Transnet National Ports Authority

an Operating Division **TRANSNET SOC LTD**

[Registration Number 1990/000900/30]

REQUEST FOR PROPOSAL (RFP)

FOR THE: Detailed design, manufacture, supply, delivery and installation of Capstans that are hydraulically driven as well as final testing, commissioning and handover to the Employer in the Ports of Cape Town and Durban.

RFP NUMBER	**: TNPA 920/CIDB**
ISSUE DATE	**: 15 OCTOBER 2021**
NON-COMPULSORY BRIEFING	**: 01 DECEMBER 2021 @ 10:00AM (CAT)**
NON-COMPULSORY SITE VISITS	**: 6 – 8 DECEMBER 2021: PORT OF CAPE TOWN**
	: 9 & 10 DECEMBER: PORT OF DURBAN
CLOSING DATE	**: 11 JANUARY 2022**
CLOSING TIME	**: 10:00AM**
TENDER VALIDITY PERIOD	**: 12 WEEKS FROM CLOSING DATE**

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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	**Detailed design, manufacture, supply, delivery and installation of Capstans that are hydraulically driven as well as final testing, commissioning and handover to the Employer in the Ports of Cape Town and Durban.**
TENDER ISSUE DATE	**This Tender issue date is 15 November 2021 and must be downloaded directly from the National Treasury eTender Publication Portal at www.etenders.gov.za/ OR Transnet website at www.transnet.net/TenderBulletins/TC/Pages/default.aspx FREE OF CHARGE.** To download RFP and Annexures from **www.etenders.gov.za/**: • Click on "Tender Opportunities"; • Select "Advertised Tenders"; • In the "Department" box, select Transnet SOC Ltd; Once the tender has been located in the list, click on the 'Tender documents" tab and process to download all uploaded documents.
INTENSION TO TENDER	Tenderers are to please indicate their **intension to respond to this tender** to: **Qetelo.Mpanza@transnet.net** by **26 November 2021**. This is to ensure that any required communication (e.g. addenda to the tender, invitation to the non-compulsory virtual briefing session, etc.) in relation to this tender reach those intending to respond. Transnet will not be held liable if Tenderers do not respond by this date and do not receive the latest information regarding this Tender as a result thereof. **NOTE: It is the responsibility of the tenderer to ensure receipt of a complete RFP with specifications, drawings and annexures.**
NON-COMPULSORY TENDER CLARIFICATION MEETING AND SITE VISIT/WALK	Non-compulsory Tender Clarification Meeting will be conducted via **Microsoft Teams on Wednesday, December 01, 2021** at **10:00am [ten O'clock]** for a period of ± 4 (four) hours. The Non-compulsory Tender Clarification Meeting will start punctually, and information will not be repeated for the benefit of Tenderers arriving late. Despite the briefing session being non-compulsory, Transnet nevertheless encourages all Respondents to attend. Transnet will not be

	held responsible if any Respondent who did not attend the **non-compulsory** session subsequently feels disadvantaged as a result thereof. Any clarifications are to be emailed to: **Qetelo.Mpanza@transnet.net**, and all responses will be loaded on the Transnet website at **www.transnet.net/TenderBulletins/TC/Pages/default.aspx** and/or National Treasury eTender Publication Portal at **www.etenders.gov.za/.** **A Site visit/walk will only be undertaken on request.** **Request for Site visit/ walks to be emailed to Qetelo.Mpanza@transnet.net by no later than Wednesday, December 01, 2021 by 16:00.** **Site visits/walks would be conducted between 10:00 and 15:00) as follows:** • **PORT OF CAPE TOWN – Monday, December 06, 2021 to Wednesday, December 08, 2021; and** • **PORT OF DURBAN – Thursday & Friday, December 09, 2021 & December 10, 2021; and tenderers are to note:** • Tenderers are required to wear safety shoes, goggles, long sleeve shirts, high visibility vests and hard hats and life jackets. • Tenderers without the recommended PPE will not be allowed on the site visit/walk. • Tenderers and their employees, visitors, clients and customers entering Transnet Offices, Depots, Workshops and Stores will have to undergo breathalyser testing. • All forms of firearms are prohibited on Transnet properties and premises. • Transnet COVID-19 Procedures to be adhered to. • The relevant persons attending the meeting must ensure that their identity documents, passports or drivers' licences are on them for inspection at the access control gates.
CLOSING DATE	**10:00am on** 11 January 2022. Tenderers must ensure that tenders are delivered timeously to the correct address. If a tender is late or delivered to an incorrect address, it will not be accepted for consideration.

2. TENDER SUBMISSION

Tender Offers must be sealed and addressed as follows:

The Secretariat, TNPA Divisional Bid Adjudication Committee

RFP No: TNPA 920/CIDB

Description: Detailed design, manufacture, supply, delivery and installation of Capstans that are hydraulically driven as well as final testing, commissioning and handover to the Employer in the Ports of Cape Town and Durban.

Closing date and time: **11 January 2022** at **10:00 am**
Closing address: *[Refer to options in paragraph 3 below]*

All submissions must reflect the return address of the Tenderer on the reverse side.

3. DELIVERY INSTRUCTIONS FOR TENDER

3.1 Delivery by hand

If delivered by hand, the sealed submission must be deposited in the tender box which is located at the main entrance and must be addressed as follows:

THE SECRETARIAT, TNPA DIVISIONAL BID ADJUDICATION COMMITTEE
TRANSNET NATIONAL PORTS AUTHORITY TENDER BOX
GROUND FLOOR
EMENDI ADMIN BUILDING
PORT OF NGQURA
GQEBERHA
6100

The measurements of the "tender slot" are 400mm wide x 100mm high, and Tenderers must please ensure that tender documents or files are not larger than the above dimensions. Tenders which are too bulky [i.e. more than 100mm thick] must be split into two or more files, and placed in separate envelopes, each such envelope to be addressed as required in paragraph 2 above.

3.2 Dispatch by courier

If dispatched by courier, the envelope must be addressed as follows and delivered to the Office of The Secretariat, Transnet National Ports Divisional Bid Adjudication Committee and a signature obtained from that Office:

THE SECRETARIAT, TNPA DIVISIONAL BID ADJUDICATION COMMITTEE
TRANSNET NATIONAL PORTS AUTHORITY TENDER BOX
GROUND FLOOR
EMENDI ADMIN BUILDING
PORT OF NGQURA
GQEBERHA
6100

3.3 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.

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

4. 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.

5. 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:

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

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

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

5.4. 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;

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

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

5.7. 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;

5.8. 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);

5.9. 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.

5.10. 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.

5.11. Transnet reserves the right to exclude any Tenderers from the tender process who have 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 T2.2-20], [**Breach of Law**] whether or not they have been found guilty of a serious breach of law during the past 5 [five] years.

6. 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.

7. NATIONAL TREASURY'S CENTRAL SUPPLIER DATABASE

Tenderers 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/. Tenderers 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……

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

The conditions of tender are the Standard Conditions of Tender as contained in Annex C of the CIDB Standard for Uniformity in Construction Procurement, 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 C1.4 Certificate of Insurance – Transnet (SOC) Limited – Principle Controlled Insurance – April 2020
	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:	Commodity Manager
	Name:	Deon Tobias
	Address:	Emendi Admin. Building, Port of Ngqura **GQEBERHA,** 6100
	Tel No.	083 461-7241
	E – mail	**Deon.Tobias@transnet.net**

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

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

a) Only those tenderers who are registered with the CIDB, or are capable of being so prior to the evaluation of submissions, in a contractor grading designation equal to or higher than a contractor grading designation determined in accordance with the sum tendered or a value determined in accordance with Regulation 25 (1B) or 25(7A) of the Construction Industry Development Regulations, designation of **9ME 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 **8ME** 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 **9ME** 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.

2. Stage Two - Pre-qualification criteria for preferential procurement in terms of the Preferential Procurement Regulations, 2017:

a) A tenderer to subcontract a minimum of 30% to-

i. an EME or QSE which is at least 51% owned by black people;
ii. (ii) an EME or QSE which is at least 51% owned by black people who are youth;
iii. an EME or QSE which is at least 51% owned by black people who are women;
iv. an EME or QSE which is at least 51% owned by black people with disabilities;
v. EME or QSE which is at least 51% owned by black people living in rural or underdeveloped areas or townships;
vi. a cooperative which is at least 51% owned by black people;
vii. an EME or QSE which is at least 51% owned by black people who are military veterans;

All Sub-Contractors must be registered on the National Treasury CSD by closing date.

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

3. Stage Three - Local Production and Content in terms of the Preferential Procurement Regulations, 2017:

Tenderers must properly complete, duly sign and submit returnable schedule T2.2-03, entitled "Declaration Certificate for Local Production and Content (SBD 6.2 and Annexures C, D & E)", committing to meet the following stipulated minimum thresholds for local production and content for the following designated sectors as determined by the Department of Trade and Industry (DTI):

(i) 70% for Valve products and actuators; and

(ii) 90% for Electrical cables.

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. The rates of exchange quoted by the tenderer in paragraph 4.1 of Returnable Schedule T2.2-03 (the Declaration Certificate for Local Production and Content for Designated Sectors) may be verified for accuracy. Only the South African Bureau of Standards (SABS) approved technical specification number SATS 1286:2011 must be used to calculate local content.

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

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 **70** points.

The evaluation criteria for measuring functionality and the points for each criterion and, if any, each sub-criterion are as stated in C.3.11.3 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 virtual clarification meeting are as stated in the Tender Notice and Invitation to Tender
C.2.12	No alternative tender offers will be considered.
C.2.13.3	Parts of each tender offer communicated on paper shall be as an **original, one (1) copy** and **a clearly marked electronic version** (compact disc or memory stick) in the same format as the original submission which shall be in the **English Language.**
C.2.13.5 C2.15.1	The *Employer*'s details and address for delivery of tender offers and identification details that are to be shown on each tender offer package are: Location of tender box: TRANSNET NATIONAL PORTS AUTHORITY Physical address: Ground Floor Emendi Admin Building Port of Ngqura **GQEBERHA (PORT ELIZABETH)** 6100 Identification details: The tender documents must be submitted labelled with: ▪ Name of Tenderer: (insert company name) ▪ Contact person and details: (insert details) ▪ The Tender Number: **TNPA 920/CIDB** ▪ The Tender Description: **DETAILED DESIGN, MANUFACTURE, SUPPLY, DELIVERY AND INSTALLATION OF CAPSTANS THAT ARE**

HYDRAULICALLY DRIVEN AS WELL AS FINAL TESTING, COMMISSIONING AND HANDOVER TO THE EMPLOYER IN THE PORTS OF CAPE TOWN AND DURBAN.

Documents must be marked for the attention of:
***Employer*'s Agent: Deon Tobias**

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: **10:00am** on **11 January 2022** Location: **Transnet National Ports Authority** **Ground Floor, Emendi Admin Building, Port of Ngqura, GQEBERHA, 6100** **<u>NO LATE TENDERS WILL BE ACCEPTED</u>** **There will not be a Public Opening. The Tender Opening Register will be made available on request.**
C.2.16	The tender offer validity period is **12 weeks** after the closing date. Tenderers are to note that they may be requested to extend the validity period of their tender, on the same terms and conditions, if Transnet's internal evaluation and governance approval processes has not been finalised within the validity period.
C.2.23	The tenderer is required to submit with his tender: 1. A valid Tax Clearance Certificate issued by the South African Revenue Services. **<u>Tenderers also to provide Transnet with a TCS PIN to verify Tenderers compliance status</u>**. 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
C3.4	The time and location for opening of the offers are after the opening submissions at the venue as stated in C.2.15.
C3.11	The minimum number of evaluation points for functionality is: **70**

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:

(Please see CIDB Compiler guidance not T1.2 – Tender Data).

Note: Any tenderer not complying with the above-mentioned requirement, 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.

Criteria	Sub-Criteria	Criteria	Scoring	Criteria Matrix	Weighting Matrix	Weighting
Evaluation Schedule: T2.2-04: Track Record (Company)						**10**
"Previous service provider experience in similar works with: 1. Traceable records 2. Reference letters. 3. Contact information"	"Similar works of 1 or more projects with the following components: 1. Proven industrial design capability 2. Integrating electrical supply with hydraulic Systems. 3. Industrial gear design, maintenance of big spur gears & gear trains. 4. Heavy rotating equipment similar to capstans, winches, and/or winders"	1 or more projects with 3 of the listed components.	1 or more projects with all listed components.	100	100%	10
			1 or more projects with 3 of the listed components.	90		
			1 or more projects with 2 of the listed components.	70		
			1 or more projects with 1 of the listed components.	40		
			No similar projects submitted.	0		
Evaluation Schedule: T2.2-05: Track Record (Lead Resources)						**50**
Previous experience of proposed personnel (where applicable, Professional Registration documentation).	" 2 X Project Managers (PrCPM/SACPCMP) registered "	5-6 years of experience with 2-3 years after registration	**More than 10** years of experience with 5 years after registration	100	10%	5
			7 years and more but less than 10 years of experience with 3-5 years after registration	90		
			5 years and more but less than 7 years of experience with 2-3 years after registration	70		
			2 years and more but less than 5 years of experience with 1-2 years after registration	40		
			Less than 2 years of experience no registered registration	0		

	"2X Construction Project Manager (PrCPM/SACPCMP) registered."	5-6 years of experience with 2-3 years after registration	**More than 10** years of experience with 5 years after registration	100	20%	10
			7 years and more but less than 10 years of experience with 3-5 years after registration	90		
			5 years and more but less than 7 years of experience with 2-3 years after registration	70		
			2 years and more but less than 5 years of experience with 1-2 years after registration	40		
			Less than 2 years of experience not registered registration	0		
	"2X Mechanical Engineer ECSA (Pr Eng / Pr Tech Eng/Pr Cert Eng) registered.	5-6 years of experience with 2-3 years after registration	**More than 10** years of experience with 5 years after registration	100	10%	5
			7 years and more but less than 10 years of experience with 3-5 years after registration	90		
			5 years and more but less than 7 years of experience with 2-3 years after registration	70		
			2 years and more but less than 5 years of experience with 1-2 years after registration	40		
			Less than 2 years of experience not registered registration	0		
	"2X Civil Engineer or Civil Technologist ECSA (Pr Eng / Pr Tech Eng) registered."	5-6 years of experience with 2-3 years after registration	**More than 10** years of experience with 5 years after registration	100	10%	5
			7 years and more but less than 10 years of experience with 3-5 years after registration	90		
			5 years and more but less than 7 years of experience with 2-3 years after registration	70		
			2 years and more but less than 5 years of experience with 1-2 years after registration	40		
			Less than 2 years of experience not registered registration	0		
	"2X Electrical Engineer ECSA (Pr Eng / Pr Tech Eng/Pr Cert Eng) registered. "	5-6 years of experience with 2-3 years after registration	**More than 10** years of experience with 5 years after registration	100	10%	5
			7 years and more but less than 10 years of experience with 3-5 years after registration	90		
			5 years and more but less than 7 years of experience with 2-3 years after registration	70		
			2 years and more but less than 5 years of experience with 1-2 years after registration	40		
			Less than 2 years of experience not registered registration	0		
	" Number of Fitters with CVs (Heavy Industrial Equipment)"	8 or more Artisans with 3-5 years of experience after	**9 or more** Artisans with 5 years or more of experience after Dept. of Labour approved trade test	100	20%	10

		Dept. of Labour approved trade test	**5 or more, but less than 9 Artisans** with 5 years or more of experience after Dept. of Labour approved trade test	90		
			8 or more Artisans with 3-5 years of experience after Dept. of Labour approved trade test	70		
			5 or more, but less than 8 Artisans with 3-5 years of experience after Dept. of Labour approved trade test	40		
			Less than 5 Artisans or Non-submission	0		
	Number of Certified Electrician with CVs	8 or more Artisans with 3-5 years of experience after Dept. of Labour approved trade test	**9 or more** Artisans with 5 years or more of experience after Dept. of Labour approved trade test	100	10%	5
			5 or more, but less than 9 Artisans with 5 years or more of experience after Dept. of Labour approved trade test	90		
			8 or more Artisans with 3-5 years of experience after Dept. of Labour approved trade test	70		
			5 or more, but less than 8 Artisans with 3-5 years of experience after Dept. of Labour approved trade test	40		
			Less than 5 Artisans or Non-submission	0		
	2X Qualified Safety Officer registered with South African Institute of Occupational Safety and Health (SAIOSH or. SACPCMP)	5-6 years of experience with 2-3 years after registration	**More than 10 years** of experience with 5 years after registration	100	10%	5
			7 or more, but less than 10 years of experience with 3-5 years after registration	90		
			5 or more, but less than 7 years of experience with 2-3 years after registration	70		
			2 or more, but less than 5 years of experience with 1-2 years after registration	40		
			Less than 2 years of experience not registered registration	0		
Evaluation Schedule: **T2.2-06: Method Statement (Relevant to this Project)**						**20**
Service Provider's understanding of Scope of Work and ability to meet Employers requirements.	"Details of the technical methodology and construction sequence of activities (relative to the scope of work) addresses: - Project method statement proposal follows logical and sequential order in accordance with the submitted project schedule/programme. - Mobilisation Plan	Submission has addressed all requirements in detail and in compliance to scope of work.	Submission has addressed all requirements in detail and in compliance to scope of work and sub-criteria elements.	100	100%	20
			Submission has addressed requirements in detail and compliance to scope of work but missing one of the sub-criteria elements.	90		
			Submission has addressed requirements in detail and compliance to scope of work but missing two of the sub-criteria elements.	70		

	- Manufacture, Procure and installing Capstans in systems - Equipment installation plan. - Design methodology."		Submission has addressed requirements in detail and compliance to scope of work but missing three or more of the sub-criteria elements.	40		
			No submission.	0		
Evaluation Schedule: T2.2-07: Project Schedule						**10**
Ability to meet the required project schedule, understand the logic of the works and the resourcing of the submitted project schedule (aligned to activity).	Ability to execute the works in terms of the Employer's requirements, in a logical sequence, the order and timing of the construction that will take place in order to provide the works in a logical sequence. Submission addresses specific criteria in a acceptable manner. Dates when the Contractor will need access to any part of the Site, acceptances, plant and material, or works to be provided by the Employer. Starting Date, Key Dates, Planned Completion Date & Completion Date Provisions for Float and Risk Allowance.	Schedule Aligned to Submitted Method Statement	**Level 3 Schedule Aligned to Submitted Method Statement, criteria and sub criteria elements** (Level 3 Schedule is the most used in planning. Level of schedule is usually decomposed into Level 5. The intention of decomposing schedule level is to manage and control the project or task to the manageable level.)	100	100%	10
			Level 2 Schedule Aligned to Submitted method Statement, criteria and sub criteria elements (Level 2 Schedule is the area or system summary (roll up summary of level 3 schedule). It is also called major summary schedule. It is used to integrate into level 3 and level 4 schedules which involved detail tasks. It can be used to report the project area or trade progress status.)	90		
			Level 1 Schedule Aligned to Method Statement, criteria and sub criteria elements (Level 1 Schedule is the highest level, called overall project summary level. It includes major milestones or achievements, highlights major activities and key deliverables.)	70		
			Schedule not aligned to method statement, criteria and sub criteria elements	40		
			No Submission	**0**		
Evaluation Schedule: T2.2-08: SHERQ						**10**
Policies and procedures which ensure compliance with stated Employer's	Documented Integrated SHERQ Policy and the Procedure Documents.	Highly Detailed with all activities	Signed SHE Plan aligned to the submitted method statement with Risk Assessments and Environmental Management Plan all aligned to submitted Method Statement.	100%	100%	10

requirements specific for the project.			Signed SHE Plan aligned to the submitted method statement with either Risk Assessments or Environmental Management not submitted.	90%		
			Signed SHE Plan aligned to the submitted method statement with no Risk Assessments and Environmental Management Plan.	70%		
			Signed SHE Plan not aligned to the submitted method statement.	40%		
			No submission.	0		
Maximum possible score for quality (W_Q)						**100**

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

- T2.2-04 Contractor's Track Record (Previous Experience).
- T2.2-05 Project Organogram, Management & CVs of Key Persons.
- T2.2-06 Method Statement.
- T2.2-07 Project Schedule / Programme.
- T2.2-08 SHERQ

Each evaluation criteria will be assessed in terms of scores of 0, 40, 70, 90 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 90/10 preference points systems as described in Preferential Procurement Regulations 7.

90 where the financial value of one or more responsive tenders received have a value equal to or above 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 tenderer's 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).

T2.1 List of Returnable Documents

2.1.1 These schedules are required for pre-qualification and eligibility purposes:

T2.2-01 **Stage One as per CIDB: Eligibility Criteria Schedule -** CIDB Registration

T2.2-02 **Stage Two as per PPPFA: Pre-qualification Criteria Schedule -** Sub-Contract

T2.2-03 **Stage Three as per PPPFA: Eligibility Criteria Schedule -** Declaration Certificate of Local Production and Content (SBD 6.2)

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

T2.2-04 **Evaluation Schedule:** Contractor's Track Record (Previous experience)

T2.2-05 **Evaluation Schedule:** Project Organogram, Management & CV's

T2.2-06 **Evaluation Schedule:** Method Statement

T2.2-07 **Evaluation Schedule:** Project Schedule/ Programme

T2.2-08 **Evaluation Schedule :** SHERQ

2.1.3 Returnable Schedules:

General:

T2.2-09 Authority to submit tender

T2.2-10 Record of addenda to tender documents

T2.2-11 Letter of Good Standing

T2.2-12 Risk Elements

T2.2-13 Availability of equipment and other resources

T2.2-14 Site Establishment requirements

T2.2-15 Capacity and Ability to meet Delivery Schedule

T2.2-16 CIDB SFU ANNEX G Compulsory Enterprise Questionnaire

Agreement and Commitment by Tenderer:

T2.2-17 Non-Disclosure Agreement

T2.2-18 RFP Declaration Form

T2.2-19 RFP – Breach of Law

T2.2-20 Certificate of Acquaintance with Tender Document

T2.2-21 Service Provider Integrity Pact

T2.2-22 Supplier Code of Conduct

1.3.2 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

1.3.3 Transnet Vendor Registration Form:

T2.2-27 Supplier Declaration Form

1.3.4 Job Creation Schedule:

T2.2-28 Job Creation Schedule

1.3.5 The National Industrial Participation Programme:

T2.2-29 SBD 5: NIPP

1.3.5 Request for Site Inspection:

T2.2-30 Request for Site Inspection due to Covid-19 Disaster Management Regulations

1.3.6 Protection of Personal Information Act, 4 of 2013 ("POPIA")

T2.2-31 Agreement in terms of Protection of Personal Information Act, 4 of 2013 ("POPIA")

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

T2.2-01: 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 **9ME** 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 in an **8ME** 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 an **9ME** 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.

T2.2-02 Pre-qualification Criteria Schedule: Sub-Contract:

Tenderers are required to meet the pre-qualification criteria of Sub-contracting of **a minimum of 30%** to one or more company/ies that meets the requirements of **Regulation 4(1)(c)** of the **PPPFA Regulations 2017** as indicated hereto:

i. an EME or QSE which is at least 51% owned by black people;
ii. an EME or QSE which is at least 51% owned by black people who are youth;
iii. an EME or QSE which is at least 51% owned by black people who are women; or
iv. an EME or QSE which is at least 51% owned by black people with disabilities;
v. an EME or QSE which is 51% owned by black people living in rural or undeveloped areas or townships;
vi. a cooperative which is at least 51% owned by black people;
vii. an EME or QSE which is at least 51%owned by black people who are military veterans.

Tenderer to note that if successful, any deviations from the list of proposed sub-contractors in the contract phase will be subject to acceptance by the *Project Manager* in terms of the Conditions of Contract. Please also note the applicable Z clauses in Contract Data by *Employer*.

Provide **detailed information** of the proposed Sub-contractors below:

	Name of proposed Subcontractor	**Address and Region**	**Nature and extent of work**	**B-BBEEE Certificates or Sworn Affidavit attached behind this schedule? Yes/No**	**Percentage (%) of the sub-contracted works in terms of the tendered total of the prices.**
1.					
2.					
3.					
4.					

5.					
6.					
7.					
8.					
9.					
10.					

The Tenderer is to submit the following document or copy thereof for each of the proposed sub-contractor(s) with this schedule:

- Valid B-BBEE Sworn Affidavit or B-BBEE Certificate of each of the proposed sub-contractor(s).

NOTE TO TENDERERS: FAILURE TO PROVIDE THE ABOVE DOCUMENT WILL RESULT IN THE PROPOSED SUBCONTRACTOR'S PERCENTAGE BEING DISCOUNTED TO ZERO.

Transnet reserves the right to request additional information of the proposed sub-contractor(s) should it be deemed necessary to verify the compliance to the black ownership percentage or sub-contractor(s) entity size. These may include but not limited to;

- Agreement or Letter of Intent confirming the Sub-Contracting Agreement between the tenderer and proposed sub-contractor(s);
- Copies of the identity documents of the members of shareholders of the sub-contractor(s);
- Copies of the Audited Financial Statements or Income Statement of the sub-contractor(s).

SBD 6.2

T2.2-03: 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) 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
• Valve Products and Actuators	;	70%
• Electrical Cables;		90%

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 on the date of advertisement of the bid.

The relevant rates of exchange information is accessible on www.resbank.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.

ISSUED BY: TRANSNET NATIONAL PORTS AUTHORITY ON BEHALF OF TRANSNET SOC LTD
NB

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 **Valve Products and Actuators** Ex VAT	R
Imported content (x), as calculated in terms of SATS 1286:2011	R
Stipulated minimum threshold for local content (paragraph 3 above)	**70%**
Local content %, as calculated in terms of SATS 1286:2011	

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

Price of the Designated commodity ..... 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 ..... 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 ..... 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 ..... 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" WILL 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.

a) 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.

b) 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.

[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.

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.

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*.

Annex C – Local Content Declaration – Summary Schedule

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Local Content Declaration - Summary Schedule

(C1)	**Tender No.**	TNPA 920/CIDB
(C2)	**Tender description:**	
(C3)	**Designated product(s)**	
(C4)	**Tender Authority:**	
(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)*
Tender	**List of items**	**Tender**	**Exempted**	**Tender**	**Imported**	**Local**	**Local**	**Tender**	**Total tender**	**Total**	**Total**

item no's		price - each (Excl. VAT)	imported value	value-net of exempted imported content	value	value	content % (per item)	Qty	value	exempted imported content	Imported content
(C8)	*(C9)*	*(C10)*	*(C11)*	*(C12)*	*(C13)*	*(C14)*	*(C15)*	*(C16)*	*(C17)*	*(C18)*	*(C19)*

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

Signature of tenderer from Annex B

Date: _____

Annex D – Imported Content Declaration – Supporting Schedule to Annex C

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Annexure D – Imported Content Declaration - Supporting Schedule to Annex C

(D1)	**Tender No.**	TNPA 920/CIDB
(D2)	**Tender description:**	
(D3)	**Designated product(s)**	
(D4)	**Tender Authority:**	
(D5)	**Tendering Entity name:**	
(D6)	**Tender Exchange Rate:**	Pula [ ] EU [ ] GBP [ ]

Note: VAT to be excluded from all calculations

A. Exempted imported content

Tender item no's	Description of imported content	Local supplier	Overseas Supplier	Foreign 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	Total tender value
				Calculation of imported content						**Summary**	
(D7)	*(D8)*	*(D9)*	*(D10)*	*(D11)*	*(D12)*	*(D13)*	*(D14)*	*(D15)*	*(D16)*	*(D17)*	*(D18)*
									(D19) Total exempt imported value		**R**

This total must correspond with Annex C – C21

B. Imported directly by the Tenderer

Calculation of imported content										Summary	
Tender item no's	**Description of imported content**	**Unit of measure**	**Overseas Supplier**	**Foreign 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**

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

Calculation of imported content										Summary	
Description of imported content	**Unit of measure**	**Local supplier**	**Overseas Supplier**	**Foreign 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**	**Qty Imported**	**Total imported value**
(D33)	*(D34)*	*(D35)*	*(D36)*	*(D37)*	*(D38)*	*(D39)*	*(D40)*	*(D41)*	*(D42)*	*(D43)*	*(D44)*
									(D45) Total imported value by 3rd party		**R**

D. Other foreign currency payments

Calculation of foreign currency payments					Summary of payments
Type of payment	**Local supplier making the payment**	**Overseas beneficiary**	**Foreign currency value paid**	**Tender Rate of Exchange**	**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

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

Date: _____

Annex E – Local Content Declaration – Supporting Schedule to Annex C

SATS 1286.2011

Annex E

Local Content Declaration - Supporting Schedule to Annex C

(E1)	**Tender No.**	
(E2)	**Tender description:**	
(E3)	**Designated products:**	
(E4)	**Tender Authority:**	
(E5)	**Tendering Entity name:**	

Note: VAT to be excluded from all calculations

Local Products (Goods, Services and Works)	Description of items purchased	Local suppliers	Value
	(E6)	*(E7)*	*(E8)*
(E9) **Total local products (Goods, Services and Works)**			R 0

(E10)	**Manpower costs**	(Tenderer's manpower cost)	R 0
(E11)	**Factory overheads**	(Rental, depreciation & amortisation, utility costs, consumables	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:

T2.2-04: Evaluation Schedule: Contractor's Track Record (Previous Experience)

Note to tenderers:

The tenderer must provide traceable record in similar projects proven design capability integrating electrical supply with hydraulic power packs. Gear design, Maintenance of big spur gears and gear trains, Heavy rotating equipment similar to capstans, winches, and/or winders:

- A list of past / current comparable projects.
- Sufficient references to substantiate experience indicated (Client name and contact details, project description, year of project completion, duration, contract value and subcontractors)

Index of documentation attached to this schedule

	DOCUMENT NAME
1	
2	
3	
4	
5	
6	
7	
8	
9	

Fill in as many line items as needed for the similar previous projects undertaken, starting from the most recent projects completed:

Client	Client Contact details	Project Description	Year of contract completion	Contract Value	Subcontractors

Criteria	Sub-Criteria	Criteria	Scoring	Criteria Matrix	Weighting Matrix	Weighting
Evaluation Schedule: **T2.2-04: Track Record (Company)**						**10**
"Previous service provider experience in similar works with: 1. Traceable records 2. Reference letters. 3. Contact information"	"Similar works of 1 or more projects with the following components: 1. Proven industrial design capability 2. Integrating electrical supply with hydraulic Systems. 3. Industrial gear design, maintenance of big spur gears & gear trains. 4. Heavy rotating equipment similar to capstans, winches, and/or winders"	1 or more projects with 3 of the listed components.	1 or more projects with all listed components.	100	100%	10
			1 or more projects with 3 of the listed components.	90		
			1 or more projects with 2 of the listed components.	70		
			1 or more projects with 1 of the listed components.	40		
			No similar projects submitted.	0		

T2.2-05: Evaluation Schedule: Project Organogram, Management & CV's

Submit the following documents as a minimum with your tender document:

1. A comprehensive and detailed **organogram** that shows the structure and composition of their management structure involved in the *works*, inclusive of the key staff/professionals, identified in the Contract Data Part two.

2. Detailed CV's providing the following:

    - The roles and responsibilities for the *works* of each resource should be clearly stated.
    - Detailed experience in this specific activity (design or construction) and positions held, such as recent assignments inclusive of total duration that has a bearing on the scope of work.
    - The education, training (*inter alia* NEC3) and skills of the assigned staff in the specific sector, field, subject, etc. which is directly linked to the *works*. Qualifications (degrees, diplomas, grades) and membership of professional societies and relevant professional registrations to be attached.

3. CV's for personnel for all identified posts should include as a minimum but not limited to:

    - Project Managers x 2;
    - Construction Project Managers x 2
    - Mechanical Engineers x 2
    - Civil Engineers/ Civil Technologist x 2;
    - Electrical Engineers x 2;
    - Fitters;
    - Certified Electricians;
    - Qualified Safety Officers x 2

    The following table is to be populated by the tenderer identifying the resources for the key roles for the *works*. Attached submissions to this returnable.

Key Person Role	**Name of Resource**
Project Managers	1.
	2.
Construction Project Managers	1.
	2.
Mechanical Engineers	1.
	2.
Civil Engineers/ Civil Technologist	1.
	2.
Electrical Engineers x 2;	1.
	2.
Qualified Safety Officers x 2	1.
	2.
Fitters;	

Key Person Role	Name of Resource
Certified Electricians;	

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

Criteria	Sub-Criteria	Criteria	Scoring	Criteria Matrix	Weighting Matrix	Weighting
Evaluation Schedule: **T2.2-05: Track Record (Lead Resources)**						**50**
Previous experience of proposed personnel (where applicable, Professional Registration documentation).	" 2 X Project Managers (PrCPM/SACPCMP) registered "	5-6 years of experience with 2-3 years after registration	**More than 10** years of experience with 5 years after registration	100	10%	5
			7 years and more but less than 10 years of experience with 3-5 years after registration	90		
			5 years and more but less than 7 years of experience with 2-3 years after registration	70		
			2 years and more but less than 5 years of experience with 1-2 years after registration	40		
			Less than 2 years of experience no registered registration	0		
	"2X Construction Project Manager (PrCPM/SACPCMP) registered."	5-6 years of experience with 2-3 years after registration	**More than 10** years of experience with 5 years after registration	100	20%	10
			7 years and more but less than 10 years of experience with 3-5 years after registration	90		
			5 years and more but less than 7 years of experience with 2-3 years after registration	70		
			2 years and more but less than 5 years of experience with 1-2 years after registration	40		
			Less than 2 years of experience not registered registration	0		

Criteria	Sub-Criteria	Criteria	Scoring	Criteria Matrix	Weighting Matrix	Weighting
	"2X Mechanical Engineer ECSA (Pr Eng / Pr Tech Eng/Pr Cert Eng) registered.	5-6 years of experience with 2-3 years after registration	**More than 10** years of experience with 5 years after registration	100	10%	5
			7 years and more but less than 10 years of experience with 3-5 years after registration	90		
			5 years and more but less than 7 years of experience with 2-3 years after registration	70		
			2 years and more but less than 5 years of experience with 1-2 years after registration	40		
			Less than 2 years of experience not registered registration	0		
	"2X Civil Engineer or Civil Technologist ECSA (Pr Eng / Pr Tech Eng) registered."	5-6 years of experience with 2-3 years after registration	**More than 10** years of experience with 5 years after registration	100	10%	5
			7 years and more but less than 10 years of experience with 3-5 years after registration	90		
			5 years and more but less than 7 years of experience with 2-3 years after registration	70		
			2 years and more but less than 5 years of experience with 1-2 years after registration	40		
			Less than 2 years of experience not registered registration	0		
	"2X Electrical Engineer ECSA (Pr Eng / Pr Tech Eng/Pr Cert Eng) registered.	5-6 years of experience with 2-3 years after registration	**More than 10** years of experience with 5 years after registration	100	10%	5
			7 years and more but less than 10 years of experience with 3-5 years after registration	90		

Criteria	Sub-Criteria	Criteria	Scoring	Criteria Matrix	Weighting Matrix	Weighting
	"		**5 years and more but less than 7 years** of experience with 2-3 years after registration	70		
			2 years and more but less than 5 years of experience with 1-2 years after registration	40		
			Less than 2 years of experience not registered registration	0		
	" Number of Fitters with CVs (Heavy Industrial Equipment)"	8 or more Artisans with 3-5 years of experience after Dept. of Labour approved trade test	**9 or more** Artisans with 5 years or more of experience after Dept. of Labour approved trade test	100	20%	10
			5 or more, but less than 9 Artisans with 5 years or more of experience after Dept. of Labour approved trade test	90		
			8 or more Artisans with 3-5 years of experience after Dept. of Labour approved trade test	70		
			5 or more, but less than 8 Artisans with 3-5 years of experience after Dept. of Labour approved trade test	40		
			Less than 5 Artisans or Non-submission	0		
	Number of Certified Electrician with CVs	8 or more Artisans with 3-5 years of experience after Dept. of Labour approved trade test	**9 or more** Artisans with 5 years or more of experience after Dept. of Labour approved trade test	100	10%	5
			5 or more, but less than 9 Artisans with 5 years or more of experience after Dept. of Labour approved trade test	90		
			8 or more Artisans with 3-5 years of experience after Dept. of Labour approved trade test	70		

Criteria	Sub-Criteria	Criteria	Scoring	Criteria Matrix	Weighting Matrix	Weighting
			5 or more, but less than 8 Artisans with 3-5 years of experience after Dept. of Labour approved trade test	40		
			Less than 5 Artisans or Non-submission	0		
	2X Qualified Safety Officer registered with South African Institute of Occupational Safety and Health (SAIOSH or. SACPCMP)	5-6 years of experience with 2-3 years after registration	**More than 10 years** of experience with 5 years after registration	100	10%	5
			7 or more, but less than 10 years of experience with 3-5 years after registration	90		
			5 or more, but less than 7 years of experience with 2-3 years after registration	70		
			2 or more, but less than 5 years of experience with 1-2 years after registration	40		
			Less than 2 years of experience not registered registration	0		

T2.2-06: Evaluation Schedule: Method Statement

Note to tenderers:

Method statement - The tenderers must submit an approach paper which responds to the scope of work and outlines proposed approach / methodology including that relating but not limited to programme, method statement, technical approach and an understanding of the project objective.

The approach paper should articulate what the Tenderer will provide in achieving the stated objectives for the project and demonstrate alignment to Programme as contained under T2.2-07. Tenderers to also exhibit a clear understanding of the project and has shown a concise method statement for all activities incorporating best practice.

The Tenderer must as such explain his / her understanding of the objectives of the works and the Employer's stated and implied requirements, highlight the issues of importance, and explain the technical approach they would adopt to address them. The approach paper should explain the methodologies which are to be adopted and demonstrate its compatibility. The approach should also include and outline processes, procedures and associated resources, to meet the requirements and indicate how risks will be managed.

The Approach Paper should cover:

- Outline of proposed approach
- Narrative related to the programme
- Detailed method statement, technical approach and construction sequencing in terms of the Works Information (design philosophy)
- Demonstrate an understanding of the project objectives
- Detailed list of equipment and number thereof to execute the works, and areas it will be utilised

A detailed method statement is required to narratively demonstrate the tenderer's approach to the project and how the work will be executed with focus to minimise impact on operations. (to enable the Employer to assess the impact to practicality, quality, health, safety, risk and the environment).

In addition to general methodology for the project, the tenderer must demonstrate the following aspects but not limited to:

- Order and timing of the audits, inspection and milestones, for both the design and construction aspects, that will take place in order to provide the *Works*.
- Indication of how the above will be achieved in terms of the associated policies and procedures, and relevant specification described in the tender
- Testing of material during construction
- How Health, Safety and Environmental issues will be taken into consideration during execution of the works.

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

Criteria	Sub-Criteria	Criteria	Scoring	Criteria Matrix	Weighting Matrix	Weighting
Evaluation Schedule: **T2.2-06: Method Statement (Relevant to this Project)**						**20**
Service Provider's understanding of Scope of Work and ability to meet Employers requirements.	"Details of the technical methodology and construction sequence of activities (relative to the scope of work) addresses: - Project method statement proposal follows logical and sequential order in accordance with the submitted project schedule/programme. - Mobilisation Plan - Manufacture, Procure and installing Capstans in systems - Equipment installation plan. - Design methodology."	Submission has addressed all requirements in detail and in compliance to scope of work.	Submission has addressed all requirements in detail and in compliance to scope of work and sub-criteria elements.	100	100%	20
			Submission has addressed requirements in detail and compliance to scope of work but missing one of the sub-criteria elements.	90		
			Submission has addressed requirements in detail and compliance to scope of work but missing two of the sub-criteria elements.	70		
			Submission has addressed requirements in detail and compliance to scope of work but missing three or more of the sub-criteria elements.	40		
			No submission.	0		

T2.2-07: Evaluation Schedule: Schedule / Programme

Note to tenderers:

The Tenderer details the programme for evaluation and attaches it to this schedule. In addition, the Tenderer is to provide an electronic copy of the programme in Primavera or Microsoft Projects.

The Tenderer's attention is drawn to core clause 31 of the NEC3 Engineering and Construction contract regarding the items to be shown on a programme.

The tenderer shall provide the proposed programme, at a minimum **Level 3** showing but not limited to the following:

- Ability to execute the works in terms of the *Employer*'s requirements and within the required timeframe indicating, in a logical sequence, the order and timing of the construction that will take place in order to Provide the Works clearly indicating the capacity & capability to achieve the dates stated in the Contract Data.
- Dates when the *Contractor* will need access to any part of the Sites; submission & approval process & timing for Health & Safety Files, Environmental Files and Quality Files. In addition, the Programme must clearly demonstrate the procurement process for all long lead items if applicable.
- The *Contractor* indicates how he plans in achieving the following dates and clearly demonstrates them on the schedule - Start Date, Access Date, Planned Completion, Key Dates/Sectional Completion Dates & Completion Date. In addition, the Programme clearly demonstrates adequate provisions for Time Risk Allowance (TRA). Time Risk Allowances are not float, are owned by the Tenderer, can be included in the activity duration and illustrated in the schedule in a code field or as an attachment.
- Schedule showing Starting and Completion as listed in contract data Part One - "Data provided by the Employer" and are logically linked to activities in the schedule and to be driven by activities.
- All activities to be logically tied using a clearly defined critical path method (CPM).
- All activity durations to be realistic and based on quantities and activities that can be measured in days. The calendar on the schedule should represent the actual work week/month used. e.g. weekends and public holidays as non-working periods.
- Linkages
- Provisions for:

  - Float;

  - Time Risk allowances;

  - Health and Safety requirements; and

  - Quality requirements,

Procedures set out in this contract,

- The Tenderer to clearly indicate the key milestones for all the activities.
- Resource loaded schedule, clearly outlining how the tenderer plans to provide the Works.
- The level of detail on the schedule should include, but not limited to, Key Milestones, Procurement Activities, Vendor Designs, Manufacturing, Delivery, Pre-Construction Activities, Construction, Pre-Commissioning, Commissioning and Close Out activities.
- The Tenderer to submit a schedule narrative (basis of schedule) which explains the schedule development, exclusions and assumptions applied on the schedule. This should include the basis used on production rates applied on the schedule.
- The Programme must clearly support and demonstrate alignment to the Approach Paper/Method Statement as contained in T2.1 List of Returnables.

Criteria	Sub-Criteria	Criteria	Scoring	Criteria Matrix	Weighting Matrix	Weighting
Evaluation Schedule: **T2.2-07: Project Schedule**						**10**
Ability to meet the required project schedule, understand the logic of the works and the resourcing of the submitted project schedule (aligned to activity).	Ability to execute the works in terms of the Employer's requirements, in a logical sequence, the order and timing of the construction that will take place in order to provide the works in a logical sequence. Submission addresses specific criteria in a acceptable manner. Dates when the Contractor will need access to any part of the Site, acceptances, plant and material, or works to be provided by the Employer. Starting Date, Key Dates, Planned Completion Date & Completion Date Provisions for Float and Risk Allowance.	Schedule Aligned to Submitted Method Statement	**Level 3 Schedule Aligned to Submitted Method Statement, criteria and sub criteria elements** (Level 3 Schedule is the most used in planning. Level of schedule is usually decomposed into Level 5. The intention of decomposing schedule level is to manage and control the project or task to the manageable level.)	100	100%	10
			Level 2 Schedule Aligned to Submitted method Statement, criteria and sub criteria elements (Level 2 Schedule is the area or system summary (roll up summary of level 3 schedule). It is also called major summary schedule. It is used to integrate into level 3 and level 4 schedules which involved detail tasks. It can be used to report the project area or trade progress status.)	90		
			Level 1 Schedule Aligned to Method Statement, criteria and sub criteria elements (Level 1 Schedule is the highest level, called overall project summary level. It includes major milestones or achievements, highlights major activities and key deliverables.)	70		
			Schedule not aligned to method statement, criteria and sub criteria elements	40		

Criteria	Sub-Criteria	Criteria	Scoring	Criteria Matrix	Weighting Matrix	Weighting
			No Submission	**0**		

Attachment A: Electronic Copy of Programme

Attachment B: Hard Copy of Programme

T2.2-08: SHERQ

Note to tenderers:

Due consideration must be given to the deliverables required to execute and complete the contract as per the Quality Management Standard stated in the Works Information and should include but not be limited to:

1. Quality Management Questionnaire
2. Project Quality Plan for the contract.
3. The Consultant's Quality Policy.
4. Index of procedures to be used during the contract.
5. Audit Schedule for internal and external audits during the contract.
6. ISO 9001:2000 certification.
7. Typical Quality Manual.
8. Typical Quality Control Plan (QCP)
9. Quality Management Representative C.V.
10. Schedule/List of QCP's
11. Typical data book/pack index.

The scoring of the Tenderer's Environmental Management submission will be as follows:

Criteria	Sub-Criteria	Criteria	Scoring	Criteria Matrix	Weighting Matrix	Weighting
Evaluation Schedule: T2.2-08: SHERQ						**10**
Policies and procedures which ensure compliance with stated Employer's requirements specific for the project.	Documented Integrated SHERQ Policy and the Procedure Documents.	Highly Detailed with all activities	Signed SHE Plan aligned to the submitted method statement with Risk Assessments and Environmental Management Plan all aligned to submitted Method Statement.	100%	100%	10
			Signed SHE Plan aligned to the submitted method statement with either Risk Assessments or Environmental Management not submitted.	90%		
			Signed SHE Plan aligned to the submitted method statement with no Risk Assessments and Environmental Management Plan.	70%		
			Signed SHE Plan not aligned to the submitted method statement.	40%		
			No submission.	0		

T2.2-09: 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

T2.2-10: 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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14		
15		

T2.2-11 Letter/s of Good Standing with the Workmen's Compensation Fund

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

1.

2.

3.

4.

5.

Name of Company/Members of Joint Venture:

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

T2.2-12: 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.

T2.2-13: 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

T2.2-14: Site Establishment Requirements

Tenderers to indicate their Site establishment area requirements:

T2.2-15: 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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.....
.....
.....
.....
.....
.....

T2.2-16 : 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.
Section 9: The attached SBD8 must be completed for each tender and be attached as a requirement.
Section 10: The attached SBD9 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 4

DECLARATION OF INTEREST

1. Any legal person, including persons employed by the state[1], or persons having a kinship with persons employed by the state, including a blood relationship, may make an offer or offers in terms of this invitation to bid (includes a price quotation, advertised competitive bid, limited bid or proposal). In view of possible allegations of favouritism, should the resulting bid, or part thereof, be awarded to persons employed by the state, or to persons connected with or related to them, it is required that the bidder or his/her authorised representative declare his/her position in relation to the evaluating/ adjudicating authority where-

   - the bidder is employed by the state; and/or

   - the legal person on whose behalf the bidding document is signed, has a relationship with persons/a person who are/is involved in the evaluation and or adjudication of the bid(s), or where it is known that such a relationship exists between the person or persons for or on whose behalf the declarant acts and persons who are involved with the evaluation and or adjudication of the bid.

[1] "State" means –

a) any national or provincial department, national or provincial public entity or constitutional institution within the meaning of the Public Finance Management Act, 1999 (Act No. 1 of 1999); any municipality or municipal entity;
b) provincial legislature;
c) national Assembly or the national Council of provinces; or
d) Parliament.

SBD 4

2. **In order to give effect to the above, the following questionnaire must be completed and submitted with the bid.**

2.1 Full Name of bidder or his or her representative: _____

_____

2.2 Identity Number: _____

2.3 Position occupied in the Company (director, trustee, shareholder[2]):

_____

2.4 Company Registration Number: _____

2.5 Tax Reference Number: _____

2.6 VAT Registration Number: _____

2.6.1 The names of all directors / trustees / shareholders / members, their individual identity numbers, tax reference numbers and, if applicable, employee / personnel numbers must be indicated in paragraph 3 below.

2.7 Are you or any person connected with the bidder presently employed by the state?

YES / NO

2.7.1 If so, furnish the following particulars:

- Name of person / director / trustee / shareholder/ member:

  _____

- Name of state institution at which you or the person connected to the bidder is employed:

  _____

- Position occupied in the state institution:

  _____

  Any other particulars:

  _____

  _____

[2] "Shareholder" means a person who owns shares in the company and is actively involved in the management of the enterprise or business and exercises control over the enterprise.

SBD 4

2.7.2 If you are presently employed by the state, did you obtain the appropriate authority to undertake remunerative work outside employment in the public sector?

YES / NO

2.7.3 If yes, did you attached proof of such authority to the bid document?

YES / NO

Note: Failure to submit proof of such authority, where applicable, may result in the disqualification of the bid.

2.7.3.1 If no, furnish reasons for non-submission of such proof:

_____

_____

_____

2.8 Did you or your spouse, or any of the company's directors / trustees / shareholders / members or their spouses conduct business with the state in the previous twelve months?

YES / NO

2.8.1 If so, furnish particulars:

_____

_____

_____

2.9 Do you, or any person connected with the bidder, have any relationship (family, friend, other) with a person employed by the state and who may be involved with the evaluation and or adjudication of this bid?

YES / NO

2.8.2 If so, furnish particulars.

_____

_____

_____

SBD 4

2.9 Are you, or any person connected with the bidder, aware of any relationship (family, friend, other) between any other bidder and any person employed by the state who may be involved with the evaluation and or adjudication of this bid?

YES/NO

2.9.1 If so, furnish particulars**.**

_____

_____

_____

2.10 Do you or any of the directors / trustees / shareholders / members of the company have any interest in any other related companies whether or not they are bidding for this contract?

YES/NO

2.10.1 If so, furnish particulars:

_____

_____

_____

SBD 4

3 Full details of directors / trustees / members / shareholders.

Full Name	Identity Number	Personal Tax Reference Number	State Employee Number / Persal Number

SBD 4

4 DECLARATION

I, THE UNDERSIGNED (NAME) _____ CERTIFY THAT THE INFORMATION FURNISHED IN PARAGRAPHS 2 and 3 ABOVE IS CORRECT.

I ACCEPT THAT THE STATE MAY REJECT THE BID OR ACT AGAINST ME IN TERMS OF PARAGRAPH 23 OF THE GENERAL CONDITIONS OF CONTRACT SHOULD THIS DECLARATION PROVE TO BE FALSE.

_____	_____
Signature	Date
_____	_____
Position	Name of bidder

SBD 6.1

PREFERENCE POINTS CLAIM FORM IN TERMS OF THE PREFERENTIAL PROCUREMENT REGULATIONS 2017

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).

NB: BEFORE COMPLETING THIS FORM, BIDDERS MUST STUDY THE GENERAL CONDITIONS, DEFINITIONS AND DIRECTIVES APPLICABLE IN RESPECT OF B-BBEE, AS PRESCRIBED IN THE PREFERENTIAL PROCUREMENT REGULATIONS, 2017.

---

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 exceed/not exceed **[Delete what is not applicable]** R50 000 000 (all applicable taxes included) and therefore the ..... 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.

OR

Either the 80/20 or 90/10 preference point system will apply **[This clause is to be used where it is unclear as to which preference point system will be applicable – lowest acceptable bid will determine the preference point system. Delete if not applicable]**

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	**80/20**
B-BBEE STATUS LEVEL OF CONTRIBUTION	**90/10**
Total points for Price and B-BBEE must not exceed	**100**

1.5 Failure on the part of a bidder to submit proof of 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 OR 90/10 PREFERENCE POINT SYSTEMS

A maximum of 80 or 90 points is allocated for price on the following basis:

80/20 or 90/10

$$Ps = 80\left(1 - \frac{Pt - P\min}{P\min}\right) \quad \text{or} \quad Ps = 90\left(1 - \frac{Pt - P\min}{P\min}\right)$$

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 In terms of Regulation 6 (2) and 7 (2) of the Preferential Procurement Regulations, 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 (90/10 system)	Number of points (80/20 system)
1	10	20
2	9	18
3	6	14
4	5	12
5	4	8
6	3	6
7	2	4
8	1	2
Non-compliant contributor	0	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[3]	Sworn Affidavit signed by the authorised EME representative and attested by a Commissioner of Oaths confirming annual turnover and black ownership Certificate issued by CIPC (formerly CIPRO) confirming annual turnover and black ownership Certificate issued by SANAS accredited verification agency only if the EME is being measured on the QSE scorecard

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

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

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

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

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

5. BID DECLARATION

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

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

[3] 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.

6.1 B-BBEE Status Level of Contribution: . = ……(maximum of 10 or 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	

v) Specify, by ticking the appropriate box, if subcontracting with an enterprise in terms of Preferential Procurement Regulations,2017:

	Designated Group: An EME or QSE which is at last 51% owned by:	EME √	QSE √
	Black people		
	Black people who are youth		
	Black people who are women		
	Black people with disabilities		
	Black people living in rural or underdeveloped areas or townships		
	Cooperative owned by black people		
	Black people who are military veterans		
	OR		
	Any EME		
	Any QSE		

8. DECLARATION WITH REGARD TO COMPANY/FIRM

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

8.2 VAT registration number:.....

8.3 Company registration number:.....

8.4 TYPE OF COMPANY/ FIRM

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

[TICK APPLICABLE BOX]

8.5 DESCRIBE PRINCIPAL BUSINESS ACTIVITIES

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

8.6 COMPANY CLASSIFICATION

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

[*TICK APPLICABLE BOX*]

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

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

i) The information furnished is true and correct;

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

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

iv) If a bidder submitted false information regarding its B-BBEE status level of contributor, local production and content, or any other matter required in terms of the Preferential Procurement Regulations, 2017 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: ……..

SBD 8

DECLARATION OF BIDDER'S PAST SUPPLY CHAIN MANAGEMENT PRACTICES

1. This Standard Bidding Document must form part of all bids invited.

2. It serves as a declaration to be used by institutions in ensuring that when goods and services are being procured, all reasonable steps are taken to combat the abuse of the supply chain management system.

3. The bid of any bidder may be disregarded if that bidder, or any of its directors have-

   a. abused the institution's supply chain management system;

   b. committed fraud or any other improper conduct in relation to such system; or

   c. failed to perform on any previous contract.

4. **In order to give effect to the above, the following questionnaire must be completed and submitted with the bid.**

Item	Question	Yes	No
4.1	Is the bidder or any of its directors listed on the National Treasury's database as companies or persons prohibited from doing business with the public sector? **(Companies or persons who are listed on this database were informed in writing of this restriction by the National Treasury after the *audi alteram partem* rule was applied).**	Yes ☐	No ☐
4.1.1	If so, furnish particulars:		
4.2	Is the bidder or any of its directors listed on the Register for Tender Defaulters in terms of section 29 of the Prevention and Combating of Corrupt Activities Act (No 12 of 2004)? **To access this Register enter the National Treasury's website, www.treasury.gov.za, click on the icon "Register for Tender Defaulters" or submit your written request for a hard copy of the Register to facsimile number (012) 3265445.**	Yes ☐	No ☐

4.2.1	If so, furnish particulars:		
4.3	Was the bidder or any of its directors convicted by a court of law (including a court outside of the Republic of South Africa) for fraud or corruption during the past five years?	Yes ☐	No ☐
4.3.1	If so, furnish particulars:		
4.4	Was any contract between the bidder and any organ of state terminated during the past five years on account of failure to perform on or comply with the contract?	Yes ☐	No ☐
4.4.1	If so, furnish particulars:		

SBD 8

CERTIFICATION

I, THE UNDERSIGNED (FULL NAME)..... CERTIFY THAT THE INFORMATION FURNISHED ON THIS DECLARATION FORM IS TRUE AND CORRECT.

I ACCEPT THAT, IN ADDITION TO CANCELLATION OF A CONTRACT, ACTION MAY BE TAKEN AGAINST ME SHOULD THIS DECLARATION PROVE TO BE FALSE.

Signature	Date
Position	Name of Tenderer

SBD 9

CERTIFICATE OF INDEPENDENT BID DETERMINATION

1. This Standard Bidding Document (SBD) must form part of all bids/quotes[4] invited.

2. Section 4 (1) (b) (iii) of the Competition Act No. 89 of 1998, as amended, prohibits an agreement between, or concerted practice by, firms, or a decision by an association of firms, if it is between parties in a horizontal relationship and if it involves collusive bidding (or bid rigging).[5] Collusive bidding is a *pe se* prohibition meaning that it cannot be justified under any grounds.

3. Treasury Regulation 16A9 prescribes that accounting officers and accounting authorities must take all reasonable steps to prevent abuse of the supply chain management system and authorizes accounting officers and accounting authorities to:

   (a) disregard the bid of any bidder if that bidder, or any of its directors have abused the institution's supply chain management system and or committed fraud or any other improper conduct in relation to such system.

   (b) cancel a contract awarded to a supplier of goods and services if the supplier committed any corrupt or fraudulent act during the bidding process or the execution of that contract.

4. This SBD serves as a certificate of declaration that would be used by institutions to ensure that, when bids are considered, reasonable steps are taken to prevent any form of bid-rigging.

5. In order to give effect to the above, the attached Certificate of Bid Determination (SBD 9) must be completed and submitted with the bid:

[4] Includes price quotations, advertised competitive bids, limited bids and proposals.

[5] Bid rigging (or collusive bidding) occurs when businesses, that would otherwise be expected to compete, secretly conspire to raise prices or lower the quality of goods and / or services for purchasers who wish to acquire goods and / or services through a bidding process. Bid rigging is, therefore, an agreement between competitors not to compete.

SBD 9

CERTIFICATE OF INDEPENDENT QUOTATION/PROPOSAL DETERMINATION

I, the undersigned, in submitting the accompanying quote:

_____

(Quote Number and Description)

in response to the invitation for the quote made by:

_____

(Name of Institution)

do hereby make the following statements that I certify to be true and complete in every respect:

I certify, on behalf of: _____ that:

(Name of Bidder)

1. I have read and I understand the contents of this Certificate;
2. I understand that the accompanying bid will be disqualified if this Certificate is found not to be true and complete in every respect;
3. I am authorized by the bidder to sign this Certificate, and to submit the accompanying bid, on behalf of the bidder;
4. Each person whose signature appears on the accompanying bid has been authorized by the bidder to determine the terms of, and to sign the bid, on behalf of the bidder;
5. For the purposes of this Certificate and the accompanying bid, I understand that the word "competitor" shall include any individual or organization, other than the bidder, whether or not affiliated with the bidder, who:
   (a) has been requested to submit a bid in response to this bid invitation;
   (b) could potentially submit a bid in response to this bid invitation, based on their qualifications, abilities or experience; and
   (c) provides the same goods and services as the bidder and/or is in the same line of business as the bidder

SBD 9

6. 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 consortium[6] will not be construed as collusive bidding.

7. In particular, without limiting the generality of paragraphs 6 above, there has been no consultation, communication, agreement or arrangement with any competitor regarding:

   (a) prices;

   (b) geographical area where product or service 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 bid;

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

   (f) bidding with the intention not to win the bid.

8. 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 products or services to which this bid invitation relates.

9. 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.

[6] 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.

10. 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.

Signature	Date
Position	Name of bidder

T2.2-17 NON-DISCLOSURE AGREEMENT

[AUGUST 2020]

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

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

TRANSNET SOC LTD

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

and

.....

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

.....

.....

WHEREAS

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

IT IS HEREBY AGREED

1. INTERPRETATION

In this Agreement:

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

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

1.3 **Confidential Information** means any information or other data relating to one party [the **Disclosing Party**] and/or the business carried on or proposed or intended to be carried on by that party and which is made available for the purposes of the Bid to the other party [the **Receiving Party**] or its Agents by the Disclosing Party or its Agents or recorded in agreed minutes following oral disclosure and any other information otherwise made available by the Disclosing Party or its Agents to the Receiving Party or its Agents, whether before, on or after the date of this Agreement, and whether in writing or otherwise, including any information, analysis or specifications derived from, containing or reflecting such information but excluding information which:

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

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

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

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

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

2. CONFIDENTIAL INFORMATION

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

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

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

2.3.1 to those of its Agents who strictly need to know the Confidential Information for the sole purpose set out in clause 2.2 above, provided that the Receiving Party shall ensure that such Agents are made aware prior to the disclosure of any part of the Confidential Information that the same is confidential and that they owe a duty of confidence to the Disclosing Party. The Receiving Party shall at all times remain liable for any actions of such Agents that would constitute a breach of this Agreement; or

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

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

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

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

3. RECORDS AND RETURN OF INFORMATION

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

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

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

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

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

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

4. ANNOUNCEMENTS

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

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

5. DURATION

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

6. PRINCIPAL

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

7. ADEQUACY OF DAMAGES

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

8. PRIVACY AND DATA PROTECTION

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

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

9. GENERAL

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

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

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

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

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

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

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

T2.2-18: 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 T2.2-23 "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.

T2.2-19: 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

T2.2-20 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

T2.2-21 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 ……..

T2.2-22 : 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

T2.2-23: 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 R5 000 000.			
Insurance in respect of loss of or damage to own property and equipment.			
Marine Craft Hull insurance in respect of all marine craft or vessels utilised in performance of the Works for a sum sufficient to provide for their replacement Protection and Indemnity Insurance in			
respect of all marine craft or vessels utilised in performance of the Works extended for Specialist Operations with a minimum indemnity limit of R 20,000,000			
(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:

……

……

……

……

……

……

……

T2.2-27 SUPPLIER DECLARATION FORM

Transnet Vendor Management has received a request to load / change your company details onto the Transnet vendor master database. Please return the completed Supplier Declaration Form (SDF) together with the required supporting documents as per Appendix A to the Transnet Official who is intending to procure your company's services / products, to enable us to process this request. Please only submit the documentation relevant to your request.

Please Note: all organisations, institutions and individuals who wish to provide goods and/or services to organs of the State must be registered on the National Treasury's Central Supplier Database (CSD). This needs to be done via their portal at https://secure.csd.gov.za/ **before applying to Transnet**.

General Terms and Conditions:

Please Note: Failure to submit the relevant documentation will delay the vendor creation / change process.

Where applicable, the respective Transnet Operating Division processing your application may request further or additional information from your company.

The Service Provider warrants that the details of its bank account ("the nominated account") provided herein, are correct and acknowledges that payments due to the Supplier will be made into the nominated account. If details of the nominated account should change, the Service Provider must notify Transnet in writing of such change, failing which any payments made by Transnet into the nominated account will constitute a full discharge of the indebtedness of Transnet to the Supplier in respect of the payment so made. Transnet will incur no liability for any payments made to the incorrect account or any costs associated therewith. In such an event, the Service Provider indemnifies and holds Transnet harmless in respect of any payments made to an incorrect bank account and will, on demand, pay Transnet any costs associated herewith.

Transnet expects its suppliers to timeously renew their Tax Clearance and B-BBEE certificates (Large Enterprises and QSEs less than 51% black owned) as well as sworn affidavits in the case of EMEs and QSEs with more than 51% black ownership as per Appendices C and D.

In addition, please take note of the following very important information:

1. **If your annual turnover is R10 million or less,** then in terms of the DTI Generic Codes of Good Practice, you are classified as an Exempted Micro Enterprise (EME). If your company is classified as an EME, please include in your submission a sworn affidavit confirming your company's most recent annual turnover is less than R10 million and percentage of black ownership and black female ownership in the company (Appendix C) OR B-BBEE certificate issued by a verification agency accredited by SANAS in terms of the EME scorecard should you feel you will be able to attain a better B-BBEE score. It is only in this context that an EME may submit a B-BBEE verification certificate. These EME sworn affidavits must be accepted by the . Government introduced this mechanism specifically to reduce the cost of doing business and regulatory burden for these entities and the template for the sworn affidavit is available at no cost on the website www.thedti.gov.za or EME certificates at CIPC from www.cipic.co.za.

The B-BBEE Commission said "that only time an EME can be verified by a SANAS accredited verification professional is when it wishes to maximise its B-BBEE points and move to a higher B-BBEEE recognition level, and that must be done use the QSE Scorecard".

