preapare and clean existing paint	m²	4		
7.9.2		Apply paint similar to existing concrete base (Yellow)	m²	4		
		Corrosion Protection				
		Bolts, Nuts Etc				
7.9.3		Wire brush Cleaning of Bolts	No	10		
		Apply prime and coat with an approved epoxy or protective spray				
7.9.4		Bolts	No	10		
7.9.5		Nuts	No	20		
7.9.6		Washers	No	10		
8		**22 (B-BERTH)**				
		Concrete sundries				
		Removal and Preparing of existing surfaces				
8.1.1		Open up remove crack material, repair erosion and fill in approved epoxy and smooth over exterior face	No	1		
		PAINTING				
		All painting to be done to Transnet's specification				
8.1.2		Preapare and clean existing paint	m²	4		
8.1.3		Apply paint similar to existing concrete base (Yellow)	m²	4		
		Bolts, Nuts Etc				
8.1.4		Wire brush Cleaning of bolt cage	No	8		
		Supply and Install Similar or Approved				
8.1.5		Bolts	No	8		
8.1.6		Nuts	No	16		
8.1.7		Washers	No	8		
8.2		**42 (C BERTH)**				
		Concrete sundries				
		Removal and Preparing of existing surfaces				
8.2.1		Remove and repair erosion and fill in approved epoxy and smooth over exterior face	No	1		
		TOTAL CARRIED FORWARD TO SECTION SUMMARY				

Item	Payment Clause	Discription	Unit	Qty	Rate	Amount
		SECTION 2: CIVIL WORKS				
		Q AND R				
8.2		**42 (C BERTH)**				
		PAINTING				
		All painting to be done to Transnet's specification				
8.2.2		Prepare and clean existing concrete surface	m²	4		
8.2.3		Apply paint similar to existing concrete base (Yellow)	m²	4		
		Corrosion Protection				
		Bolts, Nuts Etc				
8.2.4		Wire brush Cleaning of Bolts	No	10		
		Apply prime and coat with an approved epoxy or protective spray				
8.2.5		Bolts	No	10		
8.2.6		Nuts	No	20		
8.2.7		Washers	No	10		
8.3		**53 (C-WHARFSIDE)**				
		Concrete sundries				
		PAINTING				
		All painting to be done to Transnet's specification				
8.3.1		Preapare and clean existing concrete surfaces	m²	4		
8.3.2		Apply paint similar to existing concrete base (Yellow)	m²	2		
8.3.3		Apply paint similar to existing concrete base (Black)	m²	2		
		Corrosion Protection				
		Bolts, Nuts Etc				
8.3.4		Wire brush Cleaning of Bolts	No	16		
		Apply prime and coat with an approved epoxy or protective spray				
8.3.5		Bolts	No	16		
8.3.6		Nuts	No	32		
8.3.7		Washers	No	16		
8.4		**52 (D-BERTH)**				
		Concrete sundries				
		PAINTING				
		All painting to be done to Transnet's specification				
8.4.1		Preapare and clean existing concrete surfaces	m²	4		
8.4.2		Apply paint similar to existing concrete base (Yellow)	m²	4		
		Corrosion Protection				
		Bolts, Nuts Etc				
8.4.3		Wire brush Cleaning of Bolts	No	10		
		Apply prime and coat with an approved epoxy or protective spray				
8.4.4		Bolts	No	10		
8.4.5		Nuts	No	20		
8.4.6		Washers	No	10		
		TOTAL CARRIED FORWARD TO SECTION SUMMARY				

Item	Payment Clause	Discription	Unit	Qty	Rate	Amount
		SECTION 2: CIVIL WORKS				
		Q AND R				
8.5		**41 (D-STACK)**				
		Concrete sundries				
		PAINTING				
		All painting to be done to Transnet's specification				
8.5.1		Preapare and clean existing concrete surfaces	m²	4		
8.5.2		Apply paint similar to existing concrete base (Yellow)	m²	4		
		Corrosion Protection				
		Bolts, Nuts Etc				
8.5.3		Wire brush Cleaning of Bolts	No	10		
		Apply prime and coat with an approved epoxy or protective spray				
8.5.4		Bolts	No	10		
8.5.5		Nuts	No	20		
8.5.6		Washers	No	10		
8.6		**40 (E-STACK)**				
		Concrete sundries				
		PAINTING				
		All painting to be done to Transnet's specification				
8.6.1		Preapare and clean existing concrete surfaces	m²	4		
8.6.2		Apply paint similar to existing concrete base (Yellow)	m²	4		
		Corrosion Protection				
		Bolts, Nuts Etc				
8.6.3		Wire brush Cleaning of Bolts	No	10		
		Apply prime and coat with an approved epoxy or protective spray				
8.6.4		Bolts	No	10		
8.6.5		Nuts	No	20		
8.6.6		Washers	No	10		
8.7		**51 (E-STACK LOW)**				
		Concrete sundries				
		PAINTING				
		All painting to be done to Transnet's specification				
8.7.1		Preapare and clean existing concrete surfaces	m²	4		
8.7.2		Apply paint similar to existing concrete base (Yellow)	m²	4		
		Corrosion Protection				
		Bolts, Nuts Etc				
8.7.3		Wire brush Cleaning of Bolts	No	10		
		Apply prime and coat with an approved epoxy or protective spray				
8.7.4		Bolts	No	10		
8.7.5		Nuts	No	20		
8.7.6		Washers	No	10		
		TOTAL CARRIED FORWARD TO SECTION SUMMARY				

Item	Payment Clause	Discription	Unit	Qty	Rate	Amount
		SECTION 2: CIVIL WORKS				
		Q AND R				
8.8		**50 (E-STACK HIGH)**				
		Concrete sundries				
		PAINTING				
		All painting to be done to Transnet's specification				
8.8.1		Preapare and clean existing concrete surfaces	m²	4		
8.8.2		Apply paint similar to existing concrete base (Yellow)	m²	4		
		Corrosion Protection				
		Bolts, Nuts Etc				
8.8.3		Wire brush Cleaning of Bolts	No	10		
		Apply prime and coat with an approved epoxy or protective spray				
8.8.4		Bolts	No	10		
8.8.5		Nuts	No	20		
8.8.6		Washers	No	10		
8.9		**39 (E-STACK)**				
		Concrete sundries				
		PAINTING				
		All painting to be done to Transnet's specification				
8.9.1		Preapare and clean existing concrete surfaces	m²	4		
8.9.2		Apply paint similar to existing concrete base (Yellow)	m²	4		
		Corrosion Protection				
		Bolts, Nuts Etc				
8.9.3		Wire brush Cleaning of Bolts	No	10		
		Apply prime and coat with an approved epoxy or protective spray				
8.9.4		Bolts	No	10		
8.9.5		Nuts	No	20		
8.9.6		Washers	No	10		
9		**5 (INTAKE -SUB)**				
9.1.1		Take out high mast light approximately 30m long and base plate from the concrete base	No	1		
		Concrete sundries				
		Removal of existing surfaces				
		Carting away of demolished material				
		Descriptions of carting away of demolished material shall be deemed to include loading demolished material onto trucks directly from the site or, alternatively, from stock piles situated on the building site or near by dumping site				
9.1.2		Break up and remove 1400mm x 1400mm x 1800mm deep redudant reinforced concrete base including cutting off and removing reinforcement	m³	4		
		Earthfilling material supplied by the contractor				
9.1.3		Base course of G2 material in accordance to SABS 1200 DM compacted to 98% ModAASHTO density	m³	0.4		
		TOTAL CARRIED FORWARD TO SECTION SUMMARY				

Item	Payment Clause	Discription	Unit	Qty	Rate	Amount
		SECTION 2: CIVIL WORKS				
		Q AND R				
9		**5 (INTAKE -SUB)**				
		Reinforced concrete Cast On/In Formwork				
		30Mpa/19mm Concrete				
9.1.4		Bases	m³	4		
		Test Cubes				
9.1.5		Making and Testing set of three 150x150x150mm concrete strenght test Cubes	Sets	2		
		ROUGH FORMWORK (DEGREE OF ACCURACY III)				
		Rough formwork to sides				
9.1.6		Bases	m²	10		
		REINFORCEMENT (PROVISIONAL)				
		Fabric reinforcement				
9.1.7		Type Ref 395 fabric reinforcement in concrete surface Bases, etc.	m²	4		
		High tensile steel reinforcement to structural concrete work				
9.1.8		In various diameters and lengths	t	0.075		
		Mild tensile steel reinforcement to structural concrete work				
9.1.9		In various diameters and lengths.	t	0.075		
		PAINTING				
		All painting to be done to Transnet's specification				
9.1.10		Apply paint similar to existing concrete bases (Yellow)	m²	2		
		Bolts, Nuts Etc				
		Supply and Install Similar or Approved				
9.1.11		Bolts	No	8		
9.1.12		Nuts	No	16		
9.1.13		Washers	No	8		
		Mast Pole				
9.1.14		Re- Install High Mast pole approximately 30m high and base plate on to new concrete base	No	1		
		TOTAL CARRIED FORWARD TO SECTION SUMMARY				

Item	Payment Clause	Payment Clause	Discription	Unit	Qty	Rate
		SECTION 2: CIVIL WORKS				
10		**Maydon Wharf**				
		Mast 1				
		PAINTING				
		All painting to be done to Transnet's specification				
10.1		Preapare and clean existing paint	m²	4		
10.2		Apply paint similar to existing concrete base (Yellow)	m²	4		
		Corrosion Protection				
		Bolts, Nuts Etc				
10.3		Wire brush Cleaning of Bolts	No	10		
		Apply prime and coat with an approved epoxy or protective spray				
10.4		Bolts	No	10		
10.5		Nuts	No	20		
10.6		Washers	No	10		
		Maydon Wharf				
		Mast 2				
		PAINTING				
		All painting to be done to Transnet's specification				
10.7		Preapare and clean existing paint	m²	4		
10.8		Apply paint similar to existing concrete base (Yellow)	m²	4		
		Corrosion Protection				
		Bolts, Nuts Etc				
10.9		Wire brush Cleaning of Bolts	No	10		
		Apply prime and coat with an approved epoxy or protective spray				
10.10		Bolts	No	10		
10.11		Nuts	No	20		
10.12		Washers	No	10		
		Maydon Wharf				
		Mast 3				
		PAINTING				
		All painting to be done to Transnet's specification				
10.13		Preapare and clean existing paint	m²	4		
10.14		Apply paint similar to existing concrete base (Yellow)	m²	4		
		Corrosion Protection				
		Bolts, Nuts Etc				
10.15		Wire brush Cleaning of Bolts	No	10		
		Apply prime and coat with an approved epoxy or protective spray				
10.16		Bolts	No	10		
10.17		Nuts	No	20		
10.18		Washers	No	10		
		TOTAL CARRIED FORWARD TO SECTION SUMMARY				

Item	Payment Clause	Payment Clause	Discription	Unit	Qty	Rate
		SECTION 2: CIVIL WORKS				
		Maydon Wharf				
		Mast 4				
		PAINTING				
		All painting to be done to Transnet's specification				
10.19		Preapare and clean existing paint	m²	4		
10.20		Apply paint similar to existing concrete base (Yellow)	m²	4		
		Corrosion Protection				
		Bolts, Nuts Etc				
10.21		Wire brush Cleaning of Bolts	No	10		
		Apply prime and coat with an approved epoxy or protective spray				
10.22		Bolts	No	10		
10.23		Nuts	No	20		
10.24		Washers	No	10		
		Maydon Wharf				
		Mast 5				
		PAINTING				
		All painting to be done to Transnet's specification				
10.25		Preapare and clean existing paint	m²	4		
10.26		Apply paint similar to existing concrete base (Yellow)	m²	4		
		Corrosion Protection				
		Bolts, Nuts Etc				
10.27		Wire brush Cleaning of Bolts	No	10		
		Apply prime and coat with an approved epoxy or protective spray				
10.28		Bolts	No	10		
10.29		Nuts	No	20		
10.30		Washers	No	10		
		Mast 6				
		PAINTING				
		All painting to be done to Transnet's specification				
10.31		Preapare and clean existing paint	m²	4		
10.32		Apply paint similar to existing concrete base (Yellow)	m²	4		
		Corrosion Protection				
		Bolts, Nuts Etc				
10.33		Wire brush Cleaning of Bolts	No	10		
		TOTAL CARRIED FORWARD TO SECTION SUMMARY				

Item	Payment Clause	Payment Clause	Discription	Unit	Qty	Rate
		SECTION 2: CIVIL WORKS				
		Maydon Wharf				
		Mast 6				
		Apply prime and coat with an approved epoxy or protective spray				
10.34		Bolts	No	10		
10.35		Nuts	No	20		
10.36		Washers	No	10		
		Maydon Wharf				
		Mast 7				
		PAINTING				
		All painting to be done to Transnet's specification				
10.37		Preapare and clean existing paint	m²	4		
10.38		Apply paint similar to existing concrete base (Yellow)	m²	4		
		Corrosion Protection				
		Bolts, Nuts Etc				
10.39		Wire brush Cleaning of Bolts	No	10		
		Apply prime and coat with an approved epoxy or protective spray				
10.40		Bolts	No	10		
10.41		Nuts	No	20		
10.42		Washers	No	10		
		Maydon Wharf				
		Mast 8				
		PAINTING				
		All painting to be done to Transnet's specification				
10.43		Preapare and clean existing paint	m²	4		
10.44		Apply paint similar to existing concrete base (Yellow)	m²	4		
		Corrosion Protection				
		Bolts, Nuts Etc				
10.45		Wire brush Cleaning of Bolts	No	10		
		Apply prime and coat with an approved epoxy or protective spray				
10.46		Bolts	No	10		
10.47		Nuts	No	20		
10.48		Washers	No	10		
		Maydon Wharf				
		Mast 9				
		PAINTING				
		All painting to be done to Transnet's specification				
10.49		Preapare and clean existing paint	m²	4		
10.50		Apply paint similar to existing concrete base (Yellow)	m²	4		
		Corrosion Protection				
		Bolts, Nuts Etc				
10.51		Wire brush Cleaning of Bolts	No	10		
		TOTAL CARRIED FORWARD TO SECTION SUMMARY				

Item	Payment Clause	Payment Clause	Discription	Unit	Qty	Rate
		SECTION 2: CIVIL WORKS				
		Maydon Wharf				
		Mast 9				
		Apply prime and coat with an approved epoxy or protective spray				
10.52		Bolts	No	10		
10.53		Nuts	No	20		
10.54		Washers	No	10		
		Maydon Wharf				
		Mast 10				
		PAINTING				
		All painting to be done to Transnet's specification				
10.55		Preapare and clean existing paint	m²	4		
10.56		Apply paint similar to existing concrete base (Yellow)	m²	4		
		Corrosion Protection				
		Bolts, Nuts Etc				
10.57		Wire brush Cleaning of Bolts	No	10		
		Apply prime and coat with an approved epoxy or protective spray				
10.58		Bolts	No	10		
10.59		Nuts	No	20		
10.60		Washers	No	10		
		Mast 11				
		PAINTING				
		All painting to be done to Transnet's specification				
10.61		Preapare and clean existing paint	m²	4		
10.62		Apply paint similar to existing concrete base (Yellow)	m²	4		
		Corrosion Protection				
		Bolts, Nuts Etc				
		Wire brush Cleaning of Bolts	No	10		
		Apply prime and coat with an approved epoxy or protective spray				
10.63		Bolts	No	10		
10.64		Nuts	No	20		
10.65		Washers	No	10		
		TOTAL CARRIED FORWARD TO SECTION SUMMARY				

Item	Payment Clause	Payment Clause	Discription	Unit	Qty	Rate
		SECTION 2: CIVIL WORKS				
		Maydon Wharf				
		Mast 12				
		PAINTING				
		All painting to be done to Transnet's specification				
10.66		Preapare and clean existing paint	m²	4		
10.67		Apply paint similar to existing concrete base (Yellow)	m²	4		
		Corrosion Protection				
		Bolts, Nuts Etc				
10.68		Wire brush Cleaning of Bolts	No	10		
		Apply prime and coat with an approved epoxy or protective spray				
10.69		Bolts	No	10		
10.70		Nuts	No	20		
10.71		Washers	No	10		
		Maydon Wharf				
		Mast 13				
		PAINTING				
		All painting to be done to Transnet's specification				
10.72		Preapare and clean existing paint	m²	4		
10.73		Apply paint similar to existing concrete base (Yellow)	m²	4		
		Corrosion Protection				
		Bolts, Nuts Etc				
10.74		Wire brush Cleaning of Bolts	No	10		
		Apply prime and coat with an approved epoxy or protective spray				
10.75		Bolts	No	10		
10.76		Nuts	No	20		
10.77		Washers	No	10		
		Maydon Wharf				
		Mast 14				
		PAINTING				
		All painting to be done to Transnet's specification				
10.78		Preapare and clean existing paint	m²	4		
10.79		Apply paint similar to existing concrete base (Yellow)	m²	4		
		Corrosion Protection				
		Bolts, Nuts Etc				
10.80		Wire brush Cleaning of Bolts	No	10		
		Apply prime and coat with an approved epoxy or protective spray				
10.81		Bolts	No	10		
10.82		Nuts	No	20		
10.83		Washers	No	10		
		TOTAL CARRIED FORWARD TO SECTION SUMMARY				

Item	Payment Clause	Payment Clause	Discription	Unit	Qty	Rate
		SECTION 2: CIVIL WORKS				
11		**Maydon Wharf**				
		Mast 15				
		PAINTING				
		All painting to be done to Transnet's specification				
11.1		Preapare and clean existing paint	m²	4		
11.2		Apply paint similar to existing concrete base (Yellow)	m²	4		
		Corrosion Protection				
		Bolts, Nuts Etc				
11.3		Wire brush Cleaning of Bolts	No	10		
		Apply prime and coat with an approved epoxy or protective spray				
11.4		Bolts	No	10		
11.5		Nuts	No	20		
11.6		Washers	No	10		
		K Block				
		Mast 01				
		Corrosion Protection				
		Bolts, Nuts Etc				
11.7		Wire brush Cleaning of Bolts	No	8		
11.8		Wire brush Cleaning of bolt cage	No	1		
		Apply prime and coat with an approved epoxy or protective spray				
11.9		Bolts	No	8		
11.1		Nuts	No	16		
11.12		Washers	No	8		
		Supply and Install Similar or Approved				
11.13		Bolts	No	1		
11.14		Nuts	No	1		
11.15		Washers	No	1		
		K Block				
		Mast 02				
		Corrosion Protection				
		Bolts, Nuts Etc				
11.16		Wire brush Cleaning of Bolts	No	8		
11.17		Wire brush Cleaning of bolt cage	No	1		
		Apply prime and coat with an approved epoxy or protective spray				
11.18		Bolts	No	8		
11.19		Nuts	No	16		
11.19		Washers	No	8		
		Supply and Install Similar or Approved				
11.20		Bolts	No	1		
11.21		Nuts	No	1		
11.22		Washers	No	1		
		TOTAL CARRIED FORWARD TO SECTION SUMMARY				

Item	Payment Clause	Payment Clause	Discription	Unit	Qty	Rate
		SECTION 2: CIVIL WORKS				
		Mast 03				
		Apply prime and coat with an approved epoxy or protective spray				
11.23		Bolts	No	8		
11.24		Nuts	No	16		
11.24		Washers	No	8		
		Supply and Install Similar or Approved				
11.25		Bolts	No	1		
11.26		Nuts	No	1		
11.27		Washers	No	1		
		Mast 04				
		Corrosion Protection				
		Bolts, Nuts Etc				
11.28		Wire brush Cleaning of Bolts	No	8		
11.29		Wire brush Cleaning of bolt cage	No	1		
		Apply prime and coat with an approved epoxy or protective spray				
11.30		Bolts	No	8		
11.31		Nuts	No	16		
11.32		Washers	No	8		
		Supply and Install Similar or Approved				
11.33		Bolts	No	1		
11.34		Nuts	No	1		
11.35		Washers	No	1		
		Mast 05				
		Corrosion Protection				
		Bolts, Nuts Etc				
11.36		Wire brush Cleaning of Bolts	No	8		
11.37		Wire brush Cleaning of bolt cage	No	1		
		Apply prime and coat with an approved epoxy or protective spray				
11.38		Bolts	No	8		
11.39		Nuts	No	16		
11.40		Washers	No	8		
		Supply and Install Similar or Approved				
11.41		Bolts	No	1		
11.42		Nuts	No	1		
11.43		Washers	No	1		
		TOTAL CARRIED FORWARD TO SECTION SUMMARY				

Item	Payment Clause	Discription	Page	Amount
		SECTION 2 : CIVIL WORKS		
		SECTION SUMMARY		
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		TOTAL CARRIED FORWARD TO FINAL SUMMARY		

Item	Payment Clause	Discription	Unit	Qty	Rate	Amount
		SECTION 3: ELECTRICAL				
		MAIN CAR PARK				
		i) References in the headings and/or items are those contained, and described in the specifications and the Employer's Works Information (Part C3: Scope of works). Tenderers are required to study the entire Works Information (Part C3: Scope of Works) before pricing this Bill.				
		ii) If there are cases where the Employers Works Information does not adequately specify any item of work, the Model Preambles for Trades shall apply.				
		iii) Transportation costs for HML poles that might require to be taken back to factories for refurbishment should be factored in the supply rate.				
1		**MAIN CAR PARK**				
1.1		**Mast No. 40/503**				
1.1.2		Uninstall the existing 11x400W Light fittings and 4xStreet Light fittings complete with the head ring	sum	1		
1.1.3		Refurbish the high mast.	ea	1		
1.1.4		Supply, deliver, offload and install 8xBEKA-SCHREDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K	ea	8		
1.1.5		Design, supply and install an earthing and lightning protection system in the high mast	ea	1		
1.1.6		Supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT.	ea	1		
1.1.7		Supply and install an equal or similar approved to a WiFi enabled Lenovo A740 workstation with an i3 processor, 27 inch touch screen monitor complete with network adaptor and USB RJ45 adapter to control the dimming functionality of the high mast lighting	ea	1		
1.1.8		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates	ea	1		
2		**Mast No.46/503**				
2.1.1		Uninstall the existing 11x400W Light fittings and 4xStreet Light fittings complete with the head ring	Sum	1		
2.1.2		Refurbish the high mast.	ea	1		
2.1.3		Supply, deliver, offload and install 8xBEKA-SCHREDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K	ea	8		
2.1.4		Design, supply and install an earthing and lightning protection system in the high mast	ea	1		
2.1.5		Supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation.	ea	1		
2.1.6		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates	ea	1		
3		**Mast No.35/503B**				
3.1.1		Uninstall the existing 11x400W Light fittings and 4xStreet Light fittings complete with the head ring	sum	1		
3.1.2		Refurbish the high mast.	ea	1		
3.1.3		Supply, deliver, offload and install 8xBEKA-SCHREDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K	ea	8		
3.1.4		Design, supply and install an earthing and lightning protection system in the high mast	ea	1		
		TOTAL CARRIED FORWARD TO SECTION SUMMARY				

Item	Payment Clause	Discription	Unit	Qty	Rate	Amount
		SECTION 3: ELECTRICAL				
		MAIN CAR PARK				
		Mast No.35/503B				
3.1.5		Supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation.	ea	1		
3.1.6		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates	ea	1		
4		**Mast No.34/503C**				
4.1.1		Uninstall the existing 11x400W Light fittings and 4xStreet Light fittings complete with the head ring	sum	1		
4.1.2		Refurbish the high mast.	ea	1		
4.1.3		Supply, deliver, offload and install 8xBEKA-SCHREDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K	ea	8		
4.1.4		Design, supply and install an earthing and lightning protection system in the high mast	sum	1		
4.1.5		Supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation.	ea	1		
4.1.6		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates	ea	1		
5		**Mast No.503D**				
5.1.1		Uninstall the existing 11x400W Light fittings and 4xStreet Light fittings complete with the head ring	sum	1		
5.1.2		Refurbish the high mast.	ea	1		
5.1.3		Supply, deliver, offload and install 8xBEKA-SCHREDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K	ea	6		
5.1.4		Design, supply and install an earthing and lightning protection system in the high mast	ea	1		
5.1.5		Supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation.	ea	1		
5.1.6		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates	ea	1		
6		**Mast No.49/503E**				
6.1.1		Uninstall the existing 4xStreet Light fittings.	sum	1		
6.1.2		Refurbish the high mast.	ea	1		
6.1.3		Replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.	ea	4		
6.1.4		Design, supply and install an earthing and lightning protection system in the high mast	ea	1		
6.1.5		Recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.	sum	1		
6.1.6		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates	ea	1		
		TOTAL CARRIED FORWARD TO SECTION SUMMARY				

Item	Payment Clause	Discription	Unit	Qty	Rate	Amount
		SECTION 3: ELECTRICAL				
		MAIN CAR PARK				
7		**Mast No.42/504**				
7.1.1		Uninstall the existing 11x400W Light fittings and 4xStreet Light fittings complete with the head ring	sum	1		
7.1.2		Replace the top section of the mast complete with new head frame, pulleys, cables, head-ring, trailing cables and all the mechanical apparatus.	sum	1		
7.1.3		Replace section 4 (from the top) of the sectional HML pole	ea	1		
7.1.4		Refurbish the high mast. Exclude items covered by item 7.2 in the TPD-010B-HIGHMASTSPEC-B	ea	1		
7.1.5		Supply, deliver, offload and install 8xBEKA-SCHREDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K	ea	6		
7.1.6		Design, supply and install an earthing and lightning protection system in the high mast	ea	1		
7.1.7		Supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation.	ea	1		
7.1.8		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates	ea	1		
8		**Mast No.33/504**				
8.1.1		Uninstall the existing 3xStreet Light fittings.	sum	1		
8.1.2		Replace section 4 (from the top) of the sectional HML pole	ea	1		
8.1.3		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea	1		
8.1.4		Replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.	sum	1		
8.1.5		Design, supply and install an earthing and lightning protection system in the high mast	ea	1		
8.1.6		Recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.	sum	1		
8.1.7		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates	ea	1		
9		**Mast No.32/505**				
9.1.1		Uninstall the existing 11x400W Light fittings and 4xStreet Light fittings complete with the head ring	sum	1		
9.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea	1		
		Design a complete new lighting on the existing 30m High Mast Pole.	ea	1		
9.1.3		Supply, deliver, offload and install 8xBEKA-SCHREDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K	ea	6		
9.1.4		Design, supply and install an earthing and lightning protection system in the high mast	sum	1		
9.1.5		Supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation.	ea	1		
9.1.6		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates	ea	1		
		TOTAL CARRIED FORWARD TO SECTION SUMMARY				

Item	Payment Clause	Discription	Unit	Qty	Rate	Amount
		SECTION 3: ELECTRICAL				
		MAIN CAR PARK				
10		**Mast No.505**				
10.1.1		Uninstall the existing 5 x Light fittings that are not working.	ea	1		
10.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea	1		
10.1.3		Replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.	ea	1		
10.1.4		Design, supply and install an earthing and lightning protection system in the high mast	ea	1		
10.1.5		Recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.	sum	1		
10.1.6		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates	ea	1		
11		**Mast No.44/600**				
11.1.1		Uninstall the existing 5 x Light fittings that are not working.	ea	1		
11.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea	1		
11.1.3		Replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.	ea	1		
11.1.4		Design, supply and install an earthing and lightning protection system in the high mast	ea	1		
11.1.5		Recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.	sum	1		
11.1.6		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates	ea	1		
12		**Mast No.34/503C**				
12.1.1		Uninstall the existing 5 x Light fittings that are not working.	ea	1		
12.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea	1		
12.1.3		Replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.	ea	1		
12.1.4		Design, supply and install an earthing and lightning protection system in the high mast	ea	1		
12.1.5		Recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.	sum	1		
12.1.6		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates	ea	1		
13		**Mast No.30/600**				
13.1.1		Uninstall the existing 3 x Light fittings that are not working.	ea	1		
13.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea	1		
13.1.3		Replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.	ea	1		
13.1.4		Design, supply and install an earthing and lightning protection system in the high mast	ea	1		
		TOTAL CARRIED FORWARD TO SECTION SUMMARY				

Item	Payment Clause	Discription	Unit	Qty	Rate	Amount
		SECTION 3: ELECTRICAL				
		MAIN CAR PARK				
		Mast No.30/600				
13.1.5		Recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.	sum	1		
13.1.6		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates	ea	1		
14		**Mast No.29/600**				
14.1.1		Uninstall the existing 4xStreet Light fittings.	ea	1		
14.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea	1		
14.1.3		Replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.	ea	1		
14.1.4		Design, supply and install an earthing and lightning protection system in the high mast	ea	1		
14.1.5		Recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.	sum	1		
14.1.6		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates	ea	1		
15		**Mast No.47**				
15.1.1		Uninstall the existing 7x400W HPS Light fittings and 5x1000W HPS Light fittings complete with the head ring.	sum	1		
15.1.2		Refurbish the high mast.	ea	1		
15.1.3		Supply, deliver, offload and install 8xBEKA-SCHREDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K	ea	8		
15.1.4		Design, supply and install an earthing and lightning protection system in the high mast	ea	1		
15.1.5		Supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation.	ea	1		
15.1.6		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates	ea	1		
16		**Mast No.233**				
16.1.1		Uninstall the existing installation and issue the parts and the HML pole to TPT.	sum	1		
16.1.2		supply, deliver, offload, paint and erect 1 x 30m High mast equal or similar to sectional poles complete with a mounting ring, distribution board and as detailed in specification TPD-010A-HIGHMASTSPEC-A.	ea	1		
		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea	1		
		Design a complete new lighting on the existing 30m High Mast Pole.	ea	1		
16.1.3		Supply, and install new lighting on the existing 30m High Mast Pole. Equal or similar approved to 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K shall be used as a bench mark for pricing.	ea	1		
16.1.4		Design, supply and install an earthing and lightning protection system in the high mast.	ea	1		
16.1.5		Supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation.	ea	1		
16.1.6		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates	ea	1		
		TOTAL CARRIED FORWARD TO SECTION SUMMARY				

Item	Payment Clause	Discription	Unit	Qty	Rate	Amount
		SECTION 3: ELECTRICAL				
		MAIN CAR PARK				
17		**Mast No.48**				
17.1.1		Uninstall the existing 11x400W Light fittings and 4xStreet Light fittings complete with the head ring	sum	1		
17.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea	1		
		Design a complete new lighting on the existing 30m High Mast Pole.	ea	1		
17.1.3		Supply, and install new lighting on the existing 30m High Mast Pole. Equal or similar approved to 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K shall be used as a bench mark for pricing.	ea	1		
17.1.4		Design, supply and install an earthing and lightning protection system in the high mast	sum	1		
17.1.5		Supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation.	ea	1		
17.1.6		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates	ea	1		
18		**Mast No.46**				
18.1.1		Uninstall the existing 1x Light fitting.	ea	1		
18.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea	1		
18.1.3		Replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.	ea	1		
18.1.4		Design, supply and install an earthing and lightning protection system in the high mast	ea	1		
18.1.5		Recommended orientation and aiming angle of the light fitting of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.	sum	1		
18.1.6		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates	ea	1		
19		**Mast No.45**				
19.1.1		Uninstall the existing 11x400W Light fittings and 4xStreet Light fittings complete with the head ring.	sum	1		
19.1.2		Replace the top section of the mast.	sum	1		
19.1.3		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea	1		
		Design a complete new lighting on the existing 30m High Mast Pole.	ea	1		
19.1.4		Supply, and install new lighting on the existing 30m High Mast Pole. Equal or similar approved to 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K shall be used as a bench mark for pricing.	ea	8		
19.1.5		Design, supply and install an earthing and lightning protection system in the high mast	sum	1		
19.1.6		Supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation.	ea	1		
19.1.7		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates	ea	1		
		TOTAL CARRIED FORWARD TO SECTION SUMMARY				

Item	Payment Clause	Discription	Unit	Qty	Rate	Amount
		SECTION 3: ELECTRICAL				
		MAIN CAR PARK				
20		**Mast No.39**				
20.1.1		Uninstall the existing 5xStreet Light fittings.	sum	1		
20.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea	1		
20.1.3		Replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.	ea	1		
20.1.4		Design, supply and install an earthing and lightning protection system in the high mast	ea	1		
20.1.5		Recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.	ea	1		
20.1.6		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates	ea	1		
21		**Mast No.36/503**				
21.1.1		Uninstall the existing 4 x Light fittings.	ea	1		
21.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea	1		
21.1.3		Replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.	ea	1		
21.1.4		Design, supply and install an earthing and lightning protection system in the high mast	ea	1		
21.1.5		Recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.	sum	1		
21.1.6		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates	ea	1		
		Overall Scope				
21.1.7		Conditional Assessment	sum	1		
21.1.8		Conditional Assessment Report and Cost for Replacing HML apparatus	sum	1		
21.1.9		Design Drawings (1xOverall Layout and 7xSections for design details).	ea	8		
21.1.10		Supply of Spare luminaires. Equal or similar approved to 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K shall be used as a bench mark for pricing.	ea	10		
21.1.11		Supply a high mast light electric winch, a hydraulic power tool and a test lead	ea	1		
		TOTAL CARRIED FORWARD TO SECTION SUMMARY				

Item	Payment Clause	Discription	Unit	Qty	Rate	Amount
		SECTION 3: ELECTRICAL				
		Q AND R				
		i) References in the headings and/or items are those contained, and described in the specifications and the Employer's Works Information (Part C3: Scope of works). Tenderers are required to study the entire Works Information (Part C3: Scope of Works) before pricing this Bill.				
		ii) If there are cases where the Employers Works Information does not adequately specify any item of work, the Model Preambles for Trades shall apply.				
		iii) Transportation costs for HML poles that might require to be taken back to factories for refurbishment should be factored in the supply rate.				
		Main Car Park				
22		**Mast No.1**				
22.1.1		Uninstall the existing 11x400W Light fittings and 4xStreet Light fittings complete with the head ring	sum	1		
22.1.2		Refurbish the high mast as detailed in specification TPD-010B- Design a complete new lighting on the existing 30m High Mast Pole.	ea ea	1 1		
22.1.3		Supply, and install new lighting on the existing 30m High Mast Pole. Equal or similar approved to 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K shall be used as a bench mark for pricing.	ea	6		
22.1.4		Design, supply and install an earthing and lightning protection system in the high mast	ea	1		
22.1.5		Supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT.	ea	1		
22.1.6		Supply and install an equal or similar approved to a WiFi enabled Lenovo A740 workstation with an i3 processor, 27 inch touch screen monitor complete with network adaptor and USB RJ45 adapter to control the dimming functionality of the high mast lighting	ea	1		
22.1.7		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates	ea	1		
23		**Mast No.2**				
23.1.1		Uninstall the existing 8x400W Light fittings complete with the head ring.	sum	1		
23.1.2		replace section 4, 5 and the top section of the sectional pole		3		
23.1.3		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea	1		
23.1.4		Design a complete new lighting on the existing 30m High Mast Pole.		1		
23.1.5		Supply, and install new lighting on the existing 30m High Mast Pole. Equal or similar approved to 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K shall be used as a bench mark for pricing.	ea	6		
23.1.6		Design, supply and install an earthing and lightning protection system in the high mast	ea	1		
23.1.7		Supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation.	ea	1		
23.1.8		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates	ea	1		
24		**Mast No.3**				
24.1.1		Uninstall the existing 5xStreet Light fittings.	sum	1		
24.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea	1		
		TOTAL CARRIED FORWARD TO SECTION SUMMARY				

Item	Payment Clause	Discription	Unit	Qty	Rate	Amount
		SECTION 3: ELECTRICAL				
		Q AND R				
		Mast No.3				
24.1.3		Replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.	ea	1		
24.1.4		Design, supply and install an earthing and lightning protection system in the high mast.	ea	1		
24.1.5		Recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.	ea	1		
24.1.6		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates	ea	1		
25		**Mast No.51**				
25.1.1		Uninstall the existing 8x400W Light fittings complete with the head ring.	sum	1		
25.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea	1		
25.1.3		Design a complete new lighting on the existing 30m High Mast Pole.	ea	1		
25.1.4		Supply, and install new lighting on the existing 30m High Mast Pole. Equal or similar approved to 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K shall be used as a bench mark for pricing.	ea	6		
25.1.5		Design, supply and install an earthing and lightning protection system in the high mast	sum	1		
25.1.6		Supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation.	ea	1		
25.1.7		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates	ea	1		
26		**Mast No.52**				
26.1.1		Uninstall the existing 8x400W Light fittings complete with the head ring.	sum	1		
26.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea	1		
26.1.3		Design a complete new lighting on the existing 30m High Mast Pole.				
26.1.4		Supply, and install new lighting on the existing 30m High Mast Pole. Equal or similar approved to 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K shall be used as a bench mark for pricing.	ea	6		
26.1.5		Design, supply and install an earthing and lightning protection system in the high mast	ea	1		
26.1.6		Supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation.	ea	1		
26.1.7		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates	ea	1		
27		**Mast No.53**				
27.1.1		Uninstall the existing 8x400W Light fittings complete with the head ring.	sum	1		
27.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea	1		
		TOTAL CARRIED FORWARD TO SECTION SUMMARY				

Item	Payment Clause	Discription	Unit	Qty	Rate	Amount
		SECTION 3: ELECTRICAL				
		Q AND R				
		Mast No.53				
		Design a complete new lighting on the existing 30m High Mast Pole.	ea	1		
27.1.3		Supply, and install new lighting on the existing 30m High Mast Pole. Equal or similar approved to 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K shall be used as a bench mark for pricing.	ea	6		
27.1.4		Design, supply and install an earthing and lightning protection system in the high mast	ea	1		
27.1.5		Supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. Link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation.	sum	1		
27.1.6		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates	ea	1		
28		**Mast No.8(F Shed)**				
28.1.1		Uninstall the existing 1xStreet Light fittings.	sum	1		
28.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	sum	1		
28.1.3		Replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.	ea	1		
28.1.4		Design, supply and install an earthing and lightning protection system in the high mast.	ea	1		
28.1.5		Recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.	ea	1		
28.1.6		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates.	ea	1		
29		**Mast No.9 (F Shed)**				
29.1.1		Uninstall the existing 4xStreet Light fittings.	sum	1		
29.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea	1		
29.1.3		Replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.	ea	1		
29.1.4		Design, supply and install an earthing and lightning protection system in the high mast.	ea	1		
29.1.5		Recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.	ea	1		
29.1.6		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates	ea	1		
30		**Mast No.37**				
30.1.1		Uninstall the existing 1x Light fitting.	sum	1		
30.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea.	1		
30.1.3		Replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.	sum	1		
30.1.4		Design, supply and install an earthing and lightning protection system in the high mast.	ea.	1		
		TOTAL CARRIED FORWARD TO SECTION SUMMARY				

Item	Payment Clause	Discription	Unit	Qty	Rate	Amount
		SECTION 3: ELECTRICAL				
		Q AND R				
30.1.5		Recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.	sum	1		
30.1.6		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates.	ea.	1		
31		**Mast No.48(Reefers)**				
31.1.1		Uninstall the existing 1x Light fitting.	ea	1		
31.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea	1		
31.1.3		Replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.	ea	1		
31.1.4		Design, supply and install an earthing and lightning protection system in the high mast	ea	1		
31.1.5		Recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.	sum	1		
31.1.6		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates	ea	1		
32		**Mast No.49 (F Stack)**				
32.1.1		Uninstall the existing 3x400W HPS Light fittings and 2x1000W HPS light fitting that are not working.	ea	1		
32.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea	1		
32.1.3		Replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.	ea	1		
32.1.4		Design, supply and install an earthing and lightning protection system in the high mast.	ea	1		
32.1.5		Recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.	sum	1		
32.1.6		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates	ea	1		
33		**Mast No.38 (F Stack)**				
33.1.1		Uninstall the existing 15x400W Light fittings and 3x1000W HPS Light fittings complete with the head ring.	ea	1		
33.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea	1		
33.1.3		Design a complete new lighting on the existing 30m High Mast Pole.	ea	5		
33.1.4		Supply, and install new lighting on the existing 30m High Mast Pole. Equal or similar approved to 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K shall be used as a bench mark for pricing.	ea	1		
33.1.5		Design, supply and install an earthing and lightning protection system in the high mast.	sum	1		
33.1.6		Supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. Link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation.	ea	1		
		TOTAL CARRIED FORWARD TO SECTION SUMMARY				

Item	Payment Clause	Discription	Unit	Qty	Rate	Amount
		SECTION 3: ELECTRICAL				
		Q AND R				
		Mast No.38 (F Stack)				
33.1.7		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates				
34		**Mast No.36 (G Stack)**				
34.1.1		Uninstall the existing 5x400W HPS Light fittings and 1x1000W HPS light fitting that are not working.	sum	1		
34.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea.	1		
34.1.3		Replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.	sum	1		
34.1.4		Design, supply and install an earthing and lightning protection system in the high mast.	ea.	1		
34.1.5		Recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.	sum	1		
34.1.6		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates.	ea.	1		
35		**Mast No.34 (F Stack)**				
34.1.1		Uninstall the existing 15x400W Light fittings and 3x1000W HPS Light fittings complete with the head ring.	sum	1		
34.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea.	1		
34.1.3		Design a complete new lighting on the existing 30m High Mast Pole.	ea.	1		
34.1.4		Supply, and install new lighting on the existing 30m High Mast Pole. Equal or similar approved to 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K shall be used as a bench mark for pricing.	ea.	6		
34.1.5		Design, supply and install an earthing and lightning protection system in the high mast.	ea.	1		
34.1.6		Supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. Link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation.	ea.	1		
34.1.7		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates	ea.	1		
35		**Mast No.45 (G Stack)**				
35.1.1		Uninstall the existing 2x400W HPS Light fittings and 2x1000W HPS light fitting that are not working.	sum	1		
35.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea.	1		
35.1.3		Replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.	sum	1		
35.1.4		Design, supply and install an earthing and lightning protection system in the high mast.	ea.	1		
35.1.5		Recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.	sum	1		
		TOTAL CARRIED FORWARD TO SECTION SUMMARY				

Item	Payment Clause	Discription	Unit	Qty	Rate	Amount
		SECTION 3: ELECTRICAL				
		Q AND R				
		Mast No.45 (G Stack)				
35.1.6		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates.	ea.	1		
36		**Mast No.44 (G Stack)**				
36.1.1		Uninstall the existing 2x400W HPS Light fittings and 1x1000W HPS light fitting that are not working.	sum	1		
36.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea.	1		
36.1.3		Replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.	sum	1		
36.1.4		Design, supply and install an earthing and lightning protection system in the high mast.	ea.	1		
36.1.5		Recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.	sum	1		
36.1.6		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates.	ea.	1		
37		**Mast No. 33(G stack)**				
37.1.1		Uninstall the existing 2x400W HPS Light fittings and 1x1000W HPS light fitting that are not working.	sum	1		
37.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea.	1		
37.1.3		Replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.	sum	1		
37.1.4		Design, supply and install an earthing and lightning protection system in the high mast.	ea.	1		
37.1.5		Recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.	sum	1		
37.1.6		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates.	ea.	1		
38		**Mast No. 32(G stack)**				
38.1.1		Uninstall the existing 3x400W HPS Light fittings and 2x1000W HPS light fitting that are not working.	sum	1		
38.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea.	1		
38.1.3		Replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.	sum	1		
38.1.4		Design, supply and install an earthing and lightning protection system in the high mast.	ea.	1		
38.1.5		Recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.	sum	1		
38.1.6		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates.	ea.	1		
		TOTAL CARRIED FORWARD TO SECTION SUMMARY				

Item	Payment Clause	Discription	Unit	Qty	Rate	Amount
		SECTION 3: ELECTRICAL				
		Q AND R				
39		**Mast No. 43(G stack)**				
39.1.1		Uninstall the existing 2x400W HPS Light fittings and 3x1000W HPS light fitting that are not working.	sum	1		
39.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea.	1		
39.1.3		Replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.	sum	1		
39.1.4		Design, supply and install an earthing and lightning protection system in the high mast.	ea.	1		
39.1.5		Recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.	sum	1		
39.1.6		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates.	ea.	1		
40		**Mast No. 47(G stack)**				
40.1.1		Uninstall the existing 3x400W HPS Light fittings and 2x1000W HPS light fitting that are not working.	sum	1		
40.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea.	1		
40.1.3		Replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.	sum	1		
40.1.4		Design, supply and install an earthing and lightning protection system in the high mast.	ea.	1		
40.1.5		Recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.	sum	1		
40.1.6		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates.	ea.	1		
41		**Mast No. 46(G stack)**				
41.1.1		Uninstall the existing 2x400W HPS Light fittings and 2x1000W HPS light fitting that are not working.	sum	1		
41.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea.	1		
41.1.3		Replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.	sum	1		
41.1.4		Design, supply and install an earthing and lightning protection system in the high mast.	ea.	1		
41.1.5		Recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.	sum	1		
41.1.6		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates.	ea.	1		
		TOTAL CARRIED FORWARD TO SECTION SUMMARY				

Item	Payment Clause	Discription	Unit	Qty	Rate	Amount
		SECTION 3: ELECTRICAL				
		Q AND R				
42		**Mast No. 35(G stack)**				
42.1.1		Uninstall the existing 2x400W HPS Light fittings and 2x1000W HPS light fitting that are not working.	sum	1		
42.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea	1		
42.1.3		Replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.	ea	1		
42.1.4		Design, supply and install an earthing and lightning protection system in the high mast	sum	1		
42.1.5		Recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.	ea	1		
42.1.6		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates	ea	1		
43		**Mast No.31**				
43.1.1		Uninstall the existing 15x400W Light fittings and 3x1000W HPS Light fittings complete with the head ring.	sum	1		
43.1.2		replace the top section of the sectional poles	ea.	1		
43.1.3		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea.	1		
43.1.4		Design a complete new lighting on the existing 30m High Mast Pole.	ea.	1		
43.1.5		Supply, and install new lighting on the existing 30m High Mast Pole. Equal or similar approved to 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K shall be used as a bench mark for pricing.	ea.	6		
43.1.6		Design, supply and install an earthing and lightning protection system in the high mast.	ea.	1		
43.1.7		Supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. Link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation.	ea.	1		
43.1.8		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates	ea.	1		
44		**Mast No.6**				
44.1.1		Uninstall the existing 3x400W HPS Light fittings that are not working.	sum	1		
44.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea.	1		
44.1.3		Replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.	sum	1		
44.1.4		Design, supply and install an earthing and lightning protection system in the high mast.	ea.	1		
44.1.5		Recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.	sum	1		
44.1.6		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates.	ea.	1		
		TOTAL CARRIED FORWARD TO SECTION SUMMARY				

Item	Payment Clause	Discription	Unit	Qty	Rate	Amount
		SECTION 3: ELECTRICAL				
		Q AND R				
45		**Mast No.7**				
45.1.1		Uninstall the existing 4x400W HPS Light fittings that are not working.	sum	1		
45.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea.	1		
45.1.3		Replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.	sum	1		
45.1.4		Design, supply and install an earthing and lightning protection system in the high mast.	ea.	1		
45.1.5		Recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.	sum	1		
45.1.6		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates.	ea.	1		
46		**Mast No.10**				
46.1.1		Uninstall the existing 3x400W HPS Light fittings light fitting that are not working.	sum	1		
46.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea.	1		
46.1.3		Replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.	sum	1		
46.1.4		Design, supply and install an earthing and lightning protection system in the high mast.	ea.	1		
46.1.5		Recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.	sum	1		
46.1.6		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates.	ea.	1		
		Mast No.11(D shed)				
47.1.1		Uninstall the existing 3x400W HPS Light fittings that are not working.	sum	1		
47.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea.	1		
47.1.3		Replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.	sum	1		
47.1.4		Design, supply and install an earthing and lightning protection system in the high mast.	ea.	1		
47.1.5		Recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.	sum	1		
47.1.6		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates.	ea.	1		
48		**Mast No.21(Rail substation)**				
48.1.1		Uninstall the existing 30m Bow mast complete with 8x400W Light fittings and the head ring.	sum	1		
		TOTAL CARRIED FORWARD TO SECTION SUMMARY				

Item	Payment Clause	Discription	Unit	Qty	Rate	Amount
		SECTION 3: ELECTRICAL **Q AND R** **Mast No.21(Rail substation)**				
48.1.2		Supply and install a new bow 30m high mast in accordance with TPD-010B-HIGHMASTSPEC-A.	ea.	1		
48.1.3		Design a complete new lighting for the proposed 30m High Mast Pole.	ea.	1		
48.1.4		Supply, and install new lighting on the existing 30m High Mast Pole. Equal or similar approved to 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K shall be used as a bench mark for pricing.	ea.	6		
		Design, supply and install an earthing and lightning protection system in the high mast.	ea.	1		
48.1.5		Supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. Link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation.	ea.	1		
48.1.6		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates	ea.	1		
49		**Mast No.20 (Clinic)**				
49.1.1		Uninstall the existing 9x400W Light fittings complete with the head ring.	sum	1		
49.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea.	1		
49.1.3		Design a complete new lighting on the existing 30m High Mast Pole.	ea.	1		
49.1.4		Supply, and install new lighting on the existing 30m High Mast Pole. Equal or similar approved to 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K shall be used as a bench mark for pricing.	ea.	6		
49.1.5		Design, supply and install an earthing and lightning protection system in the high mast.	ea.	1		
49.1.6		Supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. Link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation.	ea.	1		
49.1.7		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates	ea.	1		
50		**Mast No.111 (Car Park)**				
50.1.1		Uninstall the existing 3x400W HPS Light fittings that are not working.	sum	1		
50.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea.	1		
50.1.3		Replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.	sum	1		
50.1.4		Design, supply and install an earthing and lightning protection system in the high mast.	ea.	1		
50.1.5		Recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.	sum	1		
50.1.6		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates.	ea.	1		
		TOTAL CARRIED FORWARD TO SECTION SUMMARY				

Item	Payment Clause	Discription	Unit	Qty	Rate	Amount
		SECTION 3: ELECTRICAL				
		Q AND R				
51		**Mast No.(B/C Berth corner)**				
51.1.1		Uninstall the existing 8x400W Light fittings complete with the head ring.	sum	1		
51.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea.	1		
51.1.3		Design a complete new lighting on the existing 30m High Mast Pole.	ea.	1		
51.1.4		Supply, and install new lighting on the existing 30m High Mast Pole. Equal or similar approved to 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K shall be used as a bench mark for pricing.	ea.	6		
51.1.5		Design, supply and install an earthing and lightning protection system in the high mast.	ea.	1		
51.1.6		Supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. Link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation.	ea.	1		
51.1.7		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates	ea.	1		
52		**Mast No.22 (B Berth)**				
52.1.1		Uninstall the existing 2x400W HPS Light fittings that are not working.	sum	1		
52.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea.	1		
52.1.3		Replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.	sum	1		
52.1.4		Design, supply and install an earthing and lightning protection system in the high mast.	ea.	1		
52.1.5		Recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.	sum	1		
52.1.6		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates.	ea.	1		
53		**Mast No.42 (B Berth)**				
53.1.1		Uninstall the existing 2x400W HPS Light fittings that are not working.	sum	1		
53.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea.	1		
53.1.3		Replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.	sum	1		
53.1.4		Design, supply and install an earthing and lightning protection system in the high mast.	ea.	1		
53.1.5		Recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.	sum	1		
53.1.6		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates.	ea.	1		
		TOTAL CARRIED FORWARD TO SECTION SUMMARY				

Item	Payment Clause	Discription	Unit	Qty	Rate	Amount
		SECTION 3: ELECTRICAL				
		Q AND R				
54		**Mast No.53 (C Warf side)**				
54.1.1		Uninstall the existing 3x400W HPS Light fittings and 2x1000W HPS light fitting that are not working.	sum	1		
54.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea.	1		
54.1.3		Replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.	sum	1		
54.1.4		Design, supply and install an earthing and lightning protection system in the high mast.	ea.	1		
54.1.5		Recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.	sum	1		
54.1.6		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates.	ea.	1		
55		**Mast No.52 (D Warf side)**				
55.1.1		Uninstall the existing 3x400W HPS Light fittings and 1x1000W HPS light fitting that are not working.	sum	1		
55.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea.	1		
55.1.3		Replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.	sum	1		
55.1.4		Design, supply and install an earthing and lightning protection system in the high mast.	ea.	1		
55.1.5		Recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.	sum	1		
55.1.6		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates.	ea.	1		
56		**Mast No.41 (D stack)**				
56.1.1		Uninstall the existing 6x400W HPS Light fittings that are not working.	sum	1		
56.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea.	1		
56.1.3		Replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.	sum	1		
56.1.4		Design, supply and install an earthing and lightning protection system in the high mast.	ea.	1		
56.1.5		Recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.	sum	1		
56.1.6		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates.	ea.	1		
		TOTAL CARRIED FORWARD TO SECTION SUMMARY				

Item	Payment Clause	Discription	Unit	Qty	Rate	Amount
		SECTION 3: ELECTRICAL				
		Q AND R				
57		**Mast No.40 (E stack)**				
57.1.1		Uninstall the existing 6x400W HPS Light fittings that are not working.	sum	1		
57.1.2		Replace section 1 to 4 (from the bottom) of the sectional pole complete with head frame, pulleys, cables, head-ring, trailing cables and other HML pole apparatus as detailed in specification TPD-010A-HIGHMASTSPEC-A and TPD-010B-HIGHMASTSPEC-B.	sum	1		
57.1.3		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea.	1		
57.1.4		Replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.	sum	1		
57.1.5		Design, supply and install an earthing and lightning protection system in the high mast.	ea.	1		
57.1.6		Recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.	sum	1		
57.1.7		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates.	ea.	1		
58		**Mast No.51 (E stack Low)**				
58.1.1		Uninstall the existing 5x400W HPS Light fittings and that are not working.	sum	1		
58.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea.	1		
58.1.3		Replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.	sum	1		
58.1.4		Design, supply and install an earthing and lightning protection system in the high mast.	ea.	1		
58.1.5		Recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.	sum	1		
58.1.6		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates.	ea.	1		
59		**Mast No.50 (E stack Low)**				
59.1.1		Uninstall the existing 4x400W HPS Light fittings and that are not working.	sum	1		
59.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea.	1		
59.1.3		Replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.	sum	1		
59.1.4		Design, supply and install an earthing and lightning protection system in the high mast.	ea.	1		
59.1.5		Recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.	sum	1		
59.1.6		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates.	ea.	1		
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		Q AND R				
60		**Mast No.39 (E stack Low)**				
60.1.1		Uninstall the existing 5x400W HPS Light fittings and that are not working.	sum	1		
60.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea.	1		
60.1.3		Replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.	sum	1		
60.1.4		Design, supply and install an earthing and lightning protection system in the high mast.	ea.	1		
60.1.5		Recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.	sum	1		
60.1.6		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates.	ea.	1		
61		**Mast No.5 (Intake Sub)**				
61.1.1		Uninstall the existing 4x400W HPS Light fittings and that are not working.	sum	1		
61.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea.	1		
61.1.3		Replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.	sum	1		
61.1.4		Design, supply and install an earthing and lightning protection system in the high mast.	ea.	1		
61.1.5		Recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.	sum	1		
61.1.6		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates.	ea.	1		
62		**Overall scope**				
62.1.1		Conditional Assessment	sum	1		
62.1.2		Conditional Assessment Report and Cost for Replacing HML apparatus	sum	1		
62.1.3		Design Drawings (1xOverall Layout and 7xSections for design details).	ea.	8		
62.1.4		Supply of Spare luminaires. Equal or similar approved to 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K shall be used as a bench mark for pricing.	ea	10		
62.1.5		Supply a high mast light electric winch, a hydraulic power tool and a test lead	ea	1		
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		SECTION 3: ELECTRICAL				
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42		**Mast No.1**				
42.1.1		Uninstall the existing Light fittings complete with the head ring.	sum	1		
42.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea	1		
42.1.3		Design the complete new lighting on the existing 30m High Mast Pole.	sum	1		
42.1.4		Supply, and install new lighting on the existing 30m High Mast Pole. Equal or similar approved to 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K shall be used as a bench mark for pricing.	ea	6		
42.1.5		Design, supply and install an earthing and lightning protection system in the high mast.	ea	1		
42.1.6		Supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT.	ea	1		
42.1.7		Supply and install an equal or similar approved to a WiFi enabled Lenovo A740 workstation with an i3 processor, 27 inch touch screen monitor complete with network adaptor and USB RJ45 adapter to control the dimming functionality of the high mast lighting	ea	1		
42.1.8		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates.	ea	1		
43		**Mast No.2**				
43.1.9		Uninstall the existing Light fittings complete with the head ring.	sum	1		
43.1.10		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea	1		
43.1.11		Design the complete new lighting on the existing 30m High Mast Pole.	sum	1		
43.1.12		Supply, and install new lighting on the existing 30m High Mast Pole. Equal or similar approved to 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K shall be used as a bench mark for pricing.	ea	6		
43.1.13		Design, supply and install an earthing and lightning protection system in the high mast.	ea	1		
43.1.14		Supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation.	ea	1		
43.1.15		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates.	ea	1		
		Mast No.3				
43.1.16		Uninstall the existing Light fittings complete with the head ring.	sum	1		
43.1.17		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea	1		
43.1.18		Design the complete new lighting on the existing 30m High Mast Pole.	sum	1		
43.1.19		Supply, and install new lighting on the existing 30m High Mast Pole. Equal or similar approved to 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K shall be used as a bench mark for pricing.	ea	6		
43.1.20		Design, supply and install an earthing and lightning protection system in the high mast.	ea	1		
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		Maydon Wharf				
43		**Mast No.3**				
43.1.21		Supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation.	ea	1		
43.1.22		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates.	ea	1		
44		**Mast No.4**				
44.1.1		Uninstall the existing Light fittings complete with the head ring.	sum	1		
44.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea	1		
44.1.3		Trace, locate and expose the cable fault for the cable supplying this high mast light.	ea	1		
44.1.4		Repair the fault and test the installation in accordance with TPD-003-CABLESPEC. Backfill and make good the surface of the exposed trench.	sum	1		
44.1.5		Design the complete new lighting on the existing 30m High Mast Pole.	sum	1		
44.1.6		Supply, and install new lighting on the existing 30m High Mast Pole. Equal or similar approved to 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K shall be used as a bench mark for pricing.	ea	6		
44.1.7		Design, supply and install an earthing and lightning protection system in the high mast.	ea	1		
44.1.8		Supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation.	ea	1		
44.1.9		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates.	ea	1		
45		**Mast No.4**				
45.1.20		Uninstall the existing Light fittings complete with the head ring.	sum	1		
45.1.21		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea	1		
45.1.22		Design the complete new lighting on the existing 30m High Mast Pole.	sum	1		
45.1.23		Supply, and install new lighting on the existing 30m High Mast Pole. Equal or similar approved to 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K shall be used as a bench mark for pricing.	ea	6		
45.1.24		Design, supply and install an earthing and lightning protection system in the high mast.	ea	1		
45.1.25		Supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation.	ea	1		
45.1.26		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates.	ea	1		
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46		**Mast No.5**				
46.1.1		Uninstall the existing Light fittings complete with the head ring.	sum	1		
46.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea	1		
46.1.3		Design the complete new lighting on the existing 30m High Mast Pole.	sum	1		
46.1.4		Supply, and install new lighting on the existing 30m High Mast Pole. Equal or similar approved to 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K shall be used as a bench mark for pricing.	ea	6		
46.1.5		Design, supply and install an earthing and lightning protection system in the high mast.	ea	1		
46.1.6		Supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation.	ea	1		
46.1.7		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates.	ea	1		
47		**Mast No.6**				
47.1.1		Uninstall the existing Light fittings complete with the head ring.	sum	1		
47.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea	1		
47.1.3		Design the complete new lighting on the existing 30m High Mast Pole.	sum	1		
47.1.4		Supply, and install new lighting on the existing 30m High Mast Pole. Equal or similar approved to 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K shall be used as a bench mark for pricing.	ea	6		
47.1.5		Design, supply and install an earthing and lightning protection system in the high mast.	ea	1		
47.1.6		Supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation.	ea	1		
47.1.7		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates.	ea	1		
48		**Mast No.7**				
48.1.1		Uninstall the existing Light fittings complete with the head ring.	sum	1		
48.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea	1		
48.1.3		Design the complete new lighting on the existing 30m High Mast Pole.	sum	1		
48.1.4		Supply, and install new lighting on the existing 30m High Mast Pole. Equal or similar approved to 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K shall be used as a bench mark for pricing.	ea	6		
48.1.5		Design, supply and install an earthing and lightning protection system in the high mast.	ea	1		
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48		**Mast No.7**				
48.1.6		Supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation.	ea	1		
48.1.7		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates.	ea	1		
49		**Mast No.8**				
49.1.8		Uninstall the existing 11x400W Light fittings and 4xStreet Light fittings complete with the head ring	sum	1		
49.1.9		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea	1		
49.1.10		Design a complete new lighting on the existing 30m High Mast Pole.	ea	1		
49.1.11		Supply, and install new lighting on the existing 30m High Mast Pole. Equal or similar approved to 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K shall be used as a bench mark for pricing.	ea	6		
49.1.12		Design, supply and install an earthing and lightning protection system in the high mast.	ea	1		
49.1.13		Supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation.	ea	1		
49.1.14		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates	ea	1		
50		**Mast No.9**				
50.1.1		Uninstall the existing Light fittings complete with the head ring.	sum	1		
50.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea	1		
50.1.3		Design the complete new lighting on the existing 30m High Mast Pole.	sum	1		
50.1.4		Supply, and install new lighting on the existing 30m High Mast Pole. Equal or similar approved to 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K shall be used as a bench mark for pricing.	ea	6		
50.1.5		Design, supply and install an earthing and lightning protection system in the high mast.	ea	1		
50.1.6		Supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation.	ea	1		
50.1.7		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates.	ea	1		
51		**Mast No.10**				
51.1.1		Uninstall the existing Light fittings complete with the head ring.	sum	1		
51.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea	1		
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51		**Mast No.10**				
51.1.3		Design the complete new lighting on the existing 30m High Mast Pole.	sum	1		
51.1.4		Supply, and install new lighting on the existing 30m High Mast Pole. Equal or similar approved to 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K shall be used as a bench mark for pricing.	ea	6		
51.1.5		Design, supply and install an earthing and lightning protection system in the high mast.	ea	1		
51.1.6		Supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation.	ea	1		
51.1.7		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates.	ea	1		
52		**Mast No.11**				
52.1.1		Uninstall the existing Light fittings complete with the head ring.	sum	1		
52.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea	1		
52.1.3		Design the complete new lighting on the existing 30m High Mast Pole.	sum	1		
52.1.4		Supply, and install new lighting on the existing 30m High Mast Pole. Equal or similar approved to 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K shall be used as a bench mark for pricing.	ea	6		
52.1.5		Design, supply and install an earthing and lightning protection system in the high mast.	ea	1		
52.1.6		Supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation.	ea	1		
52.1.7		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates.	ea	1		
53		**Mast No.12**				
53.1.1		Uninstall the existing Light fittings complete with the head ring.	sum	1		
53.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea	1		
53.1.3		Design the complete new lighting on the existing 30m High Mast Pole.	sum	1		
53.1.4		Supply, and install new lighting on the existing 30m High Mast Pole. Equal or similar approved to 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K shall be used as a bench mark for pricing.	ea	6		
53.1.5		Design, supply and install an earthing and lightning protection system in the high mast.	ea	1		
53.1.6		Supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation.	ea	1		
53.1.7		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates.	ea	1		
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54		**Mast No.13**				
54.1.1		Uninstall the existing Light fittings complete with the head ring.	sum	1		
54.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea	1		
54.1.3		Design the complete new lighting on the existing 30m High Mast Pole.	sum	1		
54.1.4		Supply, and install new lighting on the existing 30m High Mast Pole. Equal or similar approved to 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K shall be used as a bench mark for pricing.	ea	6		
54.1.5		Design, supply and install an earthing and lightning protection system in the high mast.	ea	1		
54.1.6		Supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation.	ea	1		
54.1.7		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates.	ea	1		
55		**Mast No.14**				
55.1.1		Uninstall the existing Light fittings complete with the head ring.	sum	1		
55.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea	1		
55.1.3		Design the complete new lighting on the existing 30m High Mast Pole.	sum	1		
55.1.4		Supply, and install new lighting on the existing 30m High Mast Pole. Equal or similar approved to 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K shall be used as a bench mark for pricing.	ea	6		
55.1.5		Design, supply and install an earthing and lightning protection system in the high mast.	ea	1		
55.1.6		Supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation.	ea	1		
55.1.7		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates.	ea	1		
56		**Mast No.15**				
56.1.1		Uninstall the existing Light fittings complete with the head ring.	sum	1		
56.1.1		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea	1		
56.1.1		Design the complete new lighting on the existing 30m High Mast Pole.	sum	1		
56.1.1		Supply, and install new lighting on the existing 30m High Mast Pole. Equal or similar approved to 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K shall be used as a bench mark for pricing.	ea	6		
56.1.1		Design, supply and install an earthing and lightning protection system in the high mast.	ea	1		
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55		**Mast No.15**				
56.1.1		Supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation.	ea	1		
56.1.1		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates.	ea	1		
57		**K Block**				
		Mast No.1				
57.1.1		Uninstall the existing Light fittings complete with the head ring.	sum	1		
57.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea	1		
57.1.3		Design the complete new lighting on the existing 30m High Mast Pole.	sum	1		
57.1.4		Supply, and install new lighting on the existing 30m High Mast Pole. Equal or similar approved to 4xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K shall be used as a bench mark for pricing.	ea	4		
57.1.5		Design supply and install a balancing weight to assist the swinging process of the mast	sum	1		
57.1.6		Design, supply and install an earthing and lightning protection system in the high mast.	ea	1		
57.1.7		Supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT.	ea	1		
57.1.8		Supply and install an equal or similar approved to a WiFi enabled Lenovo A740 workstation with an i3 processor, 27 inch touch screen monitor complete with network adaptor and USB RJ45 adapter to control the dimming functionality of the high mast lighting	ea	1		
57.1.9		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates.	ea	1		
58		**Mast No.2**				
58.1.1		Uninstall the existing Light fittings complete with the head ring.	sum	1		
58.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea	1		
58.1.3		Design the complete new lighting on the existing 30m High Mast Pole.	sum	1		
58.1.4		Supply, and install new lighting on the existing 30m High Mast Pole. Equal or similar approved to 4xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K shall be used as a bench mark for pricing.	ea	4		
58.1.5		Design supply and install a balancing weight to assist the swinging process of the mast	sum	1		
58.1.6		Design, supply and install an earthing and lightning protection system in the high mast.	ea	1		
58.1.7		Supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT.	ea	1		
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58		**Mast No.2**				
58.1.8		Supply and install an equal or similar approved to a WiFi enabled Lenovo A740 workstation with an i3 processor, 27 inch touch screen monitor complete with network adaptor and USB RJ45 adapter to control the dimming functionality of the high mast lighting	ea	1		
58.1.9		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates.	ea	1		
59		**Mast No.3**				
		Uninstall the existing Light fittings complete with the head ring.	sum	1		
59.1.1		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea	1		
59.1.2		Design the complete new lighting on the existing 30m High Mast Pole.	sum	1		
59.1.3		Supply, and install new lighting on the existing 30m High Mast Pole. Equal or similar approved to 4xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K shall be used as a bench mark for pricing.	ea	4		
59.1.4		Design supply and install a balancing weight to assist the swinging process of the mast	sum	1		
59.1.5		Design, supply and install an earthing and lightning protection system in the high mast.	ea	1		
59.1.6		Supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT.	ea	1		
59.1.7		Supply and install an equal or similar approved to a WiFi enabled Lenovo A740 workstation with an i3 processor, 27 inch touch screen monitor complete with network adaptor and USB RJ45 adapter to control the dimming functionality of the high mast lighting	ea	1		
59.1.8		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates.	ea	1		
60		**Mast No.4**				
60.1.1		Uninstall the existing Light fittings complete with the head ring.	sum	1		
60.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea	1		
60.1.3		Design the complete new lighting on the existing 30m High Mast Pole.	sum	1		
60.1.4		Supply, and install new lighting on the existing 30m High Mast Pole. Equal or similar approved to 4xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K shall be used as a bench mark for pricing.	ea	4		
60.1.5		Design supply and install a balancing weight to assist the swinging process of the mast	sum	1		
60.1.6		Design, supply and install an earthing and lightning protection system in the high mast.	ea	1		
60.1.7		Supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT.	ea	1		
60.1.8		Supply and install an equal or similar approved to a WiFi enabled Lenovo A740 workstation with an i3 processor, 27 inch touch screen monitor complete with network adaptor and USB RJ45 adapter to control the dimming functionality of the high mast lighting	ea	1		
		TOTAL CARRIED FORWARD TO SECTION SUMMARY				

Item	Payment Clause	Discription			Page	Amount
		SECTION 3: ELECTRICAL WORKS				
		K Block				
		Mast No.4				
60.1.9		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates.	ea	1		
61		**Mast No.5**				
61.1.1		Uninstall the existing Light fittings complete with the head ring.	sum	1		
61.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea	1		
61.1.3		Design the complete new lighting on the existing 30m High Mast Pole.	sum	1		
61.1.4		Supply, and install new lighting on the existing 30m High Mast Pole. Equal or similar approved to 4xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K shall be used as a bench mark for pricing.	ea	4		
61.1.5		Design supply and install a balancing weight to assist the swinging process of the mast	sum	1		
61.1.6		Design, supply and install an earthing and lightning protection system in the high mast.	ea	1		
61.1.7		Supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT.	ea	1		
61.1.8		Supply and install an equal or similar approved to a WiFi enabled Lenovo A740 workstation with an i3 processor, 27 inch touch screen monitor complete with network adaptor and USB RJ45 adapter to control the dimming functionality of the high mast lighting	ea	1		
61.1.9		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates.	ea	1		
62		**Mast No.6**				
62.1.1		Uninstall the existing Light fittings complete with the head ring.	sum	1		
62.1.2		Refurbish the high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.	ea	1		
62.1.3		Design the complete new lighting on the existing 30m High Mast Pole.	sum	1		
62.1.4		Supply, and install new lighting on the existing 30m High Mast Pole. Equal or similar approved to 4xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K shall be used as a bench mark for pricing.	ea	4		
62.1.5		Design supply and install a balancing weight to assist the swinging process of the mast	sum	1		
62.1.6		Design, supply and install an earthing and lightning protection system in the high mast.	ea	1		
62.1.7		Supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT.	ea	1		
62.1.8		Supply and install an equal or similar approved to a WiFi enabled Lenovo A740 workstation with an i3 processor, 27 inch touch screen monitor complete with network adaptor and USB RJ45 adapter to control the dimming functionality of the high mast lighting	ea	1		
62.1.9		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates.	ea	1		
63		Supply and install an equal or similar approved to a WiFi enabled Lenovo A740 workstation with an i3 processor, 27 inch touch screen monitor complete with network adaptor and USB RJ45 adapter to control the dimming functionality of the high mast lighting	ea	1		
		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates.	ea	1		
		TOTAL CARRIED FORWARD TO SECTION SUMMARY				

Item	Payment Clause	Payment Clause	Discription			Page
		SECTION 3: ELECTRICAL WORKS **K Block** **Mast No.6**				
63.1.4		Testing and Commissioning of complete installation in accordance to SANS 10142-1 including the issue of COC certificates.	ea	1		
63.1.5						
63.1.6		**Power Supply Scope**				
63.1.7						
63.1.8		Design supply and install an upgraded supply from the existing Kiosk to Shed 10. The works shall include an equal or similar upgrade comprising of the supply and installation of a new 200A, 30kA, 400V Electronic Trip Unit breaker.	sum	1		
63.1.9		Design supply and install an upgraded Shed 10 DB. The works shall include an equal or similar upgrade comprising of the supply and installation of a new 200A, 25kA, 400V electronic trip unit incomer breaker; Supply and installation of a new 160A, 25kA, 400V electronic trip unit feeder breaker.	sum	1		
63.1.10		Design supply and install a new LV kiosk next to the existing kiosk currently supplying K Block. The orders of magnitude for this kiosk shall include a 160A 25kA 3ph+N electronic trip unit incomer, a 100A 15kA 3ph+N electronic trip unit feeder breaker to supply K block and two 60A 15kA 3ph+N spare breakers.	sum	1		
63.1.11						
63.1.12		Supply and installation of a new 3ph 4 core 70mm2 SWA ECC LV Cu Cable.	m	300		
63.1.13						
		Supply and installation of a new 3ph 4 core 70mm2 SWA ECC LV Cu Cable standard terminations.	ea	4		
		Supply and installation of a new 3ph 4 core 25mm2 SWA ECC LV Cu Cable.	m	300		
64						
		Supply and installation of a new 3ph 4 core 25mm2 SWA ECC LV Cu Cable standard terminations.	ea	2		
		Design, Supply and Installation a cable management system to install the 70mm2 cable inside shed 10. The cable management system shall comprise of similar approved or equal to Oline PS75 Powerspan heavy duty 500mm width, combination of cable ladder system. Cable ladder shall be stainless steel suitable for a highly corrosive environment. The cable management system shall be complete with clamps, fasteners and all required accessories.	m	200		
64.1.1						
		Trenching, back filling, making the surface good and removal of surplus material. The cable route shall be designed by the contractor.	m	250		
		Provision of 110mm diameter pvc sleeves for the installation of underground cables. The contractor shall make a Provision for a spare sleeve.	m	600		
64.1.2						
		Allowance for Type E3 Manhole including excavation, backfilling, campaction, etc.	ea	2		
64.1.3		Pipe jacking under the rail.	m	50		
64.1.4		Design, supply and installation of the Earthing and lightning protection for the system in accordance with TPD-004-EARTHINGSPEC.	sum	1		
64.1.5		**Overall Scope**				
64.1.6		Conditional Assessment	sum	1		
64.1.7		Conditional Assessment Report and Cost for Replacing HML apparatus	sum	1		
64.1.8		Design Drawings (1xOverall Layout, 7xSections for design details and a cable route drawing).	ea	9		
64.1.9		Supply of Spare luminaires. Equal or similar approved to 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K shall be used as a bench mark for pricing.	ea	18		
64.1.10		Supply a high mast light electric winch, a hydraulic power tool and a test lead	ea	1		
		TOTAL CARRIED FORWARD TO FINAL SUMMARY				

Item	Payment Clause	Payment Clause	Page	Amount
		SECTION 3 : ELECTRICAL WORKS **SECTION SUMMARY**		
		Page Total brought forward	34	
		Page Total brought forward	35	
		Page Total brought forward	36	
		Page Total brought forward	37	
		Page Total brought forward	38	
		Page Total brought forward	39	
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		Page Total brought forward	62	
		Page Total brought forward	63	
		Page Total brought forward	64	
		TOTAL CARRIED FORWARD TO FINAL SUMMARY		

Item	Payment Clause	Discription	Unit	Qty		Amount
		SECTION 4: BUDGETARY ALLOWANCE **BUDGETARY ALLOWANCE**				
		Provide a sum of R250 000.00 (Two Hundred and Fifty Thousand Rands, Only) for design works by engineers	prov sum	1		R 250,000.00
		Provide a sum of R300 000.00 (Three Hundred and Fifty Thousand Rands, Only) for Unkown work to be identified by Project Manger	prov sum	1		R 300,000.00
		Provide a sum of R 240 000.00 (Two Hundred and Forty Thousand Rands only), for the replacement of bolts and nuts at the Main Carpark, Q&R and Maydon Wharf	prov sum	1		R 240,000.00
		Provide a sum of R 1 056 000.00 (One Million and Fifty six Thousand Rands Only), for the replacement of the HML raising and lowering mechanism at the main Carpark, Q&R and Maydon Wharf	prov sum	1		R 1,056,000.00
		Provide a sum of R 224 000.00 (Two Hundred and Twenty four Thousand Rands Only), for the replacement of Masts internal electrics at the Main Carpark, Q&R and Maydon Wharf	prov sum	1		R 224,000.00
		TOTAL CARRIED FORWARD TO SECTION SUMMARY				**R 2,070,000.00**

Item	Payment Clause	Discription	Page	Amount
		BILL OF QUANTITIES		
		FINAL SUMMARY		
		SECTION 1: PRELIMINARY AND GENERAL	**2**	
		SECTION 2: CIVIL WORKS	**33**	
		SECTION 3: ELECTRICAL WORKS	**68**	
		SECTION 5: BUGDETARY ALLOWANCE	**66**	**R 2,070,000.00**
		TOTAL EXCLUDING VAT CARRIED FORWARD TO FORM OF OFFER AND ACCEPTANCE		**R 2,070,000.00**

Part C3: The Scope

C3.1: Scope of Works

PART C3: SCOPE OF WORK

C3.1 *EMPLOYER'S WORKS* INFORMATION

Contents

SECTION 1
1 DESCRIPTION OF THE WORKS

1.1 EXECUTIVE OVERVIEW

The Durban Car Terminal consists of berths, sheds and operational stack areas. They are utilised for import and export purposes, as a storage area for primarily breakbulk cargo. The terminal operates 24 hours a day and operations is heavily dependent on sufficient lighting in order to achieve increased safety, productivity, security for the safeguarding of commodities, TPT assets and personnel. Due to consistent exposure to the port environmental conditions over the years, the structural condition and efficiency of the high mast poles has deteriorated. Due to this, some areas have been left with low lighting levels some which do not meet customer requirements and some which no longer adhere to the Minimum OHS Act standards. High mast light pole replacements and repairs are required to ensure sufficient lighting to enable terminal personnel to safely operate during the night, and for the security department to achieve and deliver an acceptable protection service at night.

The existing high mast lighting has deteriorated over the years. Some poles structures require repair work and some require replacement. The suspension assemblies together with pulleys and wire ropes for raising and lowering the lights require attention in some areas as they are not fully functional. The light fittings also need to be replaced as some poles have a few fittings which still operate. The risk of falling high mast poles is ever increasing with deterioration getting worse over time. The low levels of light or lux are also a risk to TPT staff, operation, equipment and customer cargo.

The *Works* that the *Contractor* is to perform involve electrical, civil and structural *Works* for the Port of Durban Lighting Upgrade project.

The scope of the *Works* includes but is not limited to the following:

- The Supply, Delivery, installation and commissioning of all the associated works for the lighting refurbishment.
- Design, supply and installation of lightning protection and earthing of the structures.
- The Supply delivery and Installation of cabling and terminations.
- Commission and testing of the entire installation and hand over to the Employer.
- Refurbishment of structural elements.

1.2 *EMPLOYER'S* OBJECTIVES

The *Employer's* objectives are to construct and commission the Lighting upgrade for the operations of the Transnet National Ports Authority to meet the necessary statutory requirements.

In addition to the above, the *Employer's* objectives are to achieve Completion of the *Works* by meeting the Completion Date whilst still maintaining the highest environmental, quality and safety standards and whilst minimising disruptions to on-going port and terminal operations and the operations and activities of other stakeholders.

1.3 INTERPRETATION AND TERMINOLOGY

For the purposes of this contract for all matters regarding technical decisions, Acceptance of Engineering related technical documents, Testing, Commissioning and any matters pertaining to the context of the Occupational Health and Safety Act, the *Contractor* is required to cooperate with the *Employer's* Engineers/Professional Engineers as per Core Clause 25.1 and Core Clause 14.2 as delegated by the *Project Manager* and the *Supervisor,* for the former and as applicable in the context. The instructions received by the *Contractor* shall be interpreted as lawful in matters pertaining to the former if the Instruction has been endorsed by both the *Project Manager* or *Supervisor*, and the *Employer's* Engineers/Professional Engineers as applicable in the context. The *Employer's* Engineers shall be named post award of the contract and prior to commencement of the *Works*. The *Contractor* is further advised that, in compliance to NEC3 ECC Core Clause 25.1, that co-operation with the *Employer*s Engineers and other representatives of the *Employer* (Others) is a requirement of this contract and the *Contractor* is to allow, grant and facilitate all reasonable access that may be required by the *Employer's* Engineers and Others as applicable, for the provision of the *Works*.

The following abbreviations are used in this *Works* Information:

Abbreviation	**Meaning given to the abbreviation**
AIA	Authorised Inspection Authority
BBBEE	Broad Based Black Economic Empowerment
CEMP	Construction Environmental Management Plan
CD	Compact Disc
CDR	*Contractor* Documentation Register
CDS	*Contractor* Documentation Schedule
CRL	*Contractor* Review Label
CSHEO	*Contractor*'s Safety, Health and Environmental Officer
CIRP	*Contractor*'s Industrial Relations Practitioner
CM	Construction Manager
DTI	Department of Trade and Industry
DWG	Drawings
EO	Environmental Officer
HAW	Hazard Assessment Workshop
HAZOP	Hazard and Operability Study
HSSP	Health and Safety Surveillance Plan
INC	Independent Nominated Consultant
IP	Industrial Participation
IR	Industrial Relations
IPP	Industrial Participation Policy
IPO	Industrial Participation Obligation
IPS	Industrial Participation Secretariat
IRCC	Industrial Relations Co-ordinating Committee
JSA	Job Safety Analysis
LV	Low voltage
MV	Medium voltage

Native	Original electronic file format of documentation
PES	Project Environmental Specifications
PHA	Preliminary Hazard Assessment
PIRM	Project Industrial Relations Manager
PIRPMP	Project Industrial Relations Policy and Management Plan
PLA	Project Labour Agreements
PSIRM	Project Site Industrial Relations Manager
PSPM	Project Safety Program Manager
PSSM	Project Site Safety Manager
ProgEM	Programme Environmental Manager
ProjEM	Project Environmental Manager
QA	Quality Assurance
R&D	Research and Development
SANS	South African National Standards
SASRIA	South African Special Risks Insurance Association
SES	Standard Environmental Specification
SHE	Safety, Health and Environment
SHEC	Safety, Health and Environment Co-ordinator
SIP	Site Induction Programme
SMP	Safety Management Plan
SSRC	Site Safety Review Committee
SCADA	Supervisory Control And Data Acquisition
TPT	Transnet Port Terminals
TNPA	Transnet National Ports Authority
TFR	Transnet Freight Rail
ISPS	International Ship and Port Facility Security
PSIRA	Private Security Industry Regulatory Authority.

2 ENGINEERING AND THE *CONTRACTOR'S* DESIGN

2.1 EMPLOYER'S DESIGN

2.1.1 THE *EMPLOYER'S* DESIGN FOR THE *WORKS* IS:

2.1.2 ELECTRICAL:

No designs will be issued by the employer.

2.2 PARTS OF THE *WORKS* WHICH THE *CONTRACTOR IS* TO DESIGN

All designs undertaken by the Contractor as per the below clauses are required to be endorsed by an ECSA Registered Professional Engineer/Professional Technologist suitably experienced in the Electrical discipline.

2.2.1 THE *CONTRACTOR* IS TO DESIGN THE FOLLOWING PARTS OF THE *WORKS* AND WILL BE RESPONSIBLE IN HIS DESIGN FOR THE OVERALL INTEGRATION OF THE DESIGN OF THE WORKS WITH THE EXISTING INSTALLATION.

a) All supporting infrastructure required to implement all of the Employers' high level designs. These may include, but is not necessarily limited to, cableways, cable support systems, conduit systems and arrangement, piped systems and pipe support systems, and the selection of fasteners and fastening systems for these items, where not specified, referenced or detailed by the Employer.
b) All new lighting designs.
c) The existing lighting configuration.
d) All designs including detailed of all LV distribution panels and electrical kiosks. The employer might give orders of magnitude for pricing purposes.
e) The detailed foundation design for a 30 metre High Mast in accordance with the Manufacturers minimum requirements and specifications.
f) The Earthing and Lightning Protection design in accordance with the Employer's specifications.
g) The Contractor shall submit detailed drawings and Workshop details for all designs, both Contractor's designs and OEM designs, to the Project Manager for acceptance by the Employer's Consultant or the Employer's Engineers.
h) Concrete mix designs, for high mast and street light pole foundations, bases.
i) All and any equipment, formwork, and temporary work associated with the provision of the Works.

2.2.2 THE *CONTRACTOR* IS RESPONSIBLE IN HIS DESIGN FOR THE OVERALL INTEGRATION OF THE DESIGN OF THE *WORKS* WITH THE EXISTING INSTALLATION TO BE RETAINED.

a) All supporting infrastructure required to support the existing installation. These may include, but is not necessarily limited to, cableways, cable support systems, conduit systems and arrangement, piped systems and pipe support systems, and the selection of fasteners and fastening systems for these items, where not specified, referenced or mentioned by the Employer.
b) All designs of all LV distribution panels. The Contractor is wholly responsible for all design coordination, integration and liaison activities involved with the Works, and shall take all measures necessary and make all arrangements with the Project Manager for activities such as meetings, inspections, endorsements, and any other activities required for the timeous completion of the Works and to the appropriate quality. When these activities require the involvement of the Employer's Professional Engineering team or any other stakeholders, the Contractor is required to make these arrangements with due consideration of the Employer's Professional Engineering team's availability and the availability of other stakeholders. The Contractor shall submit detailed drawings and Workshop details for all designs, both Contractor's designs and OEM designs, to the Project Manager for acceptance by the Employer's Consultant or the Employer's Engineers.
c) The design of light poles, base plates and luminaire fixtures and fittings where required for the provision of the Works.

2.2.3 UNLESS EXPRESSLY STATED TO FORM PART OF THE DESIGN RESPONSIBILITY OF THE *EMPLOYER* AS STATED UNDER 2.1 *EMPLOYER'S* DESIGN ABOVE AND WHETHER OR NOT SPECIFICALLY STATED TO

FORM PART OF THE DESIGN RESPONSIBILITY OF THE *CONTRACTOR* UNDER THIS PARAGRAPH 2.2, ALL RESIDUAL DESIGN RESPONSIBILITY AND OVERALL RESPONSIBILITY FOR THE TOTAL DESIGN SOLUTION FOR THE *WORKS* RESTS WITH THE *CONTRACTOR*.

a) The Contractor shall engage the services of ECSA registered Engineers and/or Technologists for all aspects of the Works for which the Contractor is to design as per Clauses 2.2.1 and 2.2.2 above.
b) The Contractor shall thus be wholly accountable and responsible for all aspects of his designs, including the implementation of all Statutory Safety, Health and Environmental Regulations of South Africa and the particular requirements, specifications, and regulations of the Employer pertaining to Health and Safety, Environment, Quality and Engineering.
c) The Contractor shall be wholly accountable and responsible for the implementation of the aspects of his designs including commissioning, putting into service, and handover of his constructed designs to the Employer, and his duly appointed ECSA registered Engineers shall be held accountable and responsible for these aspects of the Works for the lifetime duration of the Works.

2.2.4 REVIEW AND ACCEPTANCE OF THE CONTRACTORS DESIGNS:

a) Acceptance of documentation by the Project Manager will in no way relieve the Contractor of is responsibility for the correctness of information, or conformance with his obligation to Provide the Works. This obligation rests solely with the Contractor.
b) After review, a copy of the original reviewed/marked-up drawing/document, with the Project Manager's consolidated comments and document status marked on the Contractor Review Label, is scanned and the copy shall be returned to the Contractor under cover of the project's Transmittal Note for revision or re-submittal as instructed.
c) The Contractor shall allow the Project Manager 2 weeks (unless otherwise stated and agreed) to review and respond to the Contractor's submission of their documentation, i.e. from time of receipt by the project to the time of despatch. However, work shall proceed without delay in the event of late return of the documentation by the Project Manager with prior notification in writing by the Contractor.
d) On receipt of the reviewed documentation the Contractor shall make any modifications requested/marked-up and resubmit the revised documentation to the Project Manager within 2 weeks. Queries regarding comments/changes should be addressed with the Project Manager prior to re-submittal.
e) Any re-submittals, which have not included the changes/comments identified, will be returned to the Contractor to be corrected. The Contractor shall re-issue the revised documentation incorporating all comments and other specified details not included in the previous issue within 2 working days of receipt of the marked-up document.
f) The Contractor is required to undertake design safety reviews with the Project Manager the NEC Supervisor, the Employer's Engineer's and Professional team, the Employer's Health and Safety Officers, the Employer's Environmental Officers, the Employer's Quality Assurance and Quality Control Officers and any other Specialists and/or Subject Matter Experts (SME) as deemed by the Employer necessary for the provision of the Works.

2.2.5 OTHER REQUIREMENTS OF THE CONTRACTOR'S DESIGN:

2.2.5.1 The *contractor*'s design complies with the following:

a) All Statutes, Standards, Specifications, Policies, Conventions, Requirements as referenced in this document and all Statutes, Standards, Specifications, Policies, Conventions, Requirements as referenced in any Annexures thereto.

2.2.6 USE OF CONTRACTOR'S DESIGN

The *Contractor* grants the *Employer* a licence to use the copyright in all design data presented to the *Employer* in relation to the *Works* for any purpose in connection with the construction, re-construction, refurbishment, repair, maintenance and extension of the *Works* with such licence being capable of transfer to any third party without the consent of the *Contractor*.

2.2.6.1 The contractor vests in the employer full title guarantee in the intellectual property and copyright in the design data created in relation to the works as follows:

a) All supporting infrastructure required to implement all of the Employers' high level designs. These may include, but is not necessarily limited to, cableways, cable support systems, conduit systems and arrangement, piped systems and pipe support systems, and the selection of fasteners and fastening systems for these items, where not specified, referenced or detailed by the Employer.
b) All lighting designs.
c) All designs of all LV distribution panels. The Earthing and Lightning Protection design in accordance with the Employer's specifications.
d) Concrete mix designs, descriptions and properties for high mast and street light pole foundations, bases and wearing and levelling courses
e) The design of light poles, base plates and luminaire fixtures and fittings where required for the provision of the Works.
f) All and any equipment, formwork, and temporary work associated with the provision of the Works.
g) Concrete mix designs, descriptions and properties for wearing and levelling courses
h) All and any equipment, formwork, and temporary work associated with the provision of the works.
i) Design of Equipment

2.2.6.2 The contractor submits his design details for the following categories of his proposed principal equipment to the project manager for his information only:

a) Any formwork required to Provide the Works
b) Temporary electrically powered compressed air systems and pneumatic equipment that may be required to Provide the Works
c) Small electrically powered equipment
d) Equipment designed for the lifting of personnel to access any areas necessary to provide the Works, which are not at ground level.
e) Equipment designed for the lowering of personnel to access any areas necessary to Provide the Works, which are below ground level.

2.2.6.3 The following principal equipment categories deployed for the contractor to provide the works require its design to be accepted by the project manager under ecc clause 23.1:

a) Temporary petrol or diesel powered compressed air systems and pneumatic equipment that may be required to Provide the Works
b) Small petrol or diesel powered equipment
c) Specialist Equipment required to Provide the Works
d) Rigging platforms and specialised rigging Equipment that may be required by the Contractor to Provide the Works.
e) Temporary access platforms, ladders, walkways, scaffolds, and any other temporary structures required to Provide the Works.

2.2.6.4 The design of equipment is considered in terms of this contract as contractor's design and any and all applicable requirements of 2.2, 2.3, 2.4 of this document shall apply.

2.3 EQUIPMENT REQUIRED TO BE INCLUDED IN THE WORKS

Any shuttering/formwork that is left in-situ as required by the design of the *Works*, notwithstanding it be *Employer's* Design or *Contractor*'s design, and necessary for the provision of the *Works*.

2.4 AS-BUILT DRAWINGS, OPERATING MANUALS AND MAINTENANCE SCHEDULES

2.4.1 THE *CONTRACTOR* PROVIDES THE FOLLOWING:

2.4.1.1 As-built/final documentation

a) In undertaking the Works (including all incidental services required), the Contractor shall conform and adhere to the requirements of the Contractor Document Submittal Requirements Standard included in Annexure N (Refer DOC-STD-0001 Rev 03).
b) The Contractor prepares two (3) marked up hard copies of the latest revision of the Employer documents/drawings to represent the As-Built/Final status.
c) The mark-ups shall be in RED pencil or pen and be complete and accurate. The Contractor submits same to the Project Manager under cover of a Contractor's Transmittal Note.
4 x CD Roms with Adobe Acrobat (.pdf) and "Native" formats

2.4.1.2 As-built/final documentation

a) In undertaking the 'Works' (including all incidental services required), the Supplier shall conform and adhere to the requirements of the 'Contractor Document Submittal Requirements' Standard included in Annexure N (Refer DOC-STD-0001 Rev 03).

2.4.1.3 Installation, maintenance and operating manuals and data books.

a) In undertaking the 'Works' (including all incidental services required), the Supplier shall conform and adhere to the requirements of the 'Data Books and Manuals' Standard included in Annexure N (Refer DOC-STD-0001 Rev 03) and the 'Contractor Documentation Submittal Requirements' Standard included in Annexure N (Refer to DOC-STD-0001 Rev 03).

3 CONSTRUCTION

3.1 TEMPORARY *WORKS*, SITE SERVICES & CONSTRUCTION CONSTRAINTS

3.1.1 THE CONTRACTOR SHALL COMPLY WITH THE REQUIREMENTS OF THE EMPLOYER WITH REGARD TO SITE ENTRY, SECURITY CONTROL, PERMITS, AND SITE REGULATIONS.

3.1.1.1 The *contractor* complies with the following requirements of the *employer:*

a) The Contractor shall attend all necessary Safety Inductions and ensure that all personnel engaged in the provision of the Works are inducted as directed by the Project Manager, NEC Supervisor.
b) The Contractor and all personnel engaged in the provision of the Works shall attend all Safety Inductions as required by the Transnet Officer as directed through the Project Manager

c) The Contractor and all personnel engaged in the provision of the Works shall attend all Safety Inductions as required by the Employer's Safety Officer, Employer's Electrical Engineer and/or as directed by the Project Manager.
d) All work carried out on roadways or adjacent to railway lines shall require necessary permits or occupation.
e) The Contractor shall make arrangements for the Transnet official (TPT manager) to arrange for the necessary permits or occupations with relevant parties during the execution of the Works.
f) All personnel working adjacent to railway lines in shunting yards are required to daily advice the TFR Yard Master and indicate the time of entry, time of exit and the details of the work carried out.
g) The Contractor shall obtain access permits from the TPT Permit Office, and the Safety Officer before accessing the sites.
h) The Contractor shall obtain the relevant work permits from the Employer's Safety Officer before performing any work.
i) The Contractor shall at all times comply with the Transnet E7/1 Safety Instructions "Specification for Works On, Over, Under or Adjacent to Railway Lines and Near High Voltage Equipment" whilst providing the Works.
j) The Safety Inductions, Access Permits and Work Permits are part of this contract and the Contractor shall make allowance for it in his Price and Programme.
k) The Contractor shall ensure that all relevant safety inductions and access permits are obtained well before the Site Access Date as reflected in the Contract Data.
l) The Contractor shall provide all staff working within the Port area of construction with Contractor identification cards which detail the person's name, identity number and the foreman / engineer responsible. The provision of construction personnel with ID cards is considered part of this contract and shall be made by the Contractor to a standard acceptable to the Project Manager and the Contractor shall make allowance for it in his Price and Programme.
m) The Contractor is to be in constant consultation and cooperation with the Port's security operations to ensure compliance with all the required security procedures and the Contractor shall make allowance for it in his Price and Programme.

3.1.2 RESTRICTIONS TO ACCESS ON SITE, ROADS, WALKWAYS AND BARRICADES

3.1.2.1 Access route to the port

a) All vehicles are subject to security checks and all Plant and Equipment brought into the Port and leaving the Port are required to be security cleared by the relevant authorities (Project Manager and TPT Security Manager) before access or exit is granted, as the situation may require.
b) The Contractor is required to arrange for the clearing of the items with the Project Manager and the TPT Security Manager well in advance of the access or exit requirement to avoid delays in the provision of the Works.
c) The Contractor ensures that any of his staff, labour and Equipment moving outside of his allocated Sites and Working Areas does not obstruct the Employer's operations. To this end access routes are allocated and co-ordinated by the Contractor in liaison with the Project Manager.
d) The Contractor ensures the safe passage of traffic, to and around the various sites and Working Areas at all times. This includes providing flagmen, protective barriers, signage, etc. for protection, direction and control of traffic.
e) The Contractor shall provide designated, signed and demarcated walkways for all personnel who are required to traverse between the different working areas at the various sites. Personnel outside of the designated walkways are required to be conducting work activities, and when traversing, are required to use the designated walkways.

f) The Contractor plans and organises his work in such a manner so as to cause the least possible disruption to the Employer's operations.

3.1.2.2 Barricades and fencing around sites

a) The Contractor shall be responsible for providing a temporary barricade fence between the port operations, roadway and railway traffic and the construction sites and maintaining, providing, and/or relocating the fence, if required for construction purposes, to ensure the boundary fence is continuous, and the Contractor shall make allowance for it in his Price and Programme.

b) The Contractor shall ensure that his site office where equipment may be stored, prepared or refurbished has an access gate that is manned 24hrs a day for the duration of the Works and over any builder's breaks, by a Security Provider acceptable to the Project Manager and registered with the PSIRA and the Contractor shall make allowance for it in his Price and Programme.

3.1.2.3 Restrictions to access on site

a) The Contractor is prohibited from entering the Employer's Operational Areas, unless authorised to do so.

b) The Contractor plans and organises his work in such a manner so as to cause the least possible disruption to the Employer's operations.

c) The Contractor ensures that all his construction staff, labour, and Equipment remains within his allocated and fenced off construction areas.

3.1.2.4 People restrictions on site; hours of work, conduct and records:

d) The working hours shall be in accordance with the requirements of the Department of Labour or with the agreement of the relevant trade unions. This information relating to working hours shall be supplied to the Project Manager prior to commencement of the proposed working hours.

e) The Contractor complies with a nine (9) hour a day, five (5) day a week standard work day/week for all activities to be undertaken by his people (including Sub-contractors) employed on site.

f) Work times (i.e. start and end times within a standard work day) shall be as mutually agreed with the Project Manager.

g) In the event that the Contractor requests to work overtime to make up for time lost due to his own delays, the Contractor will be liable for the supervision cost required from the Employer's team during the Works.

h) The Contractor keeps daily records of his people, Plant and equipment engaged on the Site and Working Areas (including Sub-Contractors) with access to such daily records available for inspection by the Project Manager at all reasonable times

i) Minimum requirements of people employed on the Site are as follows:
- South African identity document or passport/ visa and work permit for foreign nationals;
- Employment of local labour only for unskilled and semi-skilled job categories as per PIRPMP;
- Secondment of skilled core/ permanent employees if skills are not locally available;
- Pre-employment medical examinations; and
- Induction in IR matters and conditions of employment on the Project.

j) The Contractor complies with the requirements of the IRCC involving the engineering construction Contractors engaged (including all future Contractors) by the Employer.

3.1.3 HEALTH AND SAFETY FACILITIES ON SITE

a) The Contractor complies with the requirements stated under paragraph entitled "Safety Risk Management" of the Employer's Works Information.

3.1.4 ENVIRONMENTAL CONTROLS, FAUNA & FLORA, DEALING WITH OBJECTS OF HISTORICAL INTEREST

b) The Contractor complies with the CEMP, SES and PES in the construction of the Works, all as described under paragraph "Environmental constraints and management" of the Employer's Works Information.

3.1.5 TITLE TO MATERIALS FROM DEMOLITION AND EXCAVATION

a) The Contractor has no title to any materials arising from excavation, dismantling and demolition in the performance of the Works with title to such materials remaining with the Employer. The Contractor informs the Project Manager immediately upon encountering any such materials who shall then instruct the Contractor how to label, mark, set aside and/or dispose of such materials for the benefit of the Employer in accordance with ECC3 Clause 73.1

3.1.6 COOPERATING WITH AND OBTAINING ACCEPTANCE OF OTHERS

3.1.6.1 THE CONTRACTOR PERFORMS THE WORKS AND CO-OPERATES WITH:

a) The Contractor performs the Works and co-operates with the Employer (including the agents of the Employer) who operate on Site during the entire duration of the Contract period.
b) The Contractor performs the works and co-operates with The TPT manager and agents of TPT, as directed by the Project Manager, who operate on Site during the entire duration of the Contract period.
c) The Contractor performs the Works and co-operates with others, of whom the Contractor is to be notified once appointed by the Employer, who operate on Site during the entire duration of the Contract period.

3.1.6.2 PUBLICITY AND PROGRESS PHOTOGRAPHS

a) The Contractor shall obtain the permission and approval of the Project Manager before erecting any notice boards, using the details of the contract in any advertising media or revealing any details of the contract to the public.
b) The Contractor does not advertise the contract or the project to any third party, nor communicate directly with the media (in any jurisdiction) whatsoever without the express written notification and consent of the Project Manager.
c) The Contractor provides progress photographs at monthly intervals in digital format as part of the Contractor's monthly programme narrative report. The photos shall include detailed, close up photos of construction activities.

3.1.7 CONTRACTOR'S EQUIPMENT

a) The Contractor keeps daily records of his Equipment used on Site and the Working Areas (distinguishing between owned and hired Equipment) with access to such daily records available for inspection by the Project Manager at all reasonable times.
b) The Contractor complies with the following permissions and restrictions in the use of Equipment as required by the Employer:
    - Equipment used by the Contractor to Provide the Works shall be prepared, painted, assembled and disassembled within the Contractor's Work Area and Site boundaries or lay-down areas as authorised by the Project Manager.

- The Contractor is required to remove all equipment that is not part of the Works from site after completion of the Works and before de-establishment of the site.
- All and any equipment used by the Contractor for the provision of the Works shall comply to the Employer's SHEQ regulations and restrictions, or any other statutory Health and Safety requirements as directed by the Project Manager in liaison with the Employer's Engineers or the Employers Consultants.

3.1.8 EQUIPMENT PROVIDED BY THE EMPLOYER

The *Employer* shall not provide any Equipment to the *Contractor* for the purposes of this contract.

3.1.9 SITE SERVICES AND FACILITIES:

3.1.9.1 The *employer* provides the following facilities for the *contractor*:

a) For the duration of the Contract, the Project Manager will provide an area, free of charge, for the Contractor to establish his offices, lay down areas, stores, high mast refurbishment, preparation and painting area, workshops, and other Contractor's Equipment.
b) The locations of the potential lay down areas will be identified at the site clarification meeting. The Contractor may establish a site camp anywhere within the boundary of this area that does not impede the provision of the Works.
c) The Contractor shall ensure that the area used has a suitable continuous security fence and the necessary access gates if required or instructed by the project manager.
d) The Contractor shall submit details of the layout of his Site establishment to the Project Manager for his acceptance.
e) All costs for preparation of the Site establishment area shall be for the Contractor's account.
f) The Contractor shall provide everything else necessary for providing the Works.

3.1.10 CONNECTIONS TO SERVICES FOR CONTRACTOR'S USE:

a) 50mm Isolation valve for construction potable water; and circuit breaker for construction power at 380 Volts, 3-Phase and Neutral, 50 Hz. – PLEASE CONFIRM WHETHER THIS IS AVAILABLE.
b) No connection to a sewer system will be made available and thus the Contractor will have to make provision for the containment and disposal of foul water from toilets, ablutions, basins, etc.
c) The Contractor shall provide everything necessary for providing the Works in accordance with this contract and attached Annexures.
d) Wherever the *Employer* provides facilities if applicable in the context of this contract, (including, *inter alia*, temporary power, water, waste disposal, telecommunications etc.) for the *Contractor*'*s* use within the Working Areas and the *Contractor* adapts such facilities for use, then the *Contractor* makes good and provides full reinstatement to the land (including all apparatus of the *Employer* and Others in, on or under the land) and surrounding areas to its original standard upon dismantling of such facilities and hand-back to the *Employer*.

3.1.11 FACILITIES PROVIDED BY THE CONTRACTOR:

a) The Contractor ensures that the site establishment area is compliant with the relevant safety regulations and restrictions, is clearly sign posted, and has a suitable security fence, lighting and the necessary access control gates.
b) All costs for preparation of the site establishment area are to be allowed for in the Contractor's Price.
c) The Contractor submits details of the layout of his site establishment to the Project Manager for his acceptance.
d) The Contractor installs a metering device, which is acceptable to the Project Manager and the Employer's Engineers, immediately downstream at each of the Employer's connections (if

applicable in the context of this contract) from where he draws services. The Contractor provides the Project Manager details of his monthly consumption of potable water and power.

e) The Contractor is responsible for his own connection to the Employer's services and for the reticulation of his services from the connection point. The cost of meters, connections, reticulation and all other usage costs associated with the provision of services are included in Price.

f) The Contractor provides the Project Manager with a "Certificate of Compliance" (COC), by an "Accredited" Person as defined by the OHS Act, in respect of his Construction Power electrical installation. The Project Manager only makes construction power available upon receipt of the COC.

g) The Supervisor (or his nominated representative) conducts routine inspections of the Contractor's construction power reticulation and power tools. If found to be un-safe and / or non-compliant with statutory requirements, the electrical power supply is disconnected until the Contractor rectifies all defaults.

h) The Contractor shall be responsible for providing water and power for all other Working Areas where not provided by Employer.

i) The Contractor provides, at his cost, a sufficient number of toilets and maintains them in a clean and sanitary working condition.

j) The Contractor provides temporary lighting and fencing around every section occupied by him during the construction of the works.

k) Such fencing demarcates and secures the construction area. The fencing is erected before any work starts and is removed only upon completion of the work in that area.

l) The Contractor includes for all costs for such lighting and fencing, including access control into and out of these restricted areas.

m) Wherever the Contractor provides facilities (either his own or for the Project Manager and/or Supervisor) and all items of equipment, involving, inter alia, offices, accommodation, laboratories, materials storage, etc., within the Working Areas, then the Contractor makes good and provides full reinstatement to the land (including all apparatus of the Employer and Others in, on or under the land) and surrounding areas to its original standard, upon dismantling of such facilities and items of Equipment.

n) Upon Completion the Contractor completely removes from the Site and Working Areas all his Equipment, including the foundations of any structures, stores, office accommodation or any other asset belonging to him, and leaves the Site and Working Areas in a tidy condition to the satisfaction of the Project Manager.

o) No excess or discarded materials or equipment may be buried or dumped within the port boundary.

p) Demolition of all temporary structures, surfaces etc. shall be first approved by the Project Manager prior to the work being carried out.

q) The Employer does not provide any security for the Site and Working Areas. The Contractor provides same and indemnifies and holds indemnified the Project Manager and Employer against any claims and actions that may arise out of Site and Working Area security.

r) No housing is available for the Contractor's employees. The Contractor makes his own arrangements to house his employees and transports them to Site in a closed vehicle specifically designed for passenger transport (bus or similar) accepted by the Project Manager.

s) Wherever the Employer provides facilities for the Contractor's use and the Contractor adapts such facilities for use, then the Contractor makes good and provides full reinstatement to the land (including all apparatus of the Employer and Others in, on or under the land) and surrounding areas to its original standard upon dismantling of such facilities and hand-back to the Employer.

t) The Contractor shall provide, maintain and remove lockable portable chemical type toilets.

u) The Contractor shall provide a suitably sized construction power supply by means of either municipal supply, or Generation Plant equipment, as required.
v) The Contractor shall be wholly responsible for the provision of this power supply, and shall make all the necessary arrangements for the supply, and the maintenance of the supply for the duration of the Works.
w) Wherever the Contractor provides facilities (either his own or for the Project Manager and/or Supervisor) and all items of Equipment, involving, inter alia, offices, accommodation, laboratories, Materials storage, compound areas etc., within the Working Areas, then the Contractor makes good and provides full reinstatement to the land (including all apparatus of the Employer and Others in, on or under the land) and surrounding areas to its original standard, upon dismantling of such facilities and items of Equipment.
x) Unless explicitly stated as a responsibility of the Employer, Site services and facilities, Connections to Services for Contractors' use and all residual requirements for the provision of facilities and all items of Equipment necessary for the Contractor to Provide the Works remains the responsibility of the Contractor.

3.1.12 EXISTING PREMISES, INSPECTION OF ADJOINING PROPERTIES AND CHECKING WORK OF OTHERS

a) The Contractor will be held responsible for any damage to the existing structures and surfacing caused by the Contractor during the execution of this contract; fair wear and tear excluded, and shall repair it to the satisfaction of the Supervisor on conclusion of the Works.
b) For this purpose a joint inspection with the Supervisor will be carried out prior to occupation of the site(s) and any existing damage noted.
c) The Contractor is required to forward a photographic report following the inspection to the Project Manager for record purposes.

3.1.13 EXCAVATIONS AND ASSOCIATED WATER CONTROL

3.1.13.1 The *contractor* complies with the following requirements:

a) Where applicable, the Contractor protects all excavations against any water ingress whether by seepage, rains, storms, floods or any other means.
b) Where applicable, the Contractor immediately removes any water found in the excavation by pumping and / or bailing and provides all necessary Equipment (pumps, pipes, etc.) to do so.
c) Water is cleared in such a way that it cannot slip or flow back into the excavations.
d) The Contractor shall install shoring where necessary, and in all deep excavations to ensure that the sides of the excavation does not collapse.
e) The Contractor shall comply with the Employer's SHEQ policy in all respects for the Provision of the Works involving deep excavations.
f) All activities related to excavations and water control forms part of this contract, and the Contractor shall make allowance for these activities in his Price and Programme.

3.1.14 UNDERGROUND SERVICES, OTHER EXISTING SERVICES, CABLE AND PIPE TRENCHES AND COVERS

3.1.14.1 Where the *contractor* encounters existing underground services or existing service cables, the *contractor* undertakes the following:

a) The Contractor is required to liaise with the Project Manager, and the Supervisor and the Employer's Engineers, and establish as accurately as possible the location of the various existing services situated within the Work Area and record all such information on a suitable "marked-up" drawing for reference at all times.
b) In addition to the above, the Contractor shall consult the Project Manager, the Supervisor and the Employer's Engineers, prior to undertaking any excavation work.

c) Where the Contractor encounters existing underground services / existing services cables / pipe trenches, the Contractor is to notify the Project Manager, the Supervisor and the Employers Engineers.
d) Where the encountered services are causing a delay in the provision of the Works, the Contractor shall approach the Project Manager, the Supervisor and the Employer's Engineers for a decision by submitting a Field Engineering Query (FEQ).
e) The Contractor shall then provide the solution described in the answered FEQ.
f) The Contractor must thereafter exercise due care and attention in carrying out the agreed excavation Works and any Works as may be directed by the Project Manager to avoid damage or disruption to existing services.
g) The Contractor shall be liable for all claims arising out of any damage caused by such excavation if the Contractor fails to exercise the requisite care and attention in carrying out the excavation.
h) The cost of locating and protecting, if necessary, services shall be included in the rates for the services intersecting and adjoining the trenches.
i) A group of cables intersecting or adjoining a trench will be regarded as one service.
j) The existing services shall be protected when excavating.
k) The costs of protecting these services shall be included in the rates for excavation and compaction.
l) All existing services shall be treated as in service and "live". All necessary Safety Instructions of the Employer and statutory requirements as per the OHSAct and its Regulations shall be complied with in the handling of the "live" service.
m) In the case of electrical services the Contractor shall trace, locate and identify all cables within the service and record the information as per this Works Information above.

3.1.15 CONTROL OF NOISE, DUST, WATER AND WASTE

3.1.15.1 The *contractor* complies with the following:

a) Before moving Equipment onto the Site and Working Areas and commencing the Works, the Contractor submits his proposed methods of construction which demonstrate the measures taken to avoid and or reduce any environmental and health issues arising from dust, noise and vibration for acceptance by the Project Manager.

3.1.16 SEQUENCES OF CONSTRUCTION OR INSTALLATION

3.1.16.1 The contractor complies with the following:

a) The Contractor is hereby informed of the requirements of maintaining the continuity of supply to the Terminal, and is required to arrange and sequence his Works so as to ensure that there is no disruption to the operations.
b) Should it be impossible to avoid a disruption as described in (a.1) above, the Contractor shall notify the Project Manager, Supervisor and the Employers Engineers 21 days before the anticipated disruption and request authorization to commence with the aspect of the Works that will cause the disruption. The Contractor shall not proceed without said authorization to proceed.

3.1.17 GIVING NOTICE OF WORK TO BE COVERED UP

a) The Contractor notifies the Supervisor in writing of any elements of the Works which are to be covered up. This notification is given not less than 48 (forty eight) hours prior to the proposed covering up.
b) The Contractor shall not cover the Works without the authorization of the Supervisor.
c) The Contractor shall make the Project Manager and Supervisor aware of any tests and inspections required by the Employer's Quality Management Procedures. Notification of

required test and/or the Employers Engineers inspections to be given 24 (twenty four) hours in advance.

3.2 COMPLETION, TESTING, COMMISSIONING AND CORRECTION OF DEFECTS

3.2.1 THE *WORK* TO BE DONE BY THE COMPLETION DATE

a) On or before the Completion Date or Sectional Completion Date, the Contractor shall have done everything required to Provide the Works including removal of his establishment and equipment from the respective sites but excluding the work listed below which may be done after the Completion Date but in any case before the dates stated.
b) The Project Manager cannot certify Completion until all the work except that listed below has been done and is also free of Defects, which would have, in his opinion, prevented the Employer from using the Works and Others from doing their work.

Item of work	**To be completed by**
As built drawings as specified in the Works information	14 days prior to Completion
Performance testing of the Works	Sectional Completion dates
Issuing of COC's	Sectional Completion dates

3.2.2 USE OF THE WORKS BEFORE COMPLETION HAS BEEN CERTIFIED

3.2.2.1 The *employer* uses the following part / parts of the *works* before completion is certified by the *project manager* which do not constitute take over by the *employer* for the reason(s) stated:

a) All Cable, Switchgear, Protection relays, Control Systems Plant and Software or any other Electrical Plant installed by the Contractor so that the Employer may maintain the functionality of systems and existing Plant that is required by the Employer to conduct the Employer's operational activities, and the operational activities of TPT.
b) All Cable, Switchgear, Protection relays, Control Systems Plant and Software or any other Electrical Plant installed by the Contractor so that the Employer may maintain the continuity of the Electrical Supply to the lighting in the Port Terminal.
c) Any temporary or permanent Lighting installation installed by the Contractor that may be required by the Employer to be used for the night time operational activities of TPT or others, as required by the Project Manager.

3.2.3 MATERIALS FACILITIES AND SAMPLES FOR TESTS AND INSPECTIONS

3.2.3.1 The contractor provides the employer with the following materials, facilities and samples during the provision of the works, as per ecc clause 40.2:

a) The Contractor shall furnish samples of any Plant and Materials that is other than, or different to, that specified by the Employer's Engineers, to the Supervisor for Acceptance by the Employer's Engineers. The Contractor is prohibited from installing said Plant without the required prior authorization from the Employers Engineers.
b) The Contractor shall furnish samples of any Plant and Materials that is other than, or different to, that required by the Employer's Engineering Specifications, that shall be utilised in the Contractor's Designs, to the Supervisor for Acceptance by the Employer's Engineers. The

Contractor is prohibited from installing said Plant without the required prior authorization from the Employer's Engineers.

c) The Contractor shall supply concrete mix designs to Transnet specifications, concrete cube tests, compaction results, steelwork shop detail drawings for approval, steelwork material certificates.

d) The Contractor shall furnish samples of any Plant and Materials that is proposed to be used in the Contractor's Designs, to the Supervisor for Acceptance by the Employer's Engineers. The Contractor is prohibited from designing with, and subsequently installing said Plant and Materials without the required prior authorization from the Employer's Engineers.

e) Samples, tests and inspections required of the Contractor, shall be as specified in Paragraph 4 of C3.1 or any other standards, specifications or statutory requirements referred to therein or annexed thereto.

f) The Contractor shall give notice to the Supervisor of the required inspection not less than 48 hours before the inspection is required.

g) The Employer will not provide any materials or facilities for the use of the Contractor, to perform tests and inspections.

3.2.4 PRE-COMMISSIONING TESTS AND COMMISSIONING

a) The Contractor is referred to the list of Annexures for TGC's High Level Commissioning Plan for details of the inspections tests and activities required for commissioning of Plant. Where the word or expression in the former document reads "Equipment" the meaning is "Plant" and vice versa.

b) After the Pole is erected, headgear and ring must be lowered and raised to test the operation on the pole of High Mast Pole gear.

c) Contractor to provide the certification of all steel wire ropes and shackles.

d) The Contractor shall arrange for Factory Acceptance Testing of selected Electrical Plant, as required by the Employer's Engineers at the supplier's premises and/or factory of manufacture before any Plant is despatched to Site.

e) The Factory Acceptance Testing shall be witnessed by the Employers Engineers, but in doing so; the Employers Engineers assume no responsibility or accountability for the proper functionality of the Plant in any way whatsoever.

f) The Contractor shall arrange for Factory Acceptance testing for Electrical Plant at the factory of manufacture before the Plant leaves the factory.

g) The Contractor shall arrange Site Acceptance Testing for the selected Plant when it arrives on Site.

h) The Site Acceptance Testing shall be witnessed by the Employers Engineers, but in doing so; the Employers Engineers assume no responsibility or accountability for the proper functionality of the Plant in any way whatsoever.

i) The Employer will make its own arrangements for attendance of FATs and will carry all costs associated with its personnel attending FATs.

j) The Contractor shall appoint an independent ECSA registered commissioning engineer to conduct and coordinate the commissioning activities. The Curriculum Vitae of the commissioning engineer shall be submitted to the Project Manager and Employer's Engineers for acceptance before his appointment.

k) The Employer's Engineers and/or the Project Manager reserves the right to reject the proposed commissioning engineer if he is deemed unsuitable to carry out the commissioning activities as required by the Employer and the Employer's Engineers.

l) The installation shall be comprehensively tested and commissioned as individual and integrated systems as may be required by the configuration, after the Works are substantially complete.

m) The Contractor shall provide adequate and competent personnel for testing and commissioning of every particular installation and for the full duration of the commissioning process.
n) The commissioning shall include interaction between other systems and others where interdependence of installations is encountered.
o) The commissioning process shall, after all testing has been completed be the final proving ground of the systems and during this procedure the installations shall be subjected to all possible inputs and actions which may be encountered under operational conditions.
p) The Contractor shall prove the full operation, working and compliance of the installation in accordance with the specifications.
q) A detailed programme of the planned commissioning procedures shall be submitted to the Project Manager and Employer's Engineers at least 4 weeks before commissioning commences.

The commissioning programme shall include but is not limited to:

- A schedule of equipment to be commissioned, the proposed tests to be conducted and the testing methods and the range of acceptable results,
- Commissioning check sheets,
- Commissioning programme dates and duration

r) The Contractor shall supply all relevant test equipment, monitoring devices, network analysers, protocol testers/analysers etc. required to test and commission the complete Works.
s) An accurate record of all commissioning and testing is to be taken and included in the handover documentation as a permanent record.
t) The Contractor shall perform any and all tests as required by any Sections or Clauses of the Works Information and any and all tests required by the Employers Specifications annexed thereto, and any and all tests required by any applicable SANS Standard, or other Standard, and/or as directed by the Employer's Engineers and the Project Manager.
u) Testing and commissioning is considered part of the Works and is to be done before completion.

3.2.5 TAKE OVER PROCEDURES

3.2.6 The *contractor* provides the following assistance to the *employer*:

a) The Contractor ensures that all the required documentation as described in the Works Information is presented to the Project Manager before Completion.
b) The Contractor ensures that the Project Manager has a full and accurate dossier of As-built documents that represent the completed Works for Electrical, General Layouts and Detail Drawings to present to the Employer.
c) The Contractor ensures that the Project Manager has a full and accurate dossier of Maintenance and Operating Manuals that represent the completed Works for Electrical, General Layouts and Detail Drawings prior to take-over or Completion.
d) Where the Contractor has presented Maintenance and Operating Manuals that represent the Lighting, Switchgear, Services and systems (lighting control systems) that reflect the status of the completed Works for Electrical, General Layouts and Detail Drawings to the Project Manager at take-over, the Contractor modifies and updates As-built documents as necessary prior to Completion.
e) The Contractor shall ensure that all cellular, wireless and radio communication link applications, and licencing for the lighting control system are made on behalf of the Employer.

3.2.7 ACCESS GIVEN BY THE EMPLOYER FOR CORRECTION OF DEFECTS

3.2.7.1 The contractor complies with the following constraints and procedures of the employer where the project manager arranges access for the contractor after completion:

a) Access into areas already handed over by the Contractor for correction of any defect shall be subject to the approval of Port's Operations, and these times shall be communicated to the Contractor by the Project Manager.
b) The areas required by the Contractor will need to be temporarily barricaded by the Contractor before the Contractor commences with any corrective work.

3.2.7.2 The contractor complies with the following constraints and procedures of the employer where the project manager arranges access for the contractor after completion:

a) Where the Contractor has to return to Site after Completion to rectify notified Defects, the Employer may either impose the same Site access / egress restrictions as communicated elsewhere under C3.1 Employer's Works Information at the starting date / access date stated under Contract Data - Part One, or as the Works are now in use or the Employer's occupation of the Site may be incrementally or substantially changed post Completion, there may be further access / egress restrictions as required by the Employer and/The Port Terminal.

3.2.8 PERFORMANCE TESTS AFTER COMPLETION

3.2.8.1 The *contractor* performs the following performance tests after completion of the *works*:

a) The Contractor shall be required to measure and record the lighting levels at all zones to the satisfaction of the Employer's Engineers, OHS Act requirements and applicable SANS standard.

3.2.9 TRAINING AND TECHNOLOGY TRANSFER

3.2.9.1 The *contractor* facilitates the following requirements for training workshops after completion for the *works* in use:

a) The Contractor shall provide training for the Employer's selected staff in the maintenance and operations of all specialised Plant and Systems and Software including the lighting control system.
b) The Training shall be comprehensive with printed training manuals and electronic copies of such manuals made available to each delegate.
c) The Employer envisages that the number of staff required to be trained will be approximately 15, the exact number to be confirmed by the Project Manager during the provision of the Works.

3.2.10 OPERATIONAL MAINTENANCE AFTER COMPLETION

3.2.10.1 The *contractor performs* the following operational maintenance in relation to the *works* after completion:

a) The Contractor shall arrange for with the OEM for technical support and operational maintenance (by means of an OEM service and maintenance contract) to TPT for the lighting control systems for a period of 24 months after completion.
b) After the expiry of the 24 month period, the OEM shall be required to offer a renewal of these contracts to TPT, at the same contract Price for the period, plus reasonable escalation, however, TPT reserves the right to decline the offer.
c) The Contractor shall provide maintenance contracts for Plant as contained and required anywhere else in this Works Information.

4 PLANT AND MATERIALS STANDARDS AND WORKMANSHIP

4.1 PLANT AND MATERIALS

a) The Contractor provides Plant and Materials for inclusion in the Works in accordance with the Standard Specifications and/or Project Specifications, unless otherwise stated elsewhere in the Works Information provided by the Employer. All Plant and Materials are new, unless the use of old or refurbished goods and/or Materials are expressly permitted as stated elsewhere in this Works Information or as may be subsequently instructed by the Project Manager.
b) The Contractor replaces any Plant and Materials subject to breakages (whether in the Working Areas or not) or any Plant and Materials not conforming to standards or specifications stated and notifies the Project Manager and the Supervisor on each occasion where replacement is required.
c) Lights to be reused as retrofits on high mast lights will be considered as "free issue" by the Employer. These lights shall be refurbished in accordance with the HML refurbishment specification.
d) The Contractor provides all Plant and Materials necessary for the Works.
e) The Contractor supplies all certification including test certificates, user manuals, maintenance manuals and data books with respect to Plant and Materials procured for the Works:

4.2 INVESTIGATION, SURVEY AND SITE CLEARANCE

a) The Contractor will be responsible for setting out the Works.
b) The Contractor validates the information provided by the Project Manager.
c) Prior to commencing the Works the Contractor records any defects or inaccuracies related to the existing structures, paving, etc. and presents this record to the Project Manager for acceptance. Only items recorded in this manner will be accepted as having pre-existed the Works and the remedying of all other damage will be the Contractor's responsibility and for his cost.

5 ELECTRICAL AND MECHANICAL ENGINEERING WORKS

5.1 HIGH LEVEL SCOPE OF WORK

The scope to be carried out by the *Contractor* shall include but not be limited to the following mechanical and electrical works:

a. The Supply, Delivery, installation and commissioning of all the associated works for the high mast lighting Upgrade for the Durban Transnet Port Terminal at the Multi-Purpose Terminal and Car Terminal.
b. The design, supply and installation of lightning protection and earthing of the lighting structures.
c. The Supply delivery and Installation of cabling and terminations, to power the lighting and associated infrastructure where necessary.
d. Removal and replacement of safety chains
e. Mounting of safety chains
f. Removal and replacement of D-shackles
g. Removal and replacement of turn buckles
h. Replacement of mast, complete with head, luminaries and splinter box
i. Lighting Designs
j. Removal and replacement of luminaries
k. Removal and replacement of splinter boxes
l. Replacement of spikes
m. Replacement of canopies
n. Removal and replacement of stainless steel wire rope
o. Replacement of DB covers
p. Securing of DB covers

q. Replacement of light fittings
r. Removal and replacement of socket outlets
s. Removal and replacement of DB's
t. Removal and replacement of earthing wires
u. Powering of high mast lights
v. Removal and replacement of Pratley boxes
w. Testing and fixing of electrical faults
x. Refurbishment or maintenance work as per the maintenance schedule/specification
y. Prepare, sandblast and galvanize headgear
z. Supply and install new rollers for headgear
aa. Commission and testing of the entire installation and hand over to the Employer

5.1.1 GENERAL

a) Transnet's Port electrical appointed personnel shall perform all the required switching and control work permits.
b) For any required switching, the Contractor shall submit a notification to the Project Manager seven days prior to the required work being performed.

5.1.2 STANDARD OF WORK, PLANT & MATERIALS AND NOTES

a) The electrical installation shall conform to the requirements of the latest edition and amendments of SANS 10142-1 Code of Practice for the Wiring of Premises and any additional requirements thereto, described in this specification.
b) All Plant and Material used shall be of high quality and the work shall be of a high standard of workmanship carried out by qualified staff under proper supervision by experienced and competent officers.
c) All Plant and Material shall comply with the relevant National or International standard specification.
d) The contractor's designs for earthing and lightning protection shall include surge protection for LED luminaire.
e) All OEM and contractor's designs shall be submitted to the employer's engineer for acceptance prior procurements of equipment. The pricing for shop drawings, contractor's designs and all returnables for acceptance shall be priced under the design, supply and install item of the BOQ.

5.1.3 TRANSNET SPECIFICATIONS

All *Design's* undertaken, *Plant's* and *Materials* supplied by the *Contractor* in agreement with the *Employer*, with the intention to execute the works detailed in this document, shall comply in general with all associated Transnet Specifications listed below. It is understood that Transnet Specification requirements are more stringent than the SANS standard requirements, the *Contractor* is required to fully comply with the Transnet Specifications. In the case where SANS standard is stringent than Transnet Standard, the *Contractor* shall comply with SANS Standard. The contractor shall also verify all site details given in the employers' drawings.

TPD-002-DBSPEC	Annexure A	Technical specification for low voltage distribution boards
TPD-003-CABLESPEC	Annexure B	Technical specification for medium and low voltage cables
TPD-004-EARTHINGSPEC	Annexure C	Technical specification for earthing and the protection of buildings and structures against lightning

TDPLED FLOODLIGHT LUMINAIRE SPEC	Annexure D	Specification For The Supply Of Luminaires For Lighting Of Yards And Highmast Lighting
TPD-010A-HIGHMASTSPEC-A	Annexure E	Specification for the design, supply and installation of high mast lighting.
TPD-010B-HIGHMASTSPEC-B	Annexure F	Specification for the maintenance and upgrade of high mast lighting structures.
E7/1 (July 1998)	Annexure G	Specification For Works On, Over, Under Or Adjacent To Railway Lines And Near High Voltage Equipment

5.1.4 SERVICE CONDITIONS

The Plant and Material shall be designed and rated for continuous operation under the following conditions.

5.1.4.1 Ambient/environment conditions:

All Plant and Material offered shall be rated for continuous operation under the following conditions:

- Altitude: 0 to 1800m Above Sea Level
- Ambient temperature: -5°C to +40°C (daily average +35°C)
- Relative humidity: As high as 96%
- Lightning conditions: Severe, with a maximum lightning ground flash density of 11 flashes per km² per annum.
- Lightning conditions: Salt laden and corrosive industrial Chemical and dust nature. Frequent Heavy rains driven by wind reaching Speed of 100Km/h and above.

5.1.4.2 Lightning conditions

All lightning protection Plant and Material offered shall be rated to withstand the following conditions:

- Current: The peak lightning current and its rate of rise of rise Shall be regarded as severe when IMAX = 200kA.
- Voltage: The highest cloud potential shall be assumed to be More than 100MV, where; Q = CV, where Q is Assumed at 100C and C to be 10-7

5.1.5 NORMATIVE REFERENCES

The following publications and specifications (latest edition) shall apply where contextually correct:

SANS 10313	Protection against Lightning – Physical damage to structures and life hazard
SANS 10064	Code Of Practice For The Preparation Of Steel Surfaces For Coating.
SANS10142-1	Code Of Practice For The Wiring Of Premises
SANS 10389-1	Exterior Lighting Part 1: Artificial Lighting Of Exterior Areas For Work And Safety

OHS Act	Occupational Health And Safety Act Of 1993
SANS 10199	The Design And Installation Of Earth Electrodes
SANS152	Low Voltage Air Breaker Switches, Connectors, Switch Disconnectors, Fuse Combination Units.
SANS 172	Low Voltage Fuses
SANS 767-1	Earth Leakage Protection Units.
SABS 763	Hot Dip Zinc (Galvanised) Coatings
SANS 890-1	Ballasts For Fluorescent Lamps:
SABS 950	Non-metallic Conduit And Fittings.
SANS 1091	National Colour Standards For Paints.
SANS 1012	Electric Light Dimmers
SANS 1065-1	Metal Conduits And Fittings For Electrical Wiring
SABS 1180	Electrical Distribution Boards
SANS 1507	Electric Cables With Extruded Solid Dielectric Installation For Fixed Installations
SANS 1279	Floodlight Luminaires
SABS IEC 439	Low Voltage Switchgear
SABS IEC 309	Plugs, Socket Outlets And Couplers For Industrial Purposes
SABS IEC 742	Isolating Transformers And Safety Isolating Transformers

5.2 DETAILED SCOPE

5.2.1 MAIN CAR PARK

5.2.1.1 MAST NO.40/503

a) The Contractor shall uninstall the existing 11x400W Light fittings and 4xStreet Light fittings complete with the head ring of the existing 30m High Mast Pole and issue the luminaires to TPT. *The fittings in a good condition shall be reused to replace the existing fittings in other high mast poles in the same contract.*

b) The *Contractor* shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B.

c) The *Contractor* shall design, supply, and install a complete new lighting on the existing 30m High Mast Pole. The contractor shall demonstrate the suitability of the incomer cable and the existing cable from the DB supplying the luminaires. The design shall be complete with a new DB and mountings for the luminaires. The design shall be done in equal or similar approved to the most recent relux software. The design shall consider all nearest light sources, show aiming angles and orientation to address glare, light pollution and to archive compliance to the recommended values of the OHS Act: Lighting Regulations and SANS 10389.

d) 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K have been used on a preliminary design by the *employer* for benchmarking and pricing purposes. Equal or similar approved range of product shall be used by the bidder subject to simulations submitted to the *Employer's* Engineer for acceptance.

e) The Contractor shall design, supply and install the earthing and lightning protection system for the HML. The *Contractor* shall tie the new installation to the existing suitable earthing and lightning protection system upon testing the integrity of the existing earthing and lightning protection. The results and recommendations shall be submitted to the *Employer's* Engineer for acceptance.

f) The Contractor shall supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. The Contractor shall supply and install an equal or similar approved to a WiFi enabled Lenovo A740 workstation with an i3 processor, 27 inch touch screen monitor complete with network adaptor and USB RJ45 adapter to control the dimming functionality of the high mast lighting. The system shall be wall mounted in a hinged lockable stainless steel box with cut-out for the monitor screen. The system shall be installed in the TPT office within the site. The Contractor shall also configure, programme and commission the system.

g) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.1.2 MAST NO.46/503

a) The Contractor shall uninstall the existing 11x400W Light fittings and 4xStreet Light fittings complete with the head ring of the existing 30m High Mast Pole and issue the luminaires to TPT. The fittings in a good condition shall be reused to replace the existing fittings in other high mast poles in the same contract.

b) The *Contractor* shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B.

c) The Contractor shall design, supply, and install a complete new lighting on the existing 30m High Mast Pole. The contractor shall demonstrate the suitability of the incomer cable and the existing cable from the DB supplying the luminaires. The design shall be complete with a new DB and mountings for the luminaires. The design shall be done in equal or similar approved to the most recent relux software. The design shall consider all nearest light sources, show aiming angles and orientation to address glare, light pollution and to archive compliance to the recommended values of the OHS Act: Lighting Regulations and SANS 10389.

d) 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K have been used on a preliminary design by the *employer* for benchmarking and pricing purposes. Equal or similar approved range of product can be used by the bidder subject to simulations submitted to the *Employer's* Engineer for acceptance.

e) The Contractor shall design, supply and install the earthing and lightning protection system for the HML. The *Contractor* shall tie the new installation to the existing suitable earthing and lightning protection system upon testing the integrity of the existing earthing and lightning protection. The results and recommendations shall be submitted to the *Employer's* Engineer for acceptance.

c) The Contractor shall supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. The Contractor shall link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation with an i3 processor, 27 inch touch screen monitor complete with network adaptor and USB RJ45 adapter to control the dimming functionality of the high mast lighting. The system shall be wall mounted in a hinged lockable stainless steel box with cut-out for the monitor screen. The system shall be installed in the TPT office within the site. The Contractor shall also configure, programme and commission the system.

d) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.1.3 MAST NO.35/503B

a) The Contractor shall uninstall the existing 11x400W Light fittings and 4xStreet Light fittings complete with the head ring of the existing 30m High Mast Pole and issue the luminaires to TPT. The fittings in a good condition shall be reused to replace the existing fittings in other high mast poles in the same contract.

b) The *Contractor* shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B.

c) The Contractor shall design, supply, and install a complete new lighting on the existing 30m High Mast Pole. The contractor shall demonstrate the suitability of the incomer cable and the existing cable from the DB supplying the luminaires. The design shall be complete with a new DB and mountings for the luminaires. The design shall be done in equal or similar approved to the most recent relux software. The design shall consider all nearest light sources, show aiming angles and orientation to address glare, light pollution and to archive compliance to the recommended values of the OHS Act: Lighting Regulations and SANS 10389.

d) 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K have been used on a preliminary design by the employer for benchmarking and pricing purposes. Equal or similar approved range of product can be used by the bidder subject to simulations submitted to the Employer's Engineer for acceptance.

e) The Contractor shall design, supply and install the earthing and lightning protection system for the HML. The Contractor shall tie the new installation to the existing suitable earthing and lightning protection system upon testing the integrity of the existing earthing and lightning protection. The results and recommendations shall be submitted to the Employer's Engineer for acceptance.

f) The Contractor shall supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. The Contractor shall link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation with an i3 processor, 27 inch touch screen monitor complete with network adaptor and USB RJ45 adapter to control the dimming functionality of the high mast lighting. The system shall be wall mounted in a hinged lockable stainless steel box with cut-out for the monitor screen. The system shall be installed in the TPT office within the site. The Contractor shall also configure, programme and commission the system.

g) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.1.4 MAST NO.34/503C

a) The Contractor shall uninstall the existing 11x400W Light fittings and 4xStreet Light fittings complete with the head ring of the existing 30m High Mast Pole and issue the luminaires to TPT. The fittings in a good condition shall be reused to replace the existing fittings in other high mast poles in the same contract.

b) The *Contractor* shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B.

c) The Contractor shall design, supply, and install a complete new lighting on the existing 30m High Mast Pole. The contractor shall demonstrate the suitability of the incomer cable and the existing cable from the DB supplying the luminaires. The design shall be complete with a new DB and mountings for the luminaires. The design shall be done in equal or similar approved to the most recent relux software. The design shall consider all nearest light sources, show aiming angles and orientation to address glare, light pollution and to archive compliance to the recommended values of the OHS Act: Lighting Regulations and SANS 10389.

d) 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K have been used on a preliminary design by the *employer* for benchmarking and pricing purposes. Equal or similar approved range of product can be used by the bidder subject to simulations submitted to the *Employer's* Engineer for acceptance.

e) The Contractor shall design, supply and install the earthing and lightning protection system for the HML. The *Contractor* shall tie the new installation to the existing suitable earthing and lightning protection system upon testing the integrity of the existing earthing and lightning protection. The results and recommendations shall be submitted to the *Employer's* Engineer for acceptance.

c) The Contractor shall supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. The Contractor shall link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation with an i3 processor, 27 inch touch screen monitor complete with network adaptor and USB RJ45 adapter to control the dimming functionality of the high mast lighting. The system shall be wall mounted in a hinged lockable stainless steel box with cut-out for the monitor screen. The system shall be installed in the TPT office within the site. The Contractor shall also configure, programme and commission the system.

d) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.1.5 MAST NO.503D

a) The Contractor shall uninstall the existing 11x400W Light fittings and 4xStreet Light fittings complete with the head ring of the existing 30m High Mast Pole and issue the luminaires to TPT. The fittings in a good condition shall be reused to replace the existing fittings in other high mast poles in the same contract.

b) The *Contractor* shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B.

c) The Contractor shall design, supply, and install a complete new lighting on the existing 30m High Mast Pole. The contractor shall demonstrate the suitability of the incomer cable and the existing cable from the DB supplying the luminaires. The design shall be complete with a new DB and mountings for the luminaires. The design shall be done in equal or similar approved to the most recent relux software. The design shall consider all nearest light sources, show aiming angles and orientation to address glare, light pollution and to archive compliance to the recommended values of the OHS Act: Lighting Regulations and SANS 10389.

d) 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K have been used on a preliminary design by the *employer* for benchmarking and pricing purposes. Equal or similar approved range of product can be used by the bidder subject to simulations submitted to the *Employer's* Engineer for acceptance.

e) The Contractor shall design, supply and install the earthing and lightning protection system for the HML. The *Contractor* shall tie the new installation to the existing suitable earthing and lightning protection system upon testing the integrity of the existing earthing and lightning protection. The results and recommendations shall be submitted to the *Employer's* Engineer for acceptance.

f) The Contractor shall supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. The Contractor shall link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation with an i3 processor, 27 inch touch screen monitor complete with network adaptor and USB RJ45 adapter to control the dimming functionality of the high mast lighting. The system shall be wall mounted in a hinged lockable stainless steel box with cut-out for the monitor screen. The system shall be installed in the TPT office within the site. The Contractor shall also configure, programme and commission the system.

g) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.1.6 MAST NO.49/503E

a) The Contractor shall uninstall the existing 4xLight fittings that are not working on the existing 30m High Mast Pole and issue the luminaires to TPT.

b) The *Contractor* shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B. All damaged cables or apparatus shall be replaced.

c) The *Contractor* shall replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.

d) In an unlikely case where no appropriate existing light fittings are deemed to be in good condition and reusable by both the contractor and the employer's engineer, the contractor shall supply similar light fittings as the uninstalled luminaires of this high mast.

e) The contractor shall present evidence of the recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.

f) Should the Contractor suggest different luminaires because of the possible system design compatibility, mechanical and safety compliance reasons, they are to undertake simulations and submit to the Employer's Engineer for acceptance.

g) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.1.7 MAST NO.42/504

a) The Contractor shall uninstall the existing 11x400W HPS Light fittings and 4xStreet Light fittings complete with the head ring of the existing 30m High Mast Pole and issue the luminaires to TPT. The fittings in a good condition shall be reused to replace the existing fittings in other high mast poles in the same contract.

b) The contractor shall replace the top section of the mast complete with new head frame, pulleys, cables, head-ring, trailing cables and all the mechanical apparatus.

c) The contract shall replace section 4 (from the top) of the sectional HML pole.

d) The Contractor shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B. All damaged cables or apparatus shall be replaced. The safety chain needs to be remounted.

e) The Contractor shall design, supply, and install a complete new lighting on the existing 30m High Mast Pole. The contractor shall demonstrate the suitability of the incomer cable and the existing cable from the DB supplying the luminaires. The design shall be complete with a new DB and mountings for the luminaires. The design shall be done in equal or similar approved to the most recent relux software. The design shall consider all nearest light sources, show aiming angles and orientation to address glare, light pollution and to archive compliance to the recommended values of the OHS Act: Lighting Regulations and SANS 10389.

f) 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K have been used on a preliminary design by the *employer* for benchmarking and pricing purposes. Equal or similar approved range of product can be used by the bidder subject to simulations submitted to the *Employer's* Engineer for acceptance.

g) The Contractor shall design, supply and install the earthing and lightning protection system for the HML. The *Contractor* shall tie the new installation to the existing suitable earthing and lightning protection system upon testing the integrity of the existing earthing and lightning protection. The results and recommendations shall be submitted to the *Employer's* Engineer for acceptance.

h) The Contractor shall supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. The Contractor shall link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation with an i3 processor, 27 inch

touch screen monitor complete with network adaptor and USB RJ45 adapter to control the dimming functionality of the high mast lighting. The system shall be wall mounted in a hinged lockable stainless steel box with cut-out for the monitor screen. The system shall be installed in the TPT office within the site. The Contractor shall also configure, programme and commission the system.

i) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.1.8 MAST NO.33/504

a) The Contractor shall uninstall the existing 3xLight fittings that are not working on the existing 30m High Mast Pole and issue the luminaires to TPT.

b) The contract shall replace section 4 (from the top) of the sectional HML pole.

c) The *Contractor* shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B.

d) The *Contractor* shall replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.

e) In an unlikely case where no appropriate existing light fittings are deemed to be in good condition and reusable by both the contractor and the employer's engineer, the contractor shall supply similar light fittings as the uninstalled luminaires of this high mast.

f) The contractor shall present evidence of the recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.

g) Should the Contractor suggest different luminaires because of the possible system design compatibility, mechanical and safety compliance reasons, they are to undertake simulations and submit to the Employer's Engineer for acceptance.

h) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.1.9 MAST NO.32/505

a) The Contractor shall uninstall the existing 11x400W HPS Light fittings and 4xStreet Light fittings complete with the head ring of the existing 30m High Mast Pole and issue the luminaires to TPT. The fittings in a good condition shall be reused to replace the existing fittings in other high mast poles in the same contract.

b) The *Contractor* shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B.

c) The Contractor shall design, supply, and install a complete new lighting on the existing 30m High Mast Pole. The contractor shall demonstrate the suitability of the incomer cable and the existing cable from the DB supplying the luminaires. The design shall be complete with a new DB and mountings for the luminaires. The design shall be done in equal or similar approved to the most recent relux software. The design shall consider all nearest light sources, show aiming angles and orientation to address glare, light pollution and to archive compliance to the recommended values of the OHS Act: Lighting Regulations and SANS 10389.

d) 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K have been used on a preliminary design by the *employer* for benchmarking and pricing purposes. Equal or similar approved range of product can be used by the bidder subject to simulations submitted to the *Employer's* Engineer for acceptance.

e) The Contractor shall design, supply and install the earthing and lightning protection system for the HML. The *Contractor* shall tie the new installation to the existing suitable earthing and lightning protection system upon testing the integrity of the existing earthing and lightning protection. The results and recommendations shall be submitted to the *Employer's* Engineer for acceptance.

f) The Contractor shall supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. The Contractor shall link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation with an i3 processor, 27 inch touch screen monitor complete with network adaptor and USB RJ45 adapter to control the dimming functionality of the high mast lighting. The system shall be wall mounted in a hinged lockable stainless steel box with cut-out for the monitor screen. The system shall be installed in the TPT office within the site. The Contractor shall also configure, programme and commission the system.

g) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.1.10 MAST NO./505

a) The Contractor shall uninstall five existing Light fittings that are not working on the existing 30m High Mast Pole and issue the luminaires to TPT. The current installation consists of a total of 14x400W HPS Light fittings.

b) The *Contractor* shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B.

c) The *Contractor* shall replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.

d) In an unlikely case where no appropriate existing light fittings are deemed to be in good condition and reusable by both the contractor and the employer's engineer, the contractor shall supply similar light fittings as the uninstalled luminaires of this high mast.

e) The contractor shall present evidence of the recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall

consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.

f) Should the Contractor suggest different luminaires because of the possible system design compatibility, mechanical and safety compliance reasons, they are to undertake simulations and submit to the Employer's Engineer for acceptance.

g) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.1.11 MAST NO.44/600

a) The Contractor shall uninstall three existing Light fittings that are not working on the existing 30m High Mast Pole and issue the luminaires to TPT. The current installation consists of a total of 11x400W HPS Light fittings and 4xStreet Light fittings

b) The *Contractor* shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B.

c) The *Contractor* shall replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.

d) In an unlikely case where no appropriate existing light fittings are deemed to be in good condition and reusable by both the contractor and the employer's engineer, the contractor shall supply similar light fittings as the uninstalled luminaires of this high mast.

e) The contractor shall present evidence of the recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.

f) The Contractor shall design, supply and install an earthing and lightning protection system in the high mast. The Contractor shall also design, supply and install hot-dip Galvanized finials and bonding of the high mast to ground in the high mast. The required results shall be submitted to the Employer's Engineer.

g) Should the Contractor suggest different luminaires because of the possible system design compatibility, mechanical and safety compliance reasons, they are to undertake simulations and submit to the Employer's Engineer for acceptance.

h) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.1.12 MAST NO.31/600

a) The Contractor shall uninstall the existing Light fittings that are not working on the existing 30m High Mast Pole and issue the luminaires to TPT. The current installation consists of a total of 11x400W HPS Light fittings and 4xStreet Light fittings

b) The *Contractor* shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B.

c) The *Contractor* shall replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.

d) In an unlikely case where no appropriate existing light fittings are deemed to be in good condition and reusable by both the contractor and the employer's engineer, the contractor shall supply similar light fittings as the uninstalled luminaires of this high mast.

e) The contractor shall present evidence of the recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.

f) The Contractor shall design, supply and install an earthing and lightning protection system in the high mast. The Contractor shall also design, supply and install hot-dip Galvanized finials and bonding of the high mast to ground in the high mast. The required results shall be submitted to the Employer's Engineer

g) Should the Contractor suggest different luminaires because of the possible system design compatibility, mechanical and safety compliance reasons, they are to undertake simulations and submit to the Employer's Engineer for acceptance.

h) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.1.13 MAST NO.30/600

a) The Contractor shall uninstall the existing Light fittings that are not working on the existing 30m High Mast Pole and issue the luminaires to TPT. The current installation consists of a total of 11x400W HPS Light fittings and 4xStreet Light fittings.

b) The *Contractor* shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B.

c) The *Contractor* shall replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.

d) In an unlikely case where no appropriate existing light fittings are deemed to be in good condition and reusable by both the contractor and the employer's engineer, the contractor shall supply similar light fittings as the uninstalled luminaires of this high mast.

e) The contractor shall present evidence of the recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.

f) Should the Contractor suggest different luminaires because of the possible system design compatibility, mechanical and safety compliance reasons, they are to undertake simulations and submit to the Employer's Engineer for acceptance.

g) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.1.14 MAST NO.29/600

a) The Contractor shall uninstall the existing 4xLight fittings that are not working on the existing 30m High Mast Pole and issue the luminaires to TPT. The current installation consists of a total of 11x400W HPS Light fittings and 4xStreet Light fittings.

b) The *Contractor* shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B.

c) The *Contractor* shall replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.

d) In an unlikely case where no appropriate existing light fittings are deemed to be in good condition and reusable by both the contractor and the employer's engineer, the contractor shall supply similar light fittings as the uninstalled luminaires of this high mast.

e) The contractor shall present evidence of the recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.

f) Should the Contractor suggest different luminaires because of the possible system design compatibility, mechanical and safety compliance reasons, they are to undertake simulations and submit to the Employer's Engineer for acceptance.

g) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.1.15 MAST NO.47

a) The Contractor shall uninstall the existing 7x400W HPS Light fittings and 5x1000W HPS Light fittings complete with the head ring of the existing 30m High Mast Pole and issue the luminaires to TPT. The fittings in a good condition shall be reused to replace the existing fittings in other high mast poles in the same contract.

b) The *Contractor* shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B.

c) The Contractor shall design, supply, and install a complete new lighting on the existing 30m High Mast Pole. The contractor shall demonstrate the suitability of the incomer cable and the existing cable from the DB supplying the luminaires. The design shall be complete with a new DB and mountings for the luminaires. The design shall be done in equal or similar approved to the most

recent relux software. The design shall consider all nearest light sources, show aiming angles and orientation to address glare, light pollution and to archive compliance to the recommended values of the OHS Act: Lighting Regulations and SANS 10389.

d) 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K have been used on a preliminary design by the employer for benchmarking and pricing purposes. Equal or similar approved range of product can be used by the bidder subject to simulations submitted to the Employer's Engineer for acceptance.

e) The Contractor shall design, supply and install the earthing and lightning protection system for the HML. The Contractor shall tie the new installation to the existing suitable earthing and lightning protection system upon testing the integrity of the existing earthing and lightning protection. The results and recommendations shall be submitted to the Employer's Engineer for acceptance.

f) The Contractor shall supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. The Contractor shall link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation with an i3 processor, 27 inch touch screen monitor complete with network adaptor and USB RJ45 adapter to control the dimming functionality of the high mast lighting. The system shall be wall mounted in a hinged lockable stainless steel box with cut-out for the monitor screen. The system shall be installed in the TPT office within the site. The Contractor shall also configure, programme and commission the system.

g) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.1.16 MAST NO.233

a) The Contractor shall uninstall the existing installation and issue the parts and the HML pole to TPT.

b) The Contractor shall supply, deliver, offload, paint and erect 1 x 30m High mast equal or similar to sectional poles complete with a mounting ring, distribution board and as detailed in specification TPD-010A-HIGHMASTSPEC-A.

c) The Contractor shall design, supply, and install a complete new lighting on the existing 30m High Mast Pole. The contractor shall demonstrate the suitability of the incomer cable and the existing cable from the DB supplying the luminaires. The design shall be complete with a new DB and mountings for the luminaires. The design shall be done in equal or similar approved to the most recent relux software. The design shall consider all nearest light sources, show aiming angles and orientation to address glare, light pollution and to archive compliance to the recommended values of the OHS Act: Lighting Regulations and SANS 10389.

d) 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K have been used on a preliminary design by the employer for benchmarking and pricing purposes. Equal or similar approved range of product can be used by the bidder subject to simulations submitted to the Employer's Engineer for acceptance.

e) The Contractor shall design, supply and install the earthing and lightning protection system for the HML. The Contractor shall tie the new installation to the existing suitable earthing and lightning protection system upon testing the integrity of the existing earthing and lightning protection. The results and recommendations shall be submitted to the Employer's Engineer for acceptance.

f) The Contractor shall supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. The Contractor shall link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation with an i3 processor, 27 inch touch screen monitor complete with network adaptor and USB RJ45 adapter to control the dimming functionality of the high mast lighting. The system shall be wall mounted in a hinged lockable stainless steel box with cut-out for the monitor screen. The system shall be installed in the TPT office within the site. The Contractor shall also configure, programme and commission the system.

g) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.1.17 MAST NO.48

a) The Contractor shall uninstall the existing Light fittings complete with the head ring of the existing 30m High Mast Pole and issue the luminaires to TPT. The fittings in a good condition shall be reused to replace the existing fittings in other high mast poles in the same contract.

b) The *Contractor* shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B.

c) The Contractor shall design, supply, and install a complete new lighting on the existing 30m High Mast Pole. The contractor shall demonstrate the suitability of the incomer cable and the existing cable from the DB supplying the luminaires. The design shall be complete with a new DB and mountings for the luminaires. The design shall be done in equal or similar approved to the most recent relux software. The design shall consider all nearest light sources, show aiming angles and orientation to address glare, light pollution and to archive compliance to the recommended values of the OHS Act: Lighting Regulations and SANS 10389.

d) 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K have been used on a preliminary design by the *employer* for benchmarking and pricing purposes. Equal or similar approved range of product can be used by the bidder subject to simulations submitted to the *Employer's* Engineer for acceptance.

e) The Contractor shall design, supply and install the earthing and lightning protection system for the HML. The *Contractor* shall tie the new installation to the existing suitable earthing and lightning protection system upon testing the integrity of the existing earthing and lightning protection. The results and recommendations shall be submitted to the *Employer's* Engineer for acceptance.

f) The Contractor shall supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. The Contractor shall link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation with an i3 processor, 27 inch touch screen monitor complete with network adaptor and USB RJ45 adapter to control the

dimming functionality of the high mast lighting. The system shall be wall mounted in a hinged lockable stainless steel box with cut-out for the monitor screen. The system shall be installed in the TPT office within the site. The Contractor shall also configure, programme and commission the system.

g) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.1.18 MAST NO.46 (CAR PARK MAIN ENTRANCE)

a) The Contractor shall uninstall the existing 1xLight fittings that is not working on the existing 30m High Mast Pole and issue the luminaires to TPT.

b) The *Contractor* shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B.

c) The *Contractor* shall replace the uninstalled fitting with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.

d) In an unlikely case where no appropriate existing light fittings are deemed to be in good condition and reusable by both the contractor and the employer's engineer, the contractor shall supply similar light fittings as the uninstalled luminaires of this high mast.

e) The contractor shall present evidence of the recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.

f) Should the Contractor suggest different luminaires because of the possible system design compatibility, mechanical and safety compliance reasons, they are to undertake simulations and submit to the Employer's Engineer for acceptance.

g) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.1.19 MAST NO.45

a) The Contractor shall uninstall the existing Light fittings complete with the head ring of the existing 30m High Mast Pole and issue the luminaires to TPT. The fittings in a good condition shall be reused to replace the existing fittings in other high mast poles in the same contract.

b) The Contractor shall replace the top section of the sectional poles complete with head frame, pulleys, cables, head-ring, trailing cables and other HML pole apparatus as detailed in specification TPD-010A-HIGHMASTSPEC-A.

c) The Contractor shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B.

d) The Contractor shall design, supply, and install a complete new lighting on the existing 30m High Mast Pole. The contractor shall demonstrate the suitability of the incomer cable and the existing cable from the DB supplying the luminaires. The design shall be complete with a new DB and mountings for the luminaires. The design shall be done in equal or similar approved to the most recent relux software. The design shall consider all nearest light sources, show aiming angles and orientation to address glare, light pollution and to archive compliance to the recommended values of the OHS Act: Lighting Regulations and SANS 10389.

e) 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K have been used on a preliminary design by the *employer* for benchmarking and pricing purposes. Equal or similar approved range of product can be used by the bidder subject to simulations submitted to the *Employer's* Engineer for acceptance.

f) The Contractor shall design, supply and install the earthing and lightning protection system for the HML. The *Contractor* shall tie the new installation to the existing suitable earthing and lightning protection system upon testing the integrity of the existing earthing and lightning protection. The results and recommendations shall be submitted to the *Employer's* Engineer for acceptance.

g) The Contractor shall supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. The Contractor shall link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation with an i3 processor, 27 inch touch screen monitor complete with network adaptor and USB RJ45 adapter to control the dimming functionality of the high mast lighting. The system shall be wall mounted in a hinged lockable stainless steel box with cut-out for the monitor screen. The system shall be installed in the TPT office within the site. The Contractor shall also configure, programme and commission the system.

h) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.1.20 MAST NO.39

a) The Contractor shall uninstall the 5 existing Light fittings that are not working on the existing 30m High Mast Pole and issue the luminaires to TPT. The current installation consists of a total of 11x400W HPS Light fittings and 4xStreet Light fittings.

b) The *Contractor* shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B. All damaged cables or apparatus shall be replaced. Socket outlet to be replaced.

c) The *Contractor* shall replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.

d) In an unlikely case where no appropriate existing light fittings are deemed to be in good condition and reusable by both the contractor and the employer's engineer, the contractor shall supply similar light fittings as the uninstalled luminaires of this high mast.

e) The contractor shall present evidence of the recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall

consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.

f) Should the Contractor suggest different luminaires because of the possible system design compatibility, mechanical and safety compliance reasons, they are to undertake simulations and submit to the Employer's Engineer for acceptance.

g) The Contractor shall design, supply and install the earthing and lightning protection system for the HML. The Contractor shall tie the new installation to the existing suitable earthing and lightning protection system upon testing the integrity of the existing earthing and lightning protection. The results and recommendations shall be submitted to the Employer's Engineer for acceptance.

h) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.1.21 MAST NO.36/503

a) The Contractor shall uninstall the 5 existing Light fittings that are not working on the existing 30m High Mast Pole and issue the luminaires to TPT. The current installation consists of a total of 11x400W HPS Light fittings and 4xStreet Light fittings.

b) The *Contractor* shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B. All damaged cables or apparatus shall be replaced. Socket outlet to be replaced.

c) The *Contractor* shall replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.

d) In an unlikely case where no appropriate existing light fittings are deemed to be in good condition and reusable by both the contractor and the employer's engineer, the contractor shall supply similar light fittings as the uninstalled luminaires of this high mast.

e) The contractor shall present evidence of the recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.

f) Should the Contractor suggest different luminaires because of the possible system design compatibility, mechanical and safety compliance reasons, they are to undertake simulations and submit to the Employer's Engineer for acceptance.

g) The Contractor shall design, supply and install the earthing and lightning protection system for the HML. The Contractor shall tie the new installation to the existing suitable earthing and lightning protection system upon testing the integrity of the existing earthing and lightning protection. The results and recommendations shall be submitted to the Employer's Engineer for acceptance.

h) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.2 Q AND R

5.2.2.1 MAST NO.1

a) The Contractor shall uninstall the existing Light fittings complete with the head ring of the existing 30m High Mast Pole and issue the luminaires to TPT. The current installation consists of a total of 8x400W HPS Light fittings. The fittings in a good condition shall be reused to replace the existing fittings in other high mast poles in the same contract.

b) The *Contractor* shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B.

c) The Contractor shall design, supply, and install a complete new lighting on the existing 30m High Mast Pole. The contractor shall demonstrate the suitability of the incomer cable and the existing cable from the DB supplying the luminaires. The design shall be complete with a new DB and mountings for the luminaires. The design shall be done in equal or similar approved to the most recent relux software. The design shall consider all nearest light sources, show aiming angles and orientation to address glare, light pollution and to archive compliance to the recommended values of the OHS Act: Lighting Regulations and SANS 10389.

d) 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K have been used on a preliminary design by the *employer* for benchmarking and pricing purposes. Equal or similar approved range of product can be used by the bidder subject to simulations submitted to the *Employer's* Engineer for acceptance.

e) The Contractor shall design, supply and install the earthing and lightning protection system for the HML. The *Contractor* shall tie the new installation to the existing suitable earthing and lightning protection system upon testing the integrity of the existing earthing and lightning protection. The results and recommendations shall be submitted to the *Employer's* Engineer for acceptance.

f) The Contractor shall supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. The Contractor shall supply and install an equal or similar approved to a WiFi enabled Lenovo A740 workstation with an i3 processor, 27 inch touch screen monitor complete with network adaptor and USB RJ45 adapter to control the dimming functionality of the high mast lighting. The system shall be wall mounted in a hinged lockable stainless steel box with cut-out for the monitor screen. The system shall be installed in the TPT office within the site. The Contractor shall also configure, programme and commission the system.

g) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.2.2 MAST NO.2

a) The Contractor shall uninstall the existing Light fittings complete with the head ring of the existing 30m High Mast Pole and issue the luminaires to TPT. The fittings in a good condition shall be reused to replace the existing fittings in other high mast poles in the same contract.

b) The Contractor shall replace section 4, 5 and the top section of the sectional pole complete with head frame, pulleys, cables, head-ring, trailing cables and other HML pole apparatus as detailed in specification TPD-010A-HIGHMASTSPEC-A.

c) The Contractor shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B.

d) The Contractor shall design, supply, and install a complete new lighting on the existing 30m High Mast Pole. The contractor shall demonstrate the suitability of the incomer cable and the existing cable from the DB supplying the luminaires. The design shall be complete with a new DB and mountings for the luminaires. The design shall be done in equal or similar approved to the most recent relux software. The design shall consider all nearest light sources, show aiming angles and orientation to address glare, light pollution and to archive compliance to the recommended values of the OHS Act: Lighting Regulations and SANS 10389.

e) 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K have been used on a preliminary design by the employer for benchmarking and pricing purposes. Equal or similar approved range of product can be used by the bidder subject to simulations submitted to the Employer's Engineer for acceptance.

f) The Contractor shall design, supply and install the earthing and lightning protection system for the HML. The Contractor shall tie the new installation to the existing suitable earthing and lightning protection system upon testing the integrity of the existing earthing and lightning protection. The results and recommendations shall be submitted to the Employer's Engineer for acceptance.

g) The Contractor shall supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. The Contractor shall link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation with an i3 processor, 27 inch touch screen monitor complete with network adaptor and USB RJ45 adapter to control the dimming functionality of the high mast lighting. The system shall be wall mounted in a hinged lockable stainless steel box with cut-out for the monitor screen. The system shall be installed in the TPT office within the site. The Contractor shall also configure, programme and commission the system.

h) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.2.3 MAST NO.3

a) The Contractor shall uninstall the existing 5xLight fittings that are not working on the existing 30m High Mast Pole and issue the luminaires to TPT. The current installation consists of a total of 13x400W HPS Light fittings.

b) The Contractor shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B. Pratley box, socket outlet and DB to be replaced.

c) The Contractor shall replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.

d) In an unlikely case where no appropriate existing light fittings are deemed to be in good condition and reusable by both the contractor and the employer's engineer, the contractor shall supply similar light fittings as the uninstalled luminaires of this high mast.

e) The contractor shall present evidence of the recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.

f) Should the Contractor suggest different luminaires because of the possible system design compatibility, mechanical and safety compliance reasons, they are to undertake simulations and submit to the Employer's Engineer for acceptance.

g) The Contractor shall design, supply and install the earthing and lightning protection system for the HML. The Contractor shall tie the new installation to the existing suitable earthing and lightning protection system upon testing the integrity of the existing earthing and lightning protection. The results and recommendations shall be submitted to the Employer's Engineer for acceptance.

h) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.2.4 MAST NO.51

a) The Contractor shall uninstall the existing 8x400W HPS Light fittings complete with the head ring of the existing 30m High Mast Pole and issue the luminaires to TPT. The fittings in a good condition shall be reused to replace the existing fittings in other high mast poles in the same contract.

b) The Contractor shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B.

c) The Contractor shall design, supply, and install a complete new lighting on the existing 30m High Mast Pole. The contractor shall demonstrate the suitability of the incomer cable and the existing cable from the DB supplying the luminaires. The design shall be complete with a new DB and mountings for the luminaires. The design shall be done in equal or similar approved to the most recent relux software. The design shall consider all nearest light sources, show aiming angles and orientation to address glare, light pollution and to archive compliance to the recommended values of the OHS Act: Lighting Regulations and SANS 10389.

d) 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K have been used on a preliminary design by the employer for benchmarking and pricing purposes. Equal or similar approved range of product can be used by the bidder subject to simulations submitted to the Employer's Engineer for acceptance.

e) The Contractor shall design, supply and install the earthing and lightning protection system for the HML. The Contractor shall tie the new installation to the existing suitable earthing and lightning protection system upon testing the integrity of the existing earthing and lightning

protection. The results and recommendations shall be submitted to the Employer's Engineer for acceptance.

f) The Contractor shall supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. The Contractor shall link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation with an i3 processor, 27 inch touch screen monitor complete with network adaptor and USB RJ45 adapter to control the dimming functionality of the high mast lighting. The system shall be wall mounted in a hinged lockable stainless steel box with cut-out for the monitor screen. The system shall be installed in the TPT office within the site. The Contractor shall also configure, programme and commission the system.

g) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.2.5 MAST NO.52

a) The Contractor shall uninstall the existing Light fittings complete with the head ring of the existing 30m High Mast Pole and issue the luminaires to TPT. The fittings in a good condition shall be reused to replace the existing fittings in other high mast poles in the same contract.

b) The Contractor shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B.

c) The Contractor shall design, supply, and install a complete new lighting on the existing 30m High Mast Pole. The contractor shall demonstrate the suitability of the incomer cable and the existing cable from the DB supplying the luminaires. The design shall be complete with a new DB and mountings for the luminaires. The design shall be done in equal or similar approved to the most recent relux software. The design shall consider all nearest light sources, show aiming angles and orientation to address glare, light pollution and to archive compliance to the recommended values of the OHS Act: Lighting Regulations and SANS 10389.

d) 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K have been used on a preliminary design by the employer for benchmarking and pricing purposes. Equal or similar approved range of product can be used by the bidder subject to simulations submitted to the Employer's Engineer for acceptance.

e) The Contractor shall design, supply and install the earthing and lightning protection system for the HML. The Contractor shall tie the new installation to the existing suitable earthing and lightning protection system upon testing the integrity of the existing earthing and lightning protection. The results and recommendations shall be submitted to the Employer's Engineer for acceptance.

f) The Contractor shall supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. The Contractor shall link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation with an i3 processor, 27 inch touch screen monitor complete with network adaptor and USB RJ45 adapter to control the dimming functionality of the high mast lighting. The system shall be wall mounted in a hinged lockable stainless steel box with cut-out for the monitor screen. The system shall be installed in

the TPT office within the site. The Contractor shall also configure, programme and commission the system.

g) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.2.6 MAST NO.53

a) The Contractor shall uninstall the existing Light fittings complete with the head ring of the existing 30m High Mast Pole and issue the luminaires to TPT. The fittings in a good condition shall be reused to replace the existing fittings in other high mast poles in the same contract.

b) The Contractor shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B.

c) The Contractor shall design, supply, and install a complete new lighting on the existing 30m High Mast Pole. The contractor shall demonstrate the suitability of the incomer cable and the existing cable from the DB supplying the luminaires. The design shall be complete with a new DB and mountings for the luminaires. The design shall be done in equal or similar approved to the most recent relux software. The design shall consider all nearest light sources, show aiming angles and orientation to address glare, light pollution and to archive compliance to the recommended values of the OHS Act: Lighting Regulations and SANS 10389.

d) 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K have been used on a preliminary design by the employer for benchmarking and pricing purposes. Equal or similar approved range of product can be used by the bidder subject to simulations submitted to the Employer's Engineer for acceptance.

e) The Contractor shall design, supply and install the earthing and lightning protection system for the HML. The Contractor shall tie the new installation to the existing suitable earthing and lightning protection system upon testing the integrity of the existing earthing and lightning protection. The results and recommendations shall be submitted to the Employer's Engineer for acceptance.

f) The Contractor shall supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. The Contractor shall link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation with an i3 processor, 27 inch touch screen monitor complete with network adaptor and USB RJ45 adapter to control the dimming functionality of the high mast lighting. The system shall be wall mounted in a hinged lockable stainless steel box with cut-out for the monitor screen. The system shall be installed in the TPT office within the site. The Contractor shall also configure, programme and commission the system.

g) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.2.7 MAST NO.8 (F SHED)

a) The Contractor shall uninstall the existing 1xfittings that is not working on the existing 30m High Mast Pole and issue the luminaires to TPT. The current installation consists of a total of 8x400W HPS Light fittings.

b) The Contractor shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B.

c) The Contractor shall replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.

d) In an unlikely case where no appropriate existing light fittings are deemed to be in good condition and reusable by both the contractor and the employer's engineer, the contractor shall supply similar light fittings as the uninstalled luminaires of this high mast.

e) The contractor shall present evidence of the recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.

f) Should the Contractor suggest different luminaires because of the possible system design compatibility, mechanical and safety compliance reasons, they are to undertake simulations and submit to the Employer's Engineer for acceptance.

g) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.2.8 MAST NO.9 (F SHED)

a) The Contractor shall uninstall 4 existing fittings that are not working on the existing 30m High Mast Pole and issue the luminaires to TPT. The current installation consists of a total of 8x400W HPS Light fittings.

b) The Contractor shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B.

c) The Contractor shall replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.

d) In an unlikely case where no appropriate existing light fittings are deemed to be in good condition and reusable by both the contractor and the employer's engineer, the contractor shall supply similar light fittings as the uninstalled luminaires of this high mast.

e) The contractor shall present evidence of the recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.

f) Should the Contractor suggest different luminaires because of the possible system design compatibility, mechanical and safety compliance reasons, they are to undertake simulations and submit to the Employer's Engineer for acceptance.

g) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.2.9 MAST NO.37 (REEFERS)

a) The Contractor shall uninstall 7 existing fittings that are not working on the existing 30m High Mast Pole and issue the luminaires to TPT. The current installation consists of a total of 15x400W HPS Light fittings and 3x1000W HPS light fittings.

b) The Contractor shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B.

c) The Contractor shall replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.

d) In an unlikely case where no appropriate existing light fittings are deemed to be in good condition and reusable by both the contractor and the employer's engineer, the contractor shall supply similar light fittings as the uninstalled luminaires of this high mast.

e) The contractor shall present evidence of the recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.

f) Should the Contractor suggest different luminaires because of the possible system design compatibility, mechanical and safety compliance reasons, they are to undertake simulations and submit to the Employer's Engineer for acceptance.

g) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.2.10 MAST NO.48 (REEFERS)

a) The Contractor shall uninstall the existing 1xfittings that are not working on the existing 30m High Mast Pole and issue the luminaires to TPT. The current installation consists of a total of 7x400W HPS Light fittings and 5x1000W HPS light fittings.

b) The Contractor shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B.

c) The Contractor shall replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.

d) In an unlikely case where no appropriate existing light fittings are deemed to be in good condition and reusable by both the contractor and the employer's engineer, the contractor shall supply similar light fittings as the uninstalled luminaires of this high mast.

e) The contractor shall present evidence of the recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.

f) Should the Contractor suggest different luminaires because of the possible system design compatibility, mechanical and safety compliance reasons, they are to undertake simulations and submit to the Employer's Engineer for acceptance.

g) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.2.11 MAST NO.49 (F STACK)

a) The Contractor shall uninstall 5 existing fittings that are not working on the existing 30m High Mast Pole and issue the luminaires to TPT. The current installation consists of a total of 7x400W HPS Light fittings and 5x1000W HPS light fittings.

b) The Contractor shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B.

c) The Contractor shall replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.

d) In an unlikely case where no appropriate existing light fittings are deemed to be in good condition and reusable by both the contractor and the employer's engineer, the contractor shall supply similar light fittings as the uninstalled luminaires of this high mast.

e) The contractor shall present evidence of the recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.

f) Should the Contractor suggest different luminaires because of the possible system design compatibility, mechanical and safety compliance reasons, they are to undertake simulations and submit to the Employer's Engineer for acceptance.

g) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.2.12 MAST NO.38 (F STACK)

a) The Contractor shall uninstall the existing Light fittings complete with the head ring of the existing 30m High Mast Pole and issue the luminaires to TPT. The fittings in a good condition shall be reused to replace the existing fittings in other high mast poles in the same contract.

b) The Contractor shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B. The contractor shall replace the corroded steel wire.

c) The Contractor shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B.

d) The Contractor shall design, supply, and install a complete new lighting on the existing 30m High Mast Pole. The contractor shall demonstrate the suitability of the incomer cable and the existing cable from the DB supplying the luminaires. The design shall be complete with a new DB and mountings for the luminaires. The design shall be done in equal or similar approved to the most recent relux software. The design shall consider all nearest light sources, show aiming angles and orientation to address glare, light pollution and to archive compliance to the recommended values of the OHS Act: Lighting Regulations and SANS 10389.

e) 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K have been used on a preliminary design by the employer for benchmarking and pricing purposes. Equal or similar approved range of product can be used by the bidder subject to simulations submitted to the Employer's Engineer for acceptance.

f) The Contractor shall design, supply and install the earthing and lightning protection system for the HML. The Contractor shall tie the new installation to the existing suitable earthing and lightning protection system upon testing the integrity of the existing earthing and lightning protection. The results and recommendations shall be submitted to the Employer's Engineer for acceptance.

g) The Contractor shall supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. The Contractor shall link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation with an i3 processor, 27 inch touch screen monitor complete with network adaptor and USB RJ45 adapter to control the dimming functionality of the high mast lighting. The system shall be wall mounted in a hinged lockable stainless steel box with cut-out for the monitor screen. The system shall be installed in the TPT office within the site. The Contractor shall also configure, programme and commission the system.

h) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.2.13 MAST NO.36 (G STACK)

a) The Contractor shall uninstall 6 existing fittings that are not working on the existing 30m High Mast Pole and issue the luminaires to TPT. The current installation consists of a total of 15x400W HPS Light fittings and 3x1000W HPS light fittings.

b) The Contractor shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B.

c) The Contractor shall replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.

d) In an unlikely case where no appropriate existing light fittings are deemed to be in good condition and reusable by both the contractor and the employer's engineer, the contractor shall supply similar light fittings as the uninstalled luminaires of this high mast.

e) The contractor shall present evidence of the recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.

f) Should the Contractor suggest different luminaires because of the possible system design compatibility, mechanical and safety compliance reasons, they are to undertake simulations and submit to the Employer's Engineer for acceptance.

g) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.2.14 MAST NO.34 (F STACK)

a) The Contractor shall uninstall the existing 15x400W HPS Light fittings and 3x1000W HPS Light fittings complete with the head ring of the existing 30m High Mast Pole and issue the luminaires to TPT. The fittings in a good condition shall be reused to replace the existing fittings in other high mast poles in the same contract.

b) The Contractor shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B.

c) The Contractor shall design, supply, and install a complete new lighting on the existing 30m High Mast Pole. The contractor shall demonstrate the suitability of the incomer cable and the existing cable from the DB supplying the luminaires. The design shall be complete with a new DB and mountings for the luminaires. The design shall be done in equal or similar approved to the most recent relux software. The design shall consider all nearest light sources, show aiming angles and orientation to address glare, light pollution and to archive compliance to the recommended values of the OHS Act: Lighting Regulations and SANS 10389.

d) 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K have been used on a preliminary design by the employer for benchmarking and pricing purposes. Equal or similar approved range of product can be used by the bidder subject to simulations submitted to the Employer's Engineer for acceptance.

e) The Contractor shall design, supply and install the earthing and lightning protection system for the HML. The Contractor shall tie the new installation to the existing suitable earthing and lightning protection system upon testing the integrity of the existing earthing and lightning protection. The results and recommendations shall be submitted to the Employer's Engineer for acceptance.

f) The Contractor shall supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. The Contractor shall link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation with an i3 processor, 27 inch touch screen monitor complete with network adaptor and USB RJ45 adapter to control the dimming functionality of the high mast lighting. The system shall be wall mounted in a hinged

lockable stainless steel box with cut-out for the monitor screen. The system shall be installed in the TPT office within the site. The Contractor shall also configure, programme and commission the system.

g) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.2.15 MAST NO.45 (G STACK)

a) The Contractor shall uninstall 4 existing fittings that are not working on the existing 30m High Mast Pole and issue the luminaires to TPT. The current installation consists of a total of 15x400W HPS Light fittings and 3x1000W HPS light fittings.

b) The Contractor shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B.

c) The Contractor shall replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.

d) In an unlikely case where no appropriate existing light fittings are deemed to be in good condition and reusable by both the contractor and the employer's engineer, the contractor shall supply similar light fittings as the uninstalled luminaires of this high mast.

e) The contractor shall present evidence of the recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.

f) Should the Contractor suggest different luminaires because of the possible system design compatibility, mechanical and safety compliance reasons, they are to undertake simulations and submit to the Employer's Engineer for acceptance.

g) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.2.16 MAST NO.44 (G STACK)

a) The Contractor shall uninstall the existing 3xfittings that are not working on the existing 30m High Mast Pole and issue the luminaires to TPT. The current installation consists of a total of 15x400W HPS Light fittings and 3x1000W HPS light fittings.

b) The Contractor shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B.

c) The Contractor shall replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.

d) In an unlikely case where no appropriate existing light fittings are deemed to be in good condition and reusable by both the contractor and the employer's engineer, the contractor shall supply similar light fittings as the uninstalled luminaires of this high mast.

e) The contractor shall present evidence of the recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.

f) Should the Contractor suggest different luminaires because of the possible system design compatibility, mechanical and safety compliance reasons, they are to undertake simulations and submit to the Employer's Engineer for acceptance.

g) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.2.17 MAST NO.33 (G STACK)

a) The Contractor shall uninstall the existing 3xfittings that are not working on the existing 30m High Mast Pole and issue the luminaires to TPT. The current installation consists of a total of 15x400W HPS Light fittings and 3x1000W HPS light fittings.

b) The Contractor shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B.

c) The Contractor shall replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.

d) In an unlikely case where no appropriate existing light fittings are deemed to be in good condition and reusable by both the contractor and the employer's engineer, the contractor shall supply similar light fittings as the uninstalled luminaires of this high mast.

e) The contractor shall present evidence of the recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.

f) Should the Contractor suggest different luminaires because of the possible system design compatibility, mechanical and safety compliance reasons, they are to undertake simulations and submit to the Employer's Engineer for acceptance.

g) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.2.18 MAST NO.32 (G STACK)

a) The Contractor shall uninstall 5 existing fittings that are not working on the existing 30m High Mast Pole and issue the luminaires to TPT. The current installation consists of a total of 15x400W HPS Light fittings and 3x1000W HPS light fittings.

b) The Contractor shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B.

c) The Contractor shall replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.

d) In an unlikely case where no appropriate existing light fittings are deemed to be in good condition and reusable by both the contractor and the employer's engineer, the contractor shall supply similar light fittings as the uninstalled luminaires of this high mast.

e) The contractor shall present evidence of the recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.

f) Should the Contractor suggest different luminaires because of the possible system design compatibility, mechanical and safety compliance reasons, they are to undertake simulations and submit to the Employer's Engineer for acceptance.

g) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.2.19 MAST NO.43 (G STACK)

a) The Contractor shall uninstall 5 existing fittings that are not working on the existing 30m High Mast Pole and issue the luminaires to TPT. The current installation consists of a total of 15x400W HPS Light fittings and 3x1000W HPS light fittings.

b) The Contractor shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B.

c) The Contractor shall replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.

d) In an unlikely case where no appropriate existing light fittings are deemed to be in good condition and reusable by both the contractor and the employer's engineer, the contractor shall supply similar light fittings as the uninstalled luminaires of this high mast.

e) The contractor shall present evidence of the recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.

f) Should the Contractor suggest different luminaires because of the possible system design compatibility, mechanical and safety compliance reasons, they are to undertake simulations and submit to the Employer's Engineer for acceptance.

g) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.2.20 MAST NO.47 (G STACK)

a) The Contractor shall uninstall 5 existing fittings that are not working on the existing 30m High Mast Pole and issue the luminaires to TPT. The current installation consists of a total of 15x400W HPS Light fittings and 3x1000W HPS light fittings.

b) The Contractor shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B.

c) The Contractor shall replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.

d) In an unlikely case where no appropriate existing light fittings are deemed to be in good condition and reusable by both the contractor and the employer's engineer, the contractor shall supply similar light fittings as the uninstalled luminaires of this high mast.

e) The contractor shall present evidence of the recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.

f) Should the Contractor suggest different luminaires because of the possible system design compatibility, mechanical and safety compliance reasons, they are to undertake simulations and submit to the Employer's Engineer for acceptance.

g) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.2.21 MAST NO.46 (G STACK)

a) The Contractor shall uninstall 4 existing fittings that are not working on the existing 30m High Mast Pole and issue the luminaires to TPT. The current installation consists of a total of 15x400W HPS Light fittings and 3x1000W HPS light fittings.

b) The Contractor shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B.

c) The Contractor shall replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.

d) In an unlikely case where no appropriate existing light fittings are deemed to be in good condition and reusable by both the contractor and the employer's engineer, the contractor shall supply similar light fittings as the uninstalled luminaires of this high mast.

e) The contractor shall present evidence of the recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall

consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.

f) Should the Contractor suggest different luminaires because of the possible system design compatibility, mechanical and safety compliance reasons, they are to undertake simulations and submit to the Employer's Engineer for acceptance.

g) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.2.22 MAST NO.35 (G STACK)

a) The Contractor shall uninstall 4 existing fittings that are not working on the existing 30m High Mast Pole and issue the luminaires to TPT. The current installation consists of a total of 15x400W HPS Light fittings and 3x1000W HPS light fittings.

b) The Contractor shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B.

c) The Contractor shall replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.

d) In an unlikely case where no appropriate existing light fittings are deemed to be in good condition and reusable by both the contractor and the employer's engineer, the contractor shall supply similar light fittings as the uninstalled luminaires of this high mast.

e) The contractor shall present evidence of the recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.

f) Should the Contractor suggest different luminaires because of the possible system design compatibility, mechanical and safety compliance reasons, they are to undertake simulations and submit to the Employer's Engineer for acceptance.

g) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.2.23 MAST NO.31 (HOLDING YARD)

a) The Contractor shall uninstall the existing 17x400W HPS Light fittings and 2x1000W HPS Light fittings complete with the head ring of the existing 30m High Mast Pole and issue the luminaires to TPT. The fittings in a good condition shall be reused to replace the existing fittings in other high mast poles in the same contract.

b) The Contractor shall replace the top section of the sectional pole complete with head frame, pulleys, cables, head-ring, trailing cables and other HML pole apparatus as detailed in specification TPD-010A-HIGHMASTSPEC-A and TPD-010B-HIGHMASTSPEC-B.

c) The Contractor shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B.

d) The Contractor shall design, supply, and install a complete new lighting on the existing 30m High Mast Pole. The contractor shall demonstrate the suitability of the incomer cable and the existing cable from the DB supplying the luminaires. The design shall be complete with a new DB and mountings for the luminaires. The design shall be done in equal or similar approved to the most recent relux software. The design shall consider all nearest light sources, show aiming angles and orientation to address glare, light pollution and to archive compliance to the recommended values of the OHS Act: Lighting Regulations and SANS 10389.

e) 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K have been used on a preliminary design by the employer for benchmarking and pricing purposes. Equal or similar approved range of product can be used by the bidder subject to simulations submitted to the Employer‘s Engineer for acceptance.

f) The Contractor shall design, supply and install the earthing and lightning protection system for the HML. The Contractor shall tie the new installation to the existing suitable earthing and lightning protection system upon testing the integrity of the existing earthing and lightning protection. The results and recommendations shall be submitted to the Employer‘s Engineer for acceptance.

g) The Contractor shall supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. The Contractor shall link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation with an i3 processor, 27 inch touch screen monitor complete with network adaptor and USB RJ45 adapter to control the dimming functionality of the high mast lighting. The system shall be wall mounted in a hinged lockable stainless steel box with cut-out for the monitor screen. The system shall be installed in the TPT office within the site. The Contractor shall also configure, programme and commission the system.

h) The Contractor is required to test the installation in the presence of the Employer‘s Engineers and issue electrical “Certificate of Compliance” (COC) for all work done to the satisfaction of the Employer’s Engineers.