2. **If your annual turnover is between R10 million and R50 million,** then in terms of the DTI codes, you are classified as a Qualifying Small Enterprise (QSE). A QSE which is at least 51% black owned, is required to submit a sworn affidavit confirming their annual total revenue of between R10 million and R50 million and level of black ownership (Appendix D). QSE 'that does not qualify for 51% of black ownership, are required to submit a B-BBEE verification certificate issued by a verification agency accredited by SANAS their QSEs are required to submit a B-BBEE verification certificate issued by a verification agency accredited by SANAS.

Please Note: B-BBEE certificate and detailed scorecard should be obtained from an accredited rating agency (e.g. SANAS Member).

3. **If your annual turnover exceeds R50 million,** then in terms of the DTI codes, you are classified as a Large Enterprise. Large Enterprises are required to submit a B-BBEE level verification certificate issued by a verification agency accredited by SANAS.

Please Note: B-BBEE certificate and detailed scorecard should be obtained from an accredited rating agency (e.g. SANAS Member).

4. **The supplier to furnish proof to the procurement department as required in the Fourth Schedule of the Income Tax Act. 58 of 1962** whether a supplier of service is to be classified as an "employee", "personal service provider" or "labour broker". Failure to do so will result in the supplier being subject to employee's tax.

5. **No payments can be made to a vendor until the** vendor has been registered / updated, and no vendor can be registered / updated until the vendor application form, together with its supporting documentation, has been received and processed**.** No payments can be made to a vendor until the vendor has met / comply with the procurement requirements.

6. It is in line with PPPFA Regulations, only valid B-BBBEE status level certificate issued by an unauthorised body or person OR a sworn affidavit as prescribed by the B-BBEE Codes of Good Practice, OR any other requirement prescribed in terms of the Broad- Based Black Economic Empowerment Act.

7. The B-BBEE Commission advises entities and organs of state to reject B-BBEE certificates that have been issues by verification agencies or professionals who are not accredited by South African National Accreditation Systems ("SANAS) as such B-BBEE certificates are invalid for lack of authority and mandate to issue them. A list of SANAS Accredited agencies is available on the SANAS website at www.sanas.co.za.

8. Presenting banking details. Please note: Banks have decided to enable the customers and provide the ability for customers to generate Account Confirmation/Bank Account letters via their online platform; this is a digital approach to the authentication of banking details.

SUPPLIER DECLARATION FORM

Supplier Declaration Form

Important Notice: all organisations, institutions and individuals who wish to provide goods and/or services to organs of the State must be registered on the National Treasury Central Supplier Database (CSD). This needs to be done via their portal at https://secure.csd.gov.za/ **before applying to Transnet**.	
CSD Number (MAAA xxxxxxx):	

Company Trading Name						
Company Registered Name						
Company Registration No Or ID No If a Sole Proprietor						
Company Income Tax Number						
Form of Entity	CC	Trust	Pty Ltd	Limited	Partnership	Sole Proprietor
	Non-profit (NPO's or NPC)	Personal Liability Co	State Owned Co	National Govt	Provincial Govt	Local Govt
	Education al Institution	Specialise d Profession	Financial Institution	Joint Venture	Foreign International	Foreign Branch Office

Did your company previously operate under another name?	Yes		No	
If **YES** state the previous details below:				
Trading Name				
Registered Name				
Company Registration No Or ID No If a Sole Proprietor				

Form of Entity	CC	Trust	Pty Ltd	Limited	Partnership	Sole Proprietor
	Non-profit (NPO's or NPC)	Personal Liability Co	State Owned Co	National Govt	Provincial Govt	Local Govt
	Education al Institution	Specialise d Profession	Financial Institution	Joint Venture	Foreign International	Foreign Branch Office

Your Current Company's VAT Registration Status	
VAT Registration Number	
If **Exempted from VAT registration,** state reason and submit proof from SARS in confirming the exemption status	

If your business entity is not VAT Registered, please submit a current original sworn affidavit (see example in Appendix I). Your Non VAT Registration must be confirmed annually.

Company Banking Details		Bank Name	
Universal Branch Code		Bank Account Number	

Company Physical Address			
		Code	
Company Postal Address			
		Code	
Company Telephone number			
Company Fax Number			
Company E-Mail Address			
Company Website Address			

Company Contact Person Name	
Designation	
Telephone	
Email	

Is your company a Labour Broker?			Yes		No			
Main Product / Service Supplied e.g. Stationery / Consulting / Labour etc.								
How many personnel does the business employ?	Full Time		Part Time					
Please Note: Should your business employ more than 2 full time employees who are not connected persons as defined in the Income Tax Act, please submit a sworn affidavit, as per Appendix II.								

Most recent Financial Year's Annual Turnover	<R10Million **EME**		>R10Million <R50Million **QSE**		>R50Million **Large Enterprise**	

Does your company have a valid proof of B-BBEE status?					Yes		No		
Please indicate your Broad Based BEE status (Level 1 to 9)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Majority Race of Ownership									

% Black Ownership		% Black Women Ownership		% Black Disabled person(s) Ownership		% Black Youth Ownership	
% Black Unemployed		% Black People Living in Rural Areas		% Black Military Veterans			

Please Note: Please provide proof of B-BBEE status as per Appendix C and D:

- Large Enterprise and QSEs with less than 51% black ownership need to obtain a B-BBEE certificate and detailed scorecard from an accredited rating agency;
- EMEs and QSEs with at least 51% black ownership may provide an affidavit using the templates provided in Appendix C and D respectively;
- Black Disabled person(s) ownership will only be accepted if accompanied with a certified letter signed by a physician on the physician's letterhead confirming the disability;
- A certified South African identification document will be required for all Black Youth Ownership.

Supplier Development Information Required	
EMPOWERING SUPPLIER An Empowering Supplier is a B-BBEE compliant Entity which complies with at least three criteria if it is a large Entity, or one criterion if it is a Qualifying Small Enterprise ("QSE"), as detailed in Statement 400 of the New Codes. In terms of the requirements of an Empowering Supplier, numerous companies found it challenging to meet the target of 25% transformation of raw materials or beneficiation including local manufacturing, particularly so, if these companies imported goods or products from offshore. The matter was further compounded by the requirement for 25% of Cost of Sales, excluding labour cost and depreciation, to be procured from local producers or suppliers.	YES ○ NO ○
FIRST TIME SUPPLIER A supplier that we haven't as yet Traded within Transnet and will be registered via our database for the 1st time.	YES ○ NO ○
SUPPLIER DEVELOPMENT PLAN Supplier Development Plan is a plan that when we as Transnet award a supplier a long term contract depending on the complexity of the Transaction. We will negotiate supplier development obligations that they must meet throughout the contract duration. e.g. we might request that they (create jobs or do skills development or encourage procurement from designated groups. (BWO, BYO & BDO etc.).	YES ○ NO ○
DEVELOPMENT PLAN DOCUMENT Agreed plan that will be crafted with the supplier in regards to their development (It could be for ED OR SD in terms of their developmental needs they may require with the company.	YES ○ NO ○ *If Yes- Attach supporting documents
ENTERPRISE DEVELOPMENT BENEFICIARY	YES ○ NO ○

A supplier that is not as yet in our value chain that we are assisting in their developmental area.	
SUPPLIER DEVELOPMENT BENEFICIARY A supplier that we are already doing business with or transacting with and we are also assisting them assisting them in their developmental area e.g. (They might require training or financial assistance etc.)	YES ○ NO ○
GRADUATION FROM ED TO SD BENEFICIARY When a supplier that we assisted with as an ED beneficiary then gets awarded a business and we start Transacting with.	YES ○ NO ○
ENTERPRISE DEVELOPMENT RECIPIENT A supplier that isn't in our value chain as yet but we have assisted them with an ED intervention	YES ○ NO ○

By signing below, I hereby verify that I am duly authorised to sign for and on behalf of firm / organisation and that all information contained herein and attached herewith are true and correct			
Name and Surname		Designation	
Signature		Date	

APPENDIX B

Affidavit or Solemn Declaration as to VAT registration status

Affidavit or Solemn Declaration

I, _____ solemnly swear/declare that _____ is not a registered VAT vendor and is not required to register as a VAT vendor because the combined value of taxable supplies made by the provider in any 12 month period has not exceeded or is not expected to exceed R1million threshold, as required in terms of the Value Added Tax Act.

Signature: _____

Designation: _____

Date: _____

Commissioner of Oaths

Thus signed and sworn to before me at _____ on this the _____ day of _____ 20_____,

the Deponent having knowledge that he/she knows and understands the contents of this Affidavit, and that he/she has no objection to taking the prescribed oath, which he/she regards binding on his/her conscience and that the allegations herein contained are all true and correct.

_____
Commissioner of Oaths

APPENDIX C

SWORN AFFIDAVIT – B-BBEE QUALIFYING SMALL ENTERPRISE – GENERAL

I, the undersigned,

Full name & Surname	
Identity number	

Hereby declare under oath as follows:

1. The contents of this statement are to the best of my knowledge a true reflection of the facts.

2. I am a Member / Director / Owner of the following enterprise and am duly authorised to act on its behalf:

Enterprise Name:	
Trading Name (If Applicable):	
Registration Number:	
Enterprise Physical Address:	
Type of Entity (CC, (Pty) Ltd, Sole Prop etc.):	
Nature of Business:	
Definition of "Black People"	As per the Broad-Based Black Economic Empowerment Act 53 of 2003 as Amended by Act No 46 of 2013 "Black People" is a generic term which means Africans, Coloureds and Indians – (a) who are citizens of the Republic of South Africa by birth or descent; or (b) who became citizens of the Republic of South Africa by naturalisationi- i. before 27 April 1994; or ii. on or after 27 April 1994 and who would have been entitled to acquire citizenship by naturalization prior to that date;"

Definition of "Black Designated Groups"	Black Designated Groups means: (a) unemployed black people not attending and not required by law to attend an educational institution and not awaiting admission to an educational institution; (b) Black people who are youth as defined in the National Youth Commission Act of 1996; (c) Black people who are persons with disabilities as defined in the Code of Good Practice on employment of people with disabilities issued under the Employment Equity Act; (d) Black people living in rural and under developed areas; (e) Black military veterans who qualifies to be called a military veteran in terms of the Military Veterans Act 18 of 2011;"

3. I hereby declare under Oath that:

- The Enterprise is _____% Black Owned as per Amended Code Series 100 of the Amended Codes of Good Practice issued under section 9 (1) of B-BBEE Act No 53 of 2003 as Amended by Act No 46 of 2013,
- The Enterprise is _____% Black Female Owned as per Amended Code Series 100 of the Amended Codes of Good Practice issued under section 9 (1) of B-BBEE Act No 53 of 2003 as Amended by Act No 46 of 2013,
- The Enterprise is _____% Black Designated Group Owned as per Amended Code Series 100 of the Amended Codes of Good Practice issued under section 9 (1) of B-BBEE Act No 53 of 2003 as Amended by Act No 46 of 2013,

- Black Designated Group Owned % Breakdown as per the definition stated above:
- Black Youth % = _____%
- Black Disabled % =_____%
- Black Unemployed % =_____%
- Black People living in Rural areas % = _____%
- Black Military Veterans % =_____%

- Based on the Financial Statements/Management Accounts and other information available on

the latest financial year-end of _____, the annual Total Revenue was between

R10,000,000.00 (Ten Million Rands) and R50,000,000.00 (Fifty Million Rands),

- Please confirm on the table below the B-BBEE level contributor, **by ticking the applicable box.**

100% Black Owned	**Level One** (135% B-BBEE procurement recognition level)	
At Least 51% black owned	**Level Two** (125% B-BBEE procurement recognition level)	

4. I know and understand the contents of this affidavit and I have no objection to take the prescribed oath and consider the oath binding on my conscience and on the owners of the enterprise which I represent in this matter.

5. The sworn affidavit will be valid for a period of 12 months from the date signed by commissioner.

Deponent Signature

.....

Date **.....**

_____

Commissioner of Oaths
Signature & stamp

APPENDIX D

SWORN AFFIDAVIT – B-BBEE EXEMPTED MICRO ENTERPRISE – GENERAL

I, the undersigned,

Full name & Surname	
Identity number	

Hereby declare under oath as follows:

1. The contents of this statement are to the best of my knowledge a true reflection of the facts.

2. I am a Member / Director / Owner of the following enterprise and am duly authorised to act on its behalf:

Enterprise Name:	
Trading Name (If Applicable):	
Registration Number:	
Enterprise Physical Address:	
Type of Entity (CC, (Pty) Ltd, Sole Prop etc.):	
Nature of Business:	

Definition of "Black People"	As per the Broad-Based Black Economic Empowerment Act 53 of 2003 as Amended by Act No 46 of 2013 "Black People" is a generic term which means Africans, Coloureds and Indians – (a) who are citizens of the Republic of South Africa by birth or descent; or (b) who became citizens of the Republic of South Africa by naturalisationi- i. before 27 April 1994; or ii. on or after 27 April 1994 and who would have been entitled to acquire citizenship by naturalization prior to that date;"
Definition of "Black Designated Groups"	"Black Designated Groups means: (a) unemployed black people not attending and not required by law to attend an educational institution and not awaiting admission to an educational institution; (b) Black people who are youth as defined in the National Youth Commission Act of 1996; (c) Black people who are persons with disabilities as defined in the Code of Good Practice on employment of people with disabilities issued under the Employment Equity Act; (d) Black people living in rural and under developed areas; (e) Black military veterans who qualifies to be called a military veteran in terms of the Military Veterans Act 18 of 2011;"

3. I hereby declare under Oath that:

- The Enterprise is _____% Black Owned as per Amended Code Series 100 of the Amended Codes of Good Practice issued under section 9 (1) of B-BBEE Act No 53 of 2003 as Amended by Act No 46 of 2013,
- The Enterprise is _____% Black Female Owned as per Amended Code Series 100 of the Amended Codes of Good Practice issued under section 9 (1) of B-BBEE Act No 53 of 2003 as Amended by Act No 46 of 2013,
- The Enterprise is _____% Black Designated Group Owned as per Amended Code Series 100 of the Amended Codes of Good Practice issued under section 9 (1) of B-BBEE Act No 53 of 2003 as Amended by Act No 46 of 2013,

- Black Designated Group Owned % Breakdown as per the definition stated above:
- Black Youth % = _____%
- Black Disabled % =_____%
- Black Unemployed % =_____%
- Black People living in Rural areas % = _____%
- Black Military Veterans % =_____%

- Based on the Financial Statements/Management Accounts and other information available on the latest financial year-end of _____, the annual Total Revenue was R10,000,000.00 (Ten Million Rands) or less

- Please Confirm on the below table the B-BBEE Level Contributor, **by ticking the applicable box.**

100% Black Owned	**Level One** (135% B-BBEE procurement recognition	
At least 51% Black Owned	**Level Two** (125% B-BBEE procurement recognition level)	
Less than 51% Black Owned	**Level Four** (100% B-BBEE procurement recognition level)	

4. I know and understand the contents of this affidavit and I have no objection to take the prescribed oath and consider the oath binding on my conscience and on the Owners of the Enterprise which I represent in this matter.

5. The sworn affidavit will be valid for a period of 12 months from the date signed by commissioner.

Deponent Signature

.....

Date **.....**

_____

Commissioner of Oaths

Signature & stamp

VENDOR REGISTRATION DOCUMENTS CHECKLIST

Please note that you will have to provide the first two documents on the list (highlighted in red) and the rest will be provided by the supplier:

	Yes	No
1. Complete the "Supplier Declaration Form" (SDF) (commissioned). See attachment.		
2. Complete the "Supplier Code of Conduct" (SCC). See attachment.		
3. Copy of cancelled cheque OR letter from the bank verifying banking details (with **bank stamp not older than 3 Months & sign by Bank Teller**).		
4. Certified (**Not Older than 3 Months**) copy of Identity document of Shareholders/Directors/Members (where applicable).		
5. Certified copy of certificate of incorporation, CM29 / CM9 (name change).		
6. Certified copy of share Certificates of Shareholders, CK1 / CK2 (if CC).		
7. A letter with the company's letterhead confirming both **Physical** and **Postal** address.		
8. Original or certified copy of SARS Tax Clearance certificate and Vat registration certificate.		
9. BBBEE certificate and detailed scorecard from a **SANAS** Accredited Verification Agency and/or Sworn Certified Affidavit.		
10. Central Supplier Database (CSD) Summary Registration Report.		

T2.2-28: JOB-CREATION SCHEDULE

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

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

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

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

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

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

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

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

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

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

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

Year 2	Q1	Q2	Q3	Q4
Total number of new jobs				
Number of new jobs for Black men				
Number of new jobs for black women				
Number of new jobs for black youth				
Number of new jobs for black people living in rural or underdeveloped areas or townships				
Number of new jobs for black People with Disabilities				
Number of new jobs for other categories				
Number of new skilled jobs				
Number of new semi-skilled jobs				
Number of new unskilled jobs				

T2.2-29: SBD 5: THE NATIONAL INDUSTRIAL PARTICIPATION PROGRAMME

This document must be signed and submitted together with your bid

THE NATIONAL INDUSTRIAL PARTICIPATION PROGRAMME

INTRODUCTION

The National Industrial Participation Programme (NIPP), which is applicable to all government procurement contracts that have an imported content, became effective on the 1 September 1996. The NIP policy and guidelines were fully endorsed by Cabinet on 30 April 1997. In terms of the Cabinet decision, all state and parastatal purchases / lease contracts (for goods, works and services) entered into after this date, are subject to the NIPP requirements. NIPP is obligatory and therefore must be complied with. The Industrial Participation Secretariat (IPS) of the Department of Trade and Industry (DTI) is charged with the responsibility of administering the programme.

1. PILLARS OF THE PROGRAMME

1.1 The NIPP obligation is benchmarked on the imported content of the contract. Any contract having an imported content equal to or exceeding US$5 million or other currency equivalent to US$5 million will have a NIP obligation. This threshold of US$5 million can be reached as follows:

(a) Any single contract with imported content exceeding US$5 million.

or

(b) Multiple contracts for the same goods, works or services each with imported content exceeding US$3 million awarded to one seller over a 2 year period which in total exceeds US$5 million.

or

(c) A contract with a renewable option clause, where should the option be exercised the total value of the imported content will exceed US$5 million.

or

(d) Multiple suppliers of the same goods, works or services under the same contract, where the value of the imported content of each allocation is equal to or exceeds US$ 3 million worth of goods, works or services to the same government institution, which in total over a two (2) year period exceeds US$5 million.

1.2 The NIP obligation applicable to suppliers in respect of sub-paragraphs 1.1 (a) to 1.1 (c) above will amount to 30% of the imported content whilst suppliers in respect of paragraph 1.1 (d) shall incur 30% of the total NIPP obligation on a *pro-rata* basis.

1.3 To satisfy the NIPP obligation, the DTI would negotiate and conclude agreements such as investments, joint ventures, sub-contracting, licensee production, export promotion, sourcing arrangements and research and development (R&D) with partners or suppliers.

1.4 A period of seven years has been identified as the time frame within which to discharge the obligation.

2. REQUIREMENTS OF THE DEPARTMENT OF TRADE AND INDUSTRY

2.1 In order to ensure effective implementation of the programme, successful bidders (contractors) are required to, immediately after the award of a contract that is in excess of **R10 million** (ten million Rands), submit details of such a contract to the DTI for reporting purposes.

2.2 The purpose for reporting details of contracts in excess of the amount of R10 million (ten million Rands) is to cater for multiple contracts for the same goods, works or services; renewable contracts and multiple suppliers for the same goods, works or services under the same contract as provided for in paragraphs 1.1.(b) to 1.1. (d) above.

3. BID SUBMISSION AND CONTRACT REPORTING REQUIREMENTS OF BIDDERS AND SUCCESSFUL BIDDERS (CONTRACTORS)

3.1 Bidders are required to sign and submit this Standard Bidding Document (SBD 5) together with their bid documentation at the closing date and time of the bid.

3.2 In order to accommodate multiple contracts for the same goods, works or services; renewable contracts and multiple suppliers for the same goods, works or services under the same contract as indicated in sub-paragraphs 1.1 (b) to 1.1 (d) above and to enable the DTI in determining the NIPP obligation, successful bidders (contractors) are required, immediately after being officially notified about any successful bid with a value in excess of R10 million (ten million Rands), to contact and furnish the DTI with the following information:

- Bid number;
- Description of the goods or services;
- Date on which the contract was awarded;
- Name, address and contact details of the contractor;
- Value of the contract; and
- Imported content of the contract, if possible.

3.3 The information required in paragraph 3.2 above must be sent to the Department of Trade and Industry, Private Bag X 84, Pretoria, 0001 for the attention of Mr Elias Malapane within five (5) working days after award of the contract. Mr Malapane may be contacted on telephone (012) 394 1401, facsimile (012) 394 2401 or e-mail at Elias@thedti.gov.za for further details about the programme.

4. PROCESS TO SATISFY THE NIPP OBLIGATION

4.1 Once the successful bidder (contractor) has made contact with and furnished the DTI with the information required, the following steps will be followed:

a. the contractor and the DTI will determine the NIPP obligation;
b. the contractor and the DTI will sign the NIPP obligation agreement;
c. the contractor will submit a performance guarantee to the DTI;
d. the contractor will submit a business concept for consideration and approval by the DTI;
e. upon approval of the business concept by the DTI, the contractor will submit detailed business plans outlining the business concepts;
f. the contractor will implement the business plans; and
g. the contractor will submit bi-annual progress reports on approved plans to the DTI.

4.2 The NIPP obligation agreement is between the DTI and the successful bidder (contractor) and, therefore, does not involve the purchasing institution.

Bid number …….. Closing date: ……
Name of bidder……
Postal address ……
……
Signature…….. Name (in print)……..
Date……..

T2.2-30: Request for Site Inspection due to Covid-19 Disaster Management Regulations.

To be returned by the tenderer to the Employer's Agent

Email to: Attention: **Qetelo Mpanza**

Email: **Qetelo.Mpanza@transnet.net**

Site visits/walks would be conducted between 10:00 and 15:00) as follows:

- **PORT OF CAPE TOWN – Monday, December 06, 2021 to Wednesday, December 08; and**
- **PORT OF DURBAN – Thursday & Friday, December 09 & 10, 2021.**

Tenderer Company/Proposed JV: .....

Contact: .....

Phone No: .....

e-mail Address: .....

I/We ..... hereby confirm that for the purposes of submitting a tender offer a site inspection are hereby requested.

NB: Should the tenderer not return this document to inform Transnet by Wednesday, December 01, 2021 that they wish to carry out a site inspection, the opportunity will be forfeited.

Signature: _____

Date: _____

T2.2-31 Agreement in terms of Protection of Personal Information Act, 4 of 2013 ("POPIA")

1. PREAMBLE AND INTRODUCTION

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

2. PROTECTION OF PERSONAL INFORMATION

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

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

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

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

2.3. The Parties acknowledge and agree that, in relation to personal information of Transnet and the information of a third party that will be processed pursuant to this Agreement , the Operator is _____ (... insert name of Tenderer) 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: _____

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:

Detailed design, manufacture, supply, delivery and installation of Capstans that are hydraulically driven as well as final testing, commissioning and handover to the Employer in the Ports of Cape Town and Durban.

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 Agreements and Contract Data, (which includes this Form of Offer and Acceptance)	
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		

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

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

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

C1.2 Contract Data

Part one - Data provided by the *Employer*

Clause	Statement	Data
1	**General**	
	The *conditions of contract* are the core clauses and the clauses for main Option	
		B: Priced contract with bill of quantities
	dispute resolution Option	**W1: Dispute resolution procedure**
	and secondary Options	
		X1 Price adjustment for inflation
		X2 Changes in the law
		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**
	Having elected its Contractual Address for the purposes of this contract as:	**Transnet National Ports Authority, a division of Transnet SOC Ltd** **Ocean Terminal Building** **Quayside Road** **PORT OF DURBAN** **4001**
10.1	The *Project Manager* is: (Name)	**Menzi Ngcobo**
	Address	**Office 114** **Ocean Terminal Building** **Quayside Road** **PORT OF DURBAN** **4001**
	Tel	**031 361 3895**
	e-mail	**Menzi.Ngcobo@transnet.net**
10.1	The *Supervisor* is: (Name)	**TBA**
	Address	
	Tel No.	
	e-mail	
11.2(13)	The *works* are	**Detailed design, manufacture, supply, delivery and installation of Capstans that are hydraulically driven as well as final testing, commissioning and handover to the Employer in the Ports of Cape Town and Durban.**

11.2(14)	The following matters will be included in the Risk Register	**a) Working in a fully operational area** **b) Lifting of heavy materials and equipment in a confined operational area.** **c) Working too close to operational machinery.**	
11.2(15)	The *boundaries of the site* are	**Surrounding working areas inside Dry Dock precinct**	
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	**15 April 2023**	
11.2(9)	The *key date*s and the *condition*s to be met are:	***Condition* to be met**	***key date***
30.1	The *access dates* are	**Part of the Site**	**Date**
		1 Port of Cape Town	**1 March 2022**
		2 Port of Durban	**1 March 2022**
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	**1 March 2022**	
32.2	The *Contractor* submits revised programmes at intervals no longer than	**4 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**
	except that the defect correction period for and related to the disruption of services, such as water, sanitation, electricity, telecommunications and other essential services for the operation of the Port.	**24 (twenty-four) hours**
5	**Payment**	
50.1	The *assessment interval* is monthly on the	**10th (tenth) 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 areas. (Ports of Port Cape Town and Durban)**
	The *weather data* are the records of past *weather measurements* for each calendar month which were recorded at:	**Cape Town/ 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	
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 **Protection and Indemnity Insurance in respect of all marine craft or vessels utilised in performance of the Works extended for Specialist Operations with a minimum indemnity limit of R 20,000,000**

6 **The insurance coverage referred to in 1, 2, 3, 4, and 5 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.**
84.3	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 OR Project Specific Insurance 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**			
X1	**Price adjustment for inflation**			
X1.1(a)	The *base date* for indices is	**September 2021**		
X1.1(c)	The proportions used to calculate the Price Adjustment Factor are:	**Proportion**	**linked to index for**	**Index prepared by**
		0.14	**Preliminary & General (P&G's)**	**STATISTICAL RELEASE P0151.1, Construction Material price Indices, Table 4 – Mining and construction plant and equipment price index, published by STATISTICS SOUTH AFRICA.**
		0.46	**Mechanical scope**	**STATISTICAL RELEASE P0151.1, Construction Material price Indices, Table 5 – Mechanical and electrical engineering input price index, published by STATISTICS SOUTH AFRICA.**

	0.34	**Electrical Scope**	**STATISTICAL RELEASE P0151.1, Construction Material price Indices, Table 5 – Mechanical and electrical engineering input price index, published by STATISTICS SOUTH AFRICA.**
	0.06	**Civil Scope**	**STATISTICAL RELEASE P0151.1, Construction Material price Indices, Table 6 – Civil Engineering material price index, published by STATISTICS SOUTH AFRICA.**
	1.00		

X2	**Changes in the law**	**No additional data is required for this Option**
X7	**Delay damages**	
X7.1	Delay damages for Completion of the whole of the *works* are	**R80 000.00 per day capped at 10% of the contract value per port.**
X13	**Performance bond**	
X13.1	The amount of the performance bond is	**5% of the total of the Prices**
X16	**Retention**	
X16.1	The retention free amount is	**Nil**
	The retention percentage is	**10% 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 (this is the default position depending on a risk assessment; therefore, this can go up to Total of the Prices)**
X18.2	For any one event, the *Contractor's* liability to the *Employer* for loss of or damage to the *Employer's* property is limited to:	**The deductible of the relevant insurance policy**
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**
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:	**The Total of the Prices**
X18.5	The *end of liability date* is	**5 years after Completion of the whole of the *works***

Z	***Additional conditions of contract* are*:***	
Z.1	**Obligations in respect of Subcontracting**	
Z1.1		**It will be a material term of this contract that the *Contractor* must subcontract a minimum of 30% of the value of the contract.**
Z1.2		**The *Contractor's* Subcontracting percentage as detailed in the tender submission Returnable T2.2-02 will constitute a binding agreement throughout the duration of the contract until Completion, if not, it will be deemed that the *Contractor* has failed in full to meet the material term of the contract, which may constitute a reason for termination.**

Z1.3	**The *Contractor* shall report to the *Employer* on a monthly basis during the term of the Contract, the amounts spent on each sub-contractor.**
Z1.4	**Insert addition to Clause 26.2. The *Contractor* may not replace any sub-contractor without acceptance of the *Project Manager. The Project Manager* shall before acceptance of a replacement by the *Contractor* of any sub-contractor as detailed in the tender submission Returnable T2.2-02 obtain representations or input from the initial sub-contractor to make an informed decision as to the proposed replacement. The sub-contracting arrangement/contract remains between the *Contractor* and sub-contractor.**
Z1.5	**The *Contractor* shall provide to the *Employer*, upon receiving an instruction to do so, any documentation and/or evidence required by the *Employer*, which in the *Employer*'s opinion would be necessary to verify whether the *Contractor* has maintained the subcontracting percentage. The *Contractor* shall provide the said documentation and/or evidence within the period stated in the instruction. The provision of the documentation and/or evidence shall not constitute a compensation event.**

Z2	**Local Production and Content Obligations**

Z2.1	**In terms of Local Production and Content (SBD 6.2), Annexure A and Annexure C of the Returnable Schedule T2.2-03 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. Valve products and actuators; and 2. Electrical cables;**
Z2.2	**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.**
Z2.3	**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.** **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.**
Z2.4	**The *Contractor* must refer to Schedule A attached to the Returnable Schedule T2.2-03 Eligibility Criteria Schedule: Declaration Certificate of Local Production and Content concerning non-compliance penalties applicable to Local Production and Content.**
Z2.5	**Breach of Local Production and Content commitments provides the *Employer* cause to terminate the contract.**

Z3	**Obligations in respect of Job Creation**	
Z3.1		**It will be a material term of this contract that the *Contractor* must contribute to the *Employer's* job-creation objectives as set out in Returnable Schedule T2.2-28.**
Z3.2		**The *Contractor's* undertaking as to the number of new jobs created due to the award of this contract as set out in Returnable Schedule T.2.2-28 will constitute a binding agreement throughout the duration of the contract until Completion, if not, it will be deemed that the *Contractor* has failed in full to meet this specific material term of the contract, which may constitute a reason for termination..**
Z3.3		**The *Contractor* shall provide to the *Employer*, on a monthly basis or upon receiving an instruction to do so by the *Project Manager*, any documentation and/or evidence required by the *Employer*, which in the *Employer*'s opinion would be necessary to verify whether the *Contractor* has maintained the job-creation undertaking as stipulated in Returnable Schedule T.2.2-28. The *Contractor* shall provide the said documentation and/or evidence within the period stated or as instructed. The provision of the documentation and/or evidence shall not constitute a compensation event.**

Z4	**Additional clause relating to Performance Bonds and/or Guarantees**	
Z4.1		**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.***

Z5 Additional clauses relating to Joint Venture

Z5.1 **Insert the additional core clause 27.5**

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.

Z5.2		**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.***
Z6	**Additional obligations in respect of Termination**	
Z6.1		**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)**

Z6.2	**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"**
Z6.3		**Amend "R1 – R15 or R18" to "R1 – R15, R18, R22 or R23."**
Z7	**Right Reserved by the *Employer* to Conduct Vetting through SSA**	
Z7.1		**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.**
Z8	**Additional Clause Relating to Collusion in the Construction Industry**	
Z8.1		**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.**

Z9	**Protection of Personal Information Act**	
Z9.1		**The *Employer* and the *Contractor* are required to process information obtained for the duration of the Agreement in a manner that is aligned to the Protection of Personal Information Act.**

C1.2 Contract Data

Part two - Data provided by the *Contractor*

The tendering *Contractor* is advised to read both the NEC3 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 .		
11.2(14)	The following matters will be included in the Risk Register			
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			
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.*		
		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			
	The percentage for adjustment for Equipment in the published list is	**%** (state plus or minus)		
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

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
C/o Transnet National Ports Authority
Transnet Corporate Centre
Waterfall Business Estate
9 Country Estate Drive
Midrand

Date:

Dear Sirs,

Performance Bond for Contract No. TNPA 920

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 Excursion 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)		

Willis Towers Watson

To Whom It May Concern,

CERTIFICATE OF INSURANCE: TRANSNET (SOC) LIMITED – PRINCIPAL CONTROLLED INSURANCE

In our capacity as Insurance Brokers to the Transnet Group of Companies, we hereby certify that the undermentioned insurances are currently in place:

INSURED:	Transnet (SOC) Limited
PERIOD:	1 April 2020 to 31 March 2021 (Both days inclusive)
DIVISION:	Transnet Group Capital, Transnet Freight Rail, Transnet Engineering, Transnet Properties, Transnet Pipelines, Transnet National Ports Authority and Transnet Port Terminals
THE INSURED'S VAT NO:	4720103177
THE INSURED'S COMPANY REGISTRATION NO:	1990/000900/30
POSTAL ADDRESS (Head Office)	P O Box 72501, Parkview, 2122

CONTRACT WORKS INSURANCE

Cover Provided : `	Contract Works - Physical loss or damage to the Property Insured which being materials, plant and other things for incorporation into the permanent works.
Insurer :	Mirabilis (Santam Limited)
Policy Number :	MZAR35023-CAR
The Contract Site :	Any location within the Territorial Limits upon which The Insured Contract is to be executed or carried out as more fully defined in The Insured Contract documents together with so much of the surrounding area as may be required or designated for the performance of The Insured Contract.

Illovo Edge, 1 Harries Rd, Illovo
Johannesburg, 2196
P O Box 55509, Northlands, 2116
South Africa

T +27(0)11 535 5400
W willistowerswatson.com

H Govind[1] (Chairman), GW Bishop (CEO), FE Genis, BA Motha[1], PJ Thomson-Hall[1]
[1] Non Executive
Registration Number 1997/020469/07
Company Secretary: PD Karodia

Willis South Africa (Pty) Limited is an authorised Financial Services Provider : FSP267

Territorial Limits :	The Republic of South Africa.
Additional Co-Insureds:	
The Contractor:	All Contractors undertaking work in connection with The Insured Contract including the Employer to the extent that the Employer undertakes work in connection with The Insured Contract;
Sub-Contractors:	All Sub-Contractors employed by the Contractor and all other Sub- Contractors (whether nominated or otherwise) engaged in fulfilment of The Insured Contract; and to the extent required by any contract or agreement; transporters, suppliers, manufacturers, vendors, other persons, persons providing storage facilities, plant owners and/or operators in respect of liability loss or damage arising out of The Insured Contract; project managers, architects, land surveyors, quantity surveyors, engineers and other advisors or consultants or sub-consultants appointed in the performance of the Insured Contract activities arising at the Contract Site provided always that any such person shall not be insured hereunder in respect of liability loss or damage arising out of such person's error or omission in the performance of the professional services for which he was appointed;
Provincial & Government:	any Local Provincial or Government Department with which the Insured enters into any contract or agreement for the performance of The Insured Contract;

all for their respective rights and interests.

Insured Contracts : All Contracts (including any undertaking awarded or commenced prior to Inception of the Period of Insurance) involving design, construction, Performance Testing and Commissioning in respect of the Works and shall Include capital expenditure, upgrade, modification, maintenance or overhaul, refurbishment, renovation, retrofitting or alterations and additions to existing facilities undertaken by the Insured or other Insured Parties acting on their behalf but **excluding**;

a) contracts which at award stage have a value in excess of R 1,000,000,000;
b) contracts with an estimated construction period exceeding 48 months but increasing to 60 months in respect of rail maintenance contracts and Transnet Freight and Rail contracts for logistical support for inline inspections and identification of defects over a 5 year period in respect of Transnet's pipeline assets (excluding Defects Liability/Maintenance period);
c) contracts involving construction or erection of petrochemical manufacturing plant(s) but this exclusion shall not apply to pipelines and other associated works undertaken by or on behalf of the Insured;
d) contracts in or on any aircraft;
e) Off-shore contracts;
f) Wet Risk Contracts which at award exceeds R500,000,000;
g) Dam Contracts
h) Tunnel contracts which at award exceeds R50,000,000;
i) Tunnel contracts using tunnel boring machines;
j) Underground Mining Contracts;
k) Horizontal Directional Drilling Contracts which at award exceeds R50,00,000;
l) Horizontal Directional Drilling Contracts where total drilling exceeds 1 km;
m) Horizontal Directional Drilling Contracts for pipe diameters greater than 76 cm.

Definitions

1. *"Off-shore contracts" means all works and installations in the sea or on the seabed including dredging which are accessible only by ship boat barge or helicopter and do not constitute normal wet works like harbours moles bridges wharves or sewage or cooling water intake or outlet facilities. "Off-Shore Contracts" shall include oilrigs and oil platforms (but not including oil platforms when connected to the land on completion). The term shall not apply to pre-fabrication works on land associated with an Off-Shore Contract.*

2. *"Wet Risk Contracts" shall mean any Contract and/or Works where more than thirty-five (35) percentile of its value is in a permanent body of water or is below the high water mark of any tidal body of water. The term shall include contracts for the construction of wharves, piers, marinas, causeways, breakwaters, jetties, dry docks and offshore pipelines when connected directly to on-shore facilities and canal developments. Wet Risks shall exclude Off-Shore Contracts;*

3. *"Dam Contracts", which term shall include weirs and hydroelectric projects involving the construction of dams or weirs;*

4. *"Horizontal Directional Drilling Contracts", means micro-tunnelling work for the construction of tunnels utilising surface based horizontal directional drilling equipment.*

5. *Tunnels" means Tunnels (Including declines) involving all of the following;*

   (a) Works below ground level; and

   (b) tunnelling machinery below ground level; and

   (c) a tunnelling crew operating the machinery below ground level;

   (d) but shall not include Horizontal Directional Drilling Contracts.

6. *"Horizontal Directional Drilling Contracts", means micro-tunnelling work for the construction of tunnels utilising surface based horizontal directional drilling equipment.*

7. *"Underground Mining Contracts", which shall mean any contract Involving underground mining.*

Testing Period: 120 Days not consecutive.

Maintenance Period : 12 Months

Main Policy Extensions :

- Costs & Expenses - Limited to maximum of R50,000,000.
- Expediting Measures – Limited to a maximum of R50,000,000.
- Professional Fees In Reinstatement Of Property Insured - Limited to a maximum of R50,000,000.
- Costs & Expenses For Removal Of Debris No Damage - Limited to a maximum of R50,000,000.
- Surrounding Property in care custody or control of the contractor – Limited to a maximum of R55,000,000.
- Fire Brigade & Public Authorities - Limited to a maximum of R10,000,000.
- Public Authority Reinstatement Costs - Limited to a maximum of R20,000,000.

- Public Relationship Costs - Limited to a maximum of R1,000,000.
- Records - Limited to a maximum of R2,000,000.
- Removal to Gain Access - Limited to a maximum of R20,000,000
- Road Reserve and Servitude Extensions - Limited to a maximum of R10,000,000
- Search & Locate Costs - Limited to a maximum of R20,000,000.
- Borrowing Of Plant For Commissioning Purposes - Limited to a maximum of R10,000,000
- Escalation during Construction – 30%
- Marine Contribution Clause
- Claim Preparation Costs – Limited to a maximum of R10,000,000

Main Policy Exclusions :

- War
- Nuclear Energy Risks
- Terrorism
- Computer Loss General Exception
- DE4 (All types of Works) for defective material workmanship design plan or specification.
- LEG 3 (Mechanical or Electrical Engineering Works only) for defective material workmanship design plan or specification. Limited to maximum of 15% of the total estimated contract value.
- loss or damage arising during air transit or any ocean voyage or whilst in storage thereafter.
- occurring during any defects/maintenance period unless cause occurred prior to such defects/maintenance period
- disappearance or by shortage revealed during routine inventory or periodic stocktaking.
- consequential loss of whatsoever nature.
- normal wear and tear, normal atmospheric conditions, rust, erosion, corrosion or oxidisation.
- due to its own explosion breakdown or derangement occurring after the Testing Period which has operated under load conditions.
- Second hand property due to its own electrical or mechanical breakdown or explosion.

Deductibles: In respect of loss or damage:

Major Perils shall mean damage caused by storm, rain, tempest, wind, flood, theft, malicious damage, subsidence, collapse, earthquake, testing or commissioning and the consequences of defective design, specification, materials or workmanship (DE4).

Minor Perils shall mean damage caused by a peril no defined as Major Perils defined above.

Contracts with a contract value :	Major perils	Minor perils
0 to R100,000,000	R25,000	R 15,000
R100,000,001 to R250,000,000	R50,000	R15,000
R250,000,001 to R500,000,000	R100,000	R25,000
R500,000,001 to R1,000,000,000	R150,000	R25,000

Minimum wet risk deductible of R100,000 per occurrence to apply.

LEG 3 Deductible (Only in respect of Mechanical and Electrical contracts);

Contracts with a contract value	Deductible
0 to R500,000,000	R1,000,000 per occurrence
R500,000,001 to R1,000,000,000	R1,500,000 per occurrence

PUBLIC LIABILITY

Cover Provided : `

Contract Works Public Liability – cover the Insured's legal liability in respect of loss or damage or injury to third parties arising out of work performed in respect of the Insured Contracts.

Insurer :

Stalker Hutchinson (Santam Limited)

Policy Number:

6000/132335

Territorial Limits :

The Republic of South Africa.

Insured Contracts:

All contracts (including any undertaking awarded or commenced prior to inception of the period of Insurance) involving design, construction, performance testing and commissioning in respect of the works and shall include capital expenditure, upgrade, modification, maintenance or overhaul, refurbishment, renovation, retrofitting or alterations and additions to existing facilities undertaken by the Insured or other Insured Parties acting on their behalf but **Excluding**:

a) Contracts which at award stage have a value in excess of R 1,000,000,000.
b) Contracts with an estimated construction period at award exceeding 48 months but 60 months in respect of contracts awarded prior to 1 April 2020 for rail maintenance contracts For Transnet Freight & Rail and for Transnet Pipeline's logistical support for inline inspections and identification of defects in respect of Transnet's pipeline assets (all excluding Defects Liability/Maintenance period).
c) Contracts with a Contractual Defects Liability Maintenance Period exceeding 24 months.
d) Contracts involving construction or erection of petrochemical manufacturing plant(s) but this exclusion shall not apply to pipelines and other associated works undertaken by or on behalf of the Insured.
e) Contracts in or on any aircraft.
f) Off-shore contracts - "Off-shore contracts" means all works and installations in the sea or on the seabed and do not constitute normal Wet Risk Contracts like harbours, moles, bridges, wharves or sewage or cooling water intake or outlet facilities, piers, marinas, causeways, breakwaters, jetties, dry docks and offshore pipelines when connected directly to onshore facilities and canal developments. "Off-Shore contracts" shall include oilrigs and oil platforms.

Policy Limits:

Contractors Public Liability	R100,000,000 any one occurrence / unlimited during the Period of Insurance
Contractors Negligent Removal or weakening of Support	R100 000 000 any one occurrence and R100,000,000 per site in the aggregate during the Period of Insurance.

Statutory Legal Defense Costs	*R5 000 000 in the aggregate during the Period of Insurance.
Arrest / Assault / Defamation	*R5 000 000 in the aggregate during the Period of Insurance.
Emergency Medical Expenses	R5 000 000 any one occurrence
Prevention of Access	*R5 000 000 in the aggregate during the Period of Insurance.
Trespass / Nuisance	*R5 000 000 in the aggregate during the Period of Insurance.
Claims Preparation Costs	R5 000 000 any one occurrence

*Where the limits are noted as in the aggregate during the policy period of insurance, that such aggregated limit is applicable to all Transnet Insured Contracts collectively and in total and does not apply to each contract separately.

Deductible(s) : R50,000 per occurrence but increased to R5,000,000 in respect of Spread of Fire and/or Hot Works and R250,000 in respect of Sudden and Accidental Pollution and/or Goods on the Hook.

General Policy Exclusions :

The policy does not cover:

- deliberate, conscious and intentional disregard to take reasonable precautions.
- fines, penalties, punitive and exemplary damages.
- Pollution unless caused by a sudden, unintended and unexpected occurrence.
- cost of removing, nullifying or cleaning up the effects of pollution unless caused by a sudden, unintended and unexpected occurrence.
- the hazardous nature of asbestos.
- War And Terrorism Risks.
- Nuclear Risks.
- Actual or alleged unlawful competition, unfair practices, abuse of monopoly power, cartel activities
- Compulsory Insurance
- Loss or damage and any consequence therefrom to any Data.
- Sanctions Exclusion

PROFESSIONAL INDEMNITY

Cover Provided : ` Professional Indemnity

a) In respect of damages which the Insured shall become legally liable to pay in consequence of neglect, error or omission by or on behalf of the Insured in the conduct or execution of their Professional Activities and Duties as defined.

b) Prior To Handover/Rectification - against loss arising out of any defect in the works discovered prior to the issue of any practical completion or take-over certificate

provided that any such defects are caused by a negligent breach of a Professional Activity or Duty by the Insured in consequence of neglect, error or omission by or on behalf of the Insured.

Insurer :	Stalker Hutchinson (Santam Limited)
Policy Number:	6000/132337
Jurisdiction :	Worldwide excluding North America
Insured Contracts:	All contracts (including any undertaking awarded or commenced prior to inception of the period of Insurance) involving design, construction, performance testing and commissioning in respect of the works and shall include capital expenditure, upgrade, modification, maintenance or overhaul, refurbishment, renovation, retrofitting or alterations and additions to existing facilities undertaken by the Insured or other Insured Parties acting on their behalf but **Excluding**:

a) Contracts which at award stage have a value in excess of R 1,000,000,000.
b) Contracts with an estimated construction period at award exceeding 48 months but 60 months in respect of contracts awarded prior to 1 April 2020 for rail maintenance contracts For Transnet Freight & Rail and for Transnet Pipeline's logistical support for inline inspections and identification of defects in respect of Transnet's pipeline assets (all excluding Defects Liability/Maintenance period).
c) Contracts with a Contractual Defects Liability Maintenance Period exceeding 24 months.
d) Contracts involving construction or erection of petrochemical manufacturing plant(s) but this exclusion shall not apply to pipelines and other associated works undertaken by or on behalf of the Insured.
e) Contracts in or on any aircraft.
f) Off-shore contracts - "Off-shore contracts" means all works and installations in the sea or on the seabed and do not constitute normal Wet Risk Contracts like harbours, moles, bridges, wharves or sewage or cooling water intake or outlet facilities, piers, marinas, causeways, breakwaters, jetties, dry docks and offshore pipelines when connected directly to onshore facilities and canal developments. "Off-Shore contracts" shall include oilrigs and oil platforms.

Limit Of Indemnity:

Professional Indemnity -	*R100,000,000 in the aggregate during the policy period of insurance.

*Where the limit is noted as in the aggregate during the policy period of insurance, that such aggregated limit is applicable to all Transnet Insured Contracts collectively and in total and does not apply to each contract separately.

Policy Extension
Limits Of Indemnity:

Claims Preparation Costs –	*R7,500,000 in the aggregate during the policy period of insurance.
Loss of Documents -	*R2,000,000 in the aggregate during the policy period of insurance.
Statutory Defence Costs -	*R5,000,000 in the aggregate during the policy period of insurance.
Defamation -	*R5,000,000 in the aggregate during the policy period of insurance. R 10,000 R 5,000,000 R 5,000,000

Infringement of Copyright -*R5,000,000 in the aggregate during the policy period of insurance.

*Where the limits are noted as in the aggregate during the policy period of insurance, that such aggregated limit is applicable to all Transnet Insured Contracts collectively and in total and does not apply to each contract separately.

Deductibles: R5,000,000 each and every but R10,000 in respect of Claims Preparation Costs, Loss of Documents, Statutory Defence Costs, Defamation and Infringement Of Copyright.

Policy Special Conditions : Condition precedent to liability that the Insured is fully qualified and registered with the relevant Industry Body/Association in terms of legislation as applicable.

Prior to hand over/rectification – the insured must give prior written notice to the Insurers of the intention to take remedial action to rectify such defect and obtain the Insurers' written agreement to such action being taken and the costs and expenses expected to be expended.

Policy Main Exclusions:

- Excludes all consequential loss other than cost of re-design, rectification and replacement as a consequence of the defect.
- Excludes Supervision.
- Excludes liability arising out of environmental impairment / pollution
- Excludes the cost of removing, nullifying or cleaning-up the effects of environmental impairment/ pollution.
- Excludes war, invasion, acts of foreign enemies, hostilities or warlike operations (whether war be declared or not), civil war, rebellion, revolution, insurrection, civil commotion assuming the proportions of or amounting to an uprising, military or usurped power, any act of terrorism and nuclear risks
- Excludes fines, penalties, punitive and exemplary damages, multiplication of compensatory damages and/or any other non-compensating damages of any kind.
- Excludes liability from the hazardous nature of asbestos.
- Excludes medical malpractice.
- Excludes failure to meet contractual requirements relating to efficiency, output or durability.
- Excludes failure to meet completion dates
- Excludes the estimation of probable costs other than cost advice and cost planning services normally provided by a Quantity Surveyor or Project manager.
- Excludes incorrect authorisation of payment.
- Excludes breach of any statutory regulation.
- Excludes liabilty from the insolvency, liquidation or judicial management of the Insured.
- Excludes the certification of value of work executed by any contractor where the Insured has an equity interest in such contractor;
- Excludes liability due to unlawful competition, unfair practices, abuse of monopoly power, cartel activities or breach of a competitions ac
- Sanctions Exclusion

This certificate of the insurance cover arranged is issued as a matter of information only and confers no rights upon the certificate holder. This certificate does not amend, extend or alter the coverage afforded by the policies issued by Insurers.

Yours Faithfully



Paul R Jacobs
Construction Specialist
Direct : +27 (0) 11 082 8622
Mobile: +27 (0)82 468 7382
paul.jacobs@willistowerswatson.com
www.willistowerswatson.com

PART 2: PRICING DATA

Document reference	Title	No of pages
C2.1	Pricing instructions: Option B	3
C2.2	The *bill of quantities*	19

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, June 2005 and 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.

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 (June 2005) 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 ECC 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

2.1. 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[1]	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. Unless otherwise stated, items are measured net in accordance with the drawings, and no allowance has been made in the quantities for waste.

2.2.2. 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.

2.2.3. 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.

2.2.4. 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.

[1] Provisional Sums should not be used unless absolutely unavoidable. Rather include specifications and associated bill items for the most likely scope of work, and then change later using the compensation event procedure if necessary. This is because tenderers cannot programme effectively for unknown scopes of work

2.2.5. 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.

2.2.6. 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.

2.2.7. 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.

2.3. Departures from the *method of measurement*

2.4. Amplification of or assumptions about measurement items

For the avoidance of doubt the following is provided to assist in the interpretation of descriptions given in the *method of measurement*. In the event of any ambiguity or inconsistency between the statements in the *method of measurement* and this section, the interpretation given in this section shall be used.

C2.2 The *bill of quantities*

SUMMARY OF BILL OF QUANTITIES

DESCRIPTION	TENDER SUM CAPE TOWN	TENDER SUM DURBAN	TOTAL
SECTION 1			
SECTION 2			
SECTION 3			
SUB-TOTAL (EXCL. VAT)			
VAT (15%)			
TOTAL (INCL. VAT)			

C2.2 the *bill of quantities (Cape Town)*

SECTION 1: PRELIMINARY & GENERAL						
ITEM No	**PAYMENT**	**DESCRIPTION**	**UNIT**	**QTY**	**RATE (Excl. VAT)**	**AMOUNT R**
1	**SABS 1200 A**	**PRELIMINARY AND GENERAL**				
1.1		**FIXED-CHARGE ITEMS:**				
1.1.1		Contractual Requirements as per NEC3 Engineering and Construction Contract (June 2005 and 2013)	Sum	1		
		Establishment Facilities:				
1.1.2		Name Boards.	Sum	1		
1.1.3		Office facilities and Storage sheds.	Sum	1		
1.1.4		Ablution and latrine facilities.	Sum	1		
1.1.5		Tools and equipment.	Sum	1		
1.1.6		Other fixed-charge obligations.	Sum	1		
1.1.7		Removal of establishment on completion.	Sum	1		
1.2		**TIME RELATED ITEMS:**				
1.2.1		Contractual Requirements as per NEC3 Engineering and Construction Contract (June 2005 and 2013)	Sum / month			
1.2.2		Office facilities and Storage sheds.	Sum / month			
1.2.3		Ablution and latrine facilities.	Sum / month			
1.2.4		Tools and equipment.	Sum / month			
1.2.5		Water supplies, Electric power and Communications.	Sum / month			
1.2.6		Supervision	Sum / month			
1.2.7		Company and head office overhead costs for the duration of the contract.	Sum / month			
1.2.8		Other time-related obligations.	Sum / month			
Section 1 Total – Carried to Summary						

SECTION 2: CONVERSION FROM DC & AC DRIVEN TO HYDRAULICALLY DRIVEN CAPSTANS

ITEM No	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT R
2.						
2.1		**REMOVAL OF EXISTING EQUIPMENT**				
2.1.1		Remove and Install AC Motors	EA	21		
		Remove and Install Gearboxes	EA	8		
		Recondition the drums (to be reclaimed),	EA	29		
		Sandblast, repaint externally in 3 coats (TNPA CONFIRM PAINT SPEC), Rubberline internally	EA	29		
		Remove approximately 100m long steel rope	EA	29		
		Strip capstan completely	EA	29		
		Strip capstan gears from shafts (DC)	EA	29		
		CIVIL WORKS PREPARATION				
		Break out old motor and gearbox plinths, remove old base plates	EA	8		
		Break out old plinths for capstan foot bearing	EA	29		
		Break concrete, area = 14,04m^2, depth = 500mm, total of = 7,02m^{3}of concrete volume/pit	EA	29		
		CIVIL CONSTRUCTION				
		Make good pit sides and floors	EA	29		
		Prepare and provide required finish as per design for the pit to accommodate ne pit cover	EA	29		
		Construct plinths for new equipment (motor and gearbox), provide necessary reinforcement as per design	EA	29		
		Construct plinths for foot bearings, provide necessary reinforcement as per design	EA	29		
		Construct plinths for the HMI units, provide necessary reinforcement as per design	EA	29		
		Construction of spillage recovery system as per design	Sum	1		
		Sandblast and paint in three coats (TNPA paint spec) existing beams supporting equipment for all 8 capstans	Sum	1		
2.2		**ELECTRIAL SCOPE**				
2.2.1		Design, Construct, supply and install MCC as per specification approved	Sum	1		
2.2.2		Supply and installation of 55kW 8 pole motor as part of the 20T capstan electrical power requirement	EA	8		
		Supply and installation of 22kW 8 pole motor as part of the 5T capstan electrical power requirement	EA	21		
2.2.3		Excavation work for restricted electrical access sleeves and wire-ways and disposal of waste	EA	1		

Section 2 Total (carried forward)						
ITEM No	**PAYMENT**	**DESCRIPTION**	**UNIT**	**QTY**	**RATE**	**AMOUNT R**
Section 2 Total (Brought forward)						
2.2.4		Covered under civil works	EA	1		
2.2.5		Suitable sized VSD rated at 90KW	EA	8		
2.3		**CABLING AND WIREWAYS**				
2.3.1		Terminate and connect suitable sized 4 core cable armoured cable	M	100		
2.3.2		Supply and install suitable sized 4 Core cable armoured cable from nearest pump-house to capstan MCC	M	200		
2.3.3		Communication cable or medium between each Capstan- preferred fibre or TCP/IP	M	200		
2.3.4		Profinet/bus communication to HMI	M	120		
2.3.5		Supply and install new suitable sized moulded Air Circuit Breaker	EA	29		
2.3.6		4 core 50mm supply cable from MCC to Capstan Motor	M	10		
2.3.7		OLM G12 Communication module	EA	2		
2.4		**LUMINARIES and WATER SENSOR**				
2.4.1		Supply and Installation of LED Luminaires as per specification in each capstan enclosure	EA	29		
2.4.2		Supply and Installation of water sensor and interlocked to MCC audible siren in each capstan enclosure	EA	29		
2.4.3		IP65 Siren and light combination	EA	29		
2.5		**CONTROL SYSTEM**				
2.5.1		Complete MCC with 7-inch touch screen mounted on MCC door	EA	29		
2.5.2		Provide and configure Siemens s400 PLC for 29 capstans	SUM	1		
2.5.3		Configure HMI and PLC to visualise status for all 29 capstans Capstan (Refer to control system design)	SUM	1		
Section 2 Total – Carried to Summary						

SECTION 3: CONVERSION FROM DC & AC DRIVEN TO HYDRAULICALLY DRIVEN CAPSTANS

ITEM No	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT R
3.1		**DESIGN – MECHANICAL**				
		a) Pinion gear for the 20 Ton capstan	EA	8		
		b) Final gear for the 20 Ton capstan	EA	8		
		c) Design pit new pit covers to eliminate water ingress into the pit,	EA	29		
		d) Complete Gear train for the 5Ton capstans	EA	21		
		e) Lubrication system for gears	EA	29		
3.2		**MECHANICAL EQUIPMENT** **(Speed ratios, gearbox 4:1 and final gear ration 4,429:1)**				
		Supply of pinion gear for 20T capstan as per design	EA	8		
		Supply of pinion gear for 5T capstan as per design	EA	21		
		Supply of final gear wheel for 20T capstan as per design	EA	8		
		Supply of final gear wheel for 5T capstan as per design	EA	21		
		Complete set of intermediate gears for the 5T capstan as per design	EA	21		
		Supply and installation of 20T hydraulic unit complete with oil reservoir	EA	8		
		Supply and installation of 5T hydraulic unit complete with oil reservoir	EA	21		
		Supply and install pump for spillage recovery system	EA	29		
		Supply of gearbox unit (4:1 ratio) for a 55kW 8 pole motor power	EA	8		
		Supply of gearbox unit (4:1 ratio) for a 22kW motor power	EA	21		
		SHAFTS				
		Supply of 160mm shaft for final drive gear assembly, as per design (for 20T capstan)	EA	8		
		Supply of 125mm shaft for final drive gear assembly as per design (for 5T capstan)	EA	21		
		BEARINGS				
		Supply and installation of Thorplas Blue bearings with a 160mm bore for a 20T capstan assembly	EA	48		
		Supply and installation of Thorplas Blue bearings with a 125mm bore for a 5T capstan assembly	EA	11		
		Fabrication and installation of waterproof pit cover as per design	EA	29		
Section 3 Total (carried forward)						

ITEM No	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT R
Section 3 Total (Brought forward)						
		LUBRICATION				
		Supply and install Kluber lubrication unit for gear lubrication	EA	29		
		COUPLINGS				
		Supply and install gearbox input coupling for a 20T capstan	EA	8		
		Supply and install gearbox output coupling for a 20T capstan	EA	8		
		Supply and install gearbox input coupling for a 5T capstan	EA	21		
		Supply and install gearbox output coupling for a 5T capstan	EA	21		
		ACCESS CAT LADDER				
		Fabricate and install cat ladder for pit access (for Capstan #2 and #7, other will be reclaimed)	EA	21		
3.3		**COMPLETION**				
		Test, commission and issue compliance certificate	SUM	1		
		Issue operations and maintenance manuals	SUM	1		
		Training of operations staff on equipment operation	SUM	1		
		Training of maintenance staff on maintenance of equipment in line with a new SAP Maintenance module which is part of the package	SUM	1		
Section 3 Total – Carried to Summary						

C2.3 the bill of quantities (DURBAN)

SECTION 1: PRELIMINARY & GENERAL						
ITEM No	**PAYMENT**	**DESCRIPTION**	**UNIT**	**QTY**	**RATE (Excl. VAT)**	**AMOUNT R**
1	**SABS 1200 A**	**PRELIMINARY AND GENERAL**				
1.1		**FIXED-CHARGE ITEMS:**				
1.1.1		Contractual Requirements as per NEC3 Engineering and Construction Contract (June 2005 and 2013)	Sum	1		
		Establishment Facilities:				
1.1.2		Name Boards.	Sum	1		
1.1.3		Office facilities and Storage sheds.	Sum	1		
1.1.4		Ablution and latrine facilities.	Sum	1		
1.1.5		Tools and equipment.	Sum	1		
1.1.6		Other fixed-charge obligations.	Sum	1		
1.1.7		Removal of establishment on completion.	Sum	1		
1.2		**TIME RELATED ITEMS:**				
1.2.1		Contractual Requirements as per NEC3 Engineering and Construction Contract (June 2005 and 2013)	Sum / month			
1.2.2		Office facilities and Storage sheds.	Sum / month			
1.2.3		Ablution and latrine facilities.	Sum / month			
1.2.4		Tools and equipment.	Sum / month			
1.2.5		Water supplies, Electric power and Communications.	Sum / month			
1.2.6		Supervision	Sum / month			
1.2.7		Company and head office overhead costs for the duration of the contract.	Sum / month			
1.2.8		Other time-related obligations.	Sum / month			
Section 1 Total – Carried to Summary						

SECTION 2: CONVERSION FROM DC & AC DRIVEN TO HYDRAULICALLY DRIVEN CAPSTANS

ITEM No	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT R
2.1		**REMOVAL OF EXISTING EQUIPMENT**				
2.1.1		Remove and Install AC Motors	EA	8		
		Remove and Install Gearboxes	EA	8		
		Recondition the drums (to be reclaimed),	EA	8		
		Sandblast, repaint externally in 3 coats (TNPA CONFIRM PAINT SPEC), Rubberline internally	EA	8		
		Remove approximately 100m long steel rope	EA	8		
		Strip capstan completely	EA	8		
		Strip capstan gears from shafts (DC)	EA	8		
		CIVIL WORKS PREPARATION				
		Break out old motor and gearbox plinths, remove old base plates	EA	8		
		Break out old plinths for capstan foot bearing	EA	8		
		Break concrete, area = 14,04m^2, depth = 500mm, total of = 7,02m^3 of concrete volume/pit	EA	8		
		CIVIL CONSTRUCTION				
		Make good pit sides and floors	EA	8		
		Prepare and provide required finish as per design for the pit to accommodate ne pit cover	EA	8		
		Construct plinths for new equipment (motor and gearbox), provide necessary reinforcement as per design	EA	8		
		Construct plinths for foot bearings, provide necessary reinforcement as per design	EA	8		
		Construct plinths for the HMI units, provide necessary reinforcement as per design	EA	8		
		Construction of spillage recovery system as per design	Sum	1		
		Sandblast and paint in three coats (TNPA paint spec) existing beams supporting equipment for all 8 capstans	Sum	1		
2.2		**ELECTRIAL SCOPE**				
2.2.1		Design, Construct, supply and install MCC as per specification approved	Sum	1		
2.2.2		Supply and installation of 55kW 8 pole motor as part of the 20T capstan electrical power requirement	EA	6		
		Supply and installation of 22kW 8 pole motor as part of the 5T capstan electrical power requirement	EA	2		
2.2.3		Excavation work for restricted electrical access sleeves and wire-ways and disposal of waste	EA	1		
Section 2 Total (carried forward)						

ITEM No	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT R
Section 2 Total (Brought forward)						
2.2.4		Covered under civil works	EA	1		
2.2.5		Suitable sized VSD rated at 90KW	EA	8		
2.3		**CABLING AND WIREWAYS**				
2.3.1		Terminate and connect suitable sized 4 core cable armoured cable	M	100		
2.3.2		Supply and install suitable sized 4 Core cable armoured cable from nearest pump-house to capstan MCC	M	200		
2.3.3		Communication cable or medium between each Capstan- preferred fibre or TCP/IP	M	200		
2.3.4		Profinet/bus communication to HMI	M	120		
2.3.5		Supply and install new suitable sized moulded Air Circuit Breaker	EA	8		
2.3.6		4 core 50mm supply cable from MCC to Capstan Motor	M	10		
2.3.7		OLM G12 Communication module	EA	2		
2.4		**LUMINARIES and WATER SENSOR**				
2.4.1		Supply and Installation of LED Luminaires as per specification in each capstan enclosure	EA	8		
2.4.2		Supply and Installation of water sensor and interlocked to MCC audible siren in each capstan enclosure	EA	8		
2.4.3		IP65 Siren and light combination	EA	8		
2.5		**CONTROL SYSTEM**				
2.5.1		Complete MCC with 7-inch touch screen mounted on MCC door	EA	8		
2.5.2		Provide and configure Siemens s700 PLC for 8 capstans	SUM	1		
2.5.3		Configure HMI and PLC to visualise status for all 29 capstans Capstan (Refer to control system design)	SUM	1		
Section 2 Total – Carried to Summary						

SECTION 3: CONVERSION FROM DC & AC DRIVEN TO HYDRAULICALLY DRIVEN CAPSTANS

ITEM No	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT R
3.1		**DESIGN – MECHANICAL**				
		a) Complete gear train/system for the 20 Ton capstan	SUM	1		
		b) Complete Gear train/system for the 5Ton capstans	SUM	1		
		c) Design pit new pit covers to eliminate water ingress into the pit,	SUM	1		
		d) Lubrication system for gears	SUM	1		
3.2		**MECHANICAL EQUIPMENT** **(Speed ratios, gearbox 4:1 and final gear ration 4,429:1)**				
		Supply of pinion gear for 20T capstan as per design	EA	6		
		Supply of pinion gear for 5T capstan as per design	EA	2		
		Supply of final gear wheel for 20T capstan as per design	EA	6		
		Supply of final gear wheel for 5T capstan as per design	EA	2		
		Complete set of intermediate gears for the 5T capstan as per design	EA	2		
		Supply and installation of 20T hydraulic unit complete with oil reservoir	EA	6		
		Supply and installation of 5T hydraulic unit complete with oil reservoir	EA	2		
		Supply and install pump for spillage recovery system	EA	8		
		Supply of gearbox unit (4:1 ratio) for a 55kW 8 pole motor power	EA	6		
		Supply of gearbox unit (4:1 ratio) for a 22kW motor power	EA	2		
		SHAFTS				
		Supply of 160mm shaft for final drive gear assembly, as per design (for 20T capstan)	EA	3		
		Supply of 125mm shaft for final drive gear assembly as per design (for 5T capstan)	EA	2		
Section 3 Total (carried forward)						

ITEM No	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT R
Section 3 Total (Brought forward)						
		BEARINGS				
		Supply and installation of Thorplas Blue bearings with a 160mm bore for a 20T capstan assembly	EA	18		
		Supply and installation of Thorplas Blue bearings with a 125mm bore for a 5T capstan assembly	EA	4		
		Fabrication and installation of waterproof pit cover as per design	EA	8		
		LUBRICATION				
		Supply and install Kluber lubrication unit for gear lubrication	EA	8		
		COUPLINGS				
		Supply and install gearbox input coupling for a 20T capstan	EA	6		
		Supply and install gearbox output coupling for a 20T capstan	EA	6		
		Supply and install gearbox input coupling for a 5T capstan	EA	2		
		Supply and install gearbox output coupling for a 5T capstan	EA	2		
		ACCESS CAT LADDER				
		Fabricate and install cat ladder for pit access (for Capstan #2 and #7, other will be reclaimed)	EA	2		
3.3		**COMPLETION**				
		Test, commission and issue compliance certificate	SUM	1		
		Issue operations and maintenance manuals	SUM	1		
		Training of operations staff on equipment operation	SUM	1		
		Training of maintenance staff on maintenance of equipment in line with a new SAP Maintenance module which is part of the package	SUM	1		
Section 3 Total – Carried to Summary						

C3: Works Information – Cape Town

1. Description of the Works

1.1. Overview

Transnet National Port Authority (TNPA) seeks to upgrade the capstans dry docks in the Port of Cape Town. The three docking facilities: Robinson, Sturrock and Synchro-lift, have been in operation since the 1880s, 1940s and 1970s respectively. As a result the infrastructure is aging and needs to be modernised.

The dry docks are used for the maintenance and repair of ships and other marine vessels. The main infrastructure utilised for docking vessels are caisson gates, capstans and pumping systems. As shown on the figures below.



Figure 1: SDD Capstans Port of Cape Town



Figure 2: RDD Capstans Port of Cape Town



Figure 3: Synchro Lift Capstans Port of Cape Town

These capstans are used to moor, manoeuvre and hold in position the vessels. They consist of a vertical drum which can be rotated and around which a steel rope can be wound.

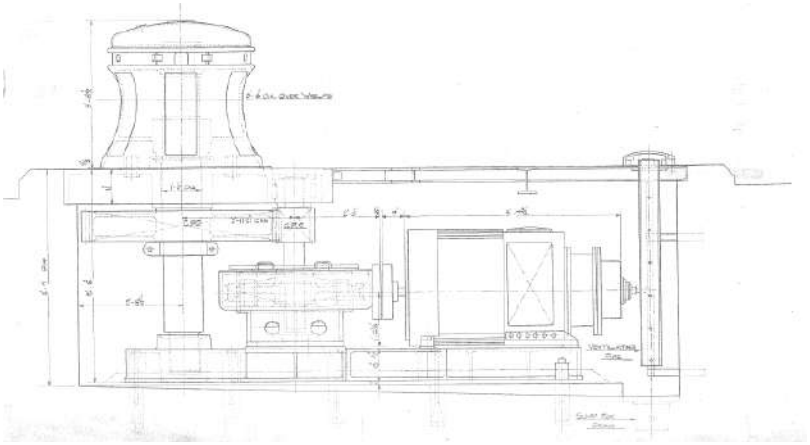


Figure 4: 20 Ton Capstans at Sturrock Dry Dock

The capstans have been identified as one of the infrastructure assets requiring modernization.

The three docks are equipped with a total of twenty nine (29) capstans as shown Table 1 below.

Table 1: Detail of quantities per dock.

Capacity	Sturrock	Robinson	Synchro-lift	Drive	Current
20 Ton	8	-	-	Below ground	DC
5 Ton	4	9	7	Above ground	AC
3 Ton	-	-	1	Above ground	AC

1.2. Employer's Objective

It is the Employer's objective is appoint a Contractor to provide a detailed design, fabrication, supply, installation and commission of all 29 hydraulically driven capstans in all three dry docks in the Port of Cape Town.

The contract objectives are:

a) Conduct a detailed condition assessment
b) To replace the electrically driven capstans with hydraulically driven capstans
c) To complete the whole of the works within a period of 12 months, commencing from the date of site access.
d) To execute the works to high quality and in a safe manner, complying with the OHS Act and its applicable regulations and standards i.e OHS Act, NEMA, SANS Codes.

It is a condition of bidder that the bidder shall have carried out a full and detailed inspection of all Bidder documents and shall have inspected the site, prior to the submission of a Bidder for the project. By such an inspection, the Tenderer shall be deemed to be fully informed as to the objectives, specifications, nature and degree of complexity of the project, the constructional problems related thereto, and the conditions under which the work is to be carried out, the means of access to the site and generally of all matters which may influence his bidder. The Tenderer shall also be aware of the interface of the construction works with Dock Operations and make sufficient allowance in his bidder. No claim of any nature whatsoever will be considered after the submission of bidders due to the failure on the part of the Tenderer to fulfil this obligation.

Note: Only Contractor's that are able to demonstrate sufficient recent experience in design capability integrating electrical supply with hydraulic power system/packs. Gear design, maintenance of big spur gears and gear trains, Heavy rotating equipment similar to capstans, winches, and/or winders systems shall be considered acceptable for executing the works. The Contractor shall supply sufficient experiential information and references with the Bidder to enable the Employer to determine their level of experience.

2. Engineering and the *Contractor's* design

2.1. Employer's Designs

The employer has in his possession all drawings of the capstans. These drawings will be made available appointed contractor.

2.2. *Contractor's* Design

2.2.1 20 Ton

Mechanical Scope

- Provide a refurbishment methodology for drums
- Design the hydraulic drive system to be compatible with the refurbished drums and existing pit
- The battery limit is top of plinth

Electrical Control and Instrumentation (EC & I) Scope

- Redesign configuration of the power supply from series connection to parallel
- Design and size power components to suit the new drive system, including but not limited to MCC, VSD, cables, etc.

- Design of the control system but not limited to PLC, SCADA and instrumentation
- Battery limits is the MCC power inlet and the equipment terminal box
- Design suitably sized electrical distribution from substation to capstan

Civil Scope

- Modify the existing plinths and pits to suit the new drive system
- Construction of oil spillage recovery system (including submersible pump)
- Plinths for new gearbox and motor
- Seal all seams of equipment interface to prevent water ingress
- The battery limit is within the pit
- Design wire-way where required

2.2.2 5 Ton and 3 Ton

Mechanical Scope

- Provide a refurbishment methodology for drums
- Design the hydraulic drive system to be compatible with the refurbished drums
- The battery limit is top of plinth

Electrical Control and Instrumentation (EC & I) Scope

- Redesign configuration of the power supply form series connection to parallel
- Design and size power components to suit the new drive system, including but not limited to MCC, VSD, cables, etc.
- Design of the control system but not limited to PLC, SCADA and instrumentation
- Battery limits is the MCC power inlet and the equipment terminal box
- Design sized electrical distribution from substation to capstan

Civil Scope

- Design the plinths to suit the new drive system
- The battery limit is within the pit

2.2.3 Design Deliverables

Mechanical

- Design report including but not limited to design criteria, supporting calculations and technical specifications
- Equipment list
- Supply layout, general arrangement, detail and OEM certified drawings
- BOQ

Electrical control and Instrumentation

- Electrical design report including but not limited design criteria, supporting calculations and technical specifications
- Supply single line diagrams
- Cable schedules
- Control design report including but not limited to control philosophy and functional specification
- Supply control diagrams including P&ID's
- Supply instrumentation, I/O list
- BOQ

Civil

- Design report including but not limited geotechnical study design criteria, supporting calculations and technical specifications
- Supply general arrangement drawings
- Rebar schedules
- BOQ

2.2.3 Works excluded from the *Contractor's* Scope of Works.

- *Works* associated with future expansions.

2.2.4 Applicable Legislation, Regulations and Standards

- Occupational Health and Safety Act of South Africa and its regulations i.e Driven Machinery and Construction Regulations
- National Environment Management Act
- All applicable SANS and ISO codes
- AWS D 1.1- 2010 Structural Welding Code of practice

3. Construction works

This section details the construction activities of which the *Contractor* will implement in conjunction with the approved and accepted designs in section 2.

3.1. Construction scope

Mechanical Scope

- Removal of existing drive system, including motor and gears for storage at predetermined lay down area
- Refurbishment of drum in accordance with the approved methodology
- Installation of the new drive system
- Test and commission the new drive system

Electrical Control and Instrumentation (EC & I) Scope

- Removal of existing power supply cables and associating components to a predetermined lay down area
- Installation of the new electrical infrastructure including but not limited to, MCC, switchgears, cables, etc
- Installation of the new control and instrumentation system
- Commission and test the new electrical, control and instrumentation infrastructure

Civil Scope

- Modify and repair the existing plinths and pits to suit the new drive system
- Construct new plinths for the 5 and 3 tonnage drive systems for above ground solution.

4. Procurement

- The *Contractor* shall procure, fabricate, supply and deliver to site all material required for execution of the works
- All sub-*Contractor* shall be vetted by the *Employer* before appointment

5. Construction work

5.1. Temporary works, Site services & construction constraints

5.1.1. Employer's Site entry and security control, permits, and Site regulations

a) The *Contractor* is required to follow the entry requirements stipulated by *Employer*. The *Contractor* will be required to attend the designated Port Safety Inductions and must comply with the requirements of the TNPA SHE Specification before port access permits and the site is handed over for construction.

b) Sections of dry docks for this contract will be made available to the *Contractor* free of charge to serve as a lay down area for the execution of the works. The area will be available for viewing at the *Bidder* at the briefing session and will be handed to the successful *Contractor* on completion of a benchmark inspection. No liability will however be accepted by the *Employer* for the safekeeping of the *Contractor's* materials.

c) The *Contractor* shall make his own arrangements for the accommodation of all labour and shall comply with the requirements of the respective authorities. Control of access for construction plant onto public roads shall be in accordance with the requirements of the relevant roads authority and the Port Authority.

a) The works will be carried out on an operational docks, with operations taking precedence. The *Contractor* will carry out the works with full cognizance of operational requirements. A docking schedule will be made available to the *Contractor* for planning purposes.

5.1.2. Restrictions to access on Site, roads, walkways and barricades

There are main entrance to Sturrock dry dock, two (2) on Alkmaar Road and one delivery entrance on Vanguard Road. Both Alkmaar and Vanguard road are accessed from Duncan Road, which is the main road on the port and carries the majority of the traffic.

The is one entrance at the Synchro lift facing the back of the virgin active, The Syncrolift is situated in the Victoria & Albert Waterfront Precinct at the far end of the Albert Basin and is used predominantly by the fishing industry.

The Robinson Dock is situated in the Victoria & Albert Waterfront precinct in the Albert Basin. it has two entrances.

General public safety is a matter of priority for the project and its stakeholders, the *Contractor* is therefore required to implement traffic management procedures to accommodate all traffic that will be impacted by the construction activities for the duration of the project.

5.1.3. The Contractor complies with the requirements of the Employer:

a) The construction site is limited to the dock perimeter and battery limits as indicated in the site information (C4 of this contract). The *Contractor* is required to ensure that no materials and equipment for this project are stored outside of the construction site unless prior approval is gained from the Project Manager.

5.1.4. People restrictions on Site; hours of work, conduct and records

a) The *Contractor* must control and keep daily records of his people engaged on the Site and Working Areas (including Subcontractors) with access to such daily records available for inspection by the Project Manager or Supervisor at all reasonable times.

b) No person shall be allowed on site without having undergone the required safety inductions and without wearing the appropriate PPE.

c) The main *Contractor* shall be held accountable to ensure that all sub-contractors comply with the site rules and regulation.

5.1.5. Health and Safety

The *Contractor* must act in accordance with the relative Health and Safety requirements (such as the OHS Act 85 of 1993 and latest revision of the construction regulations) and further to that must comply with what is stated in the employers SHE Specifications.

The *Contractor* shall ensure that he/she is fully conversant with the latest edition of the Occupational Health and Safety Act. The employer SHE specifications documents have been included in this *Bidder* document. The *Contractor* will have to ensure that his appointed full time safety officer is familiar with the document, as safety audits will be conducted by Transnet National Ports Authority to ensure compliance.

5.1.6. Cooperating with and obtaining acceptance of others

The Contactor shall take all precautions necessary to align with the existing dry dock and synchro-lift operations and shall allow for compliance with all restrictions, obligations and protocols required by the Port Authority including obtaining all Permits, licenses, permissions and authorities required for his operations.

5.1.7. The Contractor performs the works and co-operates with:

The *Contractor* shall work in close co-operation with Dock Operations. No undertaking can be given as to the exact time sectional access to work areas can be provided by Dock Operations. The *Contractor* is to make contingent allowance for such eventualities in his programme.

Where services have to be removed or relocated or protected the Project Manager will, at the request of the Contractor, notify or negotiate with the owner or authorities controlling those services and, based on the outcome of the negotiation, instruct the *Contractor* on how to proceed.

5.1.8. Publicity

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.

5.1.9. The Contractor provides a notice board

a) The *Contractor* shall provide and erect a project name board that must first be approved by the Project Manager. The signboard must contain details of the following:
   - Client/Project Manager
   - Engineering & Quality Service Provider
   - Health and Safety Service Provider
   - Environmental Service Provider
   - Main Contractor

b) The sign board must be placed at a position pointed out by the Project Manager and remain in place for the duration of the full contract period.

c) The name board shall be of sound weather-proof construction, painted by an approved sign writer. No other name board shall be permitted on or adjacent to the Works with the exception of Safety Boards (as per the NOSA specification at the *Contractor's* expense) located at the main entrance to the sites and where required.

d) *Contractor's* sub-contractors are to display one name board of less than 2m² at the *Contractor's* site office at their own cost.

e) All name boards shall be removed at the end of defects liability period.

5.1.10. 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* shall ensure that the equipment provided, be it owned or rented, shall be in good working order and complies with all maintenance, licencing, safety and environmental requirements related to the specific equipment and the OHS Act and its regulations.

5.1.11. Site Services and Facilities

a) The *Contractor* shall provide all that is necessary for providing the Works (ie.: Such as water, electricity, lighting, platforms, surfacing etc.).

b) The Employer shall make available an area for the construction site and its facilities. It shall be the *Contractor's* responsibility to ensure that all the *Contractor's* facilities and equipment (including the site offices, material lay down area, equipment and construction site) are sufficiently cordoned off and are contained within these battery limits. The details of the construction site and its battery limits can be found in C4: Site Information of this contract.

5.1.12. Existing Premises, Inspection and Reinstatement

a) The *Contractor* shall take all precautions necessary to protect the integrity of surrounding structures. The *Contractor* shall be held accountable for any 3rd party damage to infrastructure or services caused by his employees and sub-contractors, in accordance with this contract.

b) The *Contractor* is required to attend a mandatory inspection, with the Employer, of the infrastructure in and around the construction site area and adjacent buildings before site establishment, in order to agree on its current condition.

c) Records and photographs will be taken during this inspection which will be used as a benchmark for reference if an incident occurs or if damage is identified at the end of the contract.

5.1.13. Facilities provided by the Contractor: General

a) The *Contractor* shall establish his construction offices, workshops and any other facilities within the prescribed battery limits of the site. All facilities established by the *Contractor* on the Site and Working Areas shall be done in a manner that does not adversely affect the environment. However, before construction can begin, the *Contractor* shall submit to the

Project Manager for his approval, plans of the exact location, extent and construction details of these facilities and the impact mitigation measures the *Contractor* proposes to put in place.

b) The plans shall detail the locality as well as the layout of the waste facilities for litter, kitchen refuse and workshop-derived effluents or waste. The *Contractor's* intended mitigation measures for any negative impacts on the site during construction shall be indicated on the plan.

c) The *Contractor* will have to make his/her own arrangements for communication facilities which will enable the Project Manager to make contact with him during normal office hours.

d) During the construction of the works, the site shall at all times be kept in a neat and tidy condition. The *Contractor* shall provide for the cleaning up and carting away of all rubbish and debris of whatever kind throughout the currency of the contract. The Project Manager may order the *Contractor* to stop all work, until such time as, in his opinion, this condition has been observed. The cost of disposal and any other fees payable for disposal shall be deemed to be included in the rates.

e) The *Contractor* shall, within one month of the date of completion of the works; remove from site all his equipment, material, stores and accommodation or any other asset belonging to him and leave the site in a tidy condition, to the satisfaction of the Project Manager.

f) The *Contractor* shall comply with all security requirements applicable to the site. No direct payment for security measures shall be made and the *Contractor* shall make adequate provision in his tendered rates for all security measures that are deemed necessary by him to protect and safeguard his staff, plant, materials and equipment.

5.1.14. Limitation of Contractor's Responsibility in relation to Site Services, Facilities and Equipment

Unless expressly stated as a responsibility of the Employer as stated under 3.1.11, Site services and facilities, 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.

5.1.15. Underground services, other existing services, cable and pipe trenches and covers

a) The *Contractor* shall take adequate precautions against damage to existing assets and injury to persons during the course of the work.

b) The *Contractor* will be responsible for the repairs, and the costs incurred in effecting such repairs, as a result of any damage caused to Transnet's property or others' property by the *Contractor's* staff during transporting, off-loading and carrying out of the required work.

c) The *Contractor* shall take all reasonable precautions to protect existing services during construction and, if applicable, during relocation of such services.

d) Any pipe, cable, conduit or other services of any nature whatsoever indicated to the *Contractor* and subsequently damaged as a result of the *Contractor's* operations shall be repaired and reinstated forthwith by the *Contractor* or by the Authority concerned, all at the expense of the *Contractor* and to the satisfaction of the Project Manager.

e) Whenever services are encountered which interfere with the execution of the Works and which are required to be moved and relocated, the *Contractor* shall advise the Project Manager, who will determine the extent of the work, if any, to be undertaken by the *Contractor* in removing, relocating, and reinstating such services.

f) Any work, required to be undertaken by the *Contractor* in the moving and relocation of services for which no provision is made in the contract documents, or for which no applicable tendered rates exist, will be classified and paid for as prescribed under Option B in Part C1.2.

g) Where the *Contractor* encounters existing underground services / existing services cables that may pose a risk to safety or the provision of the works, the *Contractor* shall undertake the following:

- Inform the TNPA Supervisor
- Conduct a site inspection with the Construction Manager and Project Manager
- Review risks and develop mitigation measures with the Construction Manager and Project Manager
- Continue works in line with agreed mitigation measures

5.1.16. Control of noise, dust, water and waste

a) The *Contractor* is to take appropriate measures to minimise the generation of noise and dust as a result of construction works, to the satisfaction of the Project Manager, or the person approved by the Project Manager.

b) The *Contractor* shall properly deal with and dispose of water leaking into the work areas to ensure that the Works are kept sufficiently dry for their proper execution. For this purpose, he

shall provide, operate and maintain in sufficient quantity such pumping equipment, pipes and any other equipment as may be necessary to minimise damage, inconvenience or interference.

5.1.17. Proprietary Brand Products

The contract document makes provision for the use of certain type proprietary products. The *Contractor* shall base his/her *Bidder* on the use of the products specified. Notwithstanding this requirement other products are not excluded for use but these would be considered as alternatives and the *Contractor* must provide with his *Bidder* suitable details of these products as well as the cost implication on his tendered rates.

The *Contractor* must provide for all specialist materials, including those specified in the document, written proof from the manufacturer that he or his proposed sub-*Contractor* is an approved applicator/installer of these products. The *Contractor* must also take cognisance of the guarantee requirements in the Project Specification. Failure to comply with these requirements may prejudice the adjudication of such a bidder.

5.1.18. Control of Work and Quality Assurance

It is an essential element of this contract that the control of the work; the Quality Control and Quality Assurance for his works; falls under the direct control of the *Contractor*. The *Contractor* will put in controls and processes to oversee and ensure the required standards are met. Should the tenderer have a specialist sub-contractor, special arrangements will be required in terms of their contractual arrangement to ensure that the above control can be realised. Such arrangements are to the tenderer's discretion but the tenderer must demonstrate that the arrangement is functional and workable to the entire satisfaction of the Project Manager.

The *Contractor* shall clearly demonstrate his/her experience with the specified proprietary products (or approved alternatives) via the drafting of a quality assurance programme (subject to the approval of the Supervisor). The quality assurance program shall in particular detail all hold points, recording of data, witness points, etc., for the relevant actions in which proprietary materials are required.

The Quality Control on site shall be structured, and the *Contractor* have a veto on the progress of the works. Attention to detail will be of prime importance. Should the quality be of an unacceptable standard, the Supervisor, who shall be the sole arbitrator as to the sufficiency of the standard achieved, shall request the *Contractor* to stop the particular section of the works and until the quality is of an acceptable standard.

The Quality Assurance Plan and Control Plans should be aligned with the requirements of the particular specification in this contract.

5.2. Completion, testing, commissioning and correction of Defects

5.2.1. The work to be done by the Completion Date

On or before the Completion Date, the *Contractor* shall have completed all works stipulated in the Works Information to the required standard and without defects.

5.2.1.1. Handover Acceptance

The Purpose of this section is to provide essential handover and acceptance information to all parties engaged in the construction, modification, demolition, refurbishment, manufacturing, installation and commissioning of plant and equipment at the Cape Town dry-docks. The information and guidelines required to achieve a smooth sequence between all construction and commissioning activities, and thereafter the successful start-up operations and transfer of ownership of plant and equipment to employer, Cape Town dry-docks.

a) This procedure provides for a sequenced, construction completion and checkout of plant / equipment leading up to the transfer of care, custody and control to Transnet**.**
b) This procedure adopts a two package handover system:
    - Quality Control Dossier
    - Management Package
c) Quality Control Dossier and Management Package Compilation

    - The *Contractor* shall in accordance with this procedure and requirements in the Purchase Order / Technical Specifications, compile the Quality Control Dossier and Management Package with the accepted contents.
    - The *Contractor* shall compile the Quality Control Dossier which includes the data book (format as stipulated in this document) in accordance with this procedure to ensure that all requirements have been met and the relevant documents are included in the Quality Control Dossier.
    - For multiple disciplines, e.g. new installations, fabrications, modification or welding Works, the QC Dossier shall be developed for each discipline or system.
    - Management Package: consists of:
    - Completed “Punch-List”, signed off by operations, area manager and the Engineers appointed 16.2 responsible for the area/unit.
    - Drawing Package “as-built”
    - Vendor Data Documentation as per Bill of Material of detail designs and as built documentation.

    The *Contractor* shall:

    - Collect and compile the Management Package in accordance with this procedure, to ensure all requirements have been met. This ensures that:
    - The QC Dossier has been signed off by Transnet and the Inspection Authority (where applicable)

- The plant/facility/equipment has been commissioned (or handed over) by and with operations,
- All required performance tests have been successfully carried out by operations and maintenance department,
- Copies of approved test run certificates have been inserted into the Management Package.
- All maintenance documents have been updated and new instructions been inserted.
- The *Contractor* submits his Quality Management System documents to the Project Manager as part of his programme under ECC3 Clause 31.2 to include details of:
- Quality Plan for the Contract
- Quality Policy
- Index of Procedures to be used and
- A schedule of internal and external audits during the Contract
- The *Contractor* develops and maintains a comprehensive register of documents that will be generated throughout the Contract including all quality related documents as part of its Quality Plan.

d) Code Data Book

The Code Data Book shall have the following content and format

The cover page should contain:

- Manufacturer / *Contractor*
- Engineering *Contractor* Authorised Inspection Authority (if applicable)
- Purchase Order Number
- Contract Number
- Equipment/ Plant / Works Description
- Manufactures Serial Number (if applicable)
- Codes and Standards

The content inside the book should be as follows:

1. Index of Contents
2. Release of Notes (*Contractor*/Client)
3. Detailed design drawings
4. "As-Built" drawings
5. Certificate of Compliance
6. Design Calculations
7. List of required spares
8. Material and Consumables Certification
   a) Material List
   b) Material Map (Outline Drawings)
   d) Heat treatment charts, NDT and mechanical testing
9. Inspection Reports
   a) Quality Control Plan
   b) Dimensional Inspection Report (sizes etc.)

c) Heat Charts and Certificates

10. Non-Destructive Testing Documents for drums and shafts

a) NDT Map

b) NDT Procedure Record Summary

c) NDT Personnel Qualification Record Summary

d) NDT Reports

11. Tests on Completion

- Introduction

The required tests on completion shall consist of the following:

- Pre commissioning
- Commissioning
- Trial operation
- Performance

The *Contractor* shall complete all pre-commissioning and commissioning tests on all works completed under this Contract.

In order to achieve this the *Contractor* shall fulfil the following requirements:

a) Development and supply of commissioning and test plans for the approval of the Project Manager

b) Implementation of formal handover procedures and documentation from construction to commissioning

e) Punch list Category Items

- Category A: Items which compromise safety and integrity of personnel, plant, equipment and infrastructure and must be completed following the pre-commissioning tests but prior to the commissioning and trial operation tests being undertaken
- Category B: Items which require correction prior operational acceptance and are required to be remedied following the commissioning and trial operation tests but before *Employer*s taking over
- Category C: Items required to be remedied during the defects notification period

f) Pre Commissioning

- The *Contractor* shall complete all pre-commissioning tests and all Punch List Category A items shall be compiled during these tests and be attended to prior to the commencement of the commissioning tests.

g) Commissioning

- The *Contractor* shall complete all pre-commissioning tests and all Punch List Category A items shall be compiled during these tests and be attended to prior to the commencement of the commissioning tests.

h) Trial Operation

- As soon as is practicable after completion of the commissioning tests, a 72 hour trial operation of the Plant shall take place.

i) Taking Over

- Prior to the *Employer* being required to take-over the Plant all The Punch List Category B items shall be remedied.
- The *Works* and the Plant shall be taken over when the Tests on Completion have been passed and punch List Category B items have been attended to.

5.2.2. The Contractor is permitted to carry out the following works after Completion:

a) The rehabilitation and cleaning of working areas.

b) The demobilisation of equipment off site.

5.2.3. Required Submission of documentation by the Contractor to the Employer before Completion Date

Item of work	To be completed by
Completion all of Works stipulated in the Works Information in line with the be performance requirements in Particular Specifications referenced in Clause 2.1	2 weeks of the Completion Date.
Approval and Sign of Works by the Supervisor and Project Manager	2 weeks of the Completion Date.

Table 1

5.2.4. Access given by the Employer for correction of Defects

a) The Employer will notify the *Contractor* of any defects which are to be remedied within the Correction Defect Period. All areas on the construction site shall be made available to the contractor.

b) All areas that are given to the *Contractor* for the correction of defects shall be properly cordoned off by the Contractor. Proper safety measures, as required by the Employer, must be adhered to at all times for the full duration of the defect correction undertaking.

6. Drawings Issued by the Employer

This is the list of drawings issued by the Employer at or before the Contract Date and which apply to this contract.

Note: Some drawings may contain both Works Information and Site Information.

Drawings	Drawing Numbers
Sturrock Dry Dock GA	TBH-106-V6-3-3034
Robinsons Dry Dock GA	TBH-106-V6-3-3001

Synchro-Lift	TBH-106-W3-3-3021 sheet 11
Electrical MV layout	H500206-1-413-E-SL-0011-01-11JV
General Arrangement of 20 ton Electrical Capstans	TBH-106-V6-3004
Machinery Details for 20 ton Electrical Capstans	N/A

Table 2

7. Management and Start Up

7.1. Management meetings

The *Contractor* shall attend site/contract management meetings at the Project Manager's request at a specified venue. It is envisaged that the meetings will be scheduled as follows:

- The *Contractor* will attend a kick off meeting at the start of the contract
- Progress and safety meetings will be held at least once every 2 weeks.
- The *Contractor* will attend a close out meeting at the end of the contract

a) The *Contractor* will be required to present all relevant information including early warnings of compensation events, quality plans, schedules, sub-*Contractor* management, and health, environmental, risk and safety issues in progress meeting.

b) All meetings are to be recorded by Project Manager or Project Administrator 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/s identified in the conditions of contract to carry out such actions or instructions.

7.2. Documentation Control

The *Contractor* shall submit all documentation complying with the Employer's standards and requirements. The Employer will issue all relevant documentation and drawings, including revisions, to the Contractor, but control, maintenance and handling of these documents will be the *Contractor's* sole responsibility and at its expense, and managed with a suitable document control system.

7.3. Health and Safety Management

The employer has a strict Health and Safety policy. Under the policy, the following apply:

a) The *Contractor's* attention is directed to the TNPA SHE Specification for Construction, and in particular to his Health & Safety Management Plan, which must be submitted with his bidder, as well as the requirements of the Occupational Health and Safety Act, 1993 (Act 85 of 1993) as amended and Regulations issued in terms thereof or un-repealed regulations issued in terms of the former Act no. 6 of 1983, in their entirety.

b) The *Contractor* makes available and ensures compliance to the TNPA SHE Specification for Construction by its employees and Subcontractors in the language of this contract.

c) The *Contractor* employs his own health and safety coordinator to ensure compliance with both TNPA SHE Specification for Construction and the Occupational Health & Safety Act and its latest regulations.

d) The *Contractor* shall provide a Health & Safety Management Plan addressing the requirements in the TNPA SHE specification (Annexure B1) and a Baseline Risk Assessment addressing the construction activities. The Project Manager has the right to request additional specific work method statements should, in his opinion, this be required.

e) The compliance with all applicable legislation, regulations issued in terms thereof, and the Transnet safety rules, shall be entirely at the *Contractor's* cost, and shall be deemed to be allowed for in the tendered prices.

f) Without derogating from the Act or any un-repealed regulations issued in terms of legislation, or without purporting to limit the *Contractor's* responsibilities, the following are brought to the *Contractor's* attention:

- The *Contractor* shall appoint a Health and Safety coordinator to liaise at least fortnightly with the Project Manager or Supervisor on matters pertaining to occupational health and safety.
- The *Contractor* shall advise the Project Manager of any hazardous, or potentially hazardous situation, which may arise from work being performed either by the *Contractor* or Sub-Contractor.
- A letter of good standing in terms of Section 80 (Employer to register with the Compensation Commissioner) of the Compensation for Occupational Injuries and Deceases Act 1993 (Act 130 of 1993) must also be furnished.
- All clauses in this contract pertaining to health and safety form an integral part of this contract, and any non-compliance therewith may be construed as breach of contract entitling the Employer to the appropriate remedies.

- The *Contractor* and his staff shall attend a compulsory induction course to be arranged by the Employer on or before the date when the site is made available to the Contractor.

g) The *Contractor's* appointed Site Representative and the Project Manager shall finalise a site-specific HIRA Hazard Identification and Risk Assessment) document, on the day of site handover to the *Contractor.* This site-specific HIRA document, based on a continuous HIRA, must cover site-specific hazards and the safe management of these hazards. The HIRA document must be signed by the above-mentioned representatives as well as the Supervisor, and be approved by the Project Manager, before any construction work can commence.

h) The OHS Act 85 of 1993 clearly states in the Safety Regulations Clause No. 2A: "INTOXICATION" An employer or user, as the case may be, shall not permit any person who appears to be under the influence of intoxicating liquor or drugs, to enter or remain at a workplace". The Employer enforces this legislation by means of its Substance Abuse Policy, and therefore reserves the right to do substance abuse testing on anyone who enters his premises.

i) The *Contractor* shall ensure that a suitably qualified safety representative is appointed and regular safety meetings are held. Written minutes of these safety meetings shall be forwarded to the Project Manager. All costs related to the safety aspects required under this contract will be carried by the *Contractor* and therefore be covered under the rates tendered.

j) During the construction period of the Works, a monthly report will be submitted of all incidents and accidents.

7.4. Environmental constraints and management

a) The *Contractor* is to provide an environmental method statement for any construction activity on Site. The method statements, provided and approved before the commencement of such activity, shall include:

- Establishment of construction lay down area
- Hazardous and non-hazardous solid waste management
- Storm water management
- Contaminated water management
- Prevention of marine pollution
- Hydrocarbon spills
- Diesel tanks and refuelling procedures

- Dust control
- Spoil dumping
- Sourcing, excavating, transporting and dumping of fill material
- Noise and vibration control
- Site division
- Emergency procedures for environmental incidents
- *Contractor's* SHE Officer
- Closure of construction laydown area

b) The *Contractor* must appoint a sufficient number of named assistants to the Health, Safety and Environment Officer to monitor environmental issues e.g. litter, spills, illegal activities, fence patrol, dust etc. These appointments, along with details of the individuals being appointed and job descriptions, must be sent to the Project Manager for his approval.

c) Where applicable, the *Contractor* shall provide job-specific training on an *ad hoc* basis when workers are engaged in activities, which require method statements.

d) The *Contractor* shall ensure that any Materials delivery drivers are informed of all procedures and restrictions (e.g. which access roads to use, no go areas, speed limits, noise, etc.) required by the EMP and Project Manager before they arrive at Site and off-load any Materials.

e) Progressive and systematic finishing and tidying-up will form an essential part of this contract. Under no circumstances shall spoil, rubble, materials, equipment or unfinished operations be allowed to accumulate unnecessarily.

f) The *Contractor* shall, at all times, comply with the statutes that prohibit pollution of any kind. These statutes are enacted in the following legislation:

- The National Environmental Management Act, 107/1998
- The National Water Act, 36/1998

g) The tenderer amount shall include for all costs to conform to the Environmental constraints and management requirements.

7.5. Quality assurance requirements

a) The *Contractor* shall provide a Quality Management Plan as part of his bid that addresses all aspects in this contract. The plan must align and describe how the requirements will achieved

and assessed. The Project Manager has the right to request additional specific work method statements should, in his opinion, this be required.

b) The successful *Contractor* shall comply with SABS ISO 9001:2000. Proof of compliance audits and their findings are to be made available on request.

c) The *Contractor* shall submit his proposed QCP) to the Project Manager for approval. Site Access will not be permitted until the QCP is to the Project Managers satisfaction.

d) Transnet will have the right to inspect the work at any time during the progress of the contract.

e) The *Contractor* submits his Quality Management System documents to the Project Manager as part of his programme under ECC Clause 31.2 to include details of:

- Quality Plan for the contract;
- Quality Policy
- Index of Procedures to be used; and
- A schedule of internal and external audits during the contract
- Manufacturer's Data Sheets and suitability statements
- QC Plan per Activity
- Application Method Statement
- Pre-examination and Acceptance of Substrate

f) The *Contractor* develops and maintains a comprehensive register of documents that will be generated throughout the contract including all quality related documents as part of its Quality Plan.

g) The Project Manager indicates those documents required to be submitted for information, review or acceptance and the *Contractor* indicates such requirements within his register of documents. The register shall indicate the dates of issue of the documents with the Project Manager responding to documents submitted by the *Contractor* for review or acceptance within the period for reply prior to such documents being used by the Contractor.

h) The Quality Plan means the *Contractor's* statement, which outlines strategy, methodology, resources allocation, Quality Assurance and Quality Control co-ordination activities to ensure that the works meet the standards stated in the Works Information.

7.6. Programming constraints

a) As identified in the Contract Data Part 2, the *Contractor* shall submit as part of the bid a proposed activity programme with the requirements as indicated in the Works Information and with specific reference to 31.2 of the NEC3 Engineering Construction Contract.

b) The programme shall be submitted in the form of Microsoft Projects Gantt chart.

c) It is expected that the project will run over a period of 12 months from contract signature to contractual close out.

d) Within two weeks of the contract award, the *Contractor* shall be required to submit a detailed and final construction programme in the form of a Microsoft Projects Gantt chart, setting out the intended progress of the works.

e) Once the Project Manager has approved the programme, it shall be adhered to by the Contractor, unless the approval of the Project Manager is obtained for any amendment that may be necessary.

f) The *Contractor* shows on each programme he submits the construction schedule with time allotted per activity with milestones and incorporates weather, operational requirements and when materials or equipment will be delivered to site.

g) The *Contractor* will be required to submit a cash flow forecast with each programme submitted, including the programme submitted with the bidder. The cash flow shall be in the form of an S-curve and shall be a cumulative representation of the monthly cost progression for the remaining duration of the contract. The cash flow forecast must align with the programme.

h) The preferred software package is Microsoft Projects.

i) The *Contractor* shows on his Accepted Programme and all subsequently revised programmes schedules showing the critical path or paths and all necessary logic diagrams demonstrating sequence of operations.

j) The *Contractor's* programme shows duration of all operations. This includes normal working hours which are from 07:30-16:00 and from Monday to Friday and abnormal working hours which falls outside normal working hours. If the *Contractor* requires this to be revised, approval must first be obtained from the Project Manager.

k) The *Contractor* shows on each revised programme he submits to the Project Manager a resource histogram showing planned progress versus actual, forecast completion date,

deviations from the Accepted Programme and any remedial actions proposed by the Contractor.

l) The *Contractor* submits programme report information to the Project Manager at monthly intervals in addition to the intervals for submission of revised programmes stated under Contract Data Part One.

m) The revised programme, in the form of a month look-ahead, shall show two (2) separate bars for each activity as per bullet points below so as to enable a comparison of the actual progress with the first program:

- the first programme activity bar, and
- the revised activity bar identifying the currently forecast start and finish dates of the activity, and the status (% complete for each activity)

n) Deviations of the “current” activity schedule from the “baseline” activity schedule will form the basis for assessing progress and performance.

o) The *Contractor* shall provide a monthly written status report or as may be required by the Project Manager from time-to-time. The report shall summarise progress and problems encountered during that month in respect of all parts of the work under the Contract. As a minimum the report shall include:

- progress against the Accepted Programme;
- list of milestones achieved during the period;
- status of design, procurement, and off-site works;
- deviations from the Accepted Programme and in particular, the forecast completion dates of activities which have or should have commenced;
- status of approvals;
- actual or anticipated problems with corresponding action plans to minimise the impact;
- summary of works planned for the following period, and
- cash flow status versus the original forecast.

7.7. Payment, Invoicing and Cash flow

The *Contractor* shall invoice on a monthly basis in accordance to the project progress and against the agreed project schedule and cash flow. All invoices must be submitted on or before the 20th of each month for payment after 30 days of acceptance.

7.8. Services and other things provided by the Employer

a) The employer will provide the *Contractor* with the following:

- Access permit to the Port
- Dedicated laydown area for offices, ablutions, tools and equipment
- Access to power at *Contractor's* cost

b) The employer will endeavour to provide the appointed *Contractor* with all available information that may facilitate the progress of the project. However, in cases where such information is not available, the *Contractor* shall point out to the Employer for advise on steps to be taken.

7.9. *Contractor's* management, supervision and key people

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 in the Employer's Works Information.

7.10. Contract change management

a) Change Management shall be implemented in line with the NEC ECC processes.

8. Procurement

8.1. Code of Conduct

Transnet 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 Procedure Manual (PPM);
- 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 Transnet Suppliers of Transnet's expectations regarding behaviour and conduct of its Suppliers.

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

1. Transnet will not participate in corrupt practices and therefore 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 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 Transnet employees. We expect our Suppliers to use our “Tip-offs Anonymous” Hot line to report these acts. (0800 003 056).

2. Transnet 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.
    - 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, 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.

8.3. 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.

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

Transnet National Port Authority

ENGINEERING REPORT: PART C

FUNCTIONAL SPECIFICATION FOR CAPSTANS UPGRADE FOR THE DRY DOCKS

For: Port of Cape Town - Ship Repair

Project Name: Detailed Design, Manufacture, Supply, Delivery and Installation of Capstans that are Hydraulically Driven at the Dry Docks in the Port of Cape Town

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Introduction & Location of Works

This Functional Specification is for the design and manufacture of the hydraulically driven capstans for the dry docks (Sturruck, Robinson and Synchro-Lift) in the Port of Cape Town.

The capstans shall be designed to the latest technological design standards such that they enhance efficiencies of the dry dock operations and ensure compliance with safety standards.

1. Scope of Supply

The scope of supply broadly encompasses the design, manufacture, delivery, commissioning and handover of capstans for the ship repair in the Port of Cape Town – complete in all aspects.

The supply includes (but is not necessarily limited to) the following main activities:

- The detailed design of the capstans, complete in all aspects, and approved and signed-off by professional engineers and the completion of all fabrication drawings relating thereto.
- The detailed design of the capstans electrical supply distribution network, complete in all aspects, and approved and signed-off by professional engineers and the completion of all fabrication drawings relating thereto.
- The detailed design of the capstans control and philosophy, complete in all aspects, and approved and signed-off by professional engineers and the completion of all fabrication drawings relating thereto
- The detailed methology and execution of the decommissioning of the existing capstans electrical distribution, complete in all aspects, and approved and signed-off by professional engineers and the completion of all fabrication drawings relating thereto
- The supply of design calculations for review and approval by engineers and the subsequent incorporation of any approved amendments agreed upon into the fabrication drawings.
- The manufacture of the drive system of capstans complete in all aspects, according to the latest standards and in compliance with all relevant codes, standards and specifications.
- The supply and Installation capstans as per required standards
- Carrying out comprehensive Quality Assurance and Control, including testing as required.
- Ensuring compliance with all Safety, Health & Environmental legislation and specifications.
- Compiling and maintaining a risk register, complete with mitigating actions.
- The delivery and manufacturing of the drive system of capstans to site and assembling of components or modules (if applicable).
- The testing and commissioning of the capstans on site in all ship repair facilities and handover to TNPA Operations.
- The training of TNPA staff in both operational and maintenance activities.
- The supply of all certification including test certificates (e.g welding) and certification required.
- The submission of all technical literature, including final detailed design calculations, catalogues, specifications wiring diagrams for all electrical and control circuits, as-built drawings in both DWG and print outs The copies should be 3 sets of hardcopy files and digital formats PDF and MS word.
- The supply of a detailed operation manuals for the capstans in 3 files hardcopy and 1 digital format PDF and MS Word

- The compilation and supply of a preventive maintenance plan and schedule for future maintenance, both minor and major; as well as Maintenance Manuals – including a list of critical spares.

2. Operational Requirements

The following parameters are necessary to suit the operations in and around ship repair:

- Capstan shall be field operated by a single person.
- Capstans shall be 20 ton (7 off) and 5 ton (22 off) pulling load respectively and installed within the three demarcated dry-dock area.
- The hauling/line speed shall continuously vary between 0 - 20 m/min.
- There shall be a central point for monitoring the tension in the rope, torque, line speed, oil inside the tank, system status and other critical operational aspects.
- Capstans shall be bi-direction with an easily accessible emergency stop button.
- The capstans shall be equipped with a hydraulic power unit
- The control for capstan shall be a foot pad.
- The capstans manoeuvring ability/process must not be dependent on the tide.
- The system required must be capable of being powered via ± 3 phase 400 AC.
- A suitable warning system (flashing lights, alarms etc.) must be incorporated into the design to alert the public and operational staff that the capstan is operational.
- The design must minimise the required use of specialist tools and equipment for operating and maintenance purposes.
- Safety considerations such as barriers, emergency stop buttons, color demarcations shall be done according to OSH Act.
- Appropriate signage shall be placed according to the OSH Act.
- The noise level for the capstans and rotating parts of the machinery shall be 85 DBA or less.
- All control and emergency stop buttons shall be suitably recessed to prevent accidental activation or depression of the emergency stop.
- All rotating parts shall be suitably guarded to prevent any accidents according to the OSH Act.

3. Design and Technical Requirements

3.1 Employer's Objective

The Employer, Transnet National Ports Authority, requires the *Works*, comprising the complete design and new-build of hydraulic drive system of capstans are required to replace the existing electrically operated capstans at the Sturrock, Robinson Dry Dock and Synchro-lift in the Port of Cape Town to be carried out. The Employer intends to appoint a Design and Build Contractor for the Works.

The Employer is of the opinion that the existing capstans is mechanically and structurally damaged, old and systems are technologically out-dated.

> *Note: The dry dock precinct is classified as a heavy industrial, operational environment requiring the Works to be planned and executed in a manner which results in minimal operational disruption and this requirement is considered to be a primary concern of the Employer.*

3.2 Design and Engineering Criteria

The Contractor shall study, prior to the commencement of its design of the capstans (hereinafter referred to as the "Works"), the requisite design criteria, calculations and information, data and designs required to ensure that the Works specified and provided by the Contractor shall result in the Works having suitable features and capacity for the project in respect of their design in order to meet the purposes of the Works.

The Contractor shall either concur with the basic descriptions, specifications and requirements provided as the Employer's preference or submit alternatives for consideration. The acceptance of the descriptions, specifications and requirements contained herein shall not relieve the Contractor of its responsibilities in terms of the design and engineering performance of the Works to be fit for their purposes.

Any design, supply and installation requirements stated herein for the drive system of capstans 'Design and Build' to be supplied by the Contractor indicates the conceptual design only and the preference of the Employer. The responsibility for accepting any conceptual designs lies with the TNPA and carrying out detailed design and adherence to the Codes and Standards remains solely with the Contractor who shall be liable for the entire design and supply of the Works. The supply of the Works and all its components should not be of lesser quality than indicated in the Contractor's Tender Documents that it will supply. The size, quality and operating parameters of the Works supplied by the Contractor shall not be less than those specified herein.

The Contractor shall ensure that the design of the Works including the Plant and other Goods is suitable for the project.

The preparation of the Contractor`s Documents including the designs and drawings of the Works shall be the responsibility of the Contractor. The Contractor shall ensure that its execution and completion of the Works comply with the Laws in the Country, the documents forming the Contracts and good engineering and construction practices, methods, equipment and procedures usually employed in engineering, design, procurement, construction, operation and maintenance.

3.3 Design Life

The capstans should be designed to have an operating life of a minimum of 40 years.
Accordingly, the supplier needs indicate what allowance has been made for a certain amount of loss of structural strength due to corrosion over the design life of the capstans to be built into the design.

3.4 General Dimensions

- The new 20 ton capstans shall fit into the existing pits and the 5 ton capstans shall be designed to fit into the existing available space and not cause obstructions for operational purposes.
- As-built drawings of the existing capstans and the existing pit will be supplied for information purposes. However, the supplier will be required to take detailed measurements on site to confirm the required dimensions.
- The capstans shall remain in the same position they are currently in.

3.5 Design Considerations for Operations and Safety

3.6 Civil Design Considerations

The civil design must be in accordance with all relevant standards and specifications and must cover (but not be limited to) the following aspects:

- A design life of 40 years.
- The physical dimensions as per existing pits.
- The plinths shall be modified to fit the new driving system and the hydraulic pack for 20 ton.
- All pits shall be designed to contain oil spillages
- All cracks and damaged concrete structure shall be repaired and properly painted.
- The 20 tons capstans cover for the pit shall be in such a way that it prevents water ingress.
- Suitable wire-way will be cleaned/cleared or constructed where required for the electrical distribution

Note: Any duplications observed within the various design consideration categories should not be seen as separate aspects but an amplification of that aspect duplicated.

3.7 Civil Design Deliverables

The deliverables, required as part of the Civil Design requirements and for review by an approved engineer must include (but not be limited to) the following:

- A full set of design calculations for all aspects listed above, cross referenced to the standards and codes utilised; as well as a full set of preliminary approved for construction drawings; which, after review and alterations as agreed to, shall constitute the official construction drawings.

3.8 Mechanical Design Considerations

The mechanical design must be in accordance with all relevant standards and specifications and must cover (but not be limited to) the following aspects:

- The system shall be designed for maintainability.
- The capstans is to be constructed of steel and provided with a robust marine grade corrosion protection system from an internationally recognised and reputable supplier and complying with the Standard Specifications listed below, as a minimum.
- 400v-AC 50 Hz electric hydraulic power pack of adequate capacity to operate the capstan.
- A hydraulic tank, of adequate capacity, to be installed. Care to be taken that hydraulic system operates at normal temperatures for Cape Town weather conditions.
- Hydraulic tank to be provided with filling cap, breather, drain, glass gauge and filters. The hydraulic oil to be " environmentally friendly" type (vegetable hydraulic oil).
- The hydraulic pumps to be connected via seamless precision steel pipes to the hydraulic equipment.
- When equipment is not operational, pump to discharge oil back into the hydraulic oil tank.
- All valve system will be stainless steel or durable for coastal area.
- All solenoid and connections will have LED indication for operational activity.

3.9 Mechanical Design Deliverables

The deliverables, required as part of the mechanical design requirements and for review by the project team, must include (but not be limited to) the following:

- The design of all gears, drive shafts, coupling, any other piping arising from the contractor's final designs, pipe supports, pipe fittings, tanks, dip trays and valves.
- The design of hydraulic pack with all minimum requirements.
- A full set of design calculations for all aspects listed above, cross referenced to the standards and codes utilised; as well as a full set of approved for construction drawings; which, after review and alterations as agreed to, shall constitute the official construction drawings.
- The design to incorporate ease of access to all hydraulic equipment when mounted within an enclosure or on ground level

3.10 Electrical Design Considerations

The electrical design must be in accordance with all relevant all standards and specifications and must cover (but not be limited to) the following aspects:

- Any electrical motors (for pumps etc.) must have an IP rating of 54.
- The incorporation of temperature controlled anti-condensation heaters for all electrical enclosures and motors will be included.
- The main current operating voltage is 400 Volts, being the voltage between the phases of the 3 phase, 4 wire 50 Hz system to which the capstans power supply cable will be connected for operation.
- The design will allow for suitable sized cable to each capstan supplied from suitable designed sized breaker
- Suitable operating control circuit voltage for contactors, relays, indicating lights and meters, etc. is to be provided.
- The main switch board is to be located centrally within the capstans pit for 20 tons and on top for the 5 tons.

3.11 Electrical Design Deliverables

The deliverables, required as part of the Electrical Design requirements and for review by an independent Electrical Engineer, must include (but not be limited to) the following:

- The design of the electrical power distribution within the capstans
- The design of the electrical power distribution from the substation or supply point to the capstans
- The design/specification of all pump motors, valve actuators, ventilation fan motors etc.
- The design of an emergency back-up power supply for strategic components, if deemed necessary as part of the overall operational design.
- A full set of design calculations for all aspects listed above, cross referenced to the standards and codes utilised; as well as a full set of preliminary AUC (Approved for Construction) drawings; which, after review and alterations as agreed to, shall constitute the official construction/installation drawings.

3.12 Control and Information System Design Considerations

The instrumentation and control design must be in accordance with all listed codes and specifications and must cover (but not be limited to) the following aspects:

- The capstans system shall be monitored through centrally located SCADA system.
- The control, monitoring and interlocking of capstans operations shall be carried out by means of a Programmable Logic Controller (PLC) using hard-wired safety circuits and inputs/outputs (IO) systems. The particular make of PLC shall be readily available and supported in South Africa. The model utilised shall be of the latest technology on the market and the latest model available in the particular range
- Stand-by power should be incorporated into the design for the supply of power to the PLC and capstans management computer system for at least 15 minutes in the event of a power failure; after which time an automatic controlled shutdown shall take place.

3.13 Control and Information System Design Deliverables

The deliverables required as part of the Control and information Design requirements and for review by an independent Instrumentation Engineer, must include (but not be limited to) the following:

- The design of the Control and Instrumentation system throughout the capstans including interlocks to prevent conflicting operations from occurring simultaneously, if necessary.
- The specification of the Operating System and software for the operation of the PLC.
- The design of the SCADA system, specifying in detail all display screens to be developed which would cover the control and monitoring of all plant as well as fault annunciation by means of graphics and text. Also included should be extent of storage of operational and condition monitoring data, fault indication and alarm logging screens and a fault-finding process.

4. Standards and Codes

Other general applicable codes and regulations include:

- OHS Act (Act 83 of 1993)
- Construction Regulations
- NEMA
- SANS

5. Design Review: Approved for Construction Drawings

The completed design deliverables as specified in section 3 shall be submitted to the Employer for review by an independent panel of experts appointed by the Employer.

Any suggested modifications/alterations or additions to the design emanating from this process will be subject to discussion/negotiation with the Contractor as to the inclusion thereof within the final design. It is of paramount importance that the Contractor provides written confirmation as to the acceptance by them of any changes and the assumption of full ownership of the final design resulting from this process.

As there are various disciplines involved (structural, mechanical, electrical, instrumentation and control), it is envisaged that the design review can be carried out in phases and that it will not

be necessary to have every aspect fully complete before commencing with the design review process.

A review programme and schedule will be compiled jointly by the Contractor, Managing Contractor and the Employer in consultation on award of contract.

Any agreed alterations emanating from this process will be incorporated into the draft construction drawings, which will then be signed off as official "Approved for Construction" drawings.

Once this process has been concluded the contract will move into the Construction Phase.

6. Manufacture & Construction

The scope of the manufacture and construction broadly encompasses the following aspects:

- Project management of the execution of the Works and the design and supply of other Goods including planning, scheduling and reporting to the Employer in accordance with best practice project-management and all relevant Acts (eg. OHS, NEMA,ISO), codes and particular specifications.
- Decommissioning of existing capstans including the mechanical and electrical components
- Removal and disposal, as approved by the Employer, of all scrap created by the removal of the capstans to an approved waste disposal site
- The implementation of an appropriate quality system including Quality Control Plans (QCPs) to demonstrate compliance with the requirements of the Contract and stringent quality control for all Plant and Materials.
- Construction site surveys as required.
- The selection of suitable materials (where not already specified herein).
- The procurement of the Goods.
- Workshop and offsite inspection and testing.
- Preparation and protection of exposed Plant and structural surfaces in compliance with the relevant Codes and Standards.
- Packing, marking and protection for shipping / transport of the Goods
- Procurement, transportation and transfer supervision of the Goods
- Scaffolding
- Lifting equipment for erection
- All structural, mechanical, electrical and instrumentation and control work required for the Works (including piping, pipe-fittings, valves, pumps, corrosion protection etc.) in accordance with the relevant codes, standards and particular specifications.
- Construction, erection, assembly, installation and supervision of the Works in accordance with all relevant Acts, codes, standards and particular specifications.
- Ensuring that the completed Works complies in all aspects with the relevant Codes, Standards and any other applicable statutory requirements.
- Inspection, quality control, site security and monitoring, NDT testing, documentation, generation of quality and management packs/dossiers.
- Specialist installation and installation supervision
- All specialised tools necessary for the installation of the Plant and its operation and maintenance
- Name plates and name plate data

- Removal and disposal, as approved by the Employer, of all scrap and rubble generated by the Contractor within the construction/ launching site to an approved waste disposal site.

7. Delivery to site, Operational site & Commissioning

It is envisaged that the capstans will be manufactured in the Contractor's workshop either in its entirety or parts that will be assembled at the operating site.

7.1 Delivery to Site

The ship repair facility within the Port of Cape Town will be made available.

The Contractor must specify up-front the space and time required at the docks for the assembly of the capstans so that TNPA has sufficient warning to be able to make adequate provision therefor.

A data sheet containing all the necessary relevant information of the dry docks, (dimensions, capacity etc.), required for the design and launching of the capstans is supplied on drawings attached.

NOTE: The Contractor may offer an alternative arrangement for the delivery and assembly of the capstans, but this must be specified in full up-front for ratification by TNPA.

7.2 Testing & Commissioning

Once Capstans have been installed, it will be the responsibility of the Contractor to undertake final testing and the commissioning of the capstans in full with handover to TNPA operations on completion thereof.

The period required for this must be made known well in advance (including the actual date of commencement thereof) so that adequate warning associated with the commissioning, may be given to the ship repair operations.

It is envisaged that TNPA operational and maintenance staff will be involved with the final testing and commissioning as the final stage of the training.

8. Handover

Full handover of the Works shall cover the following aspects:

- Training of Employer's staff both preliminary theoretical training and practical on-site training during commissioning and handover.
- Supply of list spare and order of importance
- Supply of all Standard Operating Procedures (SOPs) for the operation and maintenance of the capstans

- Supply of all operation and maintenance manuals in sufficient detail to enable the Employer to operate, maintain and repair the capstans and ancillaries.
- All documentation required for statutory and regulatory compliance or certification.
- Supply of all the Contractors documentation including all designs, drawings, "as-built" drawings, project controls, data packs, wiring diagrams, etc., together with all test results and certificates
- Supply of any warranty and/or guarantees as stipulated by the Employer and/or as offered by the Contractor.

9. Annexures

9.1 Drawings – Annexure B

PART C3: SCOPE OF WORK – PORT OF DURBAN

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C3.2	*Contractor's Works*	69
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PART C3: SCOPE OF WORK

SECTION 1

1 DESCRIPTION OF THE *WORKS*

1.1 Executive overview

This scope of *Works* is for the detailed design, manufacture, supply, delivery and installation of Capstans that are hydraulically driven as well as final testing, commissioning and handover to the *Employer.*

The Capstans at the Durban Dry Dock has been identified as one of the infrastructure assets requiring remedial works to return it to its original operational condition. The scope of the remedial Works is at present undefined.

TNPA wants to appoint a service provider to design, manufacture desired components, assemble, install and commission the works including the scope of the remedial Works and the required conversion of electrical driven system to a hydraulically driven system.

Port of Durban Dry Dock is equipped with eight (8) capstans which were installed in early the 1960's. These capstans are used to sway the vessel and hold it in position ensuring that the keel of a vessel is centrally positioned to the centreline of the docking blocks to prevent the vessel from rolling.

Capstans are designed to pull heavy loads, they consist of a vertical drum which can be rotated and around which a cable can be wound. Capstans are either powered electrically, hydraulically and pneumatically. The Dry Dock uses electrically driven capstans, 6 of which are using Direct Current (DC) motors and drums can be rotated in both directions while the other 2 are using Alternating Current (AC) motors and these can only be rotated in one direction only and manually rotated in the other.

It must be noted that docking a vessel at the Dry Dock is impossible without the capstans. The existing capstans in Dry Dock can be considered ancient due to age, manuals and drawings are no longer available which compromises the quality of maintenance for the equipment

The assembly of a typical capstan at the Port of Durban has its drive assembly located underground in a pit. The drum is above surface. The two parts (above

and below surface) are joined by a vertical spindle shaft where the final gear wheel is mounted. The steel rope coils and reels on the drum during operation.

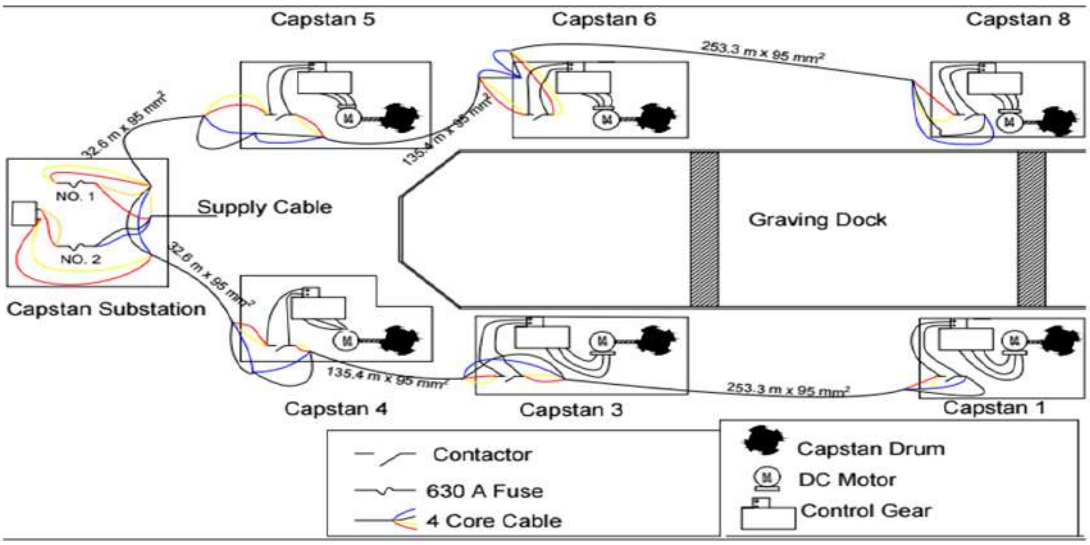


Figure 1: Diagram of the Prince Edward Dry Dock Capstans (Port of Durban)

A high level summary of the *activities* to be executed by the *Contractor* are presented below:

- Engineering design and drawings by Professional Engineer, specifications and quantity estimation
- SHERQ compliance
- Project and construction schedule management
- Inspection, testing and associated report generation. It is expected that during the execution of the *Works*, the *Contractor* shall identify damaged or corroded steelwork and concrete work on the drums, chambers and bases. The *Contractor* shall adhere the following process:
  - Immediately inform the *Project Manager* in writing as well as visually (by site visit) of the damaged drums and concrete bases.
  - Supply an Assessment report, for the *Supervisor* approval, detailing quantity for repair, the design and procedure to be followed in the repair, repair drawings and any material specifications pertinent to the repair.
- Sub-*Contractor* management

- Demolition and waste disposal. All scrap components is the property of TNPA, the *Contractor* shall lay down the scrap components in a designated area and TNPA shall dispose of such
- Repairs and modifications
- Welding: design, NDT, methodology and procedures
- The design scope includes gears, shafts, lubrication system, the MCC, control system, plinths for gearboxes and motors (as old footprints will be different from new equipment), drainage system (waste management) and choice of infrastructure to support the design
- Repair and installation of new electrical systems
- Installation of a marine grade, 5 year guaranteed corrosion protection system
- Commissioning and hand over for operation

Port of Durban Dry Dock is equipped with eight (8) capstans which were installed in early the 1960's. These capstans are used to sway the vessel and hold it in position ensuring that the keel of a vessel is centrally positioned to the centreline of the docking blocks to prevent the vessel from rolling

Note: Only Contractor's that are able to demonstrate sufficient recent experience in design capability integrating electrical supply with hydraulic power system/packs. Gear design, Maintenance of big spur gears and gear trains, Heavy rotating equipment similar to capstans, winches, and/or winders systems shall be considered acceptable for executing the Works. The Contractor shall supply sufficient experiential information and references with the tender to enable the Employer to determine their level of experience.

1.2 *Employer's* objectives

The *Employer*, Transnet National Ports Authority, requires the *Works*, comprising the design, manufacture, supply, delivery and installation of a Capstans that are hydraulically driven at the Prince Edward dry dock to be carried out. The *Employer* intends to appoint a Design and Install *Contractor* for the *Works*.