5.2.2.24 MAST NO.6 (G SHED)

a) The Contractor shall uninstall 3 existing fittings that are not working on the existing 30m High Mast Pole and issue the luminaires to TPT. The current installation consists of a total of 8x400W HPS Light fittings.

b) The Contractor shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B.

c) The Contractor shall replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.

d) In an unlikely case where no appropriate existing light fittings are deemed to be in good condition and reusable by both the contractor and the employer’s engineer, the contractor shall supply similar light fittings as the uninstalled luminaires of this high mast.

e) The contractor shall present evidence of the recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.

f) Should the Contractor suggest different luminaires because of the possible system design compatibility, mechanical and safety compliance reasons, they are to undertake simulations and submit to the Employer's Engineer for acceptance.

g) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.2.25 MAST No.7 (G SHED)

a) The Contractor shall uninstall 4 existing fittings that are not working on the existing 30m High Mast Pole and issue the luminaires to TPT. The current installation consists of a total of 8x400W HPS Light fittings.

b) The Contractor shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B.

c) The Contractor shall replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.

d) In an unlikely case where no appropriate existing light fittings are deemed to be in good condition and reusable by both the contractor and the employer's engineer, the contractor shall supply similar light fittings as the uninstalled luminaires of this high mast.

e) The contractor shall present evidence of the recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.

f) Should the Contractor suggest different luminaires because of the possible system design compatibility, mechanical and safety compliance reasons, they are to undertake simulations and submit to the Employer's Engineer for acceptance.

g) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.2.26 MAST NO.10 (D SHED)

a) The Contractor shall uninstall 3 existing fittings that are not working on the existing 30m High Mast Pole and issue the luminaires to TPT. The current installation consists of a total of 8x400W HPS Light fittings.

b) The Contractor shall replace the top section of the sectional poles complete with head frame, pulleys, cables, head-ring, trailing cables and other HML pole apparatus as detailed in specification TPD-010A-HIGHMASTSPEC-A.

c) The Contractor shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B. All damaged cables or apparatus shall be replaced.

d) The Contractor shall replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.

e) In an unlikely case where no appropriate existing light fittings are deemed to be in good condition and reusable by both the contractor and the employer's engineer, the contractor shall supply similar light fittings as the uninstalled luminaires of this high mast.

f) The contractor shall present evidence of the recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.

g) Should the Contractor suggest different luminaires because of the possible system design compatibility, mechanical and safety compliance reasons, they are to undertake simulations and submit to the Employer's Engineer for acceptance.

h) The Contractor shall design, supply and install an earthing and lightning protection system in the high mast. The Contractor shall also design, supply and install hot-dip Galvanized finials and bonding of the high mast to ground in the high mast. The required results shall be submitted to the Employer's Engineer.

i) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.2.27 MAST NO.11 (D SHED)

a) The Contractor shall uninstall 3 existing fittings that are not working on the existing 30m High Mast Pole and issue the luminaires to TPT. The current installation consists of a total of 8x400W HPS Light fittings.

b) The Contractor shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B. All damaged cables or apparatus shall be replaced. Contractor to replace the DB.

c) The Contractor shall replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.

d) In an unlikely case where no appropriate existing light fittings are deemed to be in good condition and reusable by both the contractor and the employer's engineer, the contractor shall supply similar light fittings as the uninstalled luminaires of this high mast.

e) The contractor shall present evidence of the recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.

f) Should the Contractor suggest different luminaires because of the possible system design compatibility, mechanical and safety compliance reasons, they are to undertake simulations and submit to the Employer's Engineer for acceptance.

g) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.2.28 MAST NO.21 (RAIL SUBSTATION)

a) The Contractor shall uninstall the existing 8x400W HPS Light complete with the head ring of the existing 30m High Mast Pole and issue the luminaires to TPT. The fittings in a good condition shall be reused to replace the existing fittings in other high mast poles in the same contract.

b) The Contractor shall uninstall the existing bow high mast light pole complete with it apparatus and issue the HML pole to TPT.

c) The Contractor shall supply and install a new bow 30m high mast in accordance with TPD-010B-HIGHMASTSPEC-A.

d) The Contractor shall design, supply, and install a complete new lighting for the proposed 30m High Mast Pole. The contractor shall demonstrate the suitability of the incomer cable and the existing cable from the DB supplying the luminaires. The design shall be complete with a new DB and mountings for the luminaires. The design shall be done in equal or similar approved to the most recent relux software. The design shall consider all nearest light sources, show aiming angles and orientation to address glare, light pollution and to archive compliance to the recommended values of the OHS Act: Lighting Regulations and SANS 10389.

e) 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K have been used on a preliminary design by the employer for benchmarking and pricing purposes. Equal or similar approved range of product can be used by the bidder subject to simulations submitted to the Employer's Engineer for acceptance.

f) The Contractor shall design, supply and install the earthing and lightning protection system for the HML. The Contractor shall tie the new installation to the existing suitable earthing and lightning protection system upon testing the integrity of the existing earthing and lightning protection. The results and recommendations shall be submitted to the Employer's Engineer for acceptance.

g) The Contractor shall supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. The Contractor shall link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation with an i3 processor, 27 inch touch screen monitor complete with network adaptor and USB RJ45 adapter to control the dimming functionality of the high mast lighting. The system shall be wall mounted in a hinged lockable stainless steel box with cut-out for the monitor screen. The system shall be installed in the TPT office within the site. The Contractor shall also configure, programme and commission the system.

h) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.2.29 MAST NO.20 (CLINIC)

a) The Contractor shall uninstall the existing 9x400W HPS Light complete with the head ring of the existing 30m High Mast Pole and issue the luminaires to TPT. The fittings in a good condition shall be reused to replace the existing fittings in other high mast poles in the same contract.

b) The Contractor shall inspect and refurbish the existing high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.

c) The Contractor shall design, supply, and install a complete new lighting on the existing 30m High Mast Pole. The contractor shall demonstrate the suitability of the incomer cable and the existing cable from the DB supplying the luminaires. The design shall be complete with a new DB and mountings for the luminaires. The design shall be done in equal or similar approved to the most recent relux software. The design shall consider all nearest light sources, show aiming angles and orientation to address glare, light pollution and to archive compliance to the recommended values of the OHS Act: Lighting Regulations and SANS 10389.

d) 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K have been used on a preliminary design by the employer for benchmarking and pricing purposes. Equal or similar approved range of product can be used by the bidder subject to simulations submitted to the Employer's Engineer for acceptance.

e) The Contractor shall design, supply and install the earthing and lightning protection system for the HML. The Contractor shall tie the new installation to the existing suitable earthing and lightning protection system upon testing the integrity of the existing earthing and lightning protection. The results and recommendations shall be submitted to the Employer's Engineer for acceptance.

f) The Contractor shall supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. The Contractor shall link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation with an i3 processor, 27 inch touch screen monitor complete with network adaptor and USB RJ45 adapter to control the dimming functionality of the high mast lighting. The system shall be wall mounted in a hinged lockable stainless steel box with cut-out for the monitor screen. The system shall be installed in the TPT office within the site. The Contractor shall also configure, programme and commission the system.

g) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.2.30 MAST NO.111 (CAR PARK)

a) The Contractor shall uninstall 3 existing fittings that are not working on the existing 30m High Mast Pole and issue the luminaires to TPT. The current installation consists of a total of 7x400W HPS Light fittings.

b) The Contractor shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B.

c) The Contractor shall replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.

d) In an unlikely case where no appropriate existing light fittings are deemed to be in good condition and reusable by both the contractor and the employer's engineer, the contractor shall supply similar light fittings as the uninstalled luminaires of this high mast.

e) The contractor shall present evidence of the recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.

f) Should the Contractor suggest different luminaires because of the possible system design compatibility, mechanical and safety compliance reasons, they are to undertake simulations and submit to the Employer's Engineer for acceptance.

g) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.2.31 MAST NO. (B/C BERTH CORNER)

a) The Contractor shall uninstall the existing 8x400W HPS Light complete with the head ring of the existing 30m High Mast Pole and issue the luminaires to TPT. The fittings in a good condition shall be reused to replace the existing fittings in other high mast poles in the same contract.

b) The Contractor shall inspect and refurbish the existing high mast as detailed in specification TPD-010B-HIGHMASTSPEC-B.

c) The Contractor shall design, supply, and install a complete new lighting on the existing 30m High Mast Pole. The contractor shall demonstrate the suitability of the incomer cable and the existing cable from the DB supplying the luminaires. The design shall be complete with a new DB and mountings for the luminaires. The design shall be done in equal or similar approved to the most recent relux software. The design shall consider all nearest light sources, show aiming angles and orientation to address glare, light pollution and to archive compliance to the recommended values of the OHS Act: Lighting Regulations and SANS 10389.

d) 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K have been used on a preliminary design by the employer for benchmarking and pricing purposes. Equal or similar approved range of product can be used by the bidder subject to simulations submitted to the Employer's Engineer for acceptance.

e) The Contractor shall design, supply and install the earthing and lightning protection system for the HML. The Contractor shall tie the new installation to the existing suitable earthing and lightning protection system upon testing the integrity of the existing earthing and lightning protection. The results and recommendations shall be submitted to the Employer's Engineer for acceptance.

f) The Contractor shall supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. The Contractor shall link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation with an i3 processor, 27 inch

touch screen monitor complete with network adaptor and USB RJ45 adapter to control the dimming functionality of the high mast lighting. The system shall be wall mounted in a hinged lockable stainless steel box with cut-out for the monitor screen. The system shall be installed in the TPT office within the site. The Contractor shall also configure, programme and commission the system.

g) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.2.32 MAST NO.22 (B BERTH)

a) The Contractor shall uninstall 2 existing fittings that are not working on the existing 30m High Mast Pole and issue the luminaires to TPT. The current installation consists of a total of 7x400W and 4x1000W HPS Light fittings.

b) The Contractor shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B.

c) The Contractor shall replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.

d) In an unlikely case where no appropriate existing light fittings are deemed to be in good condition and reusable by both the contractor and the employer's engineer, the contractor shall supply similar light fittings as the uninstalled luminaires of this high mast.

e) The contractor shall present evidence of the recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.

f) Should the Contractor suggest different luminaires because of the possible system design compatibility, mechanical and safety compliance reasons, they are to undertake simulations and submit to the Employer's Engineer for acceptance.

g) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.2.33 MAST NO.42 (C BERTH)

a) The Contractor shall uninstall 2 existing fittings that are not working on the existing 30m High Mast Pole and issue the luminaires to TPT. The current installation consists of a total of 7x400W and 4x1000W HPS Light fittings.

b) The Contractor shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B.

c) The Contractor shall replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.

d) In an unlikely case where no appropriate existing light fittings are deemed to be in good condition and reusable by both the contractor and the employer's engineer, the contractor shall supply similar light fittings as the uninstalled luminaires of this high mast.

e) The contractor shall present evidence of the recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.

f) Should the Contractor suggest different luminaires because of the possible system design compatibility, mechanical and safety compliance reasons, they are to undertake simulations and submit to the Employer's Engineer for acceptance.

g) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.2.34 MAST NO.53 (C WARFSIDE)

a) The Contractor shall uninstall 5 existing fittings that are not working on the existing 30m High Mast Pole and issue the luminaires to TPT. The current installation consists of a total of 7x400W and 5x1000W HPS Light fittings.

b) The Contractor shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B.

c) The Contractor shall replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.

d) In an unlikely case where no appropriate existing light fittings are deemed to be in good condition and reusable by both the contractor and the employer's engineer, the contractor shall supply similar light fittings as the uninstalled luminaires of this high mast.

e) The contractor shall present evidence of the recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.

f) Should the Contractor suggest different luminaires because of the possible system design compatibility, mechanical and safety compliance reasons, they are to undertake simulations and submit to the Employer's Engineer for acceptance.

g) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.2.35 MAST NO.52 (D-BERTH)

a) The Contractor shall uninstall 4 existing fittings that are not working on the existing 30m High Mast Pole and issue the luminaires to TPT. The current installation consists of a total of 7x400W and 5x1000W HPS Light fittings.

b) The Contractor shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B.

c) The Contractor shall replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.

d) In an unlikely case where no appropriate existing light fittings are deemed to be in good condition and reusable by both the contractor and the employer's engineer, the contractor shall supply similar light fittings as the uninstalled luminaires of this high mast.

e) The contractor shall present evidence of the recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.

f) Should the Contractor suggest different luminaires because of the possible system design compatibility, mechanical and safety compliance reasons, they are to undertake simulations and submit to the Employer's Engineer for acceptance.

g) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.2.36 MAST NO.41 (D-STACK)

a) The Contractor shall uninstall 6 existing fittings that are not working on the existing 30m High Mast Pole and issue the luminaires to TPT. The current installation consists of a total of 18x400W HPS Light fittings.

b) The Contractor shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B.

c) The Contractor shall replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.

d) In an unlikely case where no appropriate existing light fittings are deemed to be in good condition and reusable by both the contractor and the employer's engineer, the contractor shall supply similar light fittings as the uninstalled luminaires of this high mast.

e) The contractor shall present evidence of the recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.

f) Should the Contractor suggest different luminaires because of the possible system design compatibility, mechanical and safety compliance reasons, they are to undertake simulations and submit to the Employer's Engineer for acceptance.

g) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.2.37 MAST NO.40 (E STACK)

a) The Contractor shall uninstall 6 existing fittings that are not working on the existing 30m High Mast Pole and issue the luminaires to TPT. The current installation consists of a total of 18x400W HPS Light fittings.

b) The Contractor shall replace section 1 to 4 (from the bottom) of the sectional pole complete with head frame, pulleys, cables, head-ring, trailing cables and other HML pole apparatus as detailed in specification TPD-010A-HIGHMASTSPEC-A.

c) The Contractor shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B.

d) The Contractor shall replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.

e) In an unlikely case where no appropriate existing light fittings are deemed to be in good condition and reusable by both the contractor and the employer's engineer, the contractor shall supply similar light fittings as the uninstalled luminaires of this high mast.

f) The contractor shall present evidence of the recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.

g) Should the Contractor suggest different luminaires because of the possible system design compatibility, mechanical and safety compliance reasons, they are to undertake simulations and submit to the Employer's Engineer for acceptance.

h) The Contractor shall design, supply and install an earthing and lightning protection system in the high mast. The Contractor shall also design, supply and install hot-dip Galvanized finials and bonding of the high mast to ground in the high mast. The required results shall be submitted to the Employer's Engineer.

i) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.2.38 MAST NO.51 (E-STACK LOW)

a) The Contractor shall uninstall 5 existing fittings that are not working on the existing 30m High Mast Pole and issue the luminaires to TPT. The current installation consists of a total of 18x400W HPS Light fittings.

b) The Contractor shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B.

c) The Contractor shall replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.

d) In an unlikely case where no appropriate existing light fittings are deemed to be in good condition and reusable by both the contractor and the employer's engineer, the contractor shall supply similar light fittings as the uninstalled luminaires of this high mast.

e) The contractor shall present evidence of the recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.

f) Should the Contractor suggest different luminaires because of the possible system design compatibility, mechanical and safety compliance reasons, they are to undertake simulations and submit to the Employer's Engineer for acceptance.

g) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.2.39 MAST NO.50 (E-STACK HIGH)

a) The Contractor shall uninstall 4 existing fittings that are not working on the existing 30m High Mast Pole and issue the luminaires to TPT. The current installation consists of a total of 7x400W HPS Light fittings and 5x1000W HPS Light fittings.

b) The Contractor shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B. Contractor to replace the safety chain.

c) The Contractor shall replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.

d) In an unlikely case where no appropriate existing light fittings are deemed to be in good condition and reusable by both the contractor and the employer's engineer, the contractor shall supply similar light fittings as the uninstalled luminaires of this high mast.

e) The contractor shall present evidence of the recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.

f) Should the Contractor suggest different luminaires because of the possible system design compatibility, mechanical and safety compliance reasons, they are to undertake simulations and submit to the Employer's Engineer for acceptance.

g) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.2.40 MAST NO.39 (E-STACK)

a) The Contractor shall uninstall 5 existing fittings that are not working on the existing 30m High Mast Pole and issue the luminaires to TPT. The current installation consists of a total of 18x400W HPS Light fittings.

b) The Contractor shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B.

c) The Contractor shall replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.

d) In an unlikely case where no appropriate existing light fittings are deemed to be in good condition and reusable by both the contractor and the employer's engineer, the contractor shall supply similar light fittings as the uninstalled luminaires of this high mast.

e) The contractor shall present evidence of the recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.

f) Should the Contractor suggest different luminaires because of the possible system design compatibility, mechanical and safety compliance reasons, they are to undertake simulations and submit to the Employer's Engineer for acceptance.

g) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.2.41 MAST NO.5 (INTAKE SUB)

a) The Contractor shall uninstall 4 existing fittings that are not working on the existing 30m High Mast Pole and issue the luminaires to TPT. The current installation consists of a total of 15x400W HPS Light fittings.

b) The Contractor shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B.

c) The Contractor shall replace the uninstalled fittings with the existing fittings which deemed to be in good condition and have been uninstalled from other high mast poles.

d) In an unlikely case where no appropriate existing light fittings are deemed to be in good condition and reusable by both the contractor and the employer's engineer, the contractor shall supply similar light fittings as the uninstalled luminaires of this high mast.

e) The contractor shall present evidence of the recommended orientation and aiming angles of the light fittings of this installation. The arrangement shall be the contractor's design and shall consider nearby light sources to control the glare effect, and avoid a non-uniform area illumination.

f) Should the Contractor suggest different luminaires because of the possible system design compatibility, mechanical and safety compliance reasons, they are to undertake simulations and submit to the Employer's Engineer for acceptance.

g) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.3 MAYDON WHARF

5.2.3.1 MAST NO.1

a) The Contractor shall uninstall the existing Light fittings complete with the head ring of the existing 30m High Mast Pole and issue the luminaires to TPT. The current installation consists of a total of 16x400W HPS Light fittings. The fittings in a good condition shall be reused to replace the existing fittings in other high mast poles in the same contract.

b) The *Contractor* shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B. The ring lowering and raising mechanism shall be replaced. New DB required complete with new incomer 25mm^2 4 core LV cupper armoured cable gland.

c) The Contractor shall design, supply, and install a complete new lighting on the existing 30m High Mast Pole. The contractor shall demonstrate the suitability of the incomer cable and the existing cable from the DB supplying the luminaires. The design shall be complete with a new DB and mountings for the luminaires. The design shall be done in equal or similar approved to the most recent relux software. The design shall consider all nearest light sources, show aiming angles and orientation to address glare, light pollution and to archive compliance to the recommended values of the OHS Act: Lighting Regulations and SANS 10389.

d) 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K have been used on a preliminary design by the *employer* for benchmarking and pricing purposes. Equal or similar approved range of product can be used by the bidder subject to simulations submitted to the *Employer's* Engineer for acceptance.

e) The Contractor shall design, supply and install the earthing and lightning protection system for the HML. The *Contractor* shall tie the new installation to the existing suitable earthing and lightning protection system upon testing the integrity of the existing earthing and lightning protection. The results and recommendations shall be submitted to the *Employer's* Engineer for acceptance.

f) The Contractor shall supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. The Contractor shall supply and install an equal or similar approved to a WiFi enabled Lenovo A740 workstation with an i3 processor, 27 inch touch screen monitor complete with network adaptor and USB RJ45 adapter to control the dimming functionality of the high mast lighting. The system shall be wall mounted in a hinged lockable stainless steel box with cut-out for the monitor screen. The system shall be installed in the TPT office within the site. The Contractor shall also configure, programme and commission the system.

g) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.3.2 MAST NO.2

a) The Contractor shall uninstall the existing Light fittings complete with the head ring of the existing 30m High Mast Pole and issue the luminaires to TPT. The current installation consists of a total of 6x400W HPS Light fittings. The fittings in a good condition shall be reused to replace the existing fittings in other high mast poles in the same contract.

b) The *Contractor* shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B. The ring lowering and raising mechanism shall be replaced. New DB required complete with new incomer 25mm^2 4 core LV cupper armoured cable gland.

c) The Contractor shall design, supply, and install a complete new lighting on the existing 30m High Mast Pole. The contractor shall demonstrate the suitability of the incomer cable and the existing cable from the DB supplying the luminaires. The design shall be complete with a new DB and mountings for the luminaires. The design shall be done in equal or similar approved to the most recent relux software. The design shall consider all nearest light sources, show aiming angles and orientation to address glare, light pollution and to archive compliance to the recommended values of the OHS Act: Lighting Regulations and SANS 10389.

d) 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K have been used on a preliminary design by the *employer* for benchmarking and pricing purposes. Equal or similar approved range of product can be used by the bidder subject to simulations submitted to the *Employer's* Engineer for acceptance.

e) The Contractor shall design, supply and install the earthing and lightning protection system for the HML. The *Contractor* shall tie the new installation to the existing suitable earthing and lightning protection system upon testing the integrity of the existing earthing and lightning protection. The results and recommendations shall be submitted to the *Employer's* Engineer for acceptance.

f) The Contractor shall supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. The Contractor shall link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation with an i3 processor, 27 inch touch screen monitor complete with network adaptor and USB RJ45 adapter to control the dimming functionality of the high mast lighting. The system shall be wall mounted in a hinged lockable stainless steel box with cut-out for the monitor screen. The system shall be installed in the TPT office within the site. The Contractor shall also configure, programme and commission the system.

g) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.3.3 MAST NO.3

a) The Contractor shall uninstall the existing Light fittings complete with the head ring of the existing 30m High Mast Pole and issue the luminaires to TPT. The current installation consists of a total of 6x400W HPS Light fittings. The fittings in a good condition shall be reused to replace the existing fittings in other high mast poles in the same contract.

b) The Contractor shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B. The ring lowering and raising mechanism shall be replaced. New DB required complete with new incomer 25mm^2 4 core LV cupper armoured cable gland.

c) The Contractor shall design, supply, and install a complete new lighting on the existing 30m High Mast Pole. The contractor shall demonstrate the suitability of the incomer cable and the existing cable from the DB supplying the luminaires. The design shall be complete with a new DB and mountings for the luminaires. The design shall be done in equal or similar approved to the most recent relux software. The design shall consider all nearest light sources, show aiming angles and orientation to address glare, light pollution and to archive compliance to the recommended values of the OHS Act: Lighting Regulations and SANS 10389.

d) 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K have been used on a preliminary design by the employer for benchmarking and pricing purposes. Equal or similar approved range of product can be used by the bidder subject to simulations submitted to the Employer's Engineer for acceptance.

e) The Contractor shall design, supply and install the earthing and lightning protection system for the HML. The Contractor shall tie the new installation to the existing suitable earthing and lightning protection system upon testing the integrity of the existing earthing and lightning protection. The results and recommendations shall be submitted to the Employer's Engineer for acceptance.

f) The Contractor shall supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. The Contractor shall link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation with an i3 processor, 27 inch touch screen monitor complete with network adaptor and USB RJ45 adapter to control the dimming functionality of the high mast lighting. The system shall be wall mounted in a hinged lockable stainless steel box with cut-out for the monitor screen. The system shall be installed in the TPT office within the site. The Contractor shall also configure, programme and commission the system.

g) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.3.4 MAST NO.4

a) The Contractor shall uninstall the existing Light fittings complete with the head ring of the existing 30m High Mast Pole and issue the luminaires to TPT. The current installation consists of a total of 7x400W HPS Light fittings. The fittings in a good condition shall be reused to replace the existing fittings in other high mast poles in the same contract.

b) The *Contractor* shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B. The ring lowering and raising mechanism shall be replaced. New DB required complete with new incomer 25mm^2 4 core LV cupper armoured cable gland.

c) The Contractor shall design, supply, and install a complete new lighting on the existing 30m High Mast Pole. The contractor shall demonstrate the suitability of the incomer cable and the existing cable from the DB supplying the luminaires. The design shall be complete with a new DB and

mountings for the luminaires. The design shall be done in equal or similar approved to the most recent relux software. The design shall consider all nearest light sources, show aiming angles and orientation to address glare, light pollution and to archive compliance to the recommended values of the OHS Act: Lighting Regulations and SANS 10389.

d) 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K have been used on a preliminary design by the *employer* for benchmarking and pricing purposes. Equal or similar approved range of product can be used by the bidder subject to simulations submitted to the *Employer's* Engineer for acceptance.

e) The Contractor shall design, supply and install the earthing and lightning protection system for the HML. The *Contractor* shall tie the new installation to the existing suitable earthing and lightning protection system upon testing the integrity of the existing earthing and lightning protection. The results and recommendations shall be submitted to the *Employer's* Engineer for acceptance.

f) The Contractor shall supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. The Contractor shall link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation with an i3 processor, 27 inch touch screen monitor complete with network adaptor and USB RJ45 adapter to control the dimming functionality of the high mast lighting. The system shall be wall mounted in a hinged lockable stainless steel box with cut-out for the monitor screen. The system shall be installed in the TPT office within the site. The Contractor shall also configure, programme and commission the system.

g) The Contractor shall trace, locate and expose the cable fault for the cable supplying this high mast light. Provision for trenching of tar road to expose the cable fault shall be made.

h) The Contractor shall repair the fault in accordance with TPD-003-CABLESPEC. Provisions for 10m of a 25mm^2 4 core LV cupper armoured cable and a cable joint shall be made.

i) The Contractor test the cable joint, backfill and make good the excavated surface. The backfilling shall include imported bedding sand, a concrete protection slab, clean selected backfill, a pvc danger tape, backfill excavated from the trench and the existing similar tar surface. Detail drawing shall be issued by the employer during construction if required.

j) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.3.5 MAST NO.5

a) The Contractor shall uninstall the existing Light fittings complete with the head ring of the existing 30m High Mast Pole and issue the luminaires to TPT. The current installation consists of a total of 7x400W HPS Light fittings. The fittings in a good condition shall be reused to replace the existing fittings in other high mast poles in the same contract.

b) The Contractor shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B. The ring lowering and raising mechanism shall be replaced. New DB required complete with new incomer 25mm^2 4 core LV cupper armoured cable gland.

c) The Contractor shall design, supply, and install a complete new lighting on the existing 30m High Mast Pole. The contractor shall demonstrate the suitability of the incomer cable and the existing cable from the DB supplying the luminaires. The design shall be complete with a new DB and mountings for the luminaires. The design shall be done in equal or similar approved to the most recent relux software. The design shall consider all nearest light sources, show aiming angles and orientation to address glare, light pollution and to archive compliance to the recommended values of the OHS Act: Lighting Regulations and SANS 10389.

d) 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K have been used on a preliminary design by the employer for benchmarking and pricing purposes. Equal or similar approved range of product can be used by the bidder subject to simulations submitted to the Employer's Engineer for acceptance.

e) The Contractor shall design, supply and install the earthing and lightning protection system for the HML. The Contractor shall tie the new installation to the existing suitable earthing and lightning protection system upon testing the integrity of the existing earthing and lightning protection. The results and recommendations shall be submitted to the Employer's Engineer for acceptance.

f) The Contractor shall supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. The Contractor shall link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation with an i3 processor, 27 inch touch screen monitor complete with network adaptor and USB RJ45 adapter to control the dimming functionality of the high mast lighting. The system shall be wall mounted in a hinged lockable stainless steel box with cut-out for the monitor screen. The system shall be installed in the TPT office within the site. The Contractor shall also configure, programme and commission the system.

g) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.3.6 MAST NO.6

a) The Contractor shall uninstall the existing Light fittings complete with the head ring of the existing 30m High Mast Pole and issue the luminaires to TPT. The current installation consists of a total of 6x400W HPS Light fittings. The fittings in a good condition shall be reused to replace the existing fittings in other high mast poles in the same contract.

b) The *Contractor* shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B. The ring lowering and raising mechanism shall be replaced. New DB required complete with new incomer 25mm^2 4 core LV cupper armoured cable gland.

c) The Contractor shall design, supply, and install a complete new lighting on the existing 30m High Mast Pole. The contractor shall demonstrate the suitability of the incomer cable and the existing cable from the DB supplying the luminaires. The design shall be complete with a new DB and mountings for the luminaires. The design shall be done in equal or similar approved to the most recent relux software. The design shall consider all nearest light sources, show aiming angles and orientation to address glare, light pollution and to archive compliance to the recommended values of the OHS Act: Lighting Regulations and SANS 10389.

d) 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K have been used on a preliminary design by the *employer* for benchmarking and pricing purposes. Equal or similar approved range of product can be used by the bidder subject to simulations submitted to the *Employer's* Engineer for acceptance.

e) The Contractor shall design, supply and install the earthing and lightning protection system for the HML. The *Contractor* shall tie the new installation to the existing suitable earthing and lightning protection system upon testing the integrity of the existing earthing and lightning protection. The results and recommendations shall be submitted to the *Employer's* Engineer for acceptance.

f) The Contractor shall supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. The Contractor shall link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation with an i3 processor, 27 inch touch screen monitor complete with network adaptor and USB RJ45 adapter to control the dimming functionality of the high mast lighting. The system shall be wall mounted in a hinged lockable stainless steel box with cut-out for the monitor screen. The system shall be installed in the TPT office within the site. The Contractor shall also configure, programme and commission the system.

g) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.3.7 MAST NO.7

a) The Contractor shall uninstall the existing Light fittings complete with the head ring of the existing 30m High Mast Pole and issue the luminaires to TPT. The current installation consists of a total of 6x400W HPS Light fittings. The fittings in a good condition shall be reused to replace the existing fittings in other high mast poles in the same contract.

b) The Contractor shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B. The ring lowering and raising mechanism shall be replaced. New DB required complete with new incomer 25mm^2 4 core LV cupper armoured cable gland.

c) The Contractor shall design, supply, and install a complete new lighting on the existing 30m High Mast Pole. The contractor shall demonstrate the suitability of the incomer cable and the existing cable from the DB supplying the luminaires. The design shall be complete with a new DB and mountings for the luminaires. The design shall be done in equal or similar approved to the most recent relux software. The design shall consider all nearest light sources, show aiming angles and orientation to address glare, light pollution and to archive compliance to the recommended values of the OHS Act: Lighting Regulations and SANS 10389.

d) 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K have been used on a preliminary design by the employer for benchmarking and pricing purposes. Equal or similar approved range of product can be used by the bidder subject to simulations submitted to the Employer's Engineer for acceptance.

e) The Contractor shall design, supply and install the earthing and lightning protection system for the HML. The Contractor shall tie the new installation to the existing suitable earthing and lightning protection system upon testing the integrity of the existing earthing and lightning protection. The results and recommendations shall be submitted to the Employer's Engineer for acceptance.

f) The Contractor shall supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. The Contractor shall link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation with an i3 processor, 27 inch touch screen monitor complete with network adaptor and USB RJ45 adapter to control the dimming functionality of the high mast lighting. The system shall be wall mounted in a hinged lockable stainless steel box with cut-out for the monitor screen. The system shall be installed in the TPT office within the site. The Contractor shall also configure, programme and commission the system.

g) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.3.8 MAST NO.8

a) The Contractor shall uninstall the existing Light fittings complete with the head ring of the existing 30m High Mast Pole and issue the luminaires to TPT. The current installation consists of a total of 12x400W HPS Light fittings. The fittings in a good condition shall be reused to replace the existing fittings in other high mast poles in the same contract.

b) The *Contractor* shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B. The ring lowering and raising mechanism shall be replaced. New DB required complete with new incomer 25mm^2 4 core LV cupper armoured cable gland.

c) The Contractor shall design, supply, and install a complete new lighting on the existing 30m High Mast Pole. The contractor shall demonstrate the suitability of the incomer cable and the existing cable from the DB supplying the luminaires. The design shall be complete with a new DB and mountings for the luminaires. The design shall be done in equal or similar approved to the most recent relux software. The design shall consider all nearest light sources, show aiming angles and orientation to address glare, light pollution and to archive compliance to the recommended values of the OHS Act: Lighting Regulations and SANS 10389.

d) 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K have been used on a preliminary design by the *employer* for benchmarking and pricing purposes. Equal or similar approved range of product can be used by the bidder subject to simulations submitted to the *Employer's* Engineer for acceptance.

e) The Contractor shall design, supply and install the earthing and lightning protection system for the HML. The *Contractor* shall tie the new installation to the existing suitable earthing and lightning protection system upon testing the integrity of the existing earthing and lightning protection. The results and recommendations shall be submitted to the *Employer's* Engineer for acceptance.

f) The Contractor shall supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. The Contractor shall link the installation to the supplied

equal or similar approved WiFi enabled Lenovo A740 workstation with an i3 processor, 27 inch touch screen monitor complete with network adaptor and USB RJ45 adapter to control the dimming functionality of the high mast lighting. The system shall be wall mounted in a hinged lockable stainless steel box with cut-out for the monitor screen. The system shall be installed in the TPT office within the site. The Contractor shall also configure, programme and commission the system.

g) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.3.9 MAST NO.9

a) The Contractor shall uninstall the existing Light fittings complete with the head ring of the existing 30m High Mast Pole and issue the luminaires to TPT. The current installation consists of a total of 5x400W HPS Light fittings. The fittings in a good condition shall be reused to replace the existing fittings in other high mast poles in the same contract.

b) The Contractor shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B. The ring lowering and raising mechanism shall be replaced. New DB required complete with new incomer 25mm^2 4 core LV cupper armoured cable gland.

c) The Contractor shall design, supply, and install a complete new lighting on the existing 30m High Mast Pole. The contractor shall demonstrate the suitability of the incomer cable and the existing cable from the DB supplying the luminaires. The design shall be complete with a new DB and mountings for the luminaires. The design shall be done in equal or similar approved to the most recent relux software. The design shall consider all nearest light sources, show aiming angles and orientation to address glare, light pollution and to archive compliance to the recommended values of the OHS Act: Lighting Regulations and SANS 10389.

d) 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K have been used on a preliminary design by the employer for benchmarking and pricing purposes. Equal or similar approved range of product can be used by the bidder subject to simulations submitted to the Employer's Engineer for acceptance.

e) The Contractor shall design, supply and install the earthing and lightning protection system for the HML. The Contractor shall tie the new installation to the existing suitable earthing and lightning protection system upon testing the integrity of the existing earthing and lightning protection. The results and recommendations shall be submitted to the Employer's Engineer for acceptance.

f) The Contractor shall supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. The Contractor shall link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation with an i3 processor, 27 inch touch screen monitor complete with network adaptor and USB RJ45 adapter to control the dimming functionality of the high mast lighting. The system shall be wall mounted in a hinged lockable stainless steel box with cut-out for the monitor screen. The system shall be installed in the TPT office within the site. The Contractor shall also configure, programme and commission the system.

g) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.3.10 MAST NO.10

a) The Contractor shall uninstall the existing Light fittings complete with the head ring of the existing 30m High Mast Pole and issue the luminaires to TPT. The current installation consists of a total of 5x400W HPS Light fittings. The fittings in a good condition shall be reused to replace the existing fittings in other high mast poles in the same contract.

b) The *Contractor* shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B. The ring lowering and raising mechanism shall be replaced. New DB required complete with new incomer 25mm^2 4 core LV cupper armoured cable gland.

c) The Contractor shall design, supply, and install a complete new lighting on the existing 30m High Mast Pole. The contractor shall demonstrate the suitability of the incomer cable and the existing cable from the DB supplying the luminaires. The design shall be complete with a new DB and mountings for the luminaires. The design shall be done in equal or similar approved to the most recent relux software. The design shall consider all nearest light sources, show aiming angles and orientation to address glare, light pollution and to archive compliance to the recommended values of the OHS Act: Lighting Regulations and SANS 10389.

d) 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K have been used on a preliminary design by the *employer* for benchmarking and pricing purposes. Equal or similar approved range of product can be used by the bidder subject to simulations submitted to the *Employer's* Engineer for acceptance.

e) The Contractor shall design, supply and install the earthing and lightning protection system for the HML. The *Contractor* shall tie the new installation to the existing suitable earthing and lightning protection system upon testing the integrity of the existing earthing and lightning protection. The results and recommendations shall be submitted to the *Employer's* Engineer for acceptance.

f) The Contractor shall supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. The Contractor shall link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation with an i3 processor, 27 inch touch screen monitor complete with network adaptor and USB RJ45 adapter to control the dimming functionality of the high mast lighting. The system shall be wall mounted in a hinged lockable stainless steel box with cut-out for the monitor screen. The system shall be installed in the TPT office within the site. The Contractor shall also configure, programme and commission the system.

g) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.3.11 MAST NO.11

a) The Contractor shall uninstall the existing Light fittings complete with the head ring of the existing 30m High Mast Pole and issue the luminaires to TPT. The current installation consists of

a total of 7x400W HPS Light fittings. The fittings in a good condition shall be reused to replace the existing fittings in other high mast poles in the same contract.

b) The Contractor shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B. The ring lowering and raising mechanism shall be replaced. New DB required complete with new incomer 25mm^2 4 core LV cupper armoured cable gland.

c) The Contractor shall design, supply, and install a complete new lighting on the existing 30m High Mast Pole. The contractor shall demonstrate the suitability of the incomer cable and the existing cable from the DB supplying the luminaires. The design shall be complete with a new DB and mountings for the luminaires. The design shall be done in equal or similar approved to the most recent relux software. The design shall consider all nearest light sources, show aiming angles and orientation to address glare, light pollution and to archive compliance to the recommended values of the OHS Act: Lighting Regulations and SANS 10389.

d) 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K have been used on a preliminary design by the employer for benchmarking and pricing purposes. Equal or similar approved range of product can be used by the bidder subject to simulations submitted to the Employer's Engineer for acceptance.

e) The Contractor shall design, supply and install the earthing and lightning protection system for the HML. The Contractor shall tie the new installation to the existing suitable earthing and lightning protection system upon testing the integrity of the existing earthing and lightning protection. The results and recommendations shall be submitted to the Employer's Engineer for acceptance.

f) The Contractor shall supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. The Contractor shall link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation with an i3 processor, 27 inch touch screen monitor complete with network adaptor and USB RJ45 adapter to control the dimming functionality of the high mast lighting. The system shall be wall mounted in a hinged lockable stainless steel box with cut-out for the monitor screen. The system shall be installed in the TPT office within the site. The Contractor shall also configure, programme and commission the system.

g) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.3.12 MAST NO.12

a) The Contractor shall uninstall the existing Light fittings complete with the head ring of the existing 30m High Mast Pole and issue the luminaires to TPT. The current installation consists of a total of 6x400W HPS Light fittings. The fittings in a good condition shall be reused to replace the existing fittings in other high mast poles in the same contract.

b) The *Contractor* shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B. The ring lowering and raising mechanism shall be replaced. New DB required complete with new incomer 25mm^2 4 core LV cupper armoured cable gland.

c) The Contractor shall design, supply, and install a complete new lighting on the existing 30m High Mast Pole. The contractor shall demonstrate the suitability of the incomer cable and the existing cable from the DB supplying the luminaires. The design shall be complete with a new DB and mountings for the luminaires. The design shall be done in equal or similar approved to the most recent relux software. The design shall consider all nearest light sources, show aiming angles and orientation to address glare, light pollution and to archive compliance to the recommended values of the OHS Act: Lighting Regulations and SANS 10389.

d) 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K have been used on a preliminary design by the *employer* for benchmarking and pricing purposes. Equal or similar approved range of product can be used by the bidder subject to simulations submitted to the *Employer's* Engineer for acceptance.

e) The Contractor shall design, supply and install the earthing and lightning protection system for the HML. The *Contractor* shall tie the new installation to the existing suitable earthing and lightning protection system upon testing the integrity of the existing earthing and lightning protection. The results and recommendations shall be submitted to the *Employer's* Engineer for acceptance.

f) The Contractor shall supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. The Contractor shall link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation with an i3 processor, 27 inch touch screen monitor complete with network adaptor and USB RJ45 adapter to control the dimming functionality of the high mast lighting. The system shall be wall mounted in a hinged lockable stainless steel box with cut-out for the monitor screen. The system shall be installed in the TPT office within the site. The Contractor shall also configure, programme and commission the system.

g) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.3.13 MAST NO.13

a) The Contractor shall uninstall the existing Light fittings complete with the head ring of the existing 30m High Mast Pole and issue the luminaires to TPT. The current installation consists of a total of 6x400W HPS Light fittings. The fittings in a good condition shall be reused to replace the existing fittings in other high mast poles in the same contract.

b) The Contractor shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B. The ring lowering and raising mechanism shall be replaced. New DB required complete with new incomer 25mm^2 4 core LV cupper armoured cable gland.

c) The Contractor shall design, supply, and install a complete new lighting on the existing 30m High Mast Pole. The contractor shall demonstrate the suitability of the incomer cable and the existing cable from the DB supplying the luminaires. The design shall be complete with a new DB and mountings for the luminaires. The design shall be done in equal or similar approved to the most recent relux software. The design shall consider all nearest light sources, show aiming angles and orientation to address glare, light pollution and to archive compliance to the recommended values of the OHS Act: Lighting Regulations and SANS 10389.

d) 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K have been used on a preliminary design by the employer for benchmarking and pricing purposes. Equal or similar approved range of product can be used by the bidder subject to simulations submitted to the Employer's Engineer for acceptance.

e) The Contractor shall design, supply and install the earthing and lightning protection system for the HML. The Contractor shall tie the new installation to the existing suitable earthing and lightning protection system upon testing the integrity of the existing earthing and lightning protection. The results and recommendations shall be submitted to the Employer's Engineer for acceptance.

f) The Contractor shall supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. The Contractor shall link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation with an i3 processor, 27 inch touch screen monitor complete with network adaptor and USB RJ45 adapter to control the dimming functionality of the high mast lighting. The system shall be wall mounted in a hinged lockable stainless steel box with cut-out for the monitor screen. The system shall be installed in the TPT office within the site. The Contractor shall also configure, programme and commission the system.

g) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.3.14 MAST NO.14

a) The Contractor shall uninstall the existing Light fittings complete with the head ring of the existing 30m High Mast Pole and issue the luminaires to TPT. The current installation consists of a total of 12x400W HPS Light fittings. The fittings in a good condition shall be reused to replace the existing fittings in other high mast poles in the same contract.

b) The *Contractor* shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B. The ring lowering and raising mechanism shall be replaced. New DB required complete with new incomer 25mm^2 4 core LV cupper armoured cable gland.

c) The Contractor shall design, supply, and install a complete new lighting on the existing 30m High Mast Pole. The contractor shall demonstrate the suitability of the incomer cable and the existing cable from the DB supplying the luminaires. The design shall be complete with a new DB and mountings for the luminaires. The design shall be done in equal or similar approved to the most recent relux software. The design shall consider all nearest light sources, show aiming angles and orientation to address glare, light pollution and to archive compliance to the recommended values of the OHS Act: Lighting Regulations and SANS 10389.

d) 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K have been used on a preliminary design by the *employer* for benchmarking and pricing purposes. Equal or similar approved range of product can be used by the bidder subject to simulations submitted to the *Employer's* Engineer for acceptance.

e) The Contractor shall design, supply and install the earthing and lightning protection system for the HML. The *Contractor* shall tie the new installation to the existing suitable earthing and

lightning protection system upon testing the integrity of the existing earthing and lightning protection. The results and recommendations shall be submitted to the *Employer's* Engineer for acceptance.

f) The Contractor shall supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. The Contractor shall link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation with an i3 processor, 27 inch touch screen monitor complete with network adaptor and USB RJ45 adapter to control the dimming functionality of the high mast lighting. The system shall be wall mounted in a hinged lockable stainless steel box with cut-out for the monitor screen. The system shall be installed in the TPT office within the site. The Contractor shall also configure, programme and commission the system.

g) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.3.15 MAST NO.15

a) The Contractor shall uninstall the existing Light fittings complete with the head ring of the existing 30m High Mast Pole and issue the luminaires to TPT. The current installation consists of a total of 15x400W HPS Light fittings. The fittings in a good condition shall be reused to replace the existing fittings in other high mast poles in the same contract.

b) The Contractor shall inspect and refurbish the existing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B. The ring lowering and raising mechanism shall be replaced. New DB required complete with new incomer 25mm^2 4 core LV cupper armoured cable gland.

c) The Contractor shall design, supply, and install a complete new lighting on the existing 30m High Mast Pole. The contractor shall demonstrate the suitability of the incomer cable and the existing cable from the DB supplying the luminaires. The design shall be complete with a new DB and mountings for the luminaires. The design shall be done in equal or similar approved to the most recent relux software. The design shall consider all nearest light sources, show aiming angles and orientation to address glare, light pollution and to archive compliance to the recommended values of the OHS Act: Lighting Regulations and SANS 10389.

d) 6xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K have been used on a preliminary design by the employer for benchmarking and pricing purposes. Equal or similar approved range of product can be used by the bidder subject to simulations submitted to the Employer's Engineer for acceptance.

e) The Contractor shall design, supply and install the earthing and lightning protection system for the HML. The Contractor shall tie the new installation to the existing suitable earthing and lightning protection system upon testing the integrity of the existing earthing and lightning protection. The results and recommendations shall be submitted to the Employer's Engineer for acceptance.

f) The Contractor shall supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. The Contractor shall link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation with an i3 processor, 27 inch

touch screen monitor complete with network adaptor and USB RJ45 adapter to control the dimming functionality of the high mast lighting. The system shall be wall mounted in a hinged lockable stainless steel box with cut-out for the monitor screen. The system shall be installed in the TPT office within the site. The Contractor shall also configure, programme and commission the system.

g) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.4 K BLOCK

5.2.4.1 MAST NO.1

a) The Contractor shall uninstall the existing Light fittings complete with the head ring of the existing 30m High Mast Pole and issue the luminaires to TPT. The current installation consists of a total of 5x400W HPS Light fittings. The fittings in a good condition shall be reused to replace the existing fittings in other high mast poles in the same contract.

b) The *Contractor* shall inspect and refurbish the existing swing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B. The mast's swinging mechanism shall be replaced. New DB required complete with new incomer 25mm^2 4 core LV cupper armoured cable gland.

c) The Contractor shall design, supply, and install a complete new lighting on the existing 30m High Mast Pole. The contractor shall demonstrate the suitability of the incomer cable and the existing cable from the DB supplying the luminaires. The design shall be complete with a new DB and mountings for the luminaires. The design shall be done in equal or similar approved to the most recent relux software. The design shall consider all nearest light sources, show aiming angles and orientation to address glare, light pollution and to archive compliance to the recommended values of the OHS Act: Lighting Regulations and SANS 10389.

d) 4xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K have been used on a preliminary design by the *employer* for benchmarking and pricing purposes. Equal or similar approved range of product can be used by the bidder subject to simulations submitted to the *Employer's* Engineer for acceptance.

e) The Contractor shall design supply and install a balancing weight to assist the swinging process of the mast.

f) The Contractor shall design, supply and install the earthing and lightning protection system for the HML. The *Contractor* shall tie the new installation to the existing suitable earthing and lightning protection system upon testing the integrity of the existing earthing and lightning protection. The results and recommendations shall be submitted to the *Employer's* Engineer for acceptance.

g) The Contractor shall supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. The Contractor shall supply and install an equal or similar approved to a WiFi enabled Lenovo A740 workstation with an i3 processor, 27 inch touch screen monitor complete with network adaptor and USB RJ45 adapter to control the dimming functionality of the high mast lighting. The system shall be wall mounted in a hinged lockable stainless steel box with cut-out for the monitor screen. The system shall be installed in the TPT

office within the site. The Contractor shall also configure, programme and commission the system.

h) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.4.2 MAST NO.2

a) The Contractor shall uninstall the existing Light fittings complete with the head ring of the existing 30m High Mast Pole and issue the luminaires to TPT. The current installation consists of a total of 3x400W HPS Light fittings. The fittings in a good condition shall be reused to replace the existing fittings in other high mast poles in the same contract.

b) The Contractor shall inspect and refurbish the existing swing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B. The mast's swinging mechanism shall be replaced. New DB required complete with new incomer 25mm^2 4 core LV cupper armoured cable gland.

c) The Contractor shall design, supply, and install a complete new lighting on the existing 30m High Mast Pole. The contractor shall demonstrate the suitability of the incomer cable and the existing cable from the DB supplying the luminaires. The design shall be complete with a new DB and mountings for the luminaires. The design shall be done in equal or similar approved to the most recent relux software. The design shall consider all nearest light sources, show aiming angles and orientation to address glare, light pollution and to archive compliance to the recommended values of the OHS Act: Lighting Regulations and SANS 10389.

d) 4xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K have been used on a preliminary design by the employer for benchmarking and pricing purposes. Equal or similar approved range of product can be used by the bidder subject to simulations submitted to the Employer's Engineer for acceptance.

e) The Contractor shall design supply and install a balancing weight to assist the swinging process of the mast.

f) The Contractor shall design, supply and install the earthing and lightning protection system for the HML. The Contractor shall tie the new installation to the existing suitable earthing and lightning protection system upon testing the integrity of the existing earthing and lightning protection. The results and recommendations shall be submitted to the Employer's Engineer for acceptance.

g) The Contractor shall supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. The Contractor shall link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation with an i3 processor, 27 inch touch screen monitor complete with network adaptor and USB RJ45 adapter to control the dimming functionality of the high mast lighting. The system shall be wall mounted in a hinged lockable stainless steel box with cut-out for the monitor screen. The system shall be installed in the TPT office within the site. The Contractor shall also configure, programme and commission the system.

h) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.4.3 MAST NO.3

a) The Contractor shall uninstall the existing Light fittings complete with the head ring of the existing 30m High Mast Pole and issue the luminaires to TPT. The current installation consists of a total of 4x400W HPS Light fittings. The fittings in a good condition shall be reused to replace the existing fittings in other high mast poles in the same contract.

b) The Contractor shall inspect and refurbish the existing swing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B. The mast's swinging mechanism shall be replaced. New DB required complete with new incomer 25mm^2 4 core LV cupper armoured cable gland.

c) The Contractor shall design, supply, and install a complete new lighting on the existing 30m High Mast Pole. The contractor shall demonstrate the suitability of the incomer cable and the existing cable from the DB supplying the luminaires. The design shall be complete with a new DB and mountings for the luminaires. The design shall be done in equal or similar approved to the most recent relux software. The design shall consider all nearest light sources, show aiming angles and orientation to address glare, light pollution and to archive compliance to the recommended values of the OHS Act: Lighting Regulations and SANS 10389.

d) 4xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K have been used on a preliminary design by the employer for benchmarking and pricing purposes. Equal or similar approved range of product can be used by the bidder subject to simulations submitted to the Employer's Engineer for acceptance.

e) The Contractor shall design supply and install a balancing weight to assist the swinging process of the mast.

f) The Contractor shall design, supply and install the earthing and lightning protection system for the HML. The Contractor shall tie the new installation to the existing suitable earthing and lightning protection system upon testing the integrity of the existing earthing and lightning protection. The results and recommendations shall be submitted to the Employer's Engineer for acceptance.

g) The Contractor shall supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. The Contractor shall link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation with an i3 processor, 27 inch touch screen monitor complete with network adaptor and USB RJ45 adapter to control the dimming functionality of the high mast lighting. The system shall be wall mounted in a hinged lockable stainless steel box with cut-out for the monitor screen. The system shall be installed in the TPT office within the site. The Contractor shall also configure, programme and commission the system.

h) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.4.4 MAST NO.4

a) The Contractor shall uninstall the existing Light fittings complete with the head ring of the existing 30m High Mast Pole and issue the luminaires to TPT. The current installation consists of a total of 5x400W HPS Light fittings. The fittings in a good condition shall be reused to replace the existing fittings in other high mast poles in the same contract.

b) The Contractor shall inspect and refurbish the existing swing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B. The mast's swinging mechanism shall be replaced. New DB required complete with new incomer 25mm^2 4 core LV cupper armoured cable gland.

c) The Contractor shall design, supply, and install a complete new lighting on the existing 30m High Mast Pole. The contractor shall demonstrate the suitability of the incomer cable and the existing cable from the DB supplying the luminaires. The design shall be complete with a new DB and mountings for the luminaires. The design shall be done in equal or similar approved to the most recent relux software. The design shall consider all nearest light sources, show aiming angles and orientation to address glare, light pollution and to archive compliance to the recommended values of the OHS Act: Lighting Regulations and SANS 10389.

d) 4xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K have been used on a preliminary design by the employer for benchmarking and pricing purposes. Equal or similar approved range of product can be used by the bidder subject to simulations submitted to the Employer's Engineer for acceptance.

e) The Contractor shall design supply and install a balancing weight to assist the swinging process of the mast.

f) The Contractor shall design, supply and install the earthing and lightning protection system for the HML. The Contractor shall tie the new installation to the existing suitable earthing and lightning protection system upon testing the integrity of the existing earthing and lightning protection. The results and recommendations shall be submitted to the Employer's Engineer for acceptance.

g) The Contractor shall supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. The Contractor shall link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation with an i3 processor, 27 inch touch screen monitor complete with network adaptor and USB RJ45 adapter to control the dimming functionality of the high mast lighting. The system shall be wall mounted in a hinged lockable stainless steel box with cut-out for the monitor screen. The system shall be installed in the TPT office within the site. The Contractor shall also configure, programme and commission the system.

h) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.4.5 MAST NO.5

a) The Contractor shall uninstall the existing Light fittings complete with the head ring of the existing 30m High Mast Pole and issue the luminaires to TPT. The current installation consists of

a total of 5x400W HPS Light fittings. The fittings in a good condition shall be reused to replace the existing fittings in other high mast poles in the same contract.

b) The Contractor shall inspect and refurbish the existing swing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B. The mast's swinging mechanism shall be replaced. New DB required complete with new incomer 25mm^2 4 core LV cupper armoured cable gland.

c) The Contractor shall design, supply, and install a complete new lighting on the existing 30m High Mast Pole. The contractor shall demonstrate the suitability of the incomer cable and the existing cable from the DB supplying the luminaires. The design shall be complete with a new DB and mountings for the luminaires. The design shall be done in equal or similar approved to the most recent relux software. The design shall consider all nearest light sources, show aiming angles and orientation to address glare, light pollution and to archive compliance to the recommended values of the OHS Act: Lighting Regulations and SANS 10389.

d) 4xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K have been used on a preliminary design by the employer for benchmarking and pricing purposes. Equal or similar approved range of product can be used by the bidder subject to simulations submitted to the Employer's Engineer for acceptance.

e) The Contractor shall design supply and install a balancing weight to assist the swinging process of the mast.

f) The Contractor shall design, supply and install the earthing and lightning protection system for the HML. The Contractor shall tie the new installation to the existing suitable earthing and lightning protection system upon testing the integrity of the existing earthing and lightning protection. The results and recommendations shall be submitted to the Employer's Engineer for acceptance.

g) The Contractor shall supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. The Contractor shall link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation with an i3 processor, 27 inch touch screen monitor complete with network adaptor and USB RJ45 adapter to control the dimming functionality of the high mast lighting. The system shall be wall mounted in a hinged lockable stainless steel box with cut-out for the monitor screen. The system shall be installed in the TPT office within the site. The Contractor shall also configure, programme and commission the system.

h) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.4.6 MAST NO.6

a) The Contractor shall uninstall the existing Light fittings complete with the head ring of the existing 30m High Mast Pole and issue the luminaires to TPT. The current installation consists of a total of 5x400W HPS Light fittings. The fittings in a good condition shall be reused to replace the existing fittings in other high mast poles in the same contract.

b) The Contractor shall inspect and refurbish the existing swing high masts as detailed in specification TPD-010B-HIGHMASTSPEC-B. The mast's swinging mechanism shall be replaced. New DB required complete with new incomer 25mm^2 4 core LV cupper armoured cable gland.

c) The Contractor shall design, supply, and install a complete new lighting on the existing 30m High Mast Pole. The contractor shall demonstrate the suitability of the incomer cable and the existing cable from the DB supplying the luminaires. The design shall be complete with a new DB and mountings for the luminaires. The design shall be done in equal or similar approved to the most recent relux software. The design shall consider all nearest light sources, show aiming angles and orientation to address glare, light pollution and to archive compliance to the recommended values of the OHS Act: Lighting Regulations and SANS 10389.

d) 4xBEKA-SCHRÉDER OMNIBlast 2-E Maxi 192LED/910W OPTIC 5188 - 3000K have been used on a preliminary design by the employer for benchmarking and pricing purposes. Equal or similar approved range of product can be used by the bidder subject to simulations submitted to the Employer's Engineer for acceptance.

e) The Contractor shall design supply and install a balancing weight to assist the swinging process of the mast.

f) The Contractor shall design, supply and install the earthing and lightning protection system for the HML. The Contractor shall tie the new installation to the existing suitable earthing and lightning protection system upon testing the integrity of the existing earthing and lightning protection. The results and recommendations shall be submitted to the Employer's Engineer for acceptance.

g) The Contractor shall supply, install and commission an Integrated Lighting Control System, equal or similar approved to Beka Owlet IoT. The Contractor shall link the installation to the supplied equal or similar approved WiFi enabled Lenovo A740 workstation with an i3 processor, 27 inch touch screen monitor complete with network adaptor and USB RJ45 adapter to control the dimming functionality of the high mast lighting. The system shall be wall mounted in a hinged lockable stainless steel box with cut-out for the monitor screen. The system shall be installed in the TPT office within the site. The Contractor shall also configure, programme and commission the system.

h) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

5.2.5 K BLOCK POWER SUPPLY

5.2.5.1 EXISTING KIOSK TEMPORAL SUPPLY TO SHED 10

a) The Contractor shall design supply and install an upgraded supply from the existing Kiosk to Shed 10. The works shall include an equal or similar upgrade comprising of the supply and installation of a new 200A, 36kA, 400V Electronic Trip Unit feeder breaker; Supply and installation (trenching a servitude of 50mX0.5mX0.8m (LBH) in a tar surface) of a new 3ph 4 core 70mm^2 SWA ECC LV Cu Cable complete with terminations. See annexure W for a google image of the site.

5.2.5.2 EXISTING DB IN THE EXISTING DB ROOM OF SHED 10

a) The Contractor shall design supply and install an upgraded Shed 10 DB. The works shall include an equal or similar upgrade comprising of the supply and installation of a new 3ph 4 core 70mm^2 SWA ECC LV Cu Cable to a new 200A, 25kA, 400V electronic trip unit incomer breaker; Supply and installation of a new 160A, 25kA, 400V electronic trip unit feeder breaker to a new Kiosk to be installed nest to the Existing kiosk supplying K block.

b) The Contractor shall supply and install a new 3ph 4 core 70mm^2 SWA ECC LV Cu Cable complete with terminations from the proposed 160A breaker to the proposed new Kiosk to supply K Block yard. This cable shall be installed inside shed 10 using cable ladder, where the cable exit the shed, it shall be installed underground and pipe jacked under the rail. See annexure W for a google image of the site.

5.2.5.3 NEW DB OUTSIDE THE SAFETY OFFICE

a) The Contractor shall design supply and install a new LV kiosk next to the existing kiosk currently supplying K Block. The orders of magnitude for this kiosk shall include a 160A 25kA 3ph+N electronic trip unit incomer, a 100A 15kA 3ph+N electronic trip unit feeder breaker to supply K block and two 60A 15kA 3ph+N spare breakers.

b) The Contractor shall supply and install a new 25mm^2 3ph 4 core SWA ECC LV Cu Cable complete with terminations from the proposed 100A breaker to K block Mast 1. This cable shall be installed underground and pipe jacked under the rail. See annexure W for a google image of the site.

5.3 TESTING AND COMMISSIONING OF THE ENTIRE INSTALLATION

a) The *Contractor* shall conduct a Factory Acceptance Test (FAT) for all distribution boards and electrical kiosks to be installed as part of the Works to be executed in this Contract prior to delivery to site. The FAT shall be conducted in the presence of the Employer's Engineers. The legal transfer of ownership from the supplier to the *Contractor* shall be held by the *Contractor* until the distribution boards and electrical kiosks are fully installed, tested commissioned on the Employer's designated site.

b) The *Contractor* shall test the entire installation, including but not limited to the LV installation and the lighting installation as per SANS 10142-1 and annexure T. All relevant test certificates shall be handed over to the Employers Project Manager for acceptance.

5.4 EARTHING AND LIGHTNING PROTECTION

a) The Contractor shall design, supply and install earthing and lightning protection to all new high mast installations with new luminaires in accordance to specification No. TPD: 004-EARTHINGSPEC; "Transnet Specification for lightning protection and earthing". This component of work shall be undertaken by a specialist earthing and lightning protection Contractor.

b) The Contractor shall inspect and test the existing earthing and lightning protection installation for all existing high mast installations and retrofits with existing reused light fittings. Where the earthing and lightning protection is found to be non-compliant, the contractor shall inform the employer's engineer, recommend remedial measures and upon approval by the employer's engineer design, supply, install and commission the earthing and lightning protection. The installation shall be in accordance with specification No. TPD: 004-EARTHINGSPEC; "Transnet Specification for lightning protection and earthing". This component of work shall be undertaken by a specialist earthing and lightning protection Contractor.

c) The high mast shall be provided with a M12 earth bolt welded to the mast with stainless steel nuts. The incoming electrical supply earth conductor and all other electrical equipment shall be connected to the earth bolt.

d) The earth electrodes and couplers used on all high masts shall be manufactured from stainless steel and in accordance to SABS 1063.

e) The earth electrode resistance shall be in accordance with the requirements of SANS 10142-1 and SANS 10313.

f) The Contractor shall submit all the proposed designs to the employers engineer for acceptance.

5.5 COMPLIANCE CERTIFICATE

a) The *Contractor* is required to test the installation in the presence of the *Employer 's* Engineers and issue compliance certificates for lightning protection and earthing systems (SANS 10313) for all work done to the satisfaction of the *Employer's* Engineers

b) The *Contractor* is required to test the installation in the presence of the *Employer's* Engineers and issue compliance certificates for Low Voltage Installations (SANS 10142-1) for all work done to the satisfaction of the *Employer's* Engineers

c) The *Contractor* is required to test the installation in the presence of the *Employer's* Engineers and issue compliance certificates for all high masts installed and refurbished (RMD 9 Certificates) for all work done to the satisfaction of the *Employer's* Engineers

d) The *Contractor* shall submit a full set of completed and valid compliance certificates to the Employer.

4 LIST OF DRAWINGS

4.5 Drawings issued by the *Employer*

The list of drawings and drawing pack will be issued by the contractor during construction.

Note: The contractor should be able to bid without the design drawings from the employer.

SECTION *2*
6 MANAGEMENT AND START UP

6.1 MANAGEMENT MEETINGS

It is the *Employer's* specific intention that the Parties and their agents use the techniques of partnering to manage the contract by holding meetings designed to pro-actively and jointly manage the administration of the contract with the objective of minimising the adverse effects of risks and surprises for both parties.

Depending on the size and complexities of the *works*, it is probably beneficial for the *Employer* to hold a weekly risk register meeting (Clause 16.2). This could be used to discuss safety,

environmental, compensation events, subcontracting, overall co-ordination and other matters of a general nature. Separate meetings for specialist activities such as programming, engineering and design management, may also be warranted.

Types of Management Meetings

Title and purpose	Approximate time & interval	Location	Attendance by:
Risk register and compensation events	4 hours Weekly on (or at shorter intervals if required)	On site	*Project Manager, Supervisor, Contractor* and appropriate key persons
Overall contract progress and feedback	3 hours Every two weeks	On site	*Employer, Project Manager, Supervisor, Contractor* and appropriate key persons
Technical Meetings	1 hour Daily	On site	*Project Manager, Supervisor, Contractor* and appropriate key persons
SHE meetings	2 hours Every two weeks	On site	Appointed *Contractor* and appropriate key persons
Safety and environmental review meetings	1 hour Weekly	On site	Appointed *Contractor* and appropriate key persons

Meetings of a specialist nature may be convened as specified elsewhere in this *Works* Information or if not so specified by persons and at times and locations to suit the Parties, the nature and the progress of the *works*. Records of these meetings are to be submitted to the *Project Manager* by the person convening the meeting within five days of the meeting.

All meetings are to be recorded using minutes or a register prepared and circulated by the person who convened the meeting. Such minutes or register are not to be used for the purpose of confirming actions or instructions under the contract as these are to be done separately by the person identified in the conditions of contract to carry out such actions or instructions.

The *Contractor* attends management meetings at the *Project Manager's* request as set out in the table above. At these meetings the *Contractor* presents all relevant data including safety, health and environmental issues, progress reports, quality plans, Sub*Contractor* management reports, as may be required.

6.2 DOCUMENTATION CONTROL

Each supplier of documentation and data to the Project is responsible for ensuring that all documentation and data submitted is accurate in terms of numbering, uniqueness, quality, accuracy, format, completeness and currency of information. Data not meeting these requirements will be cause for rejection and returned to the Contractor for corrective action and re-submission.

The Contractor shall submit all documentation (including correspondence and drawings) to Transnet (Employers) standards and to the Project Manager's requirements in accordance with the Project Manager's document control procedure. The Employer shall use his own suitable

document control system for the control, maintenance and handling of all relevant documentation and drawings issued to him.

Should any change be made to documentation or data, which has already been submitted to the Project, then new or revised documentation or data shall be issued to replace the outdated information.

It is the responsibility of all Project participants undertaking work on the Project to ensure they obtain and comply with the relevant requirements to suit their deliverables and Scope of Work.
The Contractor is to ensure that the latest versions of the required application software and a suitable 'IT' Infrastructure are in place to support the electronic transmission of documentation.
Electronic files submitted to the Project shall be clear of known viruses and extraneous "macros".
The supplier of documentation is required to have, at all times, the latest generation of virus protection software and up-to-date virus definitions.

The required number of copies of documentation and data shall be specified in the 'Contractor Documentation Schedule' (CDS). The required number of copies shall as a minimum be two (2) (1 x original + 1 x hard copies) per site location, with the corresponding PDF and 'Native' file formats upon final submission.

The Contractor shall ensure adequate resources are available to manage and execute the Document Control function as per the requirements of the Project.
The following documentation shall be provided by the Bidder:

Post implementation the Contractor shall document the logical and physical configuration of the system providing a thorough description of the following information,
Physical information
Equipment Configuration
Post contract award the Contractor shall provide documented procedures to be followed during setup of all equipment, Documents should be specifically related to the installation performed at each of the Transnet Port Terminals sites.

6.3 PROCEDURE FOR SUBMISSION AND ACCEPTANCE OF *CONTRACTOR'S* DESIGN

The *Contractor*'s documentation shall be issued to the *Project Manager* under cover of the *Contractor*'s Transmittal Note indicating all Contract references (i.e. Project No, Contract No, etc.) as well as the *Contractor*'s Project Document Number, Revision Number, Title and chronological listing of transmitted documentation. Formats of *Contractor* data submitted is dependent on the project procedure and shall be specified by the *Project Manager*, upon the notified request of the *Contractor*.

The *Contractor* shall deliver both hard copies and electronic media copies (CD Rom) to the *Project Manager* either at the address stated within the Contract Data or at the Project site office.

All electronic documentation shall be submitted by the *Contractor* in Adobe Acrobat (.PDF) and native file format

Acceptance of documentation by the *Project Manager* will in no way relieve the *Contractor* of him undertaking the w*orks* (including all incidental services required).

6.4 AS-BUILT DRAWINGS, OPERATING MANUALS AND DATA PACKS

6.4.1 THE *CONTRACTOR* PROVIDES THE FOLLOWING:

6.4.2 RED LINE/FINAL DOCUMENTATION

- All Red Line information to be signed off by the *Contractor*'s responsible Professional/Technologist before issuing to the *employer*.

Installation, Maintenance and Operating Manuals and Data Books

- The Contractor provides manuals in an A4 hard covered, red, grease and waterproof binder, using 2 ring type binders. The manuals are well indexed and user friendly and include a summarized Table of Contents.
- Drawings and charts larger than A4 are folded and those greater than A3 are enclosed in an A4 plastic pocket of adequate strength.
- The Contractor submits the draft Table of Contents to the Project Manager for acceptance prior to the compilation and official submittal of the manuals.
- The originals of all brochures shall be issued to the Project Manager. When a general brochure is applicable to a range of equipment, then the specific item, catalogue number or model number shall be stated, which is best achieved by introducing a separate index page, which cross-references the specific item to a tag number.
- The address, phone numbers, fax numbers and reference numbers of all Sub-Contractors is provided
- Where manuals include drawings that still need to be revised to "As-Built" status, and such manuals are required prior to 'As-Built' status, the manual will not be considered to be in its final form until the "As-Built" version of each such drawing has been incorporated. The required number of copies of the manual (s) shall be as specified by the *Project Manager* and submitted per type or model number of equipment included in the contract, or as specified by the *Project Manager*.
- All electronic copies (pdf) of Data Packs to be properly indexed.
- A typical example of what the binder/file (s) shall be marked with on the spine and the front cover is as follows: -

    - Project No./Name
    - Manual Title, e.g. Installation, Maintenance and Operating Manual
    - FBS No. and Title
    - Manual Numbering (e.g. Volume 1 of 2, etc.)
    - Contract Number
    - *Contractor* Name

- Unless otherwise stated in the CDS, the required number of copies of all As-Built/Final/Data Packs shall be:
    - 3 x hard copies (Full size)
    - 3 x CD Roms with Adobe Acrobat (.pdf) and "Native" formats

6.5 SAFETY RISK MANAGEMENT

6.5.1 *CONTRACTOR'S* GENERAL REQUIREMENTS FOR HEALTH AND SAFETY

The *Contractor* is solely responsible for carrying out the work under the Contract having the highest regard for the health and safety of its employees, Transnet's employees and persons at or in the vicinity of the Site, the *works*, temporary work, materials, the property of third parties and any purpose relating to the *Contractor* carrying out its obligations under this Contract.

The *Contractor* must initiate and maintain safety precautions and programs to conform to all applicable Health and Safety laws or other requirements, including requirements of any applicable government instrumentality and client corporate, business unit and site requirements. The *Contractor* must, at its own cost, erect and maintain safeguards for the protection of workers and the public. The *Contractor* must manage all reasonably foreseeable hazards created by performance of the work. The *Contractor* must:

- Provide all things and take all measures necessary for maintaining proper personal hygiene, ensuring safety of persons and property and protecting the environment at or near the Site.
- Avoid unnecessary interference with the passage of people and property at or near the Site.
- Prevent nuisance and excessive noises and unreasonable disturbances in performing the Services.
- Be responsible for the adequacy, stability and safety of all of its site operations, of all its methods of design, construction and work and be responsible for all of the work, irrespective of any acceptance, recommendation or consent by the *employer*, its *Contractors*, employees, agents and invitees, or any Government Body.

6.5.2 COSTS FOR THE ABOVE ARE BORNE BY THE *CONTRACTOR*.

The *Contractor* must comply and is responsible for ensuring that all of its Sub-*Contractor*s comply with the relevant legislation(s) and statutory regulations for health and safety, the Transnet Health and Safety requirements included in the Contract and other document pertaining to health & safety contained in the Programme Health & Safety Management System and include standards, policies, procedures, guidelines and safe work instructions.

6.5.3 *CONTRACTOR'S* HEALTH AND SAFETY MANAGEMENT

The *Contractor* must prepare, implement and maintain a project-specific Health and Safety Management Plan. The plan must be based on the requirements set out in this specification 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; in terms of the OHS Act section 7;
- 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-*Contractor*s 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. Site Supervision
- The *Contractor* shall comply with OH&S Act – Section 8, 9, 13 and 16 and the Construction Regulations 2014.
- The *Contractor* must nominate and appoint a responsible person on site to whom the *Project Manager* may refer in connection with the *works*. Persons are nominated for all shifts worked or whilst any activity relating to the Contract is

being performed on site, and must have the authority to bind the *Contractor* with respect to the Contract. (OH&S Act - 16 Section (2)).

- The *Contractor* must ensure that the performance of all specified *works* is supervised throughout by a sufficient number of qualified and competent appointed representatives of the *Contractor*, who have experience in the type of work specified. (OH&S Act – Construction Reg. 8 (1) and 8 (2.)
- Note: No work may commence and or continue without *Supervisor*y Appointees present on site. The *Contractor's* Site *Supervisor* must be equipped with a mobile telephone with message bank and/or pager or an equivalent communication device so that communication throughout the Contract can be maintained at all times.
- The *Contractor's* Site *Supervisor* must provide a list of names and contact telephone numbers of all *Contractors* and Sub-*Contractor*'s contact persons on Site. This list is updated as a new *Contractor* or Sub-*Contractor* employee commences on Site.
- The *Contractor's* Site *Supervisor* must keep a record of all employees, including date of induction, relevant skills and licences, and be able to produce this list at the request of the *Supervisor*.
- The *Contractor's* Site *Supervisor* must complete manning sheets describing the day's activities, labour numbers and classifications and issue these to the *Supervisor* prior to 9.00 am on a daily basis.
- The *Project Manager's* Site Safety Representative is notified of any new starter with evidence of induction and site specific induction prior to commencement of work.

6.5.4 *CONTRACTOR'S* SAFETY OFFICER

The *Contractor* must appoint a full-time 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). If more than 100 employees are deployed on the project site(s) (directly or through sub-*Contractor*s), at least two full-time Health and Safety Officers must be appointed, with an additional Health and Safety Officer appointed for every 100 additional employees thereafter.

The Health and Safety Officer must be on site when work commences at the start of the day and must remain on site until all activities for that day (including the activities of sub-*Contractor*s) have been completed. A Health and Safety Officer must be present during all shifts, so if work is carried out over more than one shift per day, the *Contractor* must make provision for an additional Health and Safety Officer.

Each *Contractor* Health and Safety Officer shall be responsible for:

- Reviewing all applicable legal and project health and safety requirements and providing guidance to *Contractor* and sub-*Contractor* personnel (particularly the *Contractor's Project Manager*) to help ensure compliance at all times;
- Assisting with the implementation of effective hazard identification and risk management processes for all work to be carried out by the *Contractor*;
- Participating in the Baseline Risk Assessment for the *Contractor's* scope of work (prior to site establishment) and ensuring that identified control measures are implemented;
- Participating in all Task-Based Risk Assessments conducted for the work to be carried out by the *Contractor* and ensuring that identified control measures are implemented;
- Conducting *Contractor* health and safety induction training for all *Contractor* and sub-*Contractor* personnel;
- Compiling and maintaining all health and safety related documents and records required of the *Contractor*;
- Communicating relevant health and safety information to *Contractor* and sub-*Contractor* personnel (e.g. incidents and lessons learnt, leading practices, hazards, risks and control measures, etc.);
- Carrying out Safety Observations and Coaching (one per day);
- Evaluating (on a daily basis) the content of the Daily Safe Task Instructions (DSTI's) conducted by the *Contractor*'s appointed *Supervisor*s, and attending at least one DSTI each day;
- Attending monthly *Contractor* and Site Health and Safety Meetings;
- Assisting with the implementation of the *Contractor*'s Health and Safety Management Plan and associated Safe Work Procedures;
- Carrying out Planned Task Observations on an ad hoc basis;
- Assisting with the implementation, testing and maintenance of an effective Emergency Response Plan for all *Contractor* and sub-*Contractor* activities;
- Responding to workplace incidents (as appropriate);
- Participating in incident investigations;

- Maintaining accurate health and safety statistics (for the *Contractor* and all sub-*Contractor*s), and compiling health and safety performance reports as required;
- Auditing the health and safety management system and workplace activities of the *Contractor* and each sub-*Contractor* on a monthly basis to assess compliance with the project health and safety requirements; and
- Tracking and reporting on the implementation of corrective actions (arising from incident investigations, audits, inspections, etc.).

The *Contractor* must ensure that they have made adequate provision of safety officers as per the *Works* Information. The *Contractor* must ensure that the Health and Safety Officer is adequately equipped to enable him to perform his duties effectively. Each Health and Safety Officer must be provided with the following:

- A computer with access to all necessary systems, including access to e-mail and the internet;
- A mobile telephone on contract or with adequate pre-paid airtime; and
- A vehicle where required or instructed by a nominated project management representative (depending on the size and location of the project site(s)).
- A Health and Safety Officer must be computer literate, fluent in English, and must have the following minimum qualifications, training and experience:
- At least 5 years' experience as a Health and Safety Officer on construction projects;
- SAMTRAC or NEBOSH or Modern SHEQ Risk Management training course as a minimum qualification;
- Experience and appropriate training with regard to implementing and maintaining a health and safety management system compliant with national legislation or an international standard;
- Experience and appropriate training with regard to construction related hazard identification and risk management processes;
- Competence, experience and relevant training with regard to incident investigation procedures and causation analysis;
- Health and safety auditing experience and training;
- A valid First Aid certificate of competency;
- Fire prevention and protection training; and
- A valid Driving Licence (light motor vehicle).
- Registered as a Health and Safety Officer or Health and Safety Manager with SACPCMP depending on the size of the project and on the risk.
- Before placing a Health and Safety Officer on the project site(s), the *Contractor* must forward a copy of the person's CV to the nominated project management representative or to the Programme Health and Safety manager for review and acceptance. A proposed candidate may be rejected should he not meet the experience and/or qualification requirements, or due to poor work performance on previous projects.

6.5.5 *CONTRACTOR'S* SAFETY MANUAL

The *Contractor* must provide a hard copy of its safety manual, policies and procedures to the *Project Manager* for acceptance prior to the commencement of any site work. The *Contractor* must ensure that his personnel, at all times, strictly observe and comply with the procedures set out therein.

The *Project Manager* or the *Project Manager's* nominated Representative may from time to time request safety procedures applicable to the area of operations. The *Contractor* must forward to the *Project Manager* any updates or revisions to its safety manuals, policies or procedures as soon as practicable following revision or update.

The *Project Manager* may require the *Contractor* from time to time to supplement its safety manual, policies and procedures with guidelines and/or operating standards provided to the *Contractor* by the *Project Manager*. The *Contractor* must comply with such requests where the request is consistent with the requirements of the Contract. The *Contractor* must give prompt written notice to the *Project Manager* of any objection to the requested supplement, including the reasons for objection. The *Project Manager's* rights under this Clause are not intended, and must not be construed, to relieve the *Contractor* from any obligations to ensure compliance with all provisions of this Contract.

6.5.6 PERFORMANCE MEASUREMENT AND REPORTING

6.5.6.1 Health and safety statistics

The *Contractor* and each of its Sub-*Contractor*s must complete and submit Health and Safety statistics to the *Project Manager* or the *Project Manager's* nominated representative, or as amended by the *Project Manager*, before mid-day on the Friday of each week. The *Contractor* must submit monthly Health & Safety Statistics before mid-day on the last day of each month to the *Project Manager's* nominated representative.

6.5.6.2 Safety management records

The *Contractor* must submit to the *Project Manager* for acceptance a schedule of the specific Health and Safety records it intends to maintain for the Contract. As a minimum, such records are as specified by applicable legislation. Copies are provided to the *Project Manager* or the *Project Manager's* nominated Representative if requested.

6.5.6.3 Field technical/safety audit by the *project manager*

The *Project Manager* or the *Project Manager's* nominated Representative has the right to conduct audits/inspections of the Consultant, Professional Service Provider (PSP) and *Contractor* Safety Management Plan implementation, operations, equipment, emergency procedures, etc., at any time, and the *Contractor* must fully cooperate with the *Project Manager* or the *Project Manager's* nominated Representative during such audits/inspections. The *Project Manager's* rights under this clause does not, must not and will not relieve the Consultant, Professional Service Provider (PSP) and *Contractor* of its own obligations to conduct audits and reviews of its own Health and Safety performance.

Where such audits/inspections reveal deficiencies in the *Contractor* procedures, drills, training or equipment, or non-conformities with the *Contractor* accepted project Safety Management Plan, of a minor nature (Risk Rating of 6 or less), the *Contractor* must investigate the cause of the nonconformity and initiate corrective and preventive action to rectify such deficiencies and non-conformities and prevent recurrence as soon as practicable.

Where such audits/inspections reveal deficiencies of a major nature (Risk rating of 7 or greater), the *Contractor* must stop work on the operation/activity concerned, immediately investigate the cause of the nonconformity, and initiate corrective actions to rectify such deficiencies and non-conformities and to prevent recurrence. These corrective action plans is submitted to the *Project Manager* for review and comment within 24 hours of the audit finding.

Where such deficiencies include an unsafe practice or a breach of the statutory or the Contract's requirements, the *Project Manager* or the *Project Manager's* nominated Representative may in accordance with the General Conditions of Contract suspend the work associated with the unsafe practice or breach until the deficiency is rectified.

The *Project Manager* or the *Project Manager's* nominated Representative will establish a schedule of regular field safety audits which will be based on an audit tool aligned to the *Contractor* Safety Management Plan and site operations and activities. The *Contractor* audit conformance will be assessed as a percentage and where conformance is better than 90% it will be considered satisfactory and the *Contractor* must develop and implement an action plan within 4 weeks, to be reviewed at the next regular audit. Where the *Contractor* level of conformance is between 75 – 90%, a corrective action plan will be required to be developed and implemented within 2 weeks, and a follow up audit will be carried out. Where the *Contractor* conformance is less than 75% the *Contractor* must stop work until an investigation of the cause/s has been completed and corrective actions have been developed and implemented by the *Contractor*.

The *Contractor* must provide to the *Project Manager* or the *Project Manager's* nominated Representative, at a time to be agreed, but not to exceed monthly intervals, a regular status report on all outstanding corrective actions until they are successfully closed out.

6.5.6.4 Unsafe act/condition auditing

The *Contractor* must implement a system to recognize, correct, and report unsafe acts/conditions (Unsafe Act/Condition Auditing) associated with all Site activities.

All such observations must be recorded and delivered to the TGC Health and Safety Manager.

6.5.6.5 Involvement, communication and motivation

The *Contractor* and sub *Contractor*'s workforce must, through their supervision, safety notice boards, toolbox meetings and daily pre-start meetings be kept aware of safety related matters.

6.5.6.6 Safety meetings

The *Contractor* must implement and comply with OH&S Act, Section 19

The *Contractor* must conduct weekly safety meetings with his employees to foster safety awareness. Copies of minutes and action items arising from such Toolbox meetings is submitted or otherwise made available for review by the *Project Manager* or the *Project Manager's* nominated Representative.

Such meetings should at least address:

- Accident / safety incidents
- Hazardous conditions
- Hazardous materials / substances
- Work procedures
- Protective clothing / equipment

- Housekeeping
- General safety topics
- Job or work look-ahead issues
- Safety statistics
- Significant Safety Occurrences (SSO)

The *Contractor* must conduct at least one formal safety meeting per month and must maintain appropriate records of attendance and meeting content. Such records are made available to the *Project Manager's* Representative. In addition to Daily Safe Task Instructions, the *Contractor* must conduct at least weekly "tool box" meetings to discuss safety issues and procedures.

6.5.6.7 Pre start safety briefings

The *Contractor* must hold documented Daily Safe Task Instructions with each work team before the start of each shift. Attendance records and brief topic notes is kept for auditing and record purposes. Safety Review Meetings

- The *Contractor* Site Manager and a Site Safety Representative must take part in weekly safety review meetings between the *Contractor* and the *Project Manager* or the *Project Manager's* nominated Representative.
- The *Contractor* must attend all project safety meetings as outlined in the Project Safety Management Plan.

6.5.6.8 Site safety review committee

The *Contractor* complies with the requirements of the SSRC with respect to his own activities and others on the Site and Working Areas.

6.5.6.9 Hazop review

The *Contractor* participates in HAZOP reviews upon the instruction and direction of the *Project Manager*.

The reviews may include, but not be limited to, studies to ensure that the Plant is built and operated as designed and that personal safety, employee health and environmental protection systems conform to the *Employer's* and legislative requirements.

6.5.6.10 Job safety analysis

The *Contractor* completes a JSA prior to carrying out any operation on the Site and/or Working Area to the approval of the *Project Manager*.

6.5.6.11 Lines of communication

The following personnel act on behalf of the *Project Manager* and may communicate directly with the *Contractor* and his key persons with respect to the SMP:

- Construction Manager (CM)
- Project Site Safety Manager (PSSM)

6.5.6.12 Roles and responsibilities

- The roles and responsibilities of the various personnel acting on behalf of the *Project Manager* with respect to the SMP and health and safety issues are as stated in the paragraphs following:
- Construction Manager
- The CM is responsible (in the context of the SMP only) for health and safety on the Site and Working Areas and reports to the *Project Manager*.
- The CM specific tasks (in the context of the SMP) are:
- Implement the safety management system
- Monitor compliance to the established safety management system
- Ensure risk is at an acceptable level
- Ensure Consultant Construction Management Team are competent
- Provide for:
- Planning, organisation, leadership and control
- Particular technical competencies for critical work
- Supervision and control on each shift
- Regular monitoring and assessment
- Workplace inspections
- Project Site Safety Manager
- The PSSM is responsible for ensuring that the *Contractor* complies with the SMP. The PSSM acts on behalf of the *Project Manager*.
- The PSSM specific tasks (in the context of the SMP) are:
- Define, in accordance with the HSSP, the:
- Safety program (instructions, training, meetings, inspections, incentive)
- Health and medical program
- Checks that *Contractors* have issued their Health and Safety plans, PPSPS and procedures before the beginning of work
- Organizes safety awareness campaigns
- Promotes communication on all health and safety matters (awards, incentives, meeting/inspections/audits reports)
- Checks conformance of equipment to technical requirements and regulations.
- Issues and address the site EHS activities reports
- Promotes everybody's best efforts to keep accident frequency and severity ratios at their lowest level
- Promotes a proper and continuous housekeeping of Plant and temporary facilities in order to create the most suitable conditions for workers to wok and to be encouraged to follow HSE requirements
- Conducts *Works*ite EHS walks with all *Contractors*, and directs appropriate corrective actions

- Monitors that all factors likely to improve health and safety are taken into consideration, particularly those which lead to:
- Promoting personnel protection as an absolute requisite
- Investigating, identifying and neutralizing potential hazards
- Close coordination with all parties involved in construction in order to avoid overcrowded areas and dangerous operations
- Thorough preparation of work critical phases
- Close contacts to local EHS authorities
- Continuous follow-up in order to correct immediately unsafe acts and situations
- In case of accident, he takes actions necessary to:
- Initiate quick interventions of the emergency means.
- Check that first aid and evacuation of injured persons are properly carried out.
- Obtain a clear accident report from the sub-*Contractor* concerned.
- Report immediately to the Construction Manager.
- Investigate to identify the root causes of all incident and near misses.

6.5.6.13 Commissioning safety study

The *Project Manager*, through his Construction Management Team, will facilitate and coordinate a formal Commissioning Safety Study and ensure that required procedures are prepared prior to the commencement of the commissioning phase.

The Commissioning Safety Study will provide a final checkpoint for the completed work and is part of the process for ensuring that all necessary actions have been completed. The elements to be considered include:

- Electrical integrity systems are in place (e.g. equipment tests and inspections of critical equipment, quality control procedures, etc.) which will confirm that construction, equipment and materials are in accordance with design specifications
- Formal hazard analyses for pre-commissioning and commissioning activities have been completed, appropriately documented and communicated, and are available to all personnel.
- Punch-list work has been sufficiently completed so that installations are safe to apply hazardous energy.
- Documentation relevant to any modifications has been created/updated.
- Safe operating, maintenance and emergency procedures are in place.
- Operating and maintenance manuals are available and training of commissioning employees has been completed.
- As Built drawings are available.
- A Commissioning Permit (to apply hazardous energy) is developed and implemented.

The *Project Manager* will ensure that after commissioning there is a formal documented hand over to operations and maintenance personnel and others who will be impacted by hazards that have been identified during project activities. This will involve communication of any changes to the process hazards, procedures and operating philosophy. Safe systems of work will be established and updated throughout the Project. Safe systems of work will be subject to on-going review to ensure their effectiveness. Site-wide Permits to Work will be used as the basis of safe systems of work for specified hazardous activities.

6.5.6.14 Working at nights

A site specific health and safety management plan should be well documented and structured so that both *Employer*s and employees can benefits from its use. The following are recommended components of a safety management plan for night time *Works*.

6.5.6.15 Site Personnel responsibility

It should be determined and stated clearly in the site specific health and safety management plan the responsibility of each individual at construction site for night time *Works*. *Project Manager*, Engineers, Designers, Safety Officer and Site *Supervisor*s as well as workers each have their specific responsibility to make sure the highest level of priority are given towards safety and health issues.

The *Contractor* must ensure adequate provision of safety officer personnel are present whenever working at night activities are taking place.

6.5.6.16 Permission to work at night

The *Contractor* shall apply in writing for permission to work at night and should be obtained from the relevant authority in this case *Project Manager*, before construction *Works* at night is carried out. The *Contractor*s should submit their application for work at night permit to Client representative and it is advisable to follow all requirements enforced by the authority to executing night time construction *Works*. It is recommended that the *employer's* representative should also notified TPT responsible personnel about intended night shift work.

6.5.6.17 Housekeeping

Accidents can occur as a result of poor housekeeping. Hazards at construction site are the same for both day and night shift while the risks of injury are much higher during night *Works* because of the inherent poor illumination. It is essential that the workplace is kept clean and tidy to ensure safety and prevent accidents.

6.5.6.18 Emergency preparedness and response (epr)

Contractor should developed and implement the EPR that is specifically night time environment and submit for approval before work at night is carried out. A well-established EPR can help both *Contractors* and employees to prepare; response and recover should a disaster occur.

6.5.6.19 Public safety

When construction *Works* involves public area, it is important to make sure the safety of the public. The *Contractor* must consider the following when planning for night time work; identify the hazards for example construction vehicle movement or too much glare from lighting equipment and plan for vehicular movement to not interrupt peak hours and make sure adequate supervision is provided for such movement.

Contractor must provide sufficient signage to warn the public and put barriers at a safe distance to keep the public away.

Set up a safe walk ways where it is unavoidable to work near or in public vicinity.

Arrange noisy equipment or machinery at farthest point from the public or adopt an engineering control to reduce the noise.

When overhead crane is operating near the public, clear off the area and make sure adequate supervision is in place.

Schedule for daily cleaning of the adjacent public road and filling up holes as well as uneven surfaces.

6.5.6.20 Types of risks and factors affecting night time work

In order to decide when to conduct night time work, factors (parameters) affecting night time work must be identified. The *Contractor* must ensure the following factors are identified:

- Risk
- Illumination
- Nuisances
- Productivity
- Cost
- Safety

The *Contractor* must ensure that they implement the following step in an effective risk management program as to identify possible risks. Specific concerns related to night time work zones include poor visibility and work quality, staffing issues, unwanted noise and glare, decreased worker and driver alertness, impaired drivers, higher vehicle speeds, increased labour costs, materials and traffic control, and problems in logistics and supervision. These risks are categorized broadly as safety, cost/production and schedule, quality, organizational relationships, technical, construction, economic, and environmental.

6.5.6.21 Risk

Night time construction introduces numerous risks to a construction project. One clear set of examples is driver and worker fatigue and reduced visibility, which are factors that could increase safety risks. Other major factors contributing to the risks of night time work are human factors such as sleep, stress, work, social or domestic issues, and psychological characteristics, such as appetite and safety. Additional factors associated with the risks of night time construction work zones are reduced work space for machinery and equipment movement, inadequate lighting, high speed of traffic during the night, and long working hours. Working at night does not supersede the requirements of the Project Health and Safety Specification requirements that enforces compliance during day shift.

6.5.6.22 Medicals

Pre-employment medicals, including chest X-ray examinations, specific for the Contract will be required for all employees working on the Site regardless of duration spent on Site. Exit medicals, including chest X-ray examinations will be required at the end of the Contract. These medical examinations must be carried out by a registered Occupational Health Practitioner.

6.5.6.23 The *contractor* must ensure that budget provision for all requirements are in place.

6.6 ENVIRONMENTAL CONSTRAINTS AND MANAGEMENT

5.9.1 All work is to be conducted in accordance with the principles of the National Environmental Management Act, 1998 (Act no 107 of 1998) but not limited to other applicable regulations as well as the accepted environmental good practice. In addition, the Contractor is expected to comply with all applicable Metropolitan Municipality bylaws.

5.9.2 All aspects of the *works* must comply with the *Employers* environmental management plan attached in annexure H.

5.9.3 The Contractor shall be responsible for rehabilitation/reinstatement and cleaning all areas to the satisfaction of the Employer's Project Environmental Manager or Environmental Officer.

6.7 QUALITY ASSURANCE REQUIREMENTS

Refer to EEAM-Q-009 for the *Purchaser*'s Quality Management. Special attention must be paid to the following:

- Quality management objectives.
- Documentation and change control procedures.
- Quality control procedures that will apply to purchased materials.
- Quality control plan for all components manufactured or supplied to ensure conformance.
- The identification of suitable hold points to ensure proper quality assurance throughout manufacturing.
- Quality control of all welding and corrosion protection activities.
- The quality control procedure that will apply to erection and painting on site.

The *Contractor* shall ensure that the quality assurance requirements placed on him under this Contract are transferred into any subcontracts.
Quality system requirements shall be applied on all subcontracts to the point where the acceptability of supplies can be demonstrated solely by the conduct of inspection and/or examination of goods upon receipt at the designated point of delivery.

The *Contractors* quality plan shall include or reference the quality plans of subcontractors.

6.8 PROGRAMMING CONSTRAINTS

5.9.4 The *Contractor's* construction WBS as a minimum shall include but not be limited to the following WBS Elements:

- Procurement and delivery of all long lead items necessary to provide the *Works* in line with the stipulations of the *Employer's Works* Information. Long lead items include but are not limited to; Plant, equipment, materials and any other resources, as required to provide both temporary and permanent *works*.
- Manufacturing and or Fabrication both on and off-site which may include but is not limited to; Plant, equipment, materials and any other resources, as required to provide both temporary and permanent works.

- Preparation and Approvals of Health & Safety, Environmental and Quality Documentation.
- Approval of any applicable permits, permissions and licenses, including inductions
- Site Establishment
- Electrical LV infrastructure Installation works:

a. LV installations by a certified installer.
b. LV installations in a hazardous location by a certified installer.
c. Commissioning of LV distribution systems.
d. LV cable termination.
e. Installations of earthing, bonding and lightning protection systems.
f. Installation of lighting control system hardware and plant.
g. Installation of mast bases.
h. Installation of high masts.
i. Installation of electrical infrastructure in mast structures.
j. Installation of luminaires.
k. Rigging of high masts and street light poles.
l. Testing and commissioning.

5.9.5 The *Contractor's* construction programme shall correspond with the *Contractor's* Approach Paper.

5.9.6 The *Contractor* shows on each programme he submits to the *Project Manager*, the requirements of the [CEMP, SES, PES and SMP] as described under the relevant sections of the *Works* Information, together with the associated environmental method statements.

5.9.7 The *Employer* (including the agents of the *Employer*) operates on *Site* during dates or timings when the *Contractor* has completed certain elements of the *works* and/or during the contract period as stipulated in this *Works* Information.

5.9.8 *Others* operate on *Site* during dates or timings when the *Contractor* has completed certain elements of the *works* as stipulated in this *Works* Information.

5.9.9 The *Contractor's* first programme submitted for accepted shall be agreed during the pre-contract negotiation period, and no later than the period stipulated under Contract Data Part One (2 weeks after the Contract Date).

5.9.10 The *Contractor* complies with the *Employer's* high-level programme when he submits his first programme for acceptance.

5.9.11 The *Contractor* presents his first programme for acceptance and all subsequently revised programmes (see ECC Clauses 31.2 and 32.1) in hard copy and soft copy format.

5.9.12 The *Contractor* shows on his programme submitted for acceptance and all subsequently revised programmes, the critical path or paths and all necessary logic diagrams demonstrating sequence of operations.

5.9.13 The *Contractor*'s programme shows duration of operations in working days as per the stipulated definition of the work days and hours in the *Employer's Works* Information.

5.9.14 Each programme submitted by the *Contractor* to the *Project Manager*, is fully Cost and Resource Loaded (People, Equipment, Plant, Materials & Other Resources) with the exception of the *Contractor's* tender programme submission.

5.9.15 The *Contractor* shows on each programme he submits to the *Project Manager*, the requirements as listed in the NEC 3, ECC, and Clause 31.2.

5.9.16 The *Contractor* attends, participates in and makes a meaningful contribution to, planning initiation & set–up meetings held during the pre-contract negotiation period and no later than the period stipulated under *Contract Data Part One* (2 weeks after the Contract Date); to agree and set-up - including but not limited to - the first schedule for acceptance; monitoring, control and reporting requirements; proposed templates and planning/scheduling procedures to be complied with for the duration of the project.

5.9.17 The *Contractor* shows on each revised programme he submits to the *Project Manager* a resource histogram showing planned progress versus actual, deviations from the Accepted Programme and any remedial actions proposed by the *Contractor*, including a spread sheet identifying instances of resource over-allocation and/or conflicts, accompanied by proposed resolutions.

5.9.18 The *Contractor*'s programme shows the following levels:

- Level 1 Master Schedule – defines the major operations and interfaces between engineering design, procurement, fabrication and assembly of Plant and Materials, transportation, construction, testing and pre-commissioning, commissioning and Completion.
- Level 2 Project Schedule – summary schedules 'rolled up' from Level 3 Project Schedule described below.
- Level 3 Project Schedule – detailed schedules generated to demonstrate all operations identified on the programme from the starting date to Completion. Individual operations will be assigned a code. The *Employer* notifies any subsequent layouts and corresponding filters on revised programmes.
- Level 4 Project Schedule –detailed discipline/speciality level schedule decomposed to the appropriate levels of detail in order to accurately substantiate activity scope and activity duration estimates; developed and

maintained by the *Contractor* relating to all operations identified on the programme representing the daily activities by each discipline, with activities and operations adequately decomposed in order to accurately represent the effort required to execute said activity/operation and support accurate duration estimates.

- A narrative status report, which includes but is not limited to status and performance of operations on the *Site* and Working Areas; status and performance of operations outside the Working Areas; manpower histograms; S-curve of overall progress; critical action items (top 10) and deviations from the Accepted Programme and action plan to rectify.
- Basis of Programme/Schedule document detailing but not limited to the following minimum requirements:

- Basis of latest accepted programme, including an overview of assumptions, constraints, specific and quantified resource allocations, productivity assumptions and basis of calculation, identification and justification of general scheduling provisions such as calendars and working times, lags, date constraints, activity durations longer than one reporting period, etc.
- Description of network logic and sequencing.
- Description of general construction approach.
- Description of approach to allocation, use and management of all resources dedicated to the project.
- Description of and trend analysis of critical risks as identified through schedule risk analysis and included in schedule contingency and or Time Risk Allowance provisions.
- Discussion regarding the basis, method of calculation and validity of the critical path and near critical paths, (interrogate longest path and total float as contained in the programme).
- Reporting on change management, i.e. identify and record any deviations/changes that have taken place within the previous reporting cycle, and their resultant impact on the remaining *works* and as identified and highlighted in the current revision of the programme for acceptance.
- Identification critical activities, as well as top 10 near critical activities and undertake tends analysis on such activities with the aim of identify any deviations from planned performance.
- Identification of any recovery and or mitigation action required in order to neutralise any deviations.

6.9 REPORTING AND MONITORING

The Contractor attends weekly planning meetings and contractual matters in line with NEC ECC core clauses 31, 32 and main option clause, Option B.

The *Contractor* submits programme narrative report to the *Project Manager* at weekly intervals in addition to the intervals for submission of revised programmes stated under *Contract Data Part One*. The *Contractor* also submits fortnightly expediting report and monthly programme narrative report to *Project Manager*.

The *Contractor* completes an assessment of all activities in progress and to completion to determine physical percentage complete, forecasted completion dates, deviations from the Accepted Programme and proposes remedial action to rectify deviations.

The *Contractor* shows on each revised programme he submits to the *Project Manager* a resource histogram showing planned progress versus actual, deviations from the accepted programme and any remedial actions proposed by the *Contractor*.

The *Contractor* submits the programme narrative report detailing the status and performance of operations on the Site and Working Areas, status and performance of operations outside the Working Areas, man-power histograms, Plant and equipment histograms, S-curve of overall progress, and critical action items (top 10). Report shall indicate "progress this period" and "progress to date".

The *Contractor*'s **weekly** project progress report (narrative report) includes but is not limited to:

- Level 4 Project Schedule – showing two separate bars for each task i.e. the primary bar must reflect the current forecast dates and the secondary bar the latest Accepted Programme.
- Progress Spreadsheet detailing actual progress achieved (target/planned quantity versus actual quantity) on current (critical) activities for the previous week, planned progress for the current week, deviations and proposed recovery for each activity in question. A 1-week Look Ahead Spreadsheet in line with the aforementioned stipulations to be included. Priority to be given to identification of critical activities, progress and any deviations from planned performance in this regard.
- 3-week Look Ahead Schedule showing two separate bars for each task i.e. the primary bar must reflect the current forecast dates and the secondary bar the latest Accepted Programme.
- Dependencies/Deliverables matrix detailing interim approvals and/or any other inputs/requirements from *Employer/Supervisor/Project Manager/Others* or any other project *Stakeholder* in line with the activities identified in the 3-week Look Ahead Schedule.
- Interfacing Matrix, detailing timeous identification of any requirements for providing the *works* and/or *works* to be executed by *Others* and any other *Stakeholders* party to this contract in line with the stipulations of the *Works Information*.

- Manpower Histogram – reflecting actual, forecasted and planned activities.
- Plant and Equipment Histogram – reflecting actual, forecast and planned activities.
- S-curves – reflecting the actual percentage complete versus the planned percentage for the overall contract.
- Identification critical activities, progress and any deviations from planned performance.
- Adherence and actual performance achieved with regards to Environmental, Health & Safety and Quality Management.

The *Contractor's* **fortnightly** expediting report includes but is not limited to:

- The *Contractor* shall submit to the *Project Manager*, a bi-weekly report on progress of any off-site manufacturing activities undertaken during the previous half-month.
- Based on the Accepted Programme, the *Contractor* submits a cash flow forecast report that details the anticipated monthly cash flow, represented by the expected assessment of the amounts due, to the *Project Manager*. The cash flow forecast is to be extrapolated from the latest Accepted Programme through the mechanism of the cost loaded schedule or other similar methodologies with the prior approval of the *Project Manager*.

The *Contractor*'s **monthly** project progress report includes but is not limited to:

- Monthly, the *Contractor* completes an assessment of all activities in progress and to completion, and accordingly revises and submits the updated programme for acceptance and cash flow forecast report detailing any variances and proposes remedial actions to rectify deviations.
- The *Contractor's* monthly programme narrative report is submitted a week before the last Friday of each month, or as required by the *Project Manager*. The report shall indicate "progress this period" and "progress to date" and shall include, but is not limited to, the following;
  - Summary of progress achieved during the reporting period.
  - Latest Accepted Programme.
  - Deviations from the current Accepted Programme and action plans to rectify.
  - Project milestones table – planned versus actual and forecast.
  - Status and performance of operations on the site and Working Areas.
  - Status and performance of operations outside Working Areas.
  - Cash flow forecast report.

- Digital photographic record of the progress of the *works*.
- Manpower histograms, including a control spread sheet detailing specific over-allocation and/or conflicts in allocation of resources.
- *Contractor's* Plant and equipment histograms, including a control spread sheet detailing specific over-allocation and/or conflicts in allocation of resources.
- S-curves of overall progress.
- Critical action items list (top 10).

6.10 OTHER CONDITIONS

5.9.19 The *Contractor* shall comply with the specific provisions of NEC 3 ECC Clauses 24.1 when supplanting any planning resources previously appointed in line with the provisions of this contract. Appointment shall follow upon written approval of the *Project Manager*.

5.9.20 The *Employer* (including the agents of the *Employer*), reserves the right to exercise the provisions of NEC 3 ECC Clause 24.2, where deemed necessary in order to meet the *Employer's* objectives as stipulated in Paragraph 1.2 of the *Works* Information.

6.11 *CONTRACTOR*'S MANAGEMENT, SUPERVISION AND KEY PEOPLE

The *Contractor* shall make an adequate, experienced and stable project team available for the duration of the contract. Every effort must be exercised by the *Contractor* to minimise the replacement of project team members in order to ensure optimum contract management continuity and efficiency.

The *Contractor* employs full time, fully qualified and experienced key persons who have been delegated sufficient authority to manage the contract efficiently on Site during completion of the *works* including and not limited to:

- Contracts Manager
  - The Contracts Manager should at least have a minimum qualification of a BSc. Eng./ B.Tech./ National Diploma in Electrical Engineering and a ECSA/SACPCMP registration as Pr. Eng/Pr. Tech. Eng./ Pr. Cert Eng./ Pr. CPM with at least 10 years of experience in Electrical LV projects. The Contracts Manager must have experience working with the NEC3 Engineering and Construction Contract in at least 3 separate projects, with at least 1 project in excess of R20m in electrical Works (LV switchgear, high mast lighting and street lighting) component value.
- Construction Manager X 1
  - The Construction Manager should at least have a minimum qualification of a B.Tech./ National Diploma in Electrical Engineering and a ECSA/SACPCMP registration as Pr. Eng/ Pr. Tech. Eng./ Pr. Cert Eng./ Pr. CM with at least 10

years of experience in LV and area lighting construction projects. The Construction Manager must have experience working with the NEC3 Engineering and Contract in at least 1 project in excess of R15m in electrical works (LV switchgear, high mast lighting and street lighting) component value.

- Installation Electrician X 1

  - The Installation Electrician must have at least 10 years of experience in Low Voltage (LV) installations and be registered with Department of Labour as an installation electrician.

Foremen:

- Foreman (building and civil infrastructure) X 1

  - Building and civil infrastructure Foreman must have a minimum of NTC 4 Trade Certificate in Civil Engineering with at least 10 years of experience in building services and civil /building construction.

- Foreman (Electrical LV) x 1

  - The Electrical Foreman must have a minimum of NTC 4 Trade Certificate in Electrical Engineering with at least 10 years of experience in Electrical LV Projects and be registered with Department of Labour as an installation electrician.

- Planner X 1,

  - The planner should at least 5 years of experience working both in Electrical roadway and area lighting LV Projects as planner.

- Quality Assurance Officer X 1,
- Quality Assurance officer should have a Diploma or Certified qualification in quality systems with relevant quality experience in construction. At least 5 years of experience in a quality systems environment and relevant experience in electrical/civil construction projects is required.
- Environmental Officer X 1,

  - Environmental Officer should have a Bachelor's Degree in Environmental Management/Science or equivalent with at least 5 years of experience in electrical construction projects.

- Health & Safety Officer X 1,

  - Health and Safety Officers: Registered as Health and Safety Officer with SACPCMP with at least 5 years of experience on LV electrical/civil construction projects, and have a SAMTRAC or NEBOSH or modern SHEQ risk management training course as a minimum qualification.

- Document Controller X 1,

  Document controller should have at least 5 years of experience working in construction and experience working with the NEC3 Engineering and Construction Contract Option chosen for this contract.

The *Contractor* employs personnel listed above but not limited to those mentioned in order to perform the functions of key persons under NEC3 ECC Clause 24.1. These appointments shall have the necessary experience and be suitably qualified.

The *Contractor* provides an Organogram of all his key people (both as required by the *Employer* and as independently stated by the *Contractor* under Contract Data Part Two) and how such key people communicate with the *Project Manager* and the *Supervisor* and their delegates all as stated at paragraph 2.5 of C3.1 *Employer's Works* Information.

6.12 TRAINING WORKSHOPS

The *Contractor* facilitates the following requirements for training workshops:

- The Contractor will be required to provide training in the use of the plant to the responsible staff of the Employer.
- On completion, each delegate to be given a handbook that covers the training undertaken.
- A safety pre-mobilisation workshop.
- Contractor employee safety training programme.
- The Contractor shall utilise local people for staffing up some of his requirements and shall ensure that there is adequate skills transfer taking place.
- Any other training as required by law or specifications referred to in this document

The Contractor shall consider and make the necessary allowances for the following training requirements:

- Training approach and delivery to be tailor made according to the above audience.
- The Contractor shall provide all courseware for the training.
- Training shall be delivered in a classroom environment and Transnet Port Terminals will provide training facilities to conduct training.
- The Contractor shall provide any or all training material required for the training.

6.13 CONTRACT CHANGE MANAGEMENT

For ease of communication standard templates shall be used for contract change management. The *Contractor* forwards all correspondence with respect to contract change management, i.e. Early Warnings and notifications of Compensation Events, on the standard templates provided.

6.14 RECORDS OF DEFINED COST, PAYMENTS & ASSESSMENTS OF COMPENSATION EVENTS KEPT BY *CONTRACTOR*

The *Contractor* keeps the following records available for the *Project Manager* to inspect:

- Records of design employees location of work or professional engineers engaged by the *Contractor*
- Records of people and Equipment within the Working Areas
- Records of Equipment used and people employed outside the Working Areas
- Records of quotations, invoices and pay slips.

7 PROCUREMENT

7.1 CODE OF CONDUCT

The *Employer* 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 the *Employer* must understand and support. These are:

- The Transnet Detailed Procurement Procedure (DPP);
- 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); and
- The Anti Corruption Act.

This code of conduct has been included in this contract to formally apprise the *Employer* Suppliers of the *Employer's* expectations regarding behaviour and conduct of its Suppliers.

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

The Employer 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 *The Employer will not participate in corrupt practices and therefore expects its suppliers to act in a similar manner.*

- *The Employer* 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, 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 decision stakeholders involved in sourcing decisions; or
  - Gain an improper advantage.
- There may be times when a supplier is confronted with fraudulent or corrupt behaviour of *the Employer* employees. We expect our Suppliers to use our "Tip-offs Anonymous" Hot line to report these acts (0800 003 056).

2. *The Employer 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.
    - *The Employer* does not engage with non-value adding agents or representatives solely for the purpose of increasing BBBEE spend (fronting)

3. *The Employer's relationship with suppliers requires us to clearly define requirements, exchange information and share mutual benefits.*
    - Generally, Suppliers have their own business standards and regulations. Although *The Employer* 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 *the Employer* 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

1. *A conflict of interest arises when personal interests or activities influence (or appear to influence) the ability to act in the best interests of the Employer.*
    - Doing business with family members
    - Having a financial interest in another company in our industry

7.2 THE *CONTRACTOR'S* INVOICES

When the *Project Manager* certifies payment (see NEC3 ECC Clause 51.1) following an assessment date, the *Contractor* complies with the *Employer's* procedure for invoice submission.

The invoice must correspond to the *Project Manager's* assessment of the amount due to the *Contractor* as stated in the payment certificate.

Invoices must be submitted by the defined date of the month forecasted to the date of the month to be advised by the project manager.

The invoice states the following:

- Invoice addressed to Transnet Limited;
- Transnet Limited's VAT No;
- Invoice number;
- Registered name of the *Contractor*;
- Address (Physical and Postal) of the *Contractor*;
- The *Contractor's* VAT Number; and
- The Contract number

The invoice contains the supporting detail:

- The amount paid to date;
- Amount for payment (excluding VAT);
- VAT amount;
- Amount for payment (including VAT);
- Any retention monies to be deducted from the invoice;
- Any interest payable;
- Escalation formula used where applicable;
- Settlement discount;
- Proof of ownership of Materials supplied;
- A statement is to accompany each invoice

The invoice is presented either by post or by hand delivery on the last working day of the assessment month. Statements must accompany invoices.

The invoice is presented as an original.

The *Contractor* ensures that the *Employer* has his correct banking information to make the electronic payment transfer.

All payments are provisional and subject to audit. The *Contractor* preserves his records for such a period of time as legislation requires, but in any event not less than five (5) years.

The *Employer* deducts any amount owed by the *Contractor* to the *Employer* from any amount payable by the *Employer* to the *Contractor*.

7.3 SUBCONTRACTING

The *Contractor* shall not appoint or bring Sub*Contractor*s onto Site without the prior acceptance of the *Project Manager*, and all Sub*Contractor*s will be required to conform to the requirements as set out herein as if they were employees of the *Contractor*.

The *Contractor* shall not deviate from an approved Sub*Contractor*s list without prior acceptance of the *Project Manager*

Subcontract documentation, and assessment of subcontract tenders:

The *Contractor* is required to appoint his Sub*Contractor*s under the NEC3 Engineering Contract Sub Contract unless accepted otherwise by the *Project Manager*, and all Sub*Contractor*s will be required to conform to the requirements as set out herein as if they were employees of the *Contractor*.

The *Contractor* shall ensure that the quality assurance, health and safety, industrial relations, environmental, documentation control and all other requirements placed on him under this contract are transferred into any subcontracts.

The *Contractor* **shall not** subcontract 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 of contributor than the person concerned, unless the contract is subcontracted to an EME that has the capability and ability to execute the subcontract.

8 DELIVERY PLACE AND DELIVERY OF THE GOODS

8.1 DELIVERY PLACE AND WORKING AREAS

Working Areas

When required in terms of the delivery methodology, the *Contractor* will indicate his space requirements at the Delivery Place on a suitable drawing submitted with the tender.

The *Delivery Place* is located at the Durban Car Terminal. The area of operation of the high hast lights will be within the premises of the Durban Car Terminal.

The *Contractor* shall take all necessary steps for his works not to interfere with port operations and to ensure that normal traffic flow of the operational terminal is not obstructed.

Establishment, fencing and other work required to make the *Delivery Place* fit for use is entirely the *Contractors* responsibility.

The *Contractor is* responsible for the security of the *Delivery Place* until completion and hand-over, and must make his own arrangements for security and the safekeeping of his property. The *Contractor* watchmen are allowed on site for this purpose.

The *Contractor must* maintain the *Delivery Place* in a neat and tidy condition to the satisfaction of the *Project Manager*.

Clearing of Delivery Place

The *Contractor*, within fourteen days after completion, must completely remove from the Delivery Place all his plant, materials, Equipment, stores and temporary accommodation or any other asset belonging to him and leaves the Delivery Place in a tidy condition to the satisfaction of the *Project Manager*.

Customs and Port Regulations

Some of the *Delivery Places are* situated within a Customs controlled area and the *Contractor* and his people shall observe all Customs regulations within the port area.

Some of the *Delivery Places* are also within a promulgated port area and the *Contractor* and his people shall observe all ISPS and Port Regulations within the particular port areas. Copies of the Harbour Regulations are obtainable from the Port admin offices.

The fullest collaboration between the *Contractor*, the Port and the *Project Manager* is essential in regard to the working of the port.

Health and Safety Facilities at the Delivery Place

At all times during the delivery, installation and testing of the equipment the *Contractor* is responsible for the safety of all persons on the *Delivery Place* and on the equipment and shall have the necessary systems and procedures in place to effectively manage this.

The *Contractors* workforce must attend an induction re relating to the safety and operational aspects of the terminal for about 45 minutes before they can work at the terminal. The *Contractor* is responsible to supply all the necessary PPE to his employees.

9 EQUIPMENT PLANT AND MATERIALS STANDARDS AND WORKMANSHIP

9.1 REFERENCED STANDARD SPECIFICATIONS

The tests prescribed in the relevant standard specifications shall be carried out at the manufacturer's works before delivery of the Equipment, Plant and Materials ordered by the *Contractor*. The test results shall be submitted to the *Project Manager*.

Plant and Materials made and tested to alternative standard specifications will be considered at the discretion of the *Project Manager*, provided that such specifications are not less stringent than those laid down.

10 GENERAL

All Equipment, Components Plant and Materials shall be new.
All Equipment Plant shall be installed according to the manufacturer's recommendations.
All TPT standards and/or specifications shall be complied with where applicable.

Part C4: Site Information

PART 4: SITE INFORMATION

1. Description of the Site and its surroundings

1.1. General description

The sites are located within the Port of Durban and can be accessed through all major and minor arterial roads around the port precinct.

Figure 1. Point Area for Multipurpose Terminal and Car Terminal site
29°52 05"S 31 02'09 E

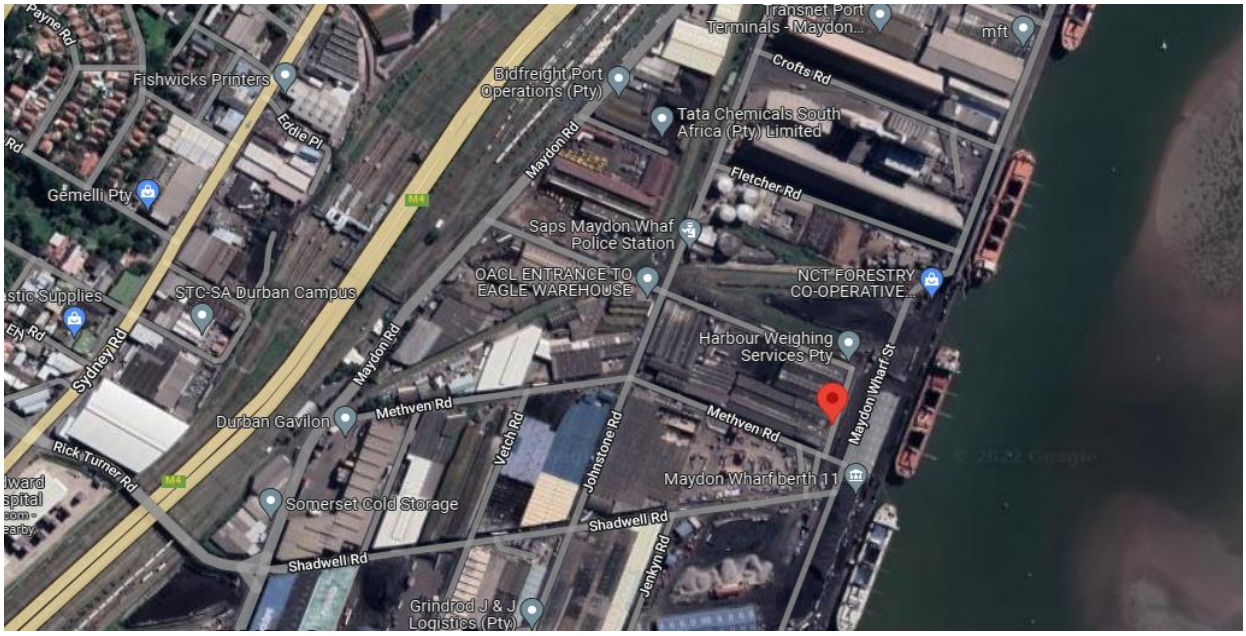


Figure 2. Maydon Wharf site
29°52'50"S 31° 00'14"E

From the N2 enter Rick Tuner Rd, continue straight to Shadwell Rd, all the way to Maydon Wharf Street. The site will be accessed at Maydon Wharf Berth 11.

1.2. Existing buildings, structures, and plant & machinery on the Site

The Durban Multipurpose Terminal (MPT) and Car Terminals consist of berths, sheds and operational stack areas as they are utilized for import and export purposes, as a storage area for primarily breakbulk cargo. The Maydon Wharf location as see on figure 3, consists of buildings and large bulk of coal as this area will experiences high volumes of container trucks and other vehicular traffic that causes major traffic delays in and around the Port of Durban, the Contractor is to take cognisance of the traffic congestion.

Figure 3. Maydon Wharf area

1.3. Subsoil information

No detailed subsoil information is available for this contract.

1.4. Hidden services

Refer to C3: Works Information, Part 3 – Underground services, other existing services, cable and pipe trenches and covers.

1.5. Other reports and publicly available information

No information available for this contract.

Annexure A - TPD-002-DBSPEC - Technical specification for low voltage distribution boards

SPECIFICATION FOR LOW VOLTAGE DISTRIBUTION BOARDS

This specification covers Transnet's requirements for low voltage distribution boards

REVISIONS		
REV	**DATE**	**APPROVED**
0	**September 2022**	

INDEX

1. SCOPE

1.1. This specification covers Transnet's requirements regarding the design, supply, manufacture, population, works testing, delivery to site, site erection, site testing and commissioning of low voltage Distribution Switchboards consisting of fuse switches incorporating high rupturing capacity cartridge fuse links, air circuit breakers, moulded case circuit breakers and auxiliary equipment. The tenderer is required to familiarise themselves with all applicable Standards and Codes of Practice listed herein, and to ensure compliance in the execution of any work in terms of this document.

2. REFERENCES

2.1. The following publications (latest edition) are referred to herein:-

2.1.1. SOUTH AFRICAN BUREAU OF STANDARDS

Codes of Practice

SANS 064	The preparation of steel surfaces for coating
SANS 10111	Engineering Drawings.
SANS 10142	Wiring of premises Part 1: Low voltage installations
SANS 10313	Protection against lightning - Physical damage to structures and life hazard

Specifications

SANS 60947	Low-voltage switchgear and control gear
SANS 156	Moulded-case circuit breakers
SANS 60269	Low-voltage fuses
SANS 1091	National colour standards for paint
SANS 1195	Busbars
SANS 1274	Coating applied by the powder coating process
SANS 1973-1	Low-voltage switchgear and control gear assemblies Part 1: Type-tested assemblies with stated deviations and a rated short-circuit withstand strength above 10 kA
SANS 1973-3	Low-voltage switchgear and control gear assemblies Part 3: Safety of assemblies with a rated prospective short-circuit current of up to and including 10 kA
SANS 60529	Degrees of protection provided by enclosures (IP Code)
SANS 1507	Electric cables with extruded solid dielectric insulation for fixed installations (300/500 V to 1 900/3 300 V)
SABS ISO 9000	Quality management systems -- Fundamentals and vocabulary
SANS 1019	Standard voltages, currents and insulation levels for electricity supply
SANS 170	Fasteners

International Electrotechnical Commission

BS	3938	Current Transformers
IEC	61508	Functional Safety of Electrical/Electronic/Programmable Electronic Safety-related Systems.
IEC	60051	Direct acting indicating analogue electrical measuring instruments and their accessories

3. SERVICE CONDITIONS

3.1 The equipment shall be designed and rated for continuous operation under the following conditions:-

3.1.1 Ambient/Environment Conditions:

3.1.1.1 Ambient temperature- 5□C to +40□C (daily average +35 □C).

3.1.1.2 Relative humidity- As high as 95%

3.1.1.3 Lightning conditions- Severe, with a maximum lightning ground flash density of eleven (11) flashes per km² per annum.

3.1.1.4 Atmosphere- Salt laden and corrosive industrial atmosphere

3.1.2 Electrical Conditions:

3.1.2.1 The system of supply shall be three phase, 4 wire, 50 Hz alternating current with solidly earthed neutral at a nominal voltage of 400 / 231 Volts.

3.1.2.2 The voltage may vary within the range of 95% to 105% of the nominal and all equipment installed shall be suitably rated.

3.1.2.3 All equipment shall be adequately rated for prospective fault level ratings.

4 DRAWINGS AND INSTRUCTION MANUALS

4.1 All drawings shall be in accordance with SANS 10111 – Engineering Drawings.

4.2 The successful tenderer shall supply the following instruction manuals, all of which shall be included in the tender price and be to the satisfaction of Transnet.

4.2.1 THREE (3) sets of detailed drawings and instruction manuals, with illustrations where necessary and 2 sets of prints of the "As Built" General Arrangement drawings and the schematic and wiring diagrams to facilitate erection and adjustment of the switchgear.

4.2.2 A full set of electronic media including all information requested above.

4.2.3 These instruction manuals and drawings shall be supplied as soon as possible after placing of the order, but before delivery of the equipment.

5. STANDARD OF WORK, EQUIPMENT & MATERIALS

5.1. The distribution board shall conform to the requirements of the latest edition and amendments of SANS 10142-1 Code of Practice for the Wiring of Premises Part 1: Low voltage installations and any additional requirements thereto, described in this specification.

5.2. All equipment and material used shall be of high quality and the work shall be of a high standard of workmanship carried out by qualified staff under proper supervision by experienced and competent officers.

5.3. If any special tools are required for the maintenance of the switchboard, the tenderer shall supply three (3) sets at delivery of the switchboard to site.

6. DISTRIBUTION BOARDS

6.1. The distribution board shall comply with SANS 60439-1

6.1.1. The form of separation will be specified in the project specific documentation.

6.2. The degree of protection shall be to IEC Publication 144/EN60529 and shall conform to the following:

- Inside Substations and MCC Rooms: IP42
- Other Locations: IP65

6.3. The distribution board shall consist of either a framework of substantial steel sections covered with heavy gauge steel plates or of folded sheet steel sections, forming a robust construction.

6.4. Particular attention shall be given to the ventilation of panels, to eliminate build-up of excessive heat caused by the sun or internal heat generation. All necessary precautions shall be taken to ensure that the temperature of the air in any portion of the assembly does not rise more than 15°C above ambient air temperature

6.5. Every board shall be fitted with a suitable gasket incorporated into the frame to ensure that the arrangement is in accordance with the required degree of protection. Sealing strips and gaskets shall be made of durable, non-hardening rubber, neoprene or other synthetic material, suitably fixed to the door or frame to ensure that the seal does not become dislodged during normal operation.

6.6. Where possible the lock and door catch shall comprise of a combination unit. Door latching and delatching operations shall be smooth and quick, whilst ensuring proper compression of the sealing gaskets. Repeated opening and closing of the hinged doors and operations of the door locks and catches shall not cause chipping or scratching of the painted surfaces or any other blemishes to the finished boards

6.7. Lifting lugs shall be provided for floor standing enclosures and as needed for wall mounted enclosures.

6.8. The board shall have a separate latches hinged or removable front cover secured to the board by means of suitable captive type screws or bolts. When the cover is removed/ opened, easy access to that compartments components and wiring shall be possible.

6.8.1. The control units shall be mounted flush with the front cover so that only the operating handles protrude.

6.8.2. Large removable panels shall be supplied with handles for easy handling.

6.8.3. No possibility should exist for panels to come into contact with live parts.

6.9. Due care shall be taken to ensure that the live side of the MAIN SWITCH is suitably protected so that no live conductors are exposed when the panel door is opened or the panel cover is removed.

6.10. The board shall be equipped with a set of 3 phase and neutral copper busbars. The 3 phase busbars shall be continuously rated for the full load of the incoming supply switch. The neutral shall be 100% of the phase busbars. Earth bar shall be rated to fault current and touch voltage.

6.11. All busbars shall be designed, manufactured, marked and tested in accordance with SANS1195.

6.12. Busbar rating shall be 2A/mm^2 up to 630A and 1.6A/mm^2 thereafter.
6.13. Busbar temperature shall not exceed a 40^{0}C temperature rise.

6.14. The busbars shall be adequately braced and supported. The busbars shall be covered with a sufficient number of layers of high quality insulating tape or heat shrinkable sleeving and finished in standard colours.

6.15. Where busbar joints and terminations have not been covered, a kit shall be provided for covering during installation.

6.16. Alternatively, busbars shall be suitable enclosed in a busbar chamber or behind a protective barrier for protection against inadvertent contact with "live" busbars with access panels removed.

6.17. Inter-connectors between the busbars and control units shall be by means of fully insulated, adequately rated conductors firmly bolted to the busbar and secured to the appropriate terminals of the control units using crimped-on terminal lugs. Solid flat conductors shall be used if the rating exceeds 400 A or if the fault current exceeds 25kA rating. No conductor of less than 16mm^2 shall be used between busbars and control units. All conductors shall be suitably rated for the fault level.

6.18. The other terminals of the incoming and outgoing panel units shall be connected by means of conductors conforming to clause 6.17, i.e. they shall be robust, insulated, easily accessible terminals, of adequate size, conveniently located in the distribution board near the incoming and outgoing cable entries but with sufficient clearance and space to enable the incoming and outgoing cables to be connected to their corresponding terminals without difficulty or strain.

6.19. All the outgoing connections of MCCB'S greater than 400A 3 phase shall be done by means of copper bus bars, securely clamped using approved busbar clamping insulators, fixed to a robust metal section of adequate size, conveniently located in the rear of the distribution board to enable the incoming cables to be terminated in the back of the distribution board cubical behind each respective MCCB. This is to allow for the easy termination of the larger incoming cables, with sufficient clearance and space to enable the outgoing cables to be connected to their corresponding busbar terminals without difficulty or strain to the MCCB's. Each MCCB up to 250A shall be fitted with extended terminal complete with phase barriers as supplied by circuit breaker supplier.

6.20. Outgoing cable tails that connect to the busbars in clause 6.19 shall have securing places to enable the cable to be secured with nylon type cable fasteners in an approved manner.

6.21. The busbars that protrude into the back compartment of the distribution board shall be covered with a perspex type barrier and shall have danger signs on each section.

6.22. Removable gland plates shall be provided. These gland plates shall be of adequate thickness or construction for the cables to be terminated without distortion of the gland plate, and shall not be less than 2mm mild steel (zinc passivated). Gland Plates shall not be mounted less than 300mm above ground floor level, alternatively a base frame of suitable depth may be provided.

6.23. Distribution board cases shall be of such dimensions that adequate space is available for manoeuvring and connecting the incoming and outgoing cables.

6.24. All cable entries shall be from the bottom of the distribution board unless stated otherwise.

6.25. Glands shall not be less that 300mm above floor level. Unless otherwise stated.

6.26. The terminals of all incoming and outgoing cables shall be firmly connected to the terminals on the lugs or ferrules, unless they are of a type that will grip the cable without splaying the strands of the conductor.

6.27. A substantial earthing terminal shall be firmly attached to the metal work of the distribution board and connected to an earth bar of cross sectional area not less than 50% of the phase bars, running the full length of the distribution board to which all earthing conductors of the incoming and outgoing circuits shall be firmly connected.

6.28. A removable link shall be provided in the Neutral busbar to ensure that the neutral busbar can be split in two sections for testing purposes. The link shall be secured in position with a bolt and nut arrangement.

6.29. The distribution board manufacturer shall allow for at least 30% capacity for the installation of additional switchgear in the distribution boards.

6.30. Each distribution board shall be fitted with the following labels as needed in suitable positions:

- Live busbars
- Flash signs
- Main label (always required)
- Voltage rating
- Current rating
- Fault level and time
- IP rating
- Job number
- Reference number
- Date of manufacture
- Form of separation
- Fed from
- Each feeder/starter to be labelled

6.31. Each distribution board shall be supplied with a test certificate. This certificate shall include all items as indicated in annexure 1 of SANS 1973–1 and annexure E of SANS 1973–3.

7. ARC DETECTION SYSTEM

7.1. All switchgears shall be equipped with an efficient and reliable arc detection system designed according to IEC 61508 with a safety level meeting at least SIL 2.

7.2. The system shall consist of one or more arc monitoring units and light detectors.

7.2.1. Arc detection system:

Arc detection system shall not be activated by interfering influences such as portable lamps, electro-magnetic fields, vibration or touching. In case of an arc occurring in the switchgear it shall be possible to identify where and when the arc has occurred. This information should be accessible without opening the switchgear door and stored even if power is lost to the system. The HMI shall not affect the IP degree of the cabinet.

7.2.2. Arc monitoring unit and light detector:

The arc detection system shall use light as the main condition for tripping. Detectors shall cover each bus-bar section, respective circuit breaker and in any other areas where the designer of the switch gear considers or finds it as a potential risk for an arc. The detectors shall be made of optical fibre in order to avoid EMC disturbances. Without any extra calibration from the user the system shall not react for a light intensity lower than 3000 lux in order to avoid nuisance tripping. The light intensity shall also be constant regardless the length of the detector.

7.3. The trip signal shall be sent within less than 2 ms to the circuit breaker in an event of an arc

7.4. The arc monitoring unit shall provide at least three high speed solid state tripping outputs to the circuit breaker.

7.5. It shall be possible to configure the detectors to trip different breakers depending on which detector detects the arc.

7.6. The system shall have the possibility to mount up to 30 detectors in the space of the main unit in order to avoid space issues if the system would be extended.

8. FUSE SWITCHES

8.1. Fuse switches shall comply with SANS 152 and SANS 60947 – 3.

8.2. Fuse switches shall be enclosed, triple pole, quick break and dustproof.

8.3. Fuse switch handle shall have an IP rating of IP65 and the handle shall be defeatable to override the door interlock.

8.4. Fuse switches shall be of the double break type and the fuses shall be completely isolated when the switches are in the "OFF" position.

8.5. Fuse switch and handle shall have a test position. It will be possible to have an auxiliary for only indication test position.

8.6. The switches shall be interlocked to prevent the opening of the front covers unless the switches are in the "OFF" position and the closing of the switches with the covers open. The switches shall be lockable in the "OFF" position.

8.7. Fuse Switches shall have a lever or rotary action with a positive spring controlled opening and closing action for making or breaking the circuit under load conditions. Fuse carrier and base contacts shall be designed to give permanent high contact pressure and shall be designed to facilitate location of blown fuses without removal of the carrier. Fuse carriers and bases shall be of the highest grade phenolic mouldings to BS 771 and shall be non-flammable and nonhygroscopic, with a hard gloss black finish.

8.8. It shall be possible to install the fuse switch in any position without derating.

9. FUSE LINKS

9.1. HRC Fuse Links shall be of the high rupturing capacity type, compliant with SANS IEC 60269 –

1:2006. Fuse links shall incorporate a visual indication device to facilitate location of blown fuses and shall be designed to clip into the fuse carrier contacts without the use of fixing screws.

9.2. Breaking capacity of all fuse links shall be not less than Category of duty AC.50 at 415 Volts (SANS IEC 60269 - 1:2006). The Fusing factor of the fuses shall not exceed 1.5 (SANS IEC 60269 Class Q1).

9.3. Fuse current ratings shall be indicated on engraved 20 x 12mm white-black-white trifoliate labels in 4mm letters. The labels are to be fitted at the fuse bases and shall not be obscured by wiring.

9.4. Fifty- percent spare fuses of each size shall be provided in suitable cubicle on the switchboard. The door of this cubicle shall be suitably identified.

10. AIR CIRCUIT BREAKERS (ACB) SHALL CONFORM TO THE FOLLOWING CHARACTISTICS.

10.1. Functional characteristics:

10.1.1. Air circuit breakers for use on the incoming supply side of the distribution board shall comply with SANS 60947.

10.1.2. The circuit breakers shall have a continuous enclosed current rating as indicated on the relevant drawings with a minimum Icu (ultimate breaking capacity) of 42kA at 415 volts. The circuit breakers shall be tested for category P.2, unless specified otherwise.

10.1.3. The circuit breakers shall have an Ics (service capacity) rating equal to the Icu (ultimate breaking capacity) rating.

10.1.4. The circuit breakers shall have an Icw (withstand current) of 1 sec and 3 sec. The 1 sec Icw rating shall be equal to the Icu rating.

10.1.5. The air circuit breakers shall be of the enclosed, ventilated, independent manual spring, draw-out type with a rated service voltage of 690 volts and a rated insulation voltage of 1000 volts and be equipped for shunt tripping from a 115 V DC battery supply. The shunt tripping facility shall be wired so that the ACB shall trip when it's associated high voltage transformer circuit breaker trips.

10.1.6. The circuit-breakers shall have a rated impulse withstand voltage of 12 kV.

10.1.7. The rated uninterrupted current shall be between 100 and 6300 A with the possibility of set trip threshold of L protection from 40A.

10.1.8. Different versions of circuit-breakers shall be available, divided into their category of use: A (current-limiting) and B (selective).

10.1.9. Different versions shall be available with rated ultimate breaking capacity from 42 to 150 kA at 440 V AC and from 42 to 100 kA at 690 V AC for circuit-breakers in category B and with 130 kA at 415 V AC, 85 kA at 690 V AC for circuit-breakers in category A.

10.1.10. The mechanical life shall be at least 12000 operations with a frequency of 60 operations/hour without the need for maintenance of the contacts and arcing chambers

10.1.11. The electrical life at a voltage of 440 V AC shall be (with a frequency of at least 10 operations/hour and without the need for maintenance of the contacts and arcing chambers):

- at least 9000 operations up to 2000 A
- at least 5000 operations up to 3200 A

These values are intended to be valid only for catagory B circuit-breakers.

10.2. Environmental characteristics

10.2.1. Operating temperature: -25 °C...+70 °C (-13 °F...158 °F) and storage temperature: -40

10.2.2. Altitude: operation without derating shall be up up to 2000 metres above sea level. (6600 ft), and with derating up to 5000 metres above sea level. (16500 ft).

10.2.3. Suitability for use in a hot-humid environment. With regard to this, the circuit-breakers shall undergo a tropicalisation process which makes them suitable for use in a hothumid environment, as established by the prescriptions of the main shipping registers and in accordance with the international IEC 60068-2-30 Standards.

10.3. Construction characteristics

10.3.1. All the models shall be available in the 3 and 4 pole versions both in the fixed (with rear horizontal, rear vertical and front terminals) and withdrawable (with rear horizontal, rear vertical, front and fl at terminals) versions.

10.3.2. There shall be total segregation between power and front shield, using double insulation where suitable so as to guarantee maximum operator safety.

10.3.3. Total segregation between the phases shall be guaranteed for safety reasons without need of phase barriers up to 1000V.

10.3.4. It shall be possible to inspect easily the arcing chambers easily and to check main contact wear with the circuit-breaker racked-out, by removing the arcing chambers.

10.3.5. All the circuit-breakers in the range shall have the same height and depth with the aim of standardising the supporting structures of the switchgear and the switchgear itself as far as possible.

10.3.6. IP30 degree of protection shall be guaranteed on the front part and IP20 on the rest of the circuit-breaker (excluding the terminals), with the possibility of having IP54 degree of protection (NEMA 3/3s/13) on the front, using the transparent cover which completely protects the front, but still leaves the panel underneath and the protection unit fully visible with the relative indications.

10.3.7. The whole range of air circuit-breakers shall be fitted with electronic protection releases. It shall be allowed the inter-changeability of protection releases from skilled personnel.

10.4. Special points for withdrawable versions:

10.4.1. The circuit-breakers in the withdrawable version shall be fitted with anti-racking-in locks to prevent racking a moving part into a fixed part with a different rated current.

10.4.2. In the case of the withdrawable version, the presence of a device shall prevent racking-out and racking-in with the apparatus closed.

10.5. Accessories

The following accessories shall be common to the whole range standard:

10.5.1. Electrical accessories:

10.5.1.1. Shunt opening/closing release.

10.5.1.2. Control and monitoring Test Unit - allows continuity of the different versions of the shunt opening releases to be checked;

10.5.1.3. Undervoltage release;

10.5.1.4. Time delay device for undervoltage release - allows release trip delay with established and adjustable times;

10.5.1.5. Geared motor for the automatic charging of the closing springs;

10.5.1.6. Mechanical and electrical signalling of overcurrent release trip;

10.5.1.7. Trip reset release;

10.5.1.8. Auxiliary contacts which allow signalling of the circuit-breaker state;

10.5.1.9. Current transformer for the neutral conductor outside the circuit-breaker;

10.5.1.10. Homopolar toroid for the main power supply earth conductor (star centre of the transformer).

10.5.2. Mechanical accessories:

10.5.2.1. Interlocks between 2 circuit-breakers or among three circuit-breakers can be used horizontally, vertically or in “L” position using different types of flexible cables:

10.5.2.2. Standard version (with maximum distance between two circuit breakers: up to 1200 mm if horizontally interlocked while up to 750mm if vertically interlocked).

10.5.2.3. Extended version (with distance between two circuit breakers: from 1200mm up to 1600 mm if horizontally interlocked while from 750 up to 1000 if vertically interlocked).

10.5.2.4. Mechanical locks to control enabling racking-in/out operations available also with interlocks. IP54 transparent front protection (NEMA 3/3S/13).

10.6. Protection Release

10.6.1. Basic Protection Functions

10.6.1.1. The release shall not require auxiliary power supplies since the power is taken from the current transformers.

10.6.1.2. The signals supplied by the release shall not operate with power supply supplied by internal batteries.

10.6.1.3. The protection against overload (L) with characteristic t=k/I2 shall always have setting ranges with timing adjustable up to 144s with I=3In.

10.6.1.4. The protection of neutral shall be set at 50%, 100%, 200% and OFF of the phase currents without changing any component.

10.6.1.5. All the protection functions except protection against overload shall be excludable.

10.6.2. Measurement Functions

10.6.2.1. The release shall always be able to provide measurement of the currents and voltages in the three phases, in the neutral and of earth fault (ammeter function), both in self-supply and with an auxiliary power supply. Measurement function shall be active, even without external supply, starting from 140 A of single-phase current, independently from the circuit-breaker size. Accuracy of the ammeter measurement chain (current sensor plus ammeter) shall equal or better than 1.5% in the 30% - 120% current interval of In.

10.6.2.2. The release shall not normally require auxiliary power supplies since the power is taken from the current transformers. For measurements and programming at very low currents, a power supply at 24 V DC shall be available. As alternative the release shall be able to receive power supply directly from busbars or terminals, up to line voltage equal to 690 V AC.

10.6.2.3. The release shall be able to acquire the waveforms of electrical values with a sampling frequency selectable from 600 to 4.800 Hz and sampling interval from 3 s to 27 s. Acquisition shall be frozen after a trip or a configurable event. Acquisition data shall be retrieved from an external device (personal computer or similar) for fault analysis purposes. The release shall show voltage measurements on display, with a precision equal or higher than 1%.

10.6.2.4. Measurement functions that shall be available:

- Current measurements
- Voltage measurements
- Power measurements
- Power factor measurements.
- Measurements of frequency and peak factor
- Energy measurements
- Historical measurements
- The last 10 trips information
- Complete trip information on display without batteries
- Data logger included as standard

10.7. Advanced Protections Functions

10.7.1. Thermal memory for functions L (overload protection) and S (short circuit protection).

10.7.2. Protection against over-temperature. It shall be possible to signal the presence of anomalous temperatures on the release by means of two LEDs (Warning and Alarm) and, if decided during the unit configuration phase, when the temperature is over 85 °C, to simultaneously control circuit-breaker opening.

10.7.3. Protection against missing and unbalanced phase (U) with characteristic t=k shall be possible.

10.7.4. Load control protection (K).

10.7.5. Undervoltage protection (UV)

10.7.6. Overvoltage protection (OV)

10.7.7. Residual voltage protection (RV)

10.7.8. Underfrequency protection (UF)

10.7.9. Overfrequency protection (OF)

10.7.10. Protection against reversal of active power (RP)

10.8. User Interface and Signalling LEDs

10.8.1. An alarm shall indicate by means of LEDs located on the release the disconnection of opening solenoid and current transformers. A trip shall also occur, after a short time delay, when the disconnection is detected.

10.8.2. The release shall allow parameterisation by means of keys and a LCD graphic display.

10.8.3. Access to control and configuration of the unit by means of a password (edit MODE).

10.8.4. The signals given by the permanent indicators shall guarantee maximum reliability.

10.8.5. Indication shall be available directly on display on request of the user for not less than 48 hours even without an auxiliary voltage and batteries and also be given in the case of re-losing on a fault. After 48 hours of inactivity the information shall be retrievable by external devices. Indication shall contain at least the protection tripped.

10.8.6. It shall be possible to read the current values and information on the last 10 measures (current values, protection tripped) at any time through external devices, some of which can transmit data via bluetooth;

10.8.7. In the event of CB tripped, shall be indicated the type of protective function that intervened.

10.8.8. Each alarm or warning alarm shall be clearly shown on the display, when it is active.

10.8.9. On the protection release two (2) led's shall be present.

10.8.10. Warning LED shall be in place indicating at least the following:

- Presence of one or more phases with current values in the 0.9*In< I <1.05*In range
- Presence, between two or three phases, of unbalance higher than the value programmed during configuration
- The first temperature threshold of T=70 °C has been exceeded
- Contact wear > 80%
- Harmonic distortion
- Out of range frequency
- Breaker status error
- Warning threshold override

10.8.11. Alarm LED shall be in place indicating at least following:

- Presence of one or more phases under overload with current values I >1,3*In (Overload Protection - L under timing)
- Timing in progress for protection function S (Selective short circuit protection)
- Timing in progress for protection function G (Earth fault protection)
- The second temperature threshold of T=85 °C has been exceeded
- Contact wear 100%.
- Timing in progress for protection function D;
- Timing in progress for protection function UV(Under Voltage), OV(Over Voltage), RV (Residual Voltage);
- Timing in progress for protection function RP(Reversal of Active Power);
- Timing in progress for protection function
- Timing in case of unbalance between the phases higher than the value set during configuration with trip set to ON;
- Current Sensors disconnected;
- Opening solenoid (Trip Coil) disconnected

10.8.12. The communication function shall be implemented on the release by means of:

- An internal bus, with interface RS485;
- An external bus, with Modbus RS485 protocol 2-Wire Twisted Pair, 19.2 kbit/s max.

10.8.13. There shall be the possibility of setting the release in remote and in local operating mode, and with the latter it shall not be possible to carry out data transmission from the system to the release. It shall be possible to automatically set the local mode by means of an external contact. An 24VDC auxiliary supply shall be used.

10.8.14. The protection release shall be able to send to the system these data:
Protection parameters set, phase and neutral currents, state of the circuit-breaker (open closed), position of the circuit-breaker (connected-isolated), state of the springs (charged discharged), number of circuit-breaker mechanical operations, total and for each protection number of trips, last interrupted current, contact wear, state of the protection functions (pre alarm function. L, timing function. L, S,G…), overtemperature protection function, state of internal communication bus.

10.8.15. The system shall transmit to the protection release the following data: protection parameters, circuit-breaker opening and closing commands, reset for tripping of some protection functions.

10.8.16. Adjustable inverse definite minimum time (IDMT) overcurrent release facilities are required in addition to the instantaneous fault trip for the air circuit breakers.

11. MOULDED CASE CIRCUIT BREAKERS (MCCB) SHALL CONFORM TO THE FOLLOWING CHARACTISTICS.

11.1. Functional Characteristics

11.1.1. AC rated service voltage for currents over 160 A: 690 V AC (50-60 Hz).

11.1.2. DC rated service voltage: 500 V DC for currents of 160 A and 750 V DC for currents over 160A.

11.1.3. Rated uninterrupted current for 1000 V AC or DC applications: 800 A (three and four poles).

11.1.4. Minimum rated insulation voltage for currents equal or over 160 A: 8 kV.

11.1.5. Rated insulation voltage for currents equal or over 160 A: 800 V AC.

11.1.6. Rated uninterrupted current between 160 and 3200 A with trip units settings starting from 1A.

11.1.7. According to IEC 60947-2 (§ 4.4) starting from 400 A the circuit breakers shall be category B

11.1.8. MCCBs shall be available with different ultimate short breaking capacities between 16kA and 200kA @ 380/415 V AC.

11.1.9. Both line up and line down supplying shall be possible without decreasing MCCBs performances or functionality

11.1.10. For rated uninterrupted currents up to160 A, the MCCB limiting features shall be enough to assure its conformity to IEC 60439-1 (§ 8.2.3.1) once installed into a type AS or ANS switchboard as general breakers. This shall be valid up to the MCCB's rated uninterrupted current (limiting versions are excluded).

11.1.11. A test bottom for the correct functionality checking (moving contacts opening) shall be place in front of the breaker.

11.2. Ambient Characteristics

11.2.1. Operating temperature: -25 °C. +70 °C (ambient temperature)

11.2.2. Storage temperature: -40 °C .. +70 °C (ambient temperature)

11.2.3. Reference temperature for setting the thermal element of the thermomagnetic trip unit: +40 °C

11.2.4. Maximum relative humidity: 98%

11.2.5. Maximum altitude: 2000 m above sea level, 5000 m above sea level with derating suitability for being used in hot-humid places. With regard to this, the circuit-breakers shall undergo a tropicalization process to make them suitable for use in hot-humid places, as established in the prescriptions of the major naval registers and in compliance with the International IEC 60068-2-30 Standards.

11.2.6. Circuit-breakers fitted with electronic trip units shall comply with the prescriptions of the International Standards on electromagnetic compatibility.

11.3. Construction Characteristics

11.3.1. The range of moulded case circuit-breakers shall cover a range of rated uninterrupted currents from 160 to 3200 A

11.3.2. By means of the double insulation technique, moulded case circuit-breakers shall guarantee complete separation between the power circuits and the auxiliary circuits.

11.3.3. Moulded case circuit-breakers shall have an operating lever which always indicates the exact position of the circuit-breaker contacts (positive operation), by means of safe and reliable signals (I= closed, O= open, yellow-green line= open due to trip unit).

11.3.4. The operating mechanism shall be designed to operate all poles of the circuit breaker simultaneously for making, breaking and tripping.

11.3.5. Moulded case circuit-breakers shall be suitable for isolation in compliance with § 7.2.7 of the IEC 60947-2 Standard. This indication shall be clearly and indelibly marked on the circuit-breaker (in accordance with § 5.2 of IEC 60947-2) and in a position where it is visible with the circuit-breaker installed.

11.3.6. Moulded case circuit-breakers shall be available in the three-pole and four-pole version both in the fixed, and in any possible plug-in or withdrawable versions.

11.3.7. Circuit-breakers in the plug-in version starting from 250 A shall be available. In the case of a plug-in or withdrawable version, the presence of a device shall prevent racking-in or racking-out with the apparatus closed.

11.3.8. In the withdrawable version, racking-out with the door closed shall be possible.

11.3.9. The same depth and installation on a DIN EN 50022 rail shall be guaranteed up to the rated setting of 250 A inclusive. The same deph shall be guaranteed. This characteristic shall allow the switchboard and their support structures to be standardized.

11.3.10. Moulded case circuit-breakers with rated uninterrupted current up to 250 A shall have a 45 mm high face which makes them suitable for installation on modular panels.

11.3.11. All the installation positions shall be possible without jeopardizing the function of the apparatus. Starting from 630 A up to 1600 A the withdrawable version shall be mounted and operated horizontally.

11.3.12. For the front parts of the circuit-breakers the degree of protection of at least IP20 (excluding the terminals) shall be guaranteed, IP30 when they are installed in switchboards, and up to IP54 for circuit-breakers installed in a switchboard fitted with transmitted rotary handle and special accessory.

11.4. Protection Trip Units

11.4.1. Moulded case circuit-breakers shall be equipped with interchangeable trip units. From 160 A up to 800 A it shall be possible to choose between a thermomagnetic and an electronic protection. For the sizes higher than 800 A, the trip unit shall only be electronic. The trip unit shall be integrated in the volume of the apparatus.

11.4.2. From the 250 A size circuit-breakers, the trip unit shall be interchangeable. Trip units shall be adjustable and it shall be possible to fit lead seals to prevent unauthorised access to the settings

11.5. Thermomagnetic Overcurrent Trip Units

11.5.1. Thermomagnetic trip units shall be fitted with protection threshold against overload (whose thermal element shall consist of a bimetal) and with protection threshold against short circuit.

11.5.2. The protection threshold against overload shall be continuously adjustable starting from 0.7 times the rated current of the trip unit and up to its rated value.

11.5.3. The reference temperature for setting the thermal element of the protection trip unit is 40°C.

11.5.4. The temperature performance of the trip unit shall be indicated as the temperature varies.

11.5.5. The protection threshold against short-circuit shall be either the fixed or adjustable type with continuity from 5 and up to 10 times the rated current of the trip unit. In the four-pole version, the neutral pole shall always be protected. For current values equal to or higher than 125 A, protection of the neutral pole shall, at choice, be at 100% or at 50% of the rated current of the trip unit. Vice versa, for current values of less than 125 A, protection of the neutral pole shall always be 100%.

11.5.6. For circuit-breakers with rated uninterrupted current of 160 A, 250 A, 400 A and 500A, a thermomagnetic trip unit shall be available for generator protection with adjustable thermal threshold, starting from 0.7 x In, and fixed magnetic threshold at 3 x In or adjustable magnetic threshold from 2.5 to 5 x In. Suitability for use in direct current.

11.6. Magnetic only overcurrent trip units

11.6.1. The overcurrent trip units with magnetic only threshold shall be suitable for protection against short-circuit.

11.6.2. The adjustable magnetic only trip units (suitable for motor protection) shall only be available in the three-pole version, whereas those with fixed threshold shall also be available in the four-pole version.

11.6.3. The adjustable magnetic only trip units shall be available for circuit-breakers up to 320 A. Suitability for use in direct current.

11.7. Electronic Overcurrent Release Trip Units

11.7.1. The electronic overcurrent trip units shall be self-supplied and shall be able to guarantee correct operation of the protection functions even in the presence of a single phase supplied with a current value equal to 20% of the phase current. They shall be unaffected by electromagnetic interference in compliance with the EMC directive on the matter.

11.7.2. The basic version shall be fitted with protection functions against overload (function L) and against short-circuit. The latter function can either be of the instantaneous type (function I) or, alternatively, with intentional delay selective short circuit protection (function S). The function of protection against short circuit shall be excludable.

11.7.3. A basic version shall also be provided with only the protection threshold against instantaneous short-circuit which cannot be excluded.

11.7.4. The complete version shall be fitted with protection threshold against overload (function L), against instantaneous short-circuit (function I) and with intentional delay (function S) and also with protection threshold against earth fault (function G). All the protection functions except for protection against overload shall be excludable.

11.7.5. The advanced version shall be suited for zone selectivity protection for the S and G protection functions. An integrated ammeter and many other additional features are provided over and above the protection functions. All the protection functions except for protection against overload shall be excludable.

11.7.6. The advanced version shall be suited for zone selectivity protection for the S and G protection

functions. An integrated ammeter and many other additional features are provided over and above the protection functions. All the protection functions except for protection against overload shall be excludable.

11.7.7. A version dedicated to ultra rapid short-circuit protection (with a detection time less than 5 ms) combined with zone selectivity shall be available.

11.7.8. An advanced version dedicated to motor protection shall be available with protection functions against overload (function L), against instantaneous short circuit (function I), against unbalanced or missing phase (function U) and against rotor block (function R).

11.7.9. A version dedicated to generator protection shall be available (up to 160A), with protection functions against overload (function L), against instantaneous short circuit (function I) and with intentional delay (function S). The S and I protection functions are not an alternative to each other. All these functions are imposed by the major naval registers.

11.7.10. All the advanced trip units shall be available with thermal memory.

11.7.11. All the protection functions shall be characterized by threshold and time tolerances according to the International Standards.

11.7.12. The trip unit shall allow parameterization of the trip thresholds and timing locally or remotely; in the case of any anomalies in remote parameterization, the protection shall automatically use the series of parameters set manually on the front of the circuit breaker.

11.7.13. On the advanced version, access to information and programming shall be allowed by a keyboard and graphic liquid crystal display.

11.7.14. Alarm signals for the protection functions will be available by means of LEDs located on the trip unit (complete version) and/or on the display (advanced version).

11.7.15. The size of the current sensors shall be a minimum of 10 A to a maximum of 3200 A so as to cover the widest possible current range.

11.7.16. Interchangeable rating-plugs shall be available starting from 400 A.

11.7.17. The four-pole circuit-breaker shall always be supplied with the neutral protected at 100% up to 125A excluded, and for higher values with protection selected between 50% and 100% of the rated current of the trip unit. Starting from 630A setting of the neutral at 150% and 200% shall be possible.

11.7.18. The current sensors for external neutral shall be optional.

11.7.19. Moulded Case Circuit breakers equipped with electronic releases shall be available a dedicated function to verify the correct connection between the trip unit, current sensor and trip coil. Eventual anomalies shall be signalled by a red led flashing.

11.8. Accessories for electronic trip units shall be available, such as the test unit for checking functioning of the tripping coil of the electronic trip unit, a trip signalling unit of the protections, a test and configuration unit which allows the electronic trip unit protections to be tested and configured, an actuation unit which allows circuit-breaker opening and closing by means of a motor operator

mounted on it, a battery unit which allows trip unit testing when the circuit-breaker and an external unit for wireless communication.

11.8.1. For both the complete and the advanced version a measurement module shall be available, in order to gauge the plant functioning parameters, such as phase and phase to phase voltages, powers and energies. On the advanced version all the available measurements can be displayed on the LCD. Furthermore, for the electronic trip units for motor protection, there shall also be a contactor control unit available.

11.8.2. The advanced version will be provided with a data logger function that automatically records and stores the instantaneous values of all the currents and voltages. Data shall be easily downloaded to any personal computer for elaboration. The data logger function freezes the recording whenever a trip occurs, so that a detailed analysis of faults can be easily performed. The sampling rate shall be adjustable up to 4800Hz, with total sampling time up to 27 s (@ 600Hz sampling rate). Tracking of up to 64 events shall be possible.

11.9. Protections

The minimum performances of the protection functions of the electronic protection trip unit for distribution, where present, shall be:

11.9.1. Function L:adjustable trip threshold I1= (0.4-1) x In, trip curves for the basic version with time settings from 3 to 12 seconds – 2 different trip curves - (at 6 times the set threshold), whereas for the advanced version with time settings from 3 to 18 seconds – 4 different trip curves - (at 6 times the set threshold). For the advanced version, L function according to IEC 60255-3 shall be available. *Cannot be excluded.*

11.9.2. Function S: adjustable trip threshold I2= (1-10) x In, trip curves for the basic version with time settings from 0.1 to 0.25 seconds – 2 different trip curves – (at 8 times the rated current of the trip unit), whereas for the advanced version with time settings from 0.05 to 0.5 seconds – 4 different trip curves with inverse short time with definite time characteristic or curves with definite time – (at 6 times the rated current of the trip unit). For circuit breakers from 250 A to 630 A, in the advanced version, I2= (0.6-10)x In. *Can be excluded.*

11.9.3. Function I: adjustable trip threshold I3= (1-10) x In for the basic version (instantaneous trip), whereas for the advanced version I3= (1.5-15) x In (instantaneous trip). *Can be excluded.*

11.9.4. Function G: adjustable trip threshold I4= (0.2-1) x In with trip time settings from 0.1 to 0.8 s with curve with inverse short time and definite time characteristic. *Can be excluded.*

11.9.5. Function U: adjustable trip threshold I6= (2%…90%) x I1 with trip time settings from 0.5 to 60 s with curve with inverse short time and definite time characteristic. *Can be excluded.*

11.9.6. Function OT: fixed at 85 °C (with instantaneous trip). *Can be excluded.*

11.9.7. Function UV: adjustable trip threshold U8= (0.5-0.95) x Un with trip time settings from 0.1 to 5 s with curve with inverse short time and definite time characteristic. *Can be excluded.*

11.9.8. Function OV: adjustable trip threshold U9= (1.05-1.2) x Un with trip time settings from 0.1 to 5 s with curve with inverse short time and definite time characteristic. *Can be excluded.*

11.9.9. Function RV: adjustable trip threshold U10= (0.1-0.4) x Un with trip time settings from 0.5 to 30 s with curve with inverse short time and definite time characteristic. *Can be excluded.*

11.9.10. Function RP: adjustable trip threshold P11= (-0.3…-0.1) x Pn with trip time settings from 0.5 to 25 s with curve with inverse short time and definite time characteristic. *Can be excluded.*

11.9.11. Function UF: adjustable trip threshold f12= (0.9-0,99) x fn with trip time settings from 0.5 to 3sec with curve with inverse short time and definite time characteristic. *Can be excluded.*

11.9.12. Function OF: adjustable trip threshold f13= (1.01-1.10) x fn with trip time settings from 0.5 to 3 s with curve with inverse short time and definite time characteristic. *Can be excluded.*

11.9.13. The minimum performances of the protection functions of the electronic protection trip unit for motor protection shall be:

- Function L: adjustable trip threshold I1= (0.4-1) x In, trip curves in class 10A, 10, 20 and 30 or 3E, 5E, 10E e 20E in compliance with the IEC 60947-4-1 Standard, with temperature compensation and sensitivity to missing/unbalanced phase. *Cannot be excluded.*

- Function R: adjustable trip threshold I5= (3-10) x I1 + OFF, with 4 different trip curves with definite time with time settings t5= 1...10 s. Automatic exclusion of the function during the motor starting phase, and automatically reactivated after this. *Can be excluded.*

- Function I: adjustable trip threshold I3= (6-13) x In (instantaneous trip) with recognition of the motor starting phase.

- Function U: adjustable trip threshold I6= (0.4-0,9) x I1 e t6= 4 s. *Can be excluded.*

- Possibility of contactor control for trip of functions L and R.

- Possibility of connection to a PTC (temperature probe) inserted in the motor.

11.10. Dialogue

For circuit-breakers from 250 A to 1600 A dialogue shall be available, making the following functions possible:

11.10.1. Remote setting of the protection function parameters, unit configuration and communication.

11.10.2. Transmission of measurements, states and alarms from circuit-breaker to system transmission of events to the system.

11.10.3. Dialogue units able to support different standard market protocols shall be available:

11.10.3.1. Modbus RTU protocol, EIA RS485 physical transmission means, speed 9.6...19,2 Kbit/s, bus architecture.

11.10.3.2. Profibus DP protocol, RS485 physical transmission, speed 9.6...19,2 Kbit/s, bus architecture.

11.10.3.3. Device Net protocol, RS485 physical transmission, speed 9.6...19,2 Kbit/s, bus architecture. Wireless bluetooth protocol.

11.10.3.4. The dialogue unit shall make all the parameterization and measurement information of the protection unit available on the field bus, as well as the state of the circuit-breaker (open/closed, racked-in/racked-out) and of the related trip units. Shall be providing a tool able to analyse all these data by PC.

11.11. Accessories

11.11.1. Electrical Accessories

11.11.1.1. Internal Accessories has to be the same up to 250A as well from 250A to 1000A.

11.11.1.2. Auxiliary contacts: these shall allow the state of the circuit-breaker (open or closed; contact on change-over) and trip unit to be known. Auxiliary contacts for use at 250 V AC/DC, 400V AC and 24 V DC (digital contacts) shall be available.

11.11.1.3. Releases: the shunt opening and under-voltage releases shall be available with different power supply voltages both in AC and DC.

11.11.1.4. With circuit-breakers up to 250 A the electrical accessories shall be available both in the pre- cabled version and with 1m long un-cabled cables.

11.11.1.5. The addition of the electrical accessories shall not increase the volume of the circuit breakers.

11.11.2. Mechanical Accessories

11.11.2.1. Terminals: different types of terminals (both front and rear) shall be available for all the sizes, suitable for connection with copper, copper-aluminium cable and bus bar connections.

11.11.2.2. Up to the 160 A size, the circuit-breakers can be fitted with different types of terminals combined in different ways (higher of one type, lower of a different type). Terminal covers and phase separators shall also be available.

11.11.2.3. Multi-cable terminals shall be available for circuit-breakers for the 250-320-400-630 A size. Support for fixing onto DIN rail: supports for fixing onto DIN EN 50022 rail shall be available up to the rated current of 250 A inclusive.

11.11.2.4. Mechanical interlocks: mechanical interlocks shall be available for the whole series of circuit-breakers; the interlock can be of the front type for circuit-breakers with rated

current up to 250 A. It shall be possible to interlock circuit-breakers of different sizes at least up to 250 A and between 250A and 630 A.

11.11.2.5. Rotary handle: a rotary handle operating mechanism both in the direct and transmitted version shall be available for the whole range of circuit-breakers, both padlockable in the open position and fitted, on request, with the following accessories: early contact for under-voltage release, compartment door lock and key lock in open position.

11.11.2.6. The whole range of moulded case circuit-breakers shall be fitted with motor operator (according to the rated current of the circuit-breaker, this can either be of the solenoid type, or with stored energy) for remote operation of the circuit-breaker.

11.12. Residual Current Release

11.12.1. General Aspects

11.12.1.1. The residual current releases used in low voltage installations shall be designed, constructed and tested in compliance with the International Standards and in particular with:

11.12.1.1.1. IEC 60947-2 appendix B and ANNEX M

11.12.1.1.2. IEC 60255-4 and IEC 61000: for protection against unwarranted trips

11.12.1.1.3. IEC 60755 for insensitivity to the continuous current components

11.12.1.2. It shall be possible to install the residual current releases in installations with line-to line voltage up to 690 V.

11.12.1.3. They shall be able to be used in close connection with circuit-breakers and/or switch disconnectors.

11.12.1.4. Shall be guaranteed the normal operating up to -25°C

11.13. Construction Characteristics

11.13.1. It shall be possible to combine the range of residual current releases with all the circuit breakers making up the range of moulded case circuit-breakers so as to cover the whole current range of MCCBs.

11.13.2. It shall be possible to combine the residual current releases with circuit-breakers in fixed, plug-in and withdrawable version.

11.13.3. Their installation on a DIN rail shall be possible.

11.13.4. Control of correct operation shall be possible according to the prescriptions of the reference Standards, by means of a test pushbutton on the front of the apparatus.

11.13.5. Residual current releases shall be available both in the three-pole up to 250A and in the four-pole version.

11.13.6. Dedicated residual current releases shall be available up to 1600 A

11.13.7. Type B residual current protection shall be available

11.13.8. It shall be possible to select the maximum threshold of sensitivity to the residual current fault frequency (3 steps: 400 700 1000 Hz).

11.14. Electrical Characteristics and Performances

11.14.1. Up to the rated current of 250 A, the service voltage shall be between 85 and 500 V AC line-to-line (operation up to 50 V phase-neutral). Trip thresholds Idn starting from 0.03A and up to 10 A shall also be available for the advanced version which shall also allow selection of the trip times (for the basic version, the trip shall be of the instantaneous type).

11.14.2. A contact signalling pre-alarm shall be available in the advanced version and the availability of an input for remote opening.

11.14.3. There shall be type A versions for alternating pulsed current, S selective and E for emergency stop of the residual current release.

11.14.4. The release shall be self-supplied and the power supply can come either from above or below.

11.14.5. Compliance with the International Standards on the matter of electromagnetic compatibility.

11.14.6. There shall be a switchboard residual current unit with voltage varying between 80 and 500 V AC and between 48 and 125 V DC. There shall be availability of several adjustment ranges from 0.03 to 30 A, with trip times from instantaneous to 5 s and pre-alarm threshold adjustment.

11.14.7. The toroidal transformers can either be closed (from 60 to 180 mm in diameter) or open (from 110 to 230 mm in diameter).

12. MINIATURE CIRCUIT BREAKERS SHALL CONFORM TO THE FOLLOWING CHARACTISTICS.

12.1. Functional Characteristics (1 to 63 Amps)

12.1.1. Miniature Circuit Breaker for cable protection according to:
DIN VDE 0641 Teil 11,
EN 60898, IEC 60947-2, EN 60947-2,
UL1077/C22.2 No.235, UL489/C22.2 No.5

12.1.2. Rated short-circuit capacity Icn shall be: 6/10/25 kA unless otherwise indicated.

12.2. Tripping Characteristics/curves shall be as follows

B: In 6/10/13/16/20/25/32/40/50/63 A
C: In 0,5/1/1,6/2/3/4/6/8/10/13/16/20/25/32/40/50/63 A
K: In 0,2/0,5/1/1,6/2/3/4/6/8/10/13/16/20/25/32/40/50/63 A
Z: In 0,5/1/1,6/2/3/4/6/8/10/16/20/25/32/40/50/63 A
Number of poles: 1/2/3/4/1+NA/3+NA
Energy Limiting Class: 3
Rated Voltage Un:
Single-pole: 230/400 VAC
Multi-pole: 400VAC
Max. Operating Voltage UBmax DC:
Single Pole: 72 VDC

Double Pole: 125 VDC
Suitable for isolation acc. IEC 60898-1

12.3. Environmental Characteristics

12.3.1. Operating temperature: -25 °C...+70 °C and storage temperature: -40 °C...+70 °C.

12.3.2. Altitude: operation without derating up to 2000 m (6600 ft), and with derating up to 4000 m.

12.3.3. Suitability for use in a hot-humid environment. With regard to this, the circuit-breakers shall undergo a tropicalisation process which makes them suitable for use in a hot humid environment, as established by the prescriptions of the main shipping registers and in accordance with the international IEC 60068-2-30 Standards.

12.4. Construction Characteristics

12.4.1. Guide edge for labels

12.4.2. Prepared for locking devices

12.4.3. Quick and easy removal of installed device

12.5. Wiring

12.5.1. *Busbars*: Terminals for in and out coming feeder on top of busbars. The MCB shall have a "safe terminal". Each pole shall have 2 connection points. Combining busbar and wire in same terminal shall not be permitted. Combining wire of un-equal sizes in the same terminal shall not be permitted.

12.6. Accessories

12.6.1. Retrofit accessories (extract):

- Universal signal contact/auxiliary contact (right): 1SO
- Auxiliary contact (right): 1SO
- Auxiliary contact (left): 1NO/1NC, 2NO or 2NC
- Bottom-fitting auxiliary contact: 1NO or 1NC
- (bottom fitted without increasing width of MCB)
- Undervoltage- or Shunt trip release
- Hand operated neutral
- Motor operating device (remote control)
- DDA-Block
- Labelling system (marked or blank)
- Locking devices

12.7. Functional Characteristics (80 to 100 Amps)

12.7.1. Miniature Circuit Breaker for cable protection according to:
DIN VDE 0641 Teil 11, DIN VDE 0660 Teil 101, IEC 60898, EN 60898, IEC 60947-2, EN 60947-2

12.7.2. Rated short-circuit capacity shall be minimum: 6 kA unless otherwise stated.

12.8. Tripping Characteristics

12.8.1. B mit In 80/100 A

C mit In 80/100 A
Number of poles: 1/2/3/4
Energy Limiting Class: 3
Rated Voltage:
Single-pole: 230 VAC and 60 VDC
Single-pole: 400 VAC and 125 VDC
Suitable for isolation acc.: IEC 60947-1/-3

12.9. General Features

12.9.1. Label holder

12.9.2. Prepared to get equipped with toggle-locking device

12.10. Wiring

12.10.1. *Busbars*: Terminals for in and out coming feeder on top of busbars.The MCB shall have a "safe terminal". Each pole shall have 2 connection points. Combining busbar and wire in same terminal shall not be permitted. Combining wire of un-equal sizes in the same terminal shall not be permitted.

12.11. Accessories

12.11.1. Auxiliary contact: 2 or 3 contacts (screw-able or push-in-able)

12.11.2. Auxiliary contact (low power): 1 or 3 contacts

12.11.3. Signal contact or signal contact/auxiliary contact: 3 contacts

12.11.4. Undervoltage release or shunt trip

12.11.5. Neutral conductor

12.11.6. Printed labels

12.11.7. Labels for individual printing

12.11.8. Locking devices

12.12. Functional Characteristics (DC Protection)

12.12.1. Miniature Circuit Breaker for cable protection according to: DIN VDE 0641 Teil 12, DIN VDE 0660 Teil 101, IEC 60898, EN 60898, IEC 60947-2, EN 60947-2, UL1077

12.12.2. Rated short-circuit capacity: 4,5/6 kA

12.13. Tripping characteristics shall conform to the following

B: In 6/10/16/20/25 A
K: In 0,2/0,3/0,5/0,75/1/1,6/2/3/4/6/8/10/16/20/25/32/40/50/63 A
In 0,5/1/1,6/2/3/4/6/8/10/16/20/25/32/40/50/63A
Number of poles : 1/2/3/4 (K,Z); 1/2 (B)

Rated Voltage:
Single-pole: 230/400 VAC and 220 VDC
Multi-pole: 400 VAC and 440 VDC
Suitable for isolation acc: IEC 60947-1/-3

12.14. General Features

12.14.1. Label holder

12.14.2. Prepared to get equipped with toggle-locking device

12.15. Wiring

12.15.1. *Busbars*: Terminals for in and out coming feeder on top of busbars. The MCB shall have a "safe terminal". Each pole shall have 2 connection points. Combining busbar and wire in same terminal shall not be permitted. Combining wire of un-equal sizes in the same terminal shall not be permitted.

12.16. Accessories

12.16.1. Auxiliary contact: 2 or 3 contacts shall be (screw-able or push-in-able)

12.16.2. Auxiliary contact (low power): 1 or 3 contacts

12.16.3. Signal contact or signal contact/auxiliary contact: 3 contacts

12.16.4. Undervoltage release or shunt trip

12.16.5. Neutral conductor

12.16.6. Printed labels

12.16.7. Labels for individual printing

12.16.8. Locking devices

13. CONTACTORS

13.1. Contactors shall comply with SANS 60947. Duty cycle shall be AC3. Contactor coil voltage may be either 230V or 400V unless otherwise stated.

13.2. Lighting contactors for 24 to 63 Amps (AC1) shall be DIN mounted on the same rail as the MCBs and feature a DC solenoid actuator and are thus hum-free. They shall have a switching position indicator, integrated coil protection circuits and overvoltage protection for the solenoid coil up to 5kV.

13.3. Contactors from 9 to 38 Amps shall be electronic coils.

13.4. For contactors from 50 to 300 Amps, standard coils will be accepted.

13.5. Contactors from 400 to 2050 Amps shall be electronic coils.

13.6. Mixture of contactors shall not be permitted.

13.7. Ambient characteristics

13.7.1. Climatic withstand according to IEC60068-2-0 AND 60068-2-11

13.8. Construction characteristics

13.8.1. Contactors with electronic coils 9 to 38 Amps AC3 shall have:

13.8.1.1. Maximum of two frame sizes from 9 to 16 amps AC3

13.8.1.2. Width not to exceed 45mm for contactors 9 to 38 amps AC3 rating

13.8.1.3. Contactor up to 16 amps to include built in auxiliary contact

13.8.1.4. Common auxiliaries for contactors 9 to 38 amps AC3

13.8.2. Contactors 9 to 110 Amps with standard coil shall have:

13.8.2.1. Mounting positions: only position 6 not permitted (see appendix 1)

13.8.2.2. Maximum of 4 frame sizes from 9 to 110 amps

13.8.2.3. Quick fixing on mounting rail according to IEC 60715 standards as:-

- 35 x 7.5 mm for 9 to 40 amps contactors
- 35 x 15 mm for 9 to 75 amps contactors
- 75 x 25 mm for 50 to 110 amps contactors
- Terminal with captive screws
- Terminal screws to be of Pozidriv type up to 75 amps AC3
- Terminal screws to be M8 Hexagon socket for main terminals and Pozidriv for coil terminals

13.8.3. Contactors 145 to 750 Amps AC3 with Standard or Electronic Coil shall have:

13.8.3.1. Maximum of 4 frame sizes from 145 amp to 750 amp

13.8.3.2. Mechanical design to incorporate power terminal at base of contactor, operating coil to be mounted on top of contactor. Coil removal to side of contactor shall not be permitted.

13.8.3.3. Shall have front access to coil , with no need to remove the power cables when changing coils

13.8.3.4. Shall have front access to main fixed and moving contacts , without the need to remove the power cables

13.8.3.5. Removal and replacement of the fixed and moving contacts shall be able to be accomplished without the need to remove the power cables

13.8.3.6. Contactor shall have quick release quarter turn screws for easy access to main contact inspection

13.8.3.7. Clear marking of contactor electrical information, marking to be clearly visible on front of contactor

13.8.3.8. Electrical characteristics and performances

13.8.3.8.1. All Contactors shall be electrically coordinated with upstream protection device, whether device or the fuse type, MCCB, or manual motor starter. All coordination to be backed up by Manufactures coordination tables, available on request.

13.8.4. Contactors with electronic coils 9 to 38 Amps AC3

13.8.4.1. Same coil to cover both the AC or DC control supplies

13.8.4.2. Coil to be of torroidal design

13.8.4.3. Coil to have extended voltage operating limits.

13.8.4.4. 4 coil types only covering: 24..500 V 50/60Hz and 20..500 V DC

13.8.4.5. Coil Consumption not to exceed the following limits

13.8.4.6. On pull in 50VA

13.8.4.7. On holding 2.2VA

13.8.4.8. Built-in surge protection to be incorporated

13.8.4.9. Flexible position of Coil terminals i.e. can be transferred from the top to the bottom of contactor

13.8.4.10. With additional coil terminal block, it shall be possible to connect the coil both at the top and at the bottom.

13.8.5. Contactors with standard AC coil 50 to 30 Amps AC3 shall have:

13.8.5.1. Rated operational voltage 690V for contactors up to 40 amp AC3

13.8.5.2. Rated operational voltage 1000V for contactors 50 to 750 amps AC3.

13.8.5.3. Rated making capacity to be equal to 10 x AC3 rated operational current, or greater.

13.8.5.4. Rated breaking capacity to be equal to 8 x AC3 rated operational current, or greater.

13.8.5.5. Coil operating limits (according to IEC60947-4-1) 0.85 ….1.1 x rated Control circuit voltage, at temperature less or equal to 55degrees Celsius

13.8.5.6. Drop out voltage in %age of rated Control Voltage approximately 40 to 65%

13.8.5.7. Contactors 400 amp AC3 upward to incorporate electronic coil technology

13.8.6. Contactors with electronic coils 400 to 750 Amps AC3 shall have:

13.8.6.1. As above but to include the following

13.8.6.2. Same coil to cover both the AC or DC control supplies

13.8.6.3. Coil to have extended voltage operating limits.

13.8.6.4. Can withstand voltage interruptions or voltage dips in control supply up to 20ms.

13.8.6.5. Distinct opening and closing voltages as follows

13.8.6.6. Opening 0.55 x min operating voltage

13.8.6.7. Closing 0.85 x min operating voltage

13.8.6.8. Coil types only covering: 24..500 V 50/60Hz and 20..500 V DC

13.9. Accessories

13.9.1. All auxiliary contacts shall employ the “wipe action” mechanism for the self cleaning of the contact tips.

13.9.2. Front mounted auxiliary contact blocks rated insulation voltage equal to 690V a.c or greater

13.9.3. Rated operation voltage 24…690VAC

13.9.4. Rated making capacity 10 x AC-15 rated operational current

13.9.5. Rated breaking capacity 10 x AC-15 rated operational current

13.9.6. Rated short time withstand current 100amps for 1sec:, 140 amps for 0.1 sec

13.9.7. Electrical durability, max electrical switching frequency 1200 cycles per hour or greater

13.10. Side Mount Auxiliary Contact Blocks shall have:

13.10.1. Rated insulation voltage equal to 690V a.c or greater

13.10.2. Rated operation voltage 24…690V a.c

13.10.3. Rated making capacity 10 x AC-15 rated operational current

13.10.4. Rated breaking capacity 10 x AC-15 rated operational current

13.10.5. Rated short time withstand current 100amps for 1sec:, 140 amps for 0.1 sec

13.10.6. Electrical durability, max electrical switching 1200 cycles per hour or greater.

14. LIGHTNING AND SURGE PROTECTION

14.1. Main Distribution Board

14.1.1. According to the IEC 62305 recommendations, electrical installations shall be protected against direct lightning and surge impulses with din rail Class 1/Type 1 (10/350µs) lightning current arresters.

14.1.2. SPD shall use a triggered spark gap technology to allow high lightning discharge current, unpluggable type to avoid ejection of the cartridge during the discharge of the current and non-blow out technology to avoid fire risks.

14.1.3. The SPD shall provide either common protection in TNC network or common and differential mode protection in TT and TNS network according to the IEC60364 recommendations.

14.1.4. Lightning arresters shall have the following technical specifications:

14.1.4.1. Class of test (IEC 61643-1) I

14.1.4.2. Lightning impulse current: Iimp/pole (10/350µs) ≥ 25kA

14.1.4.3. Nominal voltage Un 230 / 400V

14.1.4.4. Maximum continuous AC voltage Uc 255V

14.1.4.5. Follow current extinguishing capability Ifi ≥ 50kA

14.1.4.6. Protection level Up : 2.5kV

14.1.4.7. Max. back up fuse gG/gL: 125A

14.1.4.8. Visual state indicator: Yes

14.2. Sub-Main Distribution Board

14.2.1. According to the IEC 62305 recommendations to avoid oscillations and magnetic coupling phenomenon, sensible equipments shall be protected against indirect surges with din rail Class 2 / Type 2 (8/20µs) surge arresters.

14.2.2. The SPD shall have a safety reserve system and shall be pluggable for preventive and easy maintenance. The SPD shall provide either common protection in TNC network or common and differential mode protection in TNS and TT network according to the IEC 60 364 recommendations.

14.2.3. In case of common and differential mode protection the SPD shall use an association of MOV and GDT to provide isolation to the ground and low protection level in all protection modes. The associated switching element

14.2.4. (MCB/Fuse) (to insure a safe end of life) shall be the same brand as the SPD to insure a good coordination.

14.2.5. Surge arresters technical specifications:

14.2.5.1. Class of test (IEC 61643-1) II

14.2.5.2. Max. discharge current: Imax/pole (8/20µs) ≥ 40kA

14.2.5.3. Nominal current In / pole ≥ 20kA

14.2.5.4. Nominal voltage Un 230 / 400V

14.2.5.5. Maximum continuous AC voltage Uc 275 / 255V

14.2.5.6. Protection level Up at 20kA ≤ 1.5 kV

14.2.5.7. Protection level Up at 3kA (Class 3 test)

14.2.5.8. Pluggable :Yes

14.2.5.9. Visual status indicator: Yes

14.2.5.10. Safety reserve: Yes

14.2.5.11. Remote indicator :Yes

14.3. Data line / Telecom line

14.3.1. The selection of the surge protection device shall be according the IEC 62305 recommendations and therefore shall be a type C2 SPD.

14.3.2. The SPD shall be pluggable type for easy maintenance and shall provide the dialling tone returns when the cartridge is withdrawn in case of end of life.

14.3.3. The cartridges, whatever the nominal voltage, shall be adaptable onto different base. The base shall be chosen according to the connection of the wire: it can be RJ11, RJ45 or screw connection. The connections to the earth shall be either by a DIN rail contact or by a screw terminal.

14.3.4. The SPD dimension shall not exceed 12.5 mm wide to save space. The SPD shall use two level of protection: the first one by GDT, the second one by zener diode. These two levels shall be coordinated and shall provide common and differential mode protection.

14.3.5. Low current surge arresters technical specifications:

14.3.5.1. Class of test (IEC 61643-21): C2

14.3.5.2. Nominal voltage Un According to the Max.voltage of signal

14.3.5.3. Maximum continuous AC voltage Uc (L-N / N-G): According to the Max. voltage of signal

14.3.5.4. Loading current: 140mA

14.3.5.5. Max. discharge current: Imax / line (8/20µs) ≥ 10kA

14.3.5.6. C2 Nominal discharge current In / line (8/20µs) ≥ 5kA

14.3.5.7. Protection level Up (L-L / L-G): According to the Max. voltage of signal

14.3.5.8. Pluggable: Yes

15. ANTI-CONDENSATION HEATERS

15.1. Anti-condensation 220 Volt heaters shall be provided for all compartments. A switch with thermostat shall be provided to control the heaters.

15.2. The wiring from the heater elements to terminals shall be high temperature insulation covered, a suitable compression type gland shall be fitted for the incoming 231V supply.

16. INDICATING INSTRUMENTS

16.1. A flush mounted, industrial grade, 96 mm square voltmeters and ammeter conforming to SABS 1299 shall be mounted near the centre top of the front panel and connected to measure the busbar voltage and current.

16.2. The calibrated scale length shall be a minimum of 70 mm. Means shall be provided for zero adjustment from the front without any dismantling of the indicating instrument.

16.3. A voltmeters selector switch with phase to phase, phase to neutral, and "off" position shall be provided.

16.4. An ammeter selector switch shall be provided with an "OFF" position.

16.5. Meters shall indicate by means of colours the relevant phase that it is metering.

17. CURRENT TRANSFORMERS

17.1. Current transformers shall comply with BS 3938.

18. MECHANICAL CABLE GLANDS

18.1. Cable glands shall be of the compression type, manufactured in brass and/or bronze, and suitable for termination of earth-continuity conductor type cables where applicable.

18.2. The gland body shall incorporate a knurled cone for clamping the armouring and an integrally cast earth lug, complete with earthing screw.

18.3. All metal portions of the gland shall be electroplated for corrosion resistance.

18.4. The glands shall be supplied complete with weatherproof neoprene shrouds.

18.5. Entries for multi-core PVC, PVC, wire armoured, PVC sheathed cables shall comprise cone grip mechanical type glands mounted on robust gland plates.

18.6. The board shall be supplied complete with all glands for all outgoing and incoming circuits as indicated on the drawing.

19. LIGHT SENSITIVE CONTROL UNIT

19.1. Light sensitive control units shall be supplied by others.

19.2. A suitably rated single pole over-riding switch, for over-riding the unit in 19.1, and moulded case circuit breaker shall be provided, when called for in the drawings or appendices hereto.

19.3. The switch and circuit breaker shall be wired to a suitable terminal strip, mounted within the distribution board, to facilitate connection of the light sensitive control unit when installed.

20. EARTHING

20.1. The components shall be effectively bonded to the main frame of the distribution board, which shall also be bonded to the main earth bar. Earthing shall comply with SANS-10142 code of practice for the wiring of premises.

21. CABLING AND WIRING

21.1. All cables and wires used shall be stranded, 600/1000 V grade and comply with SABS 150, except where special cables have been otherwise specified.

22. LABELS

22.1. Labels shall be provided comprising conspicuous engraved black lettering on white background secured with rivets or screws on or adjacent to the items concerned, and worded in English.

22.2. Labels of embossed tape or labels secured with adhesive are not acceptable.

22.3. All fuse-switches, circuit breakers, isolators, contactors, relays, etc., shall be clearly designated.

22.4. The terminals of all outgoing circuits shall be provided with labels to correspond with the labelling of the units on the panel of the distribution board.

22.5. All terminal connections shall be provided with durable tags or clips, on which shall be clearly and indelibly marked, the identifying code letters of each wire. Such code letters shall correspond to those used on the wiring diagram.

23. PAINTING

23.1. All surfaces of the distribution board shall be light orange to SABS 1091 colour No. B26. (Transnet orange; Pantone 165C / 021U; Coats 50/50; Vermilion MW52; RAL 2004 rein orange; Trichromatic 70% magenta, 90% yellow), unless otherwise specified.

23.2. All surfaces shall be cleaned according to the appropriate method described in SABS 064 for the particular surface to be cleaned, the contamination to be removed and the primer to be applied.

23.3. Blast cleaning of components shall be in accordance with clause 4.3 of SABS 064 to a degree of cleanliness of at least Sa2 for inland exposure components and Sa 1/2 for coastal exposure components. See Table 1 of SABS 064 for the appropriate profile.

23.4. Sheet metal that cannot be blast cleaned shall be cleaned by pickling according to clause 4.6 of SABS 064.

23.5. Components that shall be powder coated shall be cleaned and prepared by the surface conversion process according to clause 5 of SABS 064 to a medium-weight classification of table 2 of that specification.

23.6. Oil and accumulated dirt on steel components where no rusting is present shall be removed according to clause 3 of SABS 064.

23.7. The powder-coating process shall be in accordance with SANS 1242 - type 4 : Corrosion-resistant coatings for interior use and using the thermosetting type high gloss coating.

23.8. All specified coatings shall be applied according to the relevant specification and the manufacturer's instructions shall be followed.

23.9. Coatings shall not be applied under conditions that may be detrimental to the effectiveness of the coating or the appearance of the painted surface.

23.10. When examined visually the finished products shall have a uniform appearance as far as gloss is concerned and shall show no sign of damage. Damaged areas shall be repaired coat for coat to obtain the desired finish.

24. ADDITIONS AND MODIFICATIONS TO EXISTING DISTRIBUTION BOARDS

24.1. Where the contractor needs to make modifications or additions to existing distribution boards, the following minimum criteria shall be adhered to :

24.1.1. Re-labelling and proving of existing circuits in accordance with security of existing terminations to be confirmed

24.1.2. Isolation barriers, cover blanks to be in place where required

24.1.3. Panel modification in terms of architraves, DB covers, and the closing of redundant openings to be undertaken by an accredited switchboard manufacturer.

24.1.4. Wiring to be examined for integrity correct sizing and tidied and/or replaced and neatened as required.

24.1.5. A certificate of compliance shall be issued for the full distribution board and not the additions only.

25. INSPECTION

25.1. Transnet reserves the right to carry out inspection of any items of equipment and work at any time during the manufacture at manufacturer's works and to be present at any tests.

25.2. A final inspection by Transnet before delivery to site is required.

26. TESTS

26.1. All prescribed tests as referred to in the standard specifications may be called for at the discretion of Transnet.

26.2. Transnet also reserves the right to carry out any check tests on the equipment.

26.3. Notwithstanding the successful completion of tests, the tenderer shall still be responsible for the efficient operation of the equipment.

26.4. The tenderer shall bear all costs for any tests, which shall be required.

27. GUARANTEE

27.1. The Contractor shall undertake to repair all faults due to bad workmanship and / or faulty materials and to replace all defective apparatus or materials during a period of twelve (12) calendar months, calculated from the date of delivery.

27.2. Any defects that may become apparent during the guarantee period shall be rectified to the

satisfaction of, and free of cost.

27.3. The Contractor shall undertake work on the rectification of any defects that may arise during the guarantee period within 7 days of his being notified by Transnet of such defects.

27.4. Should the Contractor fail to comply with the requirements stipulated above, Transnet will be entitled to undertake the necessary repair work or effect replacement of defective apparatus or materials, and the Contractor shall reimburse Transnet the total cost of such repair or replacements, including the labour costs incurred in replacing defective material.

28. SPARES

28.1. The tenderer shall state whether a complete range of spares is held in stock by their local representatives for subsequent purchase by Transnet as and when required.

WITNESSES

1. …….. ……
TENDERER

2. …… ……
DATE

Transnet Port Terminals
Design Services

Annexure B - TPD-003-CABLESPEC - Technical specification for medium and low voltage cables

SPECIFICATION FOR THE SUPPLY AND INSTALLATION OF MEDIUM VOLTAGE AND LOW VOLTAGE ELECTRICAL CABLES

REVISIONS		
REV	DATE	APPROVED
0	September 2022	

INDEX

1.1 SCOPE OF WORK

The scope of this specification covers the minimum requirements for the supply installation, testing and commissioning of medium and low voltage cables, instrumentation cables, cable racking, trenching, sleeves and earthing reticulation on Transnet sites on behalf of Transnet.

Contractors are required to familiarise themselves with all applicable Standards and Codes of Practice listed herein, and to ensure compliance in the execution of any work in terms of this document. Failure to comply may render the contractor liable for corrections at his own cost.

These Standards and Codes of Practice should be read in conjunction with all other Specifications and drawings as issued for a particular contract. Where discrepancies occur, these must be brought to the attention of Transnet in writing before commencement of work. In the event of any conflict between the contents of any documents forming part of a contract (as listed in the Master Index) and this document, the former shall prevail.

1.2 APPLICATION TO WORK ACTIVITIES

The Standards and Codes of Practice contained herein apply to all installations requiring Medium and Low voltage Electrical and Instrument Cabling, Racking, Trenching Sleeves and Earthing Reticulation and include amongst others the following standards:

- Supply of electrical and instrument cable trenches
- Supply, installation of electrical and instrument ladder racking reticulation
- Supply, installation of electrical and instrument dropper reticulation
- Supply, installation and termination of electrical and instrument cabling
- Cable Tagging and Core Identing standards for electrical and instrument cabling
- Supply, installation of instrument and electrical earthing

2. STANDARDS AND REFERENCES

2.1 The requirements of the materials, design, layout, fabrication, assembly, erection, examination, inspection and testing of equipment and facilities on site shall be in accordance with the relevant sections of codes: -

a)	SANS 10142-1	-	Code of Practice for the Wiring of Premises
b)	SABS 763	-	Hot dip (galvanising) Zinc Coating.
c)	SABS 1507	-	Electric cables with extruded solid dielectric Insulation for fixed installation.
d)	SANS 1574		
e)	ASME/ANSI.B31.3	-	Chemical Plant and Petroleum Refinery piping
f)	ASME/ANSI.B31.4	-	Liquid Transportation Systems for Hydrocarbons, Liquid Petroleum Gas, Anhydrous Ammonia and Alcohols.
g)	SABS 089:Part II-1965	-	The Petroleum Industry Part II: Electrical Code

h)	SABS 089 - Part II	-	The Handling, Storage and Distribution of Petroleum Products (Electrical Code)
i)	SABS 0198	-	"The Selection, Handling and Installation of Electric Power Cables of rating not exceeding 33KV"
j)	API 2003	-	Protection against ignitions arising out of static, Lighting and stray currents.
k)	SABS 03	-	The Protection of structures against lightning.
l)	SABS 086	-	The Installation and Maintenance of Electrical Equipment used in explosive atmospheres. Refer to Section 2 for Hazardous area classification.
m)	IEC 79-14	-	Electrical Installations in Hazardous Areas

n) Government, local authorities or other statutory bodies' regulations, laws, requirements or customs which are more stringent than those specified in this project specification.

2.2 The following standard specifications are to be used for reference purposes and need to be noted by Contractors in order to signify familiarity and compliance with the requirements. It is expected of Contractors that they be familiar with the applicable clauses and that these will be adhered to in the execution of any work in terms of this specification. Contractors will be required to confirm that they are able to meet these requirements.

a) SABS 0108 : 1995 The Classification of hazardous locations and the selection of electrical apparatus for use in such locations

b) The Occupational Health & Safety (OHS) Act No. 85 of 1993.

c) SABS 0314 Flameproof Enclosures for Electrical Apparatus

d) SABS 0549 Intrinsically Safe Electrical Apparatus

e) API Manual of Petroleum Measurement Standards Chapters 4 to 12
IP Chapter 10 and Papers 2 and 3

f) SABS 969 Enclosures for electrical apparatus

g) BS 5490 Classification of degrees of protection provided by enclosures

h) Safety Regulations for Contractors

i) Technical Instruction No. 16 - Contractors Work Permit Procedures.

j) VDE Standards

2.3 Where no specific rules, regulations, codes or requirements are contained in this specification nor covered by the above mentioned codes, the contractor shall, in consultation with Transnet, adhere to internationally accepted modern design and engineering practices in the Electrical and Petrochemical Industry.