The *Employer* is of the opinion that the capstans and ancillary systems are technologically outdated. Therefore the *Contractor* shall specify modern technology for ancillary systems and ensure the optimisation.

Note: The dry dock precinct is classified as a heavy industrial, operational environment requiring the *Works* to be planned and executed in a manner which results in minimal operational disruption and this requirement is considered to be a primary concern of the *Employer*.

1.3 Interpretation and terminology

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

Abbreviation	**Meaning given to the abbreviation**
Codes and Standards	Means the design and construction codes and standards that are applicable to the *Works*
Guaranteed performance parameters	Means the performance parameters and values stipulated in the Guaranteed Performance Schedule contained herein that the *Contractor* warrants and guarantees to the *Employer* that the Plant will achieve when being operated
Shall	Means that the requirement is mandatory
CA	*Contract* Administrator
CQA/QCM	*Contractor's* Quality Assurance/Quality Control Manager
CDR	*Contractor* Documentation Register
CDS	*Contractor* Documentation Schedule
QCP	Quality Control Plan
AIA	Approved Inspection Authority
CSHEO	*Contractor's* Safety Health and Environmental Officer
CHSMP	*Contractor's* Health and Safety Management Plan
CM	Construction Manager

PSIRM	Project Site Industrial Relations Manager
PSPM	Project Safety Program Manager
PSSM	Project Site Safety Manager
ProjM	*Project Manager*
ProjEM	Project Environmental Manager
ProjEO	Project Environmental Officer
QA	Quality Assurance
SANS	South African National Standards
SES	Standard Environmental Specification
SHERQ	Safety, Health, Environment, Risk and Quality

2 ENGINEERING AND DESIGN

2.1 *Employer*'s Design

The preliminary design work for the permanent *Works* has been undertaken by professional service provider on behalf of the *Employer* and the *Contractor* shall use this work only as a reference design for his detail design work. The reference design can be found in Engineering Report Annexure A.

2.2 *Contractor* Design

The *Contractor* shall undertake the design work for the facility including the designs for all temporary *Works*.

A summary of the *Employer*s requirements for the Plant and other Goods to be supplied by the *Contractor* and the execution of the *Works* is set out below, but is provided for introductory purposes only and is not exhaustive of the *Employer*s requirements and cannot be used a basis for the final design.

The supply of all necessary *Contractor's* Equipment and *Contractor's* Personnel to properly perform the *Contractor's* obligations under the Contract including:

- Project management of the execution of the *Works* and the design and supply of other Goods including planning, scheduling and reporting to the *Employer*
- The implementation of QCP`s to demonstrate compliance with the requirements of the Contract.
- Construction site surveys as required
- Ensuring that the completed *Works* shall comply with the Codes and Standards and any other applicable statutory requirements
- Selection of suitable materials (where not already specified herein)
- Procurement of the *Goods*
- Detailed design by the *Contractor* (including all drawings), purchase, fabrication, manufacture, supply, installation, testing, commissioning and trial operation of all Plant and Goods required to meet the *Employer*s Requirements for the Project. The design scope also includes gears, shafts, lubrication system, the MCC, control system, plinths for gearboxes and motors (as old footprints will be different from new equipment), drainage system (waste management) and choice of infrastructure to support the design.
    - Design of the *Works*
    - Retire, remove and replace all DC/AC Motors and convert to Hydraulic drive.
    - The hydraulic system must be a complete power pack comprising:
    - Stainless steel reservoir,
    - Stainless steel control panel,
    - Robust stainless steel pedestal
    - Load sensing (energy efficient) hydraulic system with electro and manual lever proportional speed control
    - Pressure transducer

- Built-in hydraulic fail safe disc brake
- Hydraulic load holding valves
- Filtration system
- Planetary gearbox
- Motors
- Bell housings
- Detailed functional specification
- Detailed performance specification report for the capstans under all operational modes

- The new system should have sealed self-lubricating bearings to replace the existing brass bush bearings. The advantage with this type is the fact that it does not need lubrication. The lubrication method of the main spur gears will be improved. The system will also be provided with drip trays to contain spillage and leakages. A facility will be made to pump out oils and water if the capstan pits are washed. The control philosophy includes electric VSDs and PLC.
- As part of the deliverable, the Turnkey contractor is expected to put in place a Condition Monitoring Strategy for the new installation. The Dry Dock is using SAP Maintenance module, and therefore the contractor must link to this system. This will give opportunity to the Maintenance team to utilise SAP Maintenance system to its full capability and relevant maintenance reports will be generated periodically as agreed with the department head. Artisans must report correctly so that history becomes useful when needed either to do Root Cause Failure Analysis or for planning purposes.
    - Workshop and offsite inspection and testing
    - Preparation and protection of exposed Plant and structural surfaces in compliance with the relevant Codes and Standards
    - Packing, marking and protection for shipping / transport of the *Goods*
    - Procurement, transportation and transfer supervision of the *Goods*
    - Lifting equipment for erection

- Supply of all design calculations, design criteria, static and dynamic loadings pertinent to the *Works* and associated and surrounding structures that have been signed off by a Professional Engineer
- Construction, erection, assembly, installation and supervision of the *Works*
- Specialist installation and installation supervision
- All specialised tools necessary for the installation of the Plant and its operation and maintenance
- Name plates and name plate data
- Site inspection and testing
- Removal and disposal, as approved by the *Employer*, of all scrap and rubble generated by the *Contractor* with the site to a demarcated area on the site
- Supply of Commissioning and Operating spares
- All documentation for statutory and regulatory compliance, project controls, training and the operation and maintenance of the *Works*
- Supply of all the *Contractor's* documentation including all designs, drawings, "as-built" drawings, operation and maintenance manuals in sufficient detail to enable the *Employer* to maintain and repair the plant together with all test certificates and a detailed, priced recommended Operating Spares list

- All tests on completion and results
- Training of the *Employer*s staff

2.2.1 *Works* excluded from the *Contractor's* Scope of *Works*.

- *Works* associated with future expansions.
- Permanent diversion of existing services within the site.

2.2.2 Design and Engineering Criteria

The *Contractor* shall study, prior to the commencement of its design of the Plant, other Goods and the *Works*, the requisite design criteria, calculations and information, data and designs required to ensure that the Plant and other Goods and the *Works* specified and provided by the *Contractor* shall result in the Plant and other Goods and the *Works* having suitable features and capacity for the Project in respect of their design in order to meet the purposes of the *Works*.

In regard to the Plant and other Goods to be supplied by the *Contractor* it shall be the responsibility of the *Contractor* to ensure that the Plant and other Goods chosen are suitable to meet the requirements of the project.

The *Contractor* shall either concur with the basic descriptions, specifications and requirements provided as the *Employer*s preference or submit alternatives for consideration. The acceptance of the descriptions, specifications and requirements contained herein shall not relieve the *Contractor* of its responsibilities in terms of the design and engineering performance of the Plant and other Goods to be fit for their purposes.

Any design, supply and installation requirements stated herein for the Capstans to be supplied by the *Contractor* indicates the conceptual design only and the preference of the *Employer*. The responsibility for accepting any conceptual designs, carrying out detailed design and adherence to the Codes and Standards remains solely with the *Contractor* who shall be liable for the entire design of the *Works* and supply of Plant and other Goods. The supply of the Plant and all its components should not be of lesser quality than indicated in the *Contractor*'s Tender Documents that it will supply. The size, quality and operating parameters of the Plant and Goods supplied by the *Contractor* shall not be less than those specified herein.

The preparation of the *Contractor*`s Documents including the designs and drawings of the *Works* shall be the responsibility of the *Contractor*. The *Contractor* shall ensure that its execution and completion of the *Works* comply with the Laws in the Country, the documents forming the Contracts and good engineering and

construction practices, methods, equipment and procedures usually employed in engineering, design, procurement, construction, operation and maintenance.

2.2.3 Scope of Work

The *Works* pertinent to the Capstans are the following:

New Technology (All capstans hydraulically driven system)

2.2.3.1 20 T DC Capstans

6 x 20T – each capstan will need the following

- Recondition the drum, sand blast and repaint, coat with rust resistant coating internally
- Package of hydraulic pack, motors with new gearboxes
- New coupling
- New brake system
- New approved Lubrication system
- Replacement of brass bush bearings
- Civil works to prepare installation of the new equipment and to allow for proper water or oil drainage
- Speed control and direction of drum via the Hydraulic Pack
- Direction and braking also via hydraulic pack, directional and or control valves
- The system must be capable of operating at variable speed
- Provide Remote I/O compactable with Schneider M580 PLC or similar approved product
- 2 Projects that are going to be linked back to the SCADA system to control and monitoring various machinery equipment installed, which include Pump House Upgrade, Firefighting System projects. Allow for little bit of space I/O

2.2.3.2 5T AC Capstans

2 x 5T – each capstan will need the following:

- Package of hydraulic pack, motors with new gearboxes
- New coupling
- New brake system
- New approved Lubrication or similar approved product
- Replacement of brass bush bearings Civil works to prepare installation of the new equipment and to allow for proper water or oil drainage
- Direction and braking also via hydraulic pack, directional and or control valves
- The system must be capable of operating at variable speed
- Provide Remote I/O compactable with existing Schneider M580 PLC or similar approved product.

2.2.3.3 Electrical Works

The works information entails the upgrade of LV shore supplies at Dry dock. The scope of work to be carried out by the contractor shall cover, but is not limited to the following:

a. Supplying, delivering, installing, testing and commission of 10 x LV shore supply kiosks.
b. 1 x 400V 800A and 5 x 400V 400A LV shore supply kiosks shall be rated at a prospective short-circuits current of 35 kA and 4 x 400V 60A rated at 20 kA.
c. Supplying, delivering, installing, termination and testing of LV cables.
d. Supplying, delivering and installing of capstan LV cables and 160mm PVC pipes.
e. Supplying, delivering, connecting, and testing of LV cables joints.
f. Construct new concrete foundations for all 10 x LV kiosks.
g. All LV shore supply kiosks must be protected with a crane rail barrier. The crane rail barrier must be permanently fixed in the ground. The assembled crane rail barriers will be free issued.
h. Positioning the free issued crane rail barriers on all the LV kiosks.

i. Precast concrete ducting must be installed between all LV shore supply kiosks and the Dry dock edge.

j. Handing over the completed project to Transnet in a proper working order and as per all relevant standards and regulations.

The detailed scope of work with drawings is included in this works information as Annexure B

2.2.4 Envisaged Project Rollout

It is envisaged that the project shall be rolled out as follows:

- Detail inspections of the capstans including base steel plates and drums removals in order to determine underlying steel corrosion extents. Any latent/hidden defects, corroded or damaged steel undiscovered and arising due to the nature of the *Works* shall immediately be raised formally in writing with the *Project Manager* as well as visually (by site visit).
- Supply an engineering assessment report, for the *Supervisor* approval, detailing the steel quantity for repair, the design and procedure to be followed in the repair, repair/fabrication level drawings and any material specifications pertinent to the repair
- Approval of proposed designs and repair proposals by the *Contractor* and an approved (by the *Project Manager* and *Supervisor*) Third Party Inspection Authority for the *Contractor*
- Install bracing steel as per *Contractor* generated and *Project Manager* approved report
- Disconnection and re connection of the capstans in sections. All processes flows and line connections shall be marked by the *Contractor*, but before disconnection the *Supervisor* shall approve the process. This activity shall be included in the *Contractor*`s generated QCP for the dismantling scope of activities
- Obtain statutory certificates, if relevant, for the repairs

2.2.5 Guaranteed Performance Requirements after *Works* Completion

- The overall as-built dimensions' layout of the capstans must be maintained, thus after installation the position must be identical as before the new installation

- The new installations shall be guaranteed

2.3 Applicable Codes and Standards

The following are applicable:

Corrosion Protection	EEAM-Q-008

2.4 Corrosion Protection

TNPA requires that the *Contractor* supply, install and guarantee a robust marine grade corrosion protection system for use on the capstans drums and bases. The *Contractor* may select either a 3-Coat or 1-Coat system.

The corrosion protection system selected for use shall be from an internationally recognised and reputable supplier. The selected corrosion protection system shall carry a minimum 5year guarantee, defined as a maximum of 1% of the total area of corrosion protection breakdown per year. The *Contractor* shall be required to repair yearly, any corrosion protection breakdown exceeding 1% of the total surface area. The paint supplier shall carry the guarantee for the first 5years. A guarantee certificate, from the paint supplier, is required prior to the construction *Works*.

The final paint selection by the *Contractor* shall be approved by the *Project Manager* and *Supervisor* before its application to the capstans drums and bases.

<u>Sequence of Corrosion Protection Application – 3 Coat System</u>

- High pressure wash, clean and remove oils and contaminants
- Descale
- Grit blast to SA 2 ½.
- Remove all slag and waste
- Stripe coat using 1st coat primer: angles, stiffeners, edges, corners, welding seams and all areas inaccessible by spray painting
- Spray 1st primer coat to all surfaces
- Allow sufficient drying time
- High pressure wash to remove dust before next coat application
- Stripe coat using 2nd coat primer: angles, stiffeners, edges, corners, welding seams and all areas inaccessible by spray painting
- Spray 2nd primer/intermediate coat to all surfaces
- Allow sufficient drying time
- High pressure wash to remove dust before final coat application
- Stripe coat using final coat: angles, stiffeners, edges, corners, welding seams and all areas inaccessible by spray painting
- Spray final coat to all surfaces

- Allow sufficient drying time

Paint Specification Required – 3 Coat System

- 1st Coat Primer to be 150 microns DFT
- 2nd Coat Primer to be 150 microns DFT
- Final Coat to be 160 microns DFT

Paint Application

The application instruction covers surface preparation, application equipment and application details for corrosion protection to steelwork according to the

requirements of IMO Resolution MSC.215 (82): Performance Standards for Protective Coatings on Ship Steelwork.

- The steel surfaces shall be prepared so that the coatings achieve an even distribution at the specified nominal dry film thickness. Adequate adhesion ensured by removing weld spatter and any other surface contamination
- All welding seams shall be partially dressed to remove irregular profiles
- Surface pores, pits and craters shall be sufficiently open to allow penetration of the paint
- Sharp edges shall be treated to a round radius of minimum 2mm
- Before blasting any deposits of grease or oil must be removed from steel using a suitable detergent followed by fresh water hosing
- Minor spots of oil grease may be cleaned with thinner and clean rags
- Steel must be abrasive blast cleaned to SA 2 ½
- Welds as well as shop primed areas with damage, burn marks and rust must be blasted to SA 2 ½
- Surfaces with deposits of black iron oxides from gas cutting markings shall be cleaned by light abrasive sweep blast
- Welds coated with temporary primer after welding must be cleaned by hard abrasive sweeping, preferably abrasive blast

- Spot checks for possible salt contamination of the surfaces must be executed
- When blasting the importance of working systematically must be stressed. Poorly blasted areas covered with dust are very difficult to locate during the blast inspection made after the rough cleaning. Dust must be removed just before application of the paint to a dust quantity rating "1" for dust size "3","4","5". Lower dust size classes shall be removed from the surface if visible without magnification
- Overlap zones must be treated with great care
- Damage caused by possible over- blasting must be avoided; paint edges must be feathered and consecutive layers of paint coatings given larger and larger overlaps
- The relative humidity shall be 85% or below, the steel temperature shall be 3-5 degC above the dew point
- The paint layer must be applied homogeneously and as close to the specification as possible

- The finished coatings must appear as a homogeneous film with a smooth surface. Any defects of bubbles, voids, visible abrasive residue shall be marked and appropriate repair affected

2.5 Bill of Quantities

The rate supplied by the *Contractor* per item shall incorporate the following:

- Design & Construction Drawings
- Procurement
- Manufacturing
- Installation
- Testing
- Commissioning

Thus the *Contractor* shall claim against these items on the following basis:

- Procurement = 10%
- Manufacturing = 30%
- Installation=40%
- Commissioning=20%

The stated percentages shall be applied to the components to arrive at a breakdown for each of the items. The claim that shall be certified by the *Project Manager* shall then incorporate these percentages as well as the proven percentage progress on each of the items. The *Contractor* shall substantiate their progress to the approval of the *Project Manager*.

2.6 Punitive Measures

Actions to be Instituted Against the *Contractor* Resulting from the Issuing of NCR`s to the *Contractor* for First Time and/or for Repeat/Similar Non-conformities

Should the *Contractor* breach any of its accepted and approved designs, methodologies, procedures, practices, techniques, construction norms, specifications, Codes or Standards pertaining to the project resulting in an NCR

being issued to the *Contractor*, the *Project Manager* shall institute their entitled discretionary procedures/powers as follows:

- The *Contractor* shall remedy, following the *Supervisor*`s guidance and/or to the *Project Manager*`s acceptance, the defect for which the NCR was raised, with the complete cost of the remediation being carried by the *Contractor*. Further, while the *Contractor* may not have a financial penalty instituted against them in this instance, the time implication/impact of the rework that must be completed by the *Contractor* shall in no way negatively impact/prejudice the project's approved schedule i.e.: Any late completion by the *Contractor* possibly resulting from the re-*Works* due to NCR close-out requirements shall not be considered as mitigation against the enforcement of punitive penalties against the *Contractor* as stipulated in the Contract. The Client shall record impacts to the schedule resulting from NCR close-out requirements, in detail, and shall use these time-delays as justification for the enforcement of penalties against the *Contractor* should that scenario arise.
- Any subsidiary services, engineering or otherwise, that are disenabled from performing any services/duties due to *Contractor's* performing NCR close-out requirements shall issue the Client with a standing time invoice, which the Client shall use to extract the punitive costs for reimbursement from the *Contractor* i.e.: the *Contractor* will be fully and solely responsible for all these punitive costs.

2.7 Service and Maintenance

For all Plant and *Works*, the *Contractor* shall provide the *Project Manager* with the operating and maintenance instructions. These documents shall be in sufficient detail to enable the *Employer* to operate, maintain, dismantle, reassemble and adjust all parts of the Plant. The *Works* and the supply of Plant shall not be considered to be complete to commence commissioning and ultimately take-over until these documents have been supplied to the *Project Manager.*

2.8 General Obligations of the *Contractor.*

The *Contractor's* obligations as contained in this document shall be deemed to cover, but not be limited to, the following:

- The project scope shall include the design, manufacture, supply, installation, erection, and commissioning of all Plant and Materials as required for completing the *Works*. The *Contractor* shall supply all necessary manpower, labour, supervision, materials, services and testing devices for all aspects of this project as indicated hereunder and the *Contractor's* quoted amount for the *Works* shall be deemed to cover all cost and expense thereof.
- Project Management of the complete Scope of Work including planning, scheduling and reporting verbally to the *Project Manager* on a daily basis and in writing by means of reports, updated project schedule etc. weekly. The *Contractor* shall make available, their specialist planning resource on a weekly basis, to supply and present the updated project schedule to the Client and the *Supervisor*. Weekly written progress reports shall be issued to the *Project Manager* for approval.
- Implementation of an appropriate quality system including stringent quality control for all Plant and Materials stipulated in this document.

- Submission and gaining *Project Manager* approval of all quality control plans (in accordance with ISO 9000) and conforming to requirements as contained in this document.
- Submission of a detailed Level 3, MSP generated, project schedule 1week after award and updated weekly or as advised by the *Project Manager* for the project as well as for all Plant and Materials and Services to be supplied by Others.
- The *Contractor* shall allow for any relevant information gathering exercises e.g. sample extraction and testing, dimensions, layouts, access routes, review surrounding structures, identify rigging points, checking, etc., to ensure that all Plant and Materials shall be erected in accordance with all the TNPA specifications and TNPA/*Supervisor*' requirements.
- Selection of appropriate Codes of Practice, Standards, Procedures and Specifications applicable to the *Works*.
- Remove, replace, modify, reinstall and make good all existing equipment, Plant and Materials as required to facilitate the Erection of all new Plant and Materials.

This shall also include all piping, valves, mud boxes, pipe fittings, steel members and sheeting elements.

- Supply, installation, statutory compliance to relevant Codes and Standards and safe storage of all Plant, Equipment and Materials required to completely negate the detrimental effects to construction progress resulting directly or indirectly from loss of electrical power on site.
- Mechanical fitting and alignment as required of all motors, gearboxes, couplings, pulleys, belts, sprockets, chains, bearings, seals, base plates, etc.
- Installation of all chemical anchors, bolts, fasteners, washers, nuts, clamps, brackets, fixing and securing elements as required.
- All specialized equipment, dehumidifiers, fans, extraction units, tools, brackets, supports, packers, shims, etc., necessary to complete the *Works* in accordance with the *Supervisor* and manufacturer's specifications, appropriate codes and the Project Standards.
- Supply of all construction lighting and associated support structures, access platforms, etc. as required for the successful Erection of all Plant and Materials
- The *Contractor* shall, under the direction of the *Supervisor*, carry out all hydraulic pressure testing on all Plant as required and in accordance with the *Employer*s and *Supervisor* specifications. This shall include ensuring all necessary testing equipment such as bolts, gaskets, spades, hoses, flanges, plugs, test pumps, gauges, etc. are supplied.
- Should any flooding of work areas occur for whatever reason, related to the *Contractor* or not, the *Contractor* at their cost shall supply all required clean-up equipment including drainage pumps.
- The *Contractor* shall engage the services of a certified (by relevant South African statutory organisation) welding inspection organisation for the execution and performance of all NDT, dye pen, Ultrasonic, X-ray and any other testing as required on all remediation work installations as is required by the appropriate codes, standards and the Project Standards.
- The *Contractor* shall plan, in detail, the installation and erection sequence of the Plant and Materials to allow for accessibility for rigging purposes and the

availability of respective pieces of Plant and Materials based on their delivery to site.

- Within the Site, removal and disposal of all scrap and rubble generated by the *Contractor* to the scrap lay-down or dumping area.
- Site safety supervision, personal protection and safety equipment.
- Supply of all equipment and personnel required to comply with the Occupational Health and Safety Act, 1993. The *Contractor* shall take special note of the requirements of the latest editions of Construction Regulations.
- Comply with the *Employer*s Environmental Management Plan.
- Complete all documentation to the satisfaction of the *Supervisor* in order for the Taking Over Certificates as appropriate to be signed off by the *Employer*.

- Assistance during Test on Completion (Pre-Commissioning and Commissioning) which shall be co-ordinated and directed by the *Project Manager.*
- The *Contractor* shall attend to all punch list items (Punch list A, B and C) as outlined by the *Project Manager* upon the completion of the installation and during Tests on Completion (Pre-commissioning and Commissioning).
- Supply of all *Contractor's* Documents, designs, drawings including all "As Built" drawings for Plant and Materials, specifications and details, NDT and hydraulic testing procedures and results.

2.9 *Contractor* Document Submission.

The following documentation shall be included with the *Contractor's* submission:

2.9.1 Safe working area plan

2.9.2 Emergency plan

2.9.3 Lifting/rigging studies

2.9.4 Qualification documentation (all those resources involved with fabrication, quality, *supervisor*y and HSE)

2.9.5 Engineering, Inspection, Assessment reports, drawings and programmes / schedules

2.9.6 Approved or evidence of approved welding procedures relevant to this Project scope of *Works*

2.9.7 Insurance cover

2.9.8 Detailed Method statements for the individual *Works*

2.9.9 SHERQ plan

2.9.10 Supervision and site management plan

2.9.11 Maintenance plans

2.9.12 Pre-commissioning and Commissioning plans

2.9.13 Detailed Quality control plans

2.9.14 Detailed Work instruction/procedures

2.9.15 Quality control dossier

2.9.16 Compilation of "Completion Certificates" certified by the *Employer*

2.10 Pre-preparation for *Works* execution

The *Contractor* shall initially, fully inspect the capstans drums structure and immediately inform the *Project Manager* and *Supervisor* in writing of any defects discovered during the inspection or working process that may affect the *Works* as detailed in this specification.

The *Contractor* shall compile all the necessary calculations to determine what bracing and/or strengthening is required to temporarily support the remaining members if they are to be removed in the process of the refurbishment.

The *Contractor* shall fabricate and install all bracing and strengthening as determined above and remove the bracing and strengthening, working platforms and similar after each section has been completed and signed off for acceptance.

The *Contractor* shall take all precautions necessary to prevent any damage to components especially to electronic components installed on structures (if any) which could be affected by the welding work if applicable.

2.11 General requirements for the *Works*

Surface preparation and painting is done in accordance with a 60 month supplier guaranteed specification as well as the Transnet specification **EEAM-Q-008**.

It shall be noted by the *Contractor* that all corroded areas are to be prepared to bare metal. Welding *Works* over primed metal has to be approved by the *Supervisor*.

Should members or plates be found below acceptable thickness based on the original size these members/areas shall be pointed out to the *Project Manager* who shall advise on the way forward.

All connecting flanges and 'fish plates' on the internal structure shall be inspected and checked for corrosion, and internal Rivets are to be replaced with new welded connections as required. If Rivets are not corroded or loose, the Rivets can be left in place.

All welds shall be checked for cracks. NDT or any other required weld testing procedure as approved by the Project Manger shall be carried out on at least 30% of all welds. Any cracks found are repaired. A welding procedure specification for the repairs of the cracks is provided by the *Contractor* to the *Project Manager* and *Supervisor*s' acceptance.

All welding consumable specifications stipulated herein shall be strictly adhered to.

Should the *Contractor* deviate from the project requirements, TNPA reserves the right to stop the *Works* with the *Contractor* to rectifying the areas of concern.

The *Contractor* shall provide a detailed method statement stipulating how the *Works* are to be carried out in a safe manner. The method statement is to include stability calculations, and indicate weight to be added to crane(s) to stabilize when lifting. (If required).

All cable tray brackets, stairways, walkway and platform stringers, brackets, bracing and gussets that have excessive corrosion shall be replaced. The welding of stainless and mild steel, if applicable, shall be accomplished with 309L electrodes where a gap of minimum 1mm between the different steels is required.

2.12 Procedure for submission and acceptance of *Contractor*'s design

The *Contractor* submits 1 (one) electronic copy and 2 (two) paper copies. The *Project Manager* and Client shall approve these.

2.13 Review and Acceptance of *Contractor* Documentation

The *Project Manager* comments on the proposals and forwards the comments electronically to the *Contractor*.

(One) paper copy of the approved drawings is stamped 'Approved by *Employer*' and returned to the *Contractor*.

The approval of the any drawings and documentation by the *Supervisor* is done in principle only and does not mean the approval of the details contained therein.

2.14 Equipment required to be included in the *Works*

Electric generator, sized by the *Contractor* and relevant to their emergency needs on site.

2.15 As-built drawings, operating manuals and maintenance schedules

a. As-built drawings are due 14 days before the *Works* completion.
b. All submissions are in triplicate.
c. By submitting drawings, the *Contractor* represents that he has determined and verified all site measurements, site instruction criteria, materials, catalogue numbers and similar data, or will do so, and that he has checked and co-ordinated each of his drawings with the requirements of the *Works* and the contract documents, taking into account drawings of all other relevant disciplines.
d. At the time of submission, the *Contractor* informs the *Project Manager* in writing of any deviation between the approved drawings packs and the requirements of the contract documents.

e. The *Supervisor* and *Project Manager* will review and approve drawings with reasonable promptness (so as not to cause a delay) only for conformance with the design concept and the contract requirements.
f. The *Supervisor* and *Project Manager* may, at his discretion and depending on the number of discrepancies, require amendment and resubmission prior to approval. Drawings are resubmitted until approved prior to any portion of the *Works* related to the drawings being commenced.
g. Should the *Contractor* during drawing amendment, alter any portion of his drawings not specifically required by the *Supervisor* and *Project Manager*; he points this out in writing when resubmitting the drawing.
h. Approval of the *Contractor*'s drawings is in no way indemnifies him from being responsible for the correctness of the drawings and satisfactory operation of the installation.

3 CONSTRUCTION

3.1 Temporary *Works*, Site services & construction constraints

a. Access to the *Works* is via existing public road networks, the main access is situated along Bayhead Road.
b. Access shall be subject to the Transnet National Ports Authority security requirements and regulations. Due allowance must be made for any potential delays arising from vehicular congestion along Bayhead Road.
c. The *Contractor* complies with the *Employer*'s Site entry and security control, permits, and Site regulations.
d. The *Employer* provides coded ID cards to all *Contractor's*' employees for access / egress of personnel (and Equipment) within the Site boundaries.

3.2 Site services and facilities

a. For the duration of the Contract, the *Project Manager* provides an area, free of charge, for the *Contractor* to establish his offices, lay down areas, stores, Workshops, and other *Contractor*'s Equipment.
b. The *Employer* provides the following connections to services within the Site for *Contractor*'s use:

i. 50mm Isolation valve for construction Potable Water.
ii. Circuit breaker for construction power at 380 Volts, 3-Phase and Neutral, 50 Hz.

c. The *Contractor* provides a connection to the *Employer*'s water borne sewage network. Where no suitable connection to a sewerage system is feasible, portable chemical type toilets may be used.

3.3 Facilities provided by the *Contractor*

a. The *Contractor* ensures that this 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 for the *Contractor*'s account.
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, accepted by the *Project Manager*, immediately downstream at each of the *Employer*'s connections 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 for the *Contractor*'s account.
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 Project Managing Contractor (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* provides, at his cost, a sufficient number of toilets and maintains them in a clean and sanitary working condition.
i. The *Contractor* provides temporary lighting and fencing around every section occupied by him during the construction of the *Works*.
j. 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.
k. The *Contractor* includes for all costs for such lighting and fencing, including access control into and out of these restricted areas.
l. Wherever the *Contractor* provides facilities (either his/her 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.
m. Upon completion, and within one month of the date of acceptance of the *Works*, 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*.
n. No excess or discarded materials or Equipment may be buried or dumped within the port boundary.
o. Demolition of all permanent and temporary structures, surfaces etc. shall be first approved by the *Project Manager* prior to the work being carried out.
p. 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.
q. 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) which is in a roadworthy condition.

r. 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*.

3.4 Underground services, other existing services, cable and pipe trenches and covers

a. As a guide only, the *Project Manager* provides the *Contractor* with drawing(s) showing various known existing underground services for his information. The position of these services is approximate and it is possible that other services exist which are not reflected, and which may affect the *Works*.
b. The *Contractor* establishes the location of the various existing services situated within the Site and Working Areas, and records all such information on "marked-up" drawing(s) which remain available for reference at all times.
c. The *Contractor* exercises due care and attention in carrying out any excavation work to avoid damage or disruption to existing services. The *Contractor* accordingly consults the *Project Manager* prior to undertaking any excavation work.
d. Should the *Contractor* fail to exercise the requisite care and attention in carrying out the excavation work, the *Contractor* will be held liable for any claims arising out of damage caused by such excavation.

3.5 Control of noise, dust, water and waste

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

3.6 Giving notice of work to be covered up

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 24 (twenty four) hours prior to the proposed covering up.

3.7 Restrictions to access on Site, roads, walkways and barricades

a. The *Contractor* is specifically excluded from entering the *Employer*'s Operational Areas which are adjacent to the Site and Working Areas. The *Contractor* plans

and organises his work in such a manner so as to cause the least possible disruption to the *Employer*'s operations.

b. The *Contractor* ensures the safe passage of *Contractor*'s traffic to and around the Site and Working Areas at all times that includes providing flagmen, protective barriers, signage, etc. for protection, direction and control of traffic as detailed in the project specifications
c. The *Contractor* ensures that any of his staff, labour and Equipment moving outside of his allocated Site and Working Areas does not obstruct the operations of the Port. To this end access routes are allocated and coordinated by the *Project Manager*.
d. The *Contractor* ensures that all his construction staff, labour, and Equipment remains within his allocated and fenced off construction area.
e. All *Contractor*'s staff and labour working within Port's boundary complies with Transnet National Ports Authority's (TNPA) operational safety requirements and are equipped with all necessary personnel protective equipment (PPE).

3.8 People restrictions on Site; hours of work, conduct and records

a. The *Contractor* keeps daily records of his people engaged on the Site and Working Areas (including Sub-*Contractor's*) with access to such daily records available for inspection by the *Project Manager* at all reasonable times.
b. The *Contractor* has access to the site from 07h00 to 17h00 daily on all working days Monday to Friday. The *Contractor* will be required to obtain permission from the *Project Manager* to Conduct *Works* out of the hours stipulated. Basic conditions of employment will be adhered to – a 45 hour week will apply, with a maximum of 10 hours overtime.

3.9 Title to materials from demolition and excavation

a. The *Contractor* has no title to all materials arising from excavation and demolition in the performance of the *Works* with title to such materials remaining with the *Employer*. The *Project Manager* instructs the *Contractor* to label, mark, set aside

and/or dispose of such materials for the benefit of the *Employer* in accordance with ECC3 Clause 73.1.

3.10 Cooperating with and obtaining acceptance of others

a. The *Employer* (including the agents of the *Employer*) operates on Site during the entire duration of the Contract period.
b. Others, *Contractor* to be notified once appointed by the *Employer*, operate on Site during the entire duration of the Contract period.

3.11 Publicity and progress photographs

a. 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*.
b. The *Contractor* obtains the permission and approval of the *Project Manager* before erecting any notice boards or using the details of the contract in any advertising media.
c. The *Contractor* provides a complete digital photographic record of the progress of the construction of the *Works* to the *Project Manager*, monthly as part of the *Contractor*'s monthly programme narrative report

3.12 Completion, Testing, Commissioning and Correction of Defects

On or before the Completion Date, the *Contractor* completes everything required to Provide the *Works* including the work listed below which is to be done before the Completion Date and in any event before the dates stated. The *Project Manager* cannot certify Completion until all the work listed below has been done and is also free of Defects, which would have, in his/her 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	Within 14 days prior to Completion.

Performance testing of the *Works*	To be conducted as the *Works* progress in order to satisfy the requirements of the Technical Specifications.

3.12.1 The *Contractor* is permitted to carry out the following *Works* after Completion Defects during maintenance period.

3.12.2 Use of the *Works* is required before Completion has been certified

None.

3.12.3 Provision of materials, facilities and samples for tests and inspections

The *Contractor* provides the following:

a. The *Contractor* is to provide all materials, facilities and apparatus required for any test and /or inspections required by the *Works* Information.
b. The *Contractor* is to provide samples as required by the *Works* Information.

3.12.4 Access given by the *Employer* for correction of Defects

The *Contractor* complies with the following constraints and procedures of the *Employer* where the *Project Manager* arranges access for the *Contractor* after Completion:

a. Safety, access control and work procedures as determined by the Ports Manager.
b. These may be the same as communicated elsewhere within this *Works* Information as at the starting date / access date, or as the *Works* are now in use by the *Employer*'s occupation of the Site, the same may be incrementally or substantially changed post Completion.

4 PLANT AND MATERIALS STANDARDS AND WORKMANSHIP

4.1 Investigation, Survey and Site Clearance

The *Contractor* carries out the following investigations at the Site:

a. Conducts a detailed engineering investigation including all sampling and testing as required to determine the detailed scope of the remedial actions pertaining to the drums and capstans bases and quantifies these. The investigation and testing shall commence as soon as practicably possible after site establishment has been begun and shall be completed within a maximum period of 3 days. The *Contractor* shall inform the *Project Manager* on completion of the investigation and shall submit a repair pack for approval within 5 days following this notice.
b. Conducts an investigation to determine all the existing services on the site. Marks and records all these services.
c. Maintains a concise record of the conditions of all existing site infrastructure and services

4.2 National Standards

The latest editions and/or amendments of the following Standards and Codes shall be considered a minimum requirement. In the event of differing requirements, the most stringent Code or Standard shall apply:

a) Occupational Health and Safety (OHS) Act No. 85 of 1993;
b) South African National Standards;
c) DIN or British Standard Specifications. / DIN, EN and ASME Standard Specifications;
d) N.O.S.A. Safety Guidelines;

4.3 Civil Engineering and Structural *Works*

4.3.1 Code of Practice for Steel Construction

The relevant sections of this document shall conform to the requirements of the SANS 1200 H Series of Standards.

4.3.2 Steel Castings

Steel castings shall be sound, clean and free from all defects and distortion of any kind and should, except where otherwise specified, confirm with the conditions and tests specified in SANS 407 : 2000 for the particular purpose according to service. They shall be thoroughly annealed and all working parts and bearing surfaces shall be machined and turned accurately with correct finish.

4.3.3 Galvanising of Steelwork

This shall be in accordance with SANS 121: 2000 latest revision and the relevant Project Standards

Note: on National Standards: Where given, these are a minimum requirement, and not limited. Equivalent Standards are acceptable, but must be specified.

4.4 Electrical and Mechanical engineering *Works*

4.4.1 Code of Practice for the design of shipyards and sea locks

The relevant sections of this document and the *Works* in general as it pertains to design and fabrication shall conform to the requirements of BS 6349-3:2013 Maritime *Works*.

4.5 Materials, fabrication and finishing

All materials, where applicable, shall conform in respect to quality, manufacture, tests and performance, to the Project Standards, South African National Standards/the International Electro technical Commission, or where no such Standard exists, the appropriate British Standard. Materials not specifically stipulated shall be of the best commercial quality.

All welding activities performed by the *Contractor* shall be in accordance with appropriate codes, standards and the Project Standards and shall also include the following:

4.5.1 All welds shall be laid smooth and external welds strip polished;

4.5.2 All stainless steel and 3Cr12 welds shall be pickled and passivated.

4.6 Ease of Operation and Maintenance

All Plant and Materials supplied by the *Contractor* shall be designed and constructed for ease of operation and maintenance to ensure that the availability, reliability requirements and operating time efficiencies stated in the Specifications are achieved and maintained throughout the life span of the Plant and Materials. The Following shall also be noted:

4.6.1 All operational, maintenance and inspection points shall be safely accessible;

4.6.2 All working platforms shall be wide enough for safe and easy passage

The *Contractor* shall provide a specification and procedure that shall suggest the safest and most efficient operation to carry out the cleaning and maintenance of all Plant and Materials to be supplied by the *Contractor* as well as outline and supply all specialist tools required for these operations.

4.7 Safety equipment and name plates

The *Contractor* shall secure all safety equipment, guards, notices and nameplates associated with all Plant and Materials erected by the *Contractor*. This will include but is not limited to the following items:

4.7.1 Hot surface guards
4.7.2 Railings and chains
4.7.3 Signage and notices
4.7.4 Name plates

4.8 Erection Planning

The *Contractor* shall develop and submit to the *Supervisor* and *Project Manager* a detailed erection plan for the erection of all Plant and Materials, 10 (ten) days after the award date. The erection plan shall outline the following as a minimum:

4.8.1 Critical Path definitions
4.8.2 Installation start Dates
4.8.3 All site progress meeting dates
4.8.4 Installation milestone dates
4.8.5 Installation and Erection completion dates

4.9 Rigging

Before undertaking heavy lifting and rigging, the *Contractor* must undertake a rigging study and all rigging activities must have the following in place:

4.9.1 The rigging study must be reviewed by the *Supervisor* and the *Employer*s Safety Officer prior to any heavy lifting and rigging activities being undertaken by the *Contractor*;
4.9.2 The rigging study must be co-ordinated with the overall site planning and activities schedule.

The *Contractor* shall supply all qualified and experienced personal required to effectively and efficiently position, align, install and erect all Plant and Materials supplied (by others) in a timely manner. This shall also include the installation of all rigging equipment fixed and mobile, such as crawl beams, crawls, "A" frame, gantries, hoists, etc. as required to lift, suspend, position and align, etc.; all Plant and Materials in their respective positions and in accordance with the manufacturer's specifications and the Project Standards.

4.10 Workmanship

The *Contractor* shall only employ competent staff to execute the *Works* and submit a competency and compliance certificate of each employee (e.g. electricians, millwrights' certifications or certificates, fitter qualifications, etc.) to the *Employer* for approval.
The Contract shall be executed in accordance with good engineering practice and the relevant standards, codes, statutory requirements and the Project Standards applicable to the satisfaction of the *Employer*.

Should any material or workmanship supplied and performed by the *Contractor* not be to the satisfaction of the *Project Manager*/*Employer*; it shall be rectified at the cost of the *Contractor* and all rejected material removed from Site. The *Contractor* shall be responsible for the correct and complete installation of all Plant and Materials supplied by others.

Inspections by the *Supervisor* shall not release the *Contractor* from his responsibilities within the Contract unless covered by a formal Take over Certificate.

4.11 Painting and Corrosion Protection

The *Contractor* shall carry out all preparation, priming, protection coating, painting and finishing activities as required in accordance with both the Project Standard Technical Specification for Corrosion Protection as supplied by in this document and by TNPA

The final coat of paint or touch ups on Plant and Materials supplied by others shall be done by the *Contractor*.

Touch ups shall be limited to any damages, scratches, scraps etc. which occurred during the offloading, storage, retrieval, assembly, positioning, alignment, installation, erection and securing of all Plant and Material or unless approved by the *Employer*. All painting activities shall be undertaken by competent personnel supplied by the *Contractor*.

4.12 Lubrication

The *Contractor* shall ensure that all initial fluids, lubrication oils and greases, associated mechanisms and equipment required by all Plant and Materials and supplied by others are installed correctly and in accordance with the manufacturer's specifications. This shall also include consumables such as oil filters and chemicals, etc.

The *Contractor* shall ensure that all Plant and Materials installed, modified, removed and reinstalled by the *Contractor* are correctly lubricated prior to Commissioning.

4.13 Health, Safety and Environmental requirements

The *Contractor* shall comply with all applicable health, safety and environmental regulations and requirements for all persons entitled to be on the Site.

The *Contractor* shall be responsible for the precautions and measures to ensure the health and safety of all individuals on the Site and temporary areas (if applicable) outside of the Site, but utilised by the *Contractor*, with the prior approval of the *Employer*.

This shall also include any areas that may adjoin those areas or otherwise be affected or potentially endangered by the *Works*. The *Contractor* shall be responsible for the adequacy, stability and safety of all Site and Temporary Areas operations, methods of construction, all *Contractor*'s Equipment, Temporary *Works* and structures.

The *Contractor* shall provide and/or install for all necessary safety protection equipment (e.g. rotating parts guards, hot surface insulation/guards, and railings) and necessary *Contractor*'s Personnel, in accordance with the applicable legislation in South Africa, including the Occupational Health and Safety Act (1993) of South Africa. The *Contractor* shall take special note of the requirements of the Construction Regulations, 2003.

The *Contractor* shall comply with the *Employer*'s Environmental Management Plan Requirements.

The Plant's noise level shall be less than 85 dBA when measured at any point further than three metres from the source(s) of the noise.

4.14 Quality Control Plan

The QCP shall be approved by the *Project Manager* and shall conform to the requirements of ISO 9001 (2000) and shall incorporate the following as a minimum:

4.14.1 A detailed organisation chart;

4.14.2 A list of Sub-*Contractor's*;

4.14.3 A list of the applicable quality assurance procedures;

4.14.4 A list of applicable Codes and Standards for design, construction, inspection and tests;

4.14.5 The *Contractor*'s inspection plans;

4.14.6 Any Sub-*Contractor*'s inspection plans;

4.14.7 Provisional programmes for expediting *Works* to be executed by Sub-*Contractor's*;

4.14.8 Procedures to manage the non-conformance of Plant and Materials

4.14.9 An audit schedule for *Contractor*/Sub-*Contractor* activities.

The QCP shall indicate Hold Points and Witness Points proposed by the *Contractor*. The Engineer will determine, in consultation with the *Contractor* and the *Employer*, and notify the *Contractor*, the Hold Points and Witness Points to be witnessed by the *Supervisor* and/or the *Employer*.

The Taking-Over Certificate shall not be issued to the *Contractor* until all the Hold Points on the QCP have been witnessed and approved by the *Supervisor* and/or *Employer* as required.

The *Contractor* shall be responsible for updating the QCP regularly throughout the Contract. The QCP shall be required to demonstrate compliance with the requirements of the Contract.

The *Supervisor* shall be entitled to audit any aspect of the QCP and details of all procedures and compliance documents shall be submitted to the *Project Manager* for information, before each design and execution stage is commenced. When any document of a technical nature is issued to the Project Manage, evidence of the prior approval by the *Contractor* itself shall be apparent on the document itself.

The *Contractor* shall maintain the *Contractor*'s Data Book for the *Works* at all times, and the *Contractor*'s Data Book for the *Works* shall be made available to the *Employer* at all times during the Contract for review and approval by a Third Party Inspector.

4.15 Storage of existing Plant and Materials

Plant and Material to be stored for future use by the *Employer* shall be transported by the *Contractor* to a storage area to be advised by the *Employer*. All Plant and Materials shall as far a practically possible, be stored above the ground on wood block, palettes, etc.

5 LIST OF DRAWINGS

5.1 Drawings issued by the *Employer*

- Dry Dock LV

SECTION 2

6 MANAGEMENT AND START UP

6.1 Management meetings

a. 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.
b. The *Contractor* attends management meetings at the *Project Manager*'s request. These meetings are to be held fortnightly or as regularly as maybe determined by the *Project Manager*. At these meetings the *Contractor* presents all relevant data including safety, health and environmental issues, progress, quality plans, Sub-*Contractor* management, as may be required.
c. Meetings of a specialist nature may be convened as specified elsewhere in this *Works* Information, or if not so specified, be convened by persons at times and

locations to suit the Parties, the nature and the progress of the *Works*. Within five days of the meeting the person convening the meeting shall submit records of the meeting to the *Project Manager*.

d. All meetings shall be recorded in a register, using minutes prepared and circulated by the person who convened the meeting. Such minutes (or register) shall not be used for the purpose of confirming actions or instructions under the contract as these shall be done separately by the person identified in the conditions of contract to carry out such actions or instructions.

Management Meetings Table

Title and Purpose	Time Interval	Location	Attendance By
Risk Register and Compensation Events	Every Bi-Weeks	On Site	*Project Manager*, *supervisor* and appropriate invitees
Overall Contract Progress and Feedback	Monthly	On Site	*Project Manager*, *supervisor* and appropriate invitees
Technical Meetings	Weekly	On Site	*Project Manager*, *supervisor* and appropriate invitees
SHE Meeting	Every Bi-Weeks	On Site	*Project Manager*, *supervisor* and appropriate invitees

6.2 Documentation Control

All documentation shall conform to the latest revisions of the following, i.e.:

a. SANS 10111 - Code of Practice for Engineering Drawings, or
b. ISO 9001:2000 - Quality Management Systems Requirements.

6.3 Safety risk management

The *Contractor* shall comply with the health and safety requirements contained in Annexure C to this *Works* Information.

6.4 Environmental constraints and management

The *Contractor* performs the *Works* and all construction activities within the Site and Working Areas in accordance with the provisions of the specification Standard Environmental Specification (SES), Project Environmental Specifications (PES) and specification Construction Environmental Management Plan (CEMP) contained in Annexure D.

The *Contractor* ensures that its *Sub-contractor's* comply with the requirements of the CEMP.

The CSHEO submits daily, weekly and monthly checklists as required by the CEMP to the ProjEM.

The CEMP is:

a. *Contractor*'s Declaration of Understanding.
b. Environmental method statements for construction operations.
c. Materials handling, use and storage.
d. Environmental closure certificate.
e. Environmental inspections and audits.
f. Environmental alignment meetings.

The roles and responsibilities of the various personnel acting on behalf of the *Project Manager* and who communicate directly with the *Contractor* and his key persons with respect to the CEMP and environmental issues are:

a. The Construction Manager (CM) is responsible for environmental management on the Site and Working Areas and reports to the *Project Manager* with specific tasks to.
b. Implementing the *Employer*'s CEMP.
c. Monitor *Contractor*'s compliance to the CEMP.

The Project Environmental Manager (ProjEM) is responsible for ensuring that the *Contractor* complies with the CEMP and acts on behalf of the *Project Manager*.

The Project Environmental Officer (ProjEO) reports to the PSSM and ProjEM, conducts the day-to-day tasks to ensure that the *Contractor* complies with the CEMP and acts on behalf of the *Project Manager*.

6.5 Quality assurance requirements

6.5.1 Quality system

The supplier shall maintain an effective quality system in accordance with the relevant requirements of SABS/ISO9000 Series, or equivalent standard, to ensure and demonstrate that material, workmanship, procedures and services conform to the specified requirements.

A copy of the *Contractor*'s / supplier's Quality Manual may be requested for review by TRANSNET followed, at Transnet's option, by Quality Assessments or Surveillance's to obtain evidence that a satisfactory quality system is being maintained.

6.5.2 Work Procedures Plan

Within a maximum of two (2) weeks following Contract Award or as per order condition, the *Contractor* shall produce a Work Procedure Plan. This Procedure Plan, as a MINIMUM, identifies the following:

- Order Number, Job Title.
- Organogram with nominated personnel, including signatures and initials.
- Scope of Job, Equipment, Structure(s)
- Basis for Designs and Fabrication, e.g. codes and specifications.
- Communication e.g. contacts address, telephone number, facsimile number, numbering systems and formats.
- Bar Chart (Time Schedule) for production, supplies and repair *Works* including Sub-Suppliers.
- Control documents, e.g. issuing and receiving, transmittals.
- Numbering of Documents.
- Specific Procedures and/or General Procedures list to be utilized.
- Internal Quality Audits and/or Surveillance's to be performed with actual dates.

6.5.3 Quality Control Plan

6.5.3.1 The *Contractor* shall provide a Quality Control Plan (Inspection and Test Plan) specifying his proposed quality control activities for the entire scope of supply and scope of *Works*. The Quality Control Plan shall incorporate, as a minimum, an INSPECTION CHECK LIST. The Quality Control Plan shall reference the procedures, codes and standards which apply to the listed activities, the acceptance criteria, the records to be produced and similarly it shall incorporate all Sub-*Contractor's* and suppliers' activities. The Quality Control Plan shall be prepared on the *Contractor's* / Suppliers standard format.

6.5.3.2 Deviations from this Quality Control Plan may only be permitted following acceptance in writing by the Engineer and/or the appointed Third Party Inspection Authority.

6.5.3.3 The *Contractor* shall not undertake any work in advance of the review and acceptance of the Quality Control Plan without the written consent of Transnet.

6.5.3.4 During the review of the Quality Control Plan / Inspection and Test Plan, Inspection and Test intervention points will be included by Transnet and, where applicable, the Third Party to indicate their intended monitoring during manufacturing, and installation.

6.5.3.5 The *Contractor* / Supplier shall ensure that any work sub-contracted will be covered by Quality Control Plans / Inspection and Test Plans generated by the relevant Sub-*Contractor* or Supplier.

6.5.4 Pre Inspection Meetings

Pre-inspection meetings may be held at the discretion of Transnet. In such cases, the content of the agenda shall include, but not be limited to, the following:

- Documentation: Method of Submission, review etc.
- Quality Control Plan: Agreement of inspection, witness, review and hold points, Agreement of contacts for notification, etc.
- Code Data book / QC Dossier: Agreement to contents and format.
- QC Procedures: Agreement to Scope.
- AIA: Authorised Inspection Authority requirements.

- Communications: Responsible persons.
- Non-destructive Testing: Personnel qualification, method and extend required.

6.5.5 Inspection

6.5.5.1 Definition: Inspection means all activities such as measuring, examining, testing, gauging one or more characteristics of material or service and comparing these with specified requirements to determine conformity.

6.5.5.2 Inspection Point Definition:

- Hold Point = H: This indicates an inspection or test which is considered vital to quality, integrity and safe functioning of the material or services and which can only be achieved at this point. The *Contractor* shall not proceed beyond this point beyond this point without written approval by Transnet and/or the appointed Third Party Inspection Authority.
- Witness Point – W: This indicates an inspection or test which may be equally as important as a Hold Point, but which can be waived by the appointed Third Party Inspection Authority or Transnet.
- Review Point – R: This indicates that information collected is required to be reviewed and approved. The job may continue past the review point, however, if the information is inadequate or does not satisfy the requirements, may necessitate additional work.
- Inspection Points – I: During the review of the Quality Control Plan, Inspection points will be added by Transnet and where relevant, the Third Party Inspection Authority to indicate the intended monitoring of the *Contractor*'s and/or Sub-*Contractor*'s quality control.

6.5.5.3 *Contractor's* Inspection

The *Contractor* shall as a minimum, carry out the inspections as detailed in the Quality Control Plan and maintain the required records for verification by Transnet and/or Third Party Inspection Authority. For sub-contracted material or services, the *Contractor* shall ensure that controls are effective, including, where necessary, monitoring at the Sub-*Contractor*'s *Works* and retention of the necessary records. Signing-off of the Quality Control Plan progressively by all relevant parties is a mandatory requirement following the indicated inspection activity.

6.5.5.4 Readiness for Inspection

Material or services shall be deemed ready for inspection by Transnet only when:

- Material or services shall be deemed ready for inspection by Transnet only when:
- The *Contractor* has firstly carried out his own inspection at the stage identified on the relevant Quality Control Plan and is satisfied that material, workmanship and services meet the specified requirements. Documented evidence shall be maintained by the *Contractor* including signing-off the Quality Control Plan.
- All applicable certificates and quality documents are available for review at the inspection location. Immediately following receipt by the *Contractor* ALL material and certification (including welding consumables), the *Contractor* shall review these certificates and endorse them "Verified to Code/Specification Requirements" including date and name. Immediately following, the material and certification shall be presented to Transnet and/or the appointed Third Party Inspection Authority for review and endorsement.

6.5.5.5 Notification of Readiness for Inspection

Notification by fax/email/ telephone is required for both Hold and Witness points at least two (2) working days in advance of "Readiness of Inspection" or as agreed at the pre-inspection meeting. Review points do not require prior notification.

- The *Contractor* shall ensure that the latest revisions of approved drawings and/or procedures with evidence of acceptance by Transnet, his nominated representative or Third Party Inspection Authority are available.
- *Contractors* are advised that it is a condition of Purchase / Contract that all costs of Transnet's inspector, *Supervisor* and/or Third Party Inspection Authority will be passed on to the *Contractor* for aborted inspection visits. A visit is considered aborted if:
- The *Contractor* / Supplier advises "readiness" for inspection and upon arrival of Transnet's Inspectors, Engineer(s) or Third Party Inspection Authority, the material or Services and/or the associated documentation is not ready; or if Transnet's personnel identifies that material or services are to specification such that the *Contractor*'s Inspector should have identified the non-conformity prior advising readiness for Transnet's or Third Party Inspection Authority inspection.

NOTE: An inspection report to this effect shall be generated by the Transnet's Inspector, *Supervisor* or Third Party and countersigned by the *Contractor*'s duly authorised representative. This report shall form the basis of back-charges to the *Contractor* / Supplier by Transnet. In addition, a non-conformance report shall be raised by Transnet, the *Supervisor* or the Third Party which shall be replied to by the *Supervisor* within twenty-four (24) hours.

6.5.5.6 Inspection Waiver

Any Transnet Witness, or review or Hold point may, at the sole discretion of Transnet, be waived, which will be followed by an inspection waiver report.

6.5.6 Materials of Construction

All material shall be purchased and certified in accordance with EN 10204 ff. requirements as a minimum. The term "Purchaser" in EN 10204 shall mean the *Contractor*. The certificates shall report mechanical properties in the heat treated condition and must be accompanied by the relevant verified furnace charts.

6.5.7 Assessment/Audit/Surveillance

6.5.7.1 Transnet reserves the right to conduct a Supplier Quality Assessment, prior to the award of any Purchase Order, to verify that the *Contractor*'s system complies with the relevant quality standard. Additionally, Transnet may conduct a Quality Assurance Audit or Surveillance at any time after the award of a Purchase Order. Four (4) days notification of a QA Audit and twenty-four (24) hours notification of a QA Surveillance will be given by facsimile / email to the *Contractor*'s nominated QA/QC representative.

6.5.7.2 Should the *Contractor*'s quality system be found deficient during their assessments, audits or surveillance's, the *Contractor* will be given opportunity to carry out corrective action within a period of time to bring his system up to the required standard. A follow up audit surveillance will be carried out to verify that the *Contractor* has carried out the necessary corrective actions.

6.5.7.3 If, during a follow-up audit or surveillance, it is found that the required corrective actions have not been carried out, Transnet reserves the right to take such actions as necessary to rectify the deficiencies. It is a pre-requisite that the *Contractor* fully supports any such actions

6.5.7.4 Surveillance by Inspectors will also be carried out by Transnet as an alternative method of monitoring the *Contractor*'s quality control. This will normally take the form of a verification of a Section of the Quality Control Plan where the physical and documentary evidence will be required to verify compliance with the Quality Control Plan.

6.5.8 Non-Conformities

6.5.8.1 Non-Conformity is defined as a deficiency in characteristic, documentation or procedure which renders the quality of an item, work or service unacceptable or indeterminate in accordance with specified requirements. Such Non-Conformities shall be identified by the *Contractor*/Supplier/Transnet and/or Third Party Inspection Authority.

6.5.8.2 Such non-conformities require the issue of a Non-Conformity Report (NCR) by the *Contractor*/Supplier in compliance with his own QA system. The NCR then becomes the means by which the Non-Conformity is identified and triggers the need for corrective action and measures.

6.5.8.3 The non-conforming material, work or service shall be reviewed by the *Contractor* in accordance with documented procedures and it might be:

- Re-worked to meet the specified requirements
- Accepted, with or without repair; or
- Re-graded for alternative application; or
- Scrapped

6.5.8.4 All proposed re-working or repair shall, together with the relevant procedures, be firstly reviewed by Transnet and/or Third Party Inspection Authority where applicable.

6.5.8.5 In the event that the Transnet Inspector and/or Third Party identifies a Non-Conformity that is not subject to a *Contractor*/Supplier NCR, the Transnet Inspector and/or Third Party Inspection Authority will raise an NCR on the *Contractor*. The *Contractor* must issue to the Transnet Inspector in writing within twenty-four (24) hours a response indicating the corrective action he propose to make.

6.5.8.6 Material, work and services which do not conform to requirements shall not be used unless written authority, on the returned NCR, is obtained for the Non-Conformity.

6.5.8.7 The *Contractor* shall maintain a register of his NCR's and shall submit this register to Transnet monthly. The *Project Manager* will audit the register. Transnet reserves the right to request copies of NCR's for review of deviation and disposition.

6.5.8.8 Corrective actions will necessitate additional inspections and/or tests shall be included in an updated Quality Control Plan which shall be submitted for review to Transnet.

6.5.8.9 The *Contractor* shall ensure that his procedures provide for the identification and segregation of all non-conforming materials, work or services

6.5.9 *Contractor* Document Submissions

6.5.9.1 When the *Contractor* submits his documents for re-view, he shall, where relevant, submit them to the Transnet document handling nominated contact.

6.5.9.2 Transmittals shall only cover one item per PO and shall be submitted in complete sets in order to perform a full review, e.g.. WPS's, weld procedure, weld map summary, material lists and GA drawings and calculation, etc.

6.5.10 Handover Acceptance System

The Purpose of this system is to provide essential handover and acceptance information to all parties engaged in the construction, modification, demolition, refurbishment, manufacturing, installation and commissioning of plant and equipment at the Durban dry-dock. The information and guidelines required to achieve a smooth sequence between all construction and commissioning activities, and thereafter the successful start-up operations and transfer of ownership of plant and equipment to Transnet, Durban dry-dock.

6.5.10.1 This procedure provides for a sequenced, construction completion and checkout of plant / equipment leading up to the transfer of care, custody and control to Transnet.

6.5.10.2 This procedure adopts a two package handover system:

- Quality Control Dossier
- Management Package

6.5.10.3 Quality Control Dossier and Management Package Compilation

- The *Contractor* shall in accordance with this procedure and requirements in the Purchase Order / Technical Specifications, compile the Quality Control Dossier and Management Package with the accepted contents.
- The *Contractor* shall compile the Quality Dossier which includes the Code Data Book (format as stipulated in this document) in accordance with this procedure to ensure that all requirements have been met and the relevant documents are included in the Quality Control Dossier.
- For multiple disciplines e.g. new installations, fabrications, modification or welding *Works*, the QC Dossier shall be developed for each discipline or system.
- Management Package: consists of:

- Completed "Punch-List", signed off by operations, area manager and the Engineers appointed 16.2 responsible for the area/unit.
- Drawing Package "as-built"
- Vendor Data Documentation as per Bill of Material of detail designs and as built documentation.
- The Engineer shall:
- Collect and compile the Management Package in accordance with this procedure, to ensure all requirements have been met. This ensures that:
- The QC Dossier has been signed off by Transnet and the Inspection Authority (where applicable)
- The plant/facility/equipment has been commissioned (or handed over) by and with operations,
- All required performance tests have been successfully carried out by operations and maintenance department,
- Copies of approved test run certificates have been inserted into the Management Package.

- All maintenance documents have been updated and new instructions been inserted.
- The *Contractor* submits his Quality Management System documents to the *Project Manager* as part of his programme under ECC3 Clause 31.2 to include details of:
- Quality Plan for the Contract
- Quality Policy
- Index of Procedures to be used and
- A schedule of internal and external audits during the Contract
- The *Contractor* develops and maintains a comprehensive register of documents that will be generated throughout the Contract including all quality related documents as part of its Quality Plan.

6.5.11 Code Data Book

The Code Data Book shall have the following content and format:

- Cover Page:
- A MANUFACTURER / *CONTRACTOR*
- B ENGINEERING *CONTRACTOR* (if applicable)
- C AUTHORISED INSPECTION AUTHORITY (or certifying body)
- D PURCHASE ORDER NUMBER
- E CONTRACT NUMBER

- F EQUIPMENT / PLANT / *WORKS* DESCRIPTION
- G MAUFACTURERS SERIAL NUMBER (if applicable)
- H CODES AND STANDARDS USED

1. Index of Contents

2. Release of Notes (*Contractor*/Client)

3. Detailed design drawings

4. "As-Built" drawings

5. Certificate of Compliance

6. Design Calculations

7. MATERIAL AND CONSUMABLES CERTIFICATIONS
   6.a Material List
   6.b Material Map (Outline Drawings)
   6.c Mill Test Certificates marked with item number.
   6.e Heat treatment charts, NDE and mechanical testing.

8. INSPECTION REPORTS
   7.a Quality Control Plan
   7.b Dimensional Inspection Report (sizes etc.)
   7.c Heat Charts and Certificates.

9. NON-DESTRUCTIVE TESTING DOCUMENTS
   8.a NDT Map
   9.b NDT Procedure Record Summary
   10.c NDT Personnel Qualification Record Summary
   11.d NDT Reports

6.6 Tests on Completion

6.6.1 Introduction

The required tests on completion shall consist of the following:

- Pre commissioning
- Commissioning
- Trial operation
- Performance

The *Contractor* shall complete all pre-commissioning and commissioning tests on all Plant and *Works* completed under this Contract.

In order to achieve this the *Contractor* shall fulfil the following requirements:

- Development and supply of commissioning and test plans for the approval of the *Project Manager* and *Supervisor*
- Implementation of formal handover procedures and documentation from construction to commissioning

6.6.2 'Punch List' category Items

- Category A: Items which compromise safety and integrity of personnel, plant, equipment and infrastructure and must be completed following the pre-commissioning tests but prior to the commissioning and trial operation tests being undertaken
- Category B: Items which require correction prior operational acceptance and are required to be remedied following the commissioning and trial operation tests but before *Employer*s taking over
- Category C: Items required to be remedied during the defects notification period

6.6.3 Pre commissioning

The *Contractor* shall complete all pre-commissioning tests and all Punch List Category A items shall be compiled during these tests and be attended to prior to the commencement of the commissioning tests.

6.6.4 Commissioning

The *Contractor* shall as soon as practical after carrying out the pre-commissioning tests and once all Punch List Category A items have been attended to, carry out the commissioning tests.

The Punch List Category B items shall be compiled during these tests and be attended to prior to the commencement of the trial operation tests.

6.6.5 Trial Operation

As soon as is practicable after completion of the commissioning tests, a 72-hour trial operation of the Plant shall take place.

6.6.6 Taking Over

Prior to the *Employer* being required to take-over the Plant all The Punch List Category B items shall be remedied.

The *Works* and the Plant shall be taken over when the Tests on Completion have been passed and punch List Category B items have been attended to.