3.0 SERVICE CONDITIONS

3.1 The cable shall be designed and rated for continuous operation under the following conditions :-

3.1.1 Ambient/Environment Conditions :

3.1.1.1	Altitude	:	Sea level.
3.1.1.2	Ambient temperature	:	-5° C to +45° C (daily average +35° C).
3.1.1.3	Relative humidity	:	As high as 96%
3.1.1.4	Lightning conditions	:	Severe, with a maximum lightning ground flash density 11 flashes per km^2 per annum.
3.1.1.5	Exposure conditions	:	Salt laden, industrial atmosphere as well as hazardous gases and dust atmosphere.

3.1.1.6 Electrolytic corrosion conditions prevail in all the areas owing to the proximity of direct current traction system and cathodic protection schemes.

3.1.2 Electrical Conditions:

3.1.2.1 The system of supply will be three phase, 3 wire, 50 Hertz, 11KV alternating current for medium voltage and three-phase, 4 wire, 50 Hz 400 Volts alternating current for low voltage.

3.1.2.2 The voltage may vary within the range of 95% to 105% of the nominal and all cable shall be suitably rated.

4.0 RESPONSIBILITY FOR WORK, SAFETY

4.1 The Contractor shall be responsible for all aspects associated with the provision of the cables. This includes items such as supply of testing cable to test the cables prior to commissioning, provision of site office and storage facilities.

4.2 Occupational Health and Safety Act (Act No 85 of 1993) must be complied with in all respects during the execution of this contract. The onus shall be on the contractor to ensure that staff under his control adheres to the provisions of the act at all times.

5.0 ELECTRICAL CABLE SPECIFICATION

This part of the specification covers the general specification of electrical cables to be used on Transnet sites on behalf of Transnet Port Terminals.

5.1 TYPES OF CABLE

5.1.1 CROSS-LINKED POLYETHYLENE (XLPE)

5.1.1.1 Cross-linked Polyethylene (XPLE)-insulated cables shall be individually screened, 3 core, stranded copper conductor, type A, cable manufactured in accordance with SABS.1339. The cable is to be supplied with an overall graphite coating to the outer PVC sheath.

5.1.1.2 The cable shall have embossed on the outer P.V.C. sheath next to the **S.A.B.S.** mark the following letters:

T/G/B

where T = TRANSNET STANDARD G = GRAPHITE COATED B = BEDDING TEST

Only the above mentioned cable shall be accepted.

5.1.1.3 The cable shall be capable of withstanding continuous operational temperatures up to 90^{O} C.

5.1.1.4 Completed cable runs are subjected to the following tests :-

a. As laid down in S.A.B.S. 1339 (Appendix "E" paragraph E-1.4)

b. Anti-electrolysis insulation, applied between armouring and earth, tested at 1OkV D.C. for one minute. Bedding shall be tested at 4kV D. C. for one minute.

All the above tests shall be carried out in the presence of the Engineer

5.1.2 PAPER INSULATED

5.8.2.1 Fully impregnated hygroscopic paper insulated, Helically lapped, insulated, Three core, Stranded copper conductors, Outer layer numbered for core identification, Seamless pure lead sheath, Covered with bitumen impregnated paper, Single steel wire armoured, extruded plastic sheathed, Operational voltage 6.35 to 11kV.

5.1.2.2 The cable shall have embossed on the outer P.V.C. sheath next to the **S.A.B.S.** mark the following letters:

T/G/B

Where: T = TRANSNET STANDARD
G = GRAPHITE COATED
B = BEDDING TEST

Only the above mentioned cable shall be accepted.

5.1.2.3 The cable is to be supplied with the P.V.C. outer sheath impregnated with a high quality graphite powder coating.

5.1.2.4 Type general purpose copper woven taped screened (Table 19) cable manufactured in accordance with S.A.B.S. 97 is required.

5.1.2.5 The cable shall be capable of withstanding continuous operational temperatures up to 70 / 80^{O} C.

5.1.2.6 Completed cable runs are subjected to the following tests

a. As laid down in S.A.B.S. 97

b. Anti-electrolysis insulation, applied between armouring and earth, tested at 10Kv D. C. for one minute. Bedding shall be tested at 4Kv D.C. for one minute.
<u>All the above tests shall be carried out in the presence of the Engineer</u>

5.1.3 LOW VOLTAGE PVC CABLE

5.1.3.1 Low voltage cables shall be PVC insulated cables with ECC, and shall comply with SABS.1507.

5.1.3.2 Earth continuity conductors shall be single core PVC insulated copper cables, and shall comply with SABS. 1507.

5.1.3.3 The cable shall be capable of withstanding continuous operational temperatures up to 70^{O} C.

5.1.3.4 Electrical LV Power cabling installed in hazardous locations (flammable environment) running between Equipment located in the field, LV Panels or Motor Control Centre Panels, Valve Panels and Distribution Boards shall comprise of steel wire armoured, earth continuity conductor (ECC), PVC Insulated, four core cable, as follows:

Conductors.

Core Size : 4 core - Rated as per application (SABS 10142-1)
Stranded untinned copper, 7 strands minimum

PVC Insulated, Insulation Breakdown Voltage to withstand 2 kV 50Hz RMS for a 1 min period.

Insulation Colours: Colored RD-BL-YE/WT-BK (not numbered)

Lay Twist to be 40 – 60 mm (i.e. 16-25 twist per metre)

Inner Jacket

Extruded fire retardant black PVC with rip cord for jacket removal.
Minimum thickness 1.2mm

Outer Jacket

Overall weatherproof thermoplastic PVC jacket – fire retardant and UV resistant (Carbon black added).

Jacket thickness 1.5mm

Jacket to be totally bonded to a steel wire armoured sleeve.

Fire retardant, low halogen (20% Halogen, Blue Stripe) plastics to be used in non-ventilated areas. Fire retardant, high halogen (100% Halogen, Red Stripe) plastics may be used in ventilated areas. Fire retardant, no halogen (0% Halogen, White Stripe) plastics not required to be used.

5.1.3.5 Electrical Control cabling running between the Equipment located in the field, Control System Marshalling Cabinets, LV Panels and Incomer Breaker panels will comprise of steel wire armoured, PVC Insulated, multi-core cable, as follows :

Conductors.

Core Size : 7 core – 1.5 mm2 (Valve Actuators)
12 core – 1.5 mm2, 19 core – 1.5 mm2 (Switchgear)

Stranded untinned copper, 7 strands minimum

PVC Insulated, Insulation Breakdown Voltage to withstand 2 kV 50Hz RMS for a 1 min
Insulation Colours: 7 core and less – colored BL-YE/WT-RD-GR-BK-BR-PR/OR (Not numbered)
12 core and more – black, conductors to be numbered
Lay Twist to be 40 – 60 mm (i.e. 16-25 twist per metre)

Inner Jacket

Extruded fire retardant black PVC with ripcord for jacket removal.
Minimum thickness 1.2mm up to 7 core, 1.5mm for 12 and 19 core

Outer Jacket

Overall weatherproof thermoplastic PVC jacket – fire retardant and UV resistant.
Jacket thickness 1.5mm up to 7 core, 2.0mm for 12 and 19 core
Jacket to be totally bonded to a steel wire armoured sleeve.

Fire retardant, low halogen (20% Halogen, Blue Stripe) plastics to be used in non-ventilated areas. Fire retardant, high halogen (100% Halogen, Red Stripe) plastics may be used in ventilated areas. Fire retardant, no halogen (0% Halogen, White Stripe) plastics not required to be used.

5.1.3.6 Completed cable runs are subjected to the following tests as laid down in SANS 10142-1. Insulation resistance test between Phases, Phases and Neutral, Phases and ECC, Neutral and ECC.

5.1.4 INSTRUMENTATION CABLING

5.1.4.1 Instrument Cabling as defined within this and other Transnet Specifications includes the following types of cabling:

1. PVC SWA Multicore instrument cables running between Instrument Junction Boxes in the field and PLC Cabinets (IS and non-IS rated)
2. PVC SWA Multicore instrument cables running between instruments in the field and PLC Cabinets (IS and non-IS rated)
3. Dekabon armoured instrument cables running between Junction Boxes in the field and the instruments themselves (IS and non-IS rated)

5.1.4.2 All Instrumentation Cabling will comply in all respects to the specifications as contained in the Scope of Work attached to an Order. In the absence of cable specifications being detailed in the Scope of Work attached to an Order, the following cable specifications will apply.

5.1.4.3 Instrument cabling will be marshalled on Instrument racking and trenching as defined elsewhere within this specification.

5.1.4.4 Instrument multi-core cabling running between the Field Junction Boxes and the Control System Marshalling Cabinets will comprise of steel wire armoured, PVC Insulated, individual and overall screened multi-core cable. Note that Petronet has standardised on 1 pair, 2 pair, 8 pair and 16 pair cable – prior approval from Petronet will be required to deviate from these specifications.

Conductors

Core Size : 1.0 mm2

Stranded untinned copper, 7 strands minimum

PVC Insulated, Insulation Breakdown Voltage to withstand 2 kV 50Hz RMS for a 1 min.

Insulation Colours : Black and White

Multipair cores to be numbered (numeric on both conductors of the pairs)
Lay Twist to be 40 – 60 mm (i.e. 16-25 twist per metre)

Shield/Screen

Individual & overall screened – plasticised aluminium foil (100%) coverage
Stranded tinned copper drain wire 0.5 mm2

Inner Jacket

Extruded fire retardant black PVC with rip cord for jacket removal.
Minimum thickness 1.2mm up to 8 pair, 1.5 mm for 16 to 36 pair

Outer Jacket

Overall weatherproof thermoplastic PVC jacket – fire retardant and UV resistant (Carbon Black added).
Jacket thickness 1.5mm up to 8 pair, 2.0 mm for 16 to 36 pair.
Jacket to be totally bonded to a steel wire armoured sleeve.

Fire retardant, low halogen (20% Halogen, Blue Stripe) plastics to be used in non-ventilated areas. Fire retardant, high halogen (100% Halogen, Red Stripe) plastics may be used in ventilated areas. Fire retardant, no halogen (0% Halogen, White Stripe) plastics not required to be used.

IS Circuits: Jacket color light blue Non IS Circuits: Jacket color black.

5.1.4.5 Individual Instrument cabling running between the Field Junction Boxes and the individual field mounted Instruments will comprise of Dekabon armoured, PVC Insulated, individual and overall screened multi-core cable. Note that Petronet has standardised on 1, 2, 4 and Triad cable – prior approval from Petronet will be required to deviate from these specifications.
(Note that this specification only applies to cabling running on racks above the ground, all Instrument cables running in trenches will need to comply with the Instrument Multi-core Cable Specifications detailed above).

Conductors.

Core Size : 1.5 mm2
Stranded untinned copper, 7 strands minimum
PVC Insulated, Insulation Breakdown Voltage to withstand 2 kV 50Hz RMS for a 1 min
Insulation Colours : Black and White
Multipair cores to be numbered (alphanumeric on both conductors of the pairs)
Lay Twist to be 40 – 60 mm (i.e. 16-25 twist per metre)

Shield/Screen

Individual & overall screened – plasticised aluminium foil (100%) coverage
Stranded tinned copper drain wire 0.5 mm2

Inner Jacket

Extruded fire retardant black PVC with ripcord for jacket removal.
Minimum thickness 1.2mm

Outer Jacket

Overall weatherproof thermoplastic PVC jacket – fire retardant and UV resistant (Carbon black added).
Jacket thickness 1.5mm.
Jacket to be totally bonded to an inner waterproof aluminium sleeve, with a ripcord under the sleeve for jacket removal.

Fire retardant, low halogen (20% Halogen, Blue Stripe) plastics to be used in non-ventilated areas. Fire retardant, high halogen (100% Halogen, Red Stripe) plastics may be

used in ventilated areas. Fire retardant, no halogen (0% Halogen, White Stripe) plastics are not required to be used.

IS Circuits: Jacket color light blue Non IS Circuits: Jacket color black.

6.0 CABLE TERMINATIONS

6.1 Medium and Low Voltage cables shall be terminated to busbars and switchgear in the panels, distribution boards and kiosks using suitable cable lugs. Cable earth wires shall be brought into glands on gland plates. The insulation between cable armouring and cable earth wires shall be maintained at terminations. The separate earth conductor cable shall terminate to the main earth bar.

6.2 All materials necessary for installing all cable terminations shall be provided by the Contractor and the cost thereof shall be included in the tender price.

6.3 Glanding

6.3.1 All instrument and electrical cables will be glanded at both ends using the appropriate sized gland and will include associated adaptors, washers, ferrules, bands, etc. Provision for all glands, adaptors, washers, ferrules, bands etc. shall be included in the Tenderer's offers. All cable glands shall comply with the following specification, unless otherwise specified in the Scope of Work attached to an Order:

6.3.2 Dekabon Armoured Cabling (Instrumentation)
Increased Safety Ex"e" rated compression gland, IP68 rated, complete with UV resistant black shroud where required, in accordance with SABS 1031.

6.3.3 PVC SWA Cabling (Instrument & Electrical motors)
Increased Safety Ex"e" rated non-compression gland, IP68 rated, complete with SWA protection (CCG Corrosion Guard or similar), in accordance with SABS 1031.

6.3.4 PVC SWA Cabling (Ex"d" rated Valve Actuators)
Flameproof Ex"d" rated non-compression gland, IP68 rated, complete with SWA protection (CCG Corrosion Guard or similar), in accordance with SABS 808.

6.3.5 PVC SWA Cabling (Electrical and PLC Panels located within buildings rated as Safe Areas in terms of Hazardous Area Classifications SABS 0108)
Non-Flameproof rated, non-compression gland, IP68 rated, complete with UV resistant (black) shroud where required.

All glands will be waterproof and in the case of Hazardous Areas, correctly rated in terms of the Explosion Proof Classification of the equipment housings to which they are installed.

6.4 Termination

6.4.1 All cables will be terminated at field instrumentation, electrical equipment, field junction boxes, switchgear panels and control room marshalling cabinets according to

manufacturers specifications, instrument hook-up diagrams and control system specifications as provided/approved by Petronet.

6.4.1.1 **Instrument Dekabon Cabling**

- Outer Dekabon armouring shall be stripped back to the entry point into the associated termination/junction box. Protrusion of cable sheath/armouring into the termination/junction box (through the compression gland) shall be a minimum of 15mm and a maximum of 50mm.

- Cable pair inner aluminium foil shall be stripped back to the point at which the individual cores leave the PVC Trunking to be terminated onto the respective terminal rails. Ends of the inner foil shall be neatly taped/heat shrunk so as to prevent unravelling.

- Individual cable ends shall be sealed with the use of heat shrink tubing applied over the cable sheath/armouring at the point of entry into the termination/junction box/panel, in order to protect the cable and prevent the ingress of moisture.

- Both cable overall (drain wire) and individual screens shall be insulated with the use of appropriately sized green coloured sleeving, to prevent inadvertent contact with metallic surfaces.

- All individual cable cores (including spares) will be left long enough to accommodate 200mm slack, i.e. taking into account the routing via the trunking.

- Excess lengths of individual cable cores will be neatly folded and tied within the trunking provided. All spare cores shall be terminated into terminals so provided.

- Termination of individual cable cores in the termination strips will be such that all Control System related cabling will be terminated to one side of termination strips, whilst all field instrumentation/equipment cabling will be connected to the other side of termination strips.

In the case of Field Junction Boxes with dual terminal strips, multi-core cabling will be glanded in the centre of the gland plate and terminated into terminal rails provided, running from the centre PVC Trunking outwards. Individual Instrument cables will then be terminated into the terminal rails provided, running from the outermost PVC Trunking inwards.

In the case of Field Junction Boxes with single terminal strips, multi-core cabling will be glanded on the right side of the gland plate and terminated into terminal rails provided, running from the right hand side of the panel inwards. Individual Instrument cables will then be terminated into the terminal rails provided, running from the left hand side of the panel inwards.

- All cables connected to individual instruments/equipment will be provided with a single loop of minimum diameter of 150mm. All loops will be neatly strapped.

- All cores (including spares) will be terminated into allocated termination strips/rails in the respective Instrumentation, Termination and Field Junction Boxes

6.4.1.2 **Instrument PVC SWA Multi-core Cabling**

- Cable SWA armouring shall be stripped back to the entry point into the associated marshalling cabinet/junction box and shall be glanded in such a manner so as to ensure electrical continuity with the gland. When terminated in hazardous areas, cable armouring shall be bonded to the panel equi-potential bonding system via means of earthing rings provided as an integral part of the gland. Contact between the gland and the gland plate shall not be considered as sufficient for bonding purposes.

- Protrusion of cable inner PVC sheaths into the marshalling cabinet will be a minimum of 25mm and a maximum of 50mm.

- Cable inner aluminium foil shall be stripped back to the point at which the individual cores leave the PVC Trunking to be terminated onto the respective terminal rails. Ends of the inner foil shall be neatly taped/heat shrunk so as to prevent unravelling.

- Cable ends shall be sealed with the use of heat shrink tubing applied over the cable inner sheath at the point of entry into the termination/junction box/panel, in order to protect the cable and prevent the ingress of moisture.

- Both cable overall and individual screens shall be insulated with the use of appropriately sized green coloured sleeving, to prevent inadvertent contact.

- All individual cable cores (including spares) will be left long enough to accommodate 200mm slack, i.e. taking into account the routing via the trunking.

- Excess lengths of individual cable cores will be neatly folded and tied within the trunking provided. All spare cores shall be terminated into terminals so provided.

- Termination of individual cable cores in the termination strips will be such that all Control System related cabling will be terminated to one side of termination strips, whilst all field instrumentation/equipment cabling will be connected to the other side of termination strips.

In the case of Field Junction Boxes with dual terminal strips, multi-core cabling will be glanded in the centre of the gland plate and terminated into terminal rails provided, running from the centre PVC Trunking outwards. Individual Instrument cables will then be terminated into the terminal rails provided, running from the outermost PVC Trunking inwards.

In the case of Field Junction Boxes with single terminal strips, multi-core cabling will be glanded on the right side of the gland plate and terminated into terminal rails provided, running from the right hand side of the panel inwards. Individual Instrument cables will then be terminated into the terminal rails provided, running from the left hand side of the panel inwards.

- All cores (including spares) will be terminated into allocated termination strips/rails in the respective Instrumentation, Termination and Field Junction Boxes

6.4.1.3 **Electrical Power and Control Cabling (Low Voltage)**

- Cable SWA armouring shall be stripped back to the entry point into the associated equipment housing/termination box/panel and shall be glanded in such a manner so as to ensure electrical continuity with the gland. When terminated in hazardous areas, cable armouring shall be bonded to the panel equi-potential bonding system via means of earthing rings provided as an integral part of the gland. Contact between the gland and the gland plate shall not be considered as sufficient for bonding purposes.

- (Option 1) Cable inner PVC sheath shall be cut back at the point of entry into the equipment housing/termination box/panel, protrusion of the inner sheath into the associated switchgear cabinet/equipment housings shall be a minimum of 25mm and a maximum of 50mm. Heat shrink tubing shall be applied at the point of entry into the equipment housing/termination box/panel, in order to protect the cable and prevent the ingress of moisture.

  (Option 2) Where cables are glanded into panels, cable inner PVC sheaths may be taken directly into trunking/marshalling arrangements, with the inner PVC sheaths cut back at point of termination. Note that in this instance, heat shrink need not be applied at the point of entry into the cabinet.

- All individual cable cores (including spares) will be left long enough to accommodate 200mm slack, i.e. taking into account the routing via the trunking.

- Excess lengths of individual cable cores will be neatly folded and tied within the trunking provided.

- Termination of individual cable cores in the termination strips will be such that all Starter related cabling will be terminated to one side of termination strips, whilst all field cabling will be connected to the other side of termination strips.

- All cables connected to individual instruments/equipment will be provided with a single loop of minimum diameter of 150mm. All loops will be neatly strapped.

6.5 **Cable Core Lugging**

All individual cable cores will be neatly terminated. Appropriately sized lugs will be attached to all core ends, using the appropriate crimping tool (not side cutters or ordinary pliers). The colouring of crimps will match the size of the associated cable core. All cable lugs utilised shall comply with the following specification, unless otherwise specified in the Scope of Work attached to an Order:

- Instrument Cables - bootlace ferrules

- Electrical Power Cables - spade lugs for compression terminals, ring lugs for screw terminals (pin lugs are not acceptable)
- Electrical Control Cables - spade lugs for compression terminals, ring lugs for screw terminals (pin lugs are not acceptable)

6.6 **Cable Screening – Instrument Cabling**

6.6.1 **Individual Screens**

6.6.1.1 All Individual Instrument Cable Pair Screens shall be terminated into terminals provided within the Instrument Termination Boxes as well as the Field Junction Boxes, and shall be grounded to a common insulated earth rail to be provided in each of the Control System Marshalling Cabinets, alongside the Termination Rails provided. Individual Screens shall be terminated in such a manner so as to be continuous from the Instrument/Instrument Termination Box to the Control System Marshalling Cabinets i.e. individual instrument cables as well as multi-pair cables.

6.6.1.2 Individual screen terminals shall be insulated in the Termination Boxes and Field Junction Boxes provided, thus ensuring that the individual cable pair screens are not grounded at instrument/equipment ends, i.e. to prevent common mode noise. Where Instrument Cables terminate directly into Instrument housings, individual screens shall be cut back and insulated within the Instrument housing using heat shrink sleeving, to prevent inadvertent contact with any conducting surfaces.

9.6.1.3 All individual screen earth rails in the Control System Marshalling Cabinets will be connected to the existing panel Instrument Earth bar via means of a 25mm insulated earth cable, which shall in turn be connected at two points via means of PVC Cu 70mm2 insulated earth cables (Yellow/Green in colour), to the Instrument Earth bar located within the control room.

6.6.2 **Overall Screens**

6.6.2.1 All Instrument Cable Overall Screens/Drain wires shall be terminated to insulated earth bars provided within the Field Junction Boxes, and shall be earthed to a common electrical earth bar to be provided in each of the Control System Marshalling Cabinets. Overall Screens /Drain Wires shall be cut back and insulated within the Instrument Termination Boxes and Instrument housings (where applicable) to prevent inadvertent contact with the Termination Box housing, utilising heat shrink sleeving. Overall Screens shall be terminated in such a manner so as to be continuous from the Instrument Junction Box to the Control System Marshalling Cabinets.

6.6.2.2 The electrical earth bar shall be earthed to the Cabinet Frame, and connected at two points via means of PVC Cu 70mm2 insulated earth cables (Yellow/Green in colour), to the Electrical Earth bar located within the control room.

6.7 **Cable Screening – Electrical Cabling (Power & Control)**

6.7.1 All electrical cable screens/drain wires (where applicable) will be grounded to a common electrical earth bar to be provided in each of the Control System Marshalling Cabinets/Switchgear Cubicles. The electrical earth bar shall be earthed to the Cabinet Frame,

and connected at two points via means of PVC Cu 70mm2 insulated earth cables (Yellow/Green in colour), to the Electrical Earth bar located within the control and switchgear rooms.

7 ADDITIONAL REQUIREMENTS FOR EX IA/IB INSTALLATIONS

7.1 All I.S. (Ex ia/ib Intrinsically Safe) Installations shall be in strict compliance with IEC 79-14 Electrical Installations in Hazardous Areas, and in particular Chp 12 "Additional Requirements for type protection Instrinsic Safety", inclusive of the under mentioned items.

7.2 **Clause 12.2.**

In installations with Zone 1 and 2 classifications, IS apparatus and the intrinsically safe parts of associated apparatus shall comply to at least category "ib". Note that Petronet has standardised on category "ia" protection, and permission will need to be sought in writing for relaxation to "ib".

7.3 **Cables – General**

Where multi stranded cables are used in a hazardous area, the ends of the conductor shall be protected against separation of individual strands, by means of cable lugs.

Where cable screens are required, these shall be connected to earth at one point only, normally in the non-hazardous area. (Refer to Section 9..6 and 9.7 of this specification).

Cable armouring shall normally be bonded to the equi-potential bonding system via the cable entry devices (glands), at the end of each cable run. Where interposing Junction Boxes exist or other apparatus, the armouring shall be similarly bonded to the equi-potential bonding system at these points. In this regard and where earthing rings are provided as an integral part of the gland, use of these is recommended in serving this function. Contact between the gland and the gland plate shall not be considered as sufficient for bonding purposes.

Conductors of intrinsically safe circuits and non-intrinsically safe circuits shall not be carried in the same cable.

Conductors of intrinsically safe circuits and non-intrinsically safe circuits in the same bundle or duct shall be separated by an intermediate layer of insulated material or by an earthed metal partition. No segregation is required if metal sheaths or screens are used for intrinsically safe or non-intrinsically safe circuits. Note that Petronet has standardised on physical separation regardless of whether the cabling is screened or not, and permission will need to be sought in writing for relaxation.

7.4 **Cables – Marking**

Un-armoured Cables containing intrinsically safe circuits shall be marked. If outer sheaths are marked by color, the color used shall be light blue. Note that whilst armoured cabling

is not required to be marked in terms of IEC79-14, Petronet has standardised on the principle of marking all cable outer sheaths carrying intrinsically safe circuits by color (light blue), whether armoured or not, and that this will need to be complied with in all instances.

7.5 Cable Insulation Tests

All cables carrying intrinsically safe circuits shall be proven to be capable of withstanding an RMS AC test voltage of twice the normal voltage of the intrinsically safe circuit with a minimum of 500 V between the armouring and screens joined together and the individual conductors. Tests shall be conducted in accordance with manufacturers specifications. Where no such method is available, tests shall be carried out as follows:

- Voltage shall be an ac voltage of sinusoidal waveform at a frequency of between 48 and 62 Hertz
- Voltage shall be derived from a transformer of at least 500 VA output
- Voltage shall be increased steadily to the specified value in a period of not less than 10 seconds and maintained for a period of not less than 60 seconds.

7.6 Cable Termination

All terminals shall be reliably separated from non-intrinsically safe circuits (for example by a separating panel or gap of at least 50mm). Terminals of intrinsically safe circuits shall be marked as such. Petronet has standardised on marking by color - the specified color being light blue. All terminals, plugs and sockets shall satisfy the requirements of IEC79-11 Sections 6.3.1 and 6.3.2 respectively (6mm creepage and clearance rules 4mm to earth).

7.7 Zone 1 Installations - Surge Protection

All equipment installed in Zone 0 areas and exposed to hazardous potential differences (e.g. lightning surges), shall have a surge protection device installed between each non-earth bonded conductor/core and the local earthed structure as near as is practically possible. The surge protection device shall be capable of diverting a minimum peak discharge current of 10kA (8/20 microsecond impulse according to IEC60-1, 10 operations). The bonding connection between the protection device and the structure shall have a minimum cross sectional area equivalent to 4 mm2 copper.

Note that Petronet has extended these requirements to include all analogue transmitters installed in the field, whether in hazardous areas or not, and will need to be complied with in all instances.

8. CABLE JOINTS

8.1 MEDIUM VOLTAGE CABLE JOINTS

8.1.1 The contractor shall give the Engineer advance notice of his intention to do jointing of medium voltage cables to enable arrangements to be made for measuring and inspection.

8.1.2 The complete cable installation, including all joints shall be fully insulated from earth throughout.

8.2 LOW VOLTAGE CABLE JOINTS

8.2.1 The low voltage cable through joints shall be of the epoxy resin filled type. The low voltage joints shall be constructed according to manufacturer's instructions.

9. CABLE ROUTES

9.1 All low voltage cables and associated earth continuity conductors shall be installed as shown in drawings PPD: BDD059C-E-01, sheet 1 of 3.

10. SURVEY OF ROUTE

10.1 The drawings showing the proposed cable route listed in the "Schedule of Drawings" shall not be taken to show the precise final cable route. The Contractor shall within 30 days after being awarded the Contract carry out a final route survey, which shall include digging test holes, and using the routes shown on the drawings as a general guide, to determine a suitable route.

10.2 The Contractor shall submit details of the cable routes selected in final survey to the Engineer for approval. No excavation of any section of the cable route shall commence until the Engineer has authorised the commencement of work on the section concerned.

10.2.1 After completion of all cable laying and jointing and before commissioning of any cable the Contractor shall carry out a final "as laid" survey of the cable routes and hand to the Engineer cable route plans. The cable route plans shall include the following information:

(i) Overall length of each cable.

(ii) Centre to centre distances between all joints and between final joints and terminations of each cable including auxiliary cables.

(iii) Accurate indications of the position of each cable joint and cable marker preferably by triangulation, i.e. indicating two distances to each joint or marker from structures not likely to be moved such as permanent buildings, bridge piers, etc.

(iv) Tables showing all information regarding each high-voltage cable necessary for cable fault location by the reflected pulse method.

(v) Soil thermal resistivity and temperature values as determined on final survey shown on the plans at the positions where they were determined.

11. EXCAVATIONS

11.1 Excavations shall be carried out in strict compliance with the specification for works on, over, under or adjacent to a railway line No. E.7 (July 1998) (Part 1) that forms part of the tender documents.

11.2 The procedure and the order of doing the work shall be subject to the approval of the Engineer.

11.3 The Contractor shall, before trenching commences, familiarise himself with the route and conditions on site. The Contractor shall be advised of any known buried services such as cables, pipes, etc., in the vicinity of the cable route. However, the Contractor shall at all times exercise care to ensure that any uncharted services are not damaged.

11.4 Power driven mechanical excavators may be used for trenching operations provided that they are not used in close proximity to other cables, water mains, or any other plant liable to be damaged by the use of such plant. Their use along sections of the route shall in each case be subject to approval of the Engineer.

11.5 Trenches shall be as straight as possible and each trench shall be excavated to the dimensions indicated in this specification. The Contractor shall provide shuttering for use in places where danger exists should the sides of the trench collapse. The strength of such shuttering must be adequate especially where railway tracks in proximity are concerned and the shuttering must be braced across the trench. Provision of shuttering will be paid for per metre length of shuttered trench.

11.6 The bottom of each cable trench shall be as firm as conditions permit and be of smooth contour.

11.7 In sections where the soil or water level conditions indicate that the cable trench will endanger rail tracks or any nearby structures, the Contractor must restrict the length of continuous open trench to a distance to be indicated by the Engineer.

11.8 The Contractor shall take all reasonable steps to ascertain if the cables will be liable to be subjected to chemical or other damage or electrolysis action and shall submit his recommendations for approval, of any precautionary measures to be taken, in such instances.

11.9 The material excavated from each trench shall be placed adjacent to the trench in such a manner as to prevent nuisance or damage to adjacent ditches, railway lines, drains, gateways and other properties and shall be stacked so as to avoid undue interference with traffic. Where, owing to certain considerations, this is not permissible, the excavated materials shall be removed from the site and be returned for refilling the trench on completion of laying.

11.10 Surplus material shall be disposed of by the Contractor at his cost. Where the possibility exists that railway line ballast may be fouled by excavated material or material brought on site, the Contractor shall take precautions as directed by the Engineer.

11.11 The Contractor shall not trench beneath any railway line without departmental supervision. Should the contractor wish to carry out such work the Engineer must be

advised not less than 14 working days before hand to arrange for the necessary supervision. The cost of such supervision shall not be charged to the Contractor.

11.12 Prior to laying the cable, the trench shall be inspected thoroughly by the Engineer or his authorised representative to ensure that it is free from all objects likely to damage the cable either during or after cable laying operations. Cable laying shall not proceed unless the Engineer or his authorised representative is satisfied with the condition of the trench.

11.13 When trenching, the Contractor shall take all precautions necessary to prevent damage to any other cables, water mains, roads, pavements, drainage systems, building or any structure etc. Should any of the above be damaged by the Contractor's staff, it shall be reported immediately to the Engineer, who shall arrange for the necessary repairs. The Contractor is responsible for the cost of repairs.

11.14 Should it be necessary for any reason to remove accumulated water or other liquid from the trench, this shall be done by the Contractor at his expense and should be taken into account at the time of tendering. The Contractor is to provide all pumps and appliances required to carry out this operation. Water or any other liquid removed shall be disposed of without creating any nuisance or hazard.

14.15 Trenching procedure shall be programmed in advance with the Engineer and the programme approved by the Engineer shall not be departed from save with his consent.

11.16 Programming of trenching shall be on the basis of the Contractor giving the Engineer an assurance that any length of trench opened on a particular day will be back-filled and compacted to an adequately firm surface on the same day where possible. If it is anticipated that trenching will remain open for longer periods, the Contractor shall first obtain the approval of the Engineer. No new sections of trenching shall commence if previously uncompleted sections still exist. Under no circumstances may sections greater than 300 metres be opened.

Where such approval is given, the onus shall be on the Contractor to safeguard the works to the satisfaction of the Engineer during the extended period such trenches remain open. Where cables have already been laid, but not covered, steps shall be taken by the Contractor to protect cables and the personnel around.

11.17 The near side of any cable trench shall preferably not be less than 2500mm from any adjacent railway line. Approval from the Engineer will be required if the above clearances cannot be achieved. The conditions of clause 13.1 shall apply.

11.18 The removal of obstructions along the cable routes shall be subject to the approval of the Engineer and shall be paid for at pre-agreed rates.

11.19 The area traversed by the cable routes has been used for many years. It is inevitable that there will be uncharted services. On encountering any such service the Contractor shall promptly advise the Engineer who shall direct what action shall be taken.

11.20 Transnet reserves the right to alter any cable route or portion thereof in advance of cable laying. Payment in respect of any additional or wasted work involved shall be at scheduled rates.

11.21 Any existing electrical cables obstructing the cable routes shall be removed or deviated as appropriate by the Contractor. The work shall be paid for at scheduled rates.

11.22 The bottom of the trench shall be filled with 200mm of suitable soil sifted through a 6mm mesh and levelled off. Only soil with a satisfactory thermal resistivity may be used for this purpose and ash which occurs on the route shall not be used. Where no suitable soil is available in proximity, imported fill shall be arranged. The manufacturer's assurance is required that the current rating of cables is not reduced by the ground conditions.

12.0 TRENCH/EXCAVATION SPECIFICATION

Separate Trenches shall be supplied to cater for the following cable types:

12.1 ELECTRICAL HV/MV TRENCHES

Trench Dimensions	:	1200 mm deep by 500 mm wide (two cables), add 300mm width for additional cables
River Sand Bedding	:	PVC Piping – 75 mm above pipe, 50mm under pipe
	:	Direct Burial – 100 mm
Identification	:	PVC or Concrete Interlocking Tiles at a depth of 350mm
Cable Markers	:	Concrete with engraved anodised aluminium ID plates cable Marker Colour – Brilliant Green
Cabling	:	Medium and High Voltage Power Cabling > 400 VAC
Separation	:	400 mm (LV cabling), 800mm (Instrument cabling)

12.2 ELECTRICAL LV TRENCHES

Trench Dimensions	:	800 mm deep by 300 mm wide
River Sand Bedding	:	PVC Piping – 75 mm above pipe, 50mm under pipe
	:	Direct Burial – 100 mm
Identification	:	Polythene Marker Tape (150mm wide, yellow and marked with the words “Electric Cable” at a depth of 350mm
Cable Markers	:	Concrete with engraved anodised aluminium ID plates. cable Marker Colour – Black
Cabling	:	Low Voltage Power Cabling 400 VAC/230 VAC (e.g. Actuators, Aux Motors, DB circuits)
	:	Control Cabling (e.g. MV Breaker Inter-tripping cables, Actuator control signals, Aux Motor local stop/start panels etc.)

Separation : 400 mm (HV/MV cabling), 800mm (Instrument cabling)

12.3 **INSTRUMENT TRENCHES**

Trench Dimensions : 500 mm deep by 300 mm wide

River Sand Bedding : PVC Piping – 75 mm above pipe, 50mm under pipe

: Direct Burial – 100 mm

Identification : PVC Tiles / Polythene Marker Tape (150mm wide, yellow and marked with the words "Electric Cable/Elektriese Kabel") at a depth of 350mm

Cable Markers : Concrete with engraved anodised aluminium ID plates cable Marker Colour – Light Blue

Cabling : Instrument Multi-core & Single Pair Cabling (IS and non IS)

Separation : 800mm (HV/MV/LV Electrical cabling)

13. CABLE LAYING

13.1 CABLES BURIED UNDERGROUND.

13.1.1 HV, MV, LV AND Instrument cables shall be spaced as indicated in Table 1 below. Pilot cables shall be laid beside the associated power cable. Cables crossing beneath railway tracks, roads, etc., shall be enclosed in 15Omm diameter uPVC pipes. Where more than one length of pipe is required for a crossing, uPVC couplings with PVC glue, shall be used to prevent water from penetrating the joint. Cable pipes must maintain or exceed the specified cable spacing.

Table 1

CABLE	MINIMUM SPACING BETWEEN CABLES
MV To MV	300mm
MV To LV	400mm
LV TO LV	300mm
MV To instrumentation	800mm
LV To instrumentation	800mm

13.1.2 All pipes laid beneath the railway lines, roads, pavements shall be laid with their tops not less than 900mm below the formation level, and shall where possible extend at least 2000mm on either side of the centre of the outer most line. Where there is more than one

line crossed and in the case of roads and pavements at least 900mm on either side of the road and 1 or pavement. All pipes shall be graded for water drainage ; the required grade is 75mm in 30m.

13.1.3 All Low voltage cables shall be laid at a depth of 750mm. All cable depth measurements shall be made to the top of the cable when laid direct in the ground, otherwise to the top of the duct concerned.

13.1.4 Except where ducts, tunnels or pipes are provided and unless instructed to the contrary by the Engineer, the Contractor shall lay the cables direct in the ground.

13.15 Rollers may be used during the laying of cables, but they shall have no sharp projecting parts liable to damage the cables. They shall be carefully placed in the trench or duct in such a manner that they will not readily capsize during cable laying operations.

13.1.6 The Contractor shall ensure that all cable is laid in the same direction. No crossing of conductors inside through joints or end boxes will be permitted.

13.1.7 Where cables have to be drawn around corners, skid plates shall be used for this purpose and these plates shall be well lubricated. The skid plates shall be securely fixed between rollers and shall be constantly examined during the cable laying operations.

13.1.8 Cable shall be visually inspected for damage during and after laying.

13.1.9 Cable pulling and laying shall preferably be done manually whenever possible. Mechanical means such as winches and the like may only be used subject to the. approval of the Engineer. No cable shall be subjected to a tension exceeding that stipulated by the cable manufacturer.

13.1.10 In the event of mechanical means of cable pulling being approved, the Contractor shall establish means of communication between the operator of the winch or other pulling device and the persons tending the drum from which the cable is being run off, to the satisfaction of the Engineer.

13.1.11 The contractor shall be wholly responsible for making his own arrangements for transporting all materials to and from and on the working sites.

13.1.12 At locations where cables run under concrete bridges, the cables shall be supported on suitable brackets secured on the side of concrete wall. These brackets shall be spaced a maximum of 500mm apart. Brackets and fixing material shall be of robust design and shall meet with Engineer's approval. Drawing of proposed ' bracket shall accompany tender. Brackets shall be galvanised in accordance with SABS 763, and thereafter painted to the satisfaction of the Engineer.

14.0 CABLES LAID IN DUCTS, CABLE TRAYS AND LADDERS

14.1.1 Cables in stalled in ducts shall be supported by cable ladder installed along the walls of the ducts or installed on the duct floor. If the cable ladder is installed on the duct floor, it shall be supported at +/- 50mm from the duct floor.

14.1.2 Cables installed in perforated cable trays and cable ladder shall be secured by means of heavy duty cable ties, cable clamps, etc.

14.1.3 Where medium and low voltage cables share the same wire-ways a reasonable space shall be left between the medium voltage and low voltage cables.

15.0 CABLE SLEEVING

15.1 All areas subject to vehicle traffic, rail crossings and paved areas shall be sleeved.

15.2 Sleeves shall be designed and installed so as to ensure 25 % spare capacity.

15.3 Sleeve Specifications

Material : PVC or PHD Polyethylene

Dimensions : 100 mm OD min

Standards : DIN EN50086-2, BS EN50086-2-4:1994

16.0 DRAW BOXES

16.1 Where cable sleeves are utilised and to facilitate the hauling of cables, brick draw boxes shall be provided at all trench junctions, complete with concrete slab, as detailed below:

Draw Box Dimensions (min) : Internal 450 mm square, 3 courses of stock brick deep.

Base & Top : Concrete 50mm thick

17. COVERING, BACKFILLING AND REINSTATEMENT

17.1 Filling in of trenches shall not be commenced until the Engineer or his authorised representative has inspected and approved the cables in situ in the section of trench concerned. Such inspection shall not be unreasonably delayed.

17.2 Where, in the opinion of the Engineer, the soil on site is unsuitable for riddling or backfilling, the Contractor shall arrange for the importation of approved material. A 75mm thick layer of soil sifted through a 6mm mesh shall be laid above the high-tension cables and consolidated by hand ramming only. The conditions of clause 13.20 apply in this case also.

17.3 All excavations made (whether for the purpose of cable laying, joint bays or trial holes) shall be back-filled in 150mm layers, the earth in each layer being well rammed and consolidated and sufficient allowance being made for settlement. The back-filling shall be completed to the satisfaction of the Engineer.

15.4 The refilled trench shall be maintained by the Contractor at his expense in a thoroughly safe condition for the duration of the contract. In the case of tarmac surfaces, until such time as this surface has been restored.

17.5 All backfilling of road crossings shall be mechanically rammed by means of approved type of mechanical power driven rammer.

17.6 The replacement of made up surfaces, such as roads, pavements, tarred aprons, verandas, floors, etc., necessitated by trenching or other works shall be arranged by the contractor at his cost. The price thereof shall be included in the tender price.

17.7 Concrete cable protection slabs to Drawing No. PPD-PA-10 shall be laid on top of the 75mm layer of soil referred to in clause 15.2 before the trenches are backfilled. Cable protection slabs shall be laid close butted, convex end to concave end, directly above each cable throughout the underground portion except where otherwise protected such as by. pipes, etc. Three coloured slabs to drawing PPD-PA-9 shall be provided to give the indication of the route in the case of a change of direction. Only unbroken cable protection slabs, and those actually laid will be paid for.

17.8 When back filling of cable trench has reached a level, after consolidation, approximately 150mm below the normal level of the surface of the surrounding area the Contractor shall lay a continuous plastic cable warning tape directly above each cable for the full length of the cable trench before completing the backfilling.

17.9 Concrete cable markers to Drawing No. PPD-PA-12 shall be provided and installed by the Contractor at his cost. The price thereof shall be included in the tender price. Initial cable markers shall be installed as close as possible to cable terminations, thereafter at approximately 60m intervals and at cable joints, also on either side of crossings of oil pipelines and at ends of underground cable pipes.

17.10 Changes of direction and joints in cable runs shall be indicated by installing two markers at such positions in the manner shown on Drawing No. PPD-PA-12. The markers shall be coloured orange with oxide mixed into the concrete. Cable markers shall project approximately 25mm above normal ground level except where projecting cable markers could be a hazard to pedestrians such as in shunting yards, walkways, pavements, etc. In such cases the cable markers shall be flush with the surface.

17.11 If more than one cable is laid in one trench, only one row of cable markers shall be placed on the centre line of the trench to define the general route of the cables.

18. CABLE TESTING AND TEST DATA

18.1 All tests on completed cables shall be carried out in the presence of a representative of Transnet Projects. Not less than 14 working days notice of the Contractor's intention to carry out such tests shall be given to the Engineer.

18.2 On completion of the jointing and termination of cables, the 11kV cables are to be subjected to the test laid down in paragraph E-1.4 of Appendix E of S.A.B.S.1339 and the low voltage type cables to be tested for insulation and loop resistance.

18.3 The anti-electrolysis insulation of each 11kV cable run complete, shall withstand for 1 minute, a test voltage of 1OkV D.C., applied from the cable armouring to earth. The bedding shall withstand a test voltage of 4kV D.C. between screen and armouring for 1 minute.

18.4 As a graphite coating is required to be applied to the PVC oversheath (in accordance with British Standard), a D.C. voltage test will be carried out on all cables after installation. The D.C. voltage test can only be carried out on the installed system if the joints are suitably insulated from earth, otherwise the D.C. voltage test should be carried out prior to jointing.

18.5 The contractor shall obtain written confirmation from the manufacture of all cables, joints and terminations -etc. that the test that Transnet Projects requires the contractor to carry out in terms of this specification meets with the manufacturers approval. Such confirmation must be obtained prior to any, tests commencing.

18.6 The electrical Contractor shall on completion of the tests submit three copies of all test results. The costs of all the tests mentioned above shall be borne by the Contractor.

18.7 In addition the cable manufacturer shall provide test sheets of each manufactured cable drum length together with the cable drum numbers which shows all the test results.

18.8 Transnet Projects reserves the right to carry out any further tests deemed necessary itself, using either the Contractor's instruments and cable, or its own, or both. The costs of such tests shall not be charged to the Contract.

18.9 **Cable Testing – Low Voltage Cables (< 1 kV)**

Each individual core of all cables (including spares) will be checked for continuity and insulation breakdown, in accordance with SABS 150 (PVC):

- Insulation Resistance shall be measured with a 1000V Megger and the readings tabulated and certified.
- Similarly, earth continuity resistance shall be measured and recorded.
- All cables will be checked for correct termination.

18.10 **Cable Testing – Medium Voltage Cables (< 22 kV)**

Each section of laid and jointed cable shall be tested, in accordance with SABS 97 (PILC/SWA):

- Insulation Resistance shall be measured with a 1000V Megger, followed by the relevant pressure test. Readings shall be tabulated and certified.
- AC test voltage must be applied to each phase in turn for one minute, or alternatively the DC test voltage for fifteen minutes. Leakage current shall be measured and recorded for each test.
- All cables will be checked for correct termination.

19. MEASUREMENTS OF CABLES

19.1 All measurements for payment purposes shall be made jointly by representatives of the Contractor and Transnet Projects and shall be agreed and approved by both parties.

19.2 Measurements of cable length shall be made from centre to centre of cable joints and to the cable ends and will exclude any wastage due to jointing and terminating.

19.3 Measurements of trench width and depth shall be made to the nearest 50mm and shall not take into account subsidence or unnecessarily large excavations. No allowance shall be made where trenches have to be widened at the bottom to accommodate cables, cable joints and protection slabs

APPENDIX 1

STATEMENT OF COMPLIANCE
(TO BE COMPLETED BY TENDERER)

This tender complies with specification TPD: 003-CABLESPEC in all respects.

SIGNATURE : _____ DATE : _____

This tender complies generally with specification TPD: 003-CABLESPEC but differs from it on the following points.

_____

_____

_____

_____

SIGNATURE : _____ DATE : _____

Transnet Port Terminals

Annexure C - TPD-004-EARTHINGSPEC - Technical specification for earthing and the protection of buildings and structures against lightning

SPECIFICATION FOR EARTHING AND THE PROTECTION OF BUILDINGS AND STRUCTURES AGAINST LIGHTNING.

REVISIONS		
REV	DATE	APPROVED
0	September 2022	
	•	

INDEX

1.0 SCOPE

1.1 This specification covers Transnet Projects requirements with respect to the protection of buildings and structures against lightning and the requirements for air terminal systems, down conductors and earthing of installation of this specification

1.2 This specification applies to assessing, testing and upgrading of existing lightning protection systems and earthing on existing buildings and structures.

2.0 STANDARDS, SPECIFICATIONS AND DRAWINGS

2.1 The following publications (latest editions and amendments) are referred to herein.

South Africa Bureau of Standards (South African National Standards)

SANS 10313	-	The protection of structures against lightning.
SABS IEC 61643	-	Surge protective devices connected to low voltage power distribution systems.
SANS IEC 60950	-	Information technology equipment – safety.
SANS 10142	-	Code of practice for the wiring of premises
BS 6651	-	Code of practice for protection of structures against lightning.
BS 7430	-	Code of Practice for Earthing.
SABS 064	-	Code of Practice for the Preparation of Steel Surfaces for Coating.
SABS 086	-	Installation and Maintenance of Electrical Equipment used in Explosive Atmospheres.
SANS 10108	-	The Classification of Hazardous Locations and the Selection of Electrical Apparatus for use in such Locations.
SABS 0199	-	The design and Installation of Earth Electrodes SPECIFICATIONS
SABS 763	-	Hot Dip Zinc (galvanised) Coatings
SABS 1091	-	National Colour Standards for Paints.
SABS 1507	-	Electric Cables with Extruded Solid Dielectric Installation for Fixed Installations
SABS IEC 742	-	Isolating Transformers and Safety Isolating Transformers.

OCCUPATIONAL HEALTH AND SAFETY ACT OF 1993 (ACT 85 OF 1993).

3.0 SERVICE CONDITIONS

3.1 The earthing shall be designed, rated and installed for continuous operation under the following conditions :-

3.1.1 Ambient/Environment Conditions :

3.1.1.1	Altitude	:	Sea level.
3.1.1.2	Ambient temperature	:	-5° C to +45° C (daily average +35° C).
3.1.1.3	Relative humidity	:	As high as 96%
3.1.1.4	Lightning conditions	:	Severe, with a maximum lightning ground flash density 11 flashes per km^2 per annum.
3.1.1.5	Exposure conditions	:	Salt laden, industrial atmosphere as well as hazardous gases and dust atmosphere.

3.1.1.6 Electrolytic corrosion conditions prevail in all the areas owing to the proximity of direct current traction system and cathodic protection schemes.

4.0 EQUIPMENT AND MATERIALS

4.1 Equipment and materials to be used, shall be of high quality, and shall comply with all relevant specifications, codes as mentioned in this specification as well as the Occupational Health and Safety Act of 1993(Act 85 of 1993).

4.2 Where equipment and material does not comply with the relevant specifications it shall be submitted to Transnet Project's Engineer for approval.

4.3 All materials used for the lightning protection system shall withstand the electric and electromagnetic effects of lightning current and predictable stresses without being damaged.

4.4 Materials and sizes shall be chosen bearing in mind the possibility of corrosion of either the lightning protection system or the structure to be protected.

4.5 Components of the lightning protection system may be manufactured from the materials listed in Table 8 of SANS 10313, provided they have sufficient electrical conductivity and corrosion resistance.

5.0 LIGHTNING PROTECTION REQUIREMENTS

5.1 The contractor shall carry out the installation in accordance with SANS 10313: Code of Practice for the protection of structures against lightning and the requirements of this specification.

5.2 Where the local supply authority requirements differ from those specified herein Transnet Projects's Electrical Engineer shall be approached for a decision.

5.3 All equipment and material shall comply with the relevant National or International standard specification. Where equipment does not comply it shall be submitted to the Transnet Projects Electrical Engineer for approval.

5.4 The system of protection will be finials/air terminals, down conductors and earth spike or roof conductors, down conductors and earth spike.

5.5 The earth resistance for separate earth electrodes if down conductors are not connected to a ring earth shall be not exceed the following;

Rt = 10 Ohm for category A structures
Rt = 15 Ohm for category B and C structures.

6.0 DESIGN OF LIGHTNING PROTECTION

The designer of lightning protection shall take into consideration the following principles and requirements during the design of the system.

6.1 GENERAL PRINCIPLES

6.1.1 Basic Principles of Lightning Protection: the requirements of the basic principles of lightning protection as detailed in SABS 0313 shall be taken into consideration to ensure proper protection of structures against lightning.

6.1.2 Evaluation of Risk: The risk of lightning stroke shall be evaluated as described in SANS 10313.

6.1.3 Effective height of a structure (He): The effective height of the highest point shall be determined by considering the average height of building, trees and structures and land profile of the surrounding area.

6.1.4 Ground flash density (Ng): The ground flash density (Ng) for general buildings, structures and installations shall be estimated from the average ground flash density given in table 1 of SANS 10313 as a general guide. For important structures and installations the value of the ground flash density shall be determined on the basis of at least 5 lightning years, or from existing records

6.1.5 Number of flashes to structure per 100 year (Nt): The number of flashes to structures per 100 year shall be determined taking into consideration type and the height of the structure as described in SANS 10313.

6.2 HAZARD CATEGORY

6.2.1 Buildings and structures where lightning protection system will be installed shall be categorised prior to the installation. Hazard categories are based on the nature of the building, its content and occupancy.

6.2.2 The Hazard categories are classified as follows in SABS 03 -1985 Code of practice for the protection of buildings structures against lightning.

Category A: High Hazard

Category A1: Structures and areas containing explosives of Category Z.

Category A2: Structures and areas classified as
a) Division 0 areas in accordance with SABS089: Part II, or
b) Class I, Division 0 locations in accordance with SABS 0108.

Category A3: Strategic control and communications installations such as airport towers

Category A4: Thatched-roof structures of historic values or that contain irreplaceable works of art or like values.

Category B: Medium Hazard

Category B1: Structures and areas containing explosives of Category X or Y.

Category B2: Structures and areas classified as
a) Division 1 or 2 areas in accordance with SABS089, Part II, or
b) Class I, Division 1 or 2 locations, or Class II, Division 1 location in accordance with SABS 0108.

Category B3: All structures not included in Category A and to which the public normally has access or which are of historic value.

Category B4: Large temporary structures used for exhibitions and entertainment.

Category B5: Thatched roof dwelling houses.

Category B6: Communications towers, water towers and reservoirs.

Category B7: Caravans and Yachts.

Category B8: Buildings and areas used for livestock, fuel or flammable material.

Category C: Low Hazard

Category C1: Small buildings that are infrequently occupied.

Category C2: Dwelling houses other than thatched-roof houses.
Category C3: Farm buildings, other than those included in category B8.

6.3 ZONES PROTECTION AND SHIELDING ANGLES

6.3.1 The zone of protection shall be the area covered by either one of the following types of protection:

a) Single Vertical air terminal
b) Single horizontal air terminals
c) Area between two or more air terminals
d) Area between roof conductors.

6.3.2 The shielding angles Þ and ß are given in table 3 of SABS03-1985, Code of practice for the protection of buildings and structures against lightning.

6.3.3 The zone protection for Shielding Angles on Steep Slopes and High Ridges is not considered effective beyond a horizontal distance from the nearest air terminal of greater than 2He, where He is the effective height of the part of the air terminal above its immediate surroundings.

6.3.4 In roof areas away from the edges of tall structures (generally of He > 50m), shielding angles given in table 3, SABS 0313 can be used appropriate to hazard category of the roof area so protected and the effective height He of the air terminal above the roof area.

6.4 SELECTION OF AIR TERMINAL

6.4.1 **Mast Protection:** An air terminal consisting of one or more masts that cover the structure or area to be protected with the appropriate shielding angle will, with the possible exception of a few weak lightning strokes, successfully intercept lightning strokes.

6.4.2 **Air Terminals as Part of the Structure**: An air terminal as part of the structure may be one or more of the following:

a) A continuous metal roof.
b) A metal roof structure supporting a metal roof
c) The metal reinforcement in the roof of a reinforced concrete structure with peripheral conductors and finials where necessary.
d) Roof conductors and finials, where necessary, on a non-conducting roof.
e) Finials in chimney, gable ends, parapet walls, etc.

6.4.3 **Air Terminal Systems For Category A Hazards:** The protection is based on the principle that a primary air terminal system must be provided for the interception of major lightning strokes with, if necessary a secondary air terminal system for the interception of those weak lightning strokes that might penetrate the protection of the primary air terminal system. The secondary air terminal system shall not be intended to carry currents of major lightning strokes.

One of the following lightning protection systems shall be used as detailed in SANS 10313.

- Mast protection used as a primary air terminal
- Metal roof used as primary air terminal system
- Reinforced concrete structure used as primary air terminal system.

6.5 MASTS AND CATENARY CONDUCTORS OVER THE STRUCTURE TO BE PROTECTED

6.5.1 GENERAL

6.5.1.1 A lighting protection system consisting of free standing masts separate from the structure provides the highest degree of protection, subject to the correct positioning of the mast and to the correct choice of shielding angle.

6.5.1.2 The number and height of masts (and, where necessary, the provision of the catenary conductors between the masts) shall be based on cost, aesthetics, shielding angles and mechanical consideration

6.5.2 CLEARENCE FROM STRUCTURES

6.5.2.1 A safe clearance distance shall be kept between the mast and the catenary conductor strung between the masts and the structure to be protected by the mast or the catenary conductor. The clearance distance depends to various factors detailed in SANS 10313.

6.5.2.2 Where a common earth electrode is provided for mast and structures in close proximity, the following clearance distance “d” shall be maintained with a minimum of 100 m.

a) Between the mast and any point of structure: $d \geq 0{,}06.h$ m.

b) Between the catenary conductor and any part of the upper surface of the structure: d ≥ 0,1. (L/2) m for Category A hazard, and d ≥ 0,06. (L/2) m for Category B and C hazards.
c) Between a network of conductors and any part of the upper surface of the structure: d ≥ 0,1.(D + (L – D)/N) m for Category A hazard, and d ≥ 0,06. (D + (L – D) / n) m for Category B and C hazards.

Where L = length of path measured from the base of one mast along the catenary conductor to the base of the other mast between which the catenary conductor is suspended, m.
D = spacing between the mesh of the network measured along the catenary conductor, m
h = height of structure, m
n = number of cross bonds between two catenary conductors.

6.5.2.3 Where the earth electrode of a mast is separate from the metal water main, other services or the earth electrode of a structure, the following clearance distance "d" shall be maintained with a minimum of 1.00 m:

a) Between the mast and any point of the structure: d ≥ 0,06.h + 0,1. Rs m.
b) Between a horizontal catenary conductor and any part of the roof of the structure: d ≥ 0,06.)L/2) + 0,1. Rs m.

Where Rs = numerical value of the earth electrode resistance of the mast or, where masts are connected together by a catenary conductor, of the mast thus connected together, measured in ohms.

6.5.2.4 The minimum clearance distance "d" where the structure has no earth electrode and has limited water or electricity supply, shall be maintained within the following minimum clearance distances:

a) d ≥ 1, 00 m between the mast or catenary conductor and any part of the structure.
b) D ≥ 0,1 Rs m between the mast and any water pipe or electric cable, whether buried or above ground unless the mast electrode is bonded to the metal pipe of the underground water main. If Rs is not known, the clearance distance D must be at least 3m.

6.5.3 MAST PROTECTION IN THATCHED ROOFS

6.5.3.1 Thatched roofs shall be protected by one or more free-standing masts only. The zone of protection of the masts must include gable ends, chimneys, antennas, vent pipes and any other metal objects.
6.5.3.2 Telephone wires, overhead services connections to the electricity supply, or other overhead metal wires or pipes, shall not enter the structure through or close to the thatch.

6.5.3.3 On remote chimneys or gable ends close to imaginary surface of the protection zone, install a finial and down conductor well away from the thatch.

6.5.3.4 Metal wires and metal-coated insulating sheets used in the construction of the thatched roof shall be bonded together and to the earthed metal water main or electrode of the structure.

6.5.3.4 Where metals used in the construction of the roof are not bonded and earthed, a minimum clearance distance c of 1m between metals of the roof and water pipes, vent pipes, tanks, gas pipes, antennas, telephone and bell wires, bugler alarms and electrical wiring and conduits shall be maintained.

7.0 INSTALLATION

7.1 AIR TERMINALS ON THE STRUCTURE TO BE PROTECTED.

7.1.1 The purpose of an air terminal on a structure to be protected shall be to intercept lightning strokes at preferential points of an air terminal, thereby:

a) Minimizing penetration of a lightning discharge current which could have followed a random path in the roof structure with possibility of a resultant fire.
b) Preventing the loosening of masonry or the cracking of precast panels or reinforced concrete.

7.1.2 The selection of the air terminal system and the the position of down conductors shall be so selected such that at any likely point of incidence of lightning stroke, there are at least two parallel paths for the current to floe to earth.

7.1.3 Parallel routes shall not be necessary in the following cases.

a) An air terminal on a small structure having only one prominent point of incident.
b) Dead-ended conductors, i.e those conductors of the air terminal for which it is not feasible to provide a connection to a down conductor.

7.1.4 Where a peripheral roof conductor is required for the protection of the outer side edge of a structure, the conductor shall be installed as close to the edge as is practicable (preferable not more than 100mm from the outer edge)

7.1.5 Where buttresses or parapet walls are not already equipped with an air terminal in the form of continuous metal cladding or similar metalwork and peripheral conductors are to be provided at an effective height He of 15 m or more, finials shall be added on all exposed outer corners and at intervals not exceeding 30 m between outer corners. The finials shall be placed as close as possible to the outer edge, and so position the down conductors such that their connection to the peripheral conductor is close to the finial.

7.1.6 Concrete masonry chimneys or gables ends that are not protected with the appropriate shielding angle of another structure shall be protected by means of a finial or metal cap. Where the chimney or gable end is of masonry, a peripheral conductor along the gable or around the chimney shall be used instead.

7.1.7 Where it is not feasible to provide a down conductor at one end of an air terminal or a connection to another part of the lightning protection system, a dead ended conductor shall be used provided it is not longer than 10 m an generally flows a horizontal or downward course from the free end to end connected to the remaining part of the lightning protection system.

7.1.8 Where a dead-ended conductor partly flows an upwards course, the dead-ended conductor shall be not longer than 7.5 m. If the top of the protected part is considerably lower than the ridge conductor to which the dead-ended conductor is connected, a finial shall not be used at the free end, unless it is required for the enhancement of the protection of the surrounding area, in which case an additional down conductor at the free end is recommended.

7.1.9 Metal gutters shall be bonded along the outside perimeter of the roof to the nearest down conductor, or to the metal of the roof, where applicable.

7.2 METAL ROOFS AND NON-METAL ROOFS SUPPORTED BY METAL ROOF STRUCTURES

7.2.1 Structures having roofs covered with electrically continuous metal sheets do not require air terminals, but shall be earthed by down conductors.

7.2.2 Sheet metal separated from each other by insulating strips or by epoxy or plastic coating s, may be regarded as providing continuous metal roof. However where sparking between such roofing is considered undesirable because of magnetic interference, all sheets adjacent to the ridge conductor or peripheral conductor shall be bonded.

7.2.3 A non-metal roof consisting of non-combustible roofing material held by metal fasteners to a roof supporting structure of metal construction may be considered to be a metal if the metal structure is earthed by down conductors, or supported by earthed metal columns, and spacing between roof beams does not exceed 15m for Category B and C hazards.

7.3 REINFORCED CONCRETE STRUCTURES

7.3.1 Reinforced steel shall not be used as parallel paths to enable lightning discharge current to flow safely to general mass of the earth.

7.3.2 Air terminals or finials and where necessary peripheral conductors shall be installed, taking into consideration the likely points of incidence of lightning and the path of the current through internal down conductors.

7.3.3 Where the outer support columns of the structure may be regarded as continuous from roof to basement, the peripheral and air terminal conductors shall be bonded to the internal or external down conductors.

7.3.4 Peripheral conductors and finials shall be used for medium height structures with reinforced concrete. Where the peripheral conductor is on a parapet wall that surrounds a metal roof or the air terminals of other structures, the other air terminal shall be connected to the peripheral conductor, preferably close to a down conductor. The peripheral conductor and other air terminal shall be connected to internal or external down conductor.

7.3.5 If the upper edge of the structure with chimneys and cooling towers and of medium height is not metal clad, horizontal conductors around the upper circumference of the structure, equipped with finials at intervals of not more than 15 m, with a minimum of two shall be installed.

7.3.6 On tall reinforced concrete structures, one of the following shall be installed in order to increase the protective efficiency, depending on the risk and the degree of protection required, height and slenderness of the structure:

a) At intervals of not more than 10 m, install oblique finials along the upper perimeter, pointing upwards and outwards such that the tip of each finial points outwards at an angle of 30° to the vertical through the outer edge of the structure, and is at least 400mm above the structure, each finial being connected to a peripheral conductor.
b) A horizontal conductor that follows the contour of the structure and that is so raised on oblique struts of length at least 500 mm that the conductor is displaced outwards at an angle of 30° to the vertical through the outer edge of the structure.
c) Oblique finials spaced as in (a) above, positioned on a horizontal conductor arranged as in (b) above and in line with the oblique struts, each finial pointing upwards and outwards at an angle of 30 to the vertical through the outer edge of the structure, and of length such that the tip of the finial is at least 800 mm above the outer edge of the structure.

Where the structure is slender, an air terminal as in (b) or (c) above is to be preferred to that in (a)

The air terminal shall be bonded to the internal down conductor at intervals not exceeding 10 m, or where the circumference exceeds 60 m, at appropriate intervals not exceeding 30m with a minimum of six bonds.

7.4 FINIALS AND ROOF CONDUCTORS

7.4.1 Roof conductors and finials shall be installed along the ridges of the roof and on other projections, in accordance to SANS10313 – code of practice for the protection of structures against lightning.

7.4.2 Protruding metal objects shall be bonded in a horizontal or in a downwards direction to the nearest roof or down conductor where the distance between the metal object and the conductor is less than 7.5m otherwise provide a separate down conductor. In all cases where the pitch of the roof is less than 30°, metal gutters and roof conductors shall be bonded or eaves conductors shall be provided.

7.4.3 In the case of large roofs of non-conducting material, additional conductors shall be installed across the surface of the roof, perpendicular to the long side of the roof and at extremely equal spaces not exceeding 15m. If the width of the roof exceeds 15m install conductors to form a grid at approximately equal spacing not exceeding 15m in either direction.

7.4.4 Roof conductors, finials and roof conductor grids shall be connected to the closest down conductor.

7.5.5 All roof conductors shall be manufactured from SABS approved single-core bare aluminium conductor with a minimum cross sectional area of 25mm^2.

7.5 DOWN CONDUCTORS

7.5.1 Down conductors shall be installed close to the point of the air terminal that are most likely to be struck by lightning and preferably run them vertically along the most direct route to the earth electrode.

7.5.2 At least two down conductors shall be provided in a building, such that in plan view no point of a structure is more than 15m from the nearest down conductor , except for masts and small structures having only one prominent point of incident, such as rondavels, these need only one down conductor.

7.5.3 Each down conductor shall be supplies with a separate earth electrode. This will reduce the current flow per down conductor, resulting in a lower voltage drop across the down conductor caused by the surge impedance of the conductor.

7.5.4 Down conductors shall not be placed close to doorways or entrances to buildings. Maintain a minimum clearance distance of the order of 1 m from the door and window frames, balustrades and other large metal objects.

7.5.5 Where down conductors deviate from a vertical route due to sharp bends and loops required to carry a conductor over eaves and parapet walls, shall be permitted, provided that all requirements stated in SANS 10313, clause 6.1.4 are met.

7.5.6 Steel columns and internal metal storm water drain-pipes shall be used as down conductors only if they are joined by screwing, bolting or welding.

7.5.7 External metal stair cases, fire escapes or other large frames shall be used as down conductors if they

are electrically continuous over their full height. If not electrically continuous they shall be bonded to the lightning protection system at the top or at the bottom of the framework.

7.5.8 In the case of structures of Hazard Category A, Test joints shall be installed in down conductors at convenient heights above finished ground level.

7.5.9 Internal reinforcing steel of vertical concrete column, particularly those on the outer corners can be used as down conductors, provided that the reinforcement is electrically continuous.

7.5.10 Vertically discontinuous reinforcement shall be bonded between the reinforcement of each section to provide a continuous path to ground or an external down conductor shall be installed.

7.5.11 Large external metal frames, balconies and metal cladding on the top floors of tail structures (typically 30 floors or more) that may be exposed to direct lightning strokes must be bonded to the reinforcement of the structure or to a down conductor that is connected to the reinforcement of the roof.

8.0 STATUTORY REQUIREMENTS

8.1 The Contractor shall ensure that the installation satisfies the requirements of all relevant South African Statutory Regulations

8.2 Where applicable, equipment items shall carry the SABS mark to demonstrate compliance with the regulations.

9.0 RESPONSIBILITY FOR WORK

9.1 The tenderer shall be responsible for the complete installation of the lightning protection system including testing, earthing conductors, surge protection devices, spikes etc. as required for various buildings and structures. These installations shall include the review and the upgrading of the existing lightning protection systems. Due considerations shall be taken of the effects of lightning covered herein below in clause 8, in providing the lightning protection system.

9.2 The tenderer shall undertake to repair all faults due to bad workmanship and/or the use of faulty materials and to replace all defective materials within six months after the installation date.

9.3 The tenderer shall rectify all the defects to the satisfaction of Transnet Projects, that may become apparent during the guarantee period.

9.4 The tenderer may be required to carry out builders work such as cutting of concrete columns and coring of holes for testing of the continuity of the existing steelwork or cabling. Good contact between reinforcing bars should be ensured.

9.0 APPLICABLE INFORMATION

10.1 **Electrical effect** – The current discharged through the earth electrode resistance produces a resistive volt drop which may raise the potential of the system to a high value relative to true earth.

10.2 **Side-flashing** – The point of strike may be raised to a high potential, and there is a risk of flashover from the protection system to any metal or in the structure.

10.3 **Thermal effect** – The thermal effect of a lightning discharge is confined to the temperature rise of the conductor through which the current passes.

10.4 **Mechanical effect** – When a high current is discharged along parallel conductors in close proximity or along a single conductor with sharp bends, a different mechanical effect is exerted by a lightning flash. This is due to a sudden rise of 30 000K in air temperature and the resulting explosive expansion of the adjacent air in the channel along which the charge is propagated.

11.0 PROTECTION AGAINST CORROSION

11.1 The tenderer shall ensure that atmospheric, chemical and or electrolytic corrosion of copper and other metals is prevented from occurring when used for the lightning protection system.

11.2 The contact surfaces of dissimilar metals shall be kept completely dry and protected against ingress of moisture to prevent the acceleration of electrolytic corrosion.

11.3 Although copper is highly resistant to many types of chemical attack, lead coating shall be recommended wherever subjected to severe corrosion due to presence of sulphur compounds.

11.4 Stainless steel material of similar grading shall not be used unless prior approval is obtained.

12.0 EARTHING CODES OF PRACTICE

This part of specification details standards and codes of practice to be adhered to in the supply, installation and termination of earthing systems on all Transnet Sites.

12.1 National Standards

12.1.1 The requirements of the materials, design, layout, fabrication, assembly, erection, examination, inspection and testing of an earthing system on site shall be in accordance with the relevant sections of codes: -

• SABS 089 Part 2	1965	Electrical Code for Petroleum Industry
• SABS 0121	1977	Cathodic Protection of Buried and Submerged Structures
• SABS 0123	1976	The Control of Undesirable Static Electricity
• SABS 0198 Part 12	1988	Installation of Earthing System
• SABS 0199	1985	The Design and Installation of and Earth Electrode
• SABS 0200	1985	Neutral Earthing in Medium Voltage Industrial Power Systems
• SABS 0292	1999	Earthing of Low Voltage (LV) distribution systems
• SANS 10313	Latest ammed	Protection of Structures against Lightning
• SABS 1063	1998	Earth Rods and Couplers
• SABS IEC 61000-5-2	1997	Electromagnetic Compatibility (EMC) Part 5: Installation and mitigation guidelines

Section 2: Earthing and Cabling

- SABS IEC TS 61312-2 1999 Protection against Lightning Electromagnetic Impulse (LEMP) Part 2: Shielding of structures, bonding inside structures and earthing
- SABS IEC 61024-1 1990 Protection of Structures against Lightning Part 1: General principles
- SABS IEC 61024-1-1 1993 Protection of Structures against Lightning Part 1: General principles Section 1: Guide A – Selection of protection levels for lightning protection systems
- SABS IEC 61024-1-2 1998 Protection of Structures against Lightning Part 1-2: General Principles Guide B – Design, Installation, maintenance and inspection of lightning protection systems
- SABS IEC 61312-1 1995 Protection against Lightning Electromagnetic Impulse Part 1: General principles
- SABS IEC 61312-4 1998 Protection against Lightning Electromagnetic Impulse Part 4: Protection of Equipment in existing structures
- SABS IEC 61643-1 1998 Surge Protective Devices Connected to Low Voltage Power Distribution Systems Part 1: Performance requirements and testing methods
- SABS IEC TS 61312-2 1999 Protection against Lightning Electromagnetic Impulse (LEMP) Part 2: Shielding of structures, bonding inside structures and earthing

12.1.2 Statutory Requirements

a) The Contractor shall ensure that the installation satisfies the requirements of all relevant South African Statutory Regulations

b) Where applicable, equipment items shall carry the SABS mark to demonstrate compliance with the regulations.

12.2 Technical Requirements

12.2.1 General

a) A common integrated station earthing system shall be provided for electronic and electrical systems equipment, static and lightning protection in accordance with the requirements of this document.

b) A soil resistively survey shall be carried out by a specialist earthing consultant/contractor. The consultant/contractor shall prepare a detailed report on the conditions identified and provide the survey data recordings together with proposals, for a basis of the earthing system design.

c) Major electrical equipment such as switchgear, transformers, lighting boards, floodlight towers on poles, control panels etc. and associated metallic support frameworks, shall be connected to the station safety earth via Electrical Earth bars located nearby.

Use of embedded conductors within a power cable (spare core earth) may be utilised as the primary equipotential bonding system provided the following conditions are met: (SABS 086-1:2001)

- The embedded conductor has a cross-sectional area equal to those of the live and neutral conductors or equal to the values in Table 1 of SABS 0142)

In addition, a second visual earth connection shall be provided to each item of electrical equipment, to prevent the potential to earth of such equipment rising above spark potential. (SABS 089-2:2000)

d) The neutrals of generators and transformers shall be connected to the main earth grid either directly or via an earthing resistor, as required. Where neutrals of transformers are connected directly to earth, this shall be done via means of connections to both an individual earth rod located nearby as well as to the station earth mat by means of Electrical Earth bar located within the Switchgear Room.

e) Frames of motors shall be connected to the earthing system in accordance with the following table:

Motors kW Rating	Minimum Earth Conductor Size
Up to 30	16 mm^2
37 – 132	50 mm^2
150 – 175	70mm^2

Note:
In order to minimize the number of different sizes of earth conductor, the above three sizes only shall be used throughout, unless specifically stated otherwise.

f) Cables supplying lighting fixtures shall be 3 core for single-phase supplies and 5 core for 3 phase supplies, of which one core shall be used as the earth conductor.

g) Plant Infrastructure such as manifold piping, tanks and metallic support frameworks, shall be connected to the station safety earth, either directly or by means of Electrical earth bars located nearby.

h) Flanged joints in metallic pipelines shall be considered inherently continuous provided the surfaces of one of the bolts are cleaned and identified for earthing. Flanges of metallic pipelines that have insulated linings for purposes other than cathodic protection shall be bonded to ensure electrical continuity.

Pipelines shall only be connected to the earthing system where they enter and leave the battery limits.

i) Storage tanks that are not cathodically protected shall be earthed through at least two separate connections to the tank. Tanks shall be earthed in accordance with the relevant SABS code.

Electrically continuous structural steel columns may be used as down conductors by means of which elevated tanks, vessels, etc. shall be deemed to be connected to the earthing system.

All tank covers, gauge floats and stirrers etc. as well as all pipes entering the tanks shall be earthed.

The steel roof shall be in a direct electrical contact with, or bonded to the tank shell.

Earthed grids, gauges, gratings and the like placed in or across the inlets of tanks are not to be used as a means of static discharge. Individual bonding shall be made to the earthing system.

j) Cable trays and cable racks shall have continuous earth continuity. This shall be ensured by installing 10mm^2 earth straps across the racking fishplates (joints). Cable Trays shall be connected to the earthing system in two places - where they enter and leave the battery limits.

k) Earthing connections to all equipment and process plant shall comprise of welded earth bosses in compliance with SABS 089 Part II:1965 regulation 5.1.4K with properly provided terminations i.e. 10mm diameter earth studs. Anchor bolts shall not be used.

Earth connections to all equipment shall be effectively bolted, using crimped lugs.
All cable connections shall be fitted with a “star” or serrated washer in addition to the backnut, to ensure good earth contact.

l) All earthing connections between the station earth system and respective earth bars/lightning protection systems shall where possible be made above ground, by means of bolts, crimped lugs and PVC taped.

All cable connections shall be fitted with a “star” or serrated washer in addition to the backnut, to ensure good earth contact.

Earth connection points shall be clearly labelled.

In cases where earth connection points are required to be made underground (e.g. to earth rods), inspection wells shall be provided comprising of pre-cast concrete/PVC surrounds complete with covers, to facilitate periodic inspection.

m) Earthing conductors rising through paving or other concrete work shall be run in suitable protective sleeves which shall project above finished level.

n) Earthing and bonding conductors shall be sized and installed in compliance with regulations detailed in the current SAIEE Standard Regulations for the Wiring of Premises and in SABS 03 as applicable.

o) Extendable earthing rods shall be manufactured from stainless / copper clad / galvanized steel (dependant on soil acidity and chlorides and existence of cathodic protection systems) 16mm diameter, 1200 mm long sections, and shall have molecular bond between the two metals to prevent moisture ingress. Where it is necessary to join earth rods together, a non-ferrous corrosion resistant coupling device shall be used which shall prevent the ingress of moisture into the joint.

p) Lightning and static earthing protection shall be provided for all tall steel, masonry and concrete structures, towers, vessels, tanks etc, as well as all buildings used to house sensitive electrical/electronic equipment. Lightning protection systems shall be connected both to individual earth rods as well as bonded to the station earth mat. Where possible, the mesh method (as defined in SANS 10313) should be utilised in the protection of buildings against lightning strikes i.e. the use of masts and catenary conductors are to be avoided.

Tall steel structures such as towers or structure columns, provided they are electrical continuous, shall be considered inherently protected against lightning by their connection to the earth.

q) **The resistance of the common earthing system to the general mass of earth shall not exceed 1 Ohm.**

r) Where a separate system is installed for other than electrical equipment in remote locations, e.g. storage tanks; its resistance to the general mass of earth shall not exceed 7 Ohms. (Note: This applies only for Lightning Protection and remote valve chambers that are not connected to the Station Earth).

12.2.2 Station Safety Earth

In cases where a new Station Safety Earth Mat is required to be provided, the following specifications shall apply:

The **Earth Mat** shall consist of a completely buried, lattice network of 40x3mm, bare copper tape. All the crossover points of the lattice shall be braised or cadwelded and protected with PVC insulation tape. Buried joints or splices shall not be clamped or bolted. The earth mat shall be buried, 1000mm minimum, below finished grade.

The interconnecting conductors shall be radially interconnected to form a common earthing system, for all electrical equipment, lightning protection and static earthing in accordance with relevant SABS requirements.

If required, additional earth electrodes may be installed to achieve the specified resistance, of the common earthing system to the general mass of earth. Where earth rods are paralleled in a group to reduce the earth resistance to the permissible value, they shall be spaced apart for a distance at least equal to their buried depth length.

12.3 Switchgear Room Building and Equipment

12.3.1 A Main Safety/Electrical Earth Bar comprising of a copper bar, 50mm x 5mm min shall be installed in the basement/false floor of the Switchgear Room. Where possible, this Earth Bar shall be designated as the Primary Test Point for the station earthing system with the following equipment directly connected:

- **Station Earth Mat**. Where possible, a minimum of four separate connections shall be taken into the Switchgear Room via separate routes from the Earth Mat, by means of 40mm x 3mm Cu Earth tape. Connection to the Main Safety Earth bar shall be made in two places by means of 70mm^2, 600-volt class, green colored, PVC insulated, stranded copper conductor, to facilitate testing of the Earth System.
- **Transformers**. By means of 70mm^2, 600-volt class, green colored, PVC insulated, stranded copper conductor
- **MV/LV Panels**. By means of dual 70mm^2, 600-volt class, green colored, PVC insulated, stranded copper conductors
- **Generator**. By means of 70mm^2, 600-volt class, green colored, PVC insulated, stranded copper conductor
- **Instrument Earth**. By means of dual 70mm^2, 600-volt class, green colored, PVC insulated, stranded copper conductors
- **Manifold Earth**. By means of dual 70mm^2, 600-volt class, green colored, PVC insulated, stranded copper conductors

Note that on existing sites, the earth mat has been connected to the station earthing system in multiple places (namely; the Switchgear Room, Control Room and Manifold), and thus designation of a single Primary Test point is not possible. Multiple test points have thus been defined as follows: Switchgear Room, Control Room and Manifold Mainline Pumps 1 & 4 (where possible).

12.3.2 All secondary earthing within the substation shall be attached to this station earth bar at appropriate demarcated points.

12.4 Control Room Building and Equipment

12.4.1 A secondary Safety/Electrical Earth Bar comprising of a copper bar, 50mm x 5mm min shall be installed in the basement/false floor of the Equipment/Control Room in an easily accessible position. Where possible, this Earth Bar shall be directly connected to the Main Safety/Electrical Earth bar located in the Switchgear Room, by means of dual 70mm^2, 600-volt class, green colored, PVC insulated, stranded copper conductors.

Note that all marshalling and equipment panels shall have an electrical earth bar, separate from an insulated instrument earth bar, installed and to which all electrical equipment earths shall be connected.

12.4.2 An Instrument Earth Bar comprising of a copper bar, 50mm x 5mm min shall be installed in the basement/false floor of the Equipment/Control Room in an easily accessible position. Where possible, this Earth Bar shall be directly connected to the Main Safety Earth bar located in the Switchgear Room, by means of dual 70mm^2, 600-volt class, green colored, PVC insulated, stranded copper conductors.

Note that all marshalling and equipment panels shall have an insulated instrument earth bar, separate from the electrical earth bar, installed and to which all clean/instrument earths shall be connected.

12.4.3 Instrument and Electrical Earth systems shall be clearly labelled.

12.5 Manifold Area and Equipment

12.5.1 All manifolds shall have an insulated manifold earthing system installed, comprising of the following specifications:

- 40mm x 3mm min flat copper tape, to run the entire length of the main electrical racking reticulation and supported off of insulators at distances of no more than 2m apart. Use of existing electrical racking reticulation supports shall be permitted. All joints will require to be braised. Earthing reticulation shall be installed in such a manner so as to be unobtrusive and yet accessible and shall be positioned so as to avoid obstruction to walkways and access routes.
- The Manifold Earth bar shall be connected to the main safety/electrical earth located in the Switchgear Room, by means of dual 70mm^2, 600-volt class, green colored, PVC insulated, stranded copper conductors.

  Note that on existing sites, the earth mat has been connected to the earthing system in multiple places (namely; the Switchgear Room, Control Room and Manifold), and thus designation of a single Primary Test point is not possible. Secondary test points have thus been defined where possible as follows: Switchgear Room, Control Room and Manifold Mainline Pumps 1 & 4.

12.4.2 All process plant and equipment located within the manifold area shall be attached to this manifold earth bar at appropriate demarcated points, via appropriately sized insulated PVC copper cable (green/yellow colored insulation), as follows:

- All electrical equipment shall be earthed via two separate earths, namely via the power cable earth core back to the respective Starter Panel electrical earth bar, and secondly via a separate visual earth from the motor frame to the manifold earth bar. Use of cable armouring as an earth conductor is not acceptable.

- All instrument stands and field junction boxes shall be separately earthed via means of an insulated 16mm2 min PVC copper cabling.

- All process vessels (tanks, vessels and piping) and racking reticulation shall be earthed via insulated 70mm2 min PVC copper cabling in two separate places.

All earth conductors utilized shall comprise of stranded, PVC insulated copper conductors with crimped cable lugs. All connections shall be fitted with a “star” or serrated washer in addition to the backnut, to ensure good earth contact.

12.6 Earth System Identification Standards

12.6.1 Earth Bar Labels

Earth bars shall be clearly labelled according to their functionality (e.g. “EB xx” to denote an electrical earth bar, “IB xx” to denote an instrument earth bar, where xx denotes a unique consecutive number). The Functional Identifier “EB 00” shall always denote the Station Earth Mat.

In addition, earth bars designated as Test Points shall be labelled accordingly.

Labels shall comprise of the Traffolyte engraved type, and fixed by means of stainless steel screws. Finish shall comprise of black letters against a white background, with text 40mm height.

Labels shall be readable/visible after the wiring has been done.

12.6.2 Earth cable Identification

Earth cables may be divided into two types, namely primary earth cabling running from subsystem earth bars directly or indirectly to the main station earth (and used for testing purposes), and secondary earth cabling running between the subsystem earth bars and equipment or infrastructure.

Only Primary earth cabling (i.e. those used for testing purposes) is required to be identified, by means of a Functional Identifier denoting both source and destination earth bars.

Identification numbers will comprise of the following specification:

- Grafoplast Targa Metal TGT System (Carrier Rail 58mm in length) 316 Stainless Steel Markers, with punched text 6 mm height minimum, fastened onto the cable at both ends via means of Stainless Steel cable ties

Examples:

EB01 – EB00 Cable Identifier for Earth cable running between Electrical Earth bar EB01 and the Station Earth Mat

IB01 – EB00 Cable Identifier for Earth cable running between Instrument Earth bar IB01 and the Station Earth Mat

12.7 Testing

12.7.1 Earth Resistivity and Electrode Testing

It will be the Contractors responsibility to carry out all necessary earth resistivity tests on site, where applicable. Tests will be in accordance with the requirements of BS 1013 as amended.

After all earth electrodes/trench earth's have been installed, an earth megger shall be used to test the earth resistance at the earth bar or connection point to the main station earth and the results recorded. Note that all ECC connections, and any other bonding material shall be disconnected from the earth connection point whilst the earth is being tested.

Earth Continuity Testing.

Earth continuity readings shall be measured and recorded from the earth bar to each item of equipment and process plant, and shall include all piping, vessels, transformers, motors, actuators, switchgear cabinets, marshalling enclosures and instrumentation.

12.7.2 The following are the maximum acceptable earth electrode resistances:

Electrical Earth
a) Main substation - 1 ohm
b) Miniature substations and kiosks - 2 ohms
c) Highmasts - 5 ohms.

Instrument Earth
a) Instrument Earth - < 1 ohm

13.0 INSPECTION AND GUARANTEE

13.1 Transnet Projects reserves the right to inspect the installation and the equipment to be used.

13.2 All lightning protection systems shall be inspected and certified by an accredited person after completion of the installation, to verify conformance as required by Code of Practice, SANS 10313.

13.3 All components of the lightning protection system shall be inspected to ensure that they are in good condition and are capable of performing their designed functions.

13.4 The tenderer shall ensure that all elements of the electrical installation have been incorporated into the protected space by bonding or extensions to the lightning protection system.

13.5 The mechanical condition of all conductors, bonds, joints and earth electrodes shall be checked and the observations noted. .

13.6 The tenderer shall undertake to repair and replace all faults and faulty materials due to bad workmanship during a period of six months.

13.8 The tenderer shall be required to guarantee the installation for a period of twelve (12) months.

END

SIGNATURE OF TENDERER: ----------

DATE: ----------

TRANSNET PROJECTS
DESIGN SERVICES

Annexure D- TCPELE030LUM03-LED Floodlight luminaire - Specification For The Supply Of Luminaires For Lighting Of Yards And High mast Lighting

SPECIFICATION FOR THE SUPPLY OF LUMINAIRES FOR LIGHTING OF YARDS AND HIGHMAST LIGHTING

This specification covers Transnet Group Capital's requirements for flood lighting

REVISIONS		
REV	**DATE**	**APPROVED**
0	September 2022	

INDEX

1. SCOPE

1.1. This specification covers Transnet' requirements for the supply of LED floodlight luminaires.

2. STANDARDS & SPECIFICATIONS

2.1. The following publications and documents (latest edition) are referred to herein:

2.2. The following standards with latest amendments are referred to herein:

3. SOUTH AFRICAN STANDARDS

SATS 17576	- Light-emitting diode products for interior lighting, streetlighting and floodlighting Performance requirements
SANS 121	- Hot dip galvanized coatings on fabricated iron and steel articles — Specifications and test methods.
SANS 475	- Luminaires for interior lighting, street lighting and floodlighting – Performance requirements
SANS 529	- Heat-resisting wiring cables
SANS 1088	- Luminaire entries and spigots
SANS 1507	- Electric cables with extruded solid dielectric insulation for fixed installations (300/500V to 1 900/3 300V) Part 3: PVC Distribution cables
SANS 1574	- Electric flexible cores, cords and cables with solid extruded dielectric insulation Part 3: PVC-insulated cores and cables
SANS 60529	- Degrees of protection provided by enclosures (IP Code)
SANS 60598-1	- Luminaires - Part 1: General requirements and tests
SANS 60598-2-5	- Luminaires Part 2-5: Particular requirements – Floodlights
SANS 61000-1-2	- Methodology for the achievement of functional safety of electrical and electronic systems including equipment with regard to electromagnetic phenomena
SANS 61000-3-2	- Electromagnetic compatibility (EMC) Part 3-2: Limits — Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)
SANS 9000	- Quality management systems – Fundamentals and Vocabulary

4. INTERNATIONAL STANDARDS

CIE 121:1996	- The photometry and gonio photometry of luminaires.
IES LM-80-08	- Approved method: Measuring lumen maintenance of LED light sources
IES TM-21-11	- Projecting long-term lumen maintenance of LED light sources.

5. Books

Mottier, P. (2010). *LED for Lighting Applications*. 2nd ed. Toronto Singapore: John Wiley & Sons, p.section 1. 2009

6. INFORMATION AND METHOD OF TENDERING

6.1. Tenderers shall submit their main offers in accordance with the requirements of this specification. Deviations from the requirements of this specification which are of a minor nature and do not depart materially, will be considered at the discretion of Transnet Capital Projects.

6.2. All documents forming part of the Tender shall be firmly bound. No loose documents will be considered.

6.3. Failure to comply with the above requirements may preclude a tender from consideration.

6.4. All tender documents shall be presented in a clear format with index, uniquely numbered pages and cross-referenced. The total number of pages shall be clearly stated in the index.

6.5. Test reports/certificates shall be issued or certified by the appropriate test authority, that is accredited by the South African Bureau of Standards (SABS)

7. ANNEXURES

The following appendices form an integral part of this specification and shall be read in conjunction with it.

7.1. Annexure 1 - "Statement of Compliance"

This annexure shall be completed by all tenderers and signed. Where tenderers do not fully comply, all deviations shall be clearly indicated in the space provided. Failure to complete the statement of compliance will result in tenders being excluded.

8. SERVICE CONDITIONS

The equipment shall be designed and rated for continuous operation under the following conditions: -

Altitude:	Sea level.
Ambient temperature:	5°C to +40°C (daily average +35°C)
Relative humidity:	As high as 95%.
Lightning conditions:	Severe, with a maximum lightning ground flash density of 12 flashes per km² per annum.
Atmospheric conditions:	Salt laden as well as electrolytic corrosion conditions prevail in all areas owing to the proximity of direct current traction systems and cathodic protection schemes.

9. LUMINAIRE CONSTRUCTION

9.1. The luminaire shall bear the SANS 60598-2-3 mark and shall comply with the specifications as per SABS ARP 035.

9.2. The luminaire housing shall consist of marine grade aluminium (EN 1706 AC-44300 grade) for the LED light source and LED power supply. The housing shall be designed for LED light sources between 50W and 1000W. The floodlight shall consist of 2 separate compartments, the LED engine compartment and the gear compartment with a 10kV/10kA surge protection device. A metallurgical (MTR) test report to be provided with the Tender.

9.3. The luminaire shall be IEC 60598-1 compliant and shall be of the totally enclosure type. Luminaires shall be delivered completely assembled with housing, driver, LED module and protector lens. It shall be designed to operate in an ambient temperature (Ta) environment of up to 25 deg C, without reducing the useful lifetime of 100 000 hrs at a lumen depreciation of not more than 30% (L70)

9.4. The luminaire housing shall be constructed using a hinging action on a spigot base casting. The housing shall incorporate a self-levelling device.

9.5. The luminaires shall incorporate a marine grade aluminium heat sink for cooling the light source. No fans or liquids shall be used for the cooling of the light source. The design of the external surfaces of the luminaire shall prevent the accumulation of dirt and nesting of insects or ants, thus ensuring continuous effective cooling. Heat from the LED source shall be able to take the shortest path to the exterior by direct conduction that will not compromise the useful life of the LEDs.

9.6. The floodlight shall have cooling fins above the lamp compartment designed in such a manner as to allow maximum heat dissipation

9.7. The cooling fins shall be designed to prevent the accumulation of dirt, thus ensuring the continuous effective cooling. The cooling rib height to width ratio may not exceed 0.7. Thermal protection shall be incorporated in the luminaire to prevent overheating.

9.8. The junction temperature of the power supply or driver shall follow the mentioned allowable temperature per

specific value of the current passing through it.

Table 1: Allowable junction temperature

junction current	allowable junction temperature (°C)
1.5 A	135
1 A	150
700 mA	167
350 mA	185

9.9. The housing shall be secured using stainless steel latches, access screws and luminaire shall be supplied in raw aluminium finish.

9.10. Due attention shall be paid to the accessibility of parts and to other requirements necessary for efficient maintenance and cleaning, where required. If screws are used to secure covers, they shall be held captive when opened.

9.11. External components e.g. toggle clips, bolts, screws, nuts, washers shall be stainless steel grade 304. The luminaire shall bear the SANS 475 mark and the SANS 605295-2-5 safety mark.

9.12. The upgrading and/or service of the LED unit and the driver/power supply shall be possible without removing the whole luminaire but by means of replacing only the optical/gear compartment by means of a hinging mechanism, or other such simple method which does not require tools, to allow possible integration of future technological development of LEDs and power supply.

9.13. The LED's shall be high efficiency (> 122 lumens/watt: Absolute photometry) CRI > 70.

9.14. The luminaires shall be supplied with a NEMA 7pin socket suitable for a tele-management control system.

10. MOUNTING OF LED LUMINAIRES

10.1. The LED Luminaires on the 3 to 12m masts shall be suitable to take a 42mm dia spigot either at 15 or zero degrees in accordance with the design and shall comply with Table 1 of SANS 1088:1990.

10.2. The LED luminaires for the 15m and 30m masts shall have a Hot dip galvanised stirrup bracket for mounting onto the mast and be suitable for aiming the luminaire in both the horizontal and vertical planes as per the design requirements.

10.3. Attachment of the luminaire base casting to the spigot or stirrup bracket (for both 1.4.1 and 1.4.2 above) should be by means of at least two stainless steel M8 grub screws.

11. HELICOILS

11.1. Inserted helicoils for the lamp holder housing and the gear compartment shall prevent the corrosion of stainless steel screws to the aluminium housing.

12. LAMP COMPARTMENT

12.1. The luminaires shall have aluminium housings of grade EN1706 AC-44300DF (or higher) aluminium alloy. This shall be substantiated by an independent metallurgical report confirming the grade of aluminium for the luminaires offered.

13. POWER SUPPLY

13.1. The power supply or driver compartment shall be so designed that there is sufficient space to permit replacement of components or repairs and reassembly without difficultly and without the removal of the luminaire from its mounting.

13.2. The power supply or driver shall be able to withstand surges of up to 10kV/10kA by means of an external inline fused surge protection device mounted inside the gear compartment. This surge protection shall be easily replaceable and it shall fail in an open circuit mode to protect the luminaire from further surges.

13.3. The LED module driver(s) shall operate at a power factor of 0.95 or greater, and the harmonic distortion levels shall be limited so as to not cause interference on the electrical network.

13.4. The total harmonic distortion levels of the LED module driver(s) shall not exceed 8% limit as stipulated in SANS 61000-1-2:2009. The module driver shall comply with the mentioned limit to evade from severe light source flicker.

14. WIRING

14.1. The internal wiring of the luminaires shall be flexible and suitably insulated to withstand the voltage and the temperature encountered in service.

14.2. Wiring to the LED module compartment shall be suitably grommet, ensuring a perfect seal between compartments and protection of the wiring.

14.3. The supply terminals shall accept a minimum of 4mm² wires and be easily accessible. No part of the cover shall damage the supply wires when closed.

15. EARTHING

15.1. Luminaires shall be earthed as per Clause 13 of the Electrical Machinery Regulations of the OHSACT (Act 85 of 1993).

15.2. Metal parts of luminaires which may become alive in the event of insulation fault and which are not accessible when the luminaire is mounted, but liable to come into contact with the supporting surface, shall be permanently and reliably connected to an earthing terminal and shall withstand the test specified in SANS 60598-2-5.

15.3. Earthing terminals shall comply with clause 7.2 of SANS 60598-1. All parts of an earth terminal shall be made of brass or other corrosion resistant metal and the contact surfaces shall be bare metal and not painted or varnished surfaces.

15.4. Earth connections shall be by means of suitable lugs in a manner avoiding all possibility of electrolytic corrosion.

16. LED LUMINAIRE REPORTS

16.1. Type test according to SANS 60598-1:2014.

16.2. IP rating test reports for all items offered in accordance with SANS 60529-1:2014 annexure J, table J.1 and table J.2 stipulating degrees of protection indication by first and second numerical characteristic respectively.

16.3. A separate ambient temperature (Ta rating) test report shall be provided, in accordance with SANS 475.

16.4. The test reports shall be issued by SANS or IEC accredited test authority.

17. OPTICS

17.1. The luminaire shall be able to be equipped with a variety of lenses, providing the desired light distribution, ensuring a great diversity of light distributions for different applications.

17.2. Luminaires should be photo metered according to the C-Gamma system as detailed in CIE Publication No. 27.

17.3. The intensity distribution table, given in candela, should be converted by an accredited test facility and/or luminaire supplier into a suitable electronic format for use with any of the commercially available lighting computer programs.

17.4. A performance of the LED luminaires shall be verified by designing of an appropriate area as per SANS 10098, in accordance with design criteria submitted by the responsible engineer. The encrypted luminaire data files, in an electronic format, suitable for use with commercially available Design Software shall be readily available on request.

18. LUMINAIRE FRONT GLASS

18.1. The front glass shall be high impact acrylic, toughened, clear flat glass.

18.2. The LED's shall be protected by an impact resistant polycarbonate lens with an IK10 rating and be equipped with a high-performance lens to provide the lighting distribution required as per the lighting design.

19. LUMINAIRE SPIGOT

19.1. The luminaire can either be mounted with a stirrup or by means of a bottom entry pole cap suitable for a 76mm diameter spigot. The stirrup shall be manufactured from 5 x 50mm hot dipped galvanized steel. The pole cap shall be manufactured from die cast aluminium and shall be bolted to the housing.

19.2. Luminaire spigot entries shall comply with SANS 1088.

20. INGRESS PROTECTION

20.1. The LED light source compartment shall have an Ingress Protection (IP) rating of IP66 to prevent corrosion, premature LED failure and maximum performance of the luminaire.

20.2. The LED light source compartment shall form a perfect seal preventing the entry of moisture, dust and insects into the LED compartment.

20.3. The power supply compartment shall have an IP66 ingress protection rating to ensure that the power supply components are protected against the ingress of dust and moisture, thus preventing corrosion and premature failure.

20.4. One-piece gasket, made of silicon sponge material, shall be fitted into a groove in the housing and shall be seated in a manner ensuring the integrity of the IP66 rating and shall not work loose during maintenance of the luminaire.

20.5. The luminaire shall have a degree of protection that complies with SANS 60598-1: 2014.

20.6. The IP ratings shall be certified by a SABS test report.

21. LUMENS OUTPUT AND POWER REQUIREMENTS

21.1. The light source shall have a colour temperature of 5500K.

21.2. The light source shall generate a minimum of 120 lumens per watt.

22. QUALITY MANAGEMENT SYSTEM

22.1. The assembly, design and testing of the LED luminaire shall be undertaken within an ISO 9001 certified factory, in South Africa

22.2. The Contractor's quality management system shall comply with the requirements of SANS 9000. All volitional requirements in SANS 9000 shall be mandatory requirements for items supplied against this specification.

23. PACKING

23.1. The luminaires shall be packed in such a manner that it will be protected during handling and transport by road, rail or sea as applicable. The movements of lamps and control gear shall be protected against vibration damage during transit.

23.2. When sea transport is involved, a dehydrating agent shall be provided where necessary.

24. RADIO DISTURBANCE

24.1. The floodlight shall comply with IEC 55015 “Limits and methods of measurements of radio disturbance characteristics of electrical lighting and similar equipment”

25. GUARANTEE AND DEFECTS

25.1. The tenderer shall guarantee the equipment supplied by him in terms of this specification for a period of five years (60 months). The tenderer shall state his compliance herewith.

25.2. This guarantee shall cover all materials, parts, workmanship, performance and efficiency. The guarantee shall include all equipment supplied.

25.3. If any part/equipment fails during the 60-month guarantee period, the supplied shall immediately replace such part/equipment free of charge.

WITNESSES

1. …….. ……
TENDERER

2. …… ……
DATE

Transnet Group Capital

Annexure F - TPD-010B-HIGHMASTSPEC-B - Specification for the maintenance and upgrade of high mast lighting structures.

SPECIFICATION FOR THE MAINTENANCE AND UPGRADE OF HIGHMAST LIGHTING STRUCTURES

REVISIONS		
REV	DATE	APPROVED
0	22-03-2012	
1	September 2022	

INTRODUCTION

This specification covers the maintenance of high mast structures.

INDEX

1.0 SCOPE

1.1 This specification covers Transnet's requirements for the design, manufacture and supply of all equipment and materials for maintenance, installation and testing on site of high mast lighting.

2.0 REFERENCES

2.1 The following publications and drawing (latest editions and amendments) are referred to herein.

2.1.1 South African Bureau of Standards

SANS 10142	- Code of practice for the wiring of premises.
SABS 150	- PVC insulated electrical cables & flexible cords.
SABS 1279	- Floodlighting luminaires.
SABS 155	- Solid filler wires for gas-shielded metal arc welding of Mild steel and medium-high tensile steel.
SABS 156	- Moulded-case circuit breakers.
SABS 767	-Core balance earth leakage protection units.
SABS 0225	- The design and construction of lighting mast
SABS 1431	- Welding of structural Steel
SABS 044	- Welding
SABS 455	- Covered electrodes for the manual arc welding of carbon and carbon manganese steels
SABS 763	- Hot-dip (galvanized) zinc coatings.
SABS CKS 42	- Hypoid gear oil
SABS CKS 74	- Straight mineral bearing oil
SABS CKS 443	- Extreme pressure gear oil.

2.1.2 British Standards Institution

BS 4360	- Weldable structural steels.
BS 5135	- Metal-arc welding of carbon and carbon manganese steels.
BS 721	- Worm gearing.

2.1.3 Transnet Ltd.

CME 35	- Specification for steel wire ropes.

Lubricants and petroleum fuels standing and advisory committee Circular No. 1

3.0 APPENDICES

The following appendices form part of this specification :

3.1 Appendix No. 1 – Painting specification.
3.2 Appendix No. 2 – Statement of Compliance.

4.0 METHOD OF TENDERING

4.1 Tendering shall be in accordance with Tender Form included in the tender documents.

4.2 Tenderers shall submit their main offers in accordance with the requirements of this specification. Deviations from the requirements of this specification, which are of a minor nature and do not depart materially, will be considered at the discretion of Transnet Projects. The acceptance of alternative tenders will be considered only if a main tender is submitted as part of the tender document.

4.3 The "Technical Data Sheet" of this specification shall be completed in detail, for each offer. Alternative offers shall be clearly marked "Alternative Offer No. _____".

4.4 All Technical Data Sheets shall be signed by the Tenderer and returned.

4.5 All documents forming part of the Tender shall be firmly bound. No loose documents will be considered.

4.6 Failure to comply with the above requirements may preclude a tender from consideration

4.7 The Tenderer shall submit complete and detailed information concerning their offers. This information shall include descriptions and drawings of the various items of equipment offered, as well as full photometric data issued by the South African Bureau of Standards, for the luminaires they propose using.

4.8 The Tenderer shall superimpose the number of luminaires per mast, vertical and azimuth aiming angles, as per existing.

4.9 The Tenderer shall allow for the supply, off-load, handling on site, erection, installation and testing of all items of equipment and material necessary for the complete lighting installation. This shall include the termination of the existing supply.

4.10 The Tenderer shall submit a lump sum price for the complete installation specified.

4.11 The total price tendered shall not include for a maintenance cage, power tool and winch.

5.0 SERVICE CONDITIONS

5.1 The lighting may be installed in areas where high humidity, high temperature, high wind, heavy rain, severe hail and high incidence of lightning are encountered and where corrosive conditions including the presence of sulphur dioxide, prevail.

5.1.1 Equipment installed shall be suitable for efficient operation under these conditions.

6.0 ELECTRICITY SUPPLY SYSTEM

6.1 The electricity supply system will be 3 phase, 4 wire, 50 Hz, alternating current with earthed neutral, at a nominal voltage of 400/230 V.

6.2 The voltage may vary within the range of 95% to 105% of the nominal and equipment installed shall be suitable for efficient operation at any voltage within this range.

7.0 STANDARD OF WORK, EQUIPMENT AND MATERIALS

7.1 All work shall be carried out in a neat and orderly manner to the satisfaction of Transnet Projects, and all equipment shall be easily accessible for maintenance purposes. Electrical work shall conform to the requirements of SANS 10142 and those laid down in this specification.

7.2 Equipment and materials used, shall be of high quality design and manufacture, and shall comply with the relevant specifications and recommendations mentioned in this specification.

7.2.1 Where equipment and material does not comply with the relevant specifications it shall be submitted to Transnet Projects Technical Officer for approval.

7.3 Every reasonable precaution and provision shall be incorporated in the design of the equipment for the safety and security of the system and of those concerned with its operation and maintenance.

8.0 OUTLINE OF SCHEME

As per attached drawings and detailed works instructions

9.0 MASTS

9.1 The mast shall be constructed in the form of a tapering enclosed column of polygonal or circular cross-section.

9.2 The design of the mast shall be adequate to resist a wind loading produced by a wind speed of 150km/h, measured at a height of 10 meters above ground level and acting on the projected area of the mast, luminaires and luminaire mounting carriage. The maximum permissible deflection at the top of the mast shall not exceed 2,5% of the height of the mast under wind loading produced by a wind

speed of 100km/h. Provision shall be made in the mast design for minimising wind excited oscillation.

9.2.1 Tenderers shall submit with their offer, a full set of design calculations, as well as dimensioned drawings of the mast structure including door opening strengthening and base plate connection details, signed by a registered professional engineer.

9.3 The masts shall be designed for mounting on a reinforced concrete foundation by means of a base flange secured to a bolt cage into the foundation. The base flange shall be free from laminations and the welded connection to the mast, shall fully develop the strength of the section. Means shall be provided to enable masts to be adjusted from deviations from the vertical.

9.3.1 The space between the top of the concrete foundation and the underside of the base flange shall be filled with a suitable compound after provision of a vermin proof drainage hole. The cable entry pipes shall not be obstructed.

9.4 All steel used in the manufacture of the masts, luminaire mounting carriages, maintenance cages, etc., shall comply with the requirements of BS 4360 grades 43A or 50. No steel section used in the construction of the mast shaft shall be less than 5mm in thickness.

9.5 Each mast shall be equipped with a suitable head frame accommodating mast top equipment associated with the raising and lowering gear. The head frame shall be designed to effectively seal the top of the mast against the ingress of water.

9.5.1 Problems are being experienced at certain locations with birds nesting in the vicinity of the shaft opening at the top of the mast, resulting in a build up of debris in the base of the mast. Tenderers shall describe with the aid of sketches/drawings, means adopted to avoid this problem in masts offered.

9.6 An opening shall be provided in the side of the mast to give easy access to a power distribution board, cable termination and the raising and lowering operating mechanism. The opening shall be protected by a lockable, close fitting, hinged door, incorporating a vermin proof ventilation opening and shall be effectively sealed against the weather. When the mast is installed, the opening shall face a direction parallel to adjacent tracks. Tenderers shall submit weatherproofing details with their tender documents.

9.6.1 The sides of the base compartment opening under 9.6 above shall be suitably reinforced with fully welded steel sections to restore the section modulus and prevent buckling.

9.7 Brackets or mounting plates, drilled to template shall be welded into the mast to support the winch and mast electrical equipment.

9.8 An M12 hex head stainless steel screw shall be welded to the main body of the mast in a readily position, directly adjacent to, and level with the underside of the distribution board within the base compartment, for earthing purposes.

9.9 Access shall be provided through the bottom of the mast and foundation for looping the supply cables into and out of the mast. Non-ferrous pipes shall be used for this purpose.

9.10 Welding shall be in accordance with BS 5135, general requirements for the metal-arc welding of mild or high tensile steel. It shall be carried out by qualified welders to the satisfaction of TRANSNET. Site welding will not be allowed without the written approval of the Technical Officer.

10.0 FOUNDATIONS

10.1 Mast foundations shall be built by others.

11.0 RAISING AND LOWERING SYSTEM

11.1 Each mast shall be provided with a carriage for mounting of the luminaires. The carriage shall be in two halves joined by bolted flanges to permit removal from the erected mast. It shall be possible to raise the luminaire carriage to the top of the mast for normal operation and lower it to the base of the mast for maintenance purposes. This shall be achieved by means of three independent suspension ropes operated from a winch mounted in the base of the mast, the ropes being contained within the mast and passing over pulleys in the head frame to the carriage. The suspension ropes shall be permanently under tension and locking of the luminaire carriage in the raised position by means of a latching device at the top of the mast will not be acceptable.

11.1.1 The design of the carriage shall be such that the structure embodies as far as possible the necessary mountings and housings for individual luminaire, control gear units and terminal boxes. All mountings shall be of rigid construction and fixings for control gear units and terminal boxes shall be such that those units can be readily removed, and are easily accessible for maintenance purposes without adjustment of floodlight aiming angles.

11.1.2 The carriage shall operate in conjunction with suitable guides located on the head frame, to ensure automatic and precise alignment of the carriage in the final stages of the raising operation and to guard against any fouling of suspension ropes and electrical cables.

11.1.3 The carriage shall be provided with a soft rubbing surface to prevent damage to the mast protection during raising and lowering.

11.1.4 The luminaires and control gear shall be mounted so as to balance the carriage as far as possible and the suspension system shall ensure that the luminaire carriage is supported in a horizontal position throughout the raising and lowering operation.

11.1.5 A visible means of indication that the luminaire carriage has reached the fully raised position shall be provided in the base compartment of each mast.

11.1.6 One specially designed bracket for clamping on to the mast directly above the door opening to support the luminaire carriage in the lowered position for maintenance purposes shall be supplied per contract.

11.2 The suspension rope pulley shall be fitted with self-lubricated, maintenance free bearings, protected against the ingress of moisture and dirt and designed for operation over the life of the mast without further attention.

11.2.1 The pulley shall be machine grooved to a depth of not less than 1, 5 times the diameter of the rope. The grooves shall be finished smoothly and be free from surface defects liable to damage the rope. The contour of the bottom of the groove shall be circular over an angle of approximately 120°. The radius of this part of the groove shall be larger than the radius of the rope by 0,8mm.

11.2.2 The diameter of the pulleys at the bottom of the groove shall not be less than 17 times the diameter of the rope.

11.2.3 The shafts on which the pulleys revolve shall be of large diameter to reduce the bearing loadings below normal design ratings. The shafts shall be positively secured in the head frame assembly to prevent rotation and shall be manufactured from stainless steel.

11.2.4 Pulleys carrying ropes or electric cables shall be provided with close fitting guards to retain the ropes or cables in the grooves when operating either loaded or slack. The guards shall be securely located against movement. Arrangements shall be made to ensure that the electric cables and steel wire ropes are separated before passing over their respective pulleys.

11.2.5 Pulleys shall be easily accessible to personnel standing on the floor of a maintenance cage in the fully raised position.

11.3 All pulleys, etc., at the top of the mast shall be protected against the ingress of water by means of a removable cover securely attached to the head frame and overlapping the equipment. The use of covers depending only on the security of gaskets for weatherproofing will not be acceptable.

11.4 Suspension and winch ropes shall be manufactured of AISI grade 316, flexible, stranded, stainless steel not less than 6mm diameter, in accordance with Specification No. CME 35 (rope detail as per table 39), with a factor of safety of not less than 10.

11.4.1 Thimbles shall, where possible, be secured by "Talurit" compression splices applied by means of a hydraulic tool. If this, for some reason, is not possible, three stainless steel "Crosby" type clamps per thimble may be used. "Crosby" clamps used shall be easily visible for inspection purposes.

NB: The saddle portion of the "Crosby" clamp must be placed against the wire under tension and not against the loose end.

11.4.2 Suspension ropes shall be easily removable and replaceable for inspection purposes. Tenderers shall provide clear instructions how this can be done.

11.5 All pulleys and bearings shall be manufactured from non-corrodible materials.

11.5.1 If non-metallic suspension rope pulleys are used, these shall be manufactured of glass filled nylon.

11.5.2 Each suspension rope pulley shall have a factor of safety of at least 10.

11.6 All equipment in contact with stainless steel wire ropes shall be entirely suitable for use in close contact with stainless steel, without the danger of electrolytic reaction occurring.

11.7 It shall be possible to fit a maintenance cage to the raising and lowering system, in place of the luminaire carriage, to enable two men to be hoisted to the top of the mast in complete safety for painting and maintenance purposes. The two halves of the maintenance cage shall be diametrically opposite one another. Use of the maintenance cage shall not necessitate the re-aiming of floodlighting luminaires.

11.7.1 Safety devices shall be incorporated in the construction of the maintenance cage to ensure it will not fall in the event of failure of the raising and lowering equipment. Tenderers shall submit drawings and describe fully, the type of equipment offered and include a separate price for the maintenance cage in their tender documents.

11.8 All bolts, nuts, pins, etc., associated with the luminaire carriage, maintenance cage and raising and lowering equipment shall be manufactured from stainless steel and locked by means of nylon inserts or spilt pins. Nylon inserts shall only be used in nuts that will not require removal in the normal course of maintenance. Pins shall be turned out of solid steel bar and wherever spring washers are used over elongated holes, a suitable flat washer shall be provided between the spring washer and the hole.

11.9 Special attention shall be given to the safety, reliability and protection against corrosion of the entire suspension system, including raising and lowering gear and ancillary

equipment, all of which shall meet with the approval of Transnet Project's Supervisor before installation.

12.0 PROTECTION AGAINST CORROSION

12.1 Mast luminaire carriages, maintenance cage and all ferrous parts associated therewith, shall be hot dip galvanized in accordance with SABS 763. The mass of galvanized coating shall determine in accordance with the non-destructive method under clause 6,3 of the aforementioned specification.

12.2 All welding, drilling, punching, stamping, cutting and bending of parts shall be completed and all burns removed before the galvanizing process is carried out.

12.3 If specified, paint treatment shall be applied to all exterior galvanized surfaces in accordance with the requirements.

12.4 Stringent precautions shall be taken to protect finished surfaces from injury or damage during assembly.

13.0 WINCH

13.1 Provision shall be made in the base of the mast to accommodate a removable twin drum, totally enclosed, oil-bath type winch.

13.2 The winch shall be used for raising and lowering of the luminaire carriage and maintenance cage. The winch shall have a factor of safety of not less than 4.

13.3 The winch shall be of light weight construction and mounted on a suitable frame for easy transfer from one mast to another. It should also be easily coupled and uncoupled and removable through the door opening provided at the base of the mast. The design and mass of the unit shall allow easy handling and attachment to the mast by not more than two men. The total mass of the winch, including wire ropes and mounting frame shall not exceed 75kg.

13.4 Winches mounted outside the mast and connected to the suspension ropes through the door opening, will not be acceptable.

13.5 Each luminaire carriage suspension rope shall be secured independently in the base of the mast, prior to removal of the winch. The method of securing the ropes shall be such that there will be no deflection of the ropes from the vertical in any direction.

13.5.1 After fixing, the suspension ropes shall remain under tension to ensure that the luminaire carriage is retained in its fully raised position. This shall not be achieved by any kind of adjustment after the ropes have been secured.

13.5.2 This method of transferring the tension from each winch drum to the lock position must be safe. Pins used shall be of such a design that they lock automatically in position and cannot be removed while the hoist ropes are under tension

13.5.3 Single drum winch and compensating pulley arrangement will not be acceptable. The two suspension ropes shall be attached independently to each of the twin drum winch ropes.

13.5.4 Tenderers shall fully describe the method used for transferring the tension from the winch to the lock position and vice versa, prior to removal or replacement of the winch.

13.6 The winch shall be of the worm-gear type, self –sustaining at all loads and operating speeds, without the use of brakes or clutches. It shall have a gear ration of at least 50:1 and be suitable for both hand and power operation.

13.7 The winch shall be fitted with a safety device to ensure that the drum is locked positively when the cranking handle or power tool is removed from the drive shaft. The safety device shall be applied automatically.

13.8 Winch drums shall be machine grooved to ensure a tidy rope lay. The bottom of the groove shall be circular over an angle of approximately 120°. The radius of the groove shall be larger than the radius of the rope by not less than 0,8mm. The drum grooves shall be finished smoothly and be free from surface defects liable to damage the rope. The drum grooves shall be pitched so that there is a clearance between neighbouring turns of rope.

13.9 The rope anchorage on the drum shall be such that it is possible to inspect the termination of the rope in service without dismantling any part of the winch. It shall be so designed that the first and all successive rope lays are reeled on the drum in regular and tidy layers without any undue bending of the rope at the first turn.

13.10 The drum shall be so designed as to prevent the rope layers from stacking one on top of the other against the flange and also to prevent rope on any layer forcing its way down into lower layers.

13.11 The design of the winch and installation shall allow at least five turns of the rope to remain on the drum when the winch rope is fully extended under normal operating and maintenance conditions.

13.12 The winch shall incorporate a separate gearbox for each drum.

13.13 Worm gearing shall comply with the requirements of BS 721.

13.14 A test certificate. Stating the safe working load of the winch and issued by a recognised testing authority, shall be supplied with each winch.

13.15 Winches shall be fitted with a label and rating plate of a permanent nature in an easily visible position.

13.16.1 The label shall carry the Manufacturer's or Supplier's name and type number, serial number, test certificate number, safe working load, maximum allowable speed of operation at the safe working load, recommended lubricant and year of manufacture or supply.

13.16.2 The lubricant for the winch shall be selected from Transnet's standard list, and Tenderer's recommendations are to be based on the "Lubricants and Petroleum Fuels Standing Advisory Committee Circular No. 1". (Failure to complete form CSS 80 correctly could disqualify an offer).

13.17 Tenderers shall quote separately for the twin drum winch.

13.18 Tenderers shall include a separate quotation for the supply of an electric power tool, incorporating a torque limiting device, for operation of the winch. The power tool shall be suitable for operation on a 230 volt, 50Hz, single phase supply.

13.18.1 The operational speed of, and torque developed by, the power tool shall match the requirements of the winch and suspension system. Should a multi-speed power tool, having speeds in excess of the aforementioned operational speed, be supplied, positive means shall be provided on the power tool to prohibit its use at any speed greater than that recommended.

13.18.2 It shall be possible to support the power tool accurately and securely in its operating position for remote control at a distance of 5 meters from the mast base. The remote control switch shall incorporate a push button requiring constant pressure for operation.

13.18.3 All the equipment shall be of robust construction, suitable for site use and shall be complete with interconnecting cables and plug.

13.19 An operating handle, incorporating a torque limiting device, shall be supplied for manual operation of the winch.

13.20 The torque limiting devices shall be adjusted according to their function up to a maximum value of 40 Nm. The adjustment shall be so arranged that it cannot readily be altered during normal use of the tools on site.

14.0 LUMINAIRES AND CONTROL GEAR

14.1 The tenderer shall supply and install luminaires as detailed in the works information.

15.0 DISTRIBUTION BOARD AND MAST CABLING

15.1 All terminal blocks and cabling shall be inspected for damage and replaced if necessary.

15.2 A totally enclosed power distribution board of flame retardant reinforced fibreglass construction shall be mounted in an easily accessible position in the compartment of the mast.

15.2.1 The board shall be provided with a front cover panel secured by captive type screws and allowing only operating toggles of switches/circuit breakers to protrude.

15.3 The distribution board shall be equipped as follows:

15.3.1 One adequately rated, triple pole, moulded case, main isolating switch.

15.3.2 Three adequately rated, single pole, moulded case circuit breakers for control of the luminaires.

15.3.3 One 15 amp, 3 pin, industrial type, switched socket outlet for control of the power tool.

15.3.4 One 15 amp, single pole neutral, moulded case circuit breaker with integral 20 mA earth leakage protection device for control of the switched socket outlet under clause 15.3.3. The earth leakage unit shall comply with the requirements of SABS 767

15.3.5 One three phase, neutral and earth socket outlet for connection of the supply cable to the luminaires and protected by the circuit breakers under clause 15.3.2 above.

15.3.6 An adequate number of terminals of suitable size, allowing only one wire per terminal for looping of the incoming and outgoing supply cables. These terminals shall be provided with bridge pieces connecting any number of adjacent terminals together to form a bushbar.

15.3.6.1 Terminals shall be of the rail mounted clip-on type, with flash-barriers between terminals.

15.3.7 An insulated neutral terminal block with sufficient ways for the number of circuits employed.

15.3.8 An adequately rated earthing bar.

15.3.9 Grommeted access holes in the bottom of the board for cable entry.

15.4 All wiring in the distribution board shall be neatly arranged to run horizontally and vertically and shall be supported and fixed at regular intervals.

15.5 All moulded case circuit breakers shall comply with the requirements of SABS 156. They shall be rated for 250 volts and have a breaking capacity of "6kA".

15.6 The main switch under clause 15.3.1 shall be of the same manufacturers as the moulded case circuit breakers specified. The switch shall be capable of carrying a fault current of 1 000 A for 1 second without welding of the contracts or other damage to the unit.

15.7 Each control unit on the distribution board shall be clearly labelled by means engraved or printed labels of metal or plastic or other approved material, firmly attached to the board and indicating in both official languages the designation of each circuit controlled. Labels of embossed adhesive tape are not acceptable.

15.8 A flexible, multicore, heavy duty trailing cable shall be installed between the distribution board in the base of the mast and the luminaire carriage, for the power supply to the luminaires. The cable shall be entirely suitable for the bending and load carrying stresses involved.

15.9 Guiding pulleys in the head frame shall be of adequate diameter and shall have a cable retaining groove sized to match the cable diameter, to ensure that the cable is not subjected to abrasion or undue straining during raising and lowering operations.

15.10 The cable shall be securely clamped at the luminaire carriage, the other end being secured to the suspension cable in an approved manner, to ensure that the lower end returns to the mast base during the luminaire raising operation and does not become entangled with suspension ropes.

15.11 The cable shall be so installed that it can be replaced from ground level without lowering the mast or the use of special equipment. Tenderers shall provide clear instructions on how this can be done.

15.12 Both ends of the cable shall be fitted with adequately rated, 3 phase, neutral and earth, plug-in connectors to match the socket outlet under clause 15.3.5 and a socket outlet mounted in/on a weatherproof, corrosion resistant terminal box on the luminaire carriage.

15.13 The socket outlet, plug-in connector combinations on the distribution board and luminaire carriage shall be of the weatherproof type. When connected, the plug-in connectors shall be retained in position by suitable locking devices. The equipment shall be of Niphan, LPA-REM, Maréchal (BICC), or equal approved manufacture.

15.14 When in the lowered position, testing of the luminaires shall be effected via a three meter length of flexible cable, of equal manufacture and cross-sectional area to that supplying the luminaires, and fitted with plug-in connectors on both ends to suit the socket outlets on the distribution board and luminaire carriage. One such cable shall be provided per contract.

15.15 The terminal box on the luminaire carriage shall contain fixed terminal blocks of "KLIPPON", or equal manufacture, for connection of the cabling to the luminaires. Cabling between the terminal box and control gear provided in the construction of the luminaire carriage, or galvanised steel conduits. Any cabling exposed to the effects of ultra violet radiation, shall be silicon insulated.

15.16 All metalwork, including luminaires, control gear units and the luminaire carriage shall be bonded to the earth core of the luminaire supply cable.

15.17 The following label in both official languages shall be affixed to the distribution board in a prominent position:

"Luminaire socket outlet and plug to be isolated and disconnected before lowering the luminaire carriage".

16.0 CABLES

16.1 The contractor shall supply and install 4-core, ECC, PVC cables.

16.2 The contractor shall also supply and install a 120mm^2, 1-core, earthing cable at each mast.

16.3 The cable shall be installed in cable ducts and sleeves provided by others.

17.0 CABLE LAYING

17.1 The cable shall be installed in cable ducts and sleeves.

18.0 EARTHING AND LIGHTNING PROTECTION

18.1 The contractor shall supply and install earthing and lightning protection to the masts as per SANS 10313.

18.2 The incoming and outgoing cable termination and earthing arrangement at each mast shall be as shown.

18.3 The earthing core of the cable supplying the luminaires (clause 15.8) shall be connected to the earthing bar in the distribution board.

18.4 Lighting protection is required at all masts.

18.4.1 Each mast shall be equipped with a lighting conductor in the form of a galvanised steel rod screwed into the top of the head frame, through the head frame cover.

18.4.1.1 The minimum dimensions of the conductor shall be 12mm diameter and 600mm long.

18.4.1.2 The actual length of the conductor shall be adequately to afford a zone of protection to the luminaire carriage and ancillary equipment by an imaginary line drawn from the top of the rod at an angle not exceeding 45° from the downward vertical.

18.4.2 Depending on the mast location the earth termination shall be effected either by an earth rod, or mast to rail bond, or both.

18.4.2.1 Each mast shall be equipped with a mast to rail bond and spark gap.

18.5 The gusset arrangement and 50mm diameter hole through the foundation shown shall be included in the tender price and provided at each mast.

18.6 The earth rod described in clauses 18.7 to 18.9 below, shall be included in the tendered price for installation at all masts.

18.6.1 Should earth rods for any reason not be required. Adjustment will be effected at the rates.

18.7 The earth rod shall be of the "Taper Lock Cadweld" type, consisting of a heavy copper exterior, molecularly bonded to a high strength steel core. The copper shall have a minimum thickness of 0,25mm

18.8 Rods shall be supplied in 1 meter lengths of 16mm diameter and joined together by the taper lock method to ensure that soil contact is maintained throughout the length of the coupled rods.

18.9 Tenderers shall allow a length of 3 meters of rod per mast. Should this length be insufficient to obtain the earth resistance specified, and then further lengths will be paid for at the relevant rate.

18.10 Rods shall be driven into the ground in a professional manner to ensure that no unnecessary vibration are set up. The manufacturer's recommended rod driving practice shall be closely followed.

18.11 The resistance to earth, measured by an earth resistance tester shall not exceed 10 ohms. Salt or other corrosive substances shall not be used to reduce earth resistivity. Sanica Gel or other approved substances may be used.

19.0 LOWERING AND RAISING OF MAST:

19.1 Supply a suitable size crane and all rigging equipment as well as the qualified rigger to lower and raise the pole.

19.2 Ensure that no damage occurs on the neighbouring structures as well the lighting structure.

19.3 A nylon sling capable of carrying weight more than three tons shall be used for the lowering and the raising of the high mast structure.

20.0 CLEANING AND SURFACE PREPARATION OF ALL COMPONENTS:

20.1 All surface shall be detergent washed and fresh water rinsed to remove oil and grease.

20.2 Sharp edge shall be radiused and major roughness of welds shall be removed by grinding. Weld spatter and flux shall be removed.

20.3 All bolts, nuts, pins, etc., associated with the luminaire carriage, maintenance cage and raising and lowering equipment shall be manufactured from stainless steel and locked by means of nylon inserts or split pins. Nylon inserts shall only be used in nuts that will not require removal in the normal course of maintenance.

21.0 REMOVAL & REPLACEMENT OF MOUNTING RING

21.1 Inspect, and repair the mounting ring. The repairs on the ring shall be according to the SABS 064, and SABS 763

22.0 REMOVE AND REFURBISH EXISTING MOUNTING RING

22.1 Inspect and repair corrosion and treat rust spots on the mounting ring.

23.0 REMOVE, CLEAN, RE-LAMP AND RE INSTALL EXISTING LUMINARE

23.1 All surfaces shall be detergent washed and fresh water rinsed to remove oil and grease.

23.2 All the light fittings shall be re-lamped with appropriate lamps.

23.3 The contractor shall repair the light fitting and replace all the mounting bolts.

23.4 All removed lamps will store together and disposed appropriately. The contractor shall submit a certificate of disposal at the end of contract.

24.0 REMOVAL & REPLACEMENT OF LUMINARE COMPLETE WITH LAMPS

24.1 Remove and replace luminaries where the luminaries are no longer working satisfactorily.

24.2 All the lamps of the removed luminaries shall be removed and disposed appropriately.

24.3 Disposal certificate shall be issued to the project manager at the end of construction or maintenance.

24.4 Replacement luminaires shall comply with requirement of SABS 1279.

25.0 REFURBISHMENT OF HEADGEAR WINCH AND PULLEYS

25.1 Check oil level, winch drums as well as the pulleys.

26.0 REPAIR AND REFURBISH HIGH MAST DOOR

26.1 Clean, remove rust and paint the door.

27.0 LUBRICATION OF MOVING COMPONENTS AND FOUNDATION BOLTS.

27.1 Lubricate all the foundation bolts as well as the associated nuts.

28.0 REMOVAL & REPLACEMENT SPLITTER BOXES

28.1 Remove and replace the splitter box.

29.0 REMOVAL & REPLACEMENT OF HOIST CABLE

29.1 Inspect and replace the hoist cables. The replacement cable shall be of AISI grade 316 flexible, stranded and stainless steel not less than 6mm.

30.0 REPLACEMENT OF ALL SILICON CABLE FEEDS FROM SPLITTER BOXES INCLUDING THE PROVISION OF GLANDS

30.1 Replace all silicon cable from the splitter box.

31.0 PAINTING OF COMPLETE HIGH MAST STRUCTURE

31.1 All surfaces shall be detergent washed and fresh water rinsed to remove oil and grease.

31.2 Sharp edge shall be radiused and major roughness of welds shall be removed by grinding. Weld spatter and flux shall be removed.

31.3 The painting of the mast shall be in accordance to APPENDIX No.1

32.0 REMOVAL & REPLACEMENT OF EARTH SPIKES

32.1 Test and install new earth spikes.

33.0 REMOVAL & REPLACEMENT OF ELECTRICAL DISTRIBUTION BOARD

33.1 Remove and install an electrical distribution board.

33.2 A total enclosed power distribution board of flame retardant reinforced fibreglass.

34.0 ELECTRICAL COMPLIANCE CERTIFICATION

34.1 Contractor to test installation and issue a compliance certificate.

35.0 ISSUE OF RMD 9 CERTIFICATE

35.1 Contractor to test and issue RMD9 certificate.

APPENDIX No. 1

PAINTING SPECIFICATION FOR LIGHTING MASTS

1. PAINTING OF MASTS

1.1. The preparation and painting of masts shall comply with SABS 064 and BS 5493 respectively. Colours shall be in accordance with SABS 1091.

1.2. The primer coating shall be similar to Plascon "Plascoguard Gehophon" GW 5, Dulux "Sigmacover"' or Chemrite Coatings "Carboline 193 HB".

1.3. The two coats covering the primer surface shall be similar to Plascon "Plascothane Recoatable Enamel" CPC series; Product data sheet U-8B, Dulux "Sigmadur Gloss HB", or Chemrite Coatings" Caroboline 133 HB". Colours shall be as specified in clause 4.11.8.

1.4. All paints shall be stirred and mixed to homogeneous condition incorporation the whole contents of the paint container. Mixed paint shall be kept mixed and in good condition throughout, stirring when necessary to keep the pigment in suspension. Thinning shall only be undertaken in accordance with manufacturer's recommendations and directions. Partially used containers shall be resealed to prevent evaporation of solvent.

1.5. Galvanised surfaces shall be scrubbed with steel wool soaked in a cleaning solution to remove the protective film against formation of white rust and all other foreign matter and also to provide a key for adhesion of the primer. Protective clothing, gloves and masks must be used by workers during this cleaning process. Rinse the cleaned surface copiously with water.

1.6. All painted surfaces, prior to application of the following coat, shall be sound, dry and free from oil, grease and other contamination. Any unsound paint to be removed completely, the surface prepared as in clause 4.11 above and repainted coat for coat as specified below.

1.7. After preparation of the galvanised surfaces apply one coat of primer by spraying to give a dry film thickness of 80 microns to all surfaces with the exception of the mast interior which need not be painted. Allow to dry for a minimum period of 4 hours before overcoating.

1.8. The primed surface shall then be painted in accordance with clause 4.11.2. One coat of colour G12 (Dark Admiralty Grey), by suitable airless spray equipment to give a dry film thickness of 75 – 100 microns for this coat. An overall final coat colour H30 (French

Grey), to give a dry film thickness of 25 – 35 microns shall be applied. The total dry film thickness of the primer and two successive coats shall be between 180 – 215 microns.

1.9. Paints shall be applied under suitable conditions of light, temperature, humidity and ventilation. At time of overcoating, the painted surface shall be clean, dry, sound and free of misses and defective paint. Each coat of paint shall be applied as a continuous, even film of uniform thickness.

1.10. Painted steel shall not be handled until the paint has dried except where necessary in turning for painting of stacking for drying. Paint damaged in handling shall be scraped off and touched up by replacing each coat of paint scraped off. Painted steel shall not be transported or packed for transport until paint is dry.

1.11. When loading at the manufacturer's premises and when off-loading at the erection site, components shall be handled with hessian covered slings in order to cause minimum damage to paintwork. During transportation, the components shall be placed on wooden dunning and securely fastened to prevent sliding and other movement.

1.12. Prior to erection of masts, damaged areas of paint shall be repaired by spot cleaning in a manner that will minimise damage to sound paint. Bared areas shall be spot primed and spot painted with the materials specified, to restore all coats.

1.13. During erection, mast shall be handled with hessian covered slings to minimise damage to paintwork. After erection, paintwork shall be repaired in the manner described above.

APPENDIX No. 2

Tenderers shall complete this information for the repairs required in each HML pole.

The total price should be reflected in the main BOQ under the refurbishment item.

Item	Bill description	Unit	Qty	Supply Rate	Labour Rate	Amount
	HIGH MASTS TWO YEARLY MAINTENANCE AT ISLAND VIEW SHUNTING YARD					
1	Check that the bolt and pins, as well as security connectors and "Crosby" clamps, are secure.	EA				
2	Inspect wire rope terminl ends, anchor blocks, locating plates and pins (If Fitted)	EA				
3	Check, without ascending mast, for paint deterioration and corrosion.	EA				
4	Check for signs of vermin, insects or birds nesting in the Mast.	EA				
5	Check for ground or ballast covering the foundation bolts and arrange removals if evident.	EA				
6	Check for signs of corrosion on the foundation bolts and arrange for cleaning and anti-corrosive treatment.	EA				
7	Check and where necessary, tighten all foundation bolts.	EA				
8	Check earthing of feeder cables to mast and earthing of mast.	EA				
9	Check spark gap and bond for repair by traction personnel, if required.	EA				
10	Check general condition of distribution board and test operation of earth leakage relay.	EA				
11	Lower the luminaire carriage of each mast.	EA				
12	Check that the winch runs smoothly and that the wire ropes are undamaged (fixed winch type only) Wire ropes to be inspected in terms of clause 22.1.8.	EA				

13	inspect rope anchorage points on winch drums (fixed winch type only).	EA				
14	Check that a minimum number of five turns of rope remain on the winch drums .	EA				
15	Inspect the stainless steel wire rope connections to luminaire carriage for wear, deterioration, corrision and check that the connection are secure.	EA				
16	Inspect the luminaire carriage and all assocatted items for paint detorioration,corrosion,cracked welds and other damages.	EA				
17	Check all Nuts and Bolts and tighten if nevcessary.	EA				
18	Inspect guide rollers (if fitted), or soft rubbing surfaces.	EA				
19	Inspect electrical cables, junction boxes and "Conmax"type electrical contacts (if fitted).	EA				
20	Check that the luminaire glasses, screws, clips etc. are secure and undamaged and that water is not present in luminaires.	EA				
21	Clean luminaire glasses and replace lamps where necessary.	EA				
22	Using binoculars, inspect the stainless steel wire ropes visually from the ground. Steel wire ropes to be inspected. In terms of clause 22.1.8	EA				
23	Clean the wire ropes for a distance of two metres above the luminaire carriage. Examine the ropes for strand distortion or flattening of outer strand wires due to them being in constant stress over the top pulleys.	EA				
24	Rectify all defects.	EA				
24	Mast doors to be locked at completion of operations.	EA				
26	Complete RMD 9, and where applicable MRD 66, Logsheet.	EA				

APPENDIX 3

STATEMENT OF COMPLIANCE
(TO BE COMPLETED BY TENDERER)

This tender complies with specification TPD: 010B-HIGHMASTSPEC-B in all respects.

SIGNATURE : _____ DATE : _____

This tender complies generally with specification TPD: 010B-HIGHMASTSPEC-B but differs from it on the following points.

_____

_____

_____

_____

SIGNATURE : _____ DATE :_____

Transnet Capital Projects

Annexure G - E7_1-Working in Railway Yards - Specification For Works On, Over, Under Or Adjacent To Railway Lines And Near High Voltage Equipment

TRANSNET
LIMITED
(REGISTRATION NO.1990/000900/06)

E7/1 (July 1998)

SPECIFICATION FOR WORKS ON, OVER, UNDER OR ADJACENT TO RAILWAY LINES AND NEAR HIGH VOLTAGE EQUIPMENT

(This Specification shall be used in Transnet Contracts)

CONTENTS

ANNEXES

1 DEFINITIONS

The following definitions shall apply :

Authorised Person. A person whether an employee of Transnet or not, who has been specially authorised to undertake specific duties in terms of Spoornet's publication SAFETY INSTRUCTIONS: HIGH-VOLTAGE ELECTRICAL EQUIPMENT, 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 Transnet to carry out work on its behalf.

Dead. Isolated and earthed.

Electrical Officer (Contracts). The person appointed in writing by the responsible Electrical Engineer in Transnet 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 Transnet 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 1 000 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 Transnet 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.

Project Manager. The person or juristic person appointed by Transnet 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 staff under his control to work on, over, under or adjacent to railway lines and in the vicinity of high-voltage electrical equipment.

Technical Officer. The person or juristic person appointed by Transnet from time to time as the Technical Officer, to administer the Contractor's performance and execution of the Works according to the powers and rights held by and obligations placed upon the Technical Officer in terms of the Contract.

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.

PART A - GENERAL SPECIFICATION

2. **AUTHORITY OF OFFICERS OF TRANSNET**

2.1 The Contractor shall co-operate with the officers of Transnet and shall comply with all instructions issued and restrictions imposed with respect to the Works which bear on the existence and operation of Transnet's railway lines and high-voltage equipment.

2.2 Without limiting the generality of the provisions of 2.1, any duly authorised representative of Transnet, having identified himself, may stop the work if, in his opinion, the safe passage of trains or the safety of Transnet assets or any person is affected. **CONSIDERATIONS OF SAFETY SHALL TAKE PRECEDENCE OVER ALL OTHER CONSIDERATIONS**.

3. **CONTRACTOR'S REPRESENTATIVES**

3.1 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 Technical Officer with the names, addresses and telephone numbers of the representatives.

3.2 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. **OCCUPATIONS AND WORK PERMITS**

4.1 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 Technical Officer and at times to suit Transnet requirements.

4.2 The Contractor shall organise the Works in a manner, which will minimise the number and duration of occupations and work permits required.

4.3 Transnet 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.

4.4 The Contractor shall submit to the Technical Officer, in writing, requests for occupations or work permits together with details of the work to be undertaken, at least 14 days before they are required. Transnet does not undertake to grant an occupation or work permit for any particular date, time or duration.

4.5 Transnet 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 4.6 to 4.8.

4.6 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.

4.7 When the Contractor is notified less than 2 hours before the schedule 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.

4.8 Reimbursement the Contractor for any loss of working time in terms of 4.6 and 4.7, 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 Technical Officer certifies that no other work on which the labour and plant could be employed was immediately available.

4.9 Before starting any work for which an occupation has been arranged, the Contractor shall obtain from the Technical Officer written confirmation of the date, time and duration of the occupation.

4.10 Before starting any work for which a work permit has been arranged, the Responsible Representative shall read and sign portion C of form No. T.1276 signifying that he is aware of the limits 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 T.1276 form, thereby acknowledging that he is aware that the electrical equipment is to be made "live". The Contractor shall advise all his workmen accordingly.

5. SPEED RESTRICTIONS AND PROTECTION

5.1 When speed restrictions are imposed by Transnet 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.

5.2 When the Technical Officer 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 Transnet's and the Contractor's personnel and assets, the public and including trains. Transnet will provide training free of charge of the Contractor's flagmen and other personnel performing protection duties. The Contractor shall consult with the Technical Officer, whenever he considers that protection will be necessary, taking into account the minimum permissible clearances set out in appendixes 1 to 4.

5.3 The Contractor shall appoint a Responsible Representative to receive and transmit any instruction, which may be given by Transnet personnel providing protection.

6. ROADS ON TRANSNET PROPERTY

The provision of clause 25 of the E.5, General Conditions of Contract, or clause 23 of the E.5 (MW), General Conditions of Contract for Maintenance Works, shall apply to the use of existing roads on Transnet's property.

7. CLEARANCES

7.1 No temporary works shall encroach on the appropriate minimum clearances set out in Annexure 1 BE97-01 Sheets 1,2, 3 and 5 of 5.

8. STACKING OF MATERIAL

8.1 The Contractor shall not stack any material closer than 3 m from the centre line of any railway line without prior approval of the Technical Officer.

9. EXCAVATION, SHORING, DEWATERING AND DRAINAGE

9.1 Unless otherwise approved by the Technical Officer any excavation adjacent to a railway line shall not encroach on the hatched area shown in Figure 1.

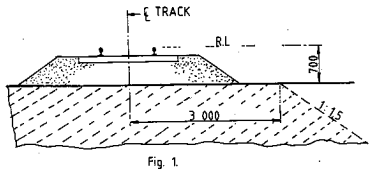


Fig. 1.

9.2 The Contractor shall provide at his own cost any shoring, dewatering or drainage of any excavation unless otherwise stipulated elsewhere in the Contract.

9.3 Where required by the Technical Officer, 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.

9.4 The Contractor shall prevent ingress of water to the excavation but where water does enter, he shall dispose of it as directed by the Technical Officer.

9.5 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.

10. FALSEWORK FOR STRUCTURES

10.1 Drawings of falsework for the construction of any structure over, under or adjacent to any railway line shall be submitted to the Technical Officer 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.

10.2 After the falsework has been erected and before any load is applied, the Contractor shall submit to the Technical Officer 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 Technical Officer to proceed, the Contractor shall be entirely responsible for the safety and adequacy of the falsework.

11. PILING

11.1 The Technical Officer will specify the conditions under which piles may be installed on Transnet property.

12. UNDERGROUND SERVICES

12.1 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.

12.2 Any damage shall be reported immediately to the Technical Officer, or to the official in charge at the nearest station, or to the traffic controller in the case of centralised traffic control.

13. BLASTING

13.1 The provisions of clause 23 of the E.5, General Conditions of Contract or clause 21 of the E.5 (MW), General Conditions of Contract for Maintenance Work, shall apply to all blasting operations undertaken in terms of the Contract.

13.2 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).

13.3 Blasting within 500m of a railway line will only be permitted during intervals between trains. A person appointed by the Technical Officer, 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.

13.4 The flagmen described in 13.3, where provided by Transnet, are for the protection of trains and Transnet 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.

13.5 The person described in 13.3 will record in a book provided and retained by Transnet 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.

13.6 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 Technical Officer and the person who will do the blasting shall both sign the book whenever an entry described in 13.5 is made.

13.7 The terms of clause 27 hereof shall be strictly adhered to.

14. RAIL TROLLEYS

14.1 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 Technical Officer and under the conditions stipulated by him.

14.2 All costs in connection with such trolley working requested by the Contractor shall, unless otherwise agreed, be borne by the Contractor, excluding the costs of any train protection services normally provided free of charge by Transnet.

15. SIGNAL TRACK CIRCUITS

15.1 Where signal track circuits are installed, the Contractor shall ensure that no material capable of conducting an electrical current makes contact between rails of a railway line/lines.

15.2 No signal connections on track-circuited tracks shall be severed without the Technical Officer's knowledge and consent.

16. PENALTY FOR DELAYS TO TRAINS

16.1 If any trains are delayed by the Contractor and the Technical Officer is satisfied that the delay was avoidable, a penalty will be imposed on the Contractor of R5 000 per hour or part thereof for the period of delay, irrespective of the number of trains delayed.

PART B - ADDITIONAL SPECIFICATION FOR WORK NEAR HIGH-VOLTAGE ELECTRICAL EQUIPMENT

17. GENERAL

17.1 This specification is based on the contents of Spoornet's publication SAFETY INSTRUCTIONS, HIGH-VOLTAGE ELECTRICAL EQUIPMENT, 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 Transnet, and the onus rests on the Contractor to ensure that he obtains a copy.

17.2 The Contractor's attention is drawn in particular to the contents of Part I, Sections 1 and 2 of the Safety Instructions : High-Voltage Electrical Equipment.

17.3 The Safety Instructions : High-Voltage Electrical Equipment 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).

17.4 This specification must be read in conjunction with and not in lieu of the Safety Instructions : High-Voltage Electrical Equipment.

17.5 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.

17.6 The Contractor shall regard all high-voltage equipment as live unless a work permit is in force.

17.7 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 Transnet staff where this is necessary.

17.8 No barrier shall be removed unless authorised by the Electrical Officer (Contracts).

18. WORK ON BUILDINGS OR FIXED STRUCTURES

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.

18.2 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.

18.3 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.

19. WORK DONE ON OR OUTSIDE OF ROLLING STOCK, INCLUDING LOADING OR UNLOADING

19.1 No person shall stand, climb or work whilst on any platform, surface or foothold higher than the normal unrestricted places of access, namely -

(i) the floor level of trucks;

(ii) external walkways on diesel, steam and electric locomotives, steam heat vans, etc. and

(iii) walkways between coaches and locomotives.

When in these positions, no person may raise his hands or any equipment or material he is handling above his head.

19.2 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.

19.3 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.

19.4 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.

19.5 Where the conditions in 19.1 to 19.3 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 Spoornet and at its costs, 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 in Transnet.

20. **USE OF EQUIPMENT**

20.1 Measuring Tapes and Devices

20.1.1 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.

20.1.2 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.

20.1.3 Special measuring devices longer than 2 metres such as survey staves and rods may be used if these are of non-conducting material and approved by the responsible Electrical Engineer in Transnet, but these devices must not be used within 3 metres of live high-voltage equipment in rainy or wet conditions.

20.1.4 The assistance of the Electrical Officer (Contracts) shall be requested when measurements within the limits defined in 20.1.1 to 20.1.3 are required.

20.1.5 The restrictions described in 20.1.1 to 20.1.3 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.

20.2 Portable Ladders

20.2.1 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.

21. **CARRYING AND HANDLING MATERIAL AND EQUIPMENT**

21.1 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 two or more persons so as to maintain it as nearly as possible in a horizontal position should carry such material. The utmost care must be take to ensure that no part of the material comes within 3 metres of any live high-voltage equipment.

21.2 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.

21.3 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.

22. **PRECAUTIONS TO BE TAKEN WHEN ERECTING OR REMOVING POLES, ANTENNAE, TREES ETC.**

22.1 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.

22.2 The cost of supervision by an Authorised Person and the provision of earthing shall, unless otherwise agreed, be borne by the Contractor.

22.3 The provisions of clauses 22.1 and 22.2 shall also apply to the erection or removal of columns, antennae, trees, posts, etc.

23. **USE OF WATER**

23.1 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.

24. **USE OF CONSTRUCTION PLANT**

24.1 "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.

24.2 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.

24.3 The cost of any supervision by an Authorised Person and the provision of earthing shall, unless otherwise agreed, be borne by the Contractor.

24.4 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.

24.5 Clauses 24.1 to 24.4 shall apply mutatis mutandis to the use of maintenance machines of any nature.

25. **WORK PERFORMED UNDER DEAD CONDITIONS UNDER COVER OF A WORK PERMIT**

25.1 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.

25.2 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.

26. **TRACTION RETURN CIRCUITS IN RAILS**

26.1 DANGEROUS CONDITIONS CAN BE CREATED BY REMOVING OR SEVERING ANY BOND.

26.2 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 Transnet personnel.

26.3 The Contractor shall not break any permanent bonds between rails or between rails and any structure. He shall give the Technical Officer at least 7 days written notice when removal of such bonds is necessary.

26.4 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.

27. **BLASTING**

27.1 The Contractor shall obtain the permission of the Electrical Officer (Contracts) before blasting, and shall give at least 14 days notice of his intention to blast.

27.2 No blasting shall be done in the vicinity of electrified lines unless a member of Transnet's electrical personnel is present.

27.3 The terms of clause 13 hereof shall be strictly adhered to.

28. **HIGH-VOLTAGE ELECTRICAL EQUIPMENT NOT MAINTAINED AND/OR OPERATED BY TRANSNET**

Where the work is undertaken on or near high-voltage electrical equipment which is not maintained and/or operated by Transnet, 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: -

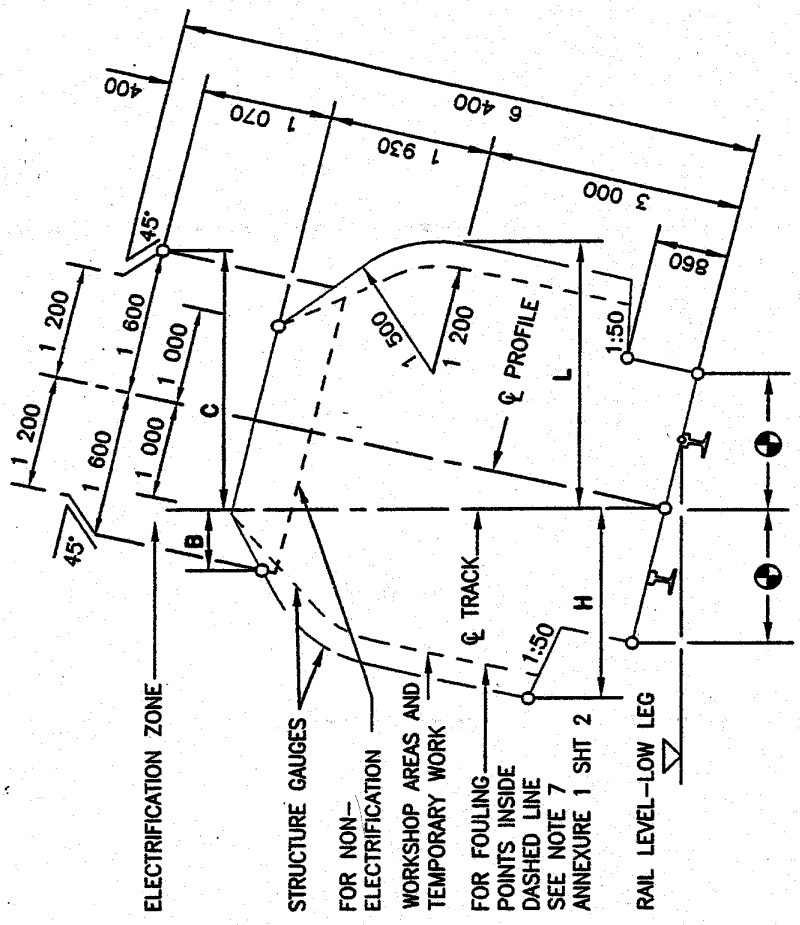
(i) Eskom and municipal equipment;

(ii) the Contractor's own power supplies; and

(iii) electrical equipment being installed but not yet taken over from the Contractor.

ANNEXURE 1
SHEET 1 of 5
AMENDMENT

HORIZONTAL CLEARANCES : 1 065mm TRACK GAUGE



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

REMARKS:

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

BE 97–01 Sht 1 of 5 DATE : JUNE 2000

ANNEXURE 1
SHEET 2 of 5
AMENDMENT

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 2,2m VECHILE BODY LENGTH.
9. ◐ SEE ANNEXURE 1 SHEET 3 FOR PLATFORM CLEARANCES.

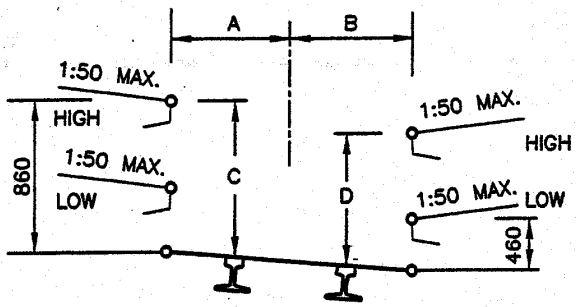
BE 97-01 Sht 2 of 5 DATE : JUNE 2000

ANNEXURE 1
SHEET 3 of 5
AMENDMENT

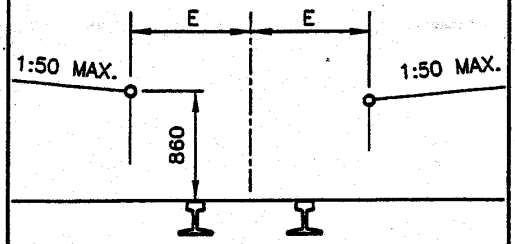
CLEARANCES : PLATFORMS

PLATFORMS : TRACK GAUGE 1 065mm

PASSENGERS



GOODS



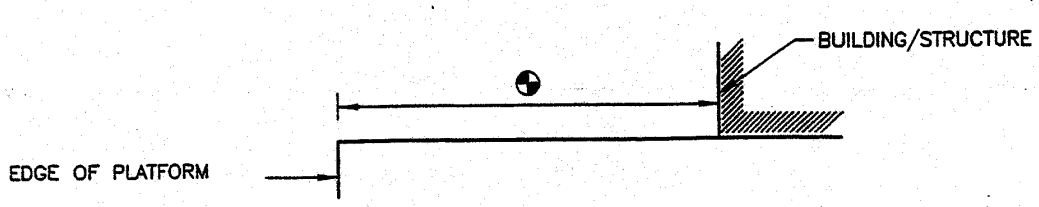
(NO CANT)

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.

STRUCTURES ON PLATFORMS : 1 065mm AND 610mm TRACK GAUGE



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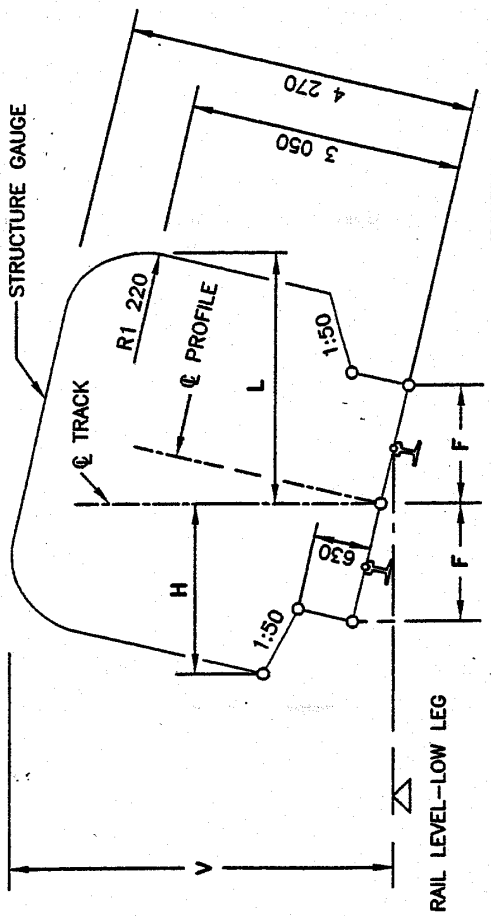
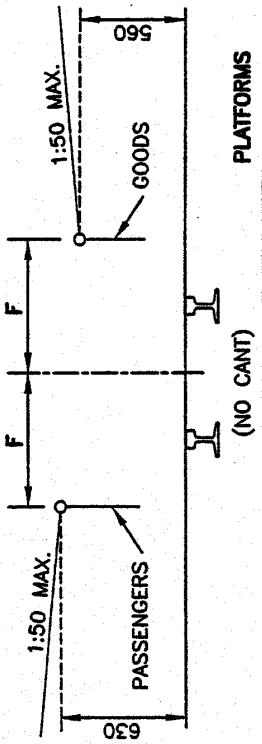
ANNEXURE 1
SHEET 5 of 5
AMENDMENT

CLEARANCES : 610mm TRACK GAUGE



CLEARANCES



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

RADIUS (m)	F (mm)
50	1 550
60	1 510
80	1 460
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.

BE 97–01 Sht 5 of 5 DATE : JUNE 2000

Annexure H - Transnet Integrated Management System Policy Commitment Statement

Annexure I - TPD-001-EL&PSPEC - Lighting Specification

SPECIFICATION FOR ELECTRICAL INSTALLATIONS TO BUILDINGS OTHER THAN DWELLINGS HOUSES

REVISIONS		
REV	**DATE**	**APPROVED**
0	**September 2022**	

INDEX

SECTION CONTENTS

1.0 SCOPE

1.1 This specification covers the requirements with respect to the electrical installation, including the supply of all material and labour necessary to complete the EL&P installation for buildings.

1.2 This specification also applies to electrical alterations and additions carried out to existing installations.

2.0 REFERENCES

2.1 The following publications (latest edition) are referred to herein:

CODES OF PRACTICE

SANS	10313		Code of Practice for Protection of Buildings against Lightning.
SABS	086	-	Installation and Maintenance of Electrical Equipment used in Explosive Atmospheres.
SABS	0108	-	The Classification of Hazardous Locations and the Selection of Electrical Apparatus for use in such Locations.
SABS	0114	-	Artificial Lighting
SANS	10142-1	-	Code of Practice for the Wiring of Premises
SABS	0199	-	Bulkhead Lighting Fittings (surface mounted).

SPECIFICATIONS

SABS	152	-	Low Voltage Air Break Switches, Connectors, Switch Disconnecters, Fuse Combination Units.
SABS	156	-	Moulded Case Circuit Breakers.
SABS	160	-	Electric Air Heaters.
SABS	162	-	Screwed Metal Conduit and Fittings for Electrical Wiring.
SABS	163	-	Wall and Appliance Switches.
SABS	164	-	Two Pole and Earthing Pin Plugs and Switch Socket Outlets
SABS	165	-	Lampholders
SABS	172	-	Cartridge Type Fuse Links
SABS	181	-	Thermostats for Electric Storage Heaters
SABS	314	-	Flameproof Enclosures foe Electrical Apparatus
SABS	743	-	Low Voltage Isolating Transformers
SABS	767	-	Core Balance Earth Leakage Protection Units.
SABS	763	-	Hot Dip Zinc (galvanised) Coatings
SABS	784	-	Metal Enclosed Busbar Trunking Systems
SABS	890	-	Ballasts for Fluorescent Lamps
SABS	908	-	Meter Cabinets
SABS	950	-	Non-metallic Conduit and Fittings.
SABS	1012	-	Electric Light Dimmers
SABS	1041	-	Tubular Fluorescent Lamps
SABS	1065	-	Screwed Metal Conduit
SABS	1085	-	Wall Outlet Boxes.

SABS	1092	-	Contactors
SABS	1119	-	Interior Luminaries for Fluorescent Lamps.
SABS	1180	-	Electrical Distribution Boards.
SABS	1197	-	Metallic Wireways for installation in floors
SABS	1247	-	Coatings Applied by the Power-coating Process
SABS	1278	-	Interior Luminaires for Discharge Sodium Lamps
SABS	1279	-	Floodlight Luminaires

SABS CKS 50199	-	Bulkhead Luminaires (surface mounted)
SABS IEC 439	-	Low Voltage Switchgear
SABS IEC 309	-	Plugs, Socket Outlets and Couplers for Industrial Purposes
SABS IEC 742	-	Isolating Transformers and Safety Isolating Transformers

3.0 SERVICE CONDITIONS

3.1 The cable shall be designed and rated for continuous operation under the following conditions :-

3.1.1 Ambient/Environment Conditions :

3.1.1.1	Altitude	:	Sea level.
3.1.1.2	Ambient temperature	:	-5° C to +45° C (daily average +35° C).
3.1.1.3	Relative humidity	:	As high as 96%
3.1.1.4	Lightning conditions	:	Severe, with a maximum lightning ground flash density 11 flashes per km^2 per annum.
3.1.1.5	Exposure conditions	:	Salt laden, industrial atmosphere as well as hazardous gases and dust atmosphere.

3.1.1.6 Electrolytic corrosion conditions prevail in all the areas owing to the proximity of direct current traction system and cathodic protection schemes.

4.0 ELECTRICAL INSTALLATION

4.1 The contractor shall carry out the installation in accordance with SANS 10142-1: Code of Practice for the Wiring of Premises and the requirements of this specification.

4.2 Where the local supply authority requirements differ from those specified herein Transnet Projects Electrical Engineer shall be approached for a decision.

4.3 All equipment and material shall comply with the relevant National or International standard specification. Where equipment does not comply it shall be submitted with the Transnet Projects Electrical Engineer for approval.

4.4 The system of supply will be three phase, 4 wire or single phase 2 wire 50 Hz. alternating current with earthed neutral at a nominal voltage of 400/230 volts. The voltage may vary within the range of ±5 % of the nominal voltage.

4.5 Wiring

4.5.1 All wiring shall be carried out in cable trunking and/or conduit. Only the loop in system of wiring shall be accepted.

4.5.2 Joints in wiring, nor the cutting away of strands to facilitate connections shall be permitted.

4.5.3 Single core cable smaller than 1,5 mm shall not be used. PVC cables shall not be connected directly to the lampholders for incandescent lamps. Conductors shall terminate in an approved connector in the conduit box directly behind the luminaire, and connection to the lampholder made by means of adequately rated silicone heat resistant wire.

4.5.4 Colour identification of conductors shall be used.

4.5.5 Flameproof equipment shall comply with SABS 314 or BS 229 for installation in hazardous areas, as defined in SABS 0108.

4.5.6 Equipment in hazardous areas shall be installed in accordance with SABS Code of Practice 086.

4.6 The provision and installation of the supply cable to the building, the termination and the connection thereof to the distribution board main incoming isolating shall be the responsibility of the Contractor, as directed by the Engineer.

4.7 The Contractor shall be responsible for the provision and connection of power supplies to electric urns, stoves, geysers, frytops, fans etc. provided by others; unless otherwise stated in the Schedule of Requirements.

6.7.1 The Contractor shall provide power supplies to air-conditioning equipment. The connection to air-conditioning equipment will be undertaken by others.

4.8 Cables shall be adequately supported to prevent strain on the terminals.

4.9 Drilling or welding of steelwork for the mounting of electrical equipment will not be permitted unless approved by Transnet's Civil Engineer on site. Equipment shall be fixed to the steelwork by means of approved, purpose made clamp/brackets.

4.10 Lightning protection shall be in accordance with the requirements of the local supply authority and SANS 10313 : Code of Practice for Protection of Buildings against Lightning.

5.0 DISTRIBUTION BOARDS

5.1 Architrave type for flush mounting, and surface type for mounting on indoor walls shall comply with SABS 1180 Parts 1 and 2 respectively.

5.1.1 These distribution boards shall be supplied with a cover plate or open window door and be suitably painted and finished to harmonise with wall finish.

5.1.2 All switches and associated equipment shall be fully enclosed within the distribution board with only the operating handles protruding through the cover plate or door.

5.2 Cubicle type shall comply with IEC publication 439.

5.3 Distribution boards for outdoor use shall be weatherproof and corrosion resistant.

5.4 A substantial earthing terminal shall be firmly attached to the steel work of the distribution board and connected to the earthing bar.

5.5 Entries suitable for all incoming and outgoing cables shall be provided. Glands for bottom entry cables shall not be less than 600mm above floor level.

5.6 Space for mounting of 20% additional control units shall be allowed on all distribution boards. In addition, 20% spare conduits (20mm diameter) shall be provided between flush distribution boards and the ceiling/roof space in pitched roof buildings (minimum 2 conduits).

5.7 All circuits shall be clearly labelled. Labels shall be of the fabricated type and permanently secured. Embossed tape is not acceptable.

5.8 When called for labelling of moulded case circuit breakers shall be labelled by means of numerals. A legend inserted behind a clear plastic window on the inside of the door shall be provided to detail the various circuits.

6.0 ISOLATING SWITCHES

6.1 Isolating switches for machines shall be lockable in the open position.

6.2 Isolating switches shall comply with SABS 152.

7.0 MOULDED CASE CIRCUIT BREAKERS

7.1 Moulded case circuit breakers shall: -

7.1.1 comply with SABS 156.

7.1.2 have a breaking capacity as specified.

7.1.3 be of the fixed pattern, non-adjustable type.

7.1.4 be suitable for clip-on tray mounting.

8.0 EARTH LEAKAGE PROTECTION UNITS

8.1 Earth leakage protection units shall: -

8.1.1 be the integral moulded case type and comply with SABS 767.

8.1.2 have a sensitivity of 30 mA.

8.1.3 be similar in design to moulded case circuit breakers and suitable for clip-on tray mounting.

8.1.4 have a breaking capacity and current rating as specified.

9.0 FUSE SWITCHES

9.1 Fuse switches shall :

9.1.1 comply with SABS 152

9.1.2 be of the double break, horizontal drawout, air insulated type, suitable for flush mounting.

11.1.3 be of the quick break, dustproof type.

12.0 HIGH RUPTURING CAPACITY FUSE LINKS

12.1 High rupturing capacity fuse links shall :

12.1.1 comply with SABS 172

12.1.2 be of the cartridge type with a breaking capacity not less than that shown in the Category of Duty AC 50 table 2 of SABS 172.

12.1.3 have a class Q1 fusing factor

12.1.4 A spare set of fuse links for each of the different ratings shall be provided and accommodated in the distribution board.

13.0 CONTACTORS

13.1 Contractors shall comply with SABS 1992.

14.0 LUMINAIRES FOR INCANDESCENT LAMPS

14.1 Luminaires shall be suitable for accommodating 100 watt B.C. lamps.

14.2 The insulation of internal wiring shall be heat resistant.

14.3 Bulkhead luminaires shall comply with CKS 199.

14.4 Bowl type luminaires shall have porcelain or acrylic galleries with white opal, high impact acrylic screw-in type bowls.

14.5 Well glass luminaires shall consist of a body of non-corrosive material with a top entry for a 20mm conduit, have a clear glass cover and be completely weatherproof.

15.0 LUMINAIRES FOR FLUORESCENT LAMPS

15.1 Luminaires for fluorescent lamps shall comply with SABS 1119.

15.2 Lampholders shall be of the telescopic type.

15.3 The luminaires shall be suitable for 1,2m or 1,5m "rapid start" lamps to SABS 1041, class B, group 2, with rated colour 3. (warm white).

15.4 Anti-corrosive luminaires shall have a body channel constructed of fibre-glass or non-corrosive material with a moulded acrylic enclosing diffuser.

15.5 A gasket shall be provided between the body channel and the diffuser to ensure a reliable seal.

15.6 The enclosing diffuser shall latch to the body channel with captive-type non-corrosive latches.

15.7 It is essential that full descriptions and photometric data of the luminaires and lamps offered, accompany tenders. This information shall include description and drawings of the various items of equipment as well as full photometric data issued by the South African Bureau of Standards.

16.0 INTERIOR LUMINAIRES FOR HIGH INTENSITY DISCHARGE LAMPS

16.1 Interior luminaires for high intensity discharge lamps shall comply with SABS 1278 and be suitable for use in an ambient temperature of 40^{o}C.

16.2 Suitable provision shall be made on the ballast housing for eyes or lugs, for the attachment of safety chains.

16.3 The electronic ignition device for high pressure of sodium and metal halide lamps shall be of the three wire type operating on the superposed pulse principle. The circuitry shall be such that at starting, or on failure of a lamp, high voltage pulses will be confined to the high voltage lead between the igniter and centre contact of the lampholder. Igniters incorporating a switching element are not acceptable.

16.4 A fully electronic ignition circuit shall be utilized to trigger the pulse transformer.

16.5 The natural frequency of the electronic ignition circuit shall be in the order of 100kHz.

16.6 The lamp ignition voltage shall remain constant within a mains voltage variation of between 200 and 250 volts.

16.7 Tenderers shall guarantee that pulsing of the igniter on a failed lamp will not have a detrimental effect on the life and efficient operation of the control gear, igniter, lampholders and circuit wiring.

16.8 It is essential that full descriptions and photometric data of the luminaires and lamps offered, accompany tenders. This information shall include description and drawings of the various items of equipment, as well as full photometric data issued by the South African Bureau of Standards.

17.0 ELECTRIC AIR HEATERS

17.1 Electric air heaters shall comply with SABS 160.

17.2 Tubular heaters shall be rated at 260 watt per metre length of tube and have an enclosed entry box containing terminals for incoming line, neutral and earth connections with a suitable entry for a flexible conduit connector.

17.2.1 Tubular heaters shall be mounted with the bottom 200mm above floor level

17.3 Convector Heaters shall:

17.3.1 be of the natural convection type, of good appearance and suitable for flush or surface mounting.

17.3.2 have incorporated a manually adjustable control switch, automatic controlling thermostat and indicating neon pilot lighting showing when the heater is on.

17.3.3 have a mounting box or housing suitable for a 20mm electrical conduit entry.

17.3.4 be installed with the bottom of the mounting box/housing 200mm above floor level.

17.4 Fan Heaters shall :

17.4.1 be of the wall mounted type with air flow directional adjustment and locking facilities.

17.4.2 have a totally enclosed type fan motor fully protected from damp and dust and fitted with self aligning noiseless bearings.

17.4.3 have a separate manually adjustable control unit incorporating an automatic controlling thermostat. The control unit shall be housed in a adequately ventilated sheet steelcase. Means of protecting and isolating the heater, shall be provided. The control unit circuit shall be arranged such that during summer months the heater can be switched off and the fan used alone for ventilation.

18.0 ROOM THERMOSTATS

18.1 Room thermostats shall comply with BS 3955 Part 2, section 2F, and be to category A.

18.2 An over-riding switch shall be mounted adjacent to the thermostat for manual control.

19.0 LIGHT SWITCHES

19.1 Light switches shall comply with SABS 163 and be of the rocker type.

19.2 They shall be mounted 1 500 mm above floor level and where possible 200 mm from door frames.

20.0 LIGHT SENSITIVE CONTROL UNITS

20.1 The complete unit shall be of the solid state type and housed in a sealed weatherproof enclosure suitable for mounting in any position.

20.2 The light sensitive cell shall operate in a manner to give an area of detection not less than a hemisphere.

20.3 The unit shall not operate due to light fluctuations of duration less than 5 minutes. They shall incorporate main contacts rated at least to 10 amps and be mounted at a height of not less than 2 400 mm.

20.4 An over-riding switch shall be provided.

21.0 SOCKET OUTLETS

21.1 All 220 volt, 16 amp socket outlets shall comply with SABS 164 and be of the 3 round pin shuttered type.

21.2 All 32V, 5A socket outlets for lead lights shall be of the industrial two pin, weatherproof type with a screw cover attached to the socket outlet by a short length of chain.

21.2.1 They shall be mounted on columns/walls 1 500mm above floor level or in recesses provided in inspection pits.

21.3 Welding socket outlets shall be in accordance with IEC publication 309 and be rated for 63A (unless other rating is indicated on the drawing) and be of the 5 pin, 6 h configuration type.

21.3.1 Welding plugs shall be supplied complete with matching male plugs and be mounted 1 500mm above floor level.

22.0 TRANSFORMERS 220V/32V

22.1 The transformers for 32V socket outlets shall be in accordance with SABS SV 118 and be designed for 220V to 250V primary power supply and have an output voltage of 32V.

23.0 ISOLATING AND SAFETY ISOLATING TRANSFORMERS

23.1 Isolating and safety isolating transformers shall comply with SABS IEC 742 and SABS 743.

24.0 POWER POINTS

24.1 Power points for hot water cylinders shall be equipped with a 2 or 3 pole isolating switch adjacent to the cylinder except for hot water cylinders mounted below sinks.

24.2 Where contactors are necessary for the operation of hot water cylinders these shall be installed adjacent to the appliance where practicable and in a suitable enclosure.

24.3 Power points for tubular heaters shall be equipped with a flush mounted 100mm x 100mm conduit box, blanked off with a cover plate accommodating a 15A flush mounted switch. Connection to the heater shall be by means of a PVC covered flexible conduit. The flexible conduit shall have sufficient slack to avoid strain but shall not touch the floor.

24.4 Power points for fan heaters shall be equipped with two recessed interconnected conduit boxes, one for connection to the heater and the other for connection to the control unit 1 500mm above floor level.

24.5 Power points for stoves, fry tops and boiling tables shall be equipped with a 2 or 3 pole isolating switch for the appliance shall be 1 500mm above floor level. The outlet for connection to the appliance shall be 500mm above floor level.

24.6 Power points for air-conditioning units shall terminate in a 100mm x 100mm conduit box mounted adjacent to the unit and equipped with a 2 pole isolating switch.

24.7 Power points for extractor fan units shall terminate in a 100mm x 100mm conduit box mounted adjacent to the unit.

24.8 Where a common thermostat is specified for controlling a number of fans, power points shall be so arranged to allow for circuit wiring between the fans and thermostat.

24.9 Power points for smoke detection and CO_2 equipment shall terminate in a 100mm x 100mm conduit box equipped with a 30A, 2 pole isolating switch, lockable in the "on" position, mounted 1500mm above floor level, with connecting facilities to the equipment.

24.10 Power points for air conditioning units shall terminate in a 100mm x 100mm conduit box mounted adjacent to the unit and equipped with a 2 pole isolating switch, with connecting facilities for the unit.

24.11 Power points for machinery shall terminate in a connection box suitable for mounting a 2 or 3 pole isolating switch, with connecting facilities to the machine.

24.12 Power points for lighting shall terminate in a circular conduit box fitted with an unswithched 5 A 3 pin socket outlet.

25.0 CONDUIT AND ASSOCIATED FITTINGS

25.1 Screwed metal conduit shall comply with SABS 162.

25.2 Non-metallic conduit and fittings shall comply with SABS 950. Non- metallic conduit shall not be cast into concrete.

25.3 Wall outlet boxes shall comply with SABS 1085.

25.4 In areas within 50 km of the coast only galvanised or non- metallic conduit shall be used. Where conduit is exposed to the weather elements only galvanised conduit shall be used or UV T. Routed P.V.C. pipe.

25.5 Threads of metallic conduit and associated fittings shall be effectively protected against rust by non-corrosive paint where they are exposed to moisture or weather elements.

25.6 Wall outlet boxes shall be positioned with the major dimension vertical and not more than 15 mm below the finished wall surface. Cover plates shall fit plumb and flush with wall surfaces.

25.7 Conduits are to be concealed and chased into plastered brick walls or cast into concrete work as building work proceeds. Where conduit cannot be concealed these shall be installed neatly on the surface as approved by the Engineer.

25.8 Conduits are to be concealed and chased into plastered brickwalls or cast into concrete work as the building work proceeds.

25.9 Chasing of finished walls or concrete work will not be allowed. Under no circumstances will chases be permitted through structural members of the building.

25.10 Chasing of face brick walls will not be permitted. Conduits and outlet boxes shall be built into walls.

26.0 CABLES AND GLANDS

26.1 Polyvinyl-chloride cables shall comply with SABS 150. Armoured cables shall be of the earth continuity conductor type.

26.2 Cable glands shall be of the compression type, (brass or bronze) and be suitable for termination of earth continuity conductor type cables. Glands shall be supplied with neoprene shroud.

27.0 BUSBAR TRUNKING

27.1 Busbar trunking shall comply with SABS 784.

28.0 CABLE TRAYS

28.1 Cable trays shall be protected against corrosion and be adequately supported so that when fully loaded the deflection does not exceed 10mm. They shall be wide enough to accommodate the power cables in a single layer.

29.0 EARTHING AND BONDING

29.1 The complete electrical installation shall be earthed in accordance with SABS 10142-1: Code of Practice for the Wiring of Premises.

29.2 Earth electrodes shall consist of an exterior copper layer molecularly bonded to a high strength steel core. The copper shall have a minimum thickness of 0.25mm.

29.3 Only approved non-corrosive substances may be used to reduce earth resistivity. The earth resistance as measured with a earth resistance tester shall not exceed 5 ohm.

29.4 Copper tape used for bonding and earthing of waste pipes shall have a minimum cross sectional area of 12mm², and when run along walls shall be fixed by means of non-ferrous screws in plastic plugs at intervals of 300 maximum.

30.0 PAINTING

30.1 All surfaces of distribution boards shall be light orange to SABS 1091 colour No. B26 unless otherwise stated in the Schedule of Requirements attached to this specification.

30.2 All surfaces shall be cleaned according to the appropriate method described in SABS 064 for the particular surface to be cleaned, the contamination to be removed and the primer to be applied.

30.3 Components that will be powder coated shall be cleaned and prepared in accordance with the requirements of SABS 064. Powder coating shall comply with the requirements of SABS 1274 - 1979 Type 4; Corrosion resistant coatings for interior use and using thermosetting high gloss coating.

30.4 All specified coatings shall be applied according to the relevant specification and the manufacturers instructions shall be followed. Coatings shall not be applied in conditions which may be detrimental to the effectiveness of the coating, or the appearance of the painted surface.

30.5 When examined visually the finished product shall have a uniform appearance as far as gloss is concerned and shall show no sign of damage. Damaged areas shall be repaired coat for coat to obtain the desired finish.

31.0 TESTS

31.1 Insulation, continuity and earthing tests in accordance with SANS 10142-1 shall be carried out to the satisfaction and in the presence of the Engineer or authorised deputy on completion of the work.

31.2 An installation Certificate of Compliance for the electrical installation issued by an accredited person as required by the Occupational Health and Safety Act,1993 (Act 85 of 1993) shall be provided.

31.3 The Contractor shall provide the necessary approved instruments.

31.4 Transnet Projects reserves the right to use its own instruments should it be considered necessary.

WITNESSES

1. …….. ……
TENDERER

2. ……. …….
DATE

Transnet Projects
Design Services

Annexure J - Refer DOC-STD-0001 Rev 03 - Contractor Document Submittal Requirements Standard

Annexure K - EEAM-Q-006
(Structural Steel Work)

REVISION	REFERENCE	TRANSNET port terminals
1	**EEAM-Q-006**	

DOCUMENT TYPE SPECIFICATION	**AUTHORISATION DATE: Date signed by CEO**

TITLE: **SPECIFICATION FOR STRUCTURAL STEEL WORK**	PAGE **0 of 11**

COMPILED BY:	**REVIEWED BY:**	**REVIEWED BY:**
PROJECT ENGINEER (HARRY DICKINSON)	**CAPITAL PROJECTS MANAGER (DAN - REDDY)**	**ACTING EXECUTIVE SHEQR MANAGER (RAYMOND Van ROOYEN)**

AUTHORIZED BY :

GENERAL MANAGER – EQUIPMENT ENGINEERING & ASSET MANGER (HAMILTON NXUMALO

FUTURE REVISION RECORD NUMBER	**DESCRIPTION OF REVISION**	**APPROVAL**	**DATE**
			09/ 2005
-2-	**5.0 FASTNERS**		

CONTENTS

KEYWORDS
STEEL WORK

DATE OF LAST REVIEW: N/A

DATE OF NEXT REVIEW: 01/06/2005

DETAIL CONTENTS

STRUCTURAL STEELWORK **SPECIFICATION HE9/2/6 [Version 9] February 2005**

1. SCOPE

1.1. This specification covers TPT's requirements for the design, manufacture and erection of structural steelwork for dynamic structures like cranes, including associated components.

2. GOVERNING CODES AND STANDARDS

ANSI/AWS D1.1 :	Structural Welding Code - Steel
BS-EN 287 Part 1 :	Approval testing of welders/fusion welding
BS-EN 288 Part 3 :	Specification and approval of welding procedures for metallic materials
BS 5135 :	Metal arc welding of carbon and carbon manganese steels
BS 4360/SABS 1431:	Weldable structural steel
BS 2573 : Part 1 :	Classification, stress calculations and design of structures
BS 3923 :	Methods for ultrasonic examination of welds
BS 2600 :	Radiographic examination of fusion welded butt joints in steel
DIN 1026	Metric channels
ISO R657	Angles
SABS 094	The use of high strength friction grip bolts and nuts
SABS 135	ISO metric bolts, screws and nuts (hexagon and square) (coarse thread free fit series)
SABS 136	ISO metric precision hexagon-head bolts and screws, and hexagon nuts (coarse thread medium fit series)
SABS 435	Mild steel rivets

3. STRUCTURAL STEELWORK

3.1. The design of all structural steelwork shall be such as to provide a robust and rigid structure requiring the minimum of maintenance and providing a long service life.

3.2. In the design of steel structures, due cognisance shall be taken of environmental and wind load conditions as specified in the main specification.

3.3. Due to the highly corrosive conditions experienced in Transnet Port Terminals, the permissible stresses shall not exceed those set out in British Standard No. 2573. The minimum thickness of steel for load bearing members shall be 15mm for gussets, 10mm for angles, tees, plates and flats and 9mm for webs of channels and joists. Punching of holes over and above that permitted in BS 2573, shall not be permitted. Other structural steel shall be of not less than 6 mm thickness.

3.4. The design of mobile structures shall be such that the induced von Mises stress (effective stress in triaxial loading) will not exceed 90% of the elastic limit strength of the steel when the equipment is travelling at maximum speed and colliding with either other stationary equipment or fixed stop blocks. In calculating von Mises stresses, due cognisance must be taken of stress concentrations. If the elastic limit strength of the steel is not known, it will be determined by using a 0,5% strain offset on the stress-strain curve of the material.

3.5. Where applicable, the design may be in bolted, riveted or welded box construction except that no site welding will be permitted in the final erection at the port except with the approval of TPT's.

3.5.1. Alternatively, a welded hollow section lattice type structure will be acceptable, subject to the following requirements:

3.5.1.1. The members must be structural sections manufactured from grade 43C/grade 300W weldable structural steel complying with BS4360/SABS1431. The hollow sections can either be seamless for all sizes (BS6323HFS) or welded for sizes above 114.3mm outside diameter (BS 6323HFW).

3.5.1.2. Tube wall thickness must not be less than 6mm.

3.5.1.3. All joints must be completely seal welded in accordance with BS 5135. Special care must be taken to prevent the ingress of moisture into hollow section members by ensuring that each member is airtight.

3.5.1.4. Bolted or screwed attachments which require drilled holes through a hollow section will not be permitted.

3.5.1.5. Non-hollow structural sections and plate used on the structure, in conjunction with the hollow section framework, must comply with the relevant requirements of this specification.

3.6. All steel sections shall be manufactured in accordance with the following standards: -

Weldable structural steel :	BS 4360/SABS 1431
I and H sections :	BS 4 Part 1
Metric channels :	DIN 1026
Structural steel, hot rolled sections :	BS 4 Part 1
Angles :	ISO - R657
Hot finished hollow sections :	BS 4848 Part 2
Cold formed sections :	BS 6363
Forgings :	BS 29
Steel castings :	BS 3100
Cast iron :	BS 1452

3.7. All steel plates and rolled steel sections used in the construction of the structures shall be of steel made by the open hearth process (acid or basic) and shall comply in every respect with BS 4360, "A" quality Structural Steel for Bridges and General Building Construction, Grade 43A or Grade 50B. That is, the percentage of phosphorous and sulphur shall not exceed 0,06.

3.7.1. The above is laid down as a standard, but tenders will also be considered for rolled steel not conforming strictly to the above standard. Full particulars of the guaranteed properties of the steel tendered for should in this case be furnished, i.e. chemical composition, tensile strength, yield point, reduction in area, bend tests, etc.

3.8. Forgings and drop forgings shall be free from flaws and surface defects of any kind and be accurately finished to the prescribed dimensions.

3.9. Steel castings shall be sound, clean and free from all defects and distortion of any kind and should, except where otherwise specified, conform with the conditions and tests specified in B.S. No. 3100/Latest Edition, for grades A, B and C according to requirements. They shall be thoroughly annealed and all working parts and bearing surfaces shall be machined and turned accurately with correct finish.

3.10. Cast iron used throughout must be close grained, tough and free from all defects, and shall conform with the conditions and tests specified in B.S. 1452/Latest Edition, for grades 12 to 14 according to requirements.

This applies to functional components only. A lower grade is acceptable for portal and machinery house ballast. Tenderers to state grade of cast iron proposed.

3.11. The dimensional and out-of-square tolerance as specified in the above Standards shall also apply to built-up components. Edge preparations, welding techniques, straight beds and material fit-up shall be considered when welded joints are designed.

3.12. The shape of all members and connections must allow easy accessibility for maintenance painting of all surfaces. No members shall comprise a double member which cannot be painted and maintained.

3.13. Structural details must be so designed as to eliminate or seal off any cavities or pockets where water or condensation could collect and promote corrosion. Horizontal members with upstanding flanges require special drainage.

3.14. All hollow sections shall be completely closed and airtight, and all welding is to be of such size and quality as to ensure complete airtightness. No tapping or drilling of holes into sealed sections will be permitted.

4. WELDING

4.1. All the provisions of BS 5135 shall be complied with as far as applicable.

4.2. Design of weld joints shall be such that crevices, overlaps, pockets, arc strikes and dead ends do not exist.

4.3. All joints shall be completely seal welded in accordance with BS 5135. Special care must be taken to prevent the ingress of moisture into the tubular members by ensuring that each such tubular member is airtight. “Stitch” welding will not be permitted. Only continuous welding will be accepted.

4.4. Weld cracks, undercut, or pock marks will not be accepted.

4.5. All welds on the load bearing frame structure, containers, piping, pipe line flanges, etc., shall be continuous and shall be visually inspected for cracks and other discontinuities.

4.6. Welds on the main chords must be tested ultrasonically in accordance with BS 3923 or X-rayed in accordance with BS 2600 and those on minor joints by the dye-penetrant method. The equipment required for these tests must be supplied by the Contractor and the testing done at his cost.

4.7. Steel, except in minor details, which has been partially heated, shall be properly annealed. (Electrically welded structural members excepted.)

4.8. All brackets, clamps, lugs, straps, suspenders, etc. required for attaching mechanical and electrical equipment must be welded on prior to erection and special precautions must be taken not to damage welds or puncture tubes during erection.

4.9. The welding of all rails shall be done by an approved method.

4.10. Welding shall only be carried out by a coded welder according to SABS 044, BS-EN 287 Part 1 and BS-EN 288 Part 3 or ANSI/AWS D1.1.

4.11. All parts to be welded shall be thoroughly cleaned and dried before welding. The welding will only be done in dry surroundings and all steps taken to prevent hydrogen embrittlement.

4.12. Where materials of different compositions are joined by welding, especially carbon steel to chrome steel, the filler welding method and post welding treatment shall be such that embrittlement and other degradation of both steel and filler are prevented.

4.13. It must be ensured that welded joints are ductile.

5. FASTENERS

5.1. All bolts, nuts and rivets shall be manufactured in accordance with the following standards: -

Commercial bolts and nuts Grade 4,6:	SABS 135
Precision bolts and nuts Grade 8,8:	SABS 136
Friction Grip Bolts and nuts Grade General:	SABS 094
Rivets:	SABS 435

5.2. All fasteners (excluding friction grip) shall be hot dipped galvanised (and their nuts and washers), structural rivets and Huck Bolts.

5.2.1. All holding down bolts and nuts and brackets, as well as all fixing bolts, washers, studs and nuts, less than 12mm diameter shall be of stainless steel. Fixing rivets shall be of either stainless steel or brass.

5.3. Bolts and setscrews shall be locked in an approved manner and shall not be stressed in tightening to beyond the recommended loads.

5.4. The quality of friction grip bolts, nuts and washers, bolt lengths, sizes of holes, tightening standards, surface condition of clamped components, shop and site assembling and acceptance inspection of friction grip joints shall comply with the latest edition of SABS 094. Certificates shall be supplied for all bolts of grade 8.8 and 10.9.

5.5. All bolt and rivet holes must be accurate to size and location, the centres of holes shall not be placed nearer the edge of a plate than 1,5 diameters with an extra allowance of 3mm for sheared edges. All holes in the structural work shall be drilled or otherwise punched to a diameter not exceeding 1,5mm less than the diameter of the finished hole on the die side, and afterward reamed out to the exact size

Where possible the adjoining parts forming a connection shall be drilled or reamed together, with holes not exceeding 1,5 mm diameter the rivet or bolt for which it is made. No rough or broken edge shall be left around any of the holes.