6.7 Programming constraints

6.7.1 Tender Program

A summary program, hereinafter referred to as the "Tender Program" for the duration of the contract are submitted by the *Contractor*, reflecting all Milestone deliverables and Events.

The level of this program must at least be "compatible" to the Price Schedule columns and or the breakdown of sections in the bills of quantities as applicable. The incidence of Payment Schedules or Cash Flow Forecast, submitted with the *Contractor*'s program must be based on this program.

The *Contractor*'s Programs are evaluated by the *Project Manager* to assess the *Contractor*'s ability to plan his portion of the project to the extent necessary for the high degree of mutual co-ordination demanded by the Project.

Non-compliance with this specification may lead to the disqualification of the tenderer. At the *Project Manager*'s discretion, the *Contractor* may be requested to prepare and submit a new Contract Program.

6.7.2 Initial Program, Contract Program and Subsequent Revisions

a. The *Contractor* submits a program within 1 weeks of the date on which he was notified of having been awarded the contract / order.
b. Any program submitted which does not supply all the required documentation set out in this document shall be deemed to be rejected, whether or not the *Project Manager* does so in writing.
c. This Initial Contract Program, hereinafter referred to as the "Initial Program", is be drawn up at the level of detail necessary in the opinion of the *Project Manager* to ensure effective control over the work, usually to Level 4 detail.
d. A "Summary" or "ham-mocked" program is submitted with the Initial Program. The summarized activities are inserted in such a way that the Milestone Dates as well as major interfaces of services and/or other contracts logically required for the completion of the contract are clearly shown. The start and finish of the summarized or ham-mocked activities are clearly indicated on the detailed network.
e. Unless stated to the contrary, the *Project Manager* will examine and comment on the Initial Program within 2 weeks of submission and the *Contractor* amends and submits this program, hereinafter referred to as the "Contract Programme" for approval within a further period of 5 days.
f. The *Project Manager* may not in every instance be able to provide all information or working drawings, where applicable, of every aspect of the *Works* but such non-availability will not be deemed to be an excuse for non-presentation of programs. In such instances the relevant part of the program should be based on the *Contractor*'s best estimate with a statement on which assumptions or drawings it is based.

g. Should the *Project Manager* so require, or should problems occur during the execution of the contract, the *Project Manager* might request that portions of the program be expanded to enable closer control to be exercised e.g. site construction and commissioning programs. In such cases the more detailed *Works* fit exactly into the logic and time span of the Contract Program, but may be presented as separate programs.

h. Minor revisions to the Contract Program may be introduced from time to time by mutual agreement. Should the *Project Manager* require a major revision to the Contract Program, such revision will be specified to the *Contractor* in writing.

i. The *Project Manager* specifies the date by which the *Contractor* is required to submit the revision in question. This date is not, unless otherwise agreed, be less than 2 weeks from the date of notice.

j. Revised Payment Schedules are required based on the revised Contract Program. These revisions are made when changes occur in this program and must be updated every month to include actual payments.

k. Should the *Contractor* require a major revision affecting the logic or dates of the program, such revision will be specified to the *Project Manager* in writing for approval before the revision is performed.

l. A revision to the program does not invalidate the "Date of Completion" in terms of the General Conditions of Contract and as given in the appropriate schedules. Changes to these dates can only be effected through a contract amendment.

m. Progress is monitored against the latest revised program and payments controlled by the latest revised Payment Schedule accepted by the *Project Manager*.

6.7.3 Progress Reporting

a. The *Contractor* updates the program and supplies the progress reports to show actual and expected progress compared to the latest agreed Contract Program. Progress information may be verified by the *Project Manager* at any stage.

b. Progress reports on design, manufacturing, shipping, transport and site progress are submitted separately as per Table 1: Progress Reporting Requirements.

c. The methodology to define work content in the progress curves needs to be agreed to between the *Contractor* and *Employer* within 5 days of Contract Award

and may include parameters such as man-hours, m^3 concrete, tons of steel, length of cable and cable rack to be installed, number of terminations, etc.

d. The work content needs to be specifically designed to suit the type of work and to effectively indicate actual progress against planned progress.
e. Progress reports are submitted in line with the requirements as specified in the table below.

TABLE 1: PROGRESS REPORTING REQUIREMENTS

ITEM	DESCRIPTION	FREQUENCY
1.	General Planning Report and revised network if logic has changed since the previous report.	Weekly
2.	Critical Activities Report. (Look ahead)	Weekly
3.	Milestone Report.	Weekly
4.	Updated Bar Charts.	Weekly
5.	Updated Program Graphs.	Weekly
7.	Progress S-Curves.	Weekly
8.	Expediting Report	Weekly
9.	Milestones of Deliverables	Weekly

f. The *Contractor* uses Microsoft Projects for his programme submissions or a similar programme software package equivalent to Microsoft Projects 2003 or

later version subject to and with the prior written notification and acceptance by the *Project Manager*.

6.7.4 Reporting and monitoring

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. *Contractor* submits monthly programme narrative report to the *Project Manager*.

The *Contractor* completes an assessment of all activities in progress and to completion to determine percentage complete, forecast completion dates, deviations from the Accepted Programme and proposes remedial actions 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*.

a. 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; manpower histograms; plant and equipment histograms; S-curve of overall progress; and critical action items (top 10). Report indicates "progress this period" and "progress to date".

b. The *Contractor*'s weekly programme narrative report, updated and issued weekly, includes:

i. 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.
ii. 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.
iii. Manpower Histogram – reflecting actual, forecast and planned activities
iv. Plant and Equipment Histogram – reflecting actual, forecast and planned activities
v. S-curves – reflecting the actual percentage complete versus the planned percentage for the overall contract utilising the earned values.

c. 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 indicates "progress this period" and "progress to date" and include, but is not limited to, the following:
   i. Summary of progress achieved during the reporting period.
   ii. Latest Accepted Programme.

6.8 *Contractor*'s management, supervision and key people

The *Contractor* provides an Organogram and Curriculum Vitae's of all his Key people (both as required by the *Employer* and as independently stated by the *Contractor* under Contract Data Part Two) and shows how such Key people communicate with the *Project Manager*, the *Supervisor* and their delegates.

The *Contractor* employs a CSHEO, based on the Site, as a key person under ECC3 Clause 24.1.

The CSHEO reports to the PSSM in respect of issues relating to safety risk management. The CSHEO submits the CHSMP to the *Project Manager* for approval and ensures that the *Contractor* implements the CHSMP.

The CSHEO reports to the ProjEM on the Site in respect of issues relating to environmental management. The CSHEO submits the CEMP to the *Project Manager* for approval and ensures that the *Contractor* implements the CEMP.

The CSHEO tasks include but are not limited to:

a. Reports a safety incident to the *Project Manager*;
b. Reports a safety incident to the *Project Manager*;
c. Attends all SHE meetings, toolbox talks, induction programmes and monitors compliance with the CHSMP;
d. Submits daily, weekly and monthly reports and data as required by the CHSMP to the PSSM;
e. Reports an environmental incident to the *Project Manager*;
f. Undertakes daily, weekly and monthly inspections of the Site and Working Areas as required by the CEMP and submits reports to the ProjEM;
g. Monitors compliance with the CEMP and the environmental method statements submitted to the *Project Manager*; and
h. Ensures the *Contractor* clears litter from the Site and Working Areas.

The *Contractor* employs a QA/QC Manager (CQA/QCM), based on the Site, as a key person under ECC3 Clause 24.1.

The CQA/QCM reports to the *Supervisor*. The CQA submits the PQP to the *Project Manager* for approval and ensures that the *Works* meet the standards stated in the *Works* Information.

The CQA/QCM tasks include but are not limited to:

a. Maintains the comprehensive register of documents required by the PQP;
b. Undertakes all inspections and testing required by the PQP;
c. Prepares and regularly updates the CDR, and
d. The *Contractor* employs a *Contractor*'s Industrial Relations Practitioner (CIRP), based on the Site, as a key person under ECC3 Clause 24.1.

e. The CIRP ensures that all reports and Industrial Relation requests are submitted accurately and in a timely manner to the *Project Manager*.

The CIRP tasks include but are not limited to:

i. Dedicated to human resources, industrial relations and any other *Contractor* employee related function; Resolve all human resources and industrial relations matters arising from the *Contractor*'s employees;
ii. The *Contractor* employs the *Contractor*'s Planner (CP), based on site, as a key person under ECC3 Clause 24.1.
iii. The CP is based on the Site and is responsible for all construction programming, planning and reporting as stated under paragraph 2.6 of this *Works* Information.

f. The CP tasks include but are not limited to:
   i. Undertakes the planning and scheduling of all activities comprising the *Works*.
   ii. Ensures the *Contractor* submits the first and all subsequently revised programmes accurately and in a timely manner to the *Project Manager*.
   iii. Ensures the *Contractor* submits programme narrative report to the *Project Manager* at weekly intervals.

6.9 Training Workshops and technology transfer

The *Contractor* facilitates the following requirements for training Workshops:

a. A safety pre-mobilisation Workshop.
b. *Contractor* employee safety training programme.
c. The *Contractor* utilises local people for staffing up some of his requirements and ensures that there is adequate skills transfer taking place.

6.10 Insurance provided by the *Employer*

The insurance that will be provided by the *Employer* is as per the procedure manual contained in Part C1.

The procedure manual further details the cover to be arranged by the *Contractor* and sub-*Contractor's* as well as exclusions and deductibles.

The *Contractor* liaises with the *Employer* and the *Project Manager* at the Contract Date to declare the ECC3 contract details to the *Employer*'s insurance brokers WILLIS SOUTH AFRICA (PTY) LTD.

Where the *Works* involve the assembly, erection and installation of Plant, the *Contractor* declares the full replacement value and not the value included in the ECC3 contract.

The *Contractor* liaises with the *Employer* and the *Project Manager* when a claim is made and assists in completing the Claims Advice Forms that are provided.

6.11 Contract change management

At the Contract kick off meeting, the *Contractor* will be provided with the format of the standard forms to be used for communication of Contract change management (ECC3 Clause 60).

6.12 Provision of bonds and guarantees

The form in which a bond or guarantee required by the conditions of contract (if any) is to be provided by the *Contractor* is given in Part 1 Agreements and Contract Data, document C1.3, Sureties.

The *Contractor* provides a bond or guarantee as required by the conditions of contract concurrently with the execution by the Parties of the form of agreement for the ECC3 contract.

6.13 Records

Defined Cost, payments & assessments of compensation events kept by *Contractor*

7 PROCUREMENT

7.1 Code of Conduct

Transnet 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:

a. The Transnet Procurement Procedures Manual (PPM);
b. Section 217 of the Constitution - the five pillars of Public PSCM (Procurement and Supply Chain Management): fair, equitable, transparent, competitive and cost effective;
c. The Public Finance Management Act (PFMA);
d. The Broad Based Black Economic Empowerment Act (B-BBEE); and
e. The Anti-Corruption Act.
f. This code of conduct has been included in this contract to formally apprise Transnet Suppliers of Transnet's expectations regarding behaviour and conduct of its Suppliers.

7.2 The *Contractor*'s Invoices

The *Contractor* is paid by electronic bank transfer within the period stated in the Contract Data.

The *Contractor* provides the *Employer* with his correct banking information to make the transfer.

All payments are provisional and subject to audit.

The *Contractor* preserves its records for such a period as the Department of Internal Revenue may require, but in any event for not less than five years.

When the *Project Manager* certifies payment (see ECC3 Clause 51.1) following an assessment date, the *Contractor* complies with the *Employer*'s procedure for invoice and statement submission.

Timing and procedure for submitting invoices will be presented at the kick-off meeting following award.

The invoice and statement must correspond to the *Project Manager*'s assessment of the amount due to the *Contractor* as stated in the payment certificate.

The invoice states the following:

a. Invoice addressed to Transnet Limited;
b. Transnet Limited's VAT No:
c. Invoice number;
d. The *Contractor*'s VAT Number; and
e. The Contract number
f. The invoice contains the supporting detail
g. The invoice is presented either by post or by hand delivery

Where applicable the invoice contains the following supporting detail;

a. A statement of invoices,
b. Escalation is calculated on a separate sheet and presented to the *Project Manager* for acceptance,
c. The amount paid to date,
d. Retention monies to be deducted from the invoice,
e. Interest payable,
f. Escalation formula used,
g. Settlement discount, and
h. Proof of ownership of materials supplied.
i. Copies of delivery notes of equipment
j. Summary sheet of manning
k. Summary of progress covered by invoice
l. The invoice is presented as an original.

7.3 People

Suitably qualified and certified persons are allocated to tasks.

7.4 Subcontracting

Contractor does not employ or bring a Sub-*Contractor* onto the Site and/or Working Areas without the prior approval of the *Project Manager*.

Where the *Contractor* employs a Sub-*Contractor* who constructs or installs part of the *Works* or who supplies Plant and Materials for incorporation into the *Works* which involves a Sub-*Contractor* operating on the Site and/or Working Areas, then the *Contractor* ensures that any such *Sub-contractor* complies with the CHSMP (described under paragraph 5.3 of the *Works* Information) and the CEMP (described under paragraph 5.4 of the *Works* Information) as appropriate and that the subcontract documentation places back-to-back obligations on the *Sub-contractor* which reflect the *Contractor*'s obligations under the CHSMP, CEMP and PQP.

The *Contractor* ensures that a *Sub-contractor* complies fully with the *Contractor*'s Quality Management System (as described under paragraph 5.5 of the *Works* Information). Quality system requirements are 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.

7.5 Plant and Materials

The *Contractor* provides all Plant and Materials for inclusion in the *Works* in accordance with the *Works* Information.

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 the specifications stated and notifies the *Project Manager* and the *Supervisor* on each occasion where replacement is required.

The *Employer* generally provides no "free issue" Plant and Materials but in this case sealing face materials shall be free issue.

7.6 Tests and inspections before delivery

At the discretion of the *Project Manager* some equipment and components is inspected at place of manufacturer before it is delivered to site.

SECTION 3

C3.2 *Contractor's Works* Information

Annexure A: Engineering Reports

A visual condition assessment was conducted by TNPA technical team for the Port of Cape Town.

The information/statements tabled below is the visual and field oral evidence of the equipment site condition/status as well as the teams' conclusive recommendations.

The inspection and evaluations covered the following capstans components and supporting infrastructure:

- Prime mover
- Couplings
- Gearing system
- Lubrication system
- Electrical and control system
- Supporting civil and concrete housing chamber

The field test runs were conducted to establish the system's operability vi-sa-vi:

- Efficiency
- Safety compliance
- Risk of environment contravention
- Equipment suitability for current and future business operations

All DC driven capstans are beyond obsolescence with only four currently running at below the required 20 ton torque capacity. The other four are in an inoperable state due to excessive wear of electro-mechanical driving mechanism.

The system exhibit the following anomalies:

- Mechanical speed adjuster operating at low efficiency.
- Non-operational lubricating system.
- Wear on the exposed torque transfer gear system.
- Poor drainage inside capstan chambers.
- Concrete threatening cracks around the capstan housing chamber opening.
- Excessive rust on reeling drums
- Misalignment between gearing shafts and couplings
- Evidence of oil contamination due to water ingress into the system.

DC Driven Capstans

Gearbox Installation

The gearboxes are installed in an unconventional manner, turned 90^0 and yielding the following engineering compromises in terms of good practice and asset are:

- Inadequate gearbox gear lubrication.
- Excessive water ingress into the oil.
- Ingress of foreign material into the oil system.

Now in plant operation and engineering terms, excessive water ingress into gearboxes or systems results in the following damages:

- Corrosion
- Pitting
- Bearing failure
- Clutch seizure

AC Driven Capstans

The extent of noise and movements were clear indicators of other problems inside the capstans assembly.

The slow, two speed (clockwise and anti-clockwise) is further exacerbating the operational capacity of the plant.

Shaft misalignment in the coupling point between the motor and gearbox.

Benefit of shaft alignment

The benefits of good shaft alignment yields the following results:

- Improvement machine reliability and productivity
- Reduce machine repair costs
- Reduced labour
- Reduced power consumption on machinery
- Minimization of machine installation and repair time
- Reduce costs of consumed spare such as seals and bearing
- Improve plant operating safety

Vibration Analysis

Definition

Vibration is mechanical phenomenon whereby oscillations occur about an equilibrium point.

Aim of Vibration Analysis

Vibration analysis aims to reduce maintenance costs and equipment downtime by deleting equipment faults. It gives record on machinery health status and is a key component of condition monitoring or predictive maintenance programme.

Vibration Analysis Detection

The vibration analysis detects various problems for different machinery components thusly:

- It detects and track progressing stages of bearing failure.
- Identifies imbalance and misalignment, and is used to correct such imbalance.
- Identifies mechanical wear in couplings, bearings support structures, etc.
- It detects defects such as lube failure, broken rotor bars, pumps cavitation, etc.

Reeling Drum

Visually the reeling drums are rusted and vibrate heavily on operation. This is an indication that the brass bushes internally are worn badly.

General Recommendation

It is recommended that:

- All capstans driving mechanism be replaced.
- Reeling drums be reconditioned.
- All brass bush bearings (reeling drums) be replaced.
- Secure and effective lubrication system be installed.
- Damaged civil works be repaired.
- Effective drainage system inside the chambers be installed.

DRY DOCK CAPSTANS UPGRADE FOR PORTS OF DURBAN & CAPE TOWN

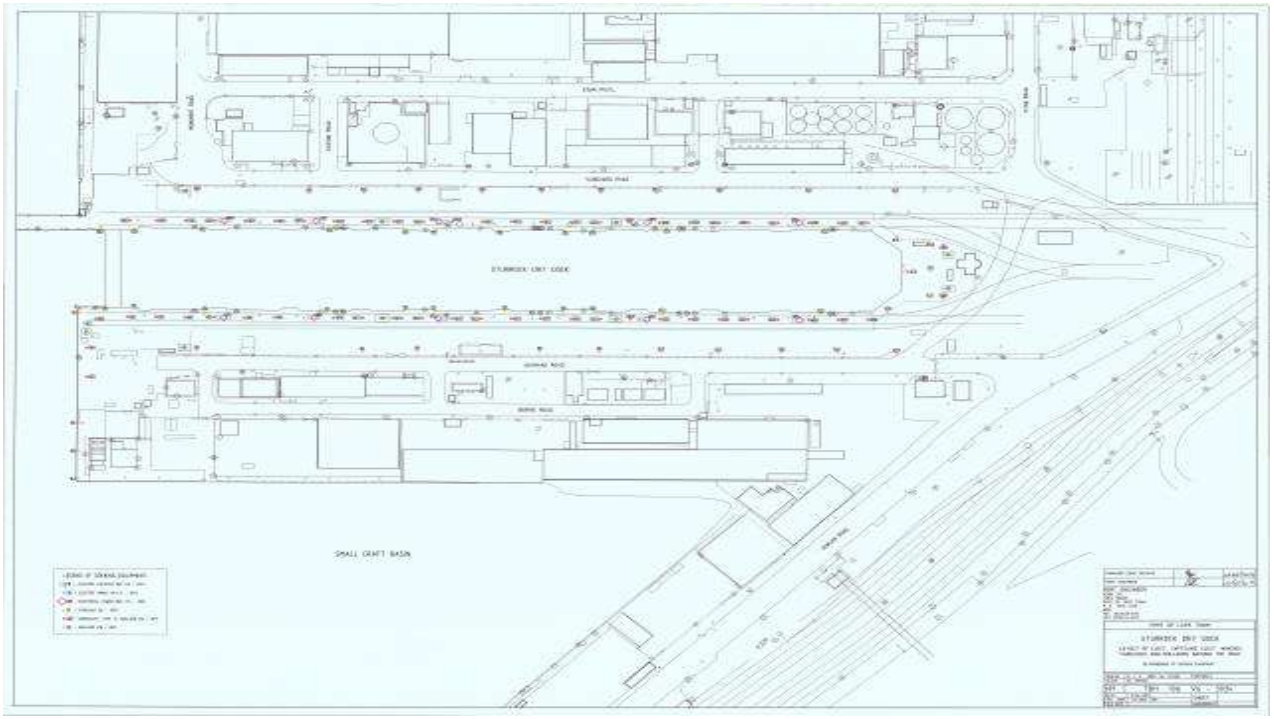
Condition Assessment report of the Robinson, Sturrock and Synchrolift Dry Dock Capstans

This report sets out the findings into the condition assessment of the Capstans at Sturrock, Robinson Dry Docks and Synchrolift. It must be noted that only a visual inspection of the condition was performed and as such no experimental investigations were performed as part of this exercise.

Sturrock Dry Dock

Findings

There are currently 7 x 20T DC driven and 5 x 5T AC driven Capstans in operation at the Sturrock Dry Dock. The picture below is a layout of the Sturrock dry dock illustrating the location of the Capstans. As part of the condition assessment, a visual assessment was performed on capstans C9 (DC driven) and W2 (AC driven).



The motors on the DC Capstans are approximately 72 years old (have been operational since the commissioning of the Dry Dock), It must be pointed that the average operating life of motors in general is approximated to be between 15 – 20 years if proper maintenace practice is applied. It can therefore be reasoned that the DC motors at Sturrock Dry dock has exceeded their design life.

Figure 1: Name plate of Sturrock Dry Dock DC motor

Figures 2 and 3 below are pictures of the gear teeth on Capstan C9, It can be clearly seen from the pictures that the gear teeth on the Capstan are rusted and corroded. This can result in unexpected breakdown to the driving mechanism.

Figure 5 below illustrates cracks noticed on the motor casing, it can be noticed from this picture that the casing (which is below ground level) will need to be revamped in order to mitigate the risk of unexpected collapse.

Figure 5: Rust and Cracks on Drive casing

It must also be further mentioned that vibrations were also noticed on the shaft of the motors, this might be caused by misalignment on the coupling or wearing our of the bearings.

Robinson Dry Dock

There are currently 9 x 5ton AC driven Capstans in operation at the Robinson Dry Dock. The picture below is a layout of the Robinson dry dock illustrating the location of the Capstans. As part of the condition assessment, a visual assessment was performed on capstans W7.

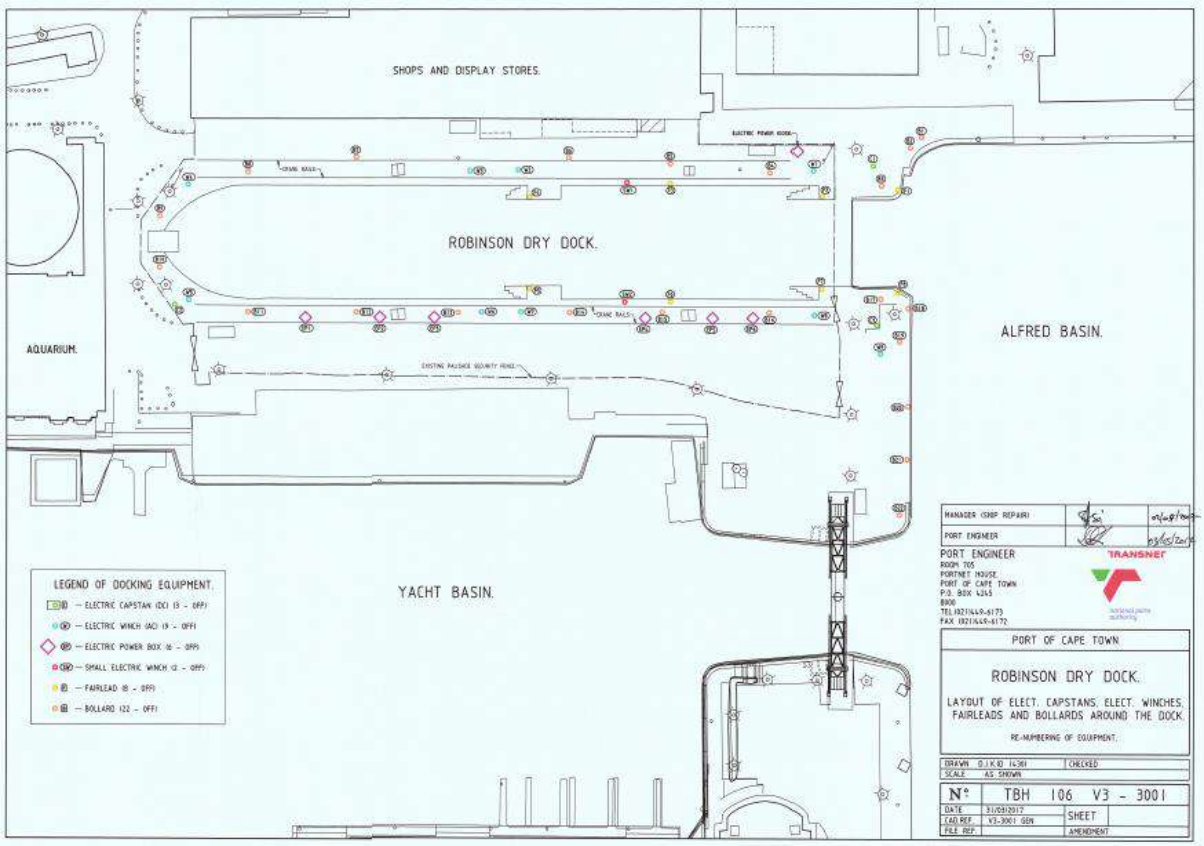


Figure 6: Layout of the Robinson Dry Dock

AC induction motors are used to drive the Capstans at the Robinson Dry Dock, the name plates on the motors do not show the year of manufacture.

Figure 8:

Synchro-lift Dry Dock

There are currently 7 x 5 ton AC driven Capstans in operation at the Synchrolift Dry Dock. The picture below is a layout of the Synchrolift dry dock illustrating the location of the Capstans.

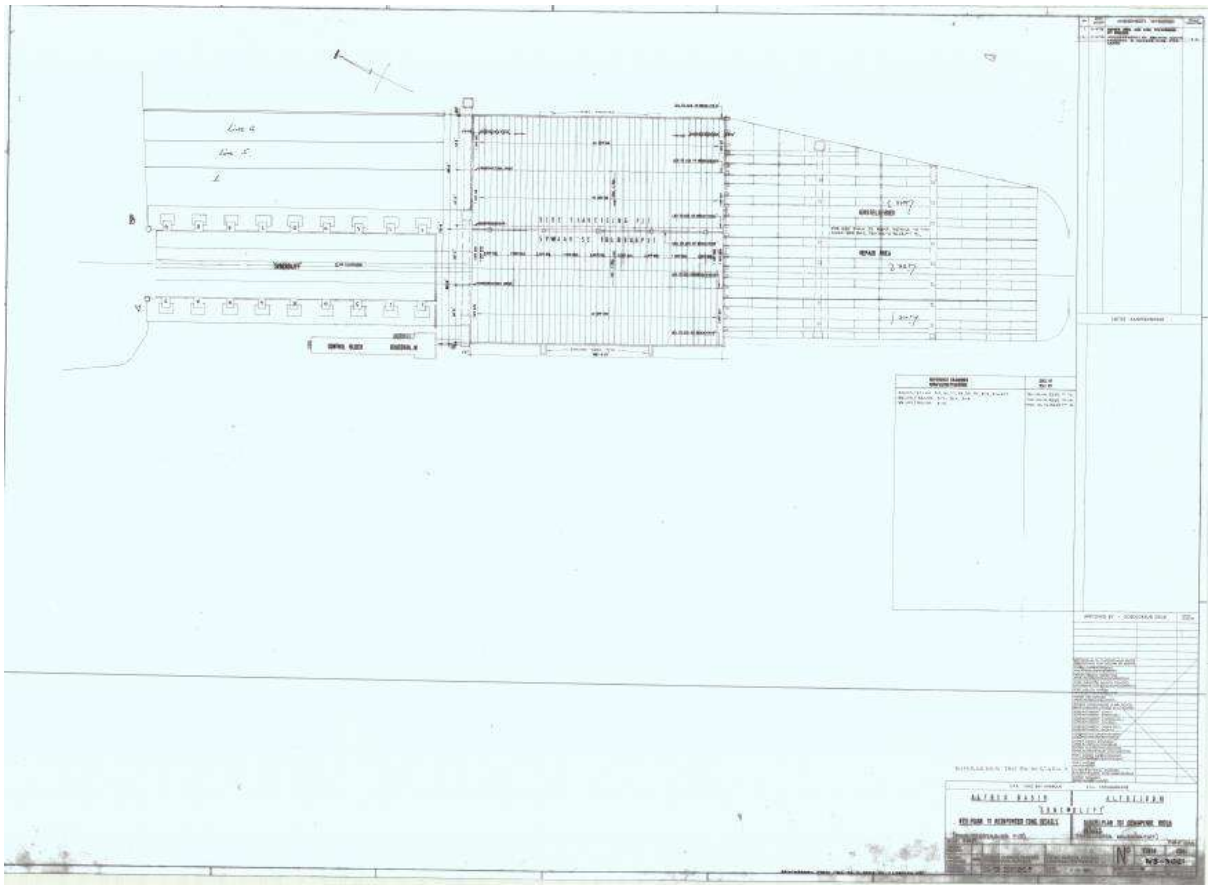


Figure 9: Layout of Synchrolift Dry Dock

The size and the outside condition of the Capstans at Synchrolift closely resemble the ones at Robinson Dry Dock, a presumption was made that their conditions are more or less the same.

Conclusion

Based the on the finding of the visual condition assessment it can be recommended that the Capstans at all three docks in the Port of Cape Town be replaced based mainly on the following:

1. The age having exceeded the design lifespan
2. There are defects identified on the capstans affecting their overall efficiency
3. Any sudden break down on the capstan might result in down time on the docking system.



Worn out gear teeth with partial lubrication

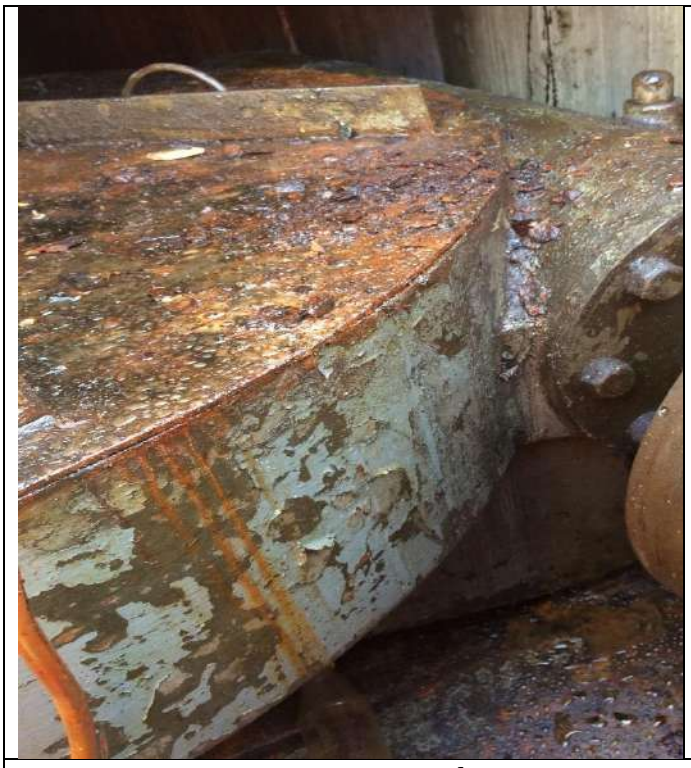


Worn out gear teeth with cntaminated lubrication





Rusted Coupling and Drive Casing





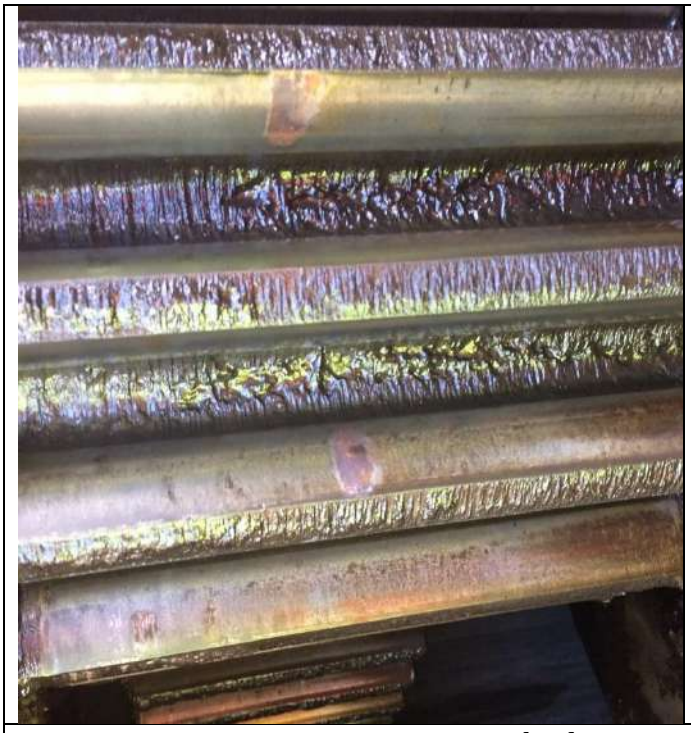
Rust and water ingress growing inside shaft and gear



Lubrication System cannot lubricate pinion Bearing for there is no gravity head



Water ingress contamitating oil & seeping inside the driving mechanism with loose washes and impurities





Big Wheel gears rusted & wonout teeth



Excessive rust on the chamber cover and edges



Concrete cracks in the civil housing infrastracture.

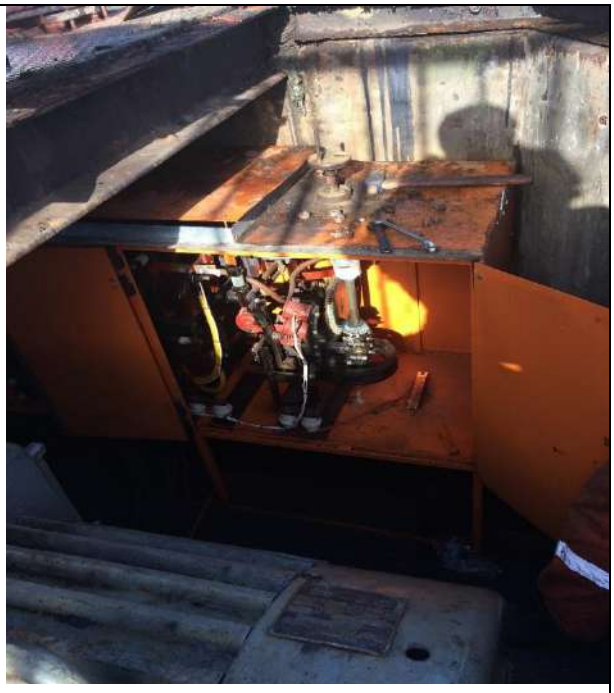








Damaged and rusted wire and motor casing

<table>
<tr><td>  </td><td>  </td></tr>
<tr><td colspan="2">Old Electrical Motor and panel in the pit</td></tr>
<tr><td> 
</td><td>  </td></tr>
<tr><td>1945 Motor</td><td>Rusted control system</td></tr>
</table>





Old Capstans with rusted ropes and cover

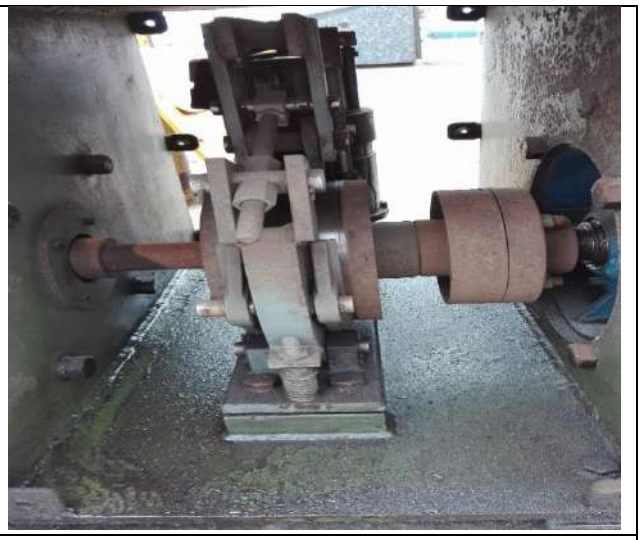




AC Rusted Coupling and Shaft



Figure 7: Capstan W7 name plate
The picture below illustrated the breaking mechanism on capstan W7. There is clearly rust on the brake shoes as well as the shaft.



Breaking Mechanism of the AC Capstan
There were also noticeable vibrations on the Capstan's motor shaft while running the motor.

INSPECTION AND EVALUATION OF CAPSTANS AT THE DRY DOCK IN THE PORT OF DURBAN

FINAL REPORT

ACKNOWLEDGEMENT

I wish to acknowledge the following individuals who contributed in different ways in our efforts to deliver a quality project for TNPA.

- Hlobisile Mdladla – (Project Manager Capstans Project).
- Nandi Mtsokoba – Senior Port Engineer.
- Menzi Ngcobo – Senior Project Manager (Phakisa Projects).
- Claude Thavarayan – Technical Manager.
- Mervin Myburg – Technical Supervisor.
- Graham Heard – Electrician.
- Lindelwa Tom – Electrician.
- Rizikar Kader – Millwright.
- Sphephelo Gumede – Millwright.

I also want to acknowledge specialist service providers who ran measurements and tests for all the technical support information we required for the evaluation of the capstans. Others supported our efforts as our library of information when we needed such references to confirm specific technical findings.

- Sugartech (Gear manufacturer).
- Wearcheck (oil analysis).
- National NDT Services (NDT, UT).
- AW Laser (Laser Alignment, and Vibration analysis).
- Turnkey Hydraulics (Hydraulic systems)
- ABB (Electrical Specialist)
- Schneider (PLC s)
- Gearwise (Gear manufacturing).

EXECUTIVE SUMMARY

Impaphala Projects & Consulting (Pty) Ltd was given an assignment to evaluate eight (8) capstans at the Dry Dock in the Port of Durban. The terms of reference were clear in that the evaluation was to involve visual inspections, running of specific tests to evaluate the integrity of the components of the capstans.

TEAM COMPOSITION

Dr Muzi Hlongwa: PhD, DSc, Pr Cert Eng,, GCC

Hugo Stewart: Pr Eng, BSc (Elect Eng), GCC

Andries Cele: Pr Eng, BSc (Elect Eng) GCC

Sfiso Ntuli: Candidate Pr Tech, BTech (Mech Eng), GCC

Taty Nyamayoka: MSc (Mech Eng), PhD (current Studies)

Mbali Chamane: BSc (Elect Eng), MSc(Elect Eng) – current studies

Wonder Kunene: BSc (Mech Eng) MSc (Mech Eng) – current studies

PROJECT BRIEF

When the consulting team did their inspections, they found a lot more than they envisaged. The evaluation study developed into a very wide engineering scope. Each observation triggered a "why" question which necessitated further investigation.

✓ Terms of Reference.

a) Detailed visual inspection and component testing of capstans

b) Provide professional opinion on their condition regarding their continued operation

c) Submit detailed report

d) Condition assessment of all capstan ancillaries like prime mover, couplings, brake system, gearing, electrical infrastructure – supply side.

e) Merits and demerits of conversion from electrical to hydraulic drive system, overhauling and repair of capstan drum and the base, system lubrication.

- ✓ Deliverables.

The list of deliverables is;

a) Detailed inspection report incorporating, Non-Destructive-Test, Visual inspection, condition assessment all items/ components/ elements.

b) Recommendation of implementable strategy for TNPA to take to resuscitate the capstans with a detailed technical justification.

c) Preliminary engineering drawings to be submitted for the proposed strategy which include the proposed electrical to hydraulic conversion.

d) Preliminary scope of work for the recommended strategy.

e) Estimated cost for the strategy with a preliminary priced bill of quantities.

f) Preliminary timelines for implementation.

g) Present the findings in a TNPA FEL 2 report template.

- ✓ Duration for the assignment.

Impaphala Projects & Consulting was appointed to start the project on 1 September, 2016. On RFQ, the project duration was 18 weeks, on appointment it was agreed that the project period be reduced to 10 weeks which meant that IPC had to employ more resources without a price change. The team went through the logistics of entry permits and induction and started its work on the 12th September, 2016. On the 31 October, 2016 a draft report was presented.

STRUCTURE OF THE REPORT

The report is categorised into two parts. The first part is the evaluation of the mechanical system while the second part assesses the electrical counterparts.

METHODOLOGY

In executing this work our methodology involved visual inspections of the capstan component by component and then the system. There are two AC and six DC Driven Capstans. All capstans are below ground level in enclosed pits. What one can see on the surface is a rope coiling drum. This drum is driven by a spur gear which is approximately 1,5m in diameter on a 300mm diameter shaft. The big gear is driven by a pinion on a 150mm diameter shaft which is the output of a worm and wheel gearbox. This gearbox was installed face up as its output shaft is vertical against a normal conventional horizontal position. This is the root cause of the oil contamination problems which are discussed in detail in the report. The gearbox input shaft is connected to a prime mover by means of a solid coupling. Coupling pins used have a collar

at the end and threaded on one end for a nut fitment. Some couplings have their collars welded with a nut. One coupling was found to have been hacked resulting in unequal coupling flanges. Two other couplings were damaged which on simulation it was found to be damages caused by using of wrong tools by whoever did maintenance on the coupling. All capstans have electromagnetic brake systems. The AC capstans brake systems are in worst condition. Capstan #7 has no brake at all as it has collapsed completely. The condition of the gearboxes is appalling. All bearings have collapsed due to excessive water in the oil. When oil was analysed some samples could not be analysed for oil as the samples had virtually only traces of oil in the water, others registered 98% water in the sample. The lubrication system is manual for the big gears and gravity feed system for the brass bush bearings and the rest of the other bearings. Reports in this regard are appended.

The methodology for quantifiable results was through sample analysis and physical testing of equipment. Each test was prompted by some observation by the consultants, like, oil condition prompted oil sampling, drum vibration prompted vibration analysis etc.

- Gears were inspected and tested for cracks using dye penetration technology(NDT).
- Shafts were checked using ultrasonic testing (UT). All the gears and shafts were found to be still in good condition on DC Capstans. However, AC capstans #2 & #7 have worn out completely. Regardless of the choice of strategy adopted for implementation, these two capstans (#2 & #7) should be replaced completely.
- Gearbox oil was analysed for all the gearboxes. All oil samples were found to have contaminants in them and a lot of water. Only Capstan #8 was in a better condition
- Vibration analysis was done on all capstan. Vibration is high in all capstans.
- Laser alignment was conducted. Although some anomalies were picked up, none were catastrophic.

It was established through these tests that the brass bush bearings are worn badly. The capstans cannot be run beyond a set-point of 3 where in fact, they originally could run to a maximum of set point 7. This piece of information is confirmation that the capability of the capstans is below 50%. Currently there is no strategy in place to mitigate this risk. To compound this risk, all DC motors are obsolete. Although the infrastructure at the Dry Dock is old, the civil infrastructure is still solid. The foundation bolts, base plates and concrete are still good. Although there is surface rust developing on the top base plates of the capstan drums, it does not warrant replacement. All that needs to be done is to sandblast and paint.

At the end IPC concludes that capstans are in a terrible state, worst of them all are the two AC Driven capstans (capstan #2 & #7). These two are in fact in an inoperable state due to excessive gear wear. The DC driven capstans are running with equipment which is beyond obsolescence. The electrical infrastructure is not complying to OHSAct standards as there are exposed live cables and damaged panels.

In summary, TNPA needs a solution to deal with the following business threatening risks:

a) Two capstans which are on the brink of mechanical collapse (#2 & #7).

b) Six capstans with obsolete prime movers (all DC driven capstans).

c) Assets operating below 50% of its original capability (all 8 capstans).

d) No drop-in spares (critical and/or long lead time spares).

IPC recommends four possible solutions for the risks that prevails at the Dry Dock with regards to the capstans. Option 1 and option 2 do not eliminate the risks permanently but they mitigate the risks. Options 3 and 4 are permanent solutions. Option 3 is the best solution, considering the socio-technical challenge which the consultants noted as they conducted their business during the execution of the evaluation. Option 3 offers a total solution. This solution is supported by the strategic methodology adopted by IPC consultants in that procurement of equipment and systems for the solution would 100% local. The services which support the strategy are all Durban based. As such Managers, responsible for the capstans won't be faced with the challenge of trying to locate overseas suppliers of equipment to solve technical problem they might be facing. In these situations, lead times are always a problem. This risk is addressed adequately in this option.

From an electrical evaluation perspective, there is no doubt that the AC electrical drives should be replaced because they have been overhauled a couple of times already and the DC electrical drives need to be replaced due to obsolescence. It is understood that the intention of management at the Port of Durban's Dry Dock is to operate an effective unit with a high level of availability. The DC drives and motors have been rewired, refurbished and repaired too many times to allow any form of operational integrity.

The electrical wiring inside the pits is unsafe to personnel and the current habit/ procedure of switching the system off after use inside the Substation is a temporary solution at best. It is not a fail-safe mode of operation and therefore not compliant with the OHSAct.

In agreement with the mechanical assessment and evaluation there are four options

recommended for the repair/ upgrading of the Capstans at the Dry Dock. The preferred solution being the adoption of new technology for a total conversion to hydraulic drives. Electrically this will consist of the following;

- Replace all existing capstan electrical drives with hydraulic drives.
- Introduce variable speed drives for speed control.
- Introduce PLC not necessarily for automation but for monitoring process and operational efficiencies as well as equipment history.
- Replace all the cables between C1 and C8with new 95mm 2 x 4 core ECC cable.
- Implement modifications for Substation to suit new arrangement including the AC Drives for C4 and C5.
- Implement a Condition Monitoring system for the Capstans using engineering techniques which are common to industry like, oil analysis (on schedule), vibration tests (after any major work), laser alignment (after any work major work), NDT and UT (on schedule).

In summary, the four options and their costs are as follows:

OPTION	**SUMMARY OF SCOPE DETAILS**	**TIME FRAME FOR IMPLEMENTATION**	**COST (RANDS)**
OPTION 1	Refurbishment of all 8 capstans (No new technology)	Design = 1,5 months Procurement = 3 months Construction = 2 months **TOTAL = 6,5 Months for one pair of capstans** **To complete the project for 8 capstans will take 14 months**	

OPTION 2	Convert all DC capstans to AC driven capstans but reclaim/reuse existing gearboxes	Design = 3 months Procurement = 3 months Construction = 4 months **TOTAL = 10 Months for one set of capstans** **For all 8 capstans, the project will take 24 months**	
OPTION 3	New Technology (All capstans hydraulically driven)	Detail Design = 2 months Procurement = 3 months Construction = 3,5 months **TOTAL = 8,5 Months for one set of capstans** **For all 8 Capstans, it will take 18 months to implement the whole project.**	
OPTION 4	New Technology (Hybrid)	Detail Design = 2 months Procurement = 3 months Construction = 3,5 months **TOTAL = 8,5 Months for one set of capstans** **For all 8 Capstans, it will take 18 months to implement the whole project.**	

In implementing the chosen option (preferably option 3) as recommended it is suggested that capstans are taken in pairs i.e. one pair out and the other six remain in operation.

Dr. Muzi Hlongwa: *PhD, DSc; Pr Cert Eng; GCC (Fact.)*

Project Manager

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ABBREVIATIONS

AC: Alternating Current

CM: Condition Monitoring

DB: Distribution Box

DC: Direct Current

ECSA: Engineering Council of South Africa

IPC: Impaphala Projects and Consulting

LCD: Liquid Crystal Display

MCC: Motor Control Centre

MTBF: Mean Time Before Failure

MTTR: Mean Time to Repair

NDT: Non – Destructive Testing

NEMA: National Environmental Management Act

OEE: Overall Equipment Effectiveness

OEM: Original Equipment Manufactured

OHSAct: Occupational Health and Safety Act

PLC: Programmable Logic Control

PM: Planned Maintenance

RCFA: Root Cause Failure Analysis

RFQ: Request For Quotation

SOW: Scope Of Work

TNPA: Transnet National Port Authority

TOR: Terms of Reference

UT: Ultrasonic Testing

VSD: Variable Speed Drive

PART 1: MECHANICAL EVALUATION

1. INTRODUCTION

When Impaphala Projects and Consulting (Pty) Ltd accepted the offer to provide engineering consulting work for the evaluation of the capstans, the team formulated a picture and they also detailed how best the project would be executed. The team was totally oblivious of the extent and depth of engineering this project would call for. To respond fully to the requirements of the scope, several questions arose which extended the research scope to a certain degree. However, this extension was dealt with mindful always of the ambits of the project time frame.

In summary, the terms of reference for this assignment are as follows:

- Visual inspection of all capstans.
- Component testing of the capstans.
- Formulating a professional opinion on the current operational condition of the capstans.
- Recommendation regarding their continued operation (the capstans).
- Submission of detailed report considering the main component assemblies of the capstans with emphasis on their condition.
- Establishing whether components are suitable for refurbishment or replacement.
- Further condition assessment of all capstan ancillaries, including but not limited to;

    a) Prime mover

    b) Couplings

    c) Brake system

    d) Gearing

- Electrical infrastructure – supply side.
- Details of the merits or demerits of undertaking following remedial action/process to enhance longevity, improved efficiency and safety compliance;

    a) Conversion from electrical to hydraulic drive system

    b) Overhauling and repair of capstan drum and the base

c) System lubrication

It became evident though that the TNPA is not faced with a purely technical problem. The challenge is much wider than that, it is a socio-technical challenge. That alone is an indicator that the solution cannot be purely technical but it should adopt a methodological synthesis of the whole components which form part of the system.

The project demanded application of tacit knowledge and depth of engineering practices to come up with technological and innovative solutions. Here technology is used much broadly more than its common definition where it is defined as a scientific means to a solution. In this paper, it is defined as a technique used for a solution to a problem. The demands of research depended heavily on information gathering which is done through observation, data collection, interviews and literature review through expansive reading. In this particular case the maintenance environment is explored. To have a view about the capstans as engineering assets, it is imperative that the philosophy of maintenance as a discipline is understood. It is also important that the socialisation of maintenance teams is understood as any discipline develops its own ethnography, value system, which they live and guard selfishly with their lives. It is for this reason that qualitative responses become key factors in the final analysis as conclusions and recommendations are made.

This project is a culmination of a Technology and Innovation at work. The research honed into the epistemology and ontology of maintenance as a discipline and how it is defined by those involved in this function. Maintenance as a discipline has evolved in leaps and bounds since the advent of Planned Maintenance as a gate keeper of machinery and plant in the 1960's. Although the scope was well defined, during the execution of the work the team made a wide range of intriguing observations which prompted them to formulate a hypothesis for each one of them. Researchers follow a hypothesis with a process to discover the truth about the hypothesis. In our endeavour to discover the truth, processes were followed in the form of sampling and testing.

This report should not be interpreted as a document which is intended to show dereliction of duties on anyone's part however, as a Consulting Firm we shall be failing in our duties if we do not confirm without any prejudice that the assets under review are derelict. The only saving grace that they are still operational is the fact that they are not used continuously. It must be highlighted quickly though, that in our assessment the root cause is more systemic rather than

structural. Any engineering practitioner would know that an organisation's maintenance philosophy is a product of its own socialisation over time. Like any culture which evolves in any set up or society, this culture manifests itself and becomes the alpha and omega for the respective society because that's what they have lived to know. In order to modify such a construct, as management literature and teachings would tell us, there should be a shift in paradigm. This is never easy and more than often it requires pragmatic leadership. However, pragmatism should be accompanied by passion to yield excellence. Having said that, consideration of the economic impact on business has a huge influence in the decisions managers should take. To this end we are mindful of the fact that the final decision won't necessarily be taken based only on the strength of the academic nature of this research and/or the depth covered of the literature on the subject, but more on the strength of the negative economic impact the current situation has on the business and the economic gains and risk mitigation the business would achieve if it had to adopt the recommendations. The economic impact analysis for the current and the recommended technologies are dealt with later on the report.

During the course of doing the capstans evaluation, it was noted that they are old and this was noted in the RFQ. Engineers of today always admire the great engineers of the past for their robust designs. The motivation to change or improve these old designs needs some convincing and reframing of the mind.

In the process of reframing one needs to consider some social challenges faced by businesses e.g.;

- **Tracking changes in the world of work.**

The question had to be asked about how the capstans were maintained before compared to how they are maintained now. Some aspects have changed. For instance, companies who used to maintain electrical motors some have moved or closed down. New players are in and they do not have the same skills as the old service providers.

- **More older workers**

This is the factor which all businesses are faced with. In the 50s to the 60s maintenance staff were called craftsman. After that in the 70s the same population was referred to as tradesmen. Today the same population of maintenance people is called artisans. The passion of a craftsman of the 60s cannot be compared with the level of passion of the present day artisan, the two are exposed to the same environment or they have to look after the same equipment, but they are socialised differently. The same capstans which are in a poor state today are not working any harder now than they were before, but they were better looked after by craftsmen than they are by the artisans of the millennium.

- **Key skills deficits across multiple industries**

This is another challenge faced by the whole country. The issue is not the lack of relevant skills but rather the quality of skills available to business. The example is bare for anyone to witness in this project.

In conclusion, this report contains the deliverables as detailed in the RFQ, namely;

a) Detailed inspection report incorporating, Non-Destructive Test, Visual Inspection, Condition Assessment of all items/components/elements.

b) Recommending implementable strategy for TNPA to take to resuscitate the capstans with detailed technical justification.

c) Preliminary engineering drawings for the proposed strategy which include the proposed electrical to hydraulic conversion.

d) Preliminary scope of work for the recommended strategy.

e) Estimated cost for the strategy with a preliminary priced bill of quantities.

f) Preliminary timelines for implementation.

g) Present the findings in a TNPA FEL 2 report.

After analysis of the capstans, the consulting team presents four options, the details, merits and demerits of which are discussed in the report;

Option 1: Reconditioning of the existing capstans without changing technology.

Option 2: Reconditioning of the existing capstans with minimum new technology

Option 3: New technology with hydraulic drives and new control strategy.

Option 4: Hybrid Solution which is a combination of conversion from electrical to hydraulic drives for capstans 1 & 8, and the rest of the other capstans to be electrically driven.

2. DISCUSSION ON OBSERVATION

The first hair raising experience was on DC drive gearboxes which were found to contain degraded oil. The oil samples which were taken were sent for analysis to test for water content and debris. The effects of this phenomenon are covered under literature review. It was also observed that all gearboxes on these drives are positioned unconventionally. The only conclusion which could be drawn for this is that whilst the gearbox is designed to drive a horizontally installed capstan or any other equipment to be driven, yet the capstans are all vertical capstans. To mitigate the situation each gearbox was turned 90^0, it's side cover removed and a make shift split cover was then made. This addressed the installation challenge but gave birth to another problem. The new position led to at least three serious engineering compromises in terms of engineering standard of good practice, engineering standard and asset care;

- Inadequate gearbox gear lubrication.
- Excessive water ingress into the oil.
- Ingress of foreign material into the oil system.

One would expect a person doing inspection to raise an alarm if one finds the gearbox with emulsified oil. All eight gearboxes were found to have excessive water in oil, some have more water and just a trace of oil floating on top of the water, but this is not reported anywhere as something which needs to be engineered out.



Picture # 1: AC Capstan gearbox

The damage due to excessive water ingress into the gearboxes is evident on the picture above namely;

- Corrosion.
- Pitting.
- Clutch seized.

These conditions also result in bearing failure. Bearings were opened for inspection and as expected they were found to have failed/collapsed completely. Below are the pictures of how the bearing housing and bearing components look like under this environment. In one gearbox (capstan #3), the worm gear bearings assembly was not correctly done. If this is the case one can conclude that even backlash of the gears was incorrect during the assembly. In this same capstan, the worm gear has moved substantially, by approximately 40mm. This is a consequence of bearing failure as by now the worm gear is floating.



Picture # 2: Worm gear housing

This is the amount of rust which is caking and growing inside the worm gear housing. The extent of this growth is by no means one year damage, it's far more than that.



Picture # 3: Worm gear housing

This is the part at 90^0 to the section shown in the picture above. Around the shaft degraded grease can be seen. There is nothing right in this area.



Picture # 4: Worm gear housing end cover

This is the end flange of the worm gear barrel. It can be seen that the barrel has turned into an untreated water steel water container.

From the PMs which were called for viewing, there is not a single report about the following;

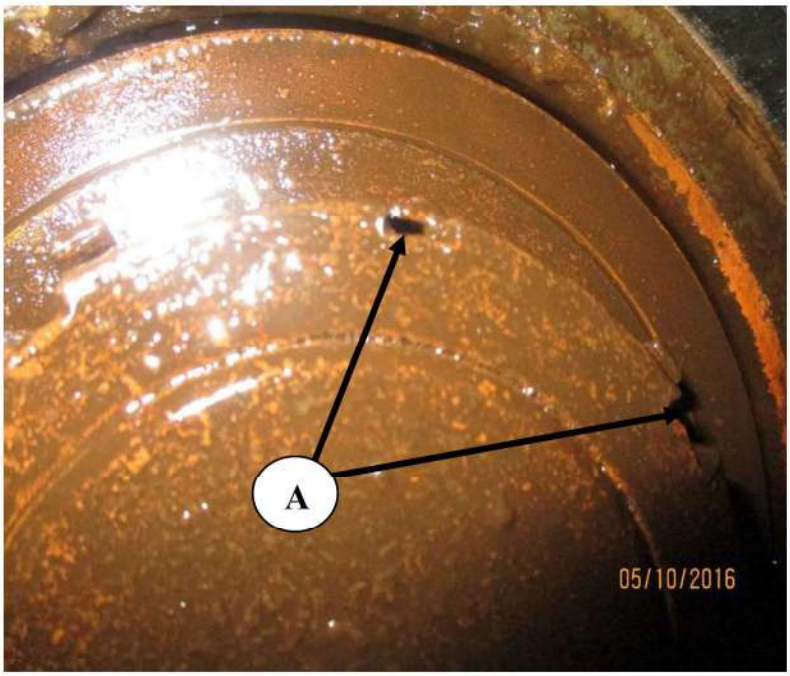
a) Rust developing internally on gearboxes.

b) Oil condition.

c) Pitting on gearbox casing and /or on gears.

d) Any wear.

A Planned Maintenance works order is an official communication document between an artisan (the executer of a PM) and the Manager (who carries a managerial responsibility for asset care). There is miscommunication in this regard because nothing is reported through this system, yet the capstans are wearing away to a level where they will be inoperable. This reinforces the consulting team assertion that the situation at hand is a socio-technical problem. Water ingress is a technical problem but reporting defects and inadequate design, those are people matters.



Picture # 5: Bearing not locked

This is a bearing assembly which is not locked with a lock nut (refer to label A above). As an engineering consulting firm, it is not our mandate to investigate and find the person who did this. It is within our scope though to strongly condemn the workmanship as observed. It begs a question whether there is any quality control for work done after equipment overhauls. The answer is a big 'NO'. Secondly, who takes responsibility for this? Moving forward, PM closure, are works orders checked before they are closed off or are they just signed off without any quality check of how this important document is completed.



Picture # 6: Volume of water contained in the DC gearboxes

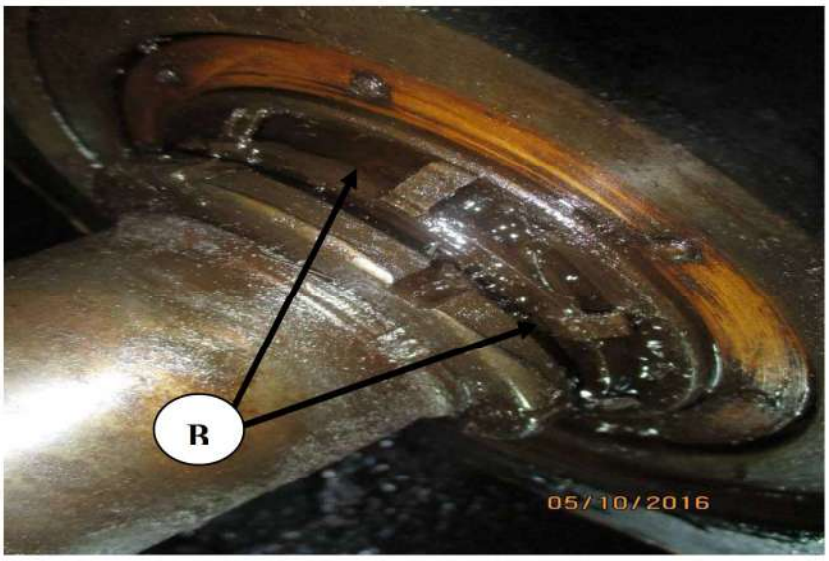
This is a fountain of water which gushed out as the bearing flange was opened. The consequences of water in gearboxes are dealt with under literature review. On observing the basic engineering as well as maintenance shortcomings on the capstans, the consulting team probed further by asking the individuals who maintain the equipment some questions to evaluate their experience and knowledge on gearbox maintenance and effects of water in the gearboxes. The intention was merely to check whether, there is lack of knowledge/skill/experience or whether there is maintenance apathy in play or any systemic problem in play

The members of staff that the engineer interviewed are well qualified individuals and possess the necessary skills to maintain the equipment under review. They also boast many years of experience in this section. This begs a question as to why the capstans are left to dilapidate like they are in the presence of high calibre artisans who have a responsibility to maintain the assets.

The human factor at play was found to be the following;

- These machines work once in a while and they work for short periods, so they are not critical – hence *complacency*
- Some artisans feel their views are down played and not considered/taken seriously by those above them – hence *maintenance apathy*

- Although this is not on your face, but there is a diversity challenge in the mix of some artisans – you've got to wear a sociologist's hat to sense the undercurrents from the waves. Hence some components in the synthesis of the system are *dysfunctional*



Picture # 7: Another bearing not locked

Sub-standard work. This bearing's lock nut is not locked, refer to the label B above in Picture #7. The consequences of this poor-quality work is known, bearing will float.



Picture # 8: Components of bearings which was unlocked during installation

Above are the bearing parts which just dropped as the end cover of the worm gear barrel was removed. This situation lies squarely on the executor of the work. The quality system was not audited. Some companies do have a quality system that they uphold. It is common for

supervisors to trust their artisans and therefore not to follow up on the work they have done. It must be confirmed that with the calibre of artisans at the Dry Dock, no one would think that anyone of them would not know how to install a bearing properly.



Picture # 9: Shaft moved – floating

Above is a picture showing a worm gear shaft which has moved due to poor workmanship. Poor workmanship costs money. The cost of this is:

- New bearings because bearings cannot be repaired.
- Wear on gearbox gears due to poor gear mesh.
- Waste of gearbox oil due to seal failure.
- Seal replacement.
- Risk of Environmental contravention.

Below is another picture which bears testimony to the assumption that PM schedules are a paperwork exercise. Planned Maintenance is a system which is there to assist the organisation to ensure that their assets are maintained properly. Executive management put their trust in management structures which are closer to the operations to ensure that assets are cared for. This picture is sore to the eye.



Picture # 10: Wheel assembly of speed adjuster

The key is floating in the key way. The key way has lost its profile; the key's edges are rounds. This is a mechanical speed adjuster/regulator. The wheel has a grub screw which is not effective as the wheel moves with it. With such a play one cannot regulate speed using this mechanism. One will always run higher than set point. Inspections are done, but still this is missed by everybody. Even those who operate the capstans miss it, the question is how, may be the correct question to ask is, why do they miss it?

THE SPUR GEARS

a) One would expect a person doing inspection to report the condition of the gears that are worn. It does not appear that the condition of the gears below was ever reported. A question was asked whether this is the standard, all artisans responded with an emphatic negative. When asked as to why it is not fixed, very long and winding answers were given. In any societal set up, communities set their standards and accept those standards as the values they will uphold. The same values become their culture and thus ethnography. This forms part of their DNA. As much as there is everything wrong with the gears from the perspective of common and universal engineering standards, to this community it looks like

b) it is still acceptable because that has become their standard. IPC emphatically disapproves that equipment in this condition be run as it is. Our advice to management is to invest in

new gears as a matter of urgency because when these gears fail, the lead time for new gears is quite long.



Picture # 11: AC Capstan intermediate gearing

c) One would expect a qualified artisan to understand the basic principle of gravity feed of liquids, in that if there is no head (H), there won't be any flow of oil from the reservoir to the top bush bearing of the pinion.