5.6. For turned and fitted bolts, the holes shall be accurately drilled or reamed, the diameter of the hole shall not exceed the finished diameter of the bolt by more than 0,25mm.

5.7. The holes, after assembly of the parts, shall be true throughout the thickness of all the parts and perpendicular to the axis of the member.

5.8. Rivets shall be cup-headed or countersunk as required, unless otherwise specified. No rivet head shall contain less metal than does a length of the rivet equal to 1,25 times its diameter. All loose and defective rivets shall be cut and replaced by sound ones; also others when required for the purpose of examining the work. Rivets shall be driven with pressure tools whenever possible and pneumatic hammers shall be used in preference to hand driving.

5.9. All field rivets must be supplied with shanks of suitable length for pneumatic riveting.

5.10. Bolts shall be of such length as to accommodate a full nut and washer when tightening up, and protrude a maximum of 3 thread pitches beyond the nut. Excessive projection of threads beyond the nut must be avoided. Bolts that are flush or under top of nut are not acceptable.

5.11. All bolts having countersunk heads shall have strong feathers forged on the neck and head to prevent turning and the bolt holes shall be cut to receive same. All nuts and bolts (excluding countersunk bolts) shall be furnished with circular washers of sufficient thickness, the outside diameter being at least twice the nominal diameter of the bolt, and washers fitted correctly.

5.12. Where bolt heads or nuts are seated on bevelled surfaces of beams or channel flanges, bevelled washers must be inserted.

6. JOINTS AND MATING SURFACES OF MEMBERS

6.1. Mating surfaces of members to be joined by high tensile steel bolts in friction grip shall be cleaned and primed as specified for the rest of the steelwork. Mating surfaces shall lay flat against each other to eliminate gaps which may allow ingress of water. After joining, the edges shall be sealed with an approved brand of Butyl/ Rubber sealing compound by means of a suitable caulking gun, or shall be seal welded.

6.2. Other joints shall be formed by one of the following methods:

6.2.1. The mating surfaces of members shall be blast cleaned, primed and protected prior to sub-assembly by the liberal application of caulking compound. While the compound is still wet, the members shall be bolted together and caulking compound which is squeezed out shall be completely removed.

6.2.2. The mating surfaces shall be protected with the full corrosion protection system as specified, the surfaces joined together and the joint so formed shall be sealed with butyl rubber sealer.

6.2.3. After being cleaned and primed the surface shall be joined together and the joint so formed shall be seal welded.

6.3. The primer coating on mating surfaces must be applied not more than 4 hours after cleaning and the edges must be sealed within 3 weeks of assembly of the part.

7. FABRICATED PARTS

7.1. All fabricated parts shall be properly fitted during assembly to result in properly aligned equipment having a neat appearance. Fabrications of load bearing members shall have no abrupt changes in cross section and regions of severe stress concentration. All sharp corners accessible by personnel during erection or operation shall be ground, rounded, or removed by other methods. Burrs, welding spatter and stubs of welding wire shall be removed.

8. BALLAST OR COUNTER MASS

8.1. Tenderers must include for the supply of all necessary ballast or counter mass.

8.2. These must preferably be of cast iron and be removable for maintenance of structural steelwork.

8.3. Concrete ballast is not recommended but will be accepted provided the Tenderer satisfies TPT that it will not cause corrosion of any steel parts.

8.4. Fastenings used for removable pieces must be of non-corrosive material.

8.5. Ballast must be in suitable shapes to be secured in position against movement but in sizes easily removable for maintenance.

8.6. Lifting hooks or eyes of non-corrosive material and of adequate strength must be provided in the removable ballast pieces.

8.7. Concrete ballast must be reinforced so as to prevent cracking or breaking, and must be coated with an approved corrosion protection system for concrete.

9. STAIRS, LADDERS, PLATFORMS AND WALKWAYS

9.1. Platforms, stairways, walkways, hatches and ladders, shall be provided where necessary to give easy access to all parts of the equipment for inspection, maintenance and lubrication purposes (including the insides of all box sections if inspection covers are provided).

9.2. The hand rails and ladders shall be complete with stanchions, knee rails, back hoops, mounting brackets etc. and shall be manufactured in

sections which are hot-dipped galvanized and painted and bolted onto the structure.

9.2.1. The handrail shall have a minimum diameter of 25mm and shall not be less than 1 050mm above the platform level. Toe boards shall not be less than 150mm high.

9.3. Stairs shall be inclined no more than 45° to the horizontal and shall be broken at suitable intervals by platforms.

9.4. Stairs and walkways shall not be less than 700 mm wide and working areas around drives etc. shall be of sufficient size to allow for ease of maintenance.

9.5. Vertical ladders must be provided with back hoops.

9.6. Trap doors and hatches must be of light, but robust, construction, suitably hinged with stainless steel hinges and provided with a catch to keep them in the open position, if necessary. Trap door openings are to be protected by means of toe boards and removable handrails.

9.7. All external platforms, stair treads and walkways shall be hot dipped galvanised open grating construction, similar to Andrew Mentis "Rectagrid" type RS40 to allow for free drainage and avoid the accumulation of water and dust. Bearer bar thickness shall not be less than 4,5 mm. The top surface shall provide for adequate grip to avoid underfoot slipping.

9.8. TPT's prior approval is required for all external platforms and walkways where open grating cannot be used. This will only be permitted where the primary purpose of the walkway/platform is for maintenance purposes. All such surfaces are to be provided with a non slip surface coating.

9.9. No obstructions or sudden changes in levels will be permitted on walkways.

10. MACHINERY AND ELECTRICAL HOUSES AND OPERATOR'S CABINS

10.1. Where required, separate, self contained fully weather proof machinery and electrical houses as well as operators cabins shall be provided. The houses shall be of the steel framed metal clad type, and shall allow ample space and strength for all equipment and control panels housed therein, permitting unrestricted access to all equipment for routine service and maintenance. Headroom shall not be less than 2,13 metres. A minimum of 700mmm working space must be provided around all machinery and in front of all panels.

10.2. The major items of machinery, electrical equipment and panels shall be so arranged that it can be removed for repairs or replacement without disturbing the walls, roof, floor or structural framework and furthermore shall be so arranged that full access to all holding down bolts is provided from inside the house.

10.3. For electrical houses both the inner and outer cladding must be stainless steel, unless otherwise approved. Side cladding plates are to be joined with butting joints with butt cover straps where required (no lap joints), and the plates must be in as large sizes as practicable to reduce the number of vertical joints, and to eliminate horizontal joints. Alternatively cladding may be welded to the frame and all joints completely seal welded. All angles around windows are to be suitably joggled to obtain a waterproof and flat surface butting on the side sheets. The whole of the framing shall be well stayed and fixed on its base. Air-conditioned electrical houses shall be provided with thermal insulation material of an approved type between the cladding.

10.4. Machinery houses must be cladded with prepainted Aluminium sheeting, minimum thickness 0.8 mm, colour coated with the appropriate colour. The profile and fastenings must be suitable for the spans and wind uplift forces corresponding to the windspeeds stated in the main specification. Flashing, corner trim, closure pieces ridge cappings etc. shall consist of prepainted Aluminium of minimum thickness 1.2mm

10.4.1. Sheeting fasteners shall be 6.3 mm grade 304 stainless steel self-tapping screws with hexagonal washer heads.

10.4.2. Galvanic isolation rubber strips shall be used between the metal frame and Aluminium cladding.

10.5. Both machinery and electrical houses shall be provided with two access doors, sealed to suit pressurisation and/or air-conditioning, one on each side of the house, arranged for external locking, but allowing exit from the inside without a key. Rain guards must be provided above external doors.

10.6. Operator's cabins shall be fully constructed from 3CR12 or similar type stainless steel. Cladding shall be welded to the frame and shall be smoothed over to provide an aesthetic appearance. The cabin shall be insulated from the heat of the sun with an approved material. A stainless steel or similar material door with a robust industrial type door lock shall be provided. The door must be lockable from the outside, but must allow exit without a key from the inside.

10.7 All windows shall be of solar heat reducing toughened safety glass.

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END OF SPECIFICATION HE9/2/6 [Version 9]
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Annexure L - EEAM-Q-008 (Corrosion Protection)

REVISION	REFERENCE	
Ver. 17	EEAM-Q-008	TRANSNET port terminals

DOCUMENT TYPE: SPECIFICATION	AUTHORISATION DATE: Date signed by CEO
TITLE: SPECIFICATION FOR CORROSION PROTECTION	PAGE 0 of 13

COMPILED BY:	REVIEWED BY:	REVIEWED BY:
EQUIPMENT ENGINEERING AND ASSET MANAGEMENT (GENERAL MANAGER)	SENIOR MANAGER (PROJECT MANAGER)	SENIOR MANAGER (ASSET MANAGER)

ACCEPTED BY:	AUTHORIZED BY:
CHIEF FINANCIAL OFFICER	CEO

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CONTENTS

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DETAIL CONTENTS

1. SCOPE

1.1. This specification covers Transnet Port Terminals requirements for protective coating of iron and steel structures, electrical motors, gear boxes etc. against corrosion and must be read in conjunction with the main specification as well as the following (latest editions):-

SABS 064 "Preparation of steel surfaces for coating"

SABS 763 "Hot-dip (galvanized) zinc coatings"

SABS 1091 "National colour standards for paint"

BS 5493 "Code of practice for protective coating of iron and steel structures against corrosion"

2. TYPES OF CORROSION PROTECTION TO BE USED

2.1. The coatings specified in this specification are chosen according to BS 5439, Table 3, part 9, to ensure that the condition of the surface will be at least RE2 on the European scale of degree of rust, after 10 years in a environment of frequent salt spray, chemicals and polluted coastal atmosphere. During the 10 years, the normal maintenance painting will be done.

2.2. The paint manufacturer shall guarantee the paint for at least 10 years.

2.3. Should a tenderer wish to offer coating systems other than those specified, as an alternative, he shall submit full technical details and a list comparing all appropriate details of the alternatives proposed, with the original specified.

2.4. Tenderers must ensure that the different coats they offer in their tenders are compatible with each other.

2.5. The coating of proprietary items must be done according to Clause 3.

2.6. All galvanized components including bolts and nuts but excluding walkway gratings, must be painted with the specified system, unless otherwise approved.

The following coating systems must be used unless otherwise specified in the main specification:-

Substrate	Coat No	Generic Description	Approved Brand Products	Dry Film Thickness (μm)
3CR12 steel	1	Surface tolerant epoxy primer	DULUX /SIGMA Sigmacover primer INTERNATIONAL (PLASCON) Intergard 269 STONCOR (CHEMRITE COATINGS) Carboline 193 Primer	65-75
	2	Two component recoatable, polyurethane finish (Gloss)	DULUX / SIGMA Sigmadur gloss INTERNATIONAL (PLASCON) Interthane 990 STONCOR (CHEMRITE COATINGS) Carboline 134	65-75
Galvanized Steel	1	Surface tolerant epoxy primer	DULUX /SIGMA- Sigmacover primer INTERNATIONAL (PLASCON) Intergard 269 STONCOR (CHEMRITE COATINGS) Carboline 193 Primer	65-75
	2	Two component recoatable, polyurethane finish (Gloss)	DULUX /SIGMA- Sigmadur gloss INTERNATIONAL (PLASCON) Interthane 990 STONCOR (CHEMRITE COATINGS) Carboline 134	65-75

Substrate	Coat No	Generic Description	Approved Brand Products	Dry Film Thickness (μm)
Mild steel	1	Two component self curing inorganic zinc ethyl silicate OR two component zinc rich polyamide cured	DULUX /SIGMA- Sigma MC60 OR Sigma-cover primer	65-75

		epoxy primer	INTERNATIONAL (PLASCON) Interzinc 233 OR Interzinc 52 or 53 STONCOR (CHEMRITE COATINGS) Carbo Zinc 11 OR Carbo-line 658 Primer	
	2	Flexible recoatable high build polyamide cured MIO epoxy	DULUX/SIGMA – Sigmacover CM MIO INTERNATIONAL (PLASCON) Interseal 010 MIO STONCOR (CHEMRITE COATINGS) Carboline 190 HB M.I.O. or Carboline 193 M.I.O.	125-150
	3	Two component recoatable, polyurethane finish (Gloss)	DULUX/SIGMA Sigmadur gloss INTERNATIONAL (PLASCON) Interthane 990 STONCOR (CHEMRITE COATINGS) Carboline 134	65-75

2.7. The paint manufacturer's recommendations for the application of the different coating systems, curing time before handling or application of subsequent coats, health and safety recommendations etc. must be carefully adhered to.

2.8. Paint contractors must have a quality management system which must be submitted to the Engineer for approval before commencement of the work.

2.9. Galvanizing shall be done to SABS 763 heavy duty hot dip galvanizing to a thickness of at least 85μm. Electroplated components in zinc or cadmium are not acceptable.

2.10. All mounting bolts, nuts, washers and brackets as well as all fixing bolts, studs nuts and washers shall be of stainless steel. Fixing rivets shall be of either stainless steel or brass.

2.11. High tensile bolts for friction grip joints must not be galvanised and must be primed and painted after installation. High tensile bolts must be certified.

2.12. The full paint system shall be applied to all surfaces which are to be covered with wear pads, linings etc.

2.13. For steelwork which will be transported over long distances and erected on site the two pack epoxy primers is preferred.

3. PROPRIETARY ITEMS

3.1. Proprietary items such as gearboxes, motors, brakes etc. must either be painted according to this specification or where the coating system is equal to or exceeds this specification sufficient proof of the coating system applied must be provided. Items which are nearly equal to this specification shall be given a finishing coat according to this specification's thicknesses and final colours and to the following procedure:-

3.1.1. A cross cut test must be done to SABS SM159 to determine if the original coating adheres correctly to the substrate;

3.1.2. The original coating shall be rubbed down to remove any smooth finishing to form a suitable key for the finish coat and any damaged areas prepared and patch primed with a suitable primer;

3.1.3. The item must then be detergent washed to remove any foreign matter, taking care that no dust, solvent etc. contaminates any working part of the item;

3.1.4. A test shall be done on the existing coat to ensure that the finish coat will not react with and cause undue dissolving and lifting of the existing coat. This can be done by applying a small quantity of the finishing coat thinners.

3.1.4.1. Should any undue dissolving or lifting occur, a suitable intermediate or barrier coat must be applied before the finishing coat is applied.

3.1.5. Proprietary items which failed the cross cut test and which generally have inadequate protection shall be dismantled and the full corrosion protection specification applied.

4. SURFACE PREPARATION

4.1. All steel surfaces shall be detergent washed and fresh water rinsed to remove all oil, grease and surface contaminates before shot blasting.

4.2. Sharp edges shall be radiused and major roughness of welds shall be removed by grinding. Welding spatter and flux shall be removed.

4.3. Components manufactured from hot rolled steel sections and steel plate shall be blast cleaned to base metal in accordance with SABS 064 grade SA2½ - very thorough blast cleaning, to remove all mill scale, rust, weld spatter etc.

4.3.1. "Sharp" chilled iron shot, chilled iron grit, or granular abrasive slag is to be used to produce a proper degree of surface roughness.

4.3.2. Blast profile shall be determined by micrometer profile gauge, Keane-Tator surface profile comparator or Testex press-o-film.

4.3.3. The profile height shall be between 40 and 50μm at any point.

4.4. Good quality blast cleaning and spray painting equipment shall be used. Air used for spraying and blast cleaning shall be free from all traces of oil, water and salinity. Water and oil traps must be fitted to all equipment.

4.5. Wheel abrading equipment shall not be used unless an angular profile the same as clause 4.3.3 is achieved.

4.6. When wet blasting is done the primer shall be applied before oxidization starts or surface contamination occurs.

4.7. Components manufactured from 3CR12 steel shall be lightly abraded. The components shall then be passivated by using a mixture of 10 - 15% nitric acid in water which is rinsed off after 10 - 15 minutes. The surface shall be neutralized to pH 7 before it is coated.

4.8. Hot-dip galvanized components, galvanized bolts and nuts etc. shall be lightly abraded with a galvanizing pre-cleaner. The components shall then be washed with detergent and water and washed down with clean water until a water break free surface is achieved. Allow to dry thoroughly.

5. JOINTS AND MATING SURFACES OF MEMBERS

5.1. Mating (faying) surfaces of members which have to be joined by high tensile steel bolts in friction grip shall be cleaned according to Clause 4 and painted with primer only.

5.1.1. After being assembled joints so formed shall be seal welded and painted or after the intermediate coat was applied the edges shall be sealed with an approved brand of paintable flexible sealant or mastic (e.g. Butyl rubber, polyurethane sealer or two component epoxy), by means of a suitable caulking gun.

5.2. All rivets, bolts, welds, sharp edges etc. must be covered with a "stripe coat" of the primer or intermediate coat specified to ensure the correct dry film thickness on sharp edges, as well as sealing of bolt threads to head etc.

5.3. All other mating surfaces must be sealed with an approved brand of flexible Butyl rubber, paintable Silicone, polyurethane sealer or two component epoxy sealer, and joined while still wet. All excess compounds must be completely removed.

6. PAINTING PROCEDURES

6.1. Directly before the application of paint, the area to be painted shall be degreased with a suitable degreaser and left to dry.

6.2. Paint shall only be applied under the following conditions:-

6.2.1. There is adequate light.

6.2.2. The steel temperature is between 5 and 50°C and at least 3°C above the dew point of the air.

6.2.3. The relative humidity of the air is between the limits specified by the paint supplier.

6.2.4. Wind does not interfere with the method used and sand and dust cannot be blown onto wet paint.

6.3. Steelwork shall be supported on trestles, at least 900 mm off the ground for painting purposes.

6.4. An adequate number of test readings shall be taken per square meter in order to determine the dry film thickness.

6.4.1. The paintwork shall be acceptable if the average of the test readings taken falls within or exceeds the ranges given.

6.4.2. Paintwork shall not be acceptable if any single test reading is less than the specified minimum thickness.

6.5. An ultrasonic or electronic magnetic flux thickness measurement gauge shall be used, but in case of dispute, destructive testing shall be applied. He painted steelwork shall present a clean, neat appearance of uniform colour and gloss as applicable to the paint used. Each coat of paint shall be applied as a continuous, even film of uniform thickness. More than one application of paint may be required to achieve the dry film thicknesses specified or to obliterate the colour of the previous coating.

6.6. The use of thinners or solvents at any stage of the work is prohibited, unless specified by the paint manufacturer.

6.7. Precautions shall be taken to prevent coatings from being applied to equipment nameplates, instrument glasses, signs etc.

7. COLOUR CODES

Machinery and equipment shall be painted in the following final colours:-

	Area	Colour	Code No. [SABS 1091 and International No's]
7.1.1	Mobile equipment (cranes, loaders etc.)		
	a) Structure, machinery and electrical houses, operator's cabins, chutes, hoppers etc.	Transnet Red	RAL 3020
	b) Undercarriage, travel bogies, rubber tyred rims	Transnet Red	RAL 3020
7.1.2	Industrial buildings, conveyor structures		
	a) Roofs and canopies	Pantone cool grey 10	RAL 7037 (Staubgrau)
	b) Painted walls	Pantone cool grey 3	RAL 7035 (Lightgrau) or SABS 1091 G62 (Pale grey)
	c) Steel columns, rafters, trusses	Pantone cool grey 5	RAL 7004 (Signalgrau)
7.1.3	General		
	a) Guards	Golden yellow	SABS 1091-B49 RAL 1003
	b) Sheaves	Orange	RAL 2008
	c) Cable reels (Stainless steel	Orange	RAL 2008
	Machine buffers and parts of machine which could constitute a serious hazard	Golden Yellow (High Gloss) with Luminous green stripes in chevron pattern	SABS B49 and Luminous green

Area	Colour	Code No. [SABS 1091 and International No's]
e) Any exposed rotating part of machinery, electrical Switch-gear (other than starting and stopping devices and emergency stop control), electrical services e.g. conduit and allied fittings	Light Orange (High Gloss)	SABS 1091 B26 BS 381C-557
f) Low voltage switchgear panels where orange is not aesthetically acceptable	Light grey	SABS 1091-G29 BS 381C-631
g) Medium voltage cable trays, switchgear and motors (3,3 kV and up)	Oxford Blue	SABS FO2 BS 381C-105 RAL5003
h) Starting devices, low voltage cable trays and switchgear	Mid brunswick green (high gloss)	BS 381C-228 SABS1091-EO4 RAL6005
i) Portnet Logo	Transnet White	RAL 3012
j) Parts of stationary machinery (Electrical, motors, gearboxes, brakes, transformers, etc.])	Light Grey	SABS G29 BS 381C-631
k) Hand levers, hand wheels, oiling points, handrails on walkways, ladders	Golden Yellow (High Gloss)	SABS 1091 B49 BS 381C-356
l) Stopping devices, grease points, motor fan covers and danger signs (not symbolic safety signs for which see SABS 1186)	Signal red (High Gloss)	SABS 1091 A11 BS 381C-537 RAL3001
m) Walkways (non slip surfaces) (galvanized gratings not to be painted)	Shop floor green	
n) Informatory signs and notices (not symbolic safety signs for which see SABS 1186)	White on Emerald Green (High Gloss)	White on SABS 1091 E14 BS 381C- 228

	Area	Colour	Code No. [SABS 1091 and International No's]
7.1.4	Pipe lines		
	a) Reclaim water piping	Aluminium	
	b) Slurry pipe lines	Dark admiralty grey	SABS 1091-G12
	c) Fire protection piping	Signal red	SABS 1091-A11
	d) Washwater drain pipes	Light grey	SABS 1091-G29
	e) Instrument air	White with Strong blue band	White and SABS 1091-F11
	f) Plant air	White with Flag blue band	White and SABS 1091-FO4
	g) Potable water	Grass green	SABS 1091-D14

7.1.5 Colour bands for pipes shall be 75 mm wide for pipe sizes up to 150 mm diameter and 100 mm wide for 150 mm and above. The colour bands shall be applied to the pipe flanges, valves, junctions, walls or structures etc. in such a manner that the pipe may be easily identifiable. On straight sections the maximum spacing shall be 100 x the pipe diameter.

8. FIELD TOUCH-UP PAINTING

8.1. Damaged and unpainted areas, fasteners, welds, etc. shall be cleaned by wire brushing with hand tool or power tool in a manner which will minimize damage to sound paint. Grinding will not be allowed. Rust spots shall be cleaned to bright metal. Thick edges of old paint abutting on bare metal surfaces shall be feathered by scraping and sanding.

8.1.1. Where welding is required on areas already coated with the coating system, the coat should be stepped back for ± 30mm around the weld area.

8.2. The paint shall be applied to match the original coats in accordance with the manufacturer's recommendations for the specific paint system.

Note: Inorganic zinc primers shall not be re-covered with an inorganic primer, but only with an organic zinc primer.

8.3. Areas of damaged galvanizing shall be repaired with an approved cold galvanizing product or metal sprayed by the wire spraying process with Zinc, and then touched up with the specific paint system.

9. GENERAL

9.1. All walkways, floors, maintenance platforms etc. must be painted with a durable, non skid coating of the appropriate colour.

9.2. Exposed machined surfaces must be coated with a strippable corrosion inhibitor (e.g. Tectyl).

9.3. Where different materials will be in contact with each other and galvanic corrosion can occur the contact areas of the materials must be isolated from each other or the joints made water proof to prevent ingress of moisture.

9.4. All components must be designed with corrosion prevention in mind and specifically the following:-

9.4.1. No entrapment of dirt, product, moisture etc.

9.4.2. No areas must be inaccessible for maintenance such as too narrow gaps etc.

9.4.3. Large flat areas rather than complicated shapes and profiles.

9.4.4. No sharp corners and discontinuous welds.

9.5. Parts of equipment which are exposed to high temperatures must be coated with the following system:-

Coat No	Generic Description	Approved Brand Products	Dry Film Thickness (μm)
1	Two component self curing inorganic zinc ethyl silicate	DULUX /SIGMA-Sigma MC60 INTERNATIONAL (PLASCON) Interzinc 233 STONCOR (CHEMRITE COATINGS) Carbo Zinc 11	65-75
2	Single component high temperature moisture curing silicone with aluminuim flakes	DULUX/SIGMA – Sigmatherm Silicate INTERNATIONAL (PLASCON) Intertherm 50 STONCOR (CHEMRITE COATINGS) Carboline 1248	40

10. MAINTENANCE PAINTING OF STRUCTURES

10.1. Areas which are only lightly corroded must be cleaned by means of high pressure water blasting or wire brushing by power tool and the following system applied:-

Coat No	Generic Description	Approved Brand Products	Dry Film Thickness (μm)
1	Surface tolerant two pack epoxy primer with aluminuim pigments	Dulux/SIGMA Aluprimer STONCOR (CHEMRITE COATINGS) Carbomastic 15 INTERNATIONAL (PLASCON) Intergard 468,	125-150
2	Same as first coat OR micaceous iron oxide (MIO) epoxy	DULUX/SIGMA – Sigmacover CM MIO	125-150

		INTERNATIONAL (PLASCON) Interseal 010 MIO STONCOR (CHEMRITE COATINGS) Carboline 190 HB M.I.O. or Carboline 193 M.I.O.	
3	Two component recoatable, polyurethane finish (Gloss)	DULUX/SIGMA Sigmadur gloss INTERNATIONAL (PLASCON) Interthane 990 STONCOR (CHEMRITE COATINGS) Carboline 134	65-75

10.1.1. Alternatively, the Noxyde paint system can be used, consisting of two to three coats of water based Noxyde paint to achieve a DFT of 350 to 400 microns. Where the Noxyde system is used on areas other than slightly corroded structural areas, the following additional requirements must be observed:

10.1.1.1. Very smooth surfaces (e.g. 3CR12, stainless steel or hot-dip galvanized components, bolts, nuts and fittings, and HT bolts): Parts must be thoroughly degreased using OptiDegreaser, washed down with potable water, and immediately when dry, a single coat of OptiPrimeAqua applied.

10.1.1.2. Paintable flexible sealant/mastic: Only sealant approved by the paint manufacturer may be used, and an initial coat of OptiPrimeAqua applied over it before the further coats of Noxyde are applied.

10.1.1.3. Bolted/rivited connections: After blasting or and/or cleaning as required, apply a coat of OptiPrimeAqua and an additional stripe coat of Noxyde, in contrasting colour, to all bolt/nut and plate edges and crevices.

10.2. The adhesion of old coatings must be verified by doing a cross cut adhesion test on selected areas.

10.3. The compatibility of the new paint system on the old coating must be tested and guaranteed in writing by the paint supplier.

10.4. The work and coating system must be guaranteed for a minimum of 12 months.

10.5. All heavily corroded areas must be shot blasted to minimum SA2 and the three coat system indicated in clause 2.6 applied.

10.6. Areas where the old coating is still sound need only be high pressure cleaned with a suitable solvent and coated with one of the primers suggested in clause 10.2 (as tie coat) and then with one of the top coats suggested in clause 2.6 to get the appropriate colour and finish. The minimum dry film thickness of this tie coat must be 75 microns and top coat must be 50 microns, but the previous coating colour shall be completely obliterated to present a uniform colour.

Note: Inorganic zinc primers shall not be re-covered with an inorganic primer, but only with an organic zinc primer.

10.7. Repairs to the insides of all the enclosed sections of the booms as well as the insides of the crane legs, sill beams, cross beams, pylon cross bracing members etc. shall be done as above but the top coat need not be applied.

****** END OF SPECIFICATION HE 9/2/8 [Version 17] ******

Annexure M - EEAM-Q-009 (Quality Management Specification)

REVISION	REFERENCE	
0	**EEAM-Q-009**	

DOCUMENT TYPE SPECIFICATION	**AUTHORISATION DATE: Date signed by CEO**

TITLE: **QUALITY MANAGEMENT SPECIFICATION FOR SUPPLIER/CONSTRUCTION**	**PAGE 1 of 14**

COMPILED BY:	**REVIEWED BY:**	**REVIEWED BY:**
SENIOR MANAGER (QUALITYMANAGER)	**SENIOR MANAGER (PROJECT MANAGER)**	**SENIOR MANAGER (GENERAL MANAGER)**

ACCEPTED BY:	**AUTHORIZED BY:**
CHIEF FINANCIAL OFFICER	**CEO**

FUTURE REVISION RECORD NUMBER	**DESCRIPTION OF REVISION**	**APPROVAL**	**DATE 01/03/2010**
-1-			

CONTENTS

KEYWORDS	**DATE OF LAST REVIEW: N/A**
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DETAILS CONTENTS

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Table of Contents

1. Introduction

This Specification outlines the minimum requirements to ensure that products and services supplied to Transnet Port Terminals are manufactured, provided, constructed or installed in accordance with all specified requirements as defined in the Contract, all associated specifications, drawings, codes and standards.

2. Definitions

Term, Abbreviation	Meaning
Data	All drawings/documents/data/information and DP's required to be supplied under the Contract
Data Pack (DP)	A compilation of manufacturing data, certification, inspection and testing records prepared by the Supplier/Contractor to verify compliance with the Contractual requirements.
Employer	For the purposes of this document, the term Employer has the same meaning as applied to the term Client.
Field Inspection Checklist (FIC)	A document that details the checks, requirements and test parameters for each type of equipment to permit field installation and pre- commissioning of the equipment.
TPT	Transnet Port Terminals is the Employer's Nominated Agent in terms of the Conditions of Contract.
Inspection Release Report (IRR)	A document issued to the Supplier/Contractor by TPT advising release of the Materials for shipment. This does not relieve the Supplier/Contractor of its obligations in accordance with the Terms and Conditions of the Contract.
Inspection Waiver Report (IWR)	A document issued to the Supplier/Contractor by TPT advising that TPT has waived final inspection for the materials listed in this document. The issue of this Report does not preclude further inspection by TPT, is issued without prejudice and does not relieve the Supplier/ Contractor from the guarantees and obligations included in the Contract/ Contract. A document prepared by the Supplier/Contractor providing relevant information applicable to the installation and maintenance of the specific equipment, including consumables (eg. oils etc)
Project Quality Plan (PQP)	A document that outlines the Supplier/Contractor's strategy, methodology, resources allocation, Quality Assurance and Quality Control coordination activities to ensure that Goods and Services supplied meet or exceed the requirements defined in the Contract, drawings, codes and standards.
Quality Control Plan (QCP*	A document outlining specific manufacturing / construction inspection and testing requirements, including responsibilities, test acceptance criteria, nomination of witness and hold points. For the purposes of this document, the term Supplier/Contractor has the same meaning as applied to the term Sub-Supplier/Sub-Contractor
Supplier/Contractor	This refers to the documentation required to be submitted by the relevant Supplier / Contractor in terms of the Contract.
Supplier/Contractor Data Requirements	These requirements are generally tailored to suit the particular Scope of Work, although it also addresses the manner in which the documentation is required to be submitted, eg Hard copy, Electronic copy etc
Technical Query Note (TQN)	This refers to a document used by the Supplier/Contractor to formally clarify a Technical Query related to the scope of supply. This should not be used where a non-conformance has already been initiated.

3. Applicable Documents

3.1 General

All work performed shall comply with the requirements of this Specification, the documentation referenced in the Contract and the latest revision/edition of the relevant Codes and Standards referenced herein.

3.2 Statutory Regulations

Occupational Health & Safety Act, Act No 85, of 1993 and Regulations as amended.

3.3 Codes and Standards

Document No.	Title
ISO 9001	International Standard Series Quality Systems
EEAM-Q-013	Punch Listing Standard

4. Quality System

4.1 General

The Supplier/Contractor shall be responsible for all quality activities necessary to ensure the Work meets the requirements specified in the Contract, and shall manage and coordinate all Quality aspects of Work in accordance with the requirements of this Specification, and the Supplier/Contractor's PQP and QCP's once reviewed and approved by TPT.

The Supplier/Contractor shall ensure that all Sub-Suppliers/Sub-Contractors also conform with the requirements of this Specification.

4.2 Supplier/Contractor Quality System Requirements

The Supplier/Contractor shall have, maintain and demonstrate its use to TPT, it's documented Quality Management System. The Supplier/Contractors Quality Management System should be in accordance with the International Standard ISO 9001.

The Supplier/Contractor shall submit its Quality System documentation to TPT at the time of tender and at Contract Phases as detailed below:

- Project Quality Plan
- Quality Policy
- Index of Procedures to be used
- Programme of internal and external audits

4.3 Supplier/Contractor Documentation Requirements

The Supplier/Contractor shall develop and maintain a comprehensive register of documents that will be generated throughout the project, and shall include all quality related documents. The register shall be submitted to TPT for review.

TPT shall indicate those documents required to be submitted for information/review and/or acceptance and this shall be indicated in the Supplier/Contractors' Document Register. The register shall indicate the dates of issue of the documents taking into account sufficient time to allow TPT review/acceptance cycle prior to the document being required for use.

5. Quality Assurance

5.1 Project Quality Plan

Where specified, the Supplier/Contractor shall submit a PQP to TPT within 28 days after the Contract start date. The PQP shall detail how the Supplier/Contractor's Quality System will be applied to the Scope of Work specified in the Contract, and shall address the following:

- Satisfying the technical and quality requirements of the Supplier/Contractor's Scope of Work, and relevant elements of the applicable ISO 9001 standard
- include all quality activities relevant to the Scope of Work, identifying all procedures, reviews, audits, controls and records used to control and verify compliance with the specified Contractual requirements

Include a listing of all special processes (eg. welding and non-destructive testing, cube testing etc) envisaged for use, including confirmation of personnel certification as required

- Include all proposed method statements (for site based work activities)
- Include a description of the Supplier/Contractor's project organisation, with key positions and responsibilities identified and individuals named. The organisation structure shall also indicate the resources committed to the management / coordination of QA / QC activities
- Include a listing of all Quality Control Plans (QCP's), and associated Field Inspection Checklists (FIC's), as applicable
- Identify in the Project Quality Plan any Sub-Supplier/Sub-Contractor work. Sub-Supplier/Sub-Contractor plans shall be approved by the Supplier/Contractor, and a copy forwarded to the TPT
- Include the proposed Authorised Inspection Authority (where applicable - for pressurised equipment and systems)
- Include a schedule of proposed quality records

The PQP shall be controlled and re-submitted for approval when required to incorporate any change necessary during the Contract duration to ensure that the document is maintained as an effective control, change management and records. The change management will be done to an agreed policy or procedure.

Note: Where the Supplier/Contractor is required to provide a PQP, no work shall commence until the PQP is approved by TPT.

5.2 Procedures

The Supplier/Contractor's PQP and procedures shall address the system elements and activities appropriate to the Scope of Work, in compliance with the specified Quality Standard.

Where specified, the Supplier/Contractor shall submit copies of Quality Procedures for review. In addition, the Supplier/Contractor shall ensure that copies of all Procedures relevant to the Scope of Work are available for reference by TPT at each work location.

These will include, as applicable, the following:

5.2.1 Document Control

The Supplier/Contractor's Project Quality Plan shall provide a description of how TPT provided, Supplier/Contractor and Sub-Supplier/Sub-Contractor documents are to be managed. The description shall address as a minimum:

- Management tools and databases
- Receipt, registration and maintenance
- Internal and external distribution to Employer, third parties and Sub-Contractors
- Management of Codes, Standards and Specifications

- Internal review and approval routines and authorities
- How it is ensured that the correct revisions of documents are available at the point of use including retention periods for all documentation.

5.2.2 Design Control

Where the Supplier/Contractor is responsible for any aspect of design related to their Scope of Work, the Quality Plan shall describe the Supplier/Contractor's methods and procedures for the control of these design activities.

5.2.3 Procurement

Where the Supplier/Contractor is responsible for any aspect of procurement related to their Scope of Work, the Quality Plan shall describe the Supplier/Contractor's methods and procedures for the control of these activities.

5.3 Supplier/Contractor Audits

The Supplier/Contractor shall:

- Carry out audits in accordance with its Quality System at its own and Sub-Supplier/Sub-Contractor's facilities to ensure project quality requirements are being achieved
- Include a QA Audit Schedule in the Supplier/Contractor PQP submitted to TPT prior to commencement of the Scope of Work. The Audit Schedule shall include all audits to be implemented by the Supplier/Contractor and Sub-Supplier/Sub-Contractor during the execution of the Contract
- Where stipulated in the Contract, perform an audit within three months after the Contract start date and thereafter at a minimum frequency of three months. Audit reports shall be submitted to TPT at the completion of each Audit. Where unsatisfactory performance is evident, additional audits shall be performed by the Supplier/Contractor as directed by TPT.

5.4 Transnet Port Terminals Audit

TPT reserves the right to perform quality audits or participate as an observer in Supplier/Contractor audits to verify compliance with the Contractual requirements. The Supplier/Contractor shall within a time frame as agreed upon, correct any adverse audit finding advised by TPT.

6. Inspection and Testing

6.1 General

TPT may, at its discretion perform surveillance inspection at the Supplier/Contractor's premises, SubSupplier/Sub-Contractor's premises or at the location of the Scope of Work.

Dependent on the nature of the Scope of Work and the frequency of inspections TPT may elect to have inspection personnel resident at the place of manufacture, fabrication, or assembly.

The Supplier/Contractor shall ensure free entry and access is given to TPT, certifying authorities and statutory authorities to inspect the Scope of Work and review procedures and quality records at all parts of the Supplier/Contractor's and Sub-Supplier/Sub-Contractor's premises, or at the location of the Scope of Work while any work or test is in progress.

The Supplier/Contractor shall provide TPT with all necessary tools, calibrated measuring equipment, safety equipment and workspace to verify or witness tests in progress.

While TPT is at the Supplier/Contractor's premises, the Supplier/Contractor shall provide, free of charge, reasonable facilities including office facilities and reasonable access to a telephone, facsimile machine and computer connection point.

The Supplier/Contractor shall provide notice in writing in within a time frame time as agreed upon, to allow the attendance of TPT and other representatives at nominated witness and hold points.

6.2 Quality Control Plans

The Supplier/Contractor shall prepare and submit QCP's to TPT for review in accordance with the requirements of the Contract and PQP.

QCP's shall identify all inspection, test and verification requirements to meet the Contractual obligations, specifications, drawings and related details including destructive and non-destructive testing, witness and hold points.

The Supplier/Contractor shall not commence fabrication or manufacture prior to review and approval of the applicable QCP by the TPT.

QCP's shall include reference to all tests specified in the Contract Document.

A typical format for an QCP is shown in Appendix A. The Supplier/Contractor may use its own format providing all information shown in Appendix A is included.

6.3 Inspection Points

The QCP shall identify points in the fabrication, manufacturing and/or installation process that are selected for inspection and shall be denoted by the following inspection codes:

- Hold Point (H) — Inspection point in the manufacturing cycle, beyond which work shall not proceed without the specified activity, work or function being witnessed. Holding points require written notification to TPT.
- Witness Point (W) — An inspection point in the manufacturing cycle that will be witnessed or verified. If TPT confirms it is unable to attend after being provided with the written notification then manufacture may proceed. Witness points require written notification to TPT.
- Review Point (R) — A point at which products and quality records are verified and endorsed. Review points are not notifiable points.
- Surveillance (S) — An inspection point in the manufacturing cycle during which any activity, work or function is observed. No formal notification is required.

The Supplier/Contractor shall maintain the status of testing and inspection by progressively having the QCP's signed off.

6.4 Revision to Quality Control Plans

Revision of the QCP shall be subject to the same submission, review and acceptance routines as described for the original QCP issue

6.5 Kick Off Meeting

After the Contract start date, and prior to manufacture, TPT will require a Kick Off Meeting with the Supplier/Contractor to discuss fully the implications of meeting TPT quality requirements. This meeting may be held as part of the Contract kick-off meeting for each package or may be a separate meeting, subject to the critical or complex nature of the work. This requirement for a pre-inspection meeting may be repeated when sub-Supplier/Contractors of key equipment are engaged.

After mobilization of the Contractor, and prior to the commencement of any construction activities, TPT will arrange for a Quality kick-off meeting to discuss fully the implications of meeting the projects' quality requirements. This meeting may be held as part of the formal kick-off meeting for each contractor, or may be a separate meeting subject to the critical or complex nature of the work.

6.6 Schedule of Inspection

The Supplier/Contractor shall submit a Schedule showing the proposed dates for inspections and tests nominated in the QCP where witness and hold points are required. The Schedule shall be regularly updated with progress and issued to TPT to show the current inspection and test status.

6.7 Field Inspection Checklists

For site installation and construction activities, the Supplier/Contractor shall prepare Field Inspection Checklists (FIC's) to permit inspection and testing of installed equipment and constructed facilities in accordance with the respective QCP's.

FIC's shall be provided to TPT for initial review, and shall be used to record the results of inspection and testing (where applicable), and on completion be submitted to TPT to confirm satisfactory completion of the tests and inspections at nominated QCP witness and hold points.

6.8 Inspection Notification

The Supplier/Contractor shall notify TPT in writing at least two calendar weeks prior to the advent of inspections or tests that require witnessing.

For inspections or tests within the country, arrangements shall be confirmed at least two working days before the event. For inspection and tests outside of the country, arrangements shall be confirmed at least seven working days before the event.

Inspection notifications shall include the following essential information:

- Contract Number
- Location of Inspection or Test
- Nature of Inspection or Test
- Date and Time of Inspection or Test
- Name and telephone number of the Supplier/Contractor's Representative.

6.9 Inspection and Testing

The Supplier/Contractor is responsible for the conduct of all Supplier/Contractor inspections and tests, and includes:

- Documenting inspection and tests result in the QCP's and relevant FIC's
- Progressively inspecting the quality of the Scope of Work performed, including that of all Sub-Supplier/Sub-Contractors
- Inspecting to meet all Contractual requirements, in number, type and form
- Inspecting day to day activities, material receipts, issue of material for installation, in-process inspections, and final inspections.

Completed original QCP's and FIC's shall be submitted to TPT in the DP

6.10 Inspection Release

At completion of the Scope of Work, either in total or in phases, TPT may issue an Inspection Release Report (IRR) or a waiver of inspection.

The issue of either an inspection release or waiver of inspection does not relieve the Supplier/Contractor of its obligations under the Contract. The Supplier/Contractor shall ensure a copy of the release note and final expediting release note for transport, where appropriate, is attached to the delivery docket and accompanies the Work to the designated destination indicated in the Contract. Items delivered to TPT without a copy of these documents may not be accepted.

A copy of the inspection release or waiver of inspection shall be included in the DP.

6.11 Special Processes

It is the Supplier/Contractor's responsibility to ensure that all processes which require prequalified procedures and/or work methods are tested and qualified before work begins. This typically covers such activities as welding, non-destructive testing, special fabrication techniques and painting. Unless specified such procedures are the Supplier/Contractor's responsibility and do not require submission to TPT before work begins. When such procedures are requested, no work shall commence until procedures are approved by TPT.

It is the Supplier/Contractor's responsibility to ensure all operators are qualified for the processes in accordance with the procedure and/or applicable standards. Records of qualification of operators shall be maintained by the Supplier/Contractor and made available to TPT when requested.

Records of qualification of procedures and processes shall be maintained by the Supplier/ Contractor in accordance with the applicable procedure or code.

6.12 Welding Procedures

Where the Supplier/Contractor's Scope of Work includes fabricated weldments, Welding Procedure Specifications (WPS) defining the method, preparation and sequences to be adopted to achieve a satisfactory welded joint shall be provided for all weld types required in the execution of the Supplier/Contractor's Scope of Work. The procedure shall only be submitted to TPT when requested in the Contract.

WPS shall include all welding essential and non-essential variables for each process used, including appropriate test results and shall comply with the standard or code pertaining to welding required in the execution of the Supplier/Contractor's Scope of Work.

When requested in the Contract a suitably marked "weld map" shall be completed by the Supplier/Contractor for all items to be fabricated. A summary of WPS shall be prepared and when used, shall be identified on the weld map.

Where TPT approval is required, fabrication shall not commence until written approval of WPS and Welding Procedure Qualification Records (WPQR) is received by the Supplier/Contractor. No welding fabrication will be accepted that is not covered by an TPT approved WPS/WPQR.

Welding Procedure Qualification (WPQ) tests may be witnessed by TPT and/or an independent inspection authority. Testing of the specimens prepared during the WPQ Tests shall be carried out by an independent approved testing laboratory independent of the Supplier/Contractor. In certain instances, a certificate to EN 10204 3.1 B may be required which will be clarified at Tender review and clarification stage.

Where actual weld deposit analysis and weld metal physical properties are required for procedure qualification, the information shall be taken from the procedure qualification tests. Data listed in the catalogues of the manufacturer of welding consumables is not acceptable.

Welders/welding operators shall be qualified in accordance with the relevant welding code prior to commencing production fabrication. Specific Welder Qualifications (WQ's) records will be reviewed by TPT in the Supplier/Contractor's works and should NOT be submitted for review.

A register of welders qualified to work shall be maintained by the Supplier/Contractor.

6.13 Material Traceability

Where, and to the extent that material traceability is required, the Contractor shall provide its procedures for the maintenance of material identification throughout all phases of manufacture. Methods of identification, routines for re-stamping or stencilling as appropriate shall be defined and agreed with the Employer.

Adequate records shall be maintained throughout construction enabling traceability of key materials from final product back to original material certificates. The material traceability records shall form part of the DP

The Contractor shall prepare a schedule of materials and equipment that are subject to traceability requirements.

6.14 Material Certification

Where specified in the Contract the following certificates shall be provided to TPT and included in the DP.

Type A:	A Supplier/Contractor's certificate of compliance with the Contract. This certifies that the goods or services are supplied in compliance with the Contract without mention of any test results (EN10204 certificate 2.1).
Type B:	A certificate issued by a laboratory or test facility independent of the Supplier/Contractor'sworks. It shall quote test results carried out on the product supplied and state whether compliance with the relevant technical standard, code etc has been complied with. (EN 10204 certificate 3. I B).
Type C:	The same as Type B, the tests are to be witnessed by a third party (EN 10204 certificate 3.1C).

7. Non Conforming Products

7.1 General

The Supplier/Contractor shall establish and maintain procedures to control material or products that do not meet the specified requirements.

All Supplier/Contractor product and/or materials identified as not conforming to requirements shall be dealt with promptly as follows:

- If the Supplier/Contractor discovers material or product which is not in accordance with the requirements of the Contract, i.e. a non conformance (NCR), the Supplier/Contractor shall promptly initiate the non-conformance procedure in terms of the Supplier/Contractor's Quality Management System, advise TPT promptly, and provide a copy of the NCR to TPT
- If TPT or it's agent identifies a non conformance an TPT NCR may be raised.
- Originals of all closed out NCR's shall be included in the DP.

7.2 Corrective and Preventative Action

If the Supplier/Contractor proposes a disposition of any non conforming materials or product which varies from the requirements of the Specification or Contract, such a proposal shall be submitted in writing to TPT whose decision on the proposal shall be obtained in writing before the non conforming material or product is covered up or incorporated into the Works, or is the subject of any other disposition.

The disposition of non-conformances which do not vary the requirements of the Contract, specification or drawings may be approved by the Supplier/Contractor following discussion and agreement with TPT.

8. Concession Requests and Technical Queries

8.1 Concession Requests

Where a Supplier/Contractor requests a Concession to deviate from the requirements of the Contract or specified requirements, the Supplier/Contractor shall raise the request with TPT using the format as shown in Annexure B.

The Concession Requests shall clearly identify all elements of the proposed deviation together with any resulting technical, commercial and/or schedule impacts.

Completed original Concession Requests shall be included in the DP.

8.2 Technical Queries

For clarification of technical issues (only), Supplier/Contractor may submit a Technical Query Note (TQN) to TPT in accordance with the Contract.

The TQN shall clearly identify all elements of the query, and all supporting documentation and/or drawings shall be attached where appropriate.

Completed original TQN's shall be included in the DP.

9. Inspection, Measuring and Test Equipment

9.1 Calibration

The Supplier/Contractor, including its Sub-Supplier/Sub-Contractors shall ensure the calibration of test and measuring equipment is performed and maintained in accordance with the relevant Supplier/Contractor procedures and/or the equipment manufacturer's specifications.

Where calibration is required by an external laboratory, the Supplier/Contractor shall ensure that the facility selected for calibration possesses current certification. Calibration certificates shall contain a statement that the test equipment is accurate to within specified tolerances.

The Supplier/Contractor should establish the frequency of calibration for each item of equipment (including jigs, fixtures or templates) and record the details in a 'Measuring and Test Equipment Register' (or similar).

9.2 Use of Inspection, Measuring and Test Equipment

The Supplier/Contractor shall ensure that authorised equipment users:

- Use the equipment in accordance with manufacturers instructions, and accepted industry practices
- Ensure the equipment is covered by a current calibration certificate
- Conduct the measurements or tests in accordance with the equipment manufacturer's specifications or other relevant specification
- Prior to commencement of each inspection or test activities:
- Identify the measurements to be made
- Determine the accuracy required
- Select the appropriate inspection, measuring or test equipment for the scope of work.

9.3 Verification of Previous Test Results

Where the calibration status of the equipment is unknown, expired or has doubtful accuracy, the equipment shall immediately be quarantined, and tagged according to Supplier/Contractor's Quality System procedures. The Supplier/Contractor shall then arrange for either in-house or external calibration, and:

- review all previous test results associated with the suspect equipment
- identify the inspections, measurements or tests required to re-validate the results
- ensure that suitable re-testing is performed with calibrated equipment
- document the results of the re-testing on the respective inspection and test documentation.

10. Quality Records

Supplier/Contractors shall maintain Quality Records necessary to provide objective evidence that demonstrates and verifies achievement of the QA / QC requirements associated with the Scope of Work. All Quality Records, including original source material test certificates and non destructive test reports, shall be retained by the Supplier/Contractor during the project, and be provided to TPT at the times, and in the quantities specified in the Contract.

The Supplier/Contractor shall collate all quality records in the DP and submit the DP to TPT in accordance with the Contract and all referenced standards and specifications. This DP shall be compiled progressively, and shall be available for review at all phases of manufacture or construction activities.

The Scope of Work shall not be complete until the Supplier/Contractor's DP including the quality records from Sub-Supplier/Sub-Contractors have been reviewed and accepted by TPT.

The DP shall be compiled progressively during the execution of the Scope of Work and shall be made available for review by TPT as required.

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port terminals

Annexure A - Sample Quality Control Plan

Quality Control Plan No.: _____ Rev: _____ Date Issued: _____

Contract No.: _____ Description: _____ Item No.: _____

Supplier / Contractor: _____ Location: _____

Activity No.	Activity Description	Procedure Ref./Code Specification	Specification Acceptance Criteria	Verifying Doc/Report Certification	Verification / Witness					
					Supplier / Contract or		TPT		Employer	
					Action	Sign	Action	Sign	Action	Sign

Rev.	Date	Reason for Revision	Drawn	Checked

Action:

H - Hold, Mandatory Hold Point

R - Review (Verify) Only

W - Witness

S - Surveillance

NOTE: H&W points require formal notification to TPT.

TRANSNET

port terminals

Annexure B - Request for Concession

Request for Concession _____ ***No:*** ___ *of 2*

A.SUPPLIER/CONTRACTOR SUPPLIED INFORMATION

SUPPLIER/CONTRACTOR NAME: CONTRACT NO.:

SUPPLIER/CONTRACTOR CONCESSION NO.: DATE:

Required concession applicable to: (Item/Material/Equipment/Area)

Description of Concession — Revised Requirements:

Justification:

(NOTE: This concession will be rejected if the following information is not provided):

(i) VALUE OF BENEFIT TO CLIENT	(ii) AGREE TO AN EXTENSION OF THE WARRANTY	YES	NO	(i i i) ANY IMPACON SCHEDULE?	NO	YES
S/R	IF "YES" WHAT PERIOD?			CF "YES" \ VHAT PERIOD?		

References:

Original reference:

Requirements Rev.: Specification No. Rev.:

Drawing No.: Rev.: Specification : Rev.:

Drawing No.: Rev.: Specification Rev.:

Attached documentation: N applicable

Requested by:

(Supplier/Contractor) Name: Signature: D

Note: Sections B to F on Page 2

Request for Concession No:				
B. SITE ADMINISTERED CONTRACT?	Yes		Nn	Go to "D"
Possible QC implications:				
	Recommend ations		Rejected	
Recommende				
Site Construction Manager:		Signature:		Date:
Site Engineer:		Signature:		Date:

C. RECOMMENDATION BY CONTRACT ADMINISTRATOR: Name:

Signature Date:

D. RECOMMENDATION BY ENGINEERING:

Recommende d | Rejected | Conditional, with the following recommendations:

Package Engineer: Signature: Date:

Lead Discipline Engineer: Signature: Date:

Engineering Manager: Signature: Date:

Comments:

E. PROJECT MANAGER DISPOSITION: Accepted Rejected

Name: Signature Date:

F. EMPLOYER DISPOSITION: Accepted Rejected

Annexure N - TPT's Contractor S.H.E. Management Specification Guidelines

CONTRACTOR'S COMPLIANCE FILE ASSESSMENT CHECKLIST

Project Manager:	
Project name:	
Client:	
Contractor Details:	

No.	items	Approved	Not Approved
1	Principal Contractors Organogram		
2	Letter Of Good Standing With Compensation Fund		
3	Notification Letter Of Construction Work ~ Department Of Labour (If Applicable)		
4	Appointments		
5	Induction: Employees And Visitors: Staff Medical Certificates		
6	Principal Contractor's SHEQ Policy		
7	Health & Safety Plan, Integrated Legal Register, Client Specification.		
8	Fall Protection Plan (If Applicable)		
9	Risk Assessments: Method Statements: Safe Operating Procedures		
10	Incidents / Accidents Register And Investigation Reports		
11	Emergency Contact Telephone Numbers		
12	Business Continuity Plan Including Emergency Plan		
13	Documented Proof Of Daily Toolbox Safety Talks/ DSTI		
14	Inspections Checklist		
15	All Registers		
16	Welfare Facilities		
17	Electrical Compliance		
18	Mandatary Agreement		
19	Communication Plan		
20	Training Records and Competency Certificates		
21	General		
22	Insurance Covering Letter		

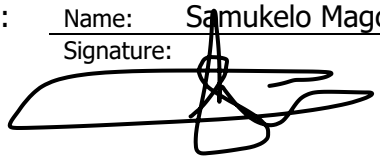
CONTRACTOR'S COMPLIANCE FILE REVIEW			
Date	Print Full Name	Designation	Signature
Status			
Approved			
Not Approved			
Reasons for not approving			

Annexure O - High Level Commissioning Plan

Transnet Port Terminals
High Level Commissioning Plan
Electrical Equipment

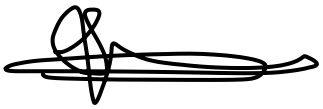
Document No:

Prepared by: Name: Samukelo Magcaba — May 2018
Signature: — Date



Reviewed by: Name: —
Signature: — Date

Approved by: Name: Samukelo Magcaba — September 2022
Signature: — Date



00	May 2018	Issued for Review
Rev	**Date**	**Revision Details**

Contents

1. INTRODUCTION

The purpose of the High Level Commissioning Plan is to outline the procedures associated with commissioning various types of electrical and mechanical systems and equipment. A detailed commissioning plan as where deemed appropriate at the discretion of the responsible engineer, shall be prepared as required for the various systems. International best practice norms and standards shall be followed in terms of inspection, testing for safety, setting and configuring, and rendering the installed equipment fully functional to its intended purpose.

2. STATUTORY REQUIREMENTS

All aspects of the commissioning process shall adhere to any and all relevant requirements of the following legislation, as appropriate:

- Occupational Health and Safety Act 85 of 1993
- National Environmental Management Act 107 of 1998
- South African National Standards and Codes of Practice
- All local, provincial or S.A. Government laws in force at the time.

3. GOVERNING CODES, STANDARDS AND SPECIFICATIONS

The commissioning process for all electrical and mechanical equipment shall adhere to any specific and relevant requirements contained in the following national and international standards. Where different standards call for different testing and commissioning procedures for the same equipment, the most stringent alternative shall apply.

Note: Where reference is made to a code, standard or specification, the reference shall be taken to mean the latest edition of the code, standard or specification, including latest Addenda, supplements and revisions thereto.

The commission process in general, shall be in accordance with the recommendations of:

- The International Electrotechnical Commission (IEC), and
- The Institute of Electrical and Electronic Engineers (IEEE)
- International Standards and Codes – ISO, DIN, BS, ASME, ASCE, ANSI, ASTM, EU

4. SCOPE

This plan covers site electrical pre-operational tests and commissioning tests required for electrical apparatus, wire, cables and other miscellaneous equipment and material as called for in the specifications and must be read in conjunction with the other specifications.

5. GENERAL INFORMATION

5.1. Pre-operational tests and acceptance certificates as herein specified are defined as those tests and inspections required by the ENGINEER prior to equipment being energized to

determine that the apparatus involved may be safely energized.

5.2. Calibrating tests, checks on limit switch settings, interlocking, PLC functioning etc. are so called cold commissioning or dry tests.

5.3. Hot commissioning tests are the tests as specified by the Engineer such as burn in tests for electronic equipment and continuous cycle tests etc. when the equipment is handling the product it was designed for.

5.4. Final acceptance will not only depend on equipment dependability, as determined by the subject tests, but will depend on complete operational tests on all equipment to show that the equipment will perform the functions for which it was designed.

5.5. These specifications intend that the workmanship methods, inspections and materials used in erection and installation of the subject equipment shall conform with accepted engineering practices, the specifications as prepared by the Engineer, Manufacturer's instructions and the relevant Standards as referred to in all the attached specifications.

5.6. Thermographic images shall be taken, as directed by the Engineer, of all equipment put into service, as part of the commissioning documentation. These images shall be time and date stamped.

5.7. The Contractor shall bear the costs of all tests required.

6. RESPONSIBILITY

6.1. The testing shall be performed by and under the immediate supervision of the Contractor and witnessed by the Engineer and/or his duly authorised representative. This representative may be an Independent Commissioning Engineer appointed by the contractor with the Engineer's approval.

6.2. The Contractor shall adjust, set, co-ordinate, calibrate and test all systems and equipment furnished and/or installed by him.

6.3. The Contractor shall determine, and the Engineer shall approve the individuals in whom final responsibility and authority rests for carrying out these tests and inspection procedures on particular equipment. The method to be followed in obtaining clearances on electrical equipment shall also be established and such method rigidly adhered to.

6.4. All testing shall be scheduled by the Contractor and cleared through the Engineer. No testing of any kind shall be done or scheduled without this clearance.

6.5. The Contractor shall notify in person or by letter all the interested parties at least 24 hours prior to tests, establishing the time the test is to be performed.

6.6. The interested parties to be informed will be determined in conjunction with the Engineer.

6.7. The parties notified shall be responsible for having their representatives present at the designated time. Absence of any one representative will not prohibit the test from proceeding on schedule, unless such representative is essential in doing the tests.

6.8. Each of the notified interested parties and the testers employed shall be individually responsible for the safety of all members of their organization during such time as the tests

are performed.

6.9. The Contractor will coordinate all testing to ensure that all trades are prepared and that the conditions are safe.

6.10. Detailed testing method and equipment shall be approved by the Engineer.

6.11. On some tests, particularly the final inspections of important equipment, the manufacturer's Engineer or representative shall be present and perform same. The request for a manufacturer's representative shall be made sufficiently in advance to the date the test is scheduled so that satisfactory arrangements for the representative's services can be made. Frequently, the manufacturer's responsibility applies to both electrical and mechanical equipment. Where such joint responsibility exists, the request for a manufacturer's representative shall be arranged to satisfy both electrical and mechanical requirements simultaneously.

6.12. Manufacturer's instructions shall be carefully read for any special conditions that may be required for testing.

6.13. Following established procedures, equipment will be energized after certification on the relevant form by the personnel performing the tests, that equipment is ready for energizing and with the concurrence of the Engineer.

7. TESTING EQUIPMENT

7.1. All testing equipment for tests which are to be performed shall be furnished by the Contractor.

7.2. Testing equipment required to prove guarantee values shall be calibrated immediately prior to the relevant tests to be performed. The error curves shall be submitted with the report.

8. TESTING RECORDS

8.1. Test results shall be entered in test forms provided by the Contractor or, if such forms are not available, in test forms approved by the Engineer.

8.2. Authorized, qualified representatives of the parties interested (see paragraph 3.0 shall be present to approve a test when made. One (1) copy of the rough draft-test report shall be given to each authorized representative at the time the test is made.

8.3. Formal test reports approved by the Engineer shall be supplied and prepared by the party performing the test within 48 hours, signed by the authorized representatives, and furnished to the Engineer for distribution.

9. SAFETY PRECAUTIONS

9.1. The Contractor shall exercise extreme care in performing the tests specified so as not to jeopardize the safety of personnel and to prevent equipment damage during any tests. All exposed live parts subject to testing shall be guarded by personnel, barricades, or other practical means to ensure against personnel being injured by coming in contact or close proximity to exposed parts.

9.2. All equipment, exposed live parts, etc., shall be completely discharged by grounding or other accepted methods so as to eliminate the possibility of injury to personnel from electrical shock after the tests have been completed.

10. PROVISIONAL ACCEPTANCE

10.1. The Engineer's Provisional Acceptance of any electrical installation shall be based upon the completion of tests and checks prescribed in clauses 8 through 13, submission of test data (where required), satisfactory materials and workmanship, and demonstration of satisfactory start-up.

11. EARTH CONTINUITY AND RESISTANCE TESTS

11.1. General:

11.1.1. All earthing and bonding cables must be checked for continuity and earth resistance.

11.2. Test procedure:

11.2.1. Measuring the cable and connection resistance simultaneously with a resistance bridge or accurate multi-meter.

11.3. Acceptance:

11.3.1. The resistance of the earthing and bonding cables and connections must be less than stated in SABS 0142/latest.

11.3.2. Complete and accurate records of all resistance readings of all earthing conductors of motors, transformers, power cables etc. must be made.

The records shall include the following:

11.3.2.1. Complete identification of the cable and connection points including its approximate length;

11.3.2.2. Resistance reading;

11.3.2.3. The approximate average cable temperature.

11.3.3. No electrical systems will be energized until the master copy of its test record is approved by the Engineer.

12. MEDIUM VOLTAGE CABLES

12.1. General:

12.1.1. The Contractor shall give all medium voltage cables a Very Low Frequency (VLF) Hi Pot test in compliance with the cable manufacturers specifications, after all splices and potheads or cable terminations have been made.

12.1.2. The Contractor shall then perform a Dissipation Factor (Tan-Delta) test on the cable as per the cable manufacturer's specifications.

12.1.3. The medium voltage cables shall be given a complete dielectric absorption test before and after the VLF and Tan-Delta test. The cable test shall be performed prior to connections to the electrical equipment at either end.

12.1.4. DC Hi Pot Testing is strictly prohibited on any MV cables or systems owned and operated by Transnet.

12.1.5. The Contractor shall supply all instruments for testing.

12.2. Test Procedures:

12.2.1. Medium voltage stress cone type terminations or potheads shall remain intact but testing shall not include any bus work beyond the pothead or stress termination.

12.2.2. Cable continuity and phase identification shall be checked.

12.2.3. In setting up the test set special safety precautions should be taken regarding grounding of the test equipment. The test set, it's voltmeter and the cable shield should be grounded at the same ground.

12.2.4. All 4 core cables shall be tested between one conductor and ground with the other conductors and the metallic shield, metallic sheath or armour grounded to the same ground. Each conductor to be tested in this manner.

12.2.5. All single conductor cables shall also be tested between one conductor and ground with the other conductor in the same conduit grounded.

12.2.6. Each cable is to be given a full dielectric absorption test as herein specified with a suitable motor driven or electronic megger. The readings taken shall be recorded in the test record.

12.2.7. The dielectrical absorption megger test shall be applied for a long enough duration to fully charge the cable. Megger readings shall be taken every fifteen (15) seconds during the first three (3) minutes and at one (1) minute intervals thereafter. The test shall continue until three (3) equal readings one (1) minute apart are obtained. The cable may then be considered to be fully charged.

12.2.8. All cables should have approximately the same megohm reading. In the event that a cable shows an appreciably lower resistance value than the others in the same conduit or cable run, this condition shall be discussed with the Engineer prior to the application of the high potential test.

12.2.9. After an acceptable megger test, the Contractor shall give the cables a VLF high potential test in accordance with the requirements of IEEE 400.2-2013. After completion of the test, the contractor shall ensure that there is no residual charge contained in the cables. Any cable that does not perform as per manufacturer's specifications shall be rejected.

12.2.10. Cables shall then be subjected to the Tan-Delta testing.

12.2.11. The successful high potential test shall be immediately followed by another megger test as heretofore specified.

12.3. Acceptance:

12.3.1. The cable must withstand the specified high voltage without an appreciable increase in leakage current.

12.3.2. Final acceptance will also depend on satisfactory results of the two megger tests. The results of the final megger test should reasonably parallel those of the first megger test and should show no evidence of differing performance prior to the VLF Hi-Pot and Tan-Delta Testing.

12.3.3. Complete and accurate records of all megger and accompanying VLF and Tan-Delta tests shall be made. The records shall include the following:-

12.3.3.1. Complete identification of the cable including its approximate length;

12.3.3.2. Megger readings vs time data;

12.3.3.3. VLF and Tan-Delta test results with date and time of test.

12.3.3.4. The approximate average cable temperature taken by Thermographic Imager, with images recorded along the entire length of cable.

12.3.4. No cable shall be energized until the master copy of its test record is approved by the Engineer.

13. LOW VOLTAGE POWER CABLES

13.1. General:

13.1.1. All wires and cables shall be tested for continuity. Except for 60 volt services and below, all wires and cables shall be given a megger test.

13.1.2. All cable connections must pass visual inspections for workmanship and conformance with standard practice.

13.2. Test Procedure:

13.2.1. Continuity shall be checked by means of a DC test device using a beeper.

13.2.2. Bus tie cables shall be meggered before connections to buses are made.

13.2.3. Each 400 volt service cable from substations shall be meggered with the cable connected to the switch gear with the corresponding breaker racked in and open. Connections at the other end of each of these cables shall be as follows:-

13.2.3.1. Cables to individual motors shall be disconnected from the motor for initial tests, and followed by cables connected to motors as per specification for rotating equipment;

13.2.3.2. Cables to control centres shall be connected to the control centre main breaker with breaker in the open position.

13.2.4. Minimum megger readings shall be 1 Me 6 ohm.

13.2.5. The megger test must be held until the reading reaches a constant value. For 400 volt cables the cable megger test shall be held until three (3) equal readings, each one (1) minute apart, are obtained.

13.2.6. A 1000 volt motor-driven or electronic megger with a value of at least twice that of the RMS voltage shall be used on all service conductors.

13.3. Acceptance:

13.3.1. Minimum megger requirements must be met.

13.3.2. Any cable having a megger reading 50% lower than average, even though meeting minimum requirements, shall await further instructions from the Engineer as to drying or other treatment to be given the cable prior to acceptance.

13.3.3. Complete and accurate records of all tests and inspections shall be made.

14. MEDIUM VOLTAGE SWITCH GEAR AND CIRCUIT BREAKERS

14.1. General:

14.1.1. All switch gear shall be given operational tests. This shall include mechanical operation, as well as operation by control circuits, relays and tripping devices. All breakers and busbars shall be given a megger test.

14.2. Test Procedures:

14.2.1. Megger tests on the medium voltage bus shall be applied between each phase separately and ground with other phases tied to ground. All breakers shall be racked-out.

14.2.2. In addition each breaker shall be given a megger test in the racked-out and closed position. Megger tests shall be applied between each phase to ground and to each other phase.

14.2.3. A suitable motor driven or electronic megger shall be used. Each test shall be held until a constant reading is obtained. Minimum test values shall be as specified in specifications.

14.2.4. All test readings shall be recorded.

14.2.5. All circuit breakers shall be operated through at least three (3) open-close-open cycles in both the rack-in and test positions by manual operation and by control circuits from each control point. All indication lights, annunciators, alarms and targets shall be observed to determine correct operation and breaker mechanism shall be observed for correct alignment, freedom of binding and good contact. All breakers shall be checked for ease of rack-in and rack-out and checked to determine that the breaker cannot be moved out of operation position while the breaker is closed.

14.2.6. The interchangeability of the circuit breakers shall be demonstrated.

14.2.7. PT and CT data shall be recorded and PT and CT circuits shall be checked with a multi-tester.

14.2.8. Protective relays shall be adjusted and calibrated with an injection type test arrangement (multi-amp or equal). Results shall be recorded and the co-ordination of the protective relaying shall be proved.

14.2.9. After initial energization, switch gear shall be checked for correct phase sequence.

14.3. Acceptance:

14.3.1. Minimum megger requirements must be met;

14.3.2. Proper mechanical and electrical operation of switch gear must be assured;

14.3.3. Correct protective relaying operation must be proven;

14.3.4. Complete and accurate records of all tests and inspections shall be made.

15. POWER TRANSFORMERS

15.1. General:

15.1.1. Before testing, all transformers shall be inspected for cleanliness, damage, moisture (blue coloured silica gel), oil leaks and phase identification. Each transformer winding shall be given megger tests.

15.1.2. Oil filled transformers shall have the oil checked for dielectric strength.

15.1.3. Accessories and auxiliary circuits to switchgear and alarm panels shall be checked.

15.2. Test Procedures:

15.2.1. Transformer windings shall be meggered with cables disconnected. (The cables have to be disconnected anyhow for cable high potential tests). See clause 9.0.

15.2.2. The 400 volt connection to the switchgear does not have to be opened, but the secondary isolator shall be racked out.

15.2.3. The transformer neutral has to be disconnected from ground.

15.2.4. When meggering the primary side, the secondary winding has to be grounded and vice versa.

15.2.5. The minimum values of the specified megger tests shall be as specified in the standard specification.

15.2.6. All 2500 V megger tests shall be held at least five (5) minutes and until three (3) consecutive equal readings one (1) minute apart are obtained. Readings shall be taken every thirty (30) seconds during the first two (2) minutes and every minute thereafter. 1000 V Megger readings must be held until the reading reaches a constant value and until three (3) consecutive equal readings one (1) minute apart are obtained.

15.2.7. The oil samples for the dielectric strength test shall be taken from the bottom of the transformer tank and tested in accordance with SABS Specifications.

15.2.8. Oil temperature indicator, level gauge and pressure relief devices must be manually actuated to check operation of auxiliary circuits.

15.2.9. To check the Bucholz relay, air shall be injected at the test connection.

15.3. Acceptance:

15.3.1. Minimum megger requirements must be met.

15.3.2. Oil dielectric strength shall be above the minimum specified by the manufacturer.

15.3.3. Auxiliary circuits shall be fully operational.

16. LOW VOLTAGE SWITCH GEAR

16.1. General:

16.1.1. The 400 volt switch gear bus shall be given a phase-to phase and phase-to-ground megger test.

16.1.2. All switch gear, relays and control devices shall be given complete operational tests to show that the equipment performs all design functions and meets design and equipment procurement specifications.

16.2. Test Procedures:

16.2.1. With transformer secondary breaker and load breakers open, all current transformers shorted, all potential transformer fuses removed and all 400 volt feeder breaker load terminals grounded, the 400 volt bus shall be given a phase-to-phase and phase-to-ground megger test.

16.2.2. Megger tests on the 400 volt bus shall be applied between each phase and ground with phases not under test also grounded.

16.2.3. All circuit breakers shall be operated through at least three (3) open-close-open cycles in both the rack-in and test position by manual operation and by control circuits from each control point (draw out breakers only). All indicating lights, annunciators, and breaker mechanisms shall be observed for correct alignment, freedom of binding and good contact. Draw out breakers shall be checked for ease of rack-in and rack-out and checked to determine that the breaker cannot be moved out of operating position while the breaker is closed.

16.2.4. PT and CT data shall be recorded and PT and CT circuits shall be checked with a multi-tester.

16.2.5. Protective relays shall be adjusted and calibrated with an injection type test arrangement (multi-amp or equal). Results shall be recorded and the co-ordination of the protective relaying shall be proved.

16.2.6. After initial energization, switch gear shall be checked for correct phase sequence.

16.3. Acceptance:

16.3.1. Minimum megger requirements must be met.

16.3.2. Proper mechanical and electrical operation of switch gear must be assured.

16.3.3. Correct protective relaying operation must be proven.

16.3.4. Complete and accurate records of all tests and inspections shall be made.

17. COLD COMMISSIONING

17.1. The programmable logic control system shall only be tested once the LV switchboard and other control panels have been tested in the manual mode and been provisionally accepted by the Engineer.

17.2. The control system shall firstly be tested DRY, i.e. all motor fuses shall be removed or circuit breakers shall be in the OPEN positions.

17.3. All plant/external inputs to the PLC shall be individually checked in the field or motor control centre by operating the required field limit switch, relays etc. and checked on the programmer monitor if the status indication of the correct input reference alters.

17.4. All plant/external outputs shall be checked individually by forcing the PLC output coil by means of the programming unit and checking the field, motor control or mimic display panel if the correct relay, indication lamp or contactor has operated.

17.5. A signed test record showing all input/ output references and reference to which field, motor control centre or mimic panel device was initiated or was operated shall be made and handed to the Engineer before the second part of the DRY test commences.

17.6. The second part of the DRY test shall be by carrying out drive selections, route start ups and route stops for all possible drives as listed. All inputs which cannot be present because of the absence of any plant movement shall be simulated by a plant input simulator to be provided by the Contractor.

17.7. Upon completion of the tests, a signed test record showing all route selections, starts and stops simulated for every route and a list of all simulated inputs/outputs used shall be made and handed to the Engineer.

17.8. The Contractor shall then call upon the Engineer to witness a repetition of all previous DRY tests.

18. HOT COMMISSIONING

18.1. Commissioning of the whole installation shall not commence until all work which is essential for safe operation has been completed.

18.2. First, the electrical equipment and circuitry shall be checked and tested in each Motor Control Board and shall be rendered "healthy" and fully operational before any other part of the installation is commissioned.

18.3. The settings of all protective, instrument and timing devices are to be correctly based on the manufacturer's characteristic curves.

18.4. The operation of all equipment and motors shall be tested on the "manual" sequence first prior to attempting "automatic" sequence control.

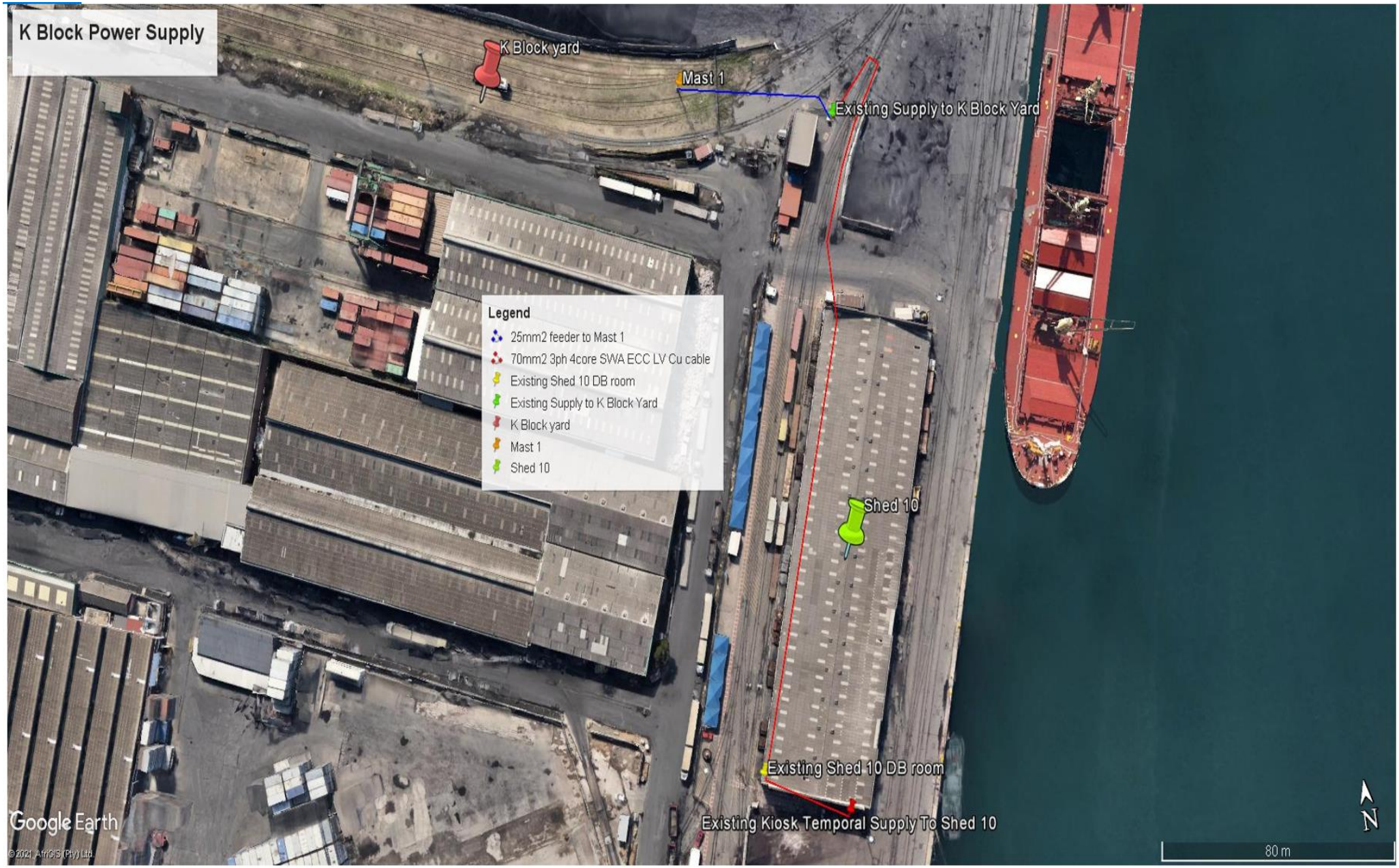
18.5. Commissioning shall follow the electrical testing procedures necessary prior to start-up of the equipment.

18.6. The start-up of each system or plant shall be done in the presence of the authorized representatives of the machine suppliers, the mechanical contractors, the electrical suppliers of the boards, the Electrical Contractor and the Engineer, unless otherwise arranged by the Engineer.

18.7. During hot commissioning the temperature rise of all motors will be calculated using the resistance method.

18.8. For a period determined elsewhere in this document, after completion of the foregoing operations, the Electrical Contractor shall arrange for a competent representative to remain on site to test-run the installation to the satisfaction of the Engineer.

Annexure P - K Block Google Image


K Block Power Supply
K Block yard
Mast 1
Existing Supply to K Block Yard
Legend
25mm2 feeder to Mast 1
70mm2 3ph 4core SWA ECC LV Cu cable
Existing Shed 10 DB room
Existing Supply to K Block Yard
K Block yard
Mast 1
Shed 10
Shed 10
Existing Shed 10 DB room
Existing Kiosk Temporal Supply To Shed 10
Google Earth
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Annexure Q - Structural Condition Assessment of High Mast Lights (MPT and Car)

K BLOCK				
ITEM No.	**HML NUMBER**	**HML SECTION**	**ELECTRICAL CONDITION**	**RECOMMENDATION**
1	**1**	**K BLOCK**	Swing Mast Badly Corroded 5x400W HPS Light fittings All not Working Must Numbering Required. Consider adding balancing weights on the design since the new technology is with lighter fittings. DB and Gland of the incoming cable to be changed. Steel wires and entire mechanism for swinging the mast to be changed. New Lighting Design Required.	Routine maintenance required
2	**2**	**K BLOCK**	Swing Mast Badly Corroded 3x400W HPS Light fittings only 1 Working Must Numbering Required. Consider adding balancing weights on the design since the new technology is with lighter fittings. DB and Gland of the incoming cable to be changed. Steel wires and entire mechanism for swinging the mast to be changed. New Lighting Design Required.	Routine maintenance required
3	**3**	**K BLOCK**	Swing Mast Badly Corroded 4x400W HPS Light fittings only 2 Working Must Numbering Required. Consider adding balancing weights on the design since the new technology is with lighter fittings. DB and Gland of the incoming cable to be changed. Steel wires and entire mechanism for swinging the mast to be changed. New Lighting Design Required.	Routine maintenance required
4	**4**	**K BLOCK**	Swing Mast Badly Corroded 5x400W HPS Light fittings All not Working Must Numbering Required. Consider adding balancing weights on the design since the new technology is with lighter fittings. DB and Gland of the incoming cable to be changed. Steel wires and entire mechanism for swinging the mast to be changed. New Lighting Design Required.	Routine maintenance required
5	**5**	**K BLOCK**	Swing Mast Badly Corroded 5x400W HPS Light fittings only 3 Working Must Numbering Required. Consider adding balancing weights on the design since the new technology is DB and Gland of the incoming cable to be changed. Steel wires and entire mechanism for swinging the mast to be changed. New Lighting Design Required.	Routine maintenance required
6	**6**	**K BLOCK**	Swing Mast Badly Corroded 5x400W HPS Light fittings only 2 Working Must Numbering Required. Consider adding balancing weights on the design since the new technology is with lighter fittings. DB and Gland of the incoming cable to be changed. Steel wires and entire mechanism for swinging the mast to be changed. New Lighting Design Required.	Routine maintenance required

Note: Only the HML post and supply cables to be retained and refurbished according to the maintenance specification.

Accepted by: Samukelo Magcaba
Date:

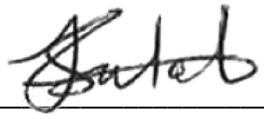
Annexure R - Structural Condition Assessment of High Mast Lights (Maydon Wharf)

Transnet Capital Projects

2127737-797

Upgrade of the Lighting in the Port of Durban

Condition Assessment Report: High Mast Lights

Prepared by:  18/08/2022

SARVDASHA SEWLAL Date

Approved by:  2022-08-18

PRAVESH MAHARAJ Date

Rev No.	**Date**	**Revision Details**

Executive Summary

This document presents a condition assessment, which was done for the High Mast Lights located within the Port of Durban. The condition of the high mast light supporting structures in the port was assessed from October 2020 to December 2020. The Port assessment was carried out at the Multi-Purpose Terminal and the Car Terminal. The major observations that were noted was cracking, spalling, delamination, efflorescence and leaching, corrosion and bolt failure.

Table of Contents

1. Introduction

The Port of Durban deemed to be one of the largest ports in Africa, having an extensive 24-hour operational cycle. Artificial illumination is necessary to provide a clear visual in order for operations to take place at night without incidents. Adequate illumination improves not only the safety of personnel and productivity but also reduces vandalism and theft in the areas within the port boundary.

There was a need for an assessment of the illuminance levels in the various port areas in terms of compliance to legislation and regulations, standards or best codes of practice; to settle any differences of opinion and interpretation of SANS lighting standards and OSH Act regulations between Port stakeholders. Transnet Port Terminals was appointed to carry-out a detailed lighting survey on the existing outdoor lighting installations, and subsequently propose solutions for non-compliant areas using both conventional luminaires and LED luminaires. The lighting report provides details of the lighting survey conducted and preliminary designs, specifications and estimates to proceed with the project to FEL 4 execution phase.

The specific goals and objectives of the project are:

- Investigate and assess the adequacy of all common user and controlled outdoor lighting installations in the Port of Durban within the Multi-Purpose Terminal and Car Terminal with reference/recommendations as contained in;
- ✓ Environmental Regulations
- ✓ Lighting Regulations of the OHS Act
- ✓ SANS 10389: Exterior Lighting (particularly Part 1)
- ✓ International Commission on Illumination: Lighting of Outdoor Workplaces
- ✓ Provide detailed designs using LED technology and recommendations based on best suitable solution.
- ✓ Determine the energy reduction potential of advanced light technology, LEDs as compared to the traditional sources.
- ✓ Evaluate the lighting characteristics of LED technology through simulations to determine if energy efficiency is possible without compromising light performance.

Part of the aforementioned study entails a comprehensive structural condition assessment report encompassing all the luminaire supporting elements. The condition assessment would comprise of a visual assessment which culminates in the report, depicting the findings and proposed remedial actions. This document will form an annexure to the "Electrical Lighting Investigation" report.

2. Report Premise

A condition assessment report is a planning tool used to determine the structural condition of a structure. This is done by examining and evaluating the structural elements that make up the structure and providing recommendations for remedial works, as deemed necessary by a competent person. Condition assessments of reinforced concrete structures and steel structures are becoming crucial at Transnet as the majority of these structures are near or surpass their intended design life. A condition assessment is commonly required under two circumstances:

- Once a structure is nearing or has passed its intended design life, it should be periodically inspected. This time interval should be based on the use and risk profile of that particular structure
- If the structure is being used for something other than what it was designed for, it should be inspected for its new purpose.

Notwithstanding, a structure will generally show signs of fatigue that will warrant a full structural assessment. Generally, condition assessments of existing structures fall into one of two categories:

- Assessments of the overall integrity of the structure; or
- Assessments of components of the structure affected by compromising events, such as fire, impact, vibration or water damage.

3. Scope of Work and Exclusions

3.1. Scope

The structural scope of works is limited to:

- A visual inspections of all identified masts
- Generation of Condition Assessment Report
- Suggested remedial measures

All recommendations made are based on current codes and standards, and accumulated knowledge and experience.

3.2. Exclusions

- The inspections were limited to areas and elements that were deemed accessible.
- Elements concealed by non-structural elements were not reviewed.
- Non-destructive testing
- Destructive testing
- Luminaire Ring

4. Description of Mast Lights

4.1. High Mast Light

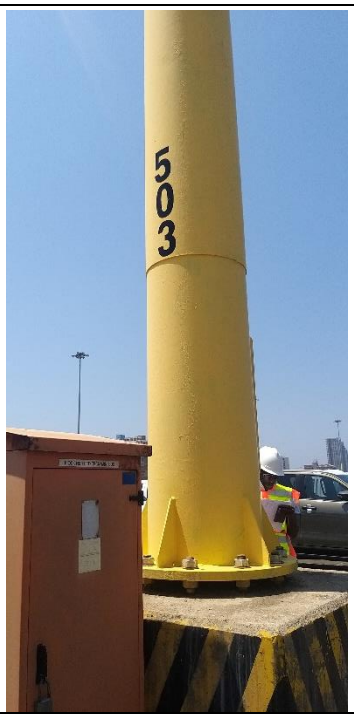
The masts are constructed in the form of tapering enclosed columns of polygonal cross-section. The masts structural steel poles are 30 metres in height. Each mast has an opening at the base, which allows access to the hollow interior for the purpose of routing the electrical cables. The openings are protected by a lockable fitting hinged plate, which effectively seals the interior against the adverse weather conditions. These plates are, in most cases, secured with a pad lock. All masts are mounted on a reinforced concrete base by means of a base plate secured to a bolt cage that is cast into the concrete base. The concrete bases, in most cases, extend above the ground to a maximum height of around one metre. The space between the top of the concrete plinth and the underside of the base plate of the masts is generally not filled with any material and is left voided. The high masts have been painted either grey, yellow or white.

5.

5. Visual Observations

The following rating system will be applied in assessing the condition of the high mast light supporting structures.