Picture # 12: Lubrication infrastructure cannot lubricate pinion bush bearing

In this picture, the pinion bearing does not get any significant amount of lubrication oil. Gravity feed systems are designed and constructed using Bernoulli's Theorem as a basis of design where:

$$H = z + \frac{P}{W} + \frac{V^2}{2g}$$

Where:

H: Total energy per unit weight.

W: Potential energy per unit weight.

P: Pressure.

z: Vertical distance from the ground.

V: Velocity of fluid.

g: gravitational acceleration.

In the picture above it's obvious this principle was never considered and hence the brass bush bearings ran dry as pictures would show. This is the single reason why the bush bearings failed. Some facts which have a bearing on what has become of the capstans;

- Age.
- Only used when ships dock.
- Ships do not dock every day.
- Not running continuously even when they are used.

The above facts have over the years made maintenance personnel somehow lethargic in their approach towards maintenance of these units. There is no evidence of proper asset care, no innovation to improve its operation, no technology upgrade except for planned maintenance schedules which are done every three months. The planned maintenance on these units does not achieve much if defects are so glaring that they are on your face as you take a first look at the capstan. Worn gears, one does not need any advanced technological tools to see that. Gearbox full of water instead of oil, one does not need to do any sampling to see that one has water in the gearbox instead of oil.

3. THE CIVIL INFRASTRUCTURE

In all capstans, the base plates and foundation bolts were found to be in good shape. When the capstans were run to do vibration tests, no vibration came through from the bases which confirmed the observations made on visual inspections. Although some mounting bolts on top covers show some surface corrosion on them, all they need is some coating for protection, otherwise they are all good. Civil work will be necessary for the purpose of accommodating new equipment and/ or opening up for access to components only.

4. LITERATURE REVIEW

4.1 SYSTEMS THINKING

The problem we are trying to solve is not purely technical as most might wish to believe. It is a socio-technical problem. The two elements or components of the problem have to be addressed. All that is needed is a method of synthesis which will form a whole of the parts. If the players in a socio-technical environment are oblivious of the consequences of the overall actions regarding the wellbeing of the whole system, they may wreck the milieu without even recognising what they have done. This is exactly what is happening at the dry dock with regard to the neglect of the capstans.

Equipment life, operability, maintainability are not one time propositions; they have to be reproduced continuously. If the processes that generate them end, the phenomena will also cease to exist. Systems thinking looks at three states of any system at play, we shall do the same for the capstans. These states are:

a) **As is** – this is what was observed on visual inspections and the results of the field tests.

b) **As it will be** – conventionally this means what the capstans would be like if the current situation prevails. The answer to that is that they will self-destruct. However, we shall modify and innovate around this theory and say, how will the capstans be, if they are conditioned/rehabilitated.

c) **As it should be** - this is the state which gives an indication of how the capstans should be like if new technology/ alternative technology is adopted.

4.2 DC AND AC

The DC motors are obsolete. There is very little further than that which needs to be said. Moving forward all motor should be AC. This part is covered in detail under the Electrical report.

4.3 POWER SYSTEMS: HYDRAULIC AND ELECTRIC

The current system is powered on AC and DC. Two capstans are on AC drives and six are on DC drives. Maintenance personnel from management to artisans share the same sentiments about the current system in that it is costly to maintain especially the DC motors. Their technology is old, spares are not readily available, service providers who service motors struggle to repair equipment on breakdowns. Due to these problems part of the scope was to investigate the possibility of converting from electrical power to hydraulic or pneumatic driven systems.

4.4 CONDITION MONITORING

4.4.1 OIL ANALYSIS

Doctors take blood samples to do diagnosis for any ailment a patient might have. Even if an individual is not suffering from any sickness, blood if analysed would show if there is anything to worry about. This goes for all the important organs in a human's body e.g. liver, kidneys, spleen and many others.

On the other hand, engineers do oil analysis to do diagnosis on gearboxes, turbines and any other oil lubricated systems.



Picture # 13: Contaminated oil – AC Driven Capstan

The picture shows the condition of the oil in the gearboxes of the AC driven capstans. The oil obviously emulsified and degraded completely. The contamination as literature would say, changes the theology of the oil. This condition has a negative effect on the components of the gearbox gears, shaft, and bearings.



Picture # 14: DC Driven Capstan gearbox oil condition

As the gearbox covers were opened the picture above was a prominent view in all DC drive gearboxes. It is depressing sight for any technical. The robustness of the equipment is abused and has been abused for a long time. Those responsible have ridden the wave of "capstans run for a very short time" for too long and complacency crept in. This became a standard. Remember the saying, "the standard you set is the standard you accept". People at the Dry Dock would not understand why the hullaballoo if the oil is contaminated because for them this has become a standard over the years, but to the outsider it is shameful because it contradicts with the accepted engineering standards and maintenance standards of good practice.

In the introduction, reference was made of the epistemology and ontology of maintenance and the engineering profession in general. This forms the foundations of our agreements and disagreements in the dialogue of engineering standards and practices. The assertions made here are informed by these foundations. It was also mentioned that a society through the socialisation process evolves and develops its own norms and behaviours referred to in this discussion as ethnography. A society's ethnography cannot supersede universal norms and standards. Therefore, no matter how the community at the Dry Dock explains the situation of the Capstans, the conclusion is:

1. **It might be accepted to them as a small community practising maintenance in their own way.**

2. **It is not acceptable by any engineering standard.**

The decision which needs to be taken is whether TNPA as a business seeks to write its own maintenance manual or does it choose to conform to universal maintenance and engineering norms, standards and practices. Our assignment of assessment and evaluation is built on the foundations of ECSA standards and other global engineering practices.



Picture # 15: DC Driven Capstan – Clearly water is washing gearbox internally and not lubrication

The picture of the gearbox above is from the DC driven capstan. This is the gearbox which was turned 90° from a conventional position. As the picture shows, the worm gear has rust marks. It can also be seen that there are areas where metal to metal effect is evident. This is the result of a combination of a fitting problem (poor workmanship) and an ineffective lubrication.

4.4.2. VIBRATION ANALYSIS

All capstans were run few times, for operational purposes and also for the consulting team's need as they were busy evaluating components. It was observed that capstans are shaking as they run. This is an indication of failed bush bearings. To evaluate the extent of the damage, it was decided to conduct a vibration analysis on all capstans. The results proved what the team experienced visually and heard when they ran the equipment. All capstans have unacceptably high levels of vibrations. The Dry Dock team are aware of this condition because already they operate the capstans at low speed and some are gagged at #2 or #3 speeds. The decision to make moving forward is whether, it is necessary to have a facility to run them higher than set point #3 or it should be taken that for all practical purposes this should be maximum speed. Undeniable fact is that they have docked and undocked at low speeds before, in fact they are still doing it. Below is a list of average speeds taken using a tachometer/stroboscope.

4.4.2.1 VIBRATION TEST RESULTS

AC DRIVES SCHEMATIC

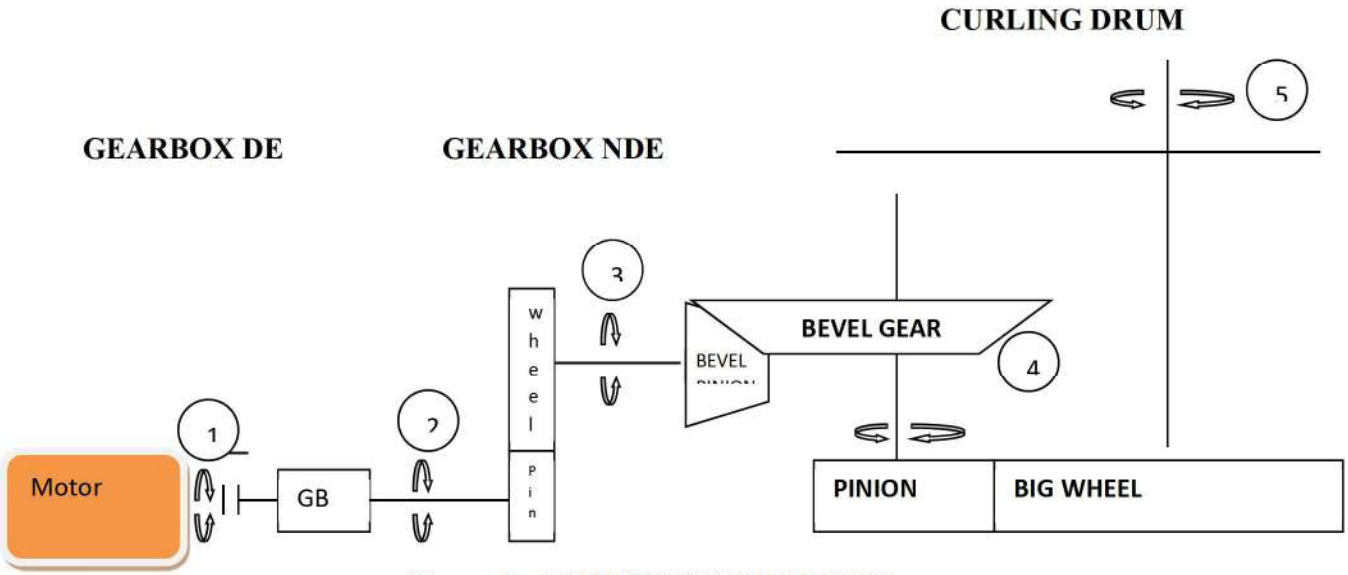


Figure 1: AC DRIVES SCHEMATIC

Table 1: AC Test speed result for vibration at different point

SPEED	1		2		3		4		5	
	RPM	Freq (Hz)	RPM	Freq (Hz)	RPM	Freq (Hz)	RPM	Freq (Hz)	RPM	Freq (Hz)
1	740		246		50		14.4		5.5	

DC DRIVES SCHEMATIC

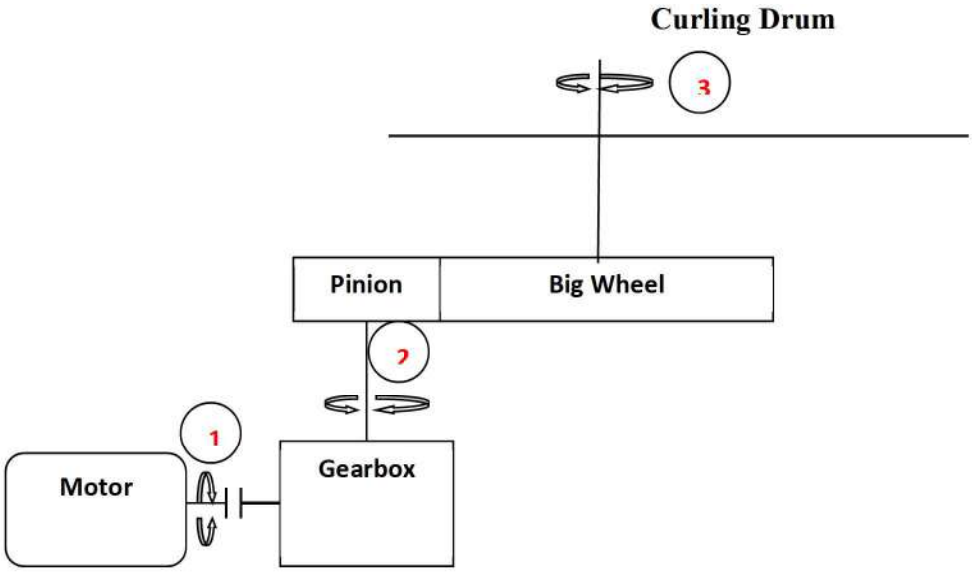


Figure 2: DC DRIVES SCHEMATIC

Table 2: DC Test speed result for vibration at different point

SPEED	1		2		3	
	RPM	Freq(Hz)	RPM	Freq(Hz)	RPM	Freq(Hz)
1	223		15		3	
2	287		19		3.5	
3	431		22		4	
4	-	-	-	-	-	-
5	-	-	-	-	-	-
6	-	-	-	-	-	-
7	-	-	-	-	-	-

The grid could not be filled completely as the capstans were vibrating vigorously at higher speed, but more than that, they are gagged at a speed set point of #3.

Although the test runs could not be done as initially planned due to the poor condition of the capstans, the findings gave the team adequate data which on analysis helped in reaching for a technical conclusion and decision that as a solution, speed should be varied between 2,5 rpm to 6 rpm through a gearbox or through a direct drive.

4.4.3 LASER ALIGNMENT

The need to do vibration analysis was triggered by the observation made when capstans were run. The extent of noise and movement were clear indicators of other problems in other places of the capstan assembly. The intention was to establish without a doubt where the vibration is coming from.

Laser alignment is an essential component of a viable maintenance strategy for rotating machines. In isolation, each strategy can help to reduce unexpected machine failure but taken together they form the hub of a proactive maintenance strategy that will not only identify incipient problems but allows extending machine operating life considerably.

a. Definition

Shaft alignment is the process whereby two or more machines (typically a motor and pump) are positioned such that at the point of power transfer from one shaft to another, the axes of rotation of both shafts should be collinear when the machine is running under normal conditions.

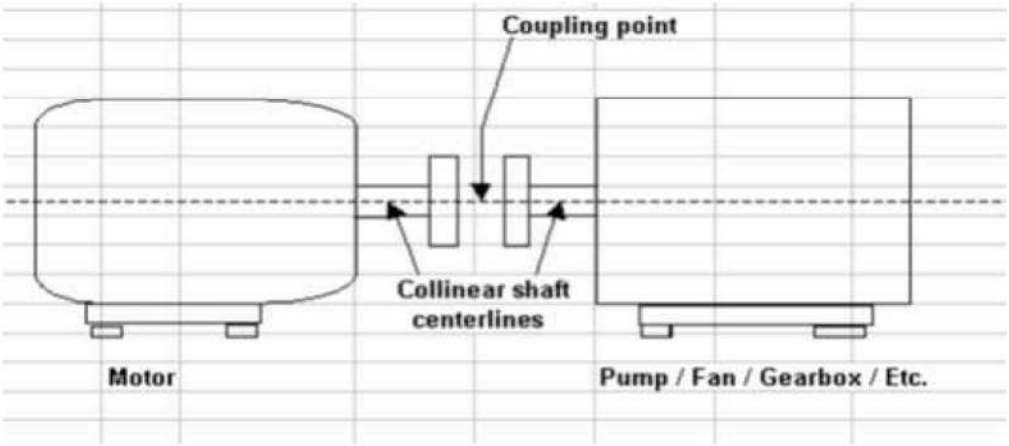


Figure 3: Shaft alignment

As with all standard definitions there are exceptions. Some coupling types, for example gear coupling or Cardin shafts, require a defined misalignment to ensure correct lubrication when operating.

b. The Importance of Motor Shaft Alignment

The objective of optimized shaft alignment is to increase the operating life span of rotating machinery. To achieve this goal, components that are the most likely to fail must be made to operate within their acceptable design limits.

While misalignment has no measurable effect on motor efficiency, correct shaft alignment ensures the smooth, efficient transmission of power from the motor to the driven equipment. Incorrect alignment occurs when the centrelines of the motor and the driven equipment shafts are not in line with each other. Misalignment produces excessive vibration, noise, coupling, and bearing temperature increases, and premature bearing, coupling, or shaft failure.

c. Different types of alignment

Shaft misalignment can occur in the following ways, Parallel and angular misalignment, refer to Figure 4. These are the two basic types of conditions that can exist in either the vertical or horizontal directions. Misalignment can occur in any combination of parallel and angular or both

- Angular misalignment occurs when the motor is set at an angle to the driven equipment. If the centrelines of the motor and the driven equipment shafts were to be extended, they would cross each other, rather than superimpose or run along a common centreline. The "gap" or difference in slope of the motor shaft when compared with the slope of the stationary machine shaft can have horizontal misalignment, vertical misalignment, or both. Angular misalignment, in particular can cause severe damage to the driven equipment and the motor.
- Parallel misalignment occurs when the two shaft centrelines are parallel, but not in the same line. There are two planes of parallel misalignment as shafts may be offset horizontally (displaced to the left or right), vertically (positioned at different elevations), or both.
- Combination misalignment occurs when the motor shaft suffers from angular misalignment in addition to parallel misalignment.

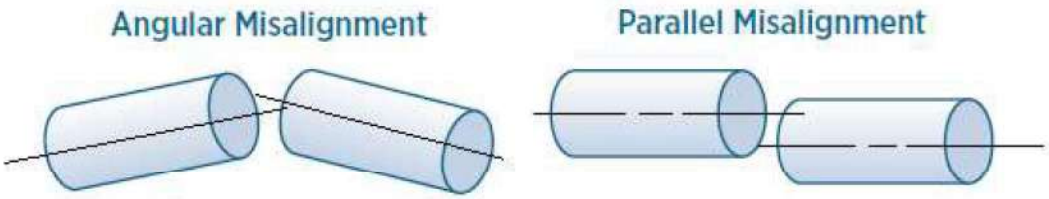


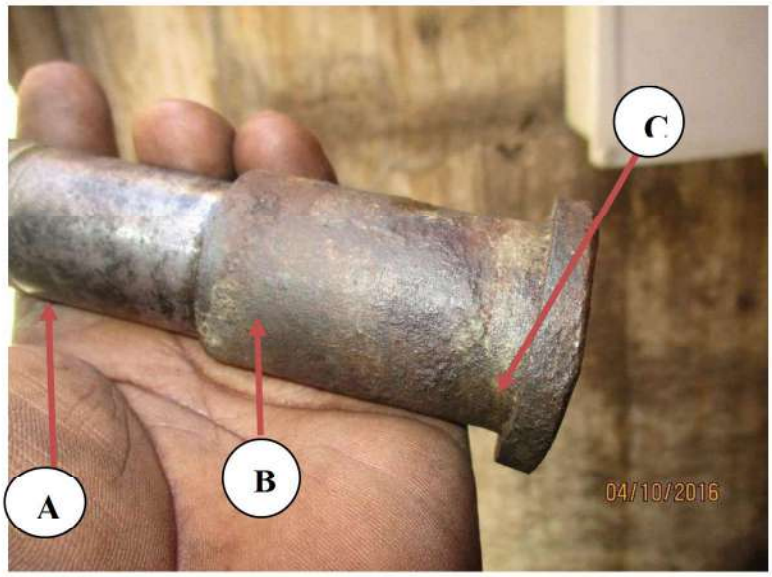
Figure 4: Different types of shaft alignment

Although results showed that there are machines which are misaligned, their misalignment was not catastrophic. Some are angular misaligned and some have parallel misalignment. The worst one was found to be capstan #8.

d. Coupling System

A coupling is used to connect a drive system to a driven system. In this application, the coupling is connecting the drive motor to a driven gearbox. The coupling transmits power and torque to the gearbox. There are different types of coupling which design engineers choose to suit applications. The capstans have flange couplings. Naturally these couplings are rigid and do not allow any flexibility. If there is any misalignment on shafts, these couplings do not compensate for such misalignment. However, it was noticed that the two coupling halves have different hole sizes. The flange on the gearbox side has bigger holes which is 46mm in diameter. The motor side coupling half is smaller at 32mm in diameter. Accordingly, the pin is designed with steps, see picture below.

Picture #16 below, symbols A, B and C are the labels of the coupling pin parts. It shows the smaller section (motor side coupling half), bigger part (gearbox side coupling half) and the collar respectively.



Picture # 16: Coupling pin

It could have helped the process if drawings were available because the actual sizes would have been compared with the original sizes to determine the wear. Out of that the wear rate could have been established as well. Such information becomes handy for a maintenance manager (technical manager in the case of TNPA) because the life cycle of these components are known. At the moment, one cannot guess but only recommend that component drawings be made, and the plan component life cycle be monitored through an improved PM System. The technical manager must be a custodian of this information.

The same should apply for the pins on the brake systems. Under no circumstances should pins on the brake linkages be replaced with ordinary bolts.

The following were found on the flange couplings

- In two capstans, coupling halves were found to be broken
- In one capstan, one coupling halve was trimmed off about 30mm.

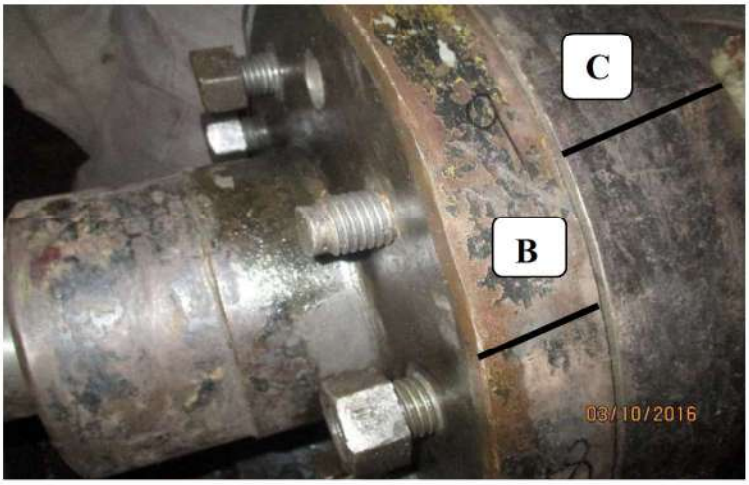
In some couplings, coupling pins had deep pitting. This is because of water trapped within the faces of the coupling bolts and the pins. The solution to this is to address the problem of water ingress. The Technical Supervisor did raise his frustration about water accumulation in the pits where capstans are situated. It is said after every rain, the pits get flooded and water has to be pumped out.

With regards to the damaged flanges, it was established that they were broken either during a disassembling or assembling action by an artisan. A normal spanner jams against the flange if one tries to fit it on the nut for tightening or undoing action. Trying to use a hammer under these situations would result in a breakage of a flange. A solution to is for artisans to use suitable tools. Picture #17 below shows a damage labelled as A that was found in two capstans coupling half and another one capstan coupling was intentionally (cannibalised) as it shown by the Picture #19 with label B and label C, it can be clearly seen that the two discs lengths were left unequal and the cut was not done according to engineering practise which could result in vibration invitation and excitement due to an imbalance caused by this cut.



Picture # 17: Broken coupling

A solid coupling half (full width) not tempered with



Picture # 18: Coupling half cannibalized (whole circumference cut off)

Damaged Coupling

As it can be seen in the picture above, whilst doing inspections it was observed that flanges in two capstans are damaged with broken pieces. A third one has its coupling half cut/trimmed the whole circumference. As consultants, we ask the irritating question, "why". Nobody shed any light neither on how the failure occurred nor on the cause of the failure. Experience has taught us though that excessive vibrations do lead to self-destruction of equipment. This prompted a need to check alignment on all the machines and the services of AW Laser were sought.

A further investigation was carried out which was aimed at assessing the coupling bolts/pins and coupling flange holes.

A general behaviour of maintenance throughout different industries is the practice of modifying equipment, systems and components. Companies curb this by putting in place a policy and procedure for modifications. This is one element of an organisation's engineering strategy. Some pins have nuts welded at the back collar. The only reasoning which can be drawn out of this is that artisans are sometimes struggling to take out pins. Instead of addressing the root cause, they treat the symptoms and end up messing up with the design. The root cause of the problem is actually the rust that develops between holes and pins on the flange. The photos below do show that with the amount of rust, erosion and deep pitting on the pins. If the RCFA was done, at the end it would have come out that applying never seize or equivalent product to that would prevent pins seizing.

Although there are no drawings, it was established that the original size is 29mm. All pins have less than 1mm wear except for those which have deep corrosion with pitting holes which are more than 1mm. Even though this work was done without drawings to reference from, our experience is that pins of this size cannot have tolerances (-1,000mm). As such all these pins, should be discarded.

Below are the pictures which tell some interesting engineering, some mischievous. Label D shows the modified end section of coupling pin which is not approved.



Picture # 19: Modified end section of coupling pin

Literature on vibration and balancing gives details on the dangers of introducing weights or removing weights on balanced systems. The only explanation which could be given as to the reasons why the cannibalisation of couplings have not resulted in catastrophic failures, is the fact that capstans are not fast running machines, because if they were, surely they would have exploded and possibly cause injuries, even fatalities. The evidence is on Capstan #4 which was run at high speed and it blew the top cover off.



Picture # 20: Coupling pin – deep erosion on coupling pin

Three things to note on this picture besides the depth of the erosion;

a) The wear is longitudinal and not circumferential

b) The wear grooves are straight

c) The wear grooves are full length of pin landing

To analyse this phenomenon further one would need to run more tests on the equipment. However, for this assignment we concluded that rust causes abrasion on the surfaces of pins. It can also be confirmed that the coupling holes do not have the same wear which means the pins are made of material softer than that of the coupling.

Rust develops due to moisture in the capstan pits. Maintenance staff who were spoken to also made mention of the fact that capstan pits get flooded with storm water on rainy days. Also, sea environment is naturally corrosive. Future solutions should look into these details.



Picture # 21: Aggressive abrasion on pin. The pattern is an indication of some movement on the coupling as well presence of foreign material between the surfaces

The patterns of abrasion on pictures 21 and 22 are different. As mentioned earlier, the pattern on picture 21 is longitudinal. Picture 22 has a circumferential pattern. Whilst the common denominator is rust which aid the abrasion, the dynamics are totally different. The contrasting wear patterns are worrying because they indicate that different dynamics exist in different capstans. The pins are from different capstans. A circumferential wear could be an indication that when the motor starts, the coupling half on the motor side moves first and the gearbox coupling half follows. This causes a shearing dynamic within the assembly.

Pins are designed to fail on shear stress or crushing stress. The level of abrasion on the pins reduces the strength of the pin.



Picture # 22: Deep corrosion, coupling pins with this kind of pitting should not be in service

Pitting on the pin above is excessive. This pin has no abrasion marks. This pin would snap quite easily if the system is made to work hard.

Three scenarios exist in the capstans couplings:

a) Longitudinal wear;

b) Circumferential wear;

c) Pitting.

No instruments were used to form an opinion on the pins wear patterns. No tests were conducted to detect the wear patterns. It is all observation and then knowledge and experience to analyse. The expectation is that anyone who is qualified as a artisan can make the same observations, report them and may be leave the analysis to the supervisor /engineer/manager. This does not seem to have happened anywhere in the maintenance work orders which IPC analysed from 2012 - 2016.

This reinforces IPC consultants' position that the issue at hand is not purely technical but socio-technical and managerially systemic.

Finally, on couplings, larger motors are usually directly coupled to their loads with rigid or flexible couplings. Rigid couplings do not compensate for any motor-to-driven-equipment misalignment, while flexible couplings tolerate small amounts of misalignment. Flexible couplings also can reduce vibration transmitted from one piece of equipment to another, and some can insulate the driven equipment shaft against stray electrical currents. Even flexible

couplings have alignment requirements, defined in the instruction sheet for the coupling. Capstans have rigid flange couplings which do not allow for any misalignment

However, it is a mistake to rely on coupling flexibility for excessive misalignment, because flexing of the coupling and of the shaft will exert forces on the motor and driven-equipment bearings. These forces may result in premature bearing, seal, or coupling failures, shaft breaking or cracking, and excessive radial and axial vibrations. Secondary effects include loosening of foundation bolts, and loose or broken coupling bolts. Operating life is shortened when shafts are misaligned.

e. Benefits of shaft alignment

The benefits that accrue from adopting good shaft alignment practice begin with improved machine operating life thus ensuring plant availability when operations require it. Accurately aligned machinery will achieve the following results.

- Improved proved machine reliability and productivity.
- Reduced machine repair costs.
- Reduced labour.
- Reduced power consumption oh machinery.
- Minimization of machine installation and repair time.
- Allow verification of machine performance throughout the machine life.
- Reduce costs of consumed spare such as seals and bearing.
- Improve plant operating safety.

4.4.4 SHAFT ALIGNMENT TOLERANCES

Shaft to shaft alignments shall be carried out to within the tolerances specified in the table below, unless more a more precise tolerance is specified by the manufacturer or because of special conditions depicted by a customer's process. The tolerances specified are the maximum allowable deviations from Zero-Zero specifications or an intentional targeted offset (parallel) and/or angularity.

Table 3: Tolerance of Misalignment

	Angular Misalignment Mils per inch .001/1"		Offset Misalignment Mils .001"	
RPM	Excellent	Acceptable	Excellent	Acceptable
3600	0.3/1"	0.5/1"	1.0	2.0
1800	0.5/1"	0.7/1"	2.0	4.0
1200	0.7/1"	1.0/1"	3.0	6.0
900	1.0/1"	1.5/1"	4.0	8.0

3.4.5 RECOMMENDATIONS

- Check the equipment for alignment changes after major work on capstans.
- Adopt this as a strategy for all rotating equipment.
- Monitor for vibrations and for increasing vibration trends as an indication of misalignment.
- Apply predictive maintenance techniques, including vibration tests and frequency spectrum analysis, to distinguish between bearing wear, shaft misalignment, or electrically caused vibrations (Adopt Condition Monitoring Strategy).

5. VIBRATION ANALYSIS

5.1 DEFINITION

Vibration is a mechanical phenomenon whereby oscillations occur about an equilibrium point. The word comes from Latin vibration term ("shaking, brandishing"). The oscillations may be periodic, such as the motion of a pendulum or random, such as the movement of a tire on a gravel road. At its simplest, vibration is displayed as displacement overtime. Figure 1 shows the display of the vibration.

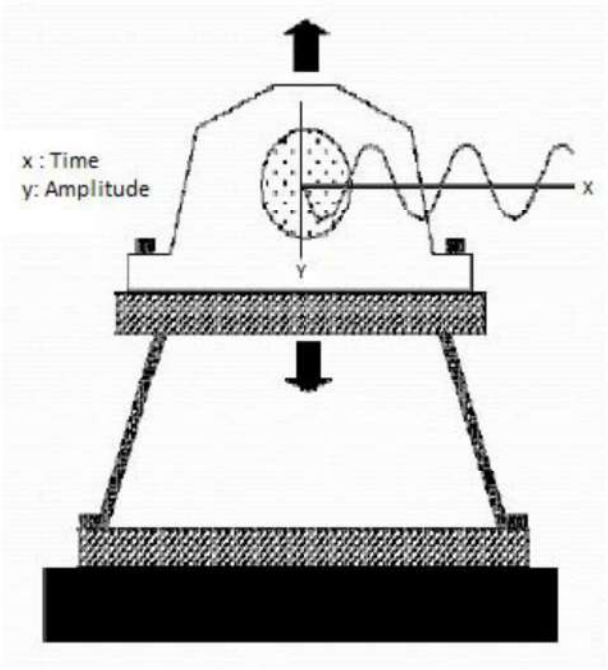


Figure 5: Different types of shaft alignment

5.2 AIM OF THE VIBRATION ANALYSIS

Vibration analysis, applied in an industrial or maintenance environment aims to reduce maintenance costs and equipment downtime by detecting equipment faults. The vibration analysis is the one containing the most information on machinery health for all the parameters that can be measured non-intrusively in industry today. Vibration analysis is a key component of a Condition Monitoring programme, and it is often referred to as Predictive Maintenance.

5.2.1 VIBRATION BASICS

To begin a discussion of vibration analysis, it is important to understand that the location of a vibrating body's surface varies with time. This motion of the body's surface is called vibration or oscillation. The swinging of a pendulum and the motion of a plucked guitar string are typical examples of vibration. The theory of vibration deals with the study of oscillatory motions of bodies and the forces associated with them.

A vibratory system must, in general, include a means for storing potential energy (spring or elasticity), a means for storing kinetic energy (mass or inertia), and a means by which energy is gradually lost (damping or resistance).

5.2.2 VIBRATION MEASUREMENT

A vibration transducer (sensor) is attached (or held by hand) to the vibrating surface during vibration measurement. The vibration sensor converts this mechanical motion into an electrical signal that corresponds to the body's motion in space. The vibration analyser is then used to sample this electrical signal and make various calculations based on the electrical signal's properties.

5.2.3 ANALYSIS MODES

The signal values resulting from these calculations may be displayed in a number of different ways. Each different way of displaying the resulting data signal is called an Analysis Mode. In some Analysis Modes, such as the Waveform Analysis Mode, signals are displayed in Time Domain. Time Domain readings are generally used to analyse impulsive or transient vibration signals.

Other modes such as the Spectrum Analysis Mode, utilize a display in the Frequency Domain. Frequency Domain readings are generally used to analyse repetitive signals such as those generated by rotating machinery. The entire signal or just a portion of it may be displayed depending on the analyser settings chosen by the user.

Sometimes the user will choose to use an Analysis Mode such as the Overall Analysis Mode that computes a spectrum analysis and then combines the entire signal or portions of it into a single convenient numeric value.

5.2.4 VIBRATION ANALYSIS DETECTION

The vibration analysis can detect various problems for different body or machinery. Various vibration analysis detections are:

- The vibration analysis can detect and track progressing stages of bearing failure;
- The vibration analysis can identify imbalance and misalignment. It is used to correct imbalance;
- The vibration analysis identifies and correct resonance;
- The vibration analysis can identify mechanical wear in couplings, bearings, support structures, etc.
- The vibration analysis can detect other defects such as lube failure, soft foot, broken rotor bars, pump cavitation, and many more…

5.2.5 RECOMMENDATIONS

Put a Condition Monitoring Strategy in place which will assist in the following;

- Creation of database
- Collection of data
- Detection of developing faults
- Diagnosing the nature and extent of fault

6. GEARING TECHNOLOGY, DESIGN, AND MAINTENANCE OF GEAR SYSTEMS

Gears drives are used to transmit power and torque. Depending on the need for torque in a particular operation, it can vary from a pulling torque, a torque to drive rollers to compress/squeeze material like in a milling process. The geometry of the gears determines the efficiency of the operation i.e. the output parameter intended. When inspection is done on gears, it is not only the damage that one should look for, but the geometry of the gears as well. Key factors in gears and teeth profiles are top land, pitch point, pressure angle.

Geometry of Gears

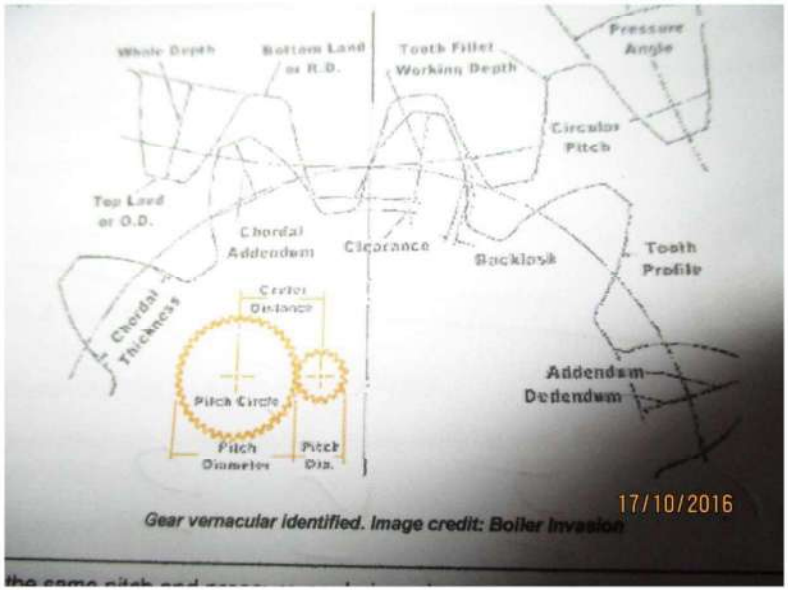


Figure 6: Geometry of spare gears showing critical design elements

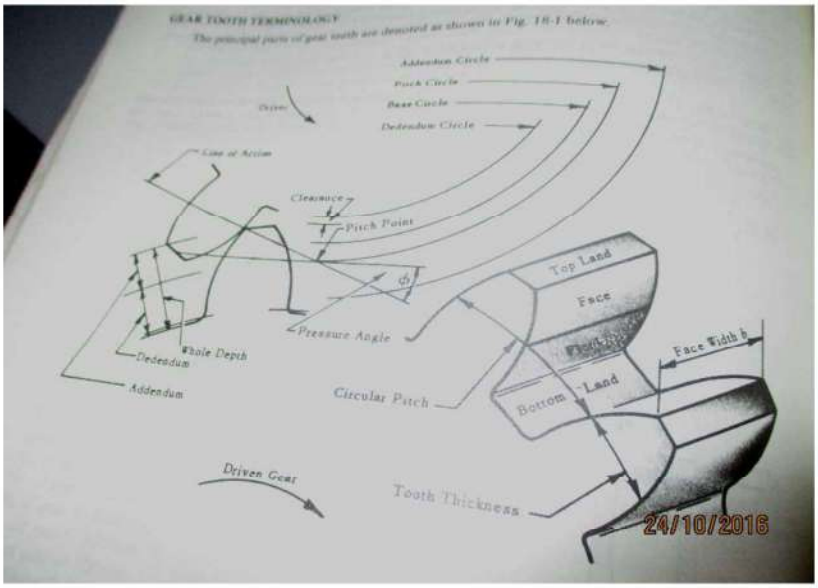
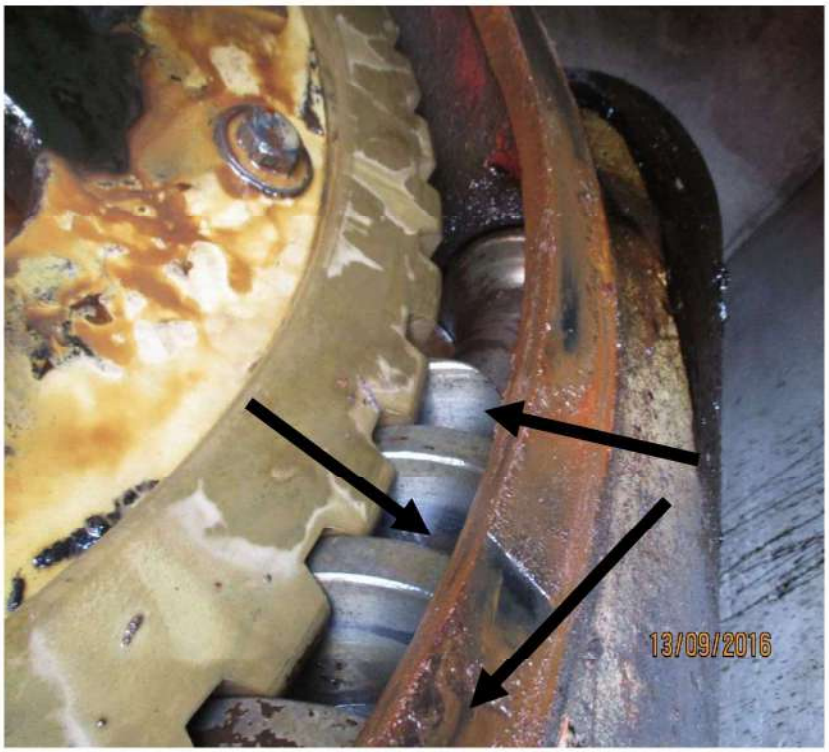


Figure 7: Gear geometry with definitions of the different parts of the gear



Picture # 23: A worm shaft and gear – developing rust



Picture # 24: Visible metal to metal scratch marks. Lock nuts not locked on worm gear. One cannot even begin to mention the setting of the backlash.

The shining marks on the worm are indicators of a worm gear that is floating because the lock nuts are not locked.

6.1 NDT (Non-Destructive Testing) ON GEARS & ULTRASONIC TESTING ON SHAFTS

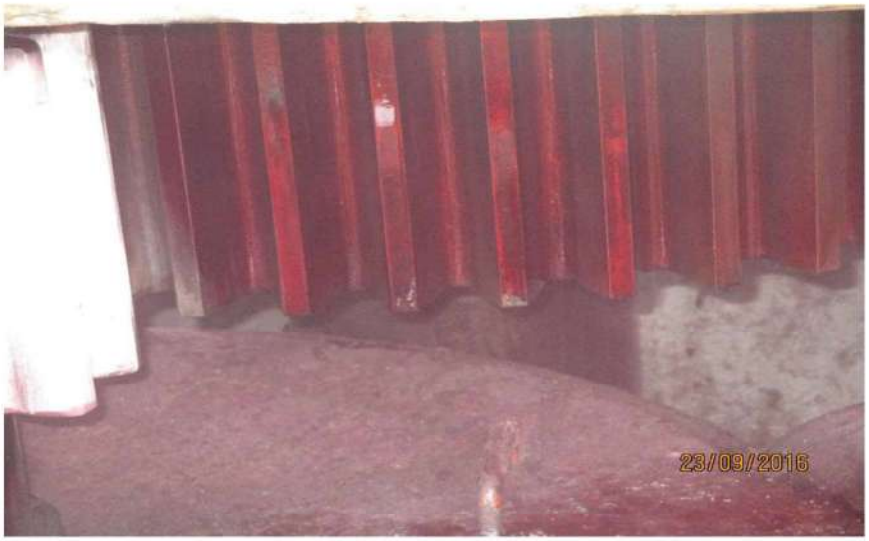
In an environment where gear systems are prominent, an organisation would ensure that a complete set of gears is kept in stock as part of the drop-in spares. The influence to this strategy is the fact that manufacturing a big gear is a long process. Gears are designed for long life but this does not warrant that they should be neglected as if they do not need any care. Gears should be inspected and tested thoroughly at least once per year and there must be a standing PM schedule to do this annually. The following tests should be done and kept in the planning office or whichever office that is responsible for record keeping

- Check for cracks on spur gear teeth.
- Check gear mesh.
- Check for any failures both internally and externally on shafts.

For this assignment, the technology which was used for crack tests on gears is Non – Destructive Testing and on shafts Ultra-Sonic testing was done



Picture # 25: NDT process in progress



Picture # 26: NDT process in progress



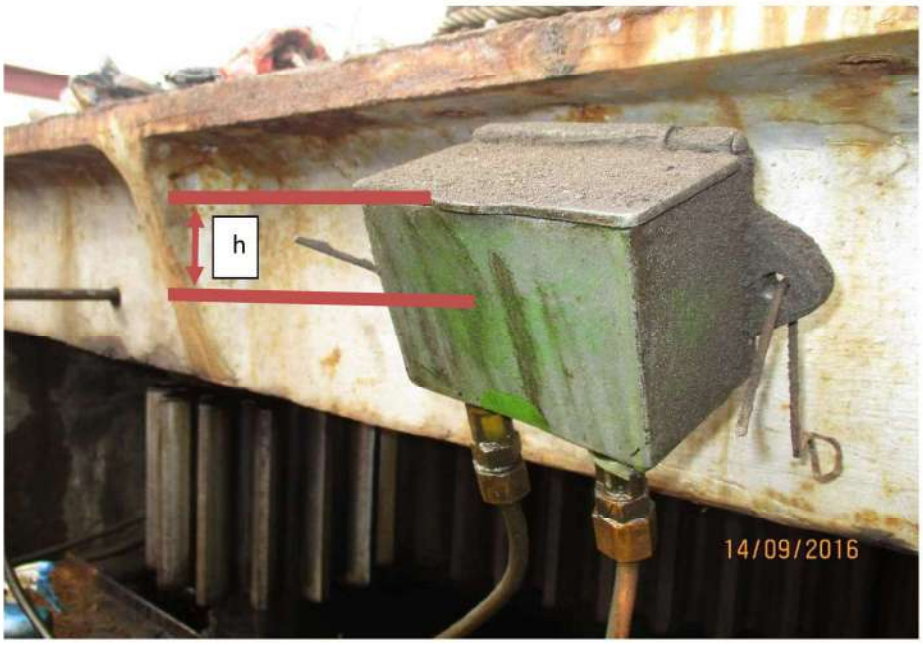
Picture # 27: UT Testing being conducted on shafts



Picture # 28: UT Testing underway

Gears and shafts all passed the NDT and UT test in all the capstans.

7. LUBRICATION SYSTEM



Picture # 29: Lubrication infrastructure – hung with the aid of a welding rod like a temporary set up

Positioning of Lubrication infrastructure to lubricate the pinion brass bearing and the wheel foot bearing (also brass bearing). Oil feed is through gravity and it therefore relies on head availability to be able to feed the utility points;

$$P = \rho g h$$

Where:

P: Pressure in kilopascals (kPa).

g: Gravitational acceleration (9.81 m. s^{-2}).

ρ: Density of oil ($kg.m^{-3}$).

h: Head above utility point (m).

With the current infrastructure, the highest-pressure value which can be achieved is 3.708 kPa at a height of 420mm which a distance from the foot bearing to the top of the oil reservoir.

The density of the lubricant which is in use SAE90 is 0,9kg/m^3 and therefore by calculation at the top bearing where h = 100mm pressure, P = 0,883 kPa. At the foot bearing with height (h) = 420mm, pressure P = 3708 kPa. These numbers explain why top brass bearings are dry

Below is a picture of a dry top brass bearing which is starved of lubrication oil.



Picture # 30: No lubrication for the brass bush bearing.



Picture # 31: Rain water penetrates through the bearing cover seams and catalyses the process of rust development.

A solution is recommended for this situation.



Picture # 32: Lubrication pipes

A network of lubrication pipes which feed different service points on bearings on an AC driven capstan. Current infrastructure needs to be changed totally, modified and less cumbersome.

8. STEEL ROPES AND DRUM

8.1 STEEL ROPES, DESIGN, USE, RISKS AND MAINTENANCE

There is one standard and law for ropes. Ropes used for lifting whether in cranes and other rigging services work much harder than ropes which perform pulling actions. The ropes under review are rated for pulling 20 Ton load.



Picture # 33: Rope on drum

The main concern with all the ropes is their dry condition, rust. Some have torn wires and some have heavy kinks and knots but they are still being used. Although by design these ropes are supposed to be self-lubricating, this does not seem effective.

Some tags on the rope show 8T and others 7T. It does not seem like the team knows exactly what rating of the steel rope should be.

In the short term, an operational procedure should be written and enforced to ensure that ropes are rolled on the drum when not in use. They should not be left lying on the floor.



Picture # 34: Damaged rope



Picture # 35: Rope with a heavy knot

8.2 DRUM

The condition of the drums is similar to all capstans. Internally they are badly rusted. During operation, they vibrate heavily. This is an indication that the brass bush has worn quite badly. This is confirmed by the vibration tests. It could help the operation if the drum has rope grooves for better handling of the rope.

Some of the I-bolts on the drum heads rusted badly. Capstan #4 lost its drum head and it was never replaced. The team was informed that the operator ramped the speed too high too fast and top cover broke.

9. ELECTROMAGNETIC BRAKE SYSTEM

The brake system linkages on capstan #2 are in a bad condition. This system should be replaced. Capstan #7's brake system is non-existent. All other brake systems are still in good condition except that in some capstans pins have been replaced by bolts, a practice which is not acceptable. This situation must be rectified. Spare pins must be kept on stock in the workshop or in the supervisor's office.

10. RESEARCH TOOLS

The research tools for this project are;

- Computers
- SAP maintenance
- Internet
- Camera
- Techometer
- Mechanical measuring instruments e.g. micrometers, vernier
- Mega
- Ultrosonic Testing Machine
- NDT kit
- Vibration testing equipment

10.1 SAMPLING METHOD

- For quantitative analysis, maintenance data was collected for the period of five years 2012 - 2016
- For qualitative response to interview component of the research study, at the Dry Dock the community was stratified as follows;
    - Mr Claude Tavarayan – Technical Manager
    - Mr Mervin – Technical Supervisor
    - Sphephelo Gumede – Artisan Millwright
    - Graham – Artisan Millwright
    - Lindelwa Tom – Artisan Electrician
    - Rizikar Kader – Millwright

One cannot help but appreciate the diversity in this section of the Port of Durban. Impaphala Projects and Consulting (Pty) Ltd was not doing a human science research study but it is proper that the point is made. This is a diversified group, which when interviewed they showed great levels of maturity. Most importantly some of them acknowledged that they could do better in the maintenance of capstans. They have the experience and qualifications to deliver better than they currently are.

10.2 FIELD TESTS

- Vibration test.
- Laser alignment checks.
- Oil analysis.
- NDT and UT.
- Gear mesh.
- All 8 capstans were checked, test run, components tested.
- Oil sampling was done for all eight (8) gearboxes.
- Vibration analysis was done on all eight (8) capstans.
- Gear mesh was tested on all eight (8) capstans.
- Alignment was checked with laser on all eight (8) capstans.

11. RESEARCH FINDINGS

11.1 MAINTAINABILITY

It was established that maintenance at the Dry Dock had no formal maintenance system and as such no maintenance records for the capstans are very scanty. The Technical Manager on his arrival put a system in place and some records are now available. Planning is a full time job, it is not easy for the Technical Manager to be a Planner or Asset Manager over and above the responsibility of his role as Technical Manager. In the analysis and evaluation of equipment reliability, critical statistics of Mean Time Between Failures (MTBF), Mean Time to Repair

(MTTR) is important. These are parameters which are indicators of maintainability. In the absence of this quantitative and scientific measurement of maintainability reliance is on qualitative information which was collected when interviews were conducted with staff and visual inspections which the consulting team did during the course of the research.

Below is a table of planned maintenance schedules for a period 2012 – 2016. When this information was sorted, it was hoped that it would give details of the actual maintenance done on each capstan. However, this is not the case on the records available. This is a shortcoming in the system. It does not help if all one would get in the record of maintenance is that an equipment was taken out of service for maintenance but no details are filled in to state what exactly was done. In completing the job card details should state for an example that bearings were changed, oil was purified or oil was drained and new oil filled in the gearbox etc.

In all capstans a schedule is done every four months according to the record but it is supposed to be every three month.

Table 4: PM SCHEDULES FOR A PERIOD 2012 – 2016

YEAR	1	2	3	4	5	6	7	8
2016	4	2	3	2	2	3	3	0
2015	3	2	3	3	3	2	2	0
2014	3	3	3	4	5	2	3	0
2013	0	0	1	0	0	1	0	0
2012	3	3	3	3	3	3	4	0

Capstan #1

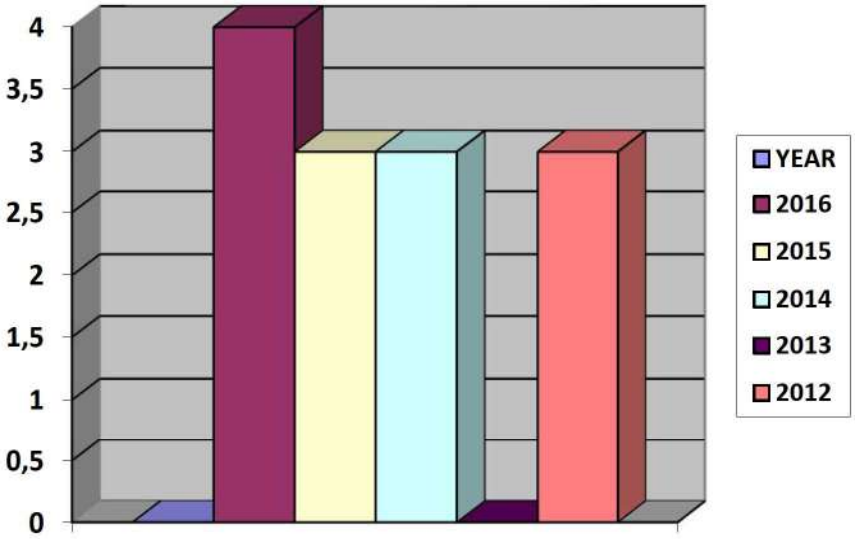


Figure 8: PM Schedules for a period 2012 - 2016 capstan #1

According to this graphic, it can be seen that in 2013 no maintenance was done on this capstan. This year alone 2016, PM maintenance was done on the capstan but more than that work was done in January.

Capstan #2

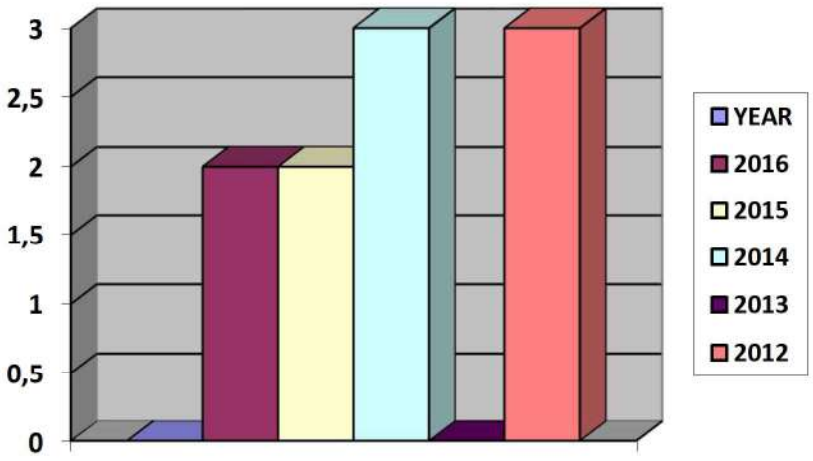


Figure 9: PM Schedules for a period 2012 - 2016 capstan #2

According to this graphic no maintenance was done on capstan #2 in 2013. In year 2015 and 2016 the same capstan was taken for maintenance twice. This is against the norm of four times a year.

Capstan #3

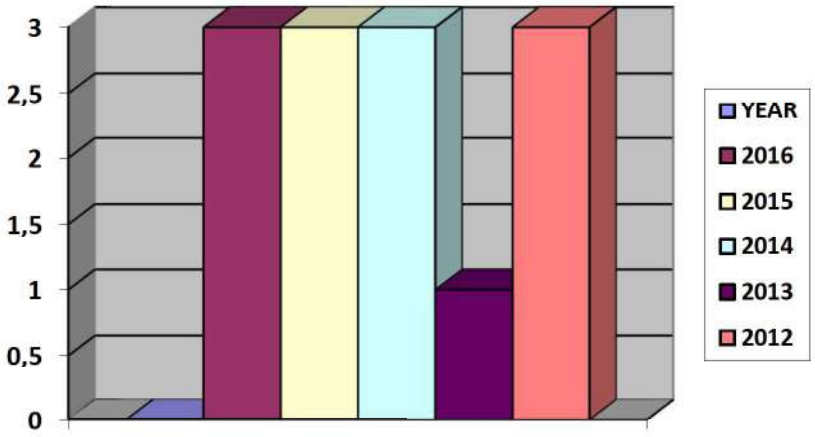


Figure 10: PM Schedules for a period 2012 - 2016 capstan #3

According to this graphic capstan #3 was taken out for maintenance once against a normal schedule of four times a year.

Capstan #4

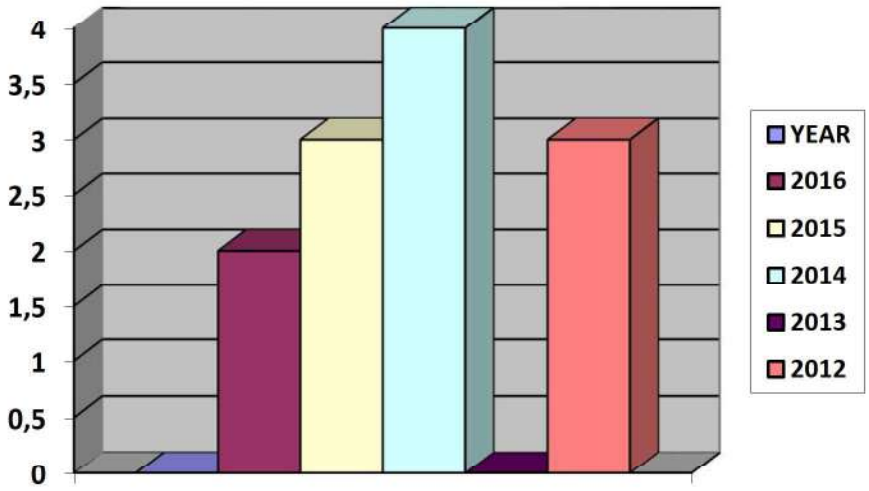


Figure 11: PM Schedules for a period 2012 - 2016 capstan #4

According to the graph, in year 2013 there was no maintenance done on capstan #4. In year 2014 this capstan was out four times, three times for schedule maintenance and once for breakdown outage.

Capstan #5

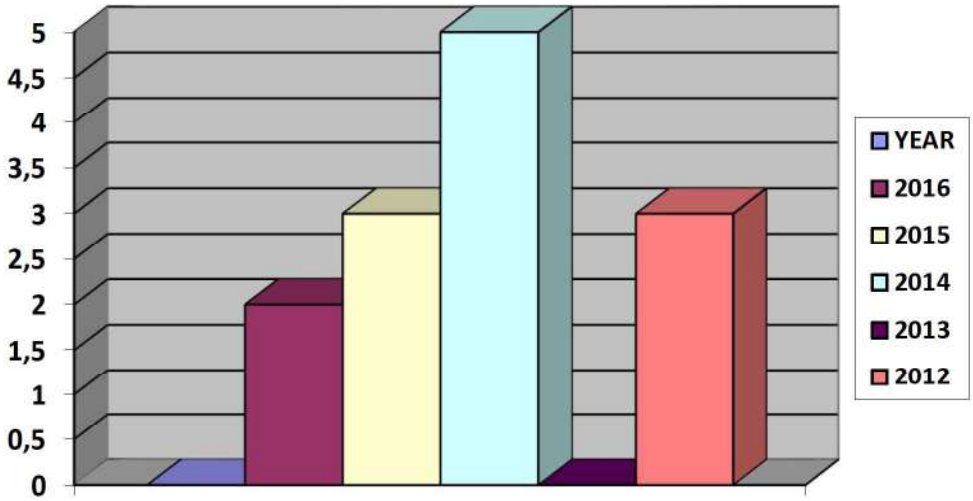


Figure 12: PM Schedules for a period 2012 - 2016 capstan #5

There was no maintenance for Capstan #5 in year 2013. In 2014 this capstan experienced two breakdowns

Capstan #6

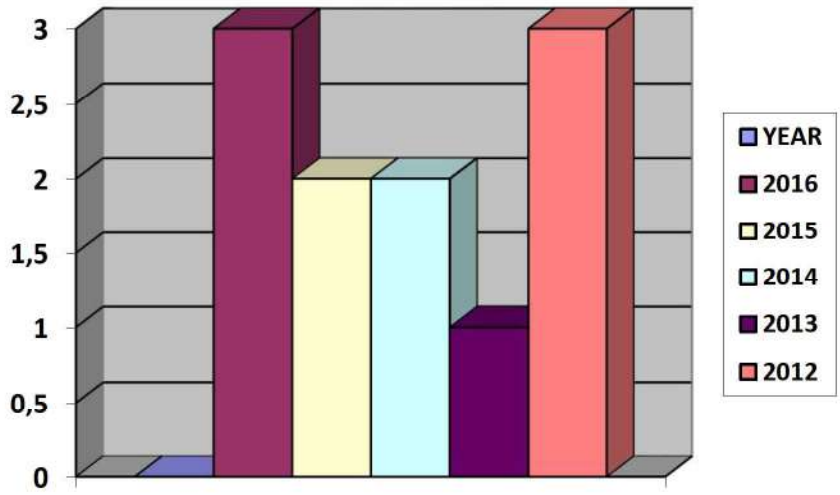


Figure 13: PM Schedules for a period 2012 - 2016 capstan #6

According to the graphic capstan #6 was out for maintenance once, whilst in 2014 and 2015 it was taken out for maintenance twice for each year. In 2016 the capstan has completed three schedules already.

Capstan #8

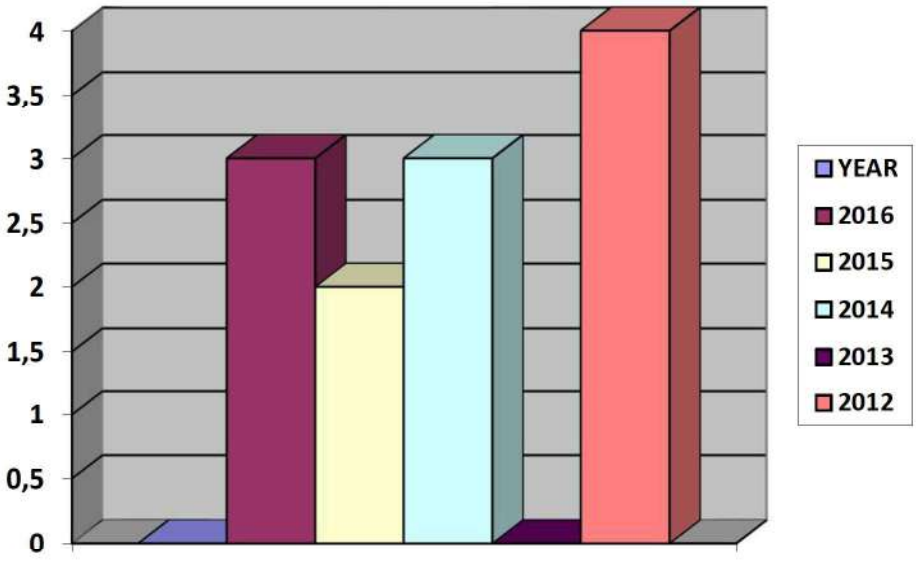


Figure 14: PM Schedules for a period 2012 - 2016 capstan #8

In 2012 capstan #7 had three normal maintenance schedule completed and one breakdown maintenance. There was no maintenance done on this capstan in 2013. In 2014 three schedules were done whilst in 2015 two schedule maintenance outages were done. In 2016, three schedules have been completed already.