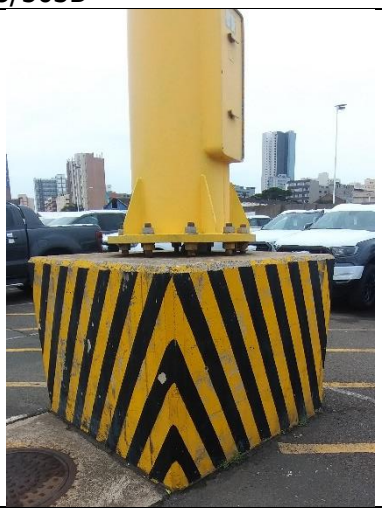
Condition	Description
0	Not Applicable
1	Good – element performs intended function with high degree of reliability
2	Fair - element performs intended function with small reduction in reliability
3	Poor - element performs intended function with significant reduction in reliability
4	Critical – element does not perform intended function with any degree of reliability

Project No:	2127737-797
Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	MAIN CAR PARK
HML Reference:	40/503
Concrete base:	 
The square shaped concrete base is approximately 1m above the ground. Paint is faded and mild cracking is visible. Overall condition of base is good. Condition Rating : 1	
Mast Pole	
Notes: Mast pole in good condition. No signs of corrosion or indentation was visible Condition Rating : 1	

Bolts	
Notes: Minor corrosion is visible on bolts as per the picture shown above. No Bolts: 10 bolts No to be replaced/treated: Treat all bolts for corrossion protection Condition Rating : 2	
Base Plate	
Notes: The base plate is in good condition and shows no signs of corrosion or failure. Condition Rating : 1	
Stiffeners	
Notes: Stiffeners are in good condition with no corrosion, damage or any signs of failure Condition Rating : 1	

Project No:	2127737-797
Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	MAIN CAR PARK
HML Reference:	46/503
Concrete base:	 . 
The square shaped concrete base is approximately 1m above the ground. Paint is faded and erosion is visible. Overall condition of base is good. Condition Rating : 1	
Mast Pole	 
Notes: Mast pole in good condition. No signs of corrosion or indentation was visible Condition Rating : 1	

Bolts	
Notes: Medium corrosion is visible on bolts as per the picture shown above. No Bolts: 10 bolts No to be replaced/treated: Treat all bolts for corrossion protection Condition Rating : 2	
Base Plate	
Notes: The base plate is in good condition and shows no signs of corrosion, delamination or failure. Condition Rating : 1	
Stiffeners	
Notes: Stiffeners are in good condition with no corrosion, damage or any signs of failure Condition Rating : 1	

Project No:	2127737-797
Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	MAIN CAR PARK
HML Reference:	35/503B
Concrete base:	 
This is a square shaped concrete base, approximately 1m above the ground. Paint is slightly faded. Overall condition of base is good. Condition Rating : 1	
Mast Pole	 
Notes: Mast pole in good condition. No signs of corrosion or indentations was visible. Condition Rating : 1	

Bolts	
Notes: Medium corrosion is visible on bolts as per the picture shown above. No Bolts: 10 bolts No to be replaced/treated: Treat all bolts Condition Rating : 2	
Base Plate	
Notes: The base plate is in good condition and shows no signs of corrosion or failure. Condition Rating : 1	
Stiffeners	
Notes: Stiffeners are in good condition with no corrosion, damage or any signs of failure Condition Rating : 1	

Project No:	2127737-797
Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	MAIN CAR PARK
HML Reference:	34/503C
Concrete base:	 
The square shaped concrete base is approximately 1m above the ground. Paint is flaking and cracking and mild erosion is visible. Overall condition of base is good. Condition Rating : 1	
Mast Pole	 
Notes: Mast pole in good condition. No signs of corrosion or indentation was visible. Condition Rating : 1	

Bolts	
Notes: Medium corrosion is visible on bolts as per the picture shown above. No Bolts: 10 bolts No to be replaced/treated: Treat all bolts for corrossion protection Condition Rating : 2	
Base Plate	
Notes: The base plate is in good condition and shows no signs of corrosion or failure. Condition Rating : 1	
Stiffeners	
Notes: Stiffeners are in good condition with no corrosion, damage or any signs of failure Condition Rating : 1	

Project No:	2127737-797
Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	MAIN CAR PARK
HML Reference:	503 D
Concrete base:	  
The square shaped concrete base is approximately 1m above the ground. Paint is flaking and cracking. The corner of the base experienced damage as shown in the picture above, this could be the result of erosion or damage by a passing vehicle, no reinforcement is exposed. Condition Rating : 1	
Mast Pole	 
Notes: Mast pole in good condition. No signs of corrosion or indentation was visible. Condition Rating : 1	

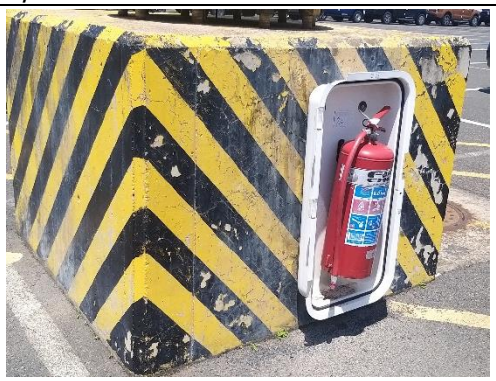
Bolts	
Notes: Mild corrosion is visible on bolts as per the picture shown above. No Bolts: 10 bolts No to be replaced/treated: Treat all bolts for corrossion protection Condition Rating : 2	
Base Plate	
Notes: The base plate is in good condition and shows no signs of corrosion or failure. Condition Rating : 1	
Stiffeners	
Notes: Stiffeners are in good condition with no corrosion, damage or any signs of failure Condition Rating : 1	

Project No:	2127737-797
Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	MAIN CAR PARK
HML Reference:	49/503E
Concrete base:	 
The square shaped concrete base is approximately 1m above the ground. Paint is flaking and cracking. The corner of the base experienced damage as shown in the picture above, this could be the result of erosion or damage by a passing vehicle, no reinforcement is exposed. Overall condition of base is good. Condition Rating : 1	
Mast Pole	 
Notes: Mast pole in good condition. No signs of corrosion or indentation was visible. Condition Rating : 1	

Bolts	
Notes: Medium corrosion is visible on bolts as per the picture shown above. No Bolts: 10 bolts No to be replaced/treated: Treat all bolts for corrossion protection. Condition Rating : 2	
Base Plate	
Notes: The base plate is in good condition and shows no signs of corrosion or failure. Condition Rating : 1	
Stiffeners	
Notes: Stiffeners are in good condition with no corrosion, damage or any signs of failure Condition Rating : 1	

Project No:	2127737-797
Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	MAIN CAR PARK
HML Reference:	42/504
Concrete base:	
The square shaped concrete base is approximately 1m above the ground. Paint is faded. Overall condition of base is good. Condition Rating : 1	
Mast Pole	 
Notes: Mast pole is in bad condition with indentations and signs of corrosion. Condition Rating : 4	

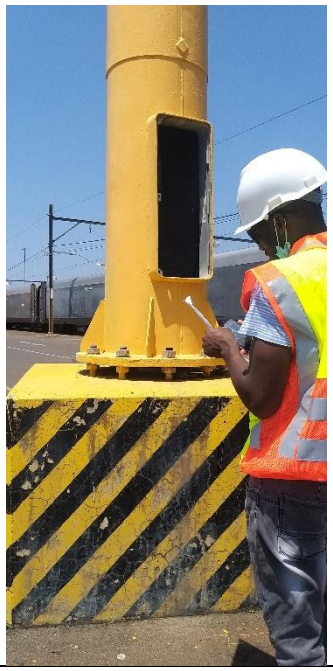
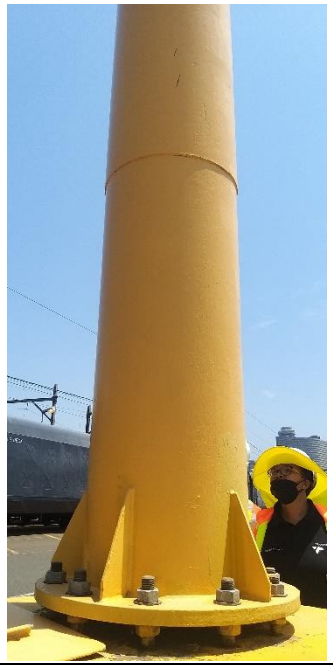
Bolts	
Notes: Medium corrosion is visible on bolts. No Bolts: 10 bolts No to be replaced/treated: Treat all bolts for corrosion protection Condition Rating : 2	
Base Plate	 
Notes: The base plate is in good condition and shows no signs of corrosion. Condition Rating : 1	
Stiffeners	
Notes: Stiffeners are in good condition with no corrosion, damage or any signs of failure. Condition Rating : 1	

Project No:	2127737-797
Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	MAIN CAR PARK
HML Reference:	33/504
Concrete base:	 
This is a square shaped concrete base, approximately 1m above the ground. Paint is faded. No signs of cracking or erosion are visible. Overall condition of base is good. Condition Rating : 1	
Mast Pole	 
Notes: Mast pole in good condition. No signs of corrosion or indentation was visible. Condition Rating : 1	

Bolts	 
Notes: Severe corrosion is visible on bolts. No Bolts: 10 bolts No to be replaced/treated: Treat all bolts for corrosion protection Condition Rating : 2	
Base Plate	
Notes: The base plate is in good condition and shows no signs of corrosion or failure. Condition Rating : 1	
Stiffeners	
Notes: Stiffeners are in good condition with no corrosion, damage or any signs of failure. Condition Rating : 1	

Project No:	2127737-797
Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	MAIN CAR PARK
HML Reference:	32/505
Concrete base:	 
The square shaped concrete base is approximately 1m above the ground. Paint is faded and cracking. Mild erosion is visible on the edges of the concrete base. No signs of cracking are visible. Overall condition of base is good. Condition Rating : 1	
Mast Pole	 
Notes: Mast pole in good condition. No signs of corrosion or indentation was visible. Condition Rating : 1	

Bolts	 
Notes: Severe corrosion is visible on bolts. No Bolts: 10 bolts No to be replaced/treated: Treat all bolts Condition Rating : 1	
Base Plate	
Notes: The base plate is in good condition and shows no signs of corrosion or failure. Condition Rating : 1	
Stiffeners	
Notes: Stiffeners are in good condition with no corrosion, damage or any signs of failure. Condition Rating : 1	

Project No:	2127737-797
Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	MAIN CAR PARK
HML Reference:	No number – 505
Concrete base:	 
The square shaped concrete base is approximately 1m above the ground. Paint is faded and cracking. Mild erosion is visible on the concrete base. No signs of cracking are visible. Overall condition of base is good. Condition Rating : 1	
Mast Pole	 
Notes: Mast pole in good condition. No signs of corrosion or indentation was visible. Condition Rating : 1	

Bolts	 
Notes: Medium corrosion is visible on bolts. No Bolts: 10 bolts No to be replaced/treated: Treat all bolts Condition Rating : 2	
Base Plate	
Notes: The base plate is in good condition and shows no signs of corrosion or failure. Condition Rating : 1	
Stiffeners	
Notes: Stiffeners are in good condition with no corrosion, damage or any signs of failure. Condition Rating : 1	

Project No:	2127737-797
Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	MAIN CAR PARK
HML Reference:	44/600
Concrete base:	 
The square shaped concrete base is approximately 1m above the ground. Paint is slightly faded and cracking. No signs of cracking or erosion are visible. Overall condition of base is good. Condition Rating : 1	
Mast Pole	
Notes: Mast pole in good condition. No signs of corrosion or indentation was visible. Condition Rating : 1	

Bolts	
Notes: Medium corrosion is visible on bolts. No Bolts: 10 bolts No to be replaced/treated: Treat all bolts Condition Rating : 2	
Base Plate	
Notes: The base plate is in good condition and shows no signs of corrosion or failure. Condition Rating : 1	
Stiffeners	
Notes: Stiffeners are in good condition with no corrosion, damage or any signs of failure. Condition Rating : 1	

Project No:	2127737-797
Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	MAIN CAR PARK
HML Reference:	31/600
Concrete base:	  
This is a square shaped concrete base, approximately 1m above the ground. Paint is faded and cracking. Cracking is visible on the top of the concrete base as well as the faces. No erosion are visible. Overall condition of base is good. Condition Rating : 1	
Mast Pole	 

Notes: Mast pole in good condition. No signs of corrosion or indentation was visible Condition Rating : 1	
Bolts	
Notes: Severe corrosion is visible on bolts. No Bolts: 10 bolts No to be replaced/treated: Treat all bolts Condition Rating : 2	
Base Plate	
Notes: The base plate is in good condition and shows no signs of corrosion or failure. Condition Rating : 1	
Stiffeners	
Notes: Stiffeners are in good condition with no corrosion, damage or any signs of failure. Condition Rating : 1	

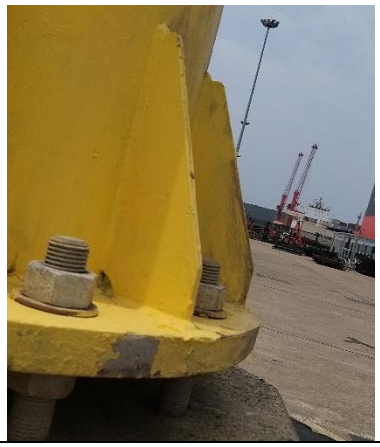
Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	MAIN CAR PARK
HML Reference:	30/600
Concrete base:	 
Thea square shaped concrete base is approximately 1m above the ground. Paint is faded and cracking. Mild cracking is visible on the concrete base. No erosion is visible. Excess vegetation must be removed as this impedes visual inspection and harbours moisture and rodents. Condition Rating : 1	
Mast Pole	
Notes: Mast pole in good condition. No signs of corrosion or indentation was visible. Condition Rating : 1	

Bolts	 
Notes: Severe corrosion is visible on bolts. No Bolts: 10 bolts No to be replaced/treated: Treat all bolts Condition Rating : 2	
Base Plate	
Notes: The base plate is in good condition and shows no signs of corrosion or failure. Condition Rating : 1	
Stiffeners	
Notes: Stiffeners are in good condition with no corrosion, damage or any signs of failure. Condition Rating : 1	

Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	MAIN CAR PARK
HML Reference:	29
Concrete base:	 
The square shaped concrete base is approximately 1m above the ground. Paint is cracking and flaking. Mild hairline cracking is visible on the concrete base. No erosion visible. Overall condition of base is good. Condition Rating : 1	
Mast Pole	
Notes: Mast pole in good condition. No signs of corrosion or indentation was visible. Condition Rating : 1	

Bolts	 
Notes: Medium corrosion is visible on bolts. No Bolts: 10 bolts No to be replaced/treated: treat all bolts Condition Rating : 2	
Base Plate	
Notes: The base plate is in good condition and shows no signs of corrosion or failure. Condition Rating : 1	
Stiffeners	
Notes: Stiffeners are in good condition with no corrosion, damage or any signs of failure. Condition Rating : 1	

Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	MAIN CAR PARK
HML Reference:	47
Concrete base:	
Base is not painted this resulted in a slight discoloration due to the concrete being exposed to water. No cracking or erosion visible on the concrete base. Overall condition of base is good. Condition Rating : 1	
Mast Pole	 
Notes: Mast pole in good condition. No signs of corrosion or indentation was visible. Paint colour does not comply with Transnet paint specifications. Mast will need to be repainted. Condition Rating : 1	
Bolts	 

Notes: Mild corrosion is visible on bolts. No Bolts: 10 bolts No to be replaced/treated: treat all bolts Condition Rating : 2	
Base Plate	
Notes: The base plate is in good condition and shows no signs of corrosion or failure. Paint is flaking on the baseplate. Condition Rating : 1	
Stiffeners	
Notes: Stiffeners are in good condition with no corrosion, damage or any signs of failure. Condition Rating : 1	

Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	MAIN CAR PARK
HML Reference:	233
Concrete base:	
Mast Pole	
Bolts	
Base Plate	
Stiffeners	

Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	MAIN CAR PARK
HML Reference:	48
Concrete base:	 
Base is not painted this resulted in a slight discoloration due to the concrete being exposed to water. No cracking or erosion visible on the concrete base. Overall condition of base is good. Condition Rating : 1	
Mast Pole	
Notes: Mast pole in good condition. No signs of corrosion or indentation was visible. Condition Rating : 1	

Bolts	
Notes: Mild corrosion is visible on bolts. No Bolts: 10 bolts No to be replaced/treated: treat all bolts Condition Rating : 1	
Base Plate	
Notes: The base plate is in good condition and shows no signs of corrosion or failure. Paint is flaking on the edge of the baseplate. Condition Rating : 1	
Stiffeners	
Notes: Stiffeners are in good condition with no corrosion, damage or any signs of failure. Condition Rating : 1	

Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	MAIN CAR PARK
HML Reference:	46
Concrete base:	
Mast Pole	
Bolts	
Base Plate	
Stiffeners	
Notes:	

Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	MAIN CAR PARK
HML Reference:	45
Concrete base:	   
The square shaped concrete base is approximately 1m above the ground. Paint is cracking and flaking. Medium cracking is visible on the concrete base. Severe erosion is also visible on the edges of the concrete. No exposed reinforcement was visible. Condition Rating : 2	
Mast Pole	
Notes: Mast pole in good condition. No signs of corrosion or indentation was visible. Condition Rating : 1	

Bolts	 
Notes: Mild corrosion is visible on bolts. No Bolts: 10 bolts No to be replaced/treated: treat all bolts Condition Rating : 2	
Base Plate	
Notes: The base plate is in good condition and shows no signs of corrosion or failure. Paint is flaking on the baseplate. Condition Rating : 1	
Stiffeners	
Notes: Stiffeners are in good condition with no corrosion, damage or any signs of failure. Condition Rating : 1	

Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	MAIN CAR PARK
HML Reference:	39
Concrete base:	 
The square shaped concrete base is approximately 1m above the ground. Paint is faded. No cracking or erosion visible. Overall condition of base is good. Condition Rating : 1	
Mast Pole	
Notes: Mast pole in good condition. No signs of corrosion or indentation was visible. Condition Rating : 1	

Bolts	
Notes: No corrosion is visible on bolts. No Bolts: 10 bolts No to be replaced/treated: Treat all bolts for corrosion protection Condition Rating : 1	
Base Plate	
Notes: The base plate is in good condition and shows no signs of corrosion or failure. Paint is slightly faded on the baseplate. Condition Rating : 1	
Stiffeners	
Notes: Stiffeners are in good condition with no corrosion, damage or any signs of failure. Condition Rating : 1	

Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	MAIN CAR PARK
HML Reference:	36/503
Concrete base:	 
The square shaped concrete base is approximately 1m above the ground. Paint is faded. No cracking or visible. Mild erosion on the edges of the base. Overall condition of base is good. Condition Rating : 1	
Mast Pole	
Notes: Mast pole in good condition. No signs of corrosion or indentation was visible. Condition Rating : 1	

Bolts	 
Notes: Mild corrosion is visible on bolts. No Bolts: 10 bolts No to be replaced/treated: Treat all bolts for corrosion protection Condition Rating : 2	
Base Plate	
Notes: The base plate is in good condition and shows no signs of corrosion or failure. Paint is slightly faded on the baseplate. Condition Rating : 1	
Stiffeners	
Notes: Stiffeners are in good condition with no corrosion, damage or any signs of failure. Condition Rating : 1	

Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	Q AND R
HML Reference:	01
Concrete base:	
Mast Pole	
Bolts	
Base Plate	
Stiffeners	

Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	Q AND R
HML Reference:	No Number
Concrete base:	
Mast Pole	
Bolts	
No	
Base Plate	
Stiffeners	

Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	Q AND R
HML Reference:	03
Concrete base:	 
The square shaped concrete base is approximately 1m above the ground. Paint is faded. Mild cracking and erosion is visible. Overall condition of base is good. Condition Rating : 1	
Mast Pole	
Notes: Mast pole in good condition. No signs of corrosion or indentation was visible. Paint is flaking. Condition Rating : 1	

Bolts	
Notes: Severe corrosion is visible on bolts. No Bolts: 10 bolts No to be replaced/treated: Treat all bolts Condition Rating : 2	
Base Plate	
Notes: Mild corrosion is visible on the base plate. Paint is slightly faded on the baseplate. Condition Rating : 1	
Stiffeners	
Notes: No stiffeners present.	

Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	Q AND R
HML Reference:	51
Concrete base:	 
The square shaped concrete base is approximately 1m above the ground. Paint is faded. No cracking is visible. Slight erosion is visible on the base. Overall condition of base is good. Condition Rating : 1	
Mast Pole	
Notes: Mast pole in good condition. No signs of corrosion or indentation was visible. Paint is flaking. Condition Rating : 1	

Bolts	 
Notes: Severe corrosion is visible on bolts. No Bolts: 10 bolts No to be replaced/treated: Treat all bolts Condition Rating : 2	
Base Plate	
Notes: Mild corrosion is visible on the base plate. Paint is slightly flaking. Condition Rating : 1	
Stiffeners	
Notes: Stiffeners are in good condition with no corrosion, damage or any signs of failure. Condition Rating : 1	

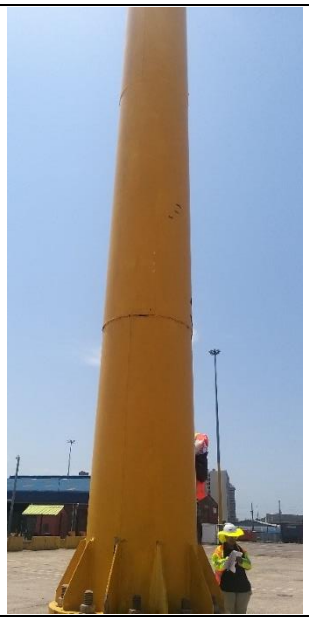
Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	Q AND R
HML Reference:	52
Concrete base:	
Mast Pole	
Bolts	
Base Plate	
Stiffeners	

Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	Q AND R
HML Reference:	53
Concrete base:	 
This is a square shaped concrete base, approximately 1m above the ground. Base not painted, therefore slight discoloration on concrete. No cracking and erosion is visible. Overall condition of base is good. Condition Rating : 1	
Mast Pole	
Notes: Mast pole in good condition. No signs of corrosion or indentation was visible. Condition Rating : 1	

Bolts	 
Notes: Mild corrosion is visible on bolts. No Bolts: 16 bolts No to be replaced/treated: Treat all bolts for corrosion. Condition Rating : 2	
Base Plate	 
Notes: Severe delamination is visible on the base plate. Paint is flaking. Condition Rating : 3	
Stiffeners	
Notes: Stiffeners are in good condition with no corrosion, damage or any signs of failure. Condition Rating : 1	

Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	Q AND R
HML Reference:	9 (MPT F-SHED)
Concrete base:	
Paint is flaking and faded. No cracking and erosion is visible on the top of the concrete base. Condition Rating : 1	
Mast Pole	
Notes: Mast pole in good condition. No signs of corrosion or indentation was visible. Condition Rating : 1	

Bolts	 
Notes: Severe corrosion is visible on bolts and nuts, especially below the base plate. No Bolts: 8 bolts No to be replaced/treated: Replace all bolts. Condition Rating : 3	
Base Plate	 
Notes: Severe delamination is visible on the base plate. Condition Rating : 3	
Stiffeners	
Notes: No stiffeners present.	

Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	Q AND R
HML Reference:	37 (REEFERS)
Concrete base:	 
Base not painted. Mild cracking and erosion is visible on the top of the concrete base. No exposed reinforcement visible. Condition Rating : 1	
Mast Pole	
Notes: Mast pole in good condition. No signs of corrosion or indentation was visible. Mild flaking of paint is visible. Condition Rating : 1	
Bolts	

Notes: No corrosion is visible on bolts and nuts. No Bolts: 10 bolts No to be replaced/treated: Treat all bolts for corrosion protection. Condition Rating : 1	
Base Plate	
Notes: No signs of damage, corrosion or delamination on base plate. Mild flaking of paint. Condition Rating : 1	
Stiffeners	
Notes: Stiffeners are in good condition with no corrosion, damage or any signs of failure. Paint is flaking. Condition Rating : 1	

Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	Q AND R
HML Reference:	48 (REEFERS)
Concrete base:	
Base not painted. No cracking and erosion is visible on the top of the concrete base. Mild leaching on concrete is visible resulting in discoloration. Condition Rating : 1	
Mast Pole	
Notes: Mast pole in good condition. No signs of corrosion or indentation was visible. Condition Rating : 1	

Bolts	 
Notes: Mild corrosion is visible on bolts and nuts. No Bolts: 10 bolts No to be replaced/treated: Treat all bolts. Condition Rating : 1	
Base Plate	
Notes: No signs of damage, corrosion or delamination on base plate. Flaking of paint is visible. Condition Rating : 1	
Stiffeners	
Notes: Stiffeners are in good condition with no corrosion, damage or any signs of failure. Condition Rating : 1	

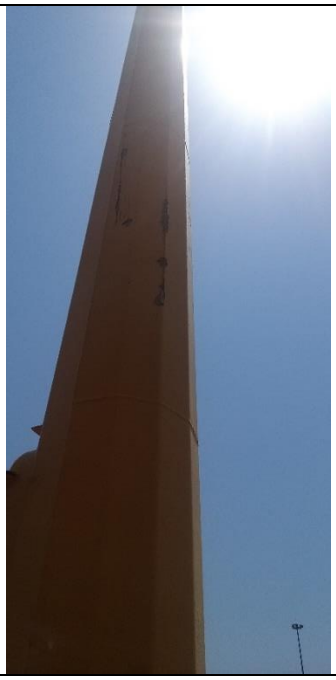
Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	Q AND R
HML Reference:	49 (F-STACK)
Concrete base:	 
Base not painted. No cracking and erosion is visible on the top of the concrete base. Mild leaching on concrete is visible resulting in discoloration. Condition Rating : 1	
Mast Pole	
Notes: Mast pole in good condition. No signs of indentation was visible. Condition Rating : 1	

Bolts	 
Notes: Mild corrosion is visible on bolts and nuts. No Bolts: 10 bolts No to be replaced/treated: Treat all bolts. Condition Rating : 2	
Base Plate	
Notes: No signs of damage, corrosion or delamination on base plate. Condition Rating : 1	
Stiffeners	
Notes: Stiffeners are in good condition with no corrosion, damage or any signs of failure. Paint is flaking. Condition Rating : 1	

Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	Q AND R
HML Reference:	38 (F-STACK)
Concrete base:	
Mast Pole	
Bolts	
Base Plate	
Stiffeners	

Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	Q AND R
HML Reference:	36 (G-STACK)
Concrete base:	 
Base not painted. Mild cracking and erosion is visible on the top of the concrete base. Mild leaching on concrete is visible resulting in discoloration. Condition Rating : 1	
Mast Pole	
Notes: Mast pole in good condition. No signs of indentation or corrosion was visible. Condition Rating : 1	

Bolts	  
Notes: Medium corrosion is visible on bolts and nuts. No Bolts: 10 bolts No to be replaced/treated: Treat all bolts. Condition Rating : 2	
Base Plate	
Notes: No signs of damage, corrosion or delamination on base plate. Condition Rating : 1	
Stiffeners	
Notes: Stiffeners are in good condition with no corrosion, damage or any signs of failure. Condition Rating : 1	

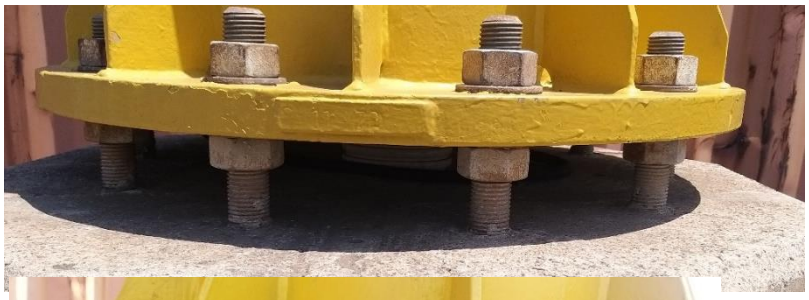
Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	Q AND R
HML Reference:	8 (F-SHED)
Concrete base:	 
Paint is completely faded and chipping. Medium cracking and erosion is visible on the top of the concrete base. Condition Rating : 1	
Mast Pole	
Notes: Flaking paint and medium corrosion is visible on the mast pole. Condition Rating : 2	

Bolts	 
Notes: Severe corrosion is visible on bolts and nuts. No Bolts: 8 bolts No to be replaced/treated: Replace all bolts. Condition Rating : 3	
Base Plate	 
Notes: Severe delamination and corrosion on base plate. Condition Rating : 3	
Stiffeners	
Notes: No stiffeners present.	

Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	Q AND R
HML Reference:	34 (G-STACK)
Concrete base:	 
Base not painted. Mild cracking and erosion is visible on the top of the concrete base. Condition Rating : 1	
Mast Pole	
Notes: Mast pole in good condition. No signs of indentation or corrosion was visible. Condition Rating : 1	

Bolts	
Notes: Mild corrosion is visible on bolts and nuts. No Bolts: 10 bolts No to be replaced/treated: Treat all bolts. Condition Rating : 1	
Base Plate	 
Notes: Medium corrosion and flaking of paint is visible on the base plate. No signs of delamination. Condition Rating : 1	
Stiffeners	
Notes: Stiffeners are in good condition with no corrosion, damage or any signs of failure. Condition Rating : 1	

Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	Q AND R
HML Reference:	45 (G-STACK)
Concrete base:	 
Base not painted. No cracking and erosion is visible on the top of the concrete base. Overall condition of base is good. Condition Rating : 1	
Mast Pole	
Notes: Mast pole in good condition. No signs of indentation or corrosion was visible. Condition Rating : 1	

Bolts	 
Notes: Mild corrosion is visible on bolts and nuts. No Bolts: 10 bolts No to be replaced/treated: Treat all bolts. Condition Rating : 1	
Base Plate	
Notes: No signs of corrosion, delamination or damage. Base plate is in good condition. Condition Rating : 1	
Stiffeners	
Notes: Stiffeners are in good condition with no corrosion, damage or any signs of failure. Condition Rating : 1	

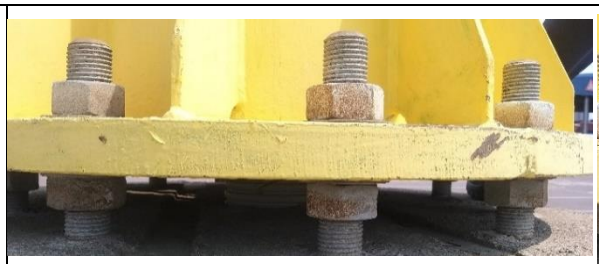
Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	Q AND R
HML Reference:	44 (G-STACK)
Concrete base:	
Base not painted. No cracking and erosion is visible on the top of the concrete base. Overall condition of the top of the concrete base is good. Condition Rating : 1	
Mast Pole	
Notes: Mast pole in good condition. No signs of indentation or corrosion was visible. Condition Rating : 1	

Bolts	  
Notes: Mild corrosion is visible on bolts and nuts. No Bolts: 10 bolts No to be replaced/treated: Treat all bolts. Condition Rating : 1	
Base Plate	
Notes: No signs of corrosion, delamination or damage. Base plate is in good condition. Condition Rating : 1	
Stiffeners	
Notes: Stiffeners are in good condition with no corrosion, damage or any signs of failure. Condition Rating : 1	

Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	Q AND R
HML Reference:	33 (G-STACK)
Concrete base:	 
Base not painted. No cracking and erosion is visible on the top of the concrete base. Leaching is visible, resulting in slight discoloration. Overall condition of the top of the concrete base is good. Condition Rating : 1	
Mast Pole	 
Notes: Mild corrosion visible on the bottom of the mast pole. Overall condition of pole is good with no further corrosion or indentations. Condition Rating : 1	

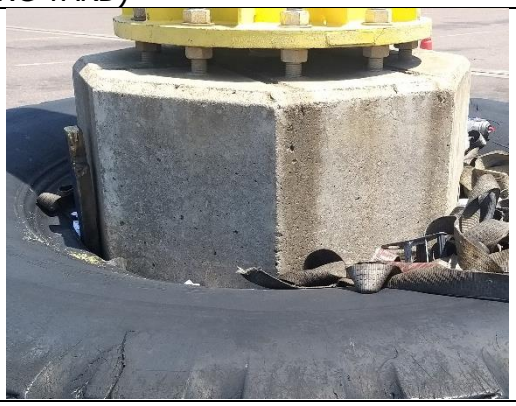
Bolts	 
Notes: Mild corrosion is visible on bolts and nuts. No Bolts: 10 bolts No to be replaced/treated: Treat all bolts. Condition Rating : 1	
Base Plate	
Notes: No signs of corrosion, delamination or damage. Base plate is in good condition. Condition Rating : 1	
Stiffeners	
Notes: Stiffeners are in good condition with no corrosion, damage or any signs of failure. Condition Rating : 1	

Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	Q AND R
HML Reference:	32 (G-STACK)
Concrete base:	
Base not painted. No cracking and erosion is visible on the top of the concrete base. Leaching is visible, resulting in slight discoloration. Overall condition of the top of the concrete base is good. Condition Rating : 1	
Mast Pole	
Notes: No signs of corrosion, indentation or failure. Condition Rating : 1	

Bolts	 
Notes: Mild corrosion is visible on bolts and nuts. No Bolts: 10 bolts No to be replaced/treated: Treat all bolts. Condition Rating : 1	
Base Plate	
Notes: No signs of corrosion, delamination or damage. Base plate is in good condition. Condition Rating : 1	
Stiffeners	
Notes: Stiffeners are in good condition with no corrosion, damage or any signs of failure. Condition Rating : 1	

Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	Q AND R
HML Reference:	43 (G-STACK)
Concrete base:	
Base not painted. No cracking and erosion is visible on the top of the concrete base. Overall condition of the top of the concrete base is good. Condition Rating : 1	
Mast Pole	
Notes: No signs of indentation. Mild corrosion and flaking of paint is visible. Oveall condition of mast pole is good. Condition Rating : 1	

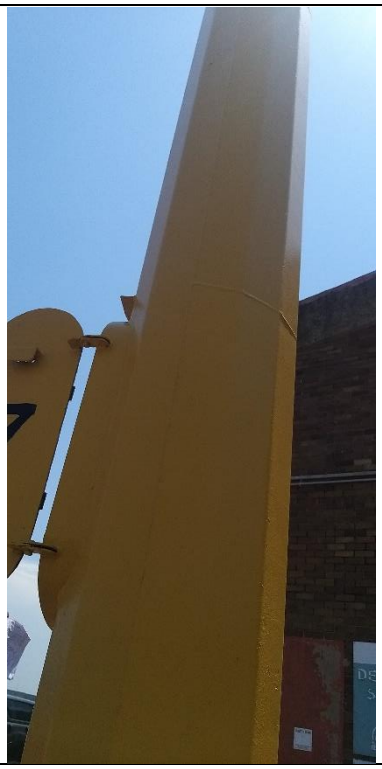
Bolts	
Notes: Mild corrosion is visible on bolts and nuts. No Bolts: 10 bolts No to be replaced/treated: Treat all bolts. Condition Rating : 1	
Base Plate	
Notes: No signs of corrosion, delamination or damage. Base plate is in good condition. Condition Rating : 1	
Stiffeners	
Notes: Stiffeners are in good condition with no damage or any signs of failure. Mild corrosion is visible on the edges. Condition Rating : 1	

Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	Q AND R
HML Reference:	31 (G-HOLDING YARD)
Concrete base:	
Base not painted. No cracking and erosion is visible on the top of the concrete base. Overall condition of the top of the concrete base is good. Condition Rating : 1	
Mast Pole	
Notes: No signs of indentation. Mild corrosion is visible on the mast pole. Condition Rating : 1	

Bolts	
Notes: Mild corrosion is visible on bolts and nuts. No Bolts: 10 bolts No to be replaced/treated: Treat all bolts. Condition Rating : 1	
Base Plate	
Notes: No signs of delamination. Mild corosion is visible and paint is flaking. Condition Rating : 1	
Stiffeners	
Notes: Stiffeners are in good condition with no corrosion, damage or any signs of failure. Condition Rating : 1	

Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	Q AND R
HML Reference:	6 (MPT G-SHED)
Concrete base:	
Paint is flaking and faded. Severe cracking and erosion is visible on the top of the concrete base. Condition Rating : 2	
Mast Pole	
Notes: No signs indentation was visible. Paint is flaking and mild corrosion is visible. Condition Rating : 1	

Bolts	  
Notes: Severe corrosion is visible on bolts and nuts, especially below the base plate. No Bolts: 8 bolts No to be replaced/treated: Replace all bolts. Condition Rating : 3	
Base Plate	 
Notes: Severe delamination and corrosion is visible on the base plate. Condition Rating : 3	
Stiffeners	
Notes: No stiffeners present.	

Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	Q AND R
HML Reference:	7 (MPT G-SHED)
Concrete base:	
Paint is flaking and faded. Mild cracking and erosion is visible on the top of the concrete base. Condition Rating : 1	
Mast Pole	
Notes: No signs indentation and corrosion was visible. Mast pole in good condition Condition Rating : 1	

Bolts	 
Notes: Severe corrosion is visible on bolts and nuts, especially below the base plate. No Bolts: 8 bolts No to be replaced/treated: Replace all bolts. Condition Rating : 1	
Base Plate	
Notes: Severe corrosion is visible on the base plate. Condition Rating : 1	
Stiffeners	
Notes: No stiffeners present.	

Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	Q AND R
HML Reference:	47 (G-STACK)
Concrete base:	 
Base not painted. No cracking and erosion is visible on the top of the concrete base. Leaching is visible and resulting in slight discoloration of concrete. Overall condition of the top of the concrete base is good. Condition Rating : 1	
Mast Pole	
Notes: No signs of indentations or corrosion visible. Overall condition of mast pole is good. Paint colour on pole does not comply with Trasnent paint specifications and colour. Condition Rating : 1	

Bolts	 
Notes: Medium corrosion is visible on bolts and nuts. No Bolts: 10 bolts No to be replaced/treated: Treat all bolts. Condition Rating : 2	
Base Plate	
Notes: No signs of delamination. Mild corrosion and flaking of paint is visible on the edges of the base plate. Condition Rating : 1	
Stiffeners	
Notes: Stiffeners are in good condition with no corrosion, damage or any signs of failure. Condition Rating : 1	

Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	Q AND R
HML Reference:	46 (G-STACK)
Concrete base:	 
Base not painted. No cracking and erosion is visible on the top of the concrete base. Overall condition of the top of the concrete base is good. Condition Rating : 1	
Mast Pole	
Notes: No signs of indentations. Mild corrosion and flaking of paint is visible. Paint colour on pole does not comply with Trasnent paint specifications and colour. Condition Rating : 1	

Bolts	 
Notes: Mild corrosion is visible on bolts and nuts. No Bolts: 10 bolts No to be replaced/treated: Treat all bolts Condition Rating : 1	
Base Plate	
Notes: No signs of delamination. Mild corrosion and flaking of paint is visible on the edges of the base plate. Condition Rating : 1	
Stiffeners	
Notes: Stiffeners are in good condition with no corrosion, damage or any signs of failure. Condition Rating : 1	

Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	Q AND R
HML Reference:	35 (G-STACK)
Concrete base:	
Mast Pole	
Bolts	
Base Plate	
Stiffeners	

Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	Q AND R
HML Reference:	10 (D-SHED)
Concrete base:	 
Paint is flaking and faded. Mild cracking and erosion is visible on the top of the concrete base. Condition Rating : 1.	
Mast Pole	
Notes: No signs indentation and corrosion was visible. Mast pole in good condition Condition Rating : 1	

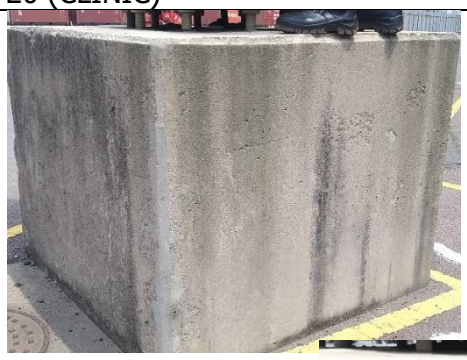
Bolts	 
Notes: Severe corrosion is visible on bolts and nuts, especially below the base plate. No Bolts: 8 bolts No to be replaced/treated: Replace all bolts. Condition Rating : 3	
Base Plate	 
Notes: Severe corrosion and delamination is visible on the base plate. Condition Rating : 3	
Stiffeners	
No stiffeners present.	

Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	Q AND R
HML Reference:	11 (D-SHED)
Concrete base:	
Paint is flaking and faded. Mild cracking and erosion is visible on the top of the concrete base. Condition Rating : 1	
Mast Pole	  
Notes: No signs indentation and corrosion was visible. Mast pole in good condition **Special Note: Maintenance or replacement of this mast will be difficult due to the position of the mast. The mast is surrounded by a mess and ablution facility.** Condition Rating : 1	

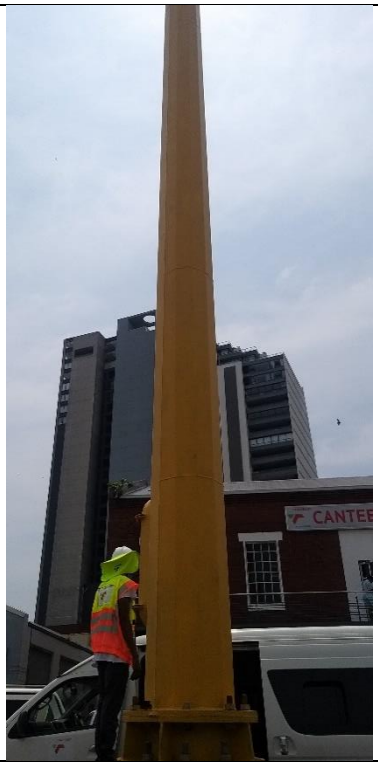
Bolts	
Notes: Severe corrosion is visible on bolts and nuts, especially below the base plate. No Bolts: 8 bolts No to be replaced/treated: Treat all bolts Condition Rating : 3	
Base Plate	
Notes: Severe corrosion and delamination is visible on the base plate. Condition Rating : 3	
Stiffeners	
No stiffeners present.	

Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	Q AND R
HML Reference:	21 (RAIL SUBSTATION)
Concrete base:	 
Paint is flaking and faded. Mild cracking and erosion is visible on the top of the concrete base. Condition Rating : 1	
Mast Pole	   
Notes: Medium corrosion on mast pole is visible. Paint is flaking. Overall condition of the mast pole is bad. Condition Rating : 2	

Bolts	
Notes: Severe corrosion is visible on bolts and nuts, especially below the base plate. No Bolts: 8 bolts No to be replaced/treated: Replace all bolts. Condition Rating : 3	
Base Plate	 
Notes: Medium corrosion is visible on the base plate. Paint is flaking. Condition Rating : 2	
Stiffeners	
No stiffeners present.	

Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	Q AND R
HML Reference:	20 (CLINIC)
Concrete base:	  
Base not painted. Medium cracking and erosion is visible. No reinforcement exposed. Overall condition of the concrete base is good. Condition Rating : 1	
Mast Pole	 
Notes: No signs of indentations. Mild corrosion and flaking of paint is visible. Condition Rating : 1	

Bolts	 
Notes: Mild corrosion is visible on bolts and nuts. No Bolts: 20 bolts No to be replaced/treated: Treat all bolts. Condition Rating : 1	
Base Plate	 
Notes: Medium corrosion and delamination is visible. Flaking of paint is visible on the edges of the base plate. Condition Rating : 1	
Stiffeners	
Notes: Stiffeners are in good condition with no corrosion, damage or any signs of failure. Condition Rating : 1	

Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	Q AND R
HML Reference:	19 (CLINIC)
Concrete base:	 
Base not painted. No cracking and erosion is visible. Leching is visible resulting in discoloration. Overall condition of the concrete base is good. Condition Rating : 1	
Mast Pole	
Notes: No signs of indentations or corrosion. Overall condition of the mast is good. Condition Rating : 1	

Bolts	
Notes: Mild corrosion is visible on bolts and nuts. No Bolts: 20 bolts No to be replaced/treated: Treat all bolts for corrosion protection. Condition Rating : 1	
Base Plate	
Notes: Mild corrosion is visible. Flaking of paint is visible on the edges of the base plate. Condition Rating : 1	
Stiffeners	
Notes: Stiffeners are in good condition with no corrosion, damage or any signs of failure. Condition Rating : 1	

Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	Q AND R
HML Reference:	NO NUMBER (BC BERTH CORNER)
Concrete base:	
Base not painted. No cracking and erosion is visible. Overall condition of the concrete base is good. Condition Rating : 1	
Mast Pole	
Notes: No signs of indentations or corrosion. Overall condition of the mast is good. Paint colour does not comply with Transnet paint specifications. Condition Rating : 1	

Bolts	
Notes: Mild corrosion is visible on bolts and nuts. No Bolts: 10 bolts No to be replaced/treated: Treat all bolts for corrosion protection. Condition Rating : 2	
Base Plate	
Notes: Mild corrosion is visible. Flaking of paint is visible on the edges of the base plate. Condition Rating : 2	
Stiffeners	
Notes: Stiffeners are in good condition with no corrosion, damage or any signs of failure. Condition Rating : 1	

Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	Q AND R
HML Reference:	22 (B-BERTH)
Concrete base:	
Paint is flaking and faded. Mild cracking and erosion is visible on the top of the concrete base. Condition Rating : 1	
Mast Pole	
Notes: No signs of corrosion or indentation. Overall condition of the mast pole is bad. Condition Rating : 1	

Bolts	
Notes: Severe corrosion is visible on bolts and nuts, especially below the base plate. No Bolts: 8 bolts No to be replaced/treated: Treat all bolts Condition Rating : 2	
Base Plate	
Notes: Severe corrosion and delamination is visible on the base plate. Condition Rating : 3	
Stiffeners	
No stiffeners present.	

Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	Q AND R
HML Reference:	42 (C BERTH)
Concrete base:	
Mild erosion is visible. No signs of cracking or exposed reinforcement. Overall condition of concrete base is good. Condition Rating : 1	
Mast Pole	
Notes: Mild corrosion and flaking of piant is visibl on the mast pole. Mild indentations, possibly from external damage by impact on mast.Structural intergrity not compromised. Condition Rating : 1	

Bolts	
Notes: Mild corrosion is visible on bolts and nuts. No Bolts: 10 bolts No to be replaced/treated: Treat all bolts for corrosion protection. Condition Rating : 1	
Base Plate	
Notes: No signs of corrosion or delamination is visible. Flaking of paint is visible on the edges of the base plate. Condition Rating : 1	
Stiffeners	
Notes: Mild corrosion and flaking of paint on the edge of the stiffeners. Condition Rating : 1	

Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	Q AND R
HML Reference:	53 (C-WHARFSIDE)
Concrete base:	 
Base not painted. No cracking and erosion is visible. Mild leaching on concrete is visible resulting in discoloration. Overall condition of the base is good. Condition Rating : 1	
Mast Pole	 
Notes: Mast pole in good condition. No signs of indentation or corrosion was visible. Paint is flaking. Condition Rating : 1	

Bolts	
Notes: Mild corrosion is visible on bolts and nuts. No Bolts: 16 bolts No to be replaced/treated: Treat all bolts for corrosion protection. Condition Rating : 1	
Base Plate	
Notes: Severe corrosion and delamination is visible on the base plate. Condition Rating : 2	
Stiffeners	
Notes: Stiffeners on the adaptor are in good condition with no corrosion, damage or any signs of failure. Condition Rating : 1	

Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	Q AND R
HML Reference:	52 (D-BERTH)
Concrete base:	
Base not painted. No cracking and erosion is visible on the top of the base. Mild leaching on concrete is visible resulting in discoloration. Overall condition of the base is good. Condition Rating : 1	
Mast Pole	
Notes: Mast pole in good condition. No signs of indentation or corrosion was visible. Condition Rating : 1	

Bolts	
Notes: Mild corrosion is visible on bolts and nuts. No Bolts: 10 bolts No to be replaced/treated: Treat all bolts for corrosion protection. Condition Rating : 1	
Base Plate	
Notes: No signs of corrosion, delamination or failure are visible. Condition Rating : 1	
Stiffeners	
Notes: Stiffeners are in good condition with no corrosion, damage or any signs of failure. Condition Rating : 1	

Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	Q AND R
HML Reference:	41 (D-STACK)
Concrete base:	
Base not painted. No cracking and erosion is visible on the top of the base. Mild leaching on concrete is visible resulting in discoloration. Overall condition of the base is good. Condition Rating : 1	
Mast Pole	
Notes: Mild corrosion is visible and paint is flaking. Condition Rating : 1	

Bolts	 
Notes: Mild corrosion is visible on bolts and nuts. No Bolts: 10 bolts No to be replaced/treated: Treat all bolts for corrosion protection. Condition Rating : 1	
Base Plate	
Notes: No signs of corrosion, delamination or failure are visible. Condition Rating : 1	
Stiffeners	
Notes: Stiffeners are in good condition with no corrosion, damage or any signs of failure. Paint is flaking. Condition Rating : 1	

Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	Q AND R
HML Reference:	40 (E-STACK)
Concrete base:	
Base not painted. No cracking and mild erosion is visible on the top of the base. Mild leaching on concrete is visible resulting in discoloration. Overall condition of the base is good. Condition Rating : 1	
Mast Pole	  
Notes: Condition mast pole is bad. Multiple indentations were visible. Damage to the mast has occurred due to external impact. Medium corrosion is also visible. Condition Rating : 3	

Bolts	
Notes: Mild corrosion is visible on bolts and nuts. No Bolts: 10 bolts No to be replaced/treated: Treat all bolts for corrosion protection. Condition Rating : 1	
Base Plate	
Notes: No signs of corrosion, delamination or failure are visible. Paint is flaking. Condition Rating : 1	
Stiffeners	
Notes: Stiffeners are in good condition with no corrosion, damage or any signs of failure. Paint is flaking. Condition Rating : 1	

Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	Q AND R
HML Reference:	51 (E-STACK LOW)
Concrete base:	 
Base not painted. No cracking and mild erosion is visible on the top of the base. Mild leaching on concrete is visible resulting in discoloration. Overall condition of the base is good. Condition Rating : 1	
Mast Pole	 
Notes: There is a mild dent at the bottom of the mast. Mild corrosion is visible on the mast pole. Paint is flaking. Condition Rating : 2	

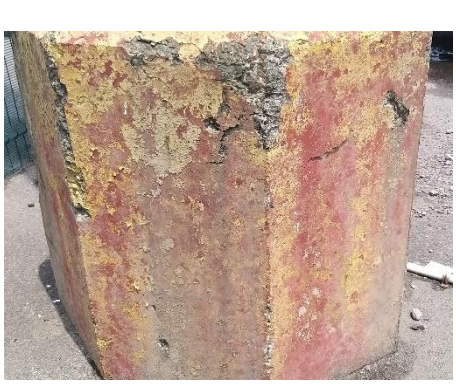
Bolts	
Notes: Mild corrosion is visible on bolts and nuts. No Bolts: 10 bolts No to be replaced/treated: Treat all bolts for corrosion protection. Condition Rating : 1	
Base Plate	
Notes: No signs of corrosion, delamination or failure are visible. Paint is flaking. Condition Rating : 1	
Stiffeners	
Notes: Stiffeners are in good condition with no corrosion, damage or any signs of failure. Condition Rating : 1	

Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	Q AND R
HML Reference:	50 (E-STACK HIGH)
Concrete base:	 
Base not painted. No cracking and erosion is visible on the top of the base. Mild leaching on concrete is visible resulting in discoloration. Overall condition of the base is good. Condition Rating : 1	
Mast Pole	
Notes: No signs of indentation or failure visible. Mild corrosion is visible. Overall condition of mast is good. Condition Rating : 1	

Bolts	 
Notes: Mild corrosion is visible on bolts and nuts. No Bolts: 10 bolts No to be replaced/treated: Treat all bolts for corrosion protection. Condition Rating : 1	
Base Plate	
Notes: No signs of corrosion, delamination or failure are visible. Paint is flaking. Condition Rating : 1	
Stiffeners	
Notes: Stiffeners are in good condition with no corrosion, damage or any signs of failure. Condition Rating : 1	

Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	Q AND R
HML Reference:	39 (E-STACK)
Concrete base:	
Base not painted. No cracking and erosion is visible on the top of the base. Mild leaching on concrete is visible resulting in discoloration. Overall condition of the base is good. Condition Rating : 1	
Mast Pole	 
Notes: Mild corrosions and indentations visible on mast poles. Condition Rating : 1	

Bolts	
Notes: Mild corrosion is visible on bolts and nuts. No Bolts: 10 bolts No to be replaced/treated: Treat all bolts for corrosion protection. Condition Rating : 1	
Base Plate	
Notes: No signs of corrosion, delamination or failure are visible. Paint is flaking. Condition Rating : 1	
Stiffeners	
Notes: Stiffeners are in good condition with no corrosion, damage or any signs of failure. Condition Rating : 1	

Project Name:	UPGRADE OF LIGHTING IN THE PORT OF DURBAN
Site Name:	Q AND R
HML Reference:	5 (INTAKE -SUB)
Concrete base:	  
Paint is flaking and faded. Medium cracking and erosion is visible on the top of the concrete base. Spalling has occurred and reinforcement is exposed. Overall condition of base is bad. Condition Rating : 3	
Mast Pole	
Notes: Mild corrosion and flaking of paint is visible on mast. Overall condition of mast pole is good. Condition Rating : 1	

Bolts	  
Notes: Severe corrosion is visible on bolts and nuts, especially below the base plate. No Bolts: 8 bolts No to be replaced/treated: Replace all bolts. Condition Rating : 3	
Base Plate	
Notes: Medium corrosion is visible on the base plate. Paint is flaking. Condition Rating : 2	
Stiffeners	
No stiffeners present.	

6. Assessment of Observations

The visual assessment, as stated in the previous section, lists a number of defects and damages that were observed during the visual site investigations. The defects observed can have varying impacts to the structure in terms its function and stability. This section describes these defects in detail providing an understanding of what they are and the possible causes.

6.1. Cracking

Cracking in concrete is a common occurrence. It appears in floors, beams, walls and bases. Cracking cannot be prevented entirely but it can be significantly reduced and controlled when preventative steps are taken. In order to take these steps the causes of these cracks need to be considered.

Diagnosing 6 Causes of Concrete Cracking:

Cracks Caused by Plastic Shrinkage

The most common reason for early cracks in concrete is plastic shrinkage. When the concrete is still in its plastic state (before hardening), it contains a fair amount of water. As the concrete inherently loses moisture during curing it begins to reduce in volume. As the concrete shrinks, internal tensile stresses are formed particularly in cases where the concrete is restrained. Concrete is rigid by nature and is strong in compression but relatively weak when placed in tension. When the stress becomes too great for the now hardened concrete it will crack in order to relieve tension.

Cracks Caused by Premature Drying

These are cracks, sometimes referred to as crazing cracks, occur on the surface of a concrete element when the top loses moisture too quickly. Crazing cracks are very fine surface cracks that resemble spider webs or shattered glass. Crazing cracks can be unsightly, but are not a structural problem. It is therefore important to ensure that the concrete surface is wetted throughout its curing period. Concrete that is exposed to the sun and wind will require more attention than concrete indoors for example.

Cracks Caused by Thermal Changes

All materials expand or contract when subjected to changes in temperature. Most materials expand when they are heated, and contract when they are cooled. When free to deform, concrete will expand or contract due to fluctuations in temperature. Temperature difference within a concrete structure may be caused by weather conditions cooling or heating one portion of the structure to a different degree or at a different rate than another portion of the structure. These temperature differences result in differential volume change, which creates tensile forces within the concrete. If the tensile strength of the concrete is exceeded, cracking will occur.

Cracks Caused by Corrosioning of Reinforcement

Steel reinforcement is susceptible to corrosioning when exposed to oxygen and water. Reinforcement is usually protected against the elements to a certain degree when cast inside concrete. The high alkalinity of concrete further protects against corrosion. Water molecules are, however, able to penetrate the microscopic pits and cracks in exposed concrete. This is intensified in the presence of larger cracks caused by shrinkage and thermal actions. If there are chloride ions or carbon dioxide present, the passivating layer of alkalinity around the steel is destroyed, allowing oxidation to take place. Oxidation is usually accompanied by a net expansion so that when it occurs in a confined space stresses are generated in the surrounding medium. This expansive force of corrosioning causes tensile forces in the concrete causing it to crack and sometimes detach.

Cracks Caused by Settlement

Settlement cracks occur as a result of settlement of a portion of the concrete which creates stresses in other portions. These stresses may develop over embedded items, such as steel reinforcement, tree roots or adjacent hardened concrete. Settlement cracking will result typically from insufficient consolidation (vibration), high slumps (overly wet concrete), or a lack of adequate cover over embedded items.

Cracks Caused by Overloading

Another factor which contributes to cracking is loading the concrete beyond that for which it has been designed. Although it is a very strong material, concrete still has load limits. Cracking is an early sign that the concrete is beginning to fail due to excessive loads.
Cracks in concrete can scar a building's aesthetic appearance. They can be the cause of leaks or of corrosion. Most importantly, they can be the first indicative signs of a potential structural failure. No crack should therefore go unexamined.

6.2. Spalling

Concrete spalling is easily identifiable, occurring on the surface of the concrete when it becomes rough and flaky, and may be pitted due to concrete chunks detaching from the structure. This may cause cracking in the concrete as well. Concrete spalling is a common problem and occurs due to a wide variety of reasons. Reinforcement corrosion is a primary cause of concrete spalling. This typically occurs as a result of wind-blown water and salt penetrating the concrete and causing the embedded reinforcing steel to corrosion. As a result of the corrosioning process the steel expands and then causes cracking and breaking of the concrete. Other common causes of spalling include damage and wear to the concrete, poor construction techniques and carbonation of the concrete where carbon dioxide reacts with the chemicals within the concrete.

Concrete spalling can be dangerous when left untreated, since chunks of concrete could fall and potentially injure somebody. The deterioration also affects the structural stability and the longevity of the structure. It is important to therefore take measures to prevent spalling before it occurs as well as to treat it when it has already occurred. The following are some ways to prevent and treat spalled concrete:

- Properly design the concrete element, allowing joints for expansion and contraction, allowing sufficient cover, giving due consideration to the environment in which the concrete will be placed.
- Using proper concrete mixes and concreting practices.
- Coating the concrete with a waterproofing membrane or using a sealant is another option, especially if it contains chemicals which are resistant to chloride.
- Filling the spalled area with cement or an adhesive admixture.

6.3. Delamination

Delamination is the separation along a plane parallel to a surface. Another way to explain delamination would be the act of splitting or separating a solid into layers. In the case of concrete delamination, the process of bleeding occurs naturally, whereby excess mix water and entrapped air are displaced and the lighter materials migrate toward the surface as the concrete settles. If finishing operations start prematurely, before bleeding is completed, and as the concrete hardens, subsurface voids develop where the water or air is trapped. These voids create weakened zones right below the surface that can eventually detach. Delamination also occurs when the environmental factors rapidly dry the surface of the concrete thereby not allowing the concrete to cure properly. This can include wind, sun, low humidity, or drying the surface with heaters. A delamination is very difficult to detect and becomes apparent after the concrete surface has dried and the delaminated area is crushed under traffic or impact. Delamination can also occur in steel items as a result of fatigue, cyclical stresses and corrosion.

The measures to avoid delamination can be as follows:

- Avoid dry shakes on air entrained concrete.
- Use heated concrete or accelerators to promote even setting of concrete.
- Avoid placing concrete directly on vapour barriers.
- Warm the grade beneath the concrete in cool weather.
- Do not use steel trowel finishes that produce a dense, impermeable surface.
- Take measures to protect steel against corrosion by using a coating or painting over its surface.

Repairing delaminated concrete can be accomplished but it may be difficult. In some instances, removal and replacement of the delaminated concrete may be the preferred method of repair. A somewhat reduced lifespan and/or durability should be expected for a repaired concrete surface. The same is true for delaminated steel, as it is better to replace the steel article as opposed to refurbishing it.

6.4. Efflorescence and Leaching

Efflorescence occurs with all concrete and is the most frequent problem that concrete contractors face with coloured concrete. It appears as the white, powdery scum that can appear on concrete surfaces after construction but can also be brown green or yellow, depending on the type of salts present. It is caused when soluble salts and other water dispersible materials come to the surface of concrete and mortars. It is induced by low temperatures, moist conditions, condensation, rain, dew, and water added to the surface of fresh concrete to assist trowelling.

Three conditions must exist before efflorescence will occur.

- There must be water-soluble salts present somewhere in the wall.
- There must be sufficient moisture in the wall to render the salts into a soluble solution.

- There must be a path for the soluble salts to migrate through to the surface where the moisture can evaporate, thus depositing the salts which then crystallize and cause efflorescence.
- Leaching of lime compounds can lead to the formation of calcium carbonate or calcium sulphate on the surface of the concrete. Deterioration due to leaching occurs gradually in structures in long-term contact with water. This results in the illusion of calcium, which is a major component of concrete, and is called leaching. Efflorescence and leaching in concrete is harmful. In addition to the blemish and unpleasant appearance, the process of carbonation of concrete is accelerated. In reinforced concrete, the chances of steel corrosion is increased due to carbonation and higher permeability of concrete.

6.5. Corrosion

When iron or an alloy that contains iron, such as steel, is exposed to oxygen or water for a sustained period of time, a chemical reaction occurs and a new compound is formed called oxide. This process is known as oxidation, corrosion or, in the case of iron and iron alloys, corrosioning. This process is often accelerated if salt is present, as is the case with sea water or sea spray. Over time the iron or iron alloy will convert entirely to corrosion becoming brittle and flaky and will eventually disintegrate. There are a variety of methods for preventing corrosion or at best to slow down the corrosion process. The most common are galvanisation, cathodic protection, coatings or painting and corrosion inhibitor repair techniques

Steel corrosion in concrete leads to cracking, reduction of bond strength, reduction of steel cross section and loss of serviceability. Reinforced concrete undergoing corrosion does not only lead to a reduced lifespan, in some cases the concrete may lose its structural integrity entirely before it reaches its intended design life. The basic processes of corrosion are closely related to the medium surrounding the steel. Environmental factors cannot affect the corrosion process directly.

but they can cause the deterioration of the cover concrete and accelerate the ingress of aggressive species.

Factors that can affect corrosion of steel in concrete are: steel, pore solution of concrete, permeability of concrete, moisture, chloride, carbon dioxide, component of concrete, concrete resistivity, thickness of concrete cover and the temperature. The first defence against corrosion of steel in concrete is quality concrete and sufficient concrete cover over the reinforcing bars. Increased corrosion resistance can also be induced by the use of concrete additives which reduce the permeability of the concrete to the penetration of chloride ions.

6.6. Bolt Failure

The bolt failure for the masts examined focused on two types of mechanical failure mechanisms, namely; cyclic loading resulting in fatigue failure as well as failure as a result of corrosion. These failure mechanisms will be discussed further in this section.

When a structure or any of its components is subjected to a cyclic tensile stress, fatigue failure may occur. This failure is characterised by an incremental propagation of a fatigue crack on the material caused by each stress cycle. The cyclic stresses present in the case of the high mast lights is caused by the oscillating action of the wind forces acting on the mast. Fatigue failure on bolts normally occurs on points where there is a change in the cross-sectional area as shown in Figure 8.1. The joint face angularity, as indicated in Figure 8.2, caused by uneven joint surfaces, also affects the fatigue life of a bolt.

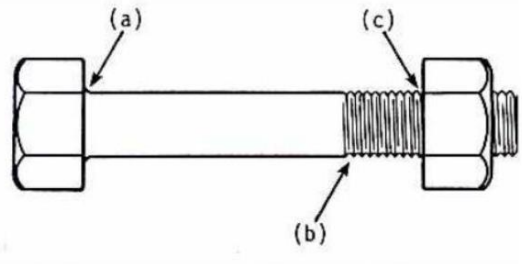


Figure 8.1: Typical failure points of a bolt

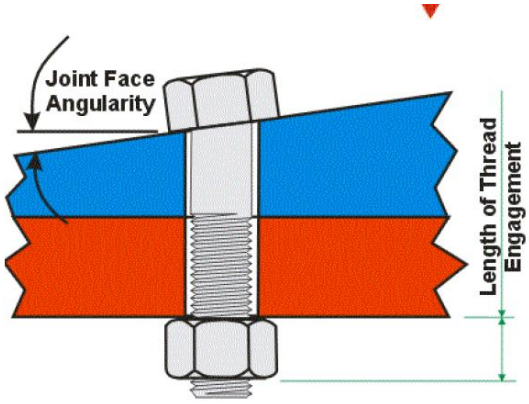


Figure 8.2: Joint face angularity

Bolted connections are often coated to prevent corrosion; however, over time, the coating themselves corrode and hence, the outer layer of the bolts themselves begin to corrode. Bolt failure due to corrosion is either in the form of chemical decomposition, galvanic corrosion, corrosion fatigue or stress corrosion cracking.

Often, corrosion and fatigue both contribute to the eventual failure of a mechanical component in failure modes including stress corrosion cracking, fretting corrosion and corrosion fatigue. The two factors determining the rate in which the corrosion assists crack propagation are the stress on the bolt and the fracture toughness of the material. Fretting corrosion, on the other hand, occurs when the contact surfaces between materials subjected to repetitive motion cause abrasion and wear of the material's surface. In terms of bolts, fretting corrosion would be observed on the bolt shank as the motion of the plates cause abrasion and wear on the bolt due to the vibration as effect of externally applied fluctuating loads. The abrasion on the bolt threads essentially remove the corrosion protective layer on the bolt allowing for accelerated corrosion attack to occur.

7. Remedial Measures

Concrete Crack Repair (RM1)

- Open up the cracks using an angle grinder or similar approved mechanical means, to a minimum of 10 mm wide and 10 mm deep.
- Ensure that any previous crack repair materials are completely removed down to a sound, dry and clean substrate.
- Apply grease nipples or similar approved at even suitable intervals.
- Using an approved epoxy repair mortar fill the opened up crack and smooth over with a trowel in between the nipples on the exterior face.
- Attach a grease gun to the grease nipples starting with the grease nipple at the bottom and inject an approved low viscosity, solvent free epoxy adhesive.

- Continue filling until resin starts to come out of the grease nipple above, and continue this process until the cracks is finished off at the top.

Spalling and Delamination Repair (RM2)

- Square cut the edge of identified repairs to a minimum depth of 10 mm to avoid feather edging.
- Remove all unsound concrete including concrete within the square cut edge, down until a clean sound surface is obtained to a minimum depth of 10 mm.
- Ensure concrete behind the reinforced steel is chipped back enough so as to allow access for priming of steel.
- The exposed reinforced steel must be sand blasted to remove all corrosion.
- Immediately following preparation and cleaning, the exposed reinforcing steel shall be primed with an approved epoxy zinc primer.
- Special attention shall be paid to the backs of the steel bars and where steel bars are tied together.
- Apply an approved wet to dry epoxy adhesive to the prepared concrete surface.
- Apply an approved polymer repair mortar to a minimum thickness of 10mm.
- Cure the repaired areas using an approved curing agent.

Sand Blast Corrosion on Masts, Base plates and Haunches (RM3)

- Sand blast the affected areas to remove all corrosion to a radius of 20mm beyond corroded area.
- Clean the surface using a brush or air blower to ensure the area is sound, dry and free from dust, grease and other contamination.
- Prime the surface using a primer as per Transnet corrosion protection specification, document EEAM-Q-008 (Appendix B).
- Apply two coats covering the primer surface to match existing colour.
- Paints shall be applied under suitable conditions of light, temperature, humidity and ventilation. At time of over-coating, the painted surface shall be clean, dry, sound and free of misses and defective paint. Each coat of paint shall be applied as a continuous, even film of uniform thickness.
- Ensure priming and painting occurs timeously after sand blasting and cleaning to prevent re-corrosioning of the area, given the highly corrosive environment of the Port of Durban. Any re-corrosioning of the surface should be considered as a contaminant and be removed by re-blasting.

Wire Brush Corrosion on Bolts (RM4)

- Bolts to be cleaned by wire brushing with hand tool or power tool in a manner which will minimize damage to sound paint.
- Corrosion spots are to be cleaned to bright metal.
- Measure diameter of bolts using a Vernier calliper or suitable measuring tool.
- If the bolts on a given high mast are still of a suitable diameter as a collective, proceed to clean the bolts, prime and coat with an approved epoxy or protective spray.

- If the collection of bolts on a given high mast have reduced in diameter as a collective as deemed by a competant structural engineer, such that the stability of the mast is in doubt, proceed to remove the mast from the base, demolish existing base and reconstruct new base with new holding down bolts.

Replacement of Base Plates (RM5)

- Remove the mast from the base.
- Remove the base plate from the mast using an angle grinder or a cut-off disc.
- Clean the rough edges of the mast using an angle grinder or a sanding disk to level the end of the mast.
- Re-weld new base plate onto the existing mast in a controlled environment.
- Clean the surface using a brush or air blower to ensure the area is sound, dry and free from dust, grease and other contamination.
- Prime the surface using a primer similar to Transnet corrosion protection specification, document EEAM-Q-008.
- Apply two coats covering the primer surface to match existing colour

Replacement of Concrete Base and Bolts (RM6)

- Remove the mast from the base.
- Demolish existing base and dispose of waste including existing bolts.
- Reconstruct new base to match specifications. See Annexure A.
- Re-install existing mast pole onto new concrete base.

Complete Replacement of High Mast (RM7)

- Completely remove existing high mast and demolish concrete base and replace with new.

A detailed method statement of each of the abovementioned repairs, is to be provided for acceptance by the responsible Transnet Engineer, prior to construction.

8. Conclusion and Recommendations

This document has presented a condition assessment of the high mast lights and the medium mast lights located within the Port of Durban. This was based on site investigations conducted during November 2020. The assessment of observations for the masts and associated structural components can be summarised as follows:

- The majority of the steel masts are still in good condition. It is the base configuration of the masts, in most cases, which is beginning to show signs of fatigue and, in some cases, possible failure.
- A large number of the concrete bases of the masts show signs of deterioration in the form of spalling, delamination and concrete detachment.
- There are concrete bases which have deteriorated to such an extent that it poses a threat to the overall stability of the mast.
- A large number of the bolts show signs of corrosion, with corrosion of the bolts typically being worse below the base plates rather than above.
- A few of the masts have base plates which have corroded, but only a small number will require replacement of the base plates, due to severe corrosion.
- The stiffeners of the majority of the masts are in good condition, with only a small amount showing signs of corrosion, damage or failure.

It is evident from the observations that the high mast lights will require remedial works to address all the problematic issues and damages found. This is especially applicable to the issues related to excessive concrete base and bolt deterioration. If these issues are not addressed they will continue to pose a huge threat to the structural stability of the masts.

It is important to note that this assessment was purely a visual assessment and, as such, certain limitations occur due to the fact that only certain elements of the structure were visually accessible. Reference should be made to attached appendices, Appendix A: EEAM-Q-006 for specifications for structural steel and Appendix B:EEAM-Q-008 for specifications for corrosion protection. Based on the assessments the following recommendations are made, as described in Section 8:

Remedial Measure 1 (RM1): Concrete Crack Repair
Remedial Measure 2 (RM2): Spalling and Delamination Repair
Remedial Measure 3 (RM3): Sand Blast Corrosion on Masts, Base plates and Haunches
Remedial Measure 4 (RM4): Wire Brush Corrosion on Bolts
Remedial Measure 5 (RM5): Replacement of Base Plates
Remedial Measure 6 (RM6): Replacement of Concrete Base and Bolts
Remedial Measure 7 (RM7): Complete Replacement of High Mast
Remedial Measure 8 (RM8): Corrosion protection to Transnet specification, document EEAM-Q-008

CAR TERMINAL

	RM1	RM2	RM3	RM4	RM5	RM6	RM7	RM8	No repairs required	Additional comments
40/503	√			√				√		
46/503A	√			√				√		
35/503B				√				√		
34/503C	√			√				√		
503D	√			√				√		
49/503E	√			√				√		
42/504							√	√		Only mast needs to be replaced. Concrete base and bolts may be treated.
33/504				√				√		
32/505				√				√		

	RM1	RM2	RM3	RM4	RM5	RM6	RM7	RM8	No repairs required	Additional comments
NO NUMBER /505	√			√				√		
44/600				√				√		
31/600	√			√				√		
30/600	√			√				√		Excess vegetation to be removed
29				√				√		
47				√				√		
233	COULD NOT LOCATE MAST ON SITE									
48				√				√		
46	COULD NOT LOCATE MAST ON SITE									
45	√			√				√		
39								√		
36/503				√				√		

Q AND R

	RM1	RM2	RM3	RM4	RM5	RM6	RM7	RM8	No repairs required	Additional comments
01	COULD NOT LOCATE MAST ON SITE									
NO NUMBER	COULD NOT LOCATE MAST ON SITE									
03	√		√	√				√		
51			√	√				√		
52	COULD NOT LOCATE MAST ON SITE									
53				√	√			√		
09					√	√				
37								√		
48				√				√		
49				√				√		
38	COULD NOT LOCATE MAST ON SITE									
36				√				√		
8							√			
34			√	√				√		
45				√				√		
44				√				√		
33			√	√				√		
32				√				√		
43			√	√				√		
31			√	√				√		
6			√		√	√				
7					√	√				

	RM1	RM2	RM3	RM4	RM5	RM6	RM7	RM8	No repairs required	Additional comments
47			√	√				√		
46			√	√				√		
35	COULD NOT LOCATE MAST ON SITE									
10	√				√	√				
11	√			√	√			√		
21	√		√			√				
20	√		√	√				√		
19			√	√				√		
BC BERTH			√	√				√		
22	√			√	√			√		
42			√	√				√		
53				√	√			√		
52				√				√		
41			√	√				√		
40										
51				√			√			ONLY REPLACE MAST
50			√	√				√		
39			√	√				√		
05	√		√			√				

Annexure S - Basic Conditional Assessment Report for the HML (Point – MPT)

MAYDON WHARF				
ITEM No.	**HML NUMBER**	**HML SECTION**	**ELECTRICAL CONDITION**	**RECOMMENDATION**
1	**3**	**MWF**	6x400W HPS Light fittings (All light fittings are working) DB not in good condition, needs to be replaced Cable gland of supply cable to be replaced (25mm² copper cable) Sectional pole needs to be painted Ring is in good condition visually, but further inspection of ring gear to take place later	Routine maintenance required
2	**2**	**MWF**	6x400W HPS Light fittings (3 light fittings are not working) DB not in good condition, needs to be replaced Sectional pole needs to be painted Ring is in good condition visually, but further inspection of ring gear to take place later	Routine maintenance required
3	**11**	**MWF**	7x400W HPS Light fittings (1 light fitting is not working) DB in good condition but cover is missing Sectional pole needs to be painted Ring is in good condition visually, but further inspection of ring gear to take place later	Routine maintenance required
4	**1**	**MWF**	16x400W HPS Light fittings (4 light fittings are not working) DB not in good condition, needs to be replaced Sectional pole needs to be painted Ring is in good condition visually, but further inspection of ring gear to take place later	Routine maintenance required
5	**9**	**MWF**	5x400W HPS Light fittings (1 light fitting is not working) Sectional pole needs to be painted Ring is in good condition visually, but further inspection of ring gear to take place later	Routine maintenance required
6	**12**	**MWF**	16x400W HPS Light fittings (7 light fittings are not working) DB in good condition but cover is missing Sectional pole needs to be painted Ring is in good condition visually, but further inspection of ring gear to take place later	Routine maintenance required
7	**10**	**MWF**	5x400W HPS Light fittings (1 light fitting is not working) DB in good condition Sectional pole needs to be painted Ring is in good condition visually, but further inspection of ring gear to take place later	Routine maintenance required
8	**13**	**MWF**	10x400W HPS Light fittings (4 light fittings are not working) DB not in good condition, needs to be replaced Sectional pole needs to be painted Cable gland of supply cable to be replaced (25mm² copper cable) Ring is in good condition visually, but further inspection of ring gear to take place later	Routine maintenance required
9	**14**	**MWF**	8x400W HPS Light fittings (7 light fittings are not working) DB not in good condition, needs to be replaced Sectional pole needs to be painted Ring is not in good condition visually (broken and sagging), further inspection of ring gear to take place later	Routine maintenance required
10	**8**	**MWF**	12x400W HPS Light fittings (All light fittings are working) DB not in good condition, needs to be replaced Sectional pole needs to be painted Bonding to earth not present Ring is in good condition visually, but further inspection of ring gear to take place later	Routine maintenance required
11	**15**	**MWF**	18x400W HPS Light fittings (6 light fittings are not working) DB in good condition but cover is missing Sectional pole needs to be painted Ring is in good condition visually, but further inspection of ring gear to take place later Change top section of mast with complete new head frame, pulleys, cables, headring, luminaires, trailing cables	Routine maintenance required
12	**7**	**MWF**	6x400W HPS Light fittings (All light fittings are not working) DB not in good condition, needs to be replaced Sectional pole needs to be painted Ring is in good condition visually, but further inspection of ring gear to take place later Change top section of mast with complete new head frame, pulleys, cables, headring, luminaires, trailing cables	Routine maintenance required

13	**6**	**MWF**	6x400W HPS Light fittings (4 light fittings are not working) DB not in good condition, needs to be replaced Sectional pole needs to be painted Ring is in good condition visually, but further inspection of ring gear to take place later Change top section of mast with complete new head frame, pulleys, cables, headring, luminaires, trailing cables	Routine maintenance required
14	**5**	**MWF**	7x400W HPS Light fittings (3 light fittings are not working) DB not in good condition, needs to be replaced Sectional pole needs to be painted Ring is in good condition visually, but further inspection of ring gear to take place later Cable gland of supply cable to be replaced (25mm² copper cable)	Routine maintenance required
15	**4**	**MWF**	7x400W HPS Light fittings (All light fittings are not working) DB not in good condition, needs to be replaced Sectional pole needs to be painted Ring is in good condition visually, but further inspection of ring gear to take place later Lights are not working due to damged supply cable. Contractor to trace fault and provide cable joint and new cable Change top section of mast with complete new head frame, pulleys, cables, headring, luminaires, trailing cables	Routine maintenance required

Accepted by:
Date:

Annexure T - Basic Conditional Assessment Report for the HML (Point – Car)

MAIN CAR PARK				
ITEM No.	**HML NUMBER**	**HML SECTION**	**ELECTRICAL CONDITION**	**RECOMMENDATION**
1	**40**	**503**	DB Cover missing screws 11x400W Light fittings and 4xStreet Light fittings Sectional pole needs to be painted Ring is in good condition	Eight yearly maintenance required
2	**46**	**503**	DB Cover missing screws 11x400W Light fittings and 4xStreet Light fittings Sectional pole needs to be painted Ring is in good condition	Eight yearly maintenance required
3	**35**	**503**	DB Good condition 11x400W Light fittings and 4xStreet Light fittings Sectional pole needs to be painted Ring is in good condition	Eight yearly maintenance required
4	**34**	**503**	DB Good but socket outlet needs to be changed 11x400W Light fittings and 4xStreet Light fittings Sectional pole needs to be painted Ring is in good condition No finial- needs to be installed	Eight yearly maintenance required
5	**No number**	**503**	DB Good 11x400W Light fittings and 4xStreet Light fittings Sectional pole needs to be painted Ring is in good condition No finial- needs to be installed	Eight yearly maintenance required
6	**49**	**503**	DB is in good condition 11x400W Light fittings and 4xStreet Light fittings Sectional pole needs to be painted Ring is in good condition	Eight yearly maintenance required
7	**36**	**503**	DB Good 11x400w Light fittings and 4xStreet Light fittings Sectional pole needs to be painted Ring is in good condition Mast not earthed	Eight yearly maintenance required
8	**42**	**504**	Mast is down Change section 4 from the top Change top section of mast with complete new head frame, pulleys, cables, headring, luminaires, trailing cables Verify power supply Headring needs to be replaced, completely new design	Eight yearly maintenance required and repairs to foundation and new bolt group required
9	**33**	**504**	DB Good condition 11x400W Light fittings and 4xStreet Light fittings Sectional pole needs to be painted Sectional pole section 3 from the top needs to be changed Ring is in good condition	Eight yearly maintenance required and repairs to foundation and new bolt group required
10	**32**	**505**	DB Good condition 11x400W Light fittings and 4xStreet Light fittings Sectional pole needs to be painted Ring is in good condition	Eight yearly maintenance required
11	**No number**	**505**	DB not in good condition, needs to be replaced 14x400W Light fittings Sectional pole needs to be painted Ring is in good condition	Eight yearly maintenance required
12	**44**	**600**	DB not in good condition, needs to be replaced 11x400W Light fittings and 4xStreet Light fittings Sectional pole needs to be painted Ring is in good condition No finial- needs to be installed	Eight yearly maintenance required and repairs to foundation and new bolt group required
13	**31**	**600**	DB not in good condition, needs to be replaced 11x400W Light fittings and 4xStreet Light fittings Sectional pole needs to be painted Ring is in good condition	Eight yearly maintenance required
14	**30**	**600**	DB not in good condition, needs to be replaced 11x400W Light fittings and 4xStreet Light fittings Sectional pole needs to be painted Ring is in good condition	Eight yearly maintenance required
15	**29**		DB in good condition 11x400W Light fittings and 4xStreet Light fittings Sectional pole needs to be painted Ring is in good condition	Eight yearly maintenance required
16	**47**		DB in good condition 7x400W Light fittings and 5x1000W Light fittings Sectional pole needs to be painted Ring is in good condition	Eight yearly maintenance required
17	**233 (critical)**		Mast is down Change section 4 from the top Change top section of mast with complete new head frame, pulleys, cables, headring, luminaires, trailing cables Verify power supply	Eight yearly maintenance required
18	**48**		DB cover is damaged, needs to be replaced Mast is not earthed Socket outlet to be changed 7x400w Light fittings not working 3x Street Light fittings not working	Eight yearly maintenance required
19	**46 (Car park main entrance)**		Mast is not earthed Socket outlet to be changed 1x400w Light fittings not working	Eight yearly maintenance required
20	**45 (critical)**		DB Cover missing screws 11x400W Light fittings and 4xStreet Light fittings Sectional pole needs to be painted Ring is not in good condition Change top section of mast with complete new head frame, pulleys, cables, headring, luminaires, trailing cables Mast is not earthed	Eight yearly maintenance required
21	**39**		DB in good condition 11x400W Light fittings and 4xStreet Light fittings Sectional pole needs to be painted Ring is in good condition Socket outlet to be changed Mast not earthed	Eight yearly maintenance required

Note: The High Masts are in a poor state and need urgent attention. The state of the Head Gear and Luminaires is not known and will be visible once the High Mast are lowered for 8Yearly service.

Accepted by: Samukelo Magcaba
Date: 05/09/2022

Annexure U - Basic Conditional Assessment Report for the HML (Maydon Wharf)

Q AND R				
ITEM No	HML NUMBER	HML SECTION	ELECTRICAL CONDITION	RECOMMENDATION
1	**1**		DB not in good condition, needs to be changed 8x400W Light fittings Bow-mast needs to be painted Ring is in good condition Mast not earthed Bow-mast dented on section 1 from the bottom	Eight Yearly Maintenance required
2	**No number (critical)**		DB good over missing screws Complete new lighting design Sectional pole needs to be painted Change section 4 and 5 from the top Change top section of mast with complete new head frame, pulleys, cables, headring, luminaires, trailing cables Mast is not earthed	Eight Yearly Maintenance required
3	**3**		DB not in good condition, needs to be changed 13x400W Light fittings Bow-mast needs to be painted Ring is in good condition Mast not earthed Cable not installed correctly (illegal connection) No Finial	Eight Yearly Maintenance required
4	**51**		DB not in good condition, needs to be changed 8x400W Light fittings Sectional pole needs to be painted Ring is in good condition Mast not earthed Cable not installed correctly (illegal connection)	Eight Yearly Maintenance required
5	**52**		Needs new head, luminaire, splitter. New DB needed	Eight Yearly Maintenance required
6	**53**		DB not in good condition, needs to be changed 15x400W Light fittings Bow-mast needs to be painted Ring is in good condition Mast not earthed	Eight Yearly Maintenance required
7	**8**	**F- SHED**	DB Good condition 8x400W Light fittings Bow-mast needs to be painted Ring is in good condition	Eight Yearly Maintenance required
8	**9**	**F-SHED**	DB Good condition 8x400W Light fittings Bow-mast needs to be painted Ring is in good condition No surge protection	Eight Yearly Maintenance required
9	**37**	**REEFERS**	DB Good condition but needs to be covered 15x400W Light fittings and 3x1000W Light fittings Sectional pole needs to be painted Ring is in good condition	Eight Yearly Maintenance required
10	**48**	**REEFERS**	DB Good condition 7x400W Light fittings and 5x1000W Light fittings Sectional pole needs to be painted Ring is in good condition	Eight Yearly Maintenance required
11	**49**	**F-STACK**	DB Good condition 7x400W Light fittings and 5x1000W Light fittings Sectional pole needs to be painted Ring is in good condition	Eight Yearly Maintenance required
12	**38 (critical)**	**F-STACK**	DB not in good condition, replace Complete new lighting design Bow-mast damaged, needs to be repaired Ring is in good condition	Eight Yearly Maintenance required
13	**36**	**G-STACK**	DB Good condition (maintenace needed to make safe) 15x400W Light fittings and 3x1000W Light fittings Sectional pole needs to be painted Ring is in good condition Pulley chain rusted, needs to be replaced	Eight Yearly Maintenance required
14	**34**	**G-STACK**	DB Good condition 15x400W Light fittings and 3x1000W Light fittings Sectional pole needs to be painted Ring is in good condition	Eight Yearly Maintenance required
15	**45**	**G-STACK**	DB Good condition 15x400W Light fittings and 3x1000W Light fittings Sectional pole needs to be painted Ring is in good condition	Eight Yearly Maintenance required
16	**44**	**G-STACK**	DB Good condition 15x400W Light fittings and 3x1000W Light fittings Sectional pole needs to be painted Ring is in good condition	Eight Yearly Maintenance required
17	**33**	**G-STACK**	DB Good condition (maintenace needed to make safe) 15x400W Light fittings and 3x1000W Light fittings Sectional pole needs to be painted Ring is in good condition Pulley chain rusted, needs to be replaced	Eight Yearly Maintenance required
18	**32**	**G-STACK**	DB Good condition (maintenace needed to make safe) 15x400W Light fittings and 3x1000W Light fittings Sectional pole needs to be painted Ring is in good condition	Eight Yearly Maintenance required
19	**43**	**G-STACK**	DB Good condition 15x400W Light fittings and 3x1000W Light fittings Sectional pole needs to be painted Ring is in good condition	Eight Yearly Maintenance required
20	**47**	**G-STACK**	DB Good condition 15x400W Light fittings and 3x1000W Light fittings Sectional pole needs to be painted Ring is in good condition	Eight Yearly Maintenance required
21	**46**	**G-STACK**	DB Good condition but needs to be covered 15x400W Light fittings and 3x1000W Light fittings Sectional pole needs to be painted Ring is in good condition	Eight Yearly Maintenance required
22	**35**	**G-STACK**	DB Good condition but needs to be covered 15x400W Light fittings and 3x1000W Light fittings Sectional pole needs to be painted Ring is in good condition	Eight Yearly Maintenance required
23	**31 (critical)**	**G-HOLDING YARD**	DB Good condition but needs to be covered 17x400W Light fittings and 2x1000W Light fittings Sectional pole needs to be painted Head ring is broken Change top section of mast with complete new head frame, pulleys, cables, headring, luminaires, trailing cables	Eight Yearly Maintenance required
24	**6**	**G-SHED**	DB Good condition 8x400W Light fittings Bow-mast needs to be painted Ring is in good condition	Eight Yearly Maintenance required
25	**7**	**G-SHED**	DB Good condition 8x400W Light fittings Bow-mast needs to be painted Ring is in good condition	Eight Yearly Maintenance required
26	**10**	**D-SHED**	DB not in good condition- exposed and corroded, replace 8x400W Light fittings Bow-mast needs to be painted Head ring is broken Change top section of mast with complete new head frame, pulleys, cables, headring, luminaires, trailing cables Mast not earthed Finial has fallen, replace Pulley chain rusted, needs to be replaced	Eight Yearly Maintenance required and Repairs to HM Foundation and New Bolt Group
27	**11**	**D-SHED**	Bow-mast needs to be painted Head ring not in good condition Mast is in an eclosed area, obstruction for maintenance, it is suggested to relocate mast (see pictures in WI) DB not in good condition, maintenace required 8x400W Light fittings	Eight Yearly Maintenance required and Repairs to HM Foundation and New Bolt Group
28	**21**	**RAIL SUBSTATION**	DB not in good condition- exposed and corroded, replace 8x400W Light fittings Bow- mast damage,needs replacement Complete new lighting design required	Eight Yearly Maintenance required
29	**20**	**CLINIC**	DB not in good condition, replace 9x400W Light fittings Bow- mast needs to be painted Complete new lighting design required	Eight Yearly Maintenance required
30	**19**	**111 CAR PARK**	DB not in good condition, replace 4x400W Light fittings and 3x400W Light fittings Bow-mast needs to be painted Ring is in good condition	Eight Yearly Maintenance required
31	**No number**	**B/C BERTH CORNER**	DB not in good condition- exposed and corroded, replace 8x400W Light fittings Bow- mast damage,needs replacement Complete new lighting design required	Eight Yearly Maintenance required
32	**22**	**B-BERTH**	DB not in good condition- exposed and corroded, replace 4x400W Light fittings and 4x1000W Light fittings Bow-mast needs to be painted	Eight Yearly Maintenance required
33	**42**	**C-BERTH**	DB to be tested for compilance by contractor 7x400W Light fittings and 5x1000W Light fittings Sectional pole needs to be painted Headring in good condition	Eight Yearly Maintenance required
34	**53**	**C-WHARFSIDE**	DB damaged and needs to be replaced 7x400W Light fittings and 5x1000W Light fittings Sectional pole needs to be painted Headring in good condition	Eight Yearly Maintenance required
35	**52**	**D-BERTH**	7x400W Light fittings and 5x1000W Light fittings Sectional pole needs to be painted Headring in good condition There is an ilegal connection from the HML DB to a parkhome. DB damaged and needs to be replaced	Eight Yearly Maintenance required
36	**41**	**D-STACK**	DB Good condition 18x400W Light fittings Sectional pole needs to be painted Headring in good condition	Eight Yearly Maintenance required
37	**40**	**E-STACK**	DB not good codition, needs replacement 9x400W Light fittings Change section 1 to 4 from the bottom of pole Sectional pole needs to be painted Mast too close to the stack (no clearance), recommended to reposion stack	Eight Yearly Maintenance required and Repairs to HM base
38	**51**	**E-STACK LOW**	DB Good condition but needs cover replacement 7x400W Light fittings and 5x1000W Light fittings Sectional pole needs to be painted Headring in good condition Pulley chain rusted and broken, needs to be replaced	Eight Yearly Maintenance required
39	**50**	**E-STACK HIGH**	DB Good condition but needs cover replacement 7x400W Light fittings and 5x1000W Light fittings Sectional pole needs to be painted Headring in good condition Mast too close to the stack (no clearance), recommended to reposion stack	Eight Yearly Maintenance required
40	**39**	**E-STACK**	DB Good condition 18x400W Light fittings Sectional pole needs to be painted Headring in good condition	Eight Yearly Maintenance required
41	**5**	**Mast No5 (INTAKE-SUB)**	DB not in good condition- exposed and corroded, replace 15x400W Light fittings Bow-mast needs to be painted	Eight Yearly Maintenance required

Note: The high masts are in a poor state and need urgent attention. The state of the Head Gear and Luminaires is not known and will be visible once the High Mast are lowered for 8Yearly service.

Accepted by: Samukelo Magcaba
Date: 05/09/2022

Annexure V - TCPELE030CON01- Lighting control network system

SPECIFICATION FOR THE SUPPLY OF LIGHTING CONTROL NETWORK SYSTEM

This specification covers Transnet's requirements for tele-management intelligent lighting control interoperable network systems

REVISIONS		
REV	**DATE**	**APPROVED**
0	September 2022	

INDEX

1. **SCOPE**

1.1. This specification covers Transnet's requirements of tele-management intelligent lighting control interoperable network systems.

2. **STANDARDS & SPECIFICATIONS**

2.1. The following publications and documents (latest edition) are referred to herein:

2.2. The following standards with latest amendments are referred to herein:

3. SOUTH AFRICAN STANDARDS

SANS 529	- Heat-resisting wiring cables
SANS 1507	- Electric cables with extruded solid dielectric insulation for fixed installations (300/500V to 1 900/3 300V) Part 3: PVC Distribution cables
SANS 1574	- Electric flexible cores, cords and cables with solid extruded dielectric insulation Part 3: PVC-insulated cores and cables
SANS 60529	- Degrees of protection provided by enclosures (IP Code)
SANS 61000-1-2	- Methodology for the achievement of functional safety of electrical and electronic systems including equipment with regard to electromagnetic phenomena
SANS 61000-3-2	- Electromagnetic compatibility (EMC) Part 3-2: Limits — Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)
SANS 9000	- Quality management systems – Fundamentals and Vocabulary

4. INTERNATIONAL STANDARDS

IEC 61347-1	- Lamp control-gear - Part 1: General and safety requirements
IEC 61347-2	- Safety requirements for electronic control-gear for use on d.c. or a.c. supplies up to 1000 V (a.c. at 50 Hz or 60 Hz)
EN 300 330-2	- Electromagnetic Compatibility And Radio Spectrum Matters (ERM) - Short Range Devices (SRD); Radio Equipment In The Frequency Range 9 KHz To 25 MHz And Inductive Loop Systems In The Frequency Range 9 KHz To 30 MHz
IEEE 802.15	- Low-Rate Wireless Networks

5. Books

Nil

6. INFORMATION AND METHOD OF TENDERING

6.1. Tenderers shall submit their main offers in accordance with the requirements of this specification. Deviations from the requirements of this specification which are of a minor nature and do not depart materially, will be considered at the discretion of Transnet.

6.2. All documents forming part of the Tender shall be firmly bound. No loose documents will be considered.

6.3. Failure to comply with the above requirements may preclude a tender from consideration.

6.4. All tender documents shall be presented in a clear format with index, uniquely numbered pages and cross-referenced. The total number of pages shall be clearly stated in the index.

6.5. Test reports/certificates shall be issued or certified by the appropriate test authority, that is accredited by the South African Bureau of Standards (SABS)

7. ANNEXURES

The following appendices form an integral part of this specification and shall be read in conjunction with it.

7.1. Annexure 1 - "Statement of Compliance"

This annexure shall be completed by all tenderers and signed. Where tenderers do not fully comply, all deviations shall be clearly indicated in the space provided. Failure to complete the statement of compliance will result in tenders being excluded.

8. SERVICE CONDITIONS

The equipment shall be designed and rated for continuous operation under the following conditions: -

Altitude:	Sea level.
Ambient temperature:	5°C to +40°C (daily average +35°C)
Relative humidity:	As high as 95%.
Lightning conditions:	Severe, with a maximum lightning ground flash density of 12 flashes per km² per annum.
Atmospheric conditions:	Salt laden as well as electrolytic corrosion conditions prevail in all areas owing to the proximity of direct current traction systems and cathodic protection schemes.

9. CONTROL SYSTEM OPERATION

9.1. The Luminaire Controller shall be a smart control module that monitors and controls LED luminaires. It shall be designed for easy installation and plug and play commissioning twist and lock 7 pin NEMA (National Electrical Manufacturers Association) socket to be able to incorporate sensor power supply and input that is compatible with a wide range of presence or traffic detectors to adjust the light levels on demand. This shall be PIR (Passive Infrared Sensor) or RADAR (Radio Detection and Ranging) with a normally OPEN inputs, 12V DC and maximum 2mA power supply.

9.2. The Luminaire Controller shall replace a standard photocell 7 pin NEMA socket with two photocell chips to control day light switching. It shall control the driver by controlling switching the power ON or OFF to the luminaire and by using dimming through either a DALI (Digital Addressable Lighting Interface) or 1-10V dimming interface which can dim the light by pre-configured dim profiles.

10. COMMUNICATION PROTOCOL

10.1. The Luminaire Controller's auto-connectivity and registration feature shall use the public local mobile communications network to communicate instantly via secure encryption with the Tele-Management Central Management System. No segment controllers or gateway infrastructure shall be required. They shall operate on all levels in secure zones using password-protected access and/or encrypted communication.

10.2. Communication between the luminaires, for exchanging sensor information, shall be done through a fast IPv6 based self-forming RF (Radio frequency) mesh tropology using ZIGBEE (ZigBee is a high-level communication protocols used to create personal area network with small, low-power digital radios), where any one controller in the mesh shall act as a router MASTER module for the neighbouring controllers through the Central Management System.

11. GEOGRAPHICAL POSITION DETECTION

11.1. A built-in GPS shall accurately locate the luminaire geographical position (+/- 2 m) which removes the need for the commissioning engineer to manually record the position of each luminaire. It shall also detect location changes e.g. following maintenance.

11.2. The Luminaire Controller shall even share the event information through the RF mesh net and shall also be able to respond by receiving detection information via the local RF mesh net, using geolocation and electrical configuration.

12. TELEMANAGEMENT

12.1. The controller shall have an ID reader which shall read out the asset information stored in the luminaire RFID tag for further use in the Telemanagement Central Management System WEBUI (Web User Interface) asset support information application.

12.2. The Telemanagement Smart Control system shall allow for every luminaire to be monitored and controlled individually and shall allow the following:

- Metering and reporting the current energy consumption
- Average RMS input voltage (Volts) when switched on
- Average RMS input current (Amps) when switched on
- Average true input power (Watts) when switched on
- Average input power factor when switched on
- Shall control dimming profiles for customised illumination levels and shall have the best possible energy savings.
- Shall have Real-time monitoring and manual control when needed. Time and network dependable.
- Shall be able to Record the consumption values in a database for comprehensive analysis. Two-week data
- Shall be able to have automatic configured scheduled reporting of all energy usage and errors in the event of faults (by email/SMS). The same as alarm.
- Shall have creation of user profiles for allowing specific user rights based on permissions.
- Shall allow creation configuration of alerts/alarms in the event of system errors (Power failure, Loss of communication, etc.) This shall be via email or SMS.
- User shall have the ability to access the system remotely from anywhere using a laptop or smart device with internet connectivity.
- Each controller shall be classified in a geographical hierarchy according to position.
- Owlet Telemanagement shall allow for control integration of 3rd party applications via API (Application Programming Interface) protocols.
- Specific parameters shall be assigned to individual luminaires such as power limits (used for alerts), design life, warm up time, etc.
- Historical data shall be viewed on the system which must save data for 12 months.
- The Telemanagement system shall be an auto-commissioning management system, which first uses GSM technology to locate itself and thereafter builds clusters between each node and defines master nodes to minimise data consumption via the GSM (Global System for Mobile Communications).
- The Telemanagement System shall use a self-repairing IEEE 802.15.4 6LoWPAN Mesh for communication between the Luminaire Controllers. This means that if a Luminaire Controller were to fail due to loss of power then the system will find a new path to communicate between the remaining Luminaire Controllers.
- In the event of a loss of communication, data shall be stored locally on the individual Luminaire Controller and shall be uploaded to the server as soon as another master node is selected. Operating and consumption data are stored in the cloud.
- In the event of communication failure, the Luminaire Controller shall continue to operate and dim the luminaire based on the last communicated settings stored on the Luminaire Controller and the time stamp saved on the Luminaire Controller.
- In case of a disrupted communication, the Luminaire Controller shall revert to dusk/dawn switching based on ambient light conditions in real-time or based on an Astro-clock setting.

13. SECURITY

13.1. Access to the server WEBUI shall be with pre-configured username and password.

13.2. User rights shall be such that each user can only access the permissions, which have been granted.

13.3. The user/server connection shall use the https protocol.

13.4. The server/ LuCo (Controller connection) shall be via a secured connection (VPN tunnel).

13.5. The luminaire Controller connection shall be encrypted IEEE 802.15.4 THREAD 6LoWPAN communication (128-bit AES encryption).

14. METERING

14.1. The control unit shall have a built-in utility grade meter which would offer effective metering accuracy (< 1% for the complete dimming range) to monitor energy usage.

15. CONSTRUCTION AND INGRESS PROTECTION

15.1. The controller housing shall be manufactured from a UV stabilized material.

15.2. The housing shall a minimum ingress protection of IP66.

16. PACKING

16.1. The luminaires shall be packed in such a manner that it will be protected during handling and transport by road, rail or sea as applicable. The movements of lamps and control gear shall be protected against vibration damage during transit.

16.2. When sea transport is involved, a dehydrating agent shall be provided where necessary.

17. GUARANTEE AND DEFECTS

17.1. The tenderer shall guarantee the equipment supplied by him in terms of this specification for a period of one year (12 months). The tenderer shall state his compliance herewith.

17.2. This guarantee shall cover all materials, parts, workmanship, performance and efficiency. The guarantee shall include all equipment supplied.

17.3. If any part/equipment fails during the 12-month guarantee period, the supplied shall immediately replace such part/equipment free of charge.

WITNESSES

1. …….. ……
TENDERER

2. …… ……
DATE

Transnet Group Capital