Table 5: DETAIL OF MAINTENANCE CARRIED OUT DURING A CAPSTAN OUTAGE

CAPSTAN #	DETAILS OF MAINTENANCE DONE ON THE CAPSTAN	Date
1	**2016** • Repair capstan	14/01

	• Renew steel cover • General maintenance • General maintenance **2015** • Capstan cover refurbishment • General maintenance • General maintenance **2014** • General maintenance • General maintenance • General maintenance **2013** No records of any maintenance **2012** • General maintenance • General maintenance • General maintenance	21/01 09/02 09/02 11/02 16/02 22/07 24/01 02/05 03/10 29/03 01/08 22/11
2	**2016** • General Maintenance • General Maintenance **2015** • General maintenance • General maintenance **2014** • General maintenance • General maintenance • General maintenance **2013** No records **2012**	 09/02 09/02 16/02 22/07 24/01 02/05 03/10
3	**2016**	

	• General Maintenance	09/02
	• General Maintenance	09/02
	• Renew steel cover for capstan	15/03
	2015	
	• General maintenance	16/02
	• General maintenance	22/07
	• Remove and replace capstan #3	05/10
	2014	
	• General maintenance	02/05
	• General maintenance	25/06
	• General maintenance	03/10
	2013	
	• Breakdown – motor	23/05
	2012	
	• General maintenance	29/03
	• General maintenance	01/08
	• General maintenance	22/11
4	**2016**	
	• General Maintenance	09/02
	• General Maintenance	09/02
	2015	
	• Repair capstan	04/02
	• General maintenance	16/02
	• General maintenance	22/07
	2014	
	• General maintenance	24/01
	• General maintenance	02/05
	• Repair motor – burnt out	05/06
	• General maintenance	03/10
	2013	
	No records	

	2012 • General maintenance • General maintenance • General maintenance •	 29/03 01/08 22/11
5	**2016** • General Maintenance • General Maintenance **2015** • General maintenance • General maintenance • Repair capstan #5 **2014** • General maintenance • Repair capstan • General maintenance • General maintenance **2013** No records **2012** • General maintenance • General maintenance • General maintenance	 09/02 09/02 16/02 22/07 05/08 24/01 06/03 02/05 03/10 29/03 01/08 22/11
6	**2016** • General maintenance • General maintenance • Renew steel cover for capstan **2015** • General maintenance • General maintenance **2014**	 09/02 09/02 21/01 16/02 22/07 06/05

	• General maintenance • General maintenance **2013** • General maintenance **2012** • General maintenance • General maintenance • General maintenance	06/06 29/03 01/08 22/11
7	**2016** • Electrical repairs • General maintenance • General maintenance **2015** • General maintenance • General maintenance **2014** • Repair capstan • General maintenance • General maintenance **2013** No records **2012** • General maintenance • Brake breakdown • General maintenance • General maintenance	 08/06 09/02 09/02 16/02 22/07 24/01 24/01 02/05 29/03 25/07 01/08 22/11

Table 6: Cost of maintenance

YEAR	NORMAL MAINTENANCE (R's)	BREAKDOWN MAINTENANCE (R's)	TOTAL EXPENDITURE

2012			
2013			
2014			
2015			
2016			

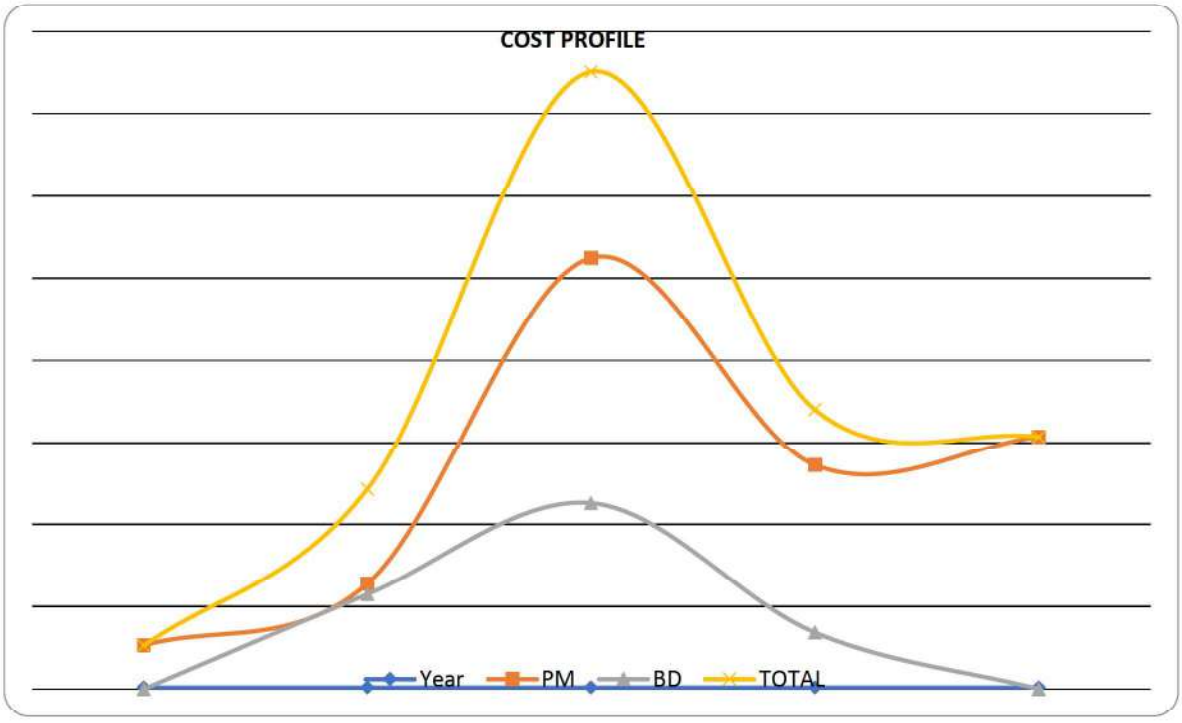


Figure 15: Cost profile of maintenance 2012 - 2016

PM: Planned Maintenance Cost
BD: Breakdown Cost
TOTAL: PM + BD

Companies are striving for high maintenance standards. Even though the Dry Dock is not a production facility, it is a facility which renders a service. This service depends on availability of the facility. Availability of the facility to provide a service is influenced by equipment condition, functionality and operability. It is therefore logical to apply norms and standards which are generic to most plants, factories and other industrial facilities. When maintenance

is effective the ratio between planned maintenance and unplanned maintenance is 80:20. Within the 20% there is Predictive Maintenance of 15% and the last 5% is breakdown maintenance. To generate reports which could give these statistics, SAP maintenance module must be live and it must have the correct inputs.

Capstans are not used continuously. Schedule of ships planned to dock at the Dry Dock is known in advance. Capstans should not breakdown as there is always enough time to maintain them and keep them ready for the next operation. **Maintenance strategy for the capstans should be formulated to achieve 100% availability**. This means the mental fixation which says, capstans do not work continuously and therefore the probability of them failing is slim and even if they do fail there is always enough time to fix them unless the ship is in the harbour ready to dock. The fixation should be turned positively in that the **strategy is Predictive** and the **approach is Pro-active**. If such a strategy is adopted, a breakdown in any of the capstans would be due to a human factor who would have committed an offence of dereliction of duties.

11.2 OPERABILITY

Capstans #2 and #7 are the worst of all the capstans. They are not in an operable state. These two capstans will run to destruction if something is not done quick enough to mitigate the risk. The part in a worst condition on them is on intermediate gears and there are no spare gears available. Each capstan has a mechanical variable speed which can be adjusted from 1 to 7. At present these machines cannot be run beyond a set point of 3. The reason is capstans vibrate excessively at higher speed. This is information which was given by maintenance and operations staff and confirmed by consulting team when equipment was run and tested. If capstans cannot be run beyond a speed set point of 3 then these machines are running below 50% of their capability. It must be said though, at these lower speed set points, 3 and below, they still do the work. However, for a conclusive scientific analysis to be done, a vibration test was done on each machine. The objective was to establish source of vibration and to also establish the extent of the vibration.

After the vibration tests, it was established that for all capstans, bush bearings are worn badly. They must be changed if the final decision is to rehabilitate these machines. The capstans could not be tested beyond a speed set point of #3, hence empty spaces. The capstans are gagged at speed set point #3.

11.3 CAPSTANS TESTING

On the 30th September, 2016, the team had an opportunity to witness the ship docking at the Dry Dock. It remained our obsession to observe the capstans in use. The following was recorded.

- The ammeter reading when the capstans are on load. Each capstan used clocked 150 Amps when it was on load with a Voltage reading on 120 V, which at times dropped to 90 Volts.
- The Curling Drums vibrate abnormally when in action. It is expected that these should run smoothly
- When power cable for the capstans was tested, it was established that there is a fault on the one side of the ring main.
- Capstan #8 alignment needs to be attended to, other capstans are reasonably and within acceptable levels.

11.4 CONTROL PHILOSOPHY (PART OF THE RECOMMENDATION)

The whole system is a manually controlled system. Even the speed adjustment of the capstan is manual. It is time for the Dry Dock to modernise. The mere fact that during the execution of this evaluation the team struggled for information is testimony that the whole engineering philosophy at the Dry Dock is ancient.

Improving the control philosophy does not necessarily mean to run the operation in auto-pilot. Control philosophy will be such that important parameters are recorded, history archived, so that it can be retrieved when necessary. The new philosophy introduces some innovation through application of an improved technique (technology).

It will achieve the following;

- Mitigate risk of equipment failure due to real time availability of information about the functioning of the whole system of each capstan.

- Capturing of information during operation.
- Mitigate dependence on individuals for knowledge as information will be readily available for anyone who has a right to know.

The control philosophy revolves around the following;

- Lubrication system.

Part 1 of the lubrication solution: Firstly, the lubrication infrastructure must be modified. The gravity feed concept should be designed to achieve good lubrication efficiency. The system should be provided with sight glasses with flow indicators which are visible and positioned where one does not have to open the cover to check the flow. All brass bearing bushes must be provided with temperature thermocouples. If temperatures in these bearings are monitored, it will be known when problems begin to develop.

Part 2 of the lubrication solution: Replace all brass bush bearings with Thorplas Bearings which need no lubrication

- Vibration.

The Capstan should be protected from running at high vibrations. The system should be programmed such that once the vibration level reaches a maximum allowable level, the speed control cannot then be increased further and/or the capstan should trip on vibration. Vibration sensors must be installed on bearing housings.

- PLC (Siemens S7).

The PLC is the best technology for operational system management and historical data management. This technology therefore serves the users of equipment, the care givers of equipment and decision makers (managers) who manage budget.

12. CONCLUSION

The scope of work for the evaluation of the capstans was thought to be a project which could be finished quite quickly as the emphasis was on the ambition to look into the possibility of a conversion from the current drive system to a hydraulically driven system. When thorough inspections were conducted though, this project blew everybody's mind with the depth of engineering application necessary to evaluate the equipment in order to make an informed

technical view about the integrity of the equipment, its operability and maintainability. Impaphala Projects and Consulting is convinced that it covered all the aspects necessary to formulate a workable technical solution for all the short comings observed. At the end of this report there is a set of recommendations. They do come at a premium but in the long term this is the investment which TNPA has to make then manage the risk of equipment failure at the Dry Dock.

In the introduction mention was made of the socio-technical nature of the challenge which the team was faced with. It must be embraced by all concerned that if any of the components of the system which form part of this challenge are ignored, this problem will surface again. If nothing is done, these assets will collapse further. The longer the decision is delayed to fix the issues identified, the deeper the more expensive the solution becomes, and the cost will grow exponentially.

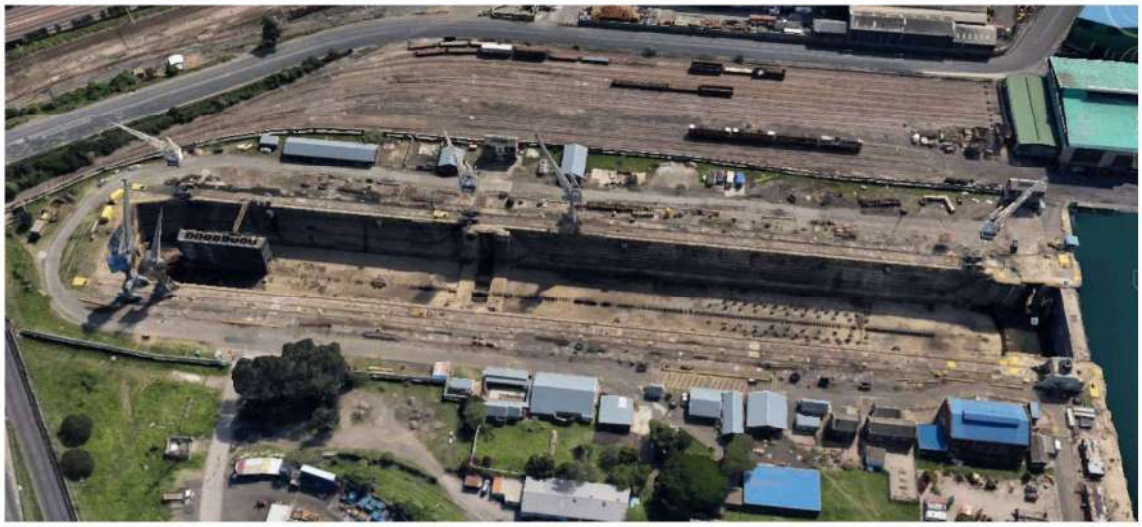
Taking cognisance of the philosophy that the reality of the situation depends on the definition given to it by those participating in the process. In our view as Impaphala Projects and Consulting (Pty) Ltd, as participants in the activity of the evaluation of the Capstans at the Dry Dock, we have an opinion in that they are not fit to be operated due to a number of engineering short comings. This opinion is informed by our definition of what is technically acceptable in engineering standards and codes of good practice. Others might have a different view as informed by their own definition of the same situation.

PART 2: ELECTRICAL EVALUATION

1. INTRODUCTION

TNPA took a decision to evaluate the capstans with an objective of resuscitating and/or upgrading these assets. The scope is both mechanical and electrical. The Project Manager, Dr Muzi Hlongwa decided to have the report in two parts, first part is mechanical and the second part is electrical. The lead electrical engineer (Mr Hugo Stewart: Pr Electrical Engineer)

compiled the report for the electrical scope. Both scopes look at current design with recommendations for the mechanical repair and electrical replacement of the existing 1961 vintage DC Drive system on the 6 x 20ton capstans. The selected solution will be compared to a solution consisting of 6 x standalone hydraulic packs. The dry dock is about 370m long with 3 x 20-ton force DC drive capstans and 1 x 5-ton force AC Capstan on each side.



Picture # 36: The Dry Dock in the port of Durban

2. SITE ASSESSMENT

Several site visits were conducted to assess the electrical integrity and condition of the 6 x 20t-force DC Capstans and 2 x 5t-force AC Capstans.

2.1 EXISTING DESIGN

Photo 2-5 below shows the layout of the dry dock. Underneath each of the capstans is a 2 x 3m chamber that houses the DC switchgear, the series DC motor, the gearbox and the pinion drive.

Motor detail:

Make – Laurence Scott

Frame size – SL53

Speed – 500 rpm

Current – 300 Amps

Power – 80 BHP

The 6 DC Capstans (20 ton) are supplied from the Converter in the MCC room on a ring system via a 95mm 4 core cable (2 + 2 cores for negative and positive). The system used DC voltage regulation to control motor speed. The system is connected in series which means that if one capstan is electrically faulty all 6 the capstans cannot be operated even though the system is on a ring.

In addition to the 6 DC capstans illustrated above, the 2 AC capstans numbered no 2 and no 7 are situated close to the 2 center capstans no. 3 and no. 6. Each motor is a 33 bhp, 720 rpm, 50 Hz, 400V motor.

Importantly these 2 AC Capstans are fed from a separate power supply to the DC capstans which are fed from a 630A 400V Mini sub-station located next to the Sub-station building.

The capstans typically don't all work at the same time whilst they maneuver a ship into the dry dock. They are typically used one at a time whilst the ship is inched into position. The longest continuous operation is when the rope is winched in under no load. A very important character of the system is the ability to hold the ship in position under zero speed i.e. max torque – zero speed.

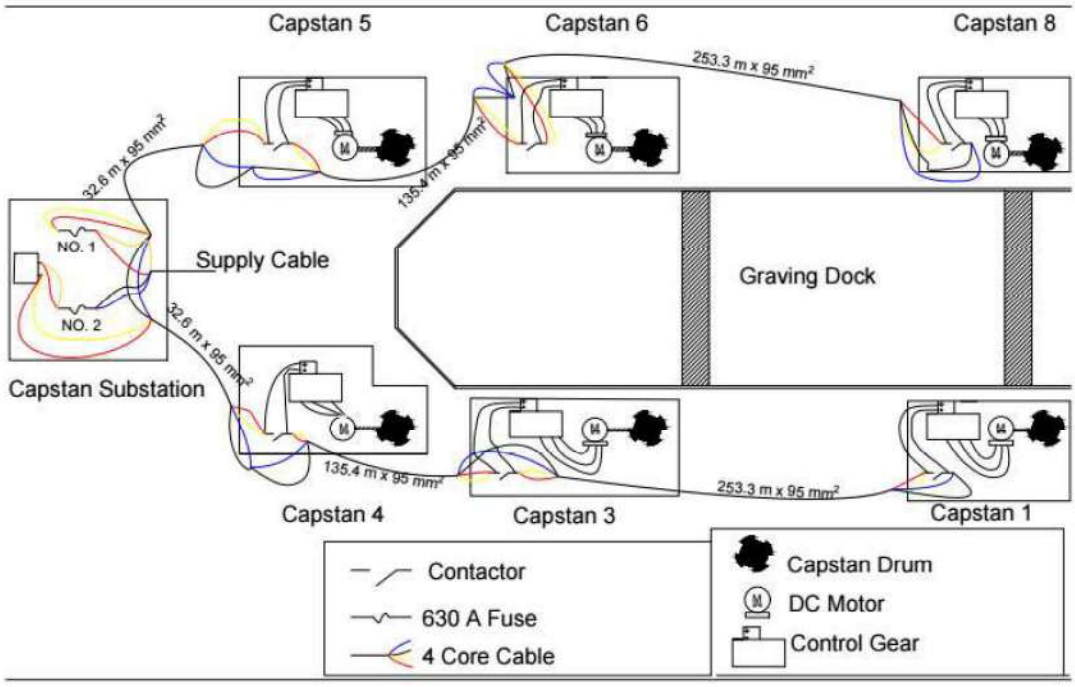
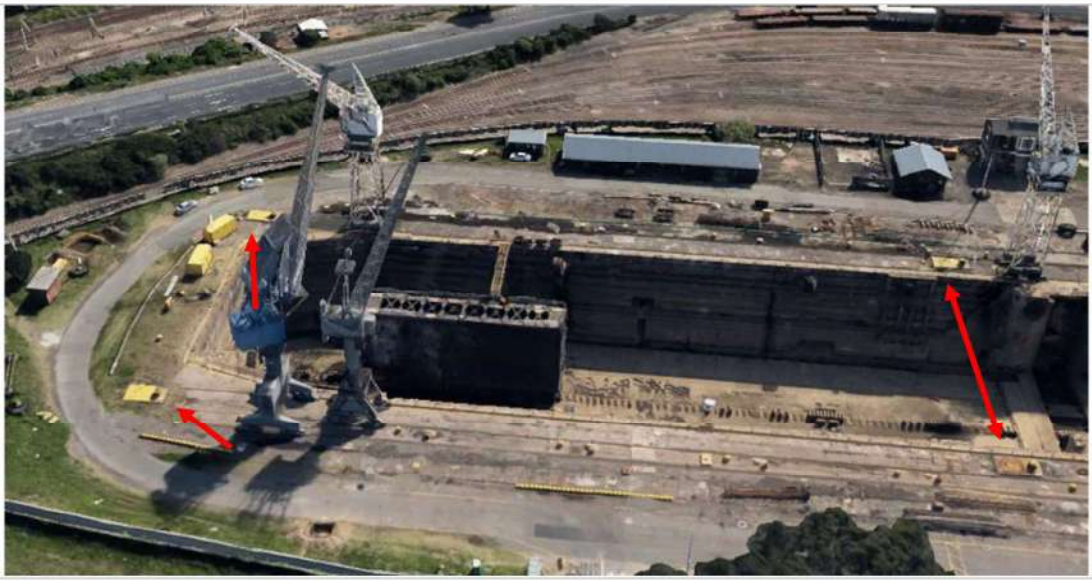


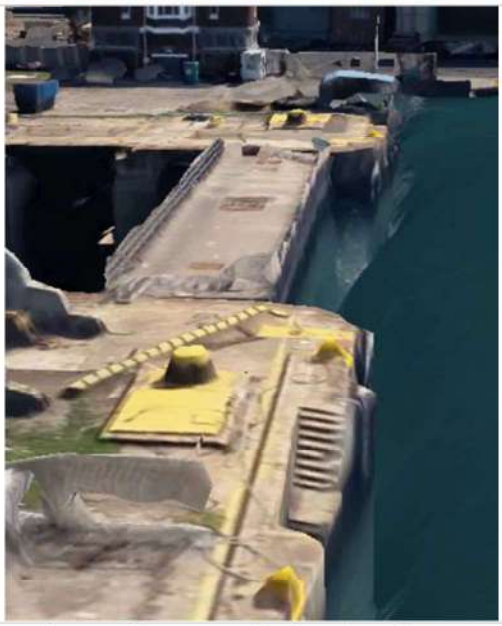
Figure 16: Diagram of the existing series DC drive system.



Picture # 37: Dry Dock land side end showing the 2 x center capstans on the right and the 2 x landside capstans on the left corners no's. 3, 4, 5 and 6



Picture # 38: Detail showing one of the DC drives



Picture # 39: Detail showing the 2 x sea side DC Capstans 1 and 8



Picture # 40: Land side end showing the 2 x landside capstans on the corners, the 630KVA Mini substation and the MCC room with the MCC and the DC Rectifier

2.2 CONDITION OF EQUIPMENT

The DC drives system is an open design as can be seen from photo 3 which means it is open to the elements. The system is regularly repaired and is maintenance intensive. The biggest problem with the system is that it is a 1960 design and the DC technology is only barely available on special request and special design. This implies very costly. Below is an assessment from the TNPA maintenance records of costs incurred to keep the system running. Unfortunately, the electrical and mechanical costs could not be separated completely as the capture was either maintenance or inspection with a few references to detail work done on the capstans. From these it was ascertained that the cost to rewind a DC motor to be in the order of **R110K excl. VAT.** A motor repair example is included in the appendices.

Table 7: Maintenance and repair costs for the Dry Dock capstans

YEAR	WORK	SUM PLANNED COSTS (R)	SUM ACTUAL COSTS (R)
2016	Maintenance, repair & inspections		
2015	Maintenance, repair & inspections		
2014	Maintenance, repair & inspections		
2013	Maintenance, repair & inspections		

2012	Maintenance, repair & inspections
2011	Maintenance, repair & inspections
2010	Maintenance, repair & inspections

TOTAL

The most obvious assessment one can make is that the repair/ maintenance costs on the capstans is increasing every year which is as can be expected.

2.3 SITE TESTS

As part of the condition assessment of the electrical system the 95mm2 cable integrity was assessed by doing resistance tests (1000V Meggar) on the cables between the capstans. The main reason for this is that one of the proposed solutions for the project is to re-use the cables within a AC Drive system. The insulation resistance tests were performed between the red, white, blue and black conductors of the cable but also between the conductors and earth. The higher the resistance, the better is the integrity of the cable insulation. Table 2 below is a summary of the resultant tests.

Table 8: 95mm^2 insulation resistance test results for the DC Bayhead dry dock capstans.

CABLE LOCATION	TEST BETWEEN	RESULT (MΩ)
Blue to earth and other conductors	C6 to C1	300
Black to earth and other conductors	C6 to C1	350
Red and White to earth and other conductors	C1 to C3	40 - 100
Red to earth and other conductors	Sub to C5	433
White to earth and other conductors	Sub to C5	751
Red to earth and other conductors	C5 to C6	280
White to earth and other conductors	C5 to C6	0.36
Red to earth and other conductors	C6 to C8	Disconnected, 0
White to earth and other conductors	C6 to C8	Disconnected, 0
Blue to earth and other conductors	C6 to C8	
Black to earth and other conductors	C6 to C8	0.78

From the Table 8, it is clear that the cable between capstan 6 and 8 is damaged and the white phase from capstan 5 to 6 is suspect.

3. DISCUSSION

The existing capstan drive systems have done a remarkable job driving the capstans for the last 50 years notwithstanding the fact that the duty cycle of the capstans is very little and only used when a ship is pulled into the dry dock. Even then they only operate one at a time and a total of less than 15 min per ship entrance and ship exit. The reason why the electrical system should be replaced is little to do with age but mainly due to:

- Unavailability of spares and obsolescence of equipment
- VERY limited dc technical skills in Industry
- Safety to personnel due to disrepair of DB's inside the pit
- Flexibility of system – one capstan drive or motor goes down the whole system is unavailable.
- High cost of repair of motors

3.1 DESIGN TOR (TERMS OF REFERENCE) FOR NEW ELECTRICAL SYSTEM

When assessing the solution to replace the existing electrical system the following terms of reference was used for both an electrical solution as well as a hydraulic system:

- The system to allow the individual capstans to work independently even if the other capstans are not operational or on maintenance.
- Utilize the existing 95mm2 4 x core, 1000V cable if possible.
- Separate PVC 70mm^2 earth cable required for safety and earth continuity.
- Power to be supplied from existing MCC.
- At each capstan, a 2 x isolator, feeder circuit breaker system needs to be considered (or better alternative).
- The system must be IP65 and be protected from the severe sea salt conditions.
- The system must have a stainless-steel pedestal on the ground level for the operator to control the capstan. This unit to be extremely robust with weather proof components including: - E/Stop button, Forward / Reverse switch, key switch to energize/ Start, method for controlling the speed – either a button or lever or

something that is robust. No LCD touch screen to be considered.

- No forced motor cooling would be preferred. This will impact the thermal derating.
- No motor encoders will be preferred.
- BINDER brakes to be used for the motors. Design as per any winch application.

The diagram below illustrates the new proposal.



Picture # 41: Proposed dc drive system layout

The solution further recommends that the following mechanical parameters are implemented:

- Existing pinion gears be re-used after complete refurbishment (addressed elsewhere in this report).
- Worm gearbox be replaced on the assumption what a new gearbox will be similar in price to their refurbishment costs (also addressed elsewhere in report). In addition to that their ratios are unknown due to lack of documentation.

3.2 DESIGN

The design is based on the 20t-force and 5t-force existing capstan capability. The pinion gear ratio was determined as:

- 20t pinion gear ratio – 5.429:1

- 5t pinion gear ratio – 5:1

To determine torque from the Capstan force the capstan diameter was used as:

- 20t radius – 500mm
- 5t radius – 350mm

The hurdle for the design was determining the capstan speed. Due to their age and condition the capstans. It was determined that the speed of the capstan was approximately 5-6 rpm at set point 3. For the design the speed was assessed as being 0 – 10 rpm.

Table 9: DC Capstan design parameters

Required Capstan rpm	rev/sec	20T Max Force (N)	Capstan Radius (m)	Capstan Max Torque (Nm)	Required Shaft Power (kW)	Planetary gearbox ratio	New Gearbox required output Shaft torque	New Gearbox required output Shaft Power (kW)
1	0.0167	200000	0.5	100000	10.47	5.429	18419.60	1.93
2	0.0333	200000	0.5	100000	41.89	5.429	18419.60	7.72
3	0.0500	200000	0.5	100000	62.83	5.429	18419.60	11.57
4	0.0667	200000	0.5	100000	83.78	5.429	18419.60	15.43
5	0.0833	200000	0.5	100000	104.72	5.429	18419.60	19.29
6	0.1000	200000	0.5	100000	125.66	5.429	18419.60	23.15
7	0.1167	200000	0.5	100000	146.61	5.429	18419.60	27.00
8	0.1333	200000	0.5	100000	167.55	5.429	18419.60	30.86
9	0.1500	200000	0.5	100000	188.50	5.429	18419.60	34.72
10	0.1667	200000	0.5	100000	209.44	5.429	18419.60	38.58

Table 10: Proposed solution for the 20t.

New gearbox output torque	New gearbox ratio	Required motor power (kW)	55kW 8 Pole Motor torque (Nm)	Motor shaft speed (rpm)	Shaft speed to Capstan at motor speeds
94,545	9.00	0.21	10,505	50	1.02
47,273	9.00	0.86	5,253	100	2.05
31,515	9.00	1.29	3,502	150	3.07
23,636	9.00	1.71	2,626	200	4.09
18,909	9.00	2.14	2,101	250	5.12
15,758	9.00	2.57	1,751	300	6.14

13,506	9.00	3.00	1,501	350	7.16
11,818	9.00	3.43	1,313	400	8.19
10,505	9.00	3.86	1,167	450	9.21
9,455	9.00	4.29	1,051	500	10.23

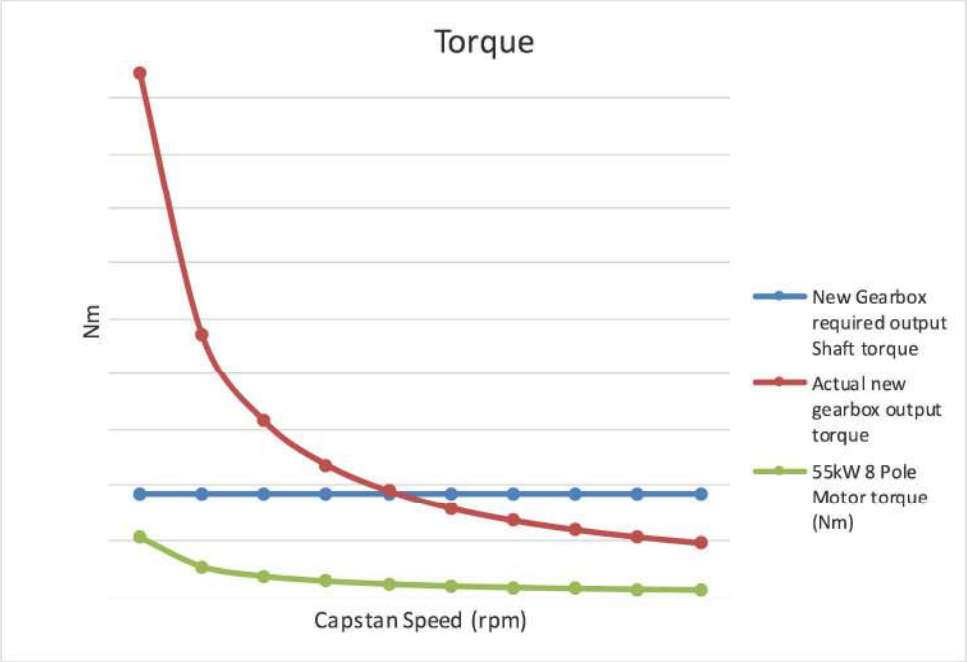


Figure 17: Torque relationships at various speeds excl. VSD impact

Table 11: Proposed solution for the 5t

Required Capstan rpm	rev/sec	5T Max Force (N)	Capstan Radius (m)	Capstan Max Torque (Nm)	Required Shaft Power (kW)	Planetary gearbox ratio	New Gearbox required output Shaft torque	New Gearbox required output Shaft Power (kW)
1	0.0167	50000	0.35	17500	1.83	5	3500.00	0.37
2	0.0333	50000	0.35	17500	10.47	5	3500.00	2.09
3	0.0500	50000	0.35	17500	15.71	5	3500.00	3.14
4	0.0667	50000	0.35	17500	20.94	5	3500.00	4.19
5	0.0833	50000	0.35	17500	26.18	5	3500.00	5.24
6	0.1000	50000	0.35	17500	31.42	5	3500.00	6.28

7	0.1167	50000	0.35	17500	36.65	5	3500.00	7.33
8	0.1333	50000	0.35	17500	41.89	5	3500.00	8.38
9	0.1500	50000	0.35	17500	47.12	5	3500.00	9.42
10	0.1667	50000	0.35	17500	52.36	5	3500.00	10.47

Table 12: Proposed solution for the 5t.

New gearbox output torque	New gearbox ratio	Required motor power (kW)	22kW 8 Pole Motor torque (Nm)	Motor shaft speed (rpm)	Shaft speed to Capstan at motor speeds
42,020	10.00	0.04	4,202	50	1.00
21,010	10.00	0.21	2,101	100	2.00
14,007	10.00	0.31	1,401	150	3.00
10,505	10.00	0.42	1,051	200	4.00
8,404	10.00	0.52	840	250	5.00
7,003	10.00	0.63	700	300	6.00
6,003	10.00	0.73	600	350	7.00
5,253	10.00	0.84	525	400	8.00
4,669	10.00	0.94	467	450	9.00
4,202	10.00	1.05	420	500	10.00

3.3 HYDRAULIC DRIVE PROPOSAL

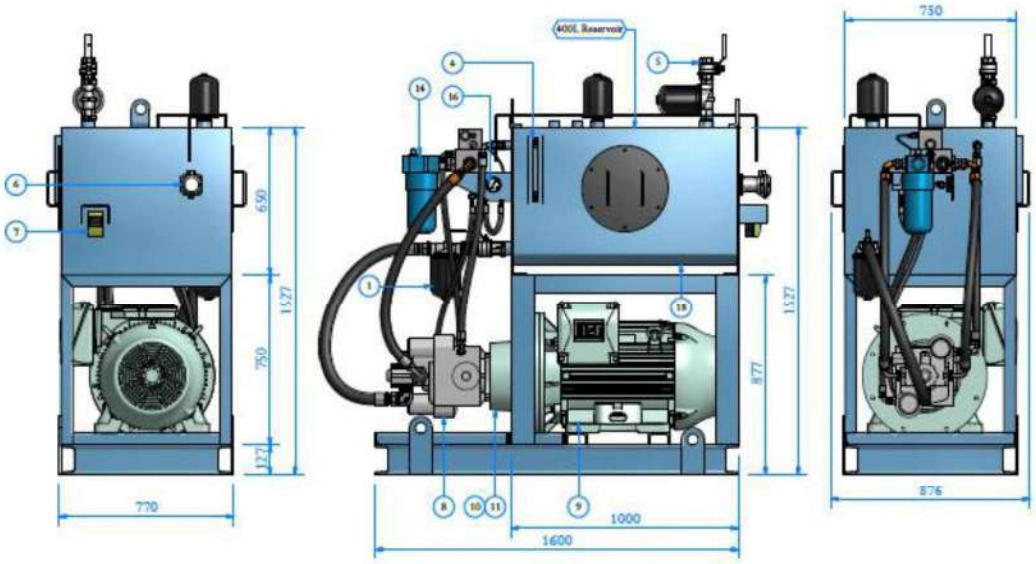
Part of the tender request and SOW was to evaluate a hydraulic drive solution to replace the old AC and DC drives. The same TOR applies to the hydraulic drives as was applied to the electrical VSD proposal. The main difference to the 2 solutions are:

- Hydraulic system might be more robust
- Hydraulic system will definitely be more maintenance intensive

A turnkey hydraulic company was contacted and has submitted a solution for both applications. The solution includes the following:

- The design, manufacture and supply of the required components and systems
- Installation of the hydraulic power pack with tank, motor and gearbox
- Commissioning

Due to the cable fault between capstans 6 and 8, a hybrid supply of electrical and hydraulic might be the most cost effective solution. This is evaluated in the next section.



Picture # 42: Proposed 20t hydraulic system

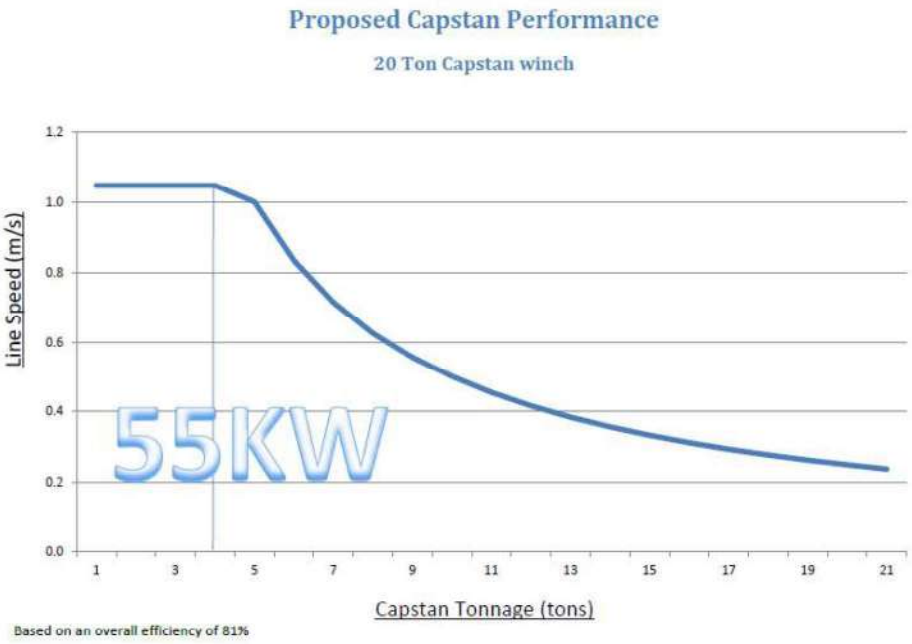


Figure 18: Torque relationship at various speeds.

3.4 CONDITION MONITORING

It is strongly recommended that a condition monitoring system be included in the upgrade of the Capstans. Condition monitoring is a very beneficial tool to assist the Engineering personnel at TNPA to assess the condition of the drives during operating them and to reduce unnecessary downtime. It will also forewarn the personnel to deterioration in the operating parameters of the drives and thereby assist with maintenance scheduling. Parameters such as vibration, oil flow and pressure, temperature, oil level, VSD status and alarms. The information can be sent to the relevant Engineers for review and can also be included into the TNPA SCADA system if required.

3.5 OPTIONS FOR DRIVE REPLACEMENT

The 4 options available to TNPA for the upgrade of the Dry Dock is as follows:

- *Repair to existing mechanical and electrical system* – From an electrical perspective this option has no value as the cost to upgrade the old DC system will be more than the replacement thereof. The system is obsolete and no spares are available hence the components will have to be specially manufactured a huge cost.
- *Repair to existing mechanical and replace with new electrical system* – This option is possible but from an implementation perspective it is not the most cost effective solution.
- *Replace with new mechanical and electrical system* – Same as option 2 above in that it is possible but it will be the 2nd most expensive solution and still have implementation issues.
- *Replace with new mechanical hydraulic system new drives, controls and electrical* – This is the most expensive option in respect to initial investment but the most suitable. It brings with it latest technology, data and information management capability, and it offers management a means to implement predictive maintenance. .
- *Hybrid system of repair and replace mechanical systems and a combination of electrical and hydraulic drives with condition monitoring* – This option has the benefit of mechanical integrity, maintenance support, but its disadvantage is that two technologies within a system not always advisable.

3.6 CAPITAL PROJECT COSTS

The input costs to the budget are as listed on the tables below. The same will be used in the next stages of the project when designing and compiling the tender document. This is purely for the electrical part of the scope.

Table 13: Proposed cost for different options.

OPTION	SCOPE	COST (RANDS)
1	**REFURBISHMENT OF ALL CAPSTANS (NO NEW TECHNOLOGY)** Electrically there is no refurbishment as DC motors cannot be reconditioned. This option still comes with new electrical equipment like motors,	
2	**CONVERSION OF ALL CAPSTANS TO AC DRIVEN CAPSTANS** All DC motors replaced, old AC motors for capstans 2 & 7 replaced. New cables, cable racks, ladders etc. Old DC Rectifier to be stripped, new supply DC, MCC new tier, and earthing. VSD panels with changeover panels on surface for all capstans	
3	**CONVERSION TO HYDRAULIC DRIVES – AC DRIVEN** Old infrastructure to be stripped off. Install new cables (95mm^2 between capstans and 70mm^2 earth cable), cable racks, ladders and trenching. PLC hardware and software.	
4	**HYBRID NEW TECHNOLOGY – 6 X ELECTRICALLY DRIVEN AND 2 X HYDRAULICALLY DRIVEN** This option proposes that capstan 1 & 8 be converted to	

	hydraulics and the other 6 remain electrically driven	

4. CONCLUSION AND RECOMMENDATIONS

From an electrical evaluation perspective, there is no doubt that the AC and DC electrical drives need to be replaced due to obsolescence if the intention is that the Dry Dock is to operate effectively in the future. The DC drives and motors have been rewired, refurbished and repaired too many times to allow any form of operational integrity.

The electrical wiring inside the pits is unsafe to personnel and the current habit/ procedure of switching the system off after use inside the Substation is a temporary solution at best. It is not fail safe and therefore cannot be considered compliant with the OHSACT.

The following is recommended for the electrical upgrade:

- Remove all existing capstan electrical drives and install new drives
- Replace the 95mm2 cables – there is already over 400m of the cable that was tested down to earth.
- Modify Substation MCC to suit new equipment.
- Install AC variable speed drives for all capstans.
- Install Siemens S7 PLC.

GENERAL CONCLUSIONS

Electrically the capstans are in a state of disrepair. DC motors and ancillary equipment are obsolete. Capstans #2 & #7 motors although AC, they cannot be overhauled and new motors are needed for both capstans. Mechanically, the gear train of both AC driven capstans #2 & #7 are damaged so badly that new set of gears are needed for these machines. All DC gearboxes are not installed in their optimum positions and this has caused multiple problems which have compromised their integrity. Lubrication infrastructure has deficiencies. Excessive vibration is compromising operability and renders a risk of catastrophic equipment failure and fatal safety risk to employees.

GENERAL RECOMMENDATIONS

The four options below are informed by analysis of the findings as well as consideration of the qualitative responses from staff at the Dry Dock as well as the terms of reference of the assignment. It was stated in this report that TNPA is faced with a socio-technical challenge. In submitting the recommendations, IPC therefore proposes a solution which addresses this kind of challenge. The solution accommodates the submissions made by members of staff that consultants engaged with, it responds to the RFQ, and lastly offers a complete solution in terms of technology and innovation. Our preferred solution is Option 3 which is a conversion to hydraulic drives supported by Condition Monitoring Strategy.

In summary, it is recommended that the following strategies are adopted to support the new technology;

- Condition Monitoring
- Planned Maintenance (improve the content of the existing PM schedule)
- Critical spares management (Drop in spares on site or have an arrangement with OEM to deliver on emergencies within specified time of say 4 hrs)
- Maintenance staff skills upgrade, exposure and or refresher on PLCs, NDT, UT, Laser alignment and vibration analysis. TNPA will save a lot of money if these skills are developed in-house.

SUMMARY OF ANALYSIS OF THE FOUR PROPOSED OTIONS

To decide which option is better than the other the following factors were considered:

- Cost of proposal
- Construction period
- End user view (view from interviews)
- Expected life span
- Technology

Option	Cost of proposal	Construction period	End user view	Expected life span	Technology	Total Score
1. Refurbishment of all capstans	**1**	**4**	**2**	**2**	**1**	10
2. Conversion to AC - all capstans	**4**	**4**	**4**	**4**	**4**	20
3. Conversion to hydraulic drives - all capstans	**4**	**4**	**5**	**4**	**5**	22
4. Hybrid (2 hydraulic drives and 6 AC drives)	**4**	**4**	**3**	**4**	**4**	19

Legend:

1 – Not acceptable
2 – Poor
3 – satisfactory
4 – Good
5 – Excellent

PROPOSALS FOR IMPLEMENTATION

The time spent physically on site, tests conducted on equipment and components, historical information (though not adequate due to systemic challenges) as well as qualitative responses from maintenance staff at the Dry Dock put IPC in a position to make an informed conclusion and as such put forward he following options for consideration.

- **Option 1**: Refurbishment of all capstans mechanically and electrical infrastructure.
- **Option 2**: Conversion of all capstans to electrically driven capstans.

- **Option 3**: Conversion of all capstans to hydraulically driven capstans.
- **Option 4**: Hybrid technology where capstan 1 and Capstan 8 are hydraulically driven and the remainder (6 – off) are AC driven.

ANALYSIS OF EACH OPTION

Option 1: Refurbishment of all capstans mechanically and electrical infrastructure

This option is short term. It does not provide for any continuous improvement in the maintenance and care of the assets. It is the cheapest of all the options at [redacted] In the RFQ the brief was TNPA looks for a solution which will provide longevity for the capstans. In this option longevity, cannot be guaranteed. Furthermore, electrically the DC motors cannot be reconditioned as this is obsolete technology. Anything which should do with an electrical drive will have to be AC.

Option 2: Conversion of capstans to electrically driven capstans

The option is attractive in that it provides AC for all capstans. Maintenance staff (internally) are familiar with the kind of equipment in use for this option. The demerit for this option is that it does not come with a new gearbox. The old gearbox on the 6 DC capstans would be reclaimed. As the gearboxes in these 6 capstans were found to be facing up, these should be repositioned in their rightful positions. In doing this a set of gears will be introduced to change direction in order to mesh the output drive. Whilst the cost of this option is reasonable at [redacted] the recovery of the old gearboxes does not make it a completely new system. As during the inspection, the gearboxes were found to have not been looked after well, it could happen that when the implementing contractor is overhauling the gearboxes some are found to be excessively damaged that components cannot be refurbished and therefore need to be thrown away, and a new gearbox to be bought. This is a huge risk and it can have both cost implications and project delays.

Option 3: Conversion of all capstans to hydraulic driven capstans

New technology for the Dry Dock. Although the technology is new, it is local technology and therefore all the technical support is around. This option allows for continuous improvement in the maintenance of capstans. Reliability and longevity is guaranteed. The risk though is the

environment. Hydraulic oil must remain clean and free of water at all times and if the present situation is to be used as a benchmark, then the hydraulic systems won't survive in this area. To mitigate the risk design should include the conditioning of the pit where the hydraulic packs would be installed. Also the option includes a mobile centrifuge which will be used to purify/clean the oil in case of water ingress. The cost of this option is [redacted] and it can be implemented complete in 18 months.

Option 4: Hybrid technology (Capstans #1 &#8 on hydraulics and the rest on AC Drives)

This is a combination of option 2 and option 3. The cost of this option is [redacted] and it can be executed to completion in 18 months as well. This option carries the risks highlighted under option 2 and under option 3.

OPTION	SCOPE DETAILS	TIME FRAME FOR IMPLEMENTATION	COST (RANDS)
1	**<u>Refurbishment of capstans (No new technology)</u>** 1.1 **Capstan 1,3,4,5,6,8 (DC Capstans)**. For each of these capstans, the following should be done: ✓ Recondition the drum, modify the drum ribs by providing them with grooves for the rope, sand blast and repaint, coat with rust resistant coating internally ✓ Change all brass bush bearings ✓ Provision for new Ø300mm and Ø150mm shafts in case old shafts must be cut out ✓ Complete overhaul of gearbox, new side cover for gearbox to prevent water ingress and improved sealing. ✓ New coupling ✓ Secure lubrication system ✓ New AC 55 kW motor ✓ Making the electrics safe in the capstan pit by provision of cable ladders and trunking ✓ Brake system overhaul ✓ Civil works for spillage control sump pump 1.2 **Capstans 2 & 7 (AC Capstans)**. For each of these capstans the following should be done.	Design = 1,5 months Procurement = 3 months Construction = 2 months **TOTAL = 6,5 Months for one pair of capstans** To complete the project for 8 capstans will take 14 months	

	✓ Recondition the drum, modify the drum ribs by providing them with grooves for the rope, sand blast and repaint, coat with rust resistant coating internally ✓ Change all brass bush bearings ✓ Provision for new Ø150mshaft ✓ In case old shaft should be cut out ✓ Install a new set of gears ✓ Secure lubrication system ✓ New gearbox ✓ New 15 KW motor ✓ Making the electrics safe in the capstan pit by provision of cable ladders and trunking ✓ Install new brake system ✓ Civil works for the new gearbox and motor		
2	**<u>Convert all DC capstans to AC driven capstans but reclaim/reuse existing gearboxes</u>** 2.1 **Capstan 1,3,4,5,6,8 (DC Capstans)**. For each of these capstans, the following should be done: ✓ Recondition the drum, modify the drum ribs by providing them with grooves for the rope, sand blast and repaint, coat with rust resistant coating internally ✓ Replace all brass bush bearings with Thorplas – blue bearings ✓ Provision for new Ø300mm and Ø150mm shafts in case old shafts should be cut out ✓ Complete overhaul of gearbox, reposition gearbox to its rightful upright position, introduce bevel gears to mesh final output gears. ✓ New coupling ✓ Secure lubrication system ✓ New AC 55 kW motor ✓ Making the electrics safe in the capstan pit by provision of cable ladders and trunking ✓ Brake system overhaul ✓ Civil works for spillage control sump pump and to accommodate new bevel gears 2.2 **Capstans 2 & 7 (AC Capstans)**. For each of these capstans the following should be done.	Design = 3 months Procurement = 3 months Construction = 4 months **TOTAL = 10 Months for one set of capstans** For all 8 capstans, the project will take 24 months	

	✓ Recondition the drum, modify the drum ribs by providing them with grooves for the rope, sand blast and repaint, coat with rust resistant coating internally ✓ Replace all brass bush bearings with Thorplas – blue bearings ✓ Provision for new Ø150mm in case old shaft should be cut out ✓ Install a new set of gears ✓ Secure lubrication system ✓ New gearbox ✓ Oil purifying machine (centrifuge) ✓ New 15 KW motor ✓ Making the electrics safe in the capstan pit by provision of cable ladders and trunking ✓ Install new brake system ✓ Civil works for the new gearbox and motor ✓ All DC motors replaced, old AC motors for capstans 2 & 7 replaced. New cables, cable racks, ladders etc. Old DC Rectifier to be stripped, new supply DC, MCC new tier, and earthling. VSD panels with changeover panels on surface for all capstans		
3	**<u>New Technology (All capstans hydraulically driven)</u>** 3.1 **All capstans 6 x 20T - each capstan will need the following;** ✓ Package of hydraulic pack, motors (55kw conversion for DC drives) with new gearboxes ✓ New pinion on gearbox output shaft to mesh final gear ✓ New coupling ✓ New brake system ✓ New Kluber Lubrication system for main gears ✓ Replacement of brass bush bearings with Thorplas-blue bearings ✓ Civil works to prepare installation of new equipment ✓ Variable Speed Drive ✓ Siemens 7 PLC 3.2 **2 x 5T AC Capstans**	Detail Design = 2 months Procurement = 3 months Construction = 3,5 months **TOTAL = 8,5 Months for one set of capstans** For all 8 capstans, it will take 18 months to implement the whole project.	

	Each capstan of the two capstans will have the following; ✓ Package of hydraulic pack, motors (15 kw for AC drives) with new gearboxes ✓ New set of gears, intermediate reduction and final gears ✓ New coupling ✓ New brake system ✓ New Kluber Lubrication system for main gears, intermediate gear system bearings, and motor bearings ✓ Replacement of brass bush bearings with Thorplas-blue bearings ✓ Substantial civil works to prepare for installation of new equipment (breaking concrete to gain about 1m of depth more than what is currently there) ✓ Variable Speed Drive ✓ SiemenS 7 PLC		
4	**<u>New Technology (Hybrid)</u>** 4.1 This is the combination of hydraulic driven capstans and purely electrically driven capstans The mix of technology is as proposed as follows; 4.1 **Capstans #1 & #8 on hydraulic drive** **each capstan will need the following;** ✓ Package of motors (55kw conversion for DC drives) with new gearboxes ✓ New inion on gearbox output shaft to mesh final gear ✓ New coupling ✓ New brake system ✓ Oil purifying machine (centrifuge) ✓ New Kluber Lubrication system for main gears ✓ Replacement of brass bush bearings with Thorplas-blue bearings ✓ Civil works to prepare installation of new equipment ✓ Variable Speed Drive ✓ Siemens 7 PLC **4.2 Capstans (20T), #3, #4, #5, and #6**	Detail Design = 2 months Procurement = 3 months Construction = 3,5 months **TOTAL = 8,5 Months for one set of capstans** For all 8 capstans it will take 18 months to implement the whole project.	

	Mechanical ✓ New gearbox and new final drive gears complete shafts and keys ✓ New drum ✓ Kluber Lubrication system ✓ Replacement of brass bush bearings with Thorplas-blue bearings ✓ Civil works to prepare installation of new equipment ✓ Variable Speed Drive ✓ Siemens 7 PLC **Electrical** ✓ New 55 kw motor **4.3 Capstans (5T), #2 and #7** **Mechanical** Same as in option 3 above **Electrical** Same as in option 3 above		

IMPLEMENTATION STRATEGY (Complete shut versus one pair of capstans at a time)

OPTION 1: TAKE OUT TWO CAPSTANS AT A TIME

Capstans work in pairs. If on implementation only one capstan is taken out of commission, the project will take longer because each capstan will be completed in no less than six months in option 1 or option 2 and eight and half months for option3 or 4. However if capstans are taken in pairs, for each pair the same times will apply, ie, duration for the pair of say capstan 1 & 8 will take six months if option 1 is chosen and eight and half months if option 3 or 4 is chosen. This is the best strategy; however, a simulation will have to be done with a docking ship where a set of capstans eg #1 & #8 would not be used but instead use #2 & #7. This simulation will assist in analysis whether there is anything temporal which needs to be set up to mitigate for the missing set. Without a doubt longer steel ropes would be needed.

OPTION 2: SHUT DOWN THE WHOLE OPERATION

This option is the easiest option but it is suited for a facility which has no demand for equipment utilisation. IPC does not recommend this strategy unless TNPA decides to shut down the facility for a minimum of 16 months and maximum of 18 months to execute the work.

APPENDIX

APPENDIX 1: CRITICAL SPARES

Critical spares are components of machinery which can compromised the operation of the business if they are unavailable when needed during breakdowns. Unavailability could be due to long lead time from OEM, country of origin for the particular component etc. Big gears are manufactured customer specific and therefore cannot be bought off the shelf. It is imperative that drop in spares

a) 20T CAPSTAN

- Final drive gears
- Gearbox
- Coupling
- Brake unit
- Motor
- Coupling pins
- Coupling rubbers
- Brake pins
- PLC cards

b) 5T CAPSTAN

- Complete set of gears
- Gearbox
- Coupling
- Coupling pins and bolts
- Motor
- Brake unit
- PLC cards

APPENDIX 2: DEFINITION & ABBREVIATIONS

Formulae for the transmission technique

Power

Rotational Movement:

$P_s = M \times \omega$ W (without loss)

$\omega = \frac{\pi \times n}{30}$ rad/s

$P = \frac{M \times n}{\eta} \times \frac{\pi}{30}$ W

$P = \frac{M \times n}{\eta} \times \frac{\pi}{30} \times \frac{1}{1000}$ kW

Torque

$M = F \times r$ Nm

$M_A = \frac{P \times 9550}{n} \times \eta$ Nm

Linear Movement:

$P = F \times v \times \frac{1}{\eta}$ W

$P = \frac{F \times v}{1000} \times \frac{1}{\eta}$ kW

Lead screw:

$M = \frac{F \times p}{2000 \times \pi \times \eta}$ Nm

Toothed belt:

$v = \pi \times D \times n$ m/min

$m = \frac{D}{z}$

$D = \frac{z \times t}{\pi}$

Units used:

M = torque in Nm
= angular velocity in rad/s
n = revolutions/min.
= efficiency (motor)
F = force in N
z = number of teeth
t = distance between teeth in mm

v = velocity in m/min
M_A = delivered torque in Nm
r = radius in m
P= power in kW or W
D= diameter in m
m = module
p = pitch in mm/rev
P_s = transmitted shaft power
P= necessary motor power

Formulas and Units

Transmission technical calculations – Main Formulas

Size designations and units according to the SI-units

Linear movement:

$v = \frac{s}{t}$	m/s
$s = v \times t$	m
$s_a = \frac{1}{2} \times a \times t_a^2$	m
$a = \frac{v}{t_a}$	m/s²
$P = F \times v$	W
$F = m \times a$	N
$W = F \times s$	Ws
$W = \frac{m \times v^2}{2}$	Ws

Rotation

$\omega = 2 \times \pi \times f$	rad/s
$v = \omega \times r = 2 \times \pi \times f \times r$	m/s
$M = F \times r$	Nm
$P = M \times \omega$	W
$M = J \times \dot{\omega}$	Nm
$W = \frac{J \times \omega^2}{2}$	Ws or J
$J = m \times r^2$	kgm²

Units used

v = velocity in m/s

M = mass in kg

P= power in W

s = length in m

t = time in sec.

a = acc. in m/s²

t_a = acc. time in sec.

F= force in N

W = work in Ws = J = Nm

ω = ang. velocity in rad./sec.

f = frequency in rev./sec.

r = radius in m

M = torque in Nm

J = Rotational mass moment of inertia in kgm²

$\dot{\omega}$ = angular acc. in rad/s²

M_a = acceleration torque in Nm

APPENDIX 3: MERITS AND DE-MERITS OF EACH OPTION

OPTION 1

This option is short term. It does not respond to a long-term vision of the business.

MERITS	DE-MERITS
1) Addresses immediate pain 2) Reclaim some components e.g. gearboxes 3) Equipment outage will be short 4) Efficiency will improve slightly from where it is currently	1) This is a short strategy applied in a business with a long strategy (built-to-last) 2) Investing on old technology is not a wise a business strategy 3) The difficulty in procuring some space will remain with TNPA 4) The assets will still be without the capability to monitor/collect historical date without some reliance on individuals 5) Maintenance budget for the assets will escalate again, few years after the refurbishment 6) No guarantee that maintenance staff will improve their attitudes towards the maintenance of these assets 7) The capstans will remain in series which is a disadvantage operationally because if one is out then the rest of the capstans cannot be used

OPTION 2

This option is for a total conversion of all capstans to AC Driven capstans.

MERITS	DE-MERITS
1) Initial investment cost marginally lower than hydraulic technology 2) One system to manage 3) Maintenance staff familiar with technology 4) Technical support readily available locally 5) Environmentally friendly	1) Cannot provide the same torque as hydraulic system 2)

OPTION 3

This option is innovative and technological up to date with the standards of engineering and maintenance practices of today. Retire, remove and replace all DC Motors and convert to Hydraulic drive. The hydraulic drive comes with a complete power pack with;

- Stainless steel reservoir,
- Stainless steel control panel,
- Robust stainless steel pedestal
- Load sensing (energy efficient) hydraulic system with electro and manual lever proportional speed control
- Pressure transducer
- Built-in hydraulic fail safe disc brake
- Hydraulic load holding valves
- Filtration system
- Bonfiglioli planetary gearbox

- Weg id1 motors
- Bell housingsthe lead time on these units is 16 – 20 weeks.

The new system will have Thorplus bearings to replace the existing brass bush bearings. The advantage with Thorplus is the fact that it does not need lubrication. The lubrication method of the main spur gears will be improved. The gears will also be provided with drip trays to contain spillage and drips. A facility will be made to pump out oils and water if the capstan pits are washed. The control philosophy includes electric VSDs and PLC.

A further recommendation to support this new technology is for the business to adopt Condition Monitoring Strategy. Also, SAP Maintenance system must be used to its full capability and relevant maintenance reports must be generated periodically as agreed with the department head. Artisans must report correctly so that history becomes useful when needed either to RCFA or for planning purposes.

The merits and de-merits of Option 3

MERITS	**DE-MERITS**
1) OHSAct and NEMA compliance 2) Introduction and adoption of Condition Monitoring as a business maintenance strategy 3) Advanced Technology which is line with a business which has a vision to serve its customers reliably and efficiently. 4) New technology facilitates Predictive Maintenance and for this kind of operation, 100% availability can be guaranteed.	1) High initial investment costs 2) New technology might not be received well by old hands.

5) High Overall Equipment Effectiveness (OEE) 6) TNPA will have a World Class Asset management system, managing world class assets 7) Skills Development for maintenance staff as they will grow professionally 8) New capstans will run in parallel as opposed to the series arrangement of the current set up 9) Capstans will be on electrical VSD with operational protections which prevents operators from running the equipment abusively 10) Spare parts available from local suppliers and technical support is also local	

OPTION 4

Option 4 is a hybrid solution which proposes two capstans (#1 & #8) on hydraulics and the rest on AC Drives. Whilst this is feasible, it is not the best solution as it introduces two technologies in one system.

MERITS	**DE-MERITS**
1) OHSAct and NEMA compliance. 2) Introduction and adoption of Condition Monitoring as a business maintenance strategy.	1)Maintenance of two systems. 2) Staff may not take kindly into maintaining two systems and preference might need to neglect of non-preferred system.

3) Advanced Technology which is line with a business which has a vision to serve its customers reliably and efficiently 4) New technology facilitates Predictive Maintenance and for this kind of operation, 100% availability can be guaranteed. 5) High Overall Equipment Effectiveness (OEE) 6) TNPA will have a World Class Asset management system, managing world class assets 7) Skills Development for maintenance staff as they will grow professionally 8) New capstans will run in parallel as opposed to the series arrangement of the current set up 9) Capstans will be on electrical VSD with operational protections which prevents operators from running the equipment abusively 10) Spare parts available from local suppliers and technical support is also local	

APPENDIX 4: SYSTEMS THINKING

The problem we are trying to solve is not purely technical as most might wish to believe. It is a socio – technical problem. The two elements or components of the problem should be addressed. All that is needed is a method of synthesis which will form a whole of the parts. If the players in a socio-technical environment are oblivious of the consequences of the overall actions in regards to the well-being of the whole system, they may wreck the milieu without even recognising what they have done. This is exactly what is happening at the dry dock with regards to the neglect of the capstans.

Equipment life, operability, maintainability are not one time propositions; they should be reproduced continuously. If the processes that generate them end, the phenomena will also cease to exist.

Look at three states of the capstans

I. As is

II. As it will be (reconditioned/rehabilitated)

III. As it should be (New technology/ alternative technology)

STATE	INDICATOR	
I. AS IS	1. OHSAct	1. Non – compliance
	2. NEMA	2. Non – compliance
	3. Gearbox condition	3. Components damaged
	4. Oil condition	4. Contaminated
	5. Technology	5. Ancient
	6. Key on speed adjusting mechanism	6. Excessive wear
	7. Brake system pins	7. Rust and pitting

	8. Coupling damaged and hacked 9. Lubrication system inadequately designed 10. Cover allowing water in 11. Curling drum corroding badly 12. Steel rope rusting badly 13. Electrical – live cables left bare 14. Control system 15. PM System 16. Execution of PM work orders 17. Content of PM work orders 18. Remote maintenance by maintenance staff	8. Broken and cut (3- off) 9. Bad design and oil not reaching other bearings 10. Water in oil 11. No maintenance 12. No maintenance 13. Non – compliance 14. Fully manual 15. There but not there 16. Paper exercise 17. Silent about core work 18. No ownership
II. AS IT WILL BE	1. Curling drum reconditioned 2. Complete new gears for capstan #2 & #7 3. New bearings for all eight (8) capstan gearboxes 4. New clutches for capstans #2 & #7 gearboxes 5. Reconditioned speed adjustment mechanism 6. New coupling pins 7. New coupling rubbers	1. De-rust, rebuild, repaint 2. Design, and cut new set of gears 3. All bearings have collapsed - equivalent to old type 4. Reinstate clutch system to allow two directions on ACs 5. New shaft, new key and new wheel 6. Machine new pins 7. Order new sets

	8. New bush bearings for all capstans 9. No lubrication for bush bearings (new technology for bearings) 10. New gear lubrication system 11. New lubrication oil collection/spill trough 12. New 250m power cable 13. Protected power cables 14. Improved oil disposal system 15. No water ingress 16. Capstans powered in parallel	8. Order new type 9. New technology is self lubricating 10. New design 11. New addition to address spillages 12. Existing length faulty 13. Safety compliance 14. NEMA compliance 15. Water tight infrastructure 16. Improved design
III. AS IT SHOULD BE	1. Safe work procedure for doing work on capstans 2. Environmental PM for inspection of spillage and oil disposal from all capstans 3. Hydraulically driven capstans 4. New gearboxes for all capstans 5. New motors for all capstans 6. Retire all DC drives 7. Improved content of PM work order 8. Improved feedback on Pm work order 9. New GA	1. OHSAct compliance, and enforcement 2. NEMA compliance and enforcement of the law to all levels 3. New technology 4. New technology 5. New technology 6. New technology 7. Continuous improvement 8. Continuous improvement 9. New technology

	10. New capstans	10. New technology
	11. New design	11. New technology
	12. Collection pans for gear lubrication oil	12. NEMA compliance
	13. Investment in new technology	13. Continuous improvement
	14. Staff training on new technology	14. Staff development
	15. Passionate maintenance staff	15. Excellence
	16. PLC control	16. Using power of technology
	17. New 250m cable	17. Section faulty
	18. Capstans powered in parallel	18. Improved design

APPENDIX 5: COST COMPARISONS

OPTIONS →	1	2	3	4
Cost of equipment and construction cost				
Contingency (10%)				
Sub - Total 1				
P & G's (10%)				
Sub - Total 2				
Professional Fees (10%)				
GRAND TOTAL (ESTIMATED PROJECT COST)				

APPENDIX 6: OIL ANALYSIS RESULTS


Oil Capsans (3,4,5,6,7&8).pdf


OIL Capstans (3,4,5&6).pdf


Oil Capstans (1&2).pdf

APPENDIX7: LUBRICATION SYSTEM LAYOUT


Modified DC new.pdf


Modified DC existing.pdf


Modified AC new.pdf


Modified AC current.pdf

APPENDIX 8: NDT & UT RESULTS


Dye Penetrant Results.pdf


Dye Penetrant and Ultrasonic results.pc

APPENDIX 9: VIBRATION RESULTS

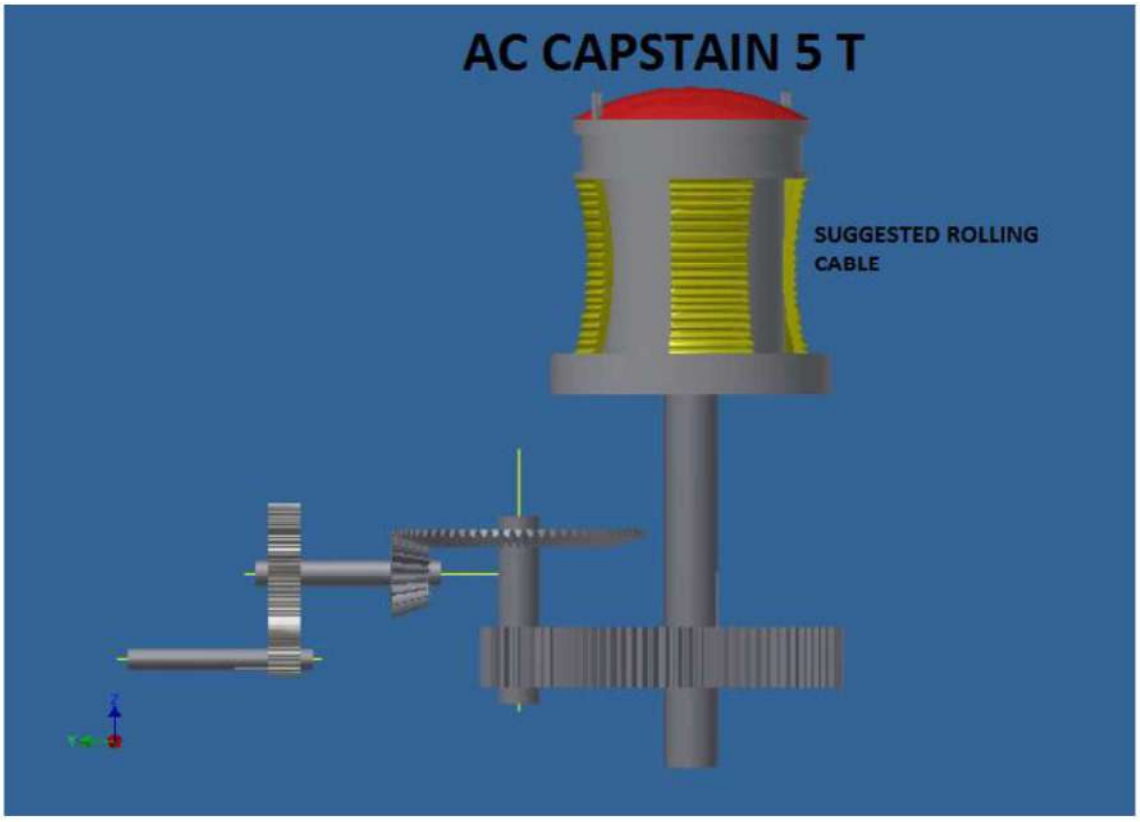

Capstan Report on Vibration.pdf

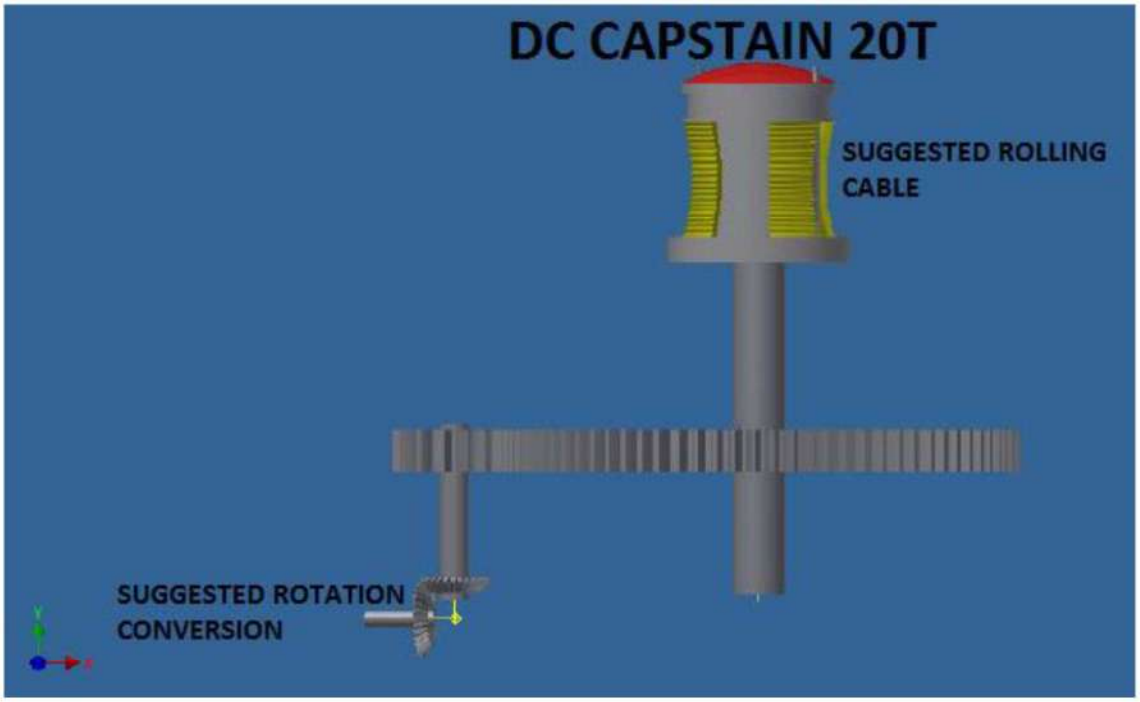
APPENDIX 10: CONCEPTUAL DRAWINGS

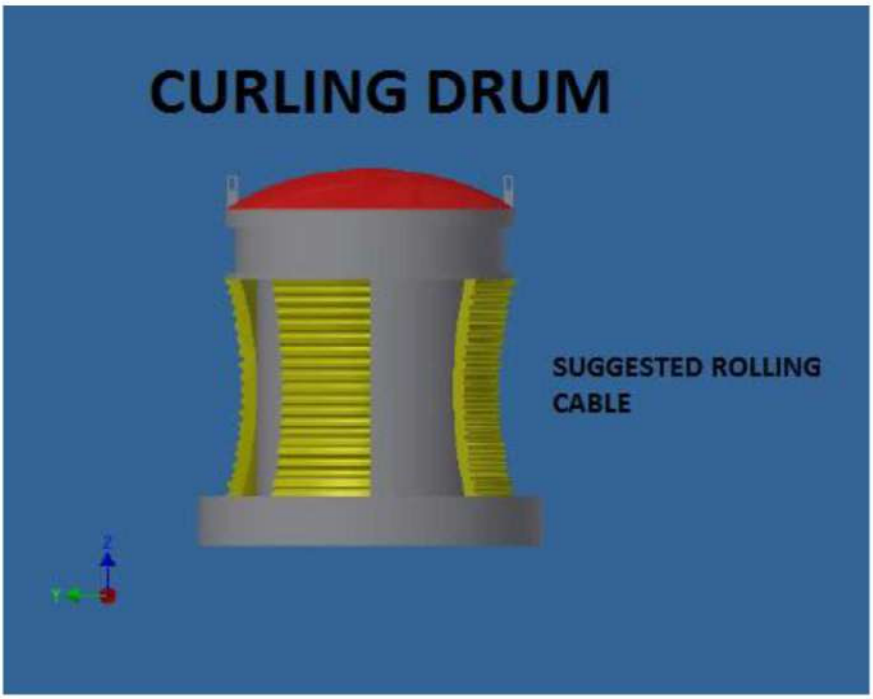
Electrical

VCE-TPNA-E-501
REV 1 Layout1 (1).pd

Mechanical

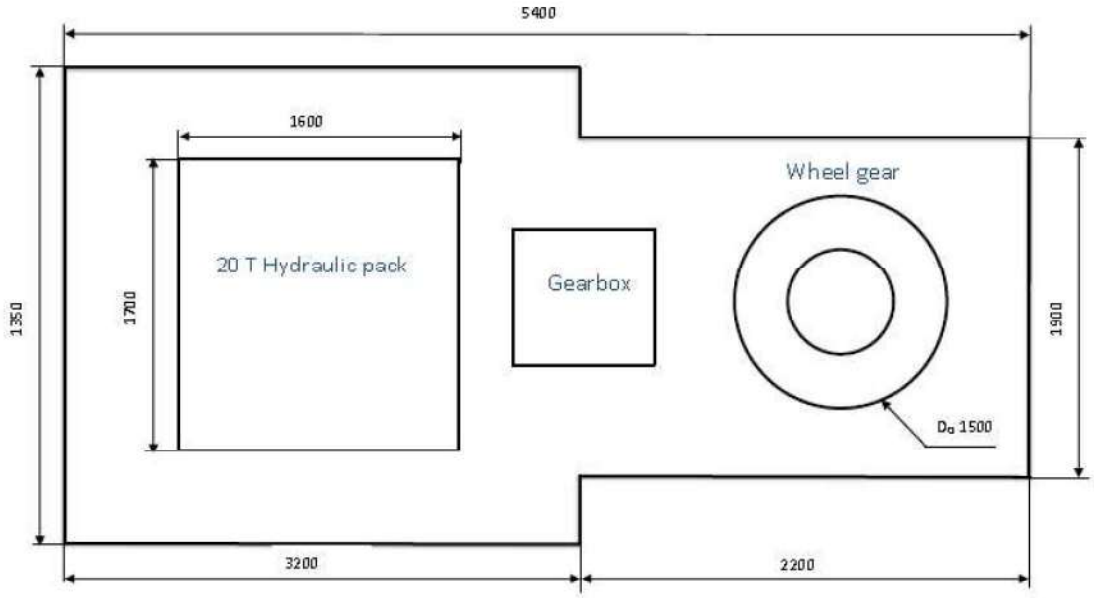



DC CAPSTAIN 20T
SUGGESTED ROLLING CABLE
SUGGESTED ROTATION CONVERSION



APPENDIX 11: FITTING SPACE AVAILABLE FOR THE NEW EQUIPMENT

FITTING SPACE OF VARIOUS EQUIPMENTS



Annexure B: Electrical Works – Drawings

DRAWING NUMBER: H500206 - 1 - 413 - E - SL - 0011 - 01 - 9 JV

DO NOT SCALE - IF IN DOUBT, ASK

BUS SECTION TO BE OPERATED IN CLOSED POSITION FOR PFC.

HARBOUR MAIN SUBSTATION

HARBOUR MAIN 'A' — HARBOUR MAIN 'B'

ESKOM No1 ESKOM No2 — ESKOM No3 ESKOM No4

20m x3x630mm² x 1c — PFC A — 1 Mvar, 6 Mvar, 6 Mvar

L18 HARBOUR MAIN MINI SUB 1 | L17 MACHINE ROOM | L16 UNITY | L15 REFRIGERATION | L14 ROAD RAIL | L13 CARRIER | L12 COASTER BERTH | L11 604 SUBSTATION | L10 603 SUBSTATION | L09 602 SUBSTATION | L08 602 SUBSTATION | L07 502 SUBSTATION | L06 501 SUBSTATION | L05 EQUIPPED SPARE | L04 EQUIPPED SPARE | L03 | L02 | L01 | 00 | R01

R02 | R03 EQUIPPED SPARE | R04 EQUIPPED SPARE | R05 501 SUBSTATION | R06 502 SUBSTATION | R07 602 SUBSTATION | R08 602 SUBSTATION | R09 603 SUBSTATION | R10 604 SUBSTATION | R11 CRANE REPAIR | R12 CAE | R13 HARBOUR SIGNALS | R14 REFRIGERATION | R15 GRAVING DOCK | R16 MACHINE ROOM | R17 HARBOUR MAIN MINI SUB 2 | R18

20m x3x630mm² x 1c — PFC B — 6 Mvar, 4 Mvar, 2 Mvar

10m x1x120mm² x 3c XLPE — HARBOUR MAIN MINI SUB 1 ISOLATOR No1 — 800kVA 11750/400V — H/M MINI SUB 1

10m x1x120mm² x 3c XLPE — HARBOUR MAIN MINI SUB 2 ISOLATOR No2 — 800kVA 11750/400V — H/M MINI SUB 2

50m x1x120mm² x 3c XLPE — HARBOUR MAIN MINI SUB 1 ISOLATOR No1 — 800kVA 11750/400V — H/M MINI SUB 1

1200m x2x240mm² x 3c XLPE

1200m x2x240mm² x 3c XLPE

2100m x1x150mm² x 3c XLPE

PORT BAKBOORD SUBSTATION

E38 E39 E40 E41 — TRF-01 400kVA 11750/400V — TRF-02 400kVA 11750/400V — TANKER BERTH SUBSTATION — UNITY SUBSTATION

K-BERTH

1000kVA 11750/400V

UNITY SUBSTATION

E01 E02 E03 E04 E05 E06 E07 BC1 E08 E09 E10 E11

MACHINE ROOM SUBSTATION — HARBOUR MAIN SUBSTATION — F-BERTH SUBSTATION — TANKER BERTH SUBSTATION — TRF-01 400kVA 11750/400V — TRF-02 400kVA 11750/400V — PORT BAKBOORD SUBSTATION — E-BERTH SUBSTATION — GRAVING DOCK SUBSTATION

M-BERTH

1250kVA 11750/400V

GRAVING DOCK SUBSTATION

E43 E44 E45 BC3 E46 E47 E48 E49

HARBOUR MAIN SUBSTATION — STURROCK PUMP HOUSE SUB — TRF-01 750kVA 11750/400V — TRF-02 750kVA 11750/400V — STURROCK PUMP HOUSE SUB — UNITY SUBSTATION — MSP/ CN BRIDGE M/S

MACHINE ROOM SUBSTATION

E16 E17 E18 E19 E20 BC4 E21 E22 E23 E24

SYNCHRO LIFT SUBSTATION — HARBOUR MAIN SUBSTATION — UNITY SUBSTATION — TRF-01 750kVA 11750/400V — TRF-02 750kVA 11750/400V — C-BERTH SUBSTATION — HARBOUR MAIN SUBSTATION — SYNCHRO LIFT SUBSTATION

TANKER BERTH SUBSTATION

E24 E25 E26 E27 E28 BC2 E29 E30 E31

PORT BAKBOORD SUBSTATION — EASTERN MOLE MINI SUB — TRF-01 800kVA 11750/400V — TRF-02 1000kVA 11750/6.6kV — EASTERN MOLE SUBSTATION — UNITY SUBSTATION

F-BERTH SUBSTATION

E15 E16 E17 E18 E19

UNITY SUBSTATION — TRF-01 1250kVA 11750/400V — TRF-02 1250kVA 11750/400V — J-BERTH SUBSTATION — TANKER BERTH MINI SUB

E-BERTH SUBSTATION

E20 E21 E22 E23

UNITY SUBSTATION — TRF-01 400kVA 11750/400V — TRF-02 400kVA 11750/400V — F-BERTH SUBSTATION

STURROCK PUMP HOUSE SUBSTATION

E51 E52 E53 BC E54 E55 E56

GRAVING DOCK SUBSTATION — TRF-04 1250kVA 11750/400V — PUMP-TRF-01 950kVA 11750/220V — PUMP-TRF-02 950kVA 11750/220V — PUMP-TRF-03 950kVA 11750/220V — GRAVING DOCK SUBSTATION

GRAVING DOCK SUBSTATION

SPARE — 800kVA 11750/400V — MISPLON BRIDGE M/S

SYNCHRO LIFT SUBSTATION

500kVA 11750/400V

501 SUBSTATION

11.75kV — BUSBAR 1250A : 25 MVA.

L07 L06 L05 L04 L03 L02 L01 00 R02 R03 R04 R05 R06

EQUIPPED SPARE — 501-TRF-01 1500kVA 11750/400V — 501 MS-19 — 501 MS-07 — 501 MS-03 — HARBOUR MAIN SUBSTATION — 501 MS-09 — 501 MS-12 — 501 MS-24 — EQUIPPED SPARE

501 SUB L04: 501-MS-01 1000kVA 11750/400V; 501-MS-02 1000kVA 11750/400V; 501-MS-20 1000kVA 11750/400V; 501-MS-04 1000kVA 11750/400V; 501-MS-05 1000kVA 11750/400V; 501-MS-06 1000kVA 11750/400V; 501-MS-21 1000kVA 11750/400V; 501-MS-22 1000kVA 11750/400V

501 SUB L05: 501-MS-07 1000kVA 11750/400V; 501-MS-08 1000kVA 11750/400V; 501-MS-09 1000kVA 11750/400V; 501-MS-10 1000kVA 11750/400V; 501-MS-11 1000kVA 11750/400V; 501-MS-12 1000kVA 11750/400V; 501-MS-23 1000kVA 11750/400V; 501-MS-24 1000kVA 11750/400V

501 SUB L06: 501-MS-19 1000kVA 11750/400V; 501-MS-20 1000kVA 11750/400V; 501-MS-21 1000kVA 11750/400V; 501-MS-22 1000kVA 11750/400V; 501-MS-23 1000kVA 11750/400V; 501-MS-24 1000kVA 11750/400V

1200m x2x240mm² x 3c XLPE — 1200m x2x240mm² x 3c XLPE

502 SUBSTATION

11.75kV — BUSBAR 1250A : 25 MVA.

L06 L05 L04 L03 L02 L01 00 R02 R03 R04 R05 R06 R07

EQUIPPED SPARE — 502-MS-31 — 502-MS-25 — 502-MS-13 — HARBOUR MAIN SUBSTATION — 502-MS-14 — 502-MS-18 — 502-MS-30 — 502-MS-26 — 502-TRF-01 1500kVA 11750/400V — EQUIPPED SPARE

502 SUB L05: 502-MS-01 1000kVA 11750/400V; 502-MS-02 1000kVA 11750/400V; 502-MS-03 1000kVA 11750/400V; 502-MS-04 1000kVA 11750/400V; 502-MS-05 1000kVA 11750/400V; 502-MS-06 1000kVA 11750/400V; 502-MS-07 1000kVA 11750/400V; 502-MS-08 1000kVA 11750/400V; 502-MS-09 1000kVA 11750/400V

502 SUB L06: 502-MS-31 1000kVA 11750/400V; 502-MS-32 1000kVA 11750/400V; 502-MS-33 1000kVA 11750/400V; 502-MS-34 1000kVA 11750/400V; 502-MS-35 1000kVA 11750/400V; 502-MS-36 1000kVA 11750/400V

1200m x2x240mm² x 3c XLPE

1200m x2x240mm² x 3c XLPE

840m x 35mm² x 3c XLPE — 840m x 35mm² x 3c XLPE

LANDING WHARF 650kVA 11750/400V

EASTERN MOLE SUBSTATION

E34 E32 E35 BC4 E33 E36

TANKER BERTH SUBSTATION — EASTERN MOLE MINI SUB — TRF-01 1000kVA 11750/400V — TRF 02 1000kVA 11750/3300V — COMPRESSOR ROOM — TANKER BERTH SUBSTATION

C-BERTH SUBSTATION

E46 E47 E48 BC7 E49 E51

MACHINE ROOM SUBSTATION — PORTNET HOUSE MINI SUB — TRF 01 400kVA 11750/400V — TRF 02 800kVA 11750/400V — A-BERTH SUBSTATION

A-BERTH SUBSTATION

E53 E54 E55 E56 E57

C-BERTH SUBSTATION — TRF 01 500kVA 11750/400V — PORTNET HOUSE MINI SUB — D-BERTH SUBSTATION — TRF 02 500kVA 11750/400V

D-BERTH SUBSTATION

E59 E60 E62 BC8 E64 E65 E66

TRF 02 500kVA 11750/400V — COMPRESSOR TRF 01 1000kVA 11750/400V — MACHINE ROOM SUBSTATION — E61 — E63 — A-BERTH SUBSTATION — COMPRESSOR TRF 02 1000kVA 11750/400V — EQUIPPED SPARE

690m x2x150mm² x 3c XLPE — 690m x2x150mm² x 3c XLPE

REFRIGERATION SUBSTATION

E27 E28 E29 E30 BC3 E31 E32 E33 E34

HARBOUR MAIN SUBSTATION — FAIRWAY ISLAND MINI SUB — TRF-01 1250kVA 11750/400V — TRF-02 1250kVA 11750/400V — TRF-03 1250kVA 11750/400V — MINI SUB 3 — EQUIPPED SPARE — HARBOUR MAIN SUBSTATION

1300m x1x240mm² x 3c XLPE — 1300m x1x240mm² x 3c XLPE

600 SUBSTATION

11.75kV — BUSBAR 1250A : 25 MVA.

L05 L04 L03 L02 L01 00 R01 R02 R03 R04 R05

600-TRF-01 800kVA 11750/400V — LCI / BOX 4 — LCI / BOX 7 — HARBOUR MAIN SUBSTATION L02 — LCI / BOX 8 — LCI / BOX 5 — HARBOUR MAIN SUBSTATION R07 — LCI / BOX 9 — LCI / BOX 3 — 602-MS-01

1340m x1x240mm² x 3c XLPE — 1340m x1x240mm² x 3c XLPE

602 SUBSTATION

11.75kV — BUSBAR 1250A : 25 MVA.

L05 L04 L03 L02 L01 00 R01 R02 R03 R04 R05

602-MS-01 — LCI / BOX 8 — LCI / BOX 5 — HARBOUR MAIN SUBSTATION L08 — LCI / BOX 6 — LCI / BOX 7 — 602-TRF-02 800kVA 11750/400V — HARBOUR MAIN SUBSTATION R07

500m x1x150mm² x 3c XLPE — 500m x1x150mm² x 3c XLPE

602 SUB R03: 602-MS-01 1000kVA 11750/400V

602 SUB L03: 602-MS-01 1000kVA 11750/400V

95mm² x 3c XLPE

TANKER BERTH MINI SUB — 800kVA 11750/400V

EASTERN MOLE MINI SUB No2 — 1000kVA 11750/400V

EASTERN MOLE MINI SUB No1 — M/S 1000kVA 11750/400V

SUPPLY TO COMPRESSOR ROOM — E37

PJANSEN ISLAND MINI SUB — 200kVA 11750/400V

MINI SUB 1 — 800kVA 11750/400V

MINI SUB 2 — 800kVA 11750/400V

MINI SUB 3 — 500kVA 11750/400V

600 SUB L03: 600-MS-01 1000kVA 11750/400V

600 SUB R03: 600-MS-01 1000kVA 11750/400V

600-MS-01 MINI SUB — 800kVA 11750/400V

1900m x2x150mm² x 3c XLPE — 1900m x2x150mm² x 3c XLPE

COASTER BERTH SUBSTATION

E72 E73 BC1 E74 E75 E76 E77

HARBOUR MAIN SUBSTATION — TRF-02 1250kVA 11750/400V — TRF-03 1250kVA 11750/400V — CRANE REPAIR SUBSTATION — TRF-04 1250kVA 11750/400V — TRF-05 1250kVA 11750/400V

1200m x2x150mm² x 3c XLPE — 380m x2x150mm² x 3c XLPE — 715m x2x150mm² x 3c XLPE — 400m x2x150mm² x 3c XLPE

CRANE REPAIR SUBSTATION

E79 E80 BC2 E81 E82

COASTER BERTH SUBSTATION — TRF-01 800kVA 11750/400V — TRF-02 800kVA 11750/400V — HARBOUR MAIN SUBSTATION

CARRIER WORKSHOP SUBSTATION

E56 E57 E58 BC7 E59 E60

EMERGENCY SUPPLY — HARBOUR MAIN SUBSTATION — TRF-01 800kVA 11750/400V — CONTAINER ADMIN SUBSTATION

CONTAINER ADMIN SUBSTATION

E62 E63 BC8 E64 E65

CARRIER WORKSHOP SUBSTATION — TRF-01 1250kVA 11750/400V — TRF-02 1250kVA 11750/400V — CAE SUBSTATION

CAE SUBSTATION

E67 E68 BC9 E69 E70 E71

CONTAINER ADMIN SUBSTATION — TRF-01 1250kVA 11750/400V — TRF-02 1250kVA 11750/400V — HARBOUR MAIN SUBSTATION — MINI SUB 7

1450m x2x150mm² x 3c FEPEX — 1350m x2x150mm² x 3c FEPEX

ROAD RAIL SUBSTATION

E44 E45 BC5 E46 E47 E48 E49 E50

MINI SUB 1 — HARBOUR MAIN SUBSTATION — TRF-02 800kVA 11750/400V — TRF-03 1250kVA 11750/550V — HARBOUR SIGNAL SUBSTATION — TRF-04 1250kVA 11750/550V — TRF-05 800kVA 11750/400V

HARBOUR SIGNALS SUBSTATION

E51 E52 BC6 E53 E54

ROAD RAIL SUBSTATION — TRF-01 800kVA 11750/400V — TRF-02 800kVA 11750/400V — HARBOUR MAIN SUBSTATION

1675m x2x150mm² x 3c XLPE — 1570m x1x240mm² x 3c XLPE — 1530m x1x240mm² x 3c XLPE — 1570m x1x240mm² x 3c XLPE — 1570m x1x240mm² x 3c XLPE

603 SUBSTATION

11.75kV — BUSBAR 1250A : 25 MVA.

L05 L04 L03 L02 L01 00 R02 R03 R04 R05

603-TRF-01 800kVA 11750/400V — EQUIPPED SPARE — LCI / BOX9 — HARBOUR MAIN SUBSTATION L09 — LCI / BOX10 — HARBOUR MAIN SUBSTATION R09 — LCI / BOX 11 — KRAN-01-FEEDER 3

604 SUBSTATION

11.75kV — BUSBAR 1250A : 25 MVA.

L06 L05 L04 L03 L02 L01 00 R02 R03 R04 R05

KRAN-01-FEEDER 2 — LCI / BOX14 — LCI / BOX12 — HARBOUR MAIN SUBSTATION L10 — LCI / BOX13 — LCI / BOX15 — 604-TRF-02 800kVA 11750/400V

500m x1x150mm² x 3c XLPE — 1050m x150mm² x 3c XLPE — 300m x1x50mm² x3c XLPE

603 SUB L05: 603-MS-01 1000kVA 11750/400V

604-MS-01 MINI SUB — 800kVA 11750/400V

QUAY 702 MINI SUB — 500kVA 11750/400V

QUAY 703 MINI SUB — 500kVA 11750/400V

CCC INCOMING — SHOP 17 — 11.75kV — E61 — E60 — 500kVA — 750kVA — E62 — 400V

MAIN INCOMING — E63 — 2.2kV — E64 — E65 — PUMP No.1 — PUMP No.2 — ROBINSON PUMPHOUSE

SHOP 17 W/SHOP — 800kVA 11750/400V

MINI SUB 7 — 1600kVA 11750/400V

MINI SUB 6 — 1600kVA 11750/400V

MINI SUB 5 — 1600kVA 11750/400V

MINI SUB 8 — 1600kVA 11750/400V

MINI SUB 4 — 1600kVA 11750/400V

MINI SUB 3 — 1600kVA 11750/400V

MINI SUB 2 — 1600kVA 11750/400V

MINI SUB 1 — 1600kVA 11750/400V

NOTE:

DRAWING NO.	REFERENCE
REFERENCE DRAWINGS	

NO.	DESCRIPTION	BY	CHK'D	APP'D	DATE
10	ADDED BERGANCAPE MINISUB	MR	AJ		26-03-15
9	UPDATED FOR RECORD PURPOSES	PS	MR.		13/06/19
8	ISSUED FOR CONSTRUCTION	SK	BA	PK	12/09/20
7	ISSUED FOR RECORD	SK	BA	PK	12/04/05
6	ISSUED FOR CONSTRUCTION	SK	BA	PK	12/01/19
5D	5-BERTH ALTERED TO D-BERTH	PS	RR		11/10/19
5C	ADDITIONAL LABELS TO MINI SUB	PS	RR		11/10/18
5B	MINI SUB CONFIGURATION CHANGE	PS	RR		11/10/14
5A	OVERALL UPDATE TO DRAWING	PS	MR		11/10/07
11	OVERAL UPDATE				06/06/16

REVISIONS / ISSUE AUTHORIZATION

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EPCM CONSULTANT: TRANSNET PROJECTS

	TITLE	NAME	SIGNATURE	DATE
LEAD DES. ENG.				
ENG. COORD.				
ENG. MANAGER				
AREA MANAGER				
PROJECT MGR.	MR			
DIVISION				
DIV.				

ORIGINATOR:	TITLE	NAME	SIGNATURE	DATE
DRAWN				11/06/10
CHECKED				12/01/19
ENG. COORD.				
DISCIP. ENG.				12/09/20
ENG. MANAGER				
AREA MANAGER				

DATE: YY MM DD — PR.ENG. / PR.TECH. — NAME — SIGNATURE — REG. NUMBER

SCALE : NTS. — SIZE: A0

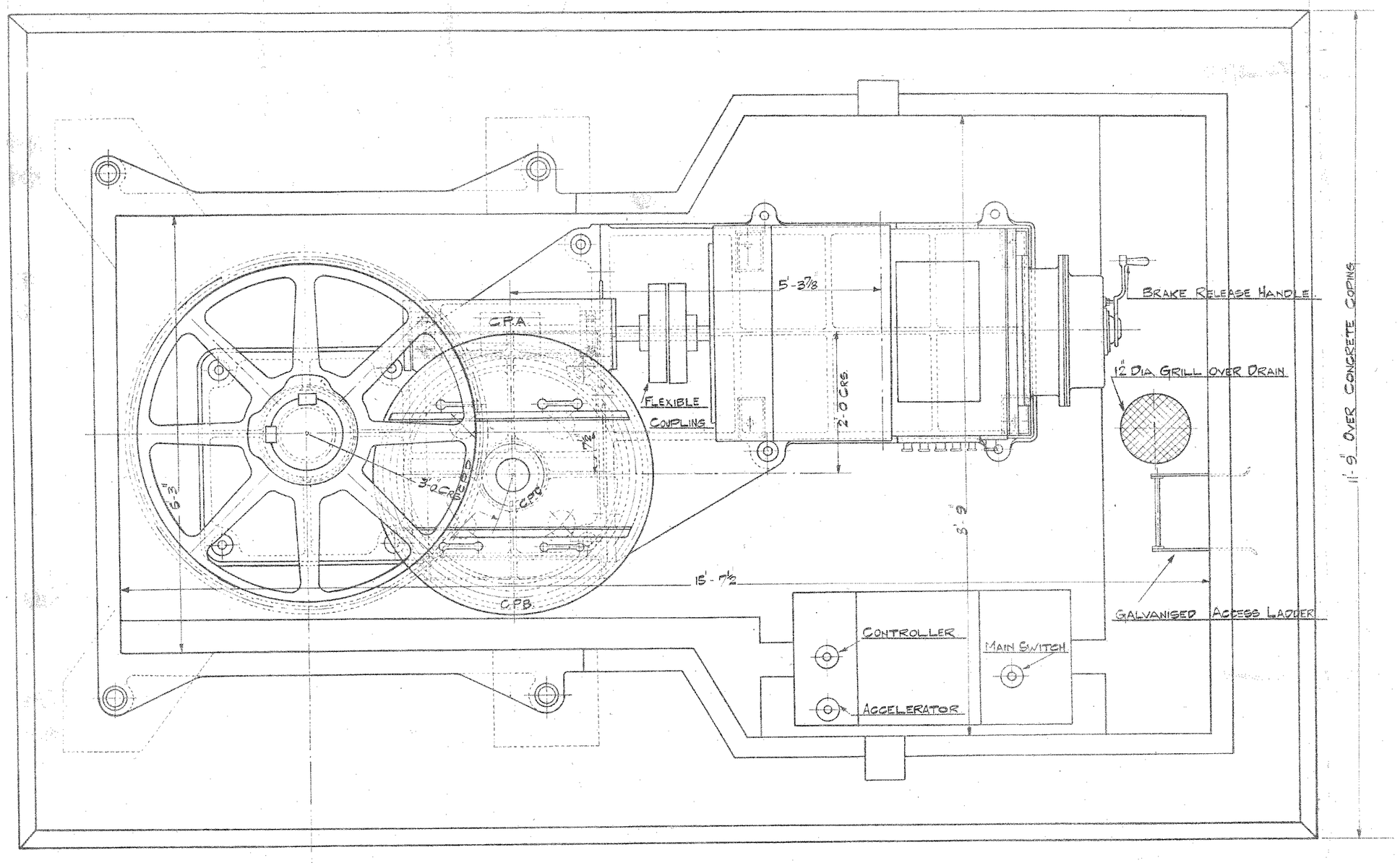
CAPE TOWN CONTAINER TERMINAL
PORT AREA
ELECTRICAL RETICULATION
OVERALL 11.75 kV
SINGLE LINE DIAGRAM

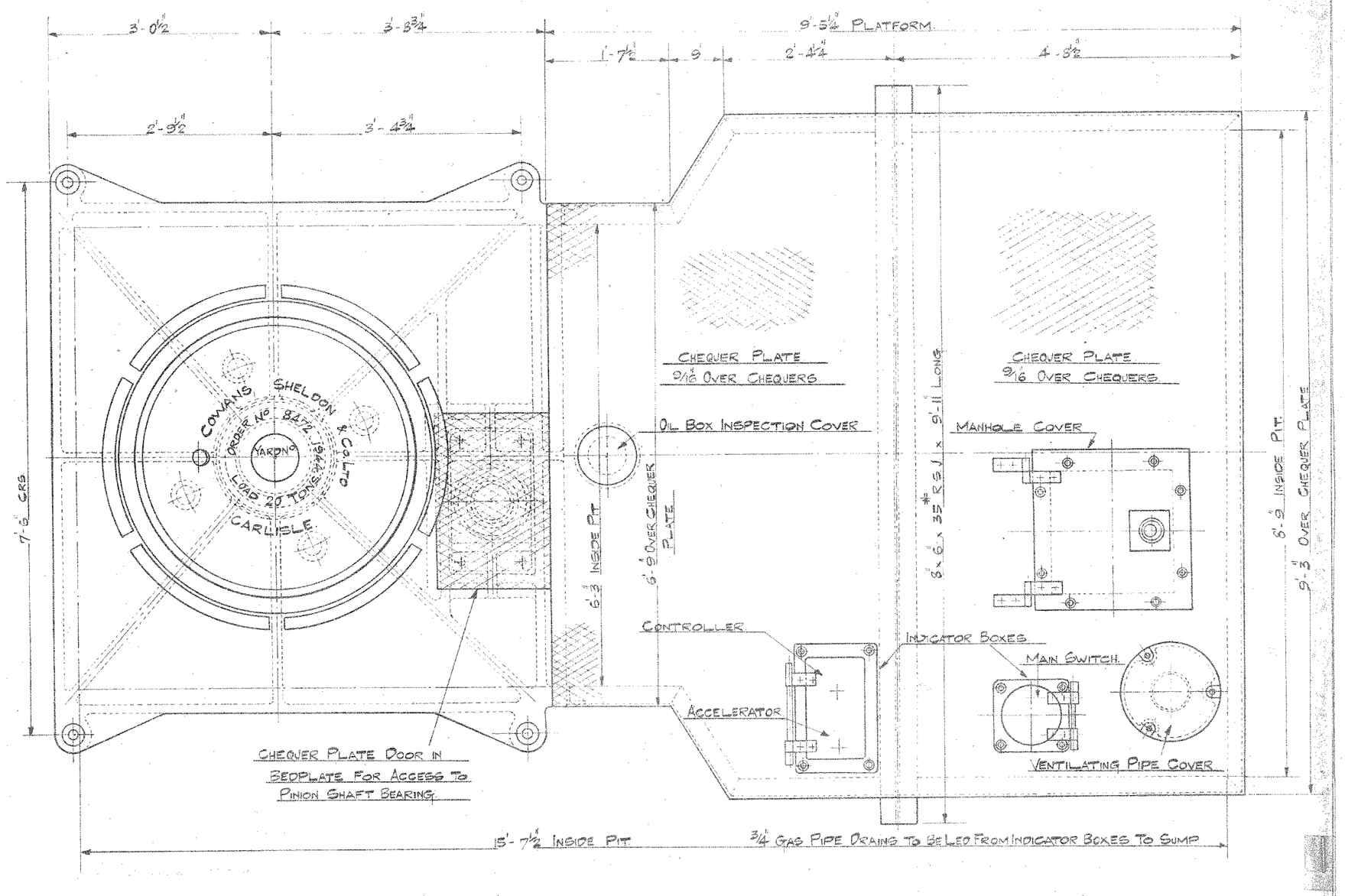
PROJECT NUMBER	DV	FBS	DS	TYPE	DRG. NO.	SHT.	REV.	ID
H500206	1	413	E	SL	0011	01	11	JV

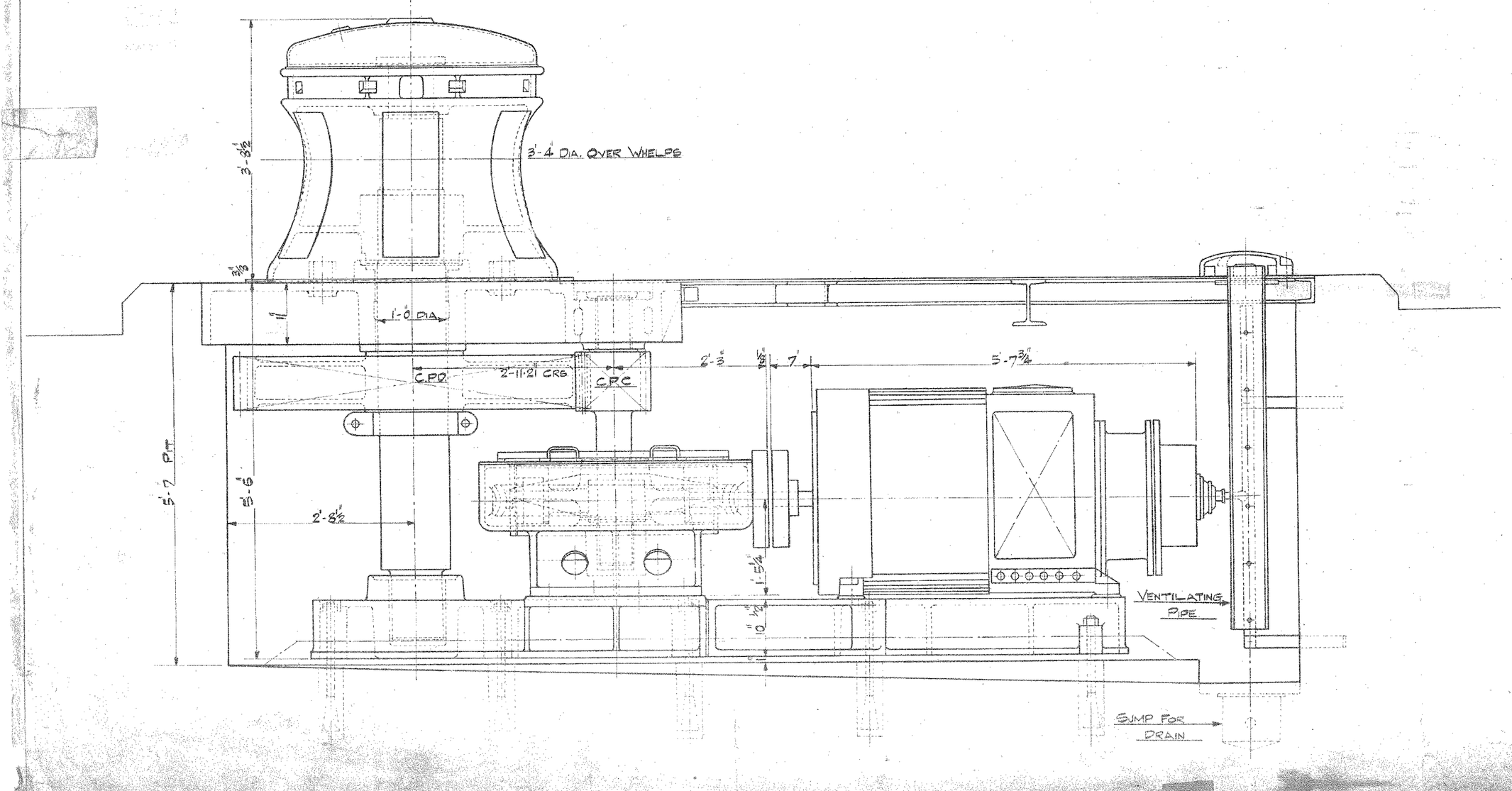
SIZE:A0 DATE: 2006/12/05
TAGS:A0 DATE: 2006/12/01

ETMES
FILE: E1
H:\SIGNAMES

20 Ton Constant Current Capstans & Generator
For Graving Dock Capetown
C.P.9/11564/43/8.111 H/L 1301 D of D







Speeds	Motor
To Exert a Pull of 20 Tons at Speeds From 10 To 40 Feet Per Minute	80 BHP at 500/1500 RPM
" " " " 15 " " " 10 " 50 " " "	
" " " " 5 " " " 10 " 100 " " "	
To Haul In Slack Rope at a Speed of 120 Feet Per Minute 250 Amp Constant Current	

Table of Machine Cut Gears

Symbol No	Description	No of Teeth	Pitch Dia	Pitch	Face	Bore	Material	Drg No
C.P.A.	Worm 3 Threads	—	5·993	2¾ C.P.	—	—	H.T. Steel	15,571/3
C.P.B.	Worm Wheel Rim	43	42·017	2¾ C.P.	5⅜	6½	Phos Bronze	15,571/3
C.P.C.	Spur Pinion	16	11·2"	1¼ D.P.	10"	-	M Steel	15,571/3
C.P.D.	Spur Wheel	76	60·8"	1¼ D.P.	9½	1-0½	C Steel	15,571/3

Order No	No off	Purchaser	Date of Order	Order No	Issue By
8472-81	10	Admiralty, Capetown	4-4-44		F.J.R.

No. TBH 106
V6 – 3004
Vel-Sheet 1
Wysigings-Amendments
Verwysing-Reference
Datum-Date '77-06-30

D.O.R.C. P 3070 1945

Cowans, Sheldon & Co Ltd. Carlisle

Subject General Arrangement
For 20 Tons Electric Capstans
Scale 1" 1 Foot

TBH·106·V6–3004 SHT 1

SHOPS AND DISPLAY STORES.

ELECTRIC POWER KIOSK

CRANE RAILS

ROBINSON DRY DOCK.

CRANE RAILS

AQUARIUM.

ALFRED BASIN.

EXISTING PALISADE SECURITY FENCE.

YACHT BASIN.

LEGEND OF DOCKING EQUIPMENT.

- C — ELECTRIC CAPSTAN (DC) (3 - OFF)
- W — ELECTRIC WINCH (AC) (9 - OFF)
- EP — ELECTRIC POWER BOX (6 - OFF)
- SW — SMALL ELECTRIC WINCH (2 - OFF)
- F — FAIRLEAD (8 - OFF)
- B — BOLLARD (22 - OFF)

MANAGER (SHIP REPAIR)		04/05/2017
PORT ENGINEER		03/05/2017

PORT ENGINEER
ROOM 705
PORTNET HOUSE.
PORT OF CAPE TOWN
P.O. BOX 4245
8000
TEL.(021)449-6173
FAX (021)449-6172

TRANSNET

national ports authority

PORT OF CAPE TOWN

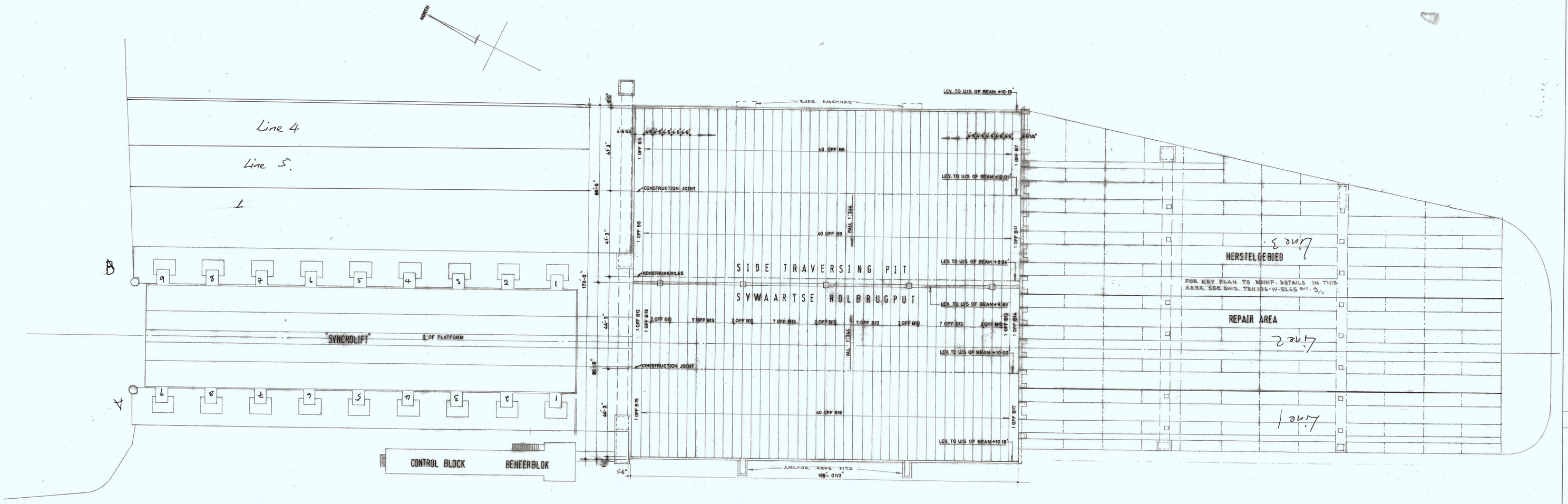
ROBINSON DRY DOCK.

LAYOUT OF ELECT. CAPSTANS, ELECT. WINCHES, FAIRLEADS AND BOLLARDS AROUND THE DOCK.

RE-NUMBERING OF EQUIPMENT.

DRAWN D.J.K.(D 1430)	CHECKED
SCALE AS SHOWN	

Nº	TBH 106 V3 - 3001		
DATE	31/03/2017	SHEET	
CAD.REF.	V3-3001 GEN		
FILE REF.		AMENDMENT	



No.	DATE DATUM	AMENDMENTS · WYSIGINGS	INITIALS VOORLETTERS
1	11-12-72	REPAIR AREA AND SIDE TRAVERSING PIT WIDENED.	
2	11-2-73	ARRANGEMENT OF SERVICE DUCTS AMENDED & ANCHOR ROPE PITS ADDED.	Y.P.

NOTES · AANTEKENINGE

REFERENCE DRAWINGS · VERWYSINGSTEKENINGE	DRG. Nº TEK. Nº
BEAMS / BALKE B5, B6, B7, B8, B9, B10, B15, B16, B17.	TBH 106-W-5265 SHT 13.
BEAMS / BALKE B12, B13, B14	TBH 106-W-5265 SHT 14.
BEAMS / BALKE B10.	TBH 106-W-5265 SHT 15.

SUPERSEDES TBH 106-W-5265 SH. 11

APPROVED BY - GOEDGEKEUR DEUR	DATE DATUM
CONTROLLER OF CUSTOMS AND EXCISE · KONTROLEUR VAN DOUANE EN AKSYNS	
STORES SUPERINTENDENT · MAGAZYNSUPERINTENDENT	
SYSTEM HEALTH INSPECTOR · AFDELINGSGESONDHEIDSINSPEKTEUR	
CHIEF DIRECTOR (HEALTH SERVICES) · HOOFDIREKTEUR (GESONDHEIDSDIENSTE)	
PORT HEALTH OFFICER · HAWEGESONDHEIDSBEAMPTE	
SYSTEM FIRE OFFICER · AFDELINGSBRANDBEAMPTE	
OFFICER COMMANDING (S.A.R. POLICE) · BEVELVOERENDE OFFISIER (S.A.S.-POLISIE)	
SUPERINTENDENT (STAFF) · SUPERINTENDENT (PERSONEEL)	
SUPERINTENDENT (COMMERCIAL) · SUPERINTENDENT (HANDEL)	
SUPERINTENDENT (OPERATING) · SUPERINTENDENT (BEDRYF)	
LOCOMOTIVE SUPERINTENDENT · LOKOMOTIEFSUPERINTENDENT	
SYSTEM SIGNAL ENGINEER · AFDELINGSEINJAALINGENIEUR	
SYSTEM AUTOMOTIVE ENGINEER · AFDELINGSINGENIEUR (PADVOERTUIG)	
PORT GOODS SUPERINTENDENT · HAWEGOEDERESUPERINTENDENT	
PORT CAPTAIN · HAWEKAPTEIN	
SYSTEM ELECTRICAL ENGINEER · ELEKTROTEGNIESE AFDELINGSINGENIEUR	
SYSTEM MANAGER · AFDELINGSBESTUURDER	

S.A.R. TABLE BAY HARBOUR · S.A.S. TAFELBAAIHAWE

ALFRED BASIN · ALFREDDOK

'SYNCROLIFT'

KEY PLAN TO REINFORCED CONC. DETAILS. (SIDE TRAVERSING PIT)

SLEUTELPLAN TOT GEWAPENDE BETON DETAILS. (SYWAARTSE ROLBRUGPUT)

SCALE: 1:20·0"					1:20·0" SKAAL
DRAWN · GETEKEN				Nº	TBH 106
TRACED · NAGETREK	G.J.M.	DISTRICT HARBOUR ENGINEER · DISTRIKSHAWE-INGENIEUR	SYSTEM HARBOUR ENGINEER · AFDELINGSHAWE-INGENIEUR		W3-3021
CHECKED · NAGESIEN		FILE · LêER WE 400/113/3 & WE 400/113/3/1	DATE · DATUM 7-12-1972	SHEET · VEL 11	
				AMENDMENTS · WYSIGINGS	1 2

RENUMBERED FROM TBH 106-W-5265 SH. 11 (1984-04-03)

20 Ton Constant Current Capstans & Generator

For Graving Dock, Capetown.

C.P. 5/115644/43/8.111.H/L.1801.00 F.D.

1 MS Washer CP16
BSS 153-15-A
2 Set Bolts 1" Dia x 3" Long.

2 Featherways At 180°

1 MS Pillar CP15
BSS 24-8-B Basic

2 Keyways At 90°

1 MS Spur Pinion & Shaft CPC 14 Teeth 1¼ DP
BSS 24-8-C Acid
Forging Ordered Out
Machined Complete

1 MS Worm Shaft CP A Ordered Out Machined Complete
BSS 24-8-D Acid.

1 Hoffmann Duplex Ball Bearing No 9688
1 " Roller Journal " RMS 20
1 " " RM 20 LL
2 R & M Lock Nuts N E 3
2 " Tab Washers No 15
3 MS Washers +3⅜ Out Dia 3 1/32 Bore ¼ Thick
All Over

Worm Gear Particulars
Worm 2¾ C Pitch 2 Threads 5'2 Lead RH
Helix Angle 73°-41
Angle Of Thread 16°-19
Normal Pitch 2.6397
Angle Of Tool 32°-39-77

1 MS Worm Wheel Rim CP B
+8 Teeth 2¾ C Pitch 5'2 Lead
Ordered Out Machined Complete.

1 CI Worm Wheel Centre CP17
8 MS Turned Bolts 1 Dia x +¾ Long.

1 CI Split Collar CP22
Existing Pattern
2-1" Dia Turned Bolts 5¼ Long.

1 CI Half Coupling CP18
Existing Pattern

1 CI Half Coupling CP19
Existing Pattern

10 MS Coupling Pins CP20
BSS 24-8-B Basic

10 R Rubber Ferrules CP21
Ordered Out

4 MS Foundation Bolts For Bedplate CP23
BSS 24-8-B Basic
4-1¼" Whit Nuts

4 MS Cut Washers For CP23 CP24
BSS 24-8-B Basic

4 CI Foundation Bolt Washers CP25
Existing Pattern

8 MS Foundation Bolts CP26
BSS 24-8-B Basic

1 CI Pinion Shaft Bearing CP31
New Patt No 6109

1 CI Bottom Pillar Bearing CP30
Pattern No 5304 Altered

1 GM Bush A 105 3640
2 Grub Screws ⅜ x 1¼ Long.

1 CI Centre Casting CP27
Patt No 5303 A Altered

1 GM Bush CP28
C. 88 Sn 10 Zn 2

List Of Spares Req For Whole Contract (12 Off)

Item A
2 CS Spur Wheels CPD
2 MS " Pinions & Shafts CPC
1 Half Coupling CP18

Item B
1 Worm Shaft CP A Complete With
Ball & Roller Bearing Lock Nuts & Tab Washers
1 Phos Br Worm Wheel Rim CP B Fitted To
1 CI Worm Wheel Centre CP17
1 MS Pinion Shaft CPC
To Be Fitted To Spare Work Box
1 Motor Coupling CP19

Item C
1 Worm Shaft CP A
1 Worm Wheel Rim CP B
1 " " Centre CP17

Item D
2 Hoffmann Duplex Ball Bearings No 9688
2 " Roller Journal Bearings RMS 20
2 " " RM 20 LL

Item E
2 GM Bushes CP28
2 " CP29
2 " A 105 3640

Item F
2 GM Bushes A 105 2434

Item H
20 Coupling Pins With Nuts CP20
20 Ferrules For Do Do CP21

Order No	No Off	Purchaser	Date Of Order	Order By	Issued By
8472-81	10	Admiralty. Capetown.	14-4-44		Final

Symbols C.P.23, C.P.24, C.P.27, C.P.28, C.P.29, C.P.30 & C.P.31 Not Used.

For Capstan & Data see Dwg No 17717/1&2

COWANS, SHELDON & Co LTD CARLISLE

Subject: Machinery. Details. No 3070

Fig: 20 Ton Electric C.C. Capstan. 1945

Scale: 1

Date: 1-9-43

G.W.

15571
3

TBH 106 VS-3004 01

TBH·106·VS-3004 SHEET 6

20 TON CONSTANT CURRENT CAPSTANS & GENERATOR

FOR GRAVING DOCK. CAPETOWN.

C.P. 9/1156.44/43/8111. H/L. 1801 D OF D

Half Plan With M.S Cover Removed.

Section A.A

Section B.B

1 C.I Worm Box Body C.P.8
New Pattern N° 6070

1 M.S. Cover C.P.14 In Halves
B.S.6.153-15-A

1 G.M Bush C.P.9
Cu 88 Sn 10 Zn 2
Existing Pattern

1 C.I. Cover C.P.10 New Patt No. 6071
8 M.S. Set Bolts ¾" dia. 2" long.

1 C.I. Cover C.P.11 New Patt No. 6072
8 M.S. Set Bolts ¾" dia. x 5⅛" long

1 M.S. Drain Plug C.P.12
1 Leather Washer 2" O. dia. 1" hole ⅛" thick
1 Steel " 2" " 1" " ⅛" "

1 M.S. Dip Stick C.P.13
B.S.S 24-3-B

Sht. No.	Notes	Purchaser	Date of Order	Size	Issued by
8472-81.	10.	Admiralty. Capetown.	14-1-44	Cotton.	F.H.R.

N°	TBH 106
	VG — 3004
VEL - SHEET	5
WYSIGINGS-AMENDMENTS	
VERWYSING-REFERENCE	
DATUM-DATE	7-06-30

No.	T.B.H. 106
	W

COWANS, SHELDON & Co., LTD. CARLISLE.

Subject: DETAILS OF WORM BOX 5070

For:- 20 TON ELECTRIC CAPSTAN

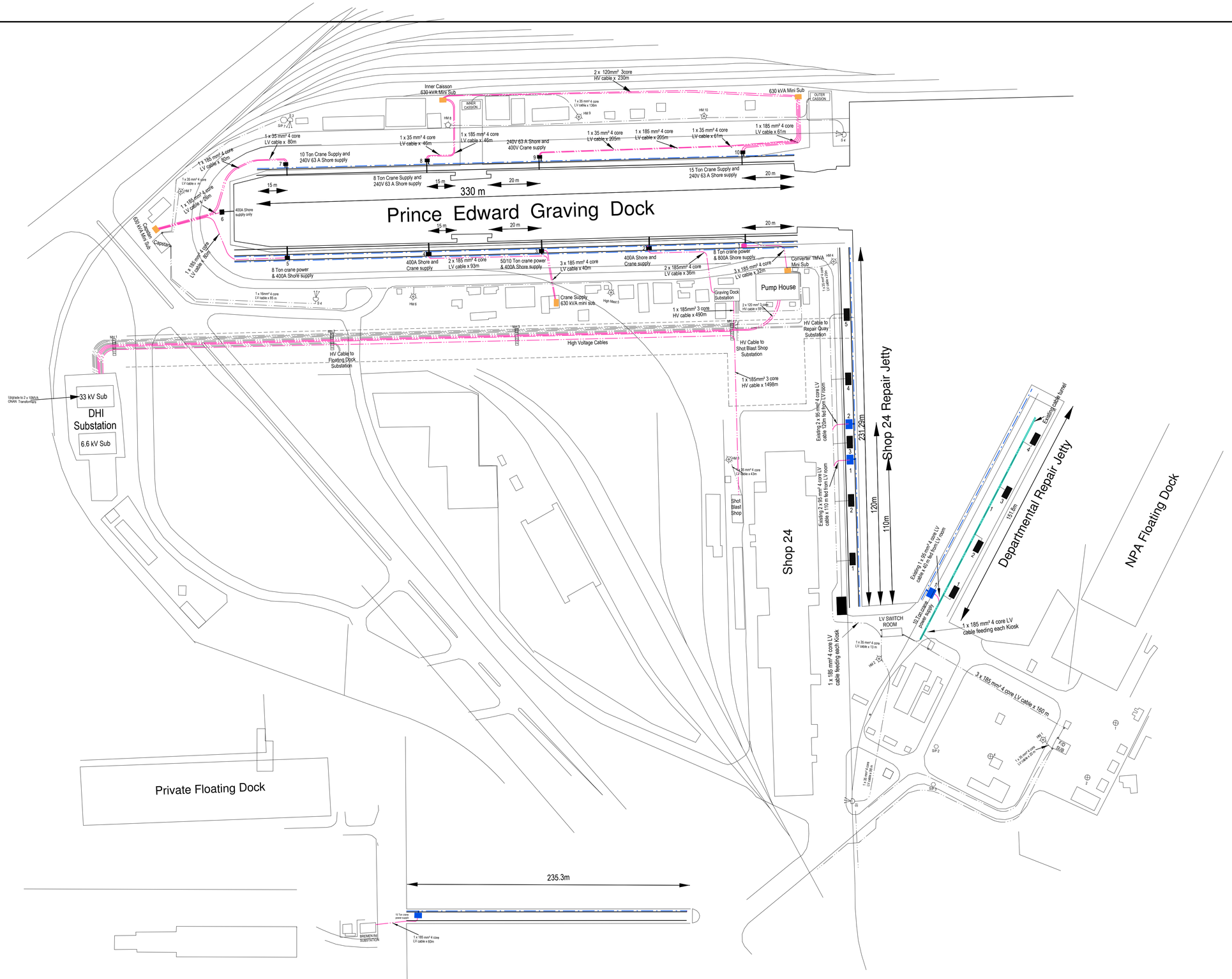
Scale:- 3" & 6" = 1 Foot

Date:- 14 - 8 - 36.

1945

15571
2

D.O.R.C.



LEGEND

- LV 240V Shore supply
- Shore and reeling drum crane LV 400V supply
- Reeling drum crane LV 400V supply
- 800A reeling drum crane LV supply
- Mini Substation
- Precast concrete rectangular ducting for cable protection
- Existing precast concrete rectangular ducting for cable protection
- New electrical cable
- Existing electrical cable
- HV Cable Man Holes (MH)

NOTES

1. 3CR12 2mm kiosk thickness
2. Enclosure rating: IP55
3. Colour: Light Orange
4. Panel catches: square key catches
5. Doors: Lockable
6. Access: Front
7. Cable entry: Bottom
8. All new electrical cables must be protected with a 16 bar PVC plastic pipes
9. Each kiosk must have a crane rail barrier for protection.
10. All crane rails must be bonded to ensure there is a good earth connection. A copper wire or cable known as bonds must be connected from one rail to another and connected to common earth.
11. All shore supply must have digital energy meter.
12. All kiosks must be bolted.
13. The length of precast concrete ducting for reeling drum crane must be the same as the rail length.
14. Cable trenching must be done as per TNPA drawing DHE-PD-1

REF	SCALE NTS	DRN: S S GAMBUSHE
CKD	ENG	DATE:

SENIOR ELECTRICAL ENGINEER
PORT OF DURBAN

TRANSNET
national ports authority

PORT OF DURBAN

PORT OF DURBAN

DRY DOCK LV SHORE & REELING DRUM CRANE SUPPLY UPGRADE

DRAWING NO. DHE- PED - 067 Rev 0

Annexure C: SHEQ – Contractor Specification

CONTRACTOR HEALTH AND SAFETY MANAGEMENT SPECIFICATION

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1. Purpose

This specification development guideline identifies and encompass the working behaviours and safe work practices that are expected of all Transnet SOC Ltd employees, Contractors, Consultant, Visitors and Suppliers, engaged on Transnet managed projects as required by Construction Regulation of 2014, regulation 5(1)(b). All contractors and service providers must take careful note of these requirements and must ensure that adequate provision has been made to ensure compliance. This Specification development guideline has been compiled to cover a wide range of construction/ work activities and should serve as a guideline for Safety Agents to develop site specific specifications for construction projects. In order to determine which requirements are applicable, the contractor must conduct a health and safety risk assessment specific to the project and specific to the contractor's scope of work. All applicable requirements must be addressed in the Contractor's Health and Safety Management Plan.

This Specification development guideline will be reviewed and updated periodically as and when necessary to address and / or include:

- Changes in legislation;
- Client requirements;
- Leading practices; and
- Lessons learnt from incidents.

The specification development guideline provides the minimum requirements for site specific specification and should be used as a guide to develop the site specific specification as it is required by the Construction Regulation of 2014.

2. Scope

This Specification applies to all project sites, and to all persons working on or visiting the Transnet managed projects. The requirements specified in this document are applicable to the contractor as well as any sub-contractors, EPCM Contractors, Consultant, Vendors and Visitors that may be appointed by Transnet as an Employer. It is the contractor's responsibility to ensure that all sub-contractors comply fully with all legal requirements as well as the requirements of this health and safety specification.

3. Definitions

Acceptable Risk
A risk that has been reduced to a level that can be tolerated having regard for the applicable legal requirements and the Health and Safety Policy adopted for the project.

ALARP (As Low As Reasonably Practicable)
The concept of weighing a risk against the sacrifice needed to implement the measures necessary to avoid the risk. With respect to health and safety, it is assumed that the measures should be implemented unless it can be shown that the sacrifice is grossly disproportionate to the benefit.

Applicant (Permit to Work)
A person requesting permission to perform work for which a Permit to Work is required. Applicants must be authorised (in writing) to receive (or accept) Permits to Work and must be competent to do so by virtue of their training, experience and knowledge of the area or plant in which the work is to be performed.

Authorised Person (Permit to Work)
A person (typically a Project employee or an employee of the client) who has been authorised (in writing) by the nominated project management representative to issue Permits to Work within the scope of his designation. A person may only be appointed to issue Permits to Work if he has undergone training and has been assessed and found competent in systems, plant and equipment operation within the scope of his designation.

Consequence
The outcome of an event expressed qualitatively or quantitatively.

Contractor
An employer (organization) or a person who performs **ANY** work and has entered into a legal binding business agreement contract to supply a product or provide services to Transnet. This applies to the Suppliers, Vendors, and Consultants, Service providers or Contractors performing construction work

NB: A Contractor is an employer in his/her own right

Competent Person
A person who has in respect of the work or task to be performed the required knowledge, training, experience and as per act cr2014.

First-Aid Injury (FA)
A first-aid injury is any one time treatment and any follow up visit for observation of minor scratches, cuts, burns, splinters and the like which do not normally require medical care. Such treatment is considered to be first aid even if administered or supervised by a medical practitioner.
First aid includes any hands on treatment given by a first aider. (E.g. Band-Aid, washing, cleansing, pain, relief). The following procedures are generally considered first aid treatment:

- Application of Antiseptics.
- Application of Butterfly adhesive dressing or sterile strips for cuts and lacerations.
- Administration of tetanus shot(s) or booster(s). However, these shots are often given in conjunction with more serious injuries, consequently injuries requiring these shots may be recordable for other reasons.
- Application of bandages during any visit to medical personnel.
- Application of ointments to abrasions to prevent drying or cracking.
- Inhalation of toxic or corrosive gas, limited to the removal of the employee to fresh air or the one time administration of oxygen for several minutes.
- Negative X-Ray diagnosis.
- Removal of foreign bodies not embedded in the eye if only irrigation is required.
- Removal of foreign bodies from a wound if procedure is uncomplicated, for example by tweezers or other simple technique.
- Treatment for first degree burns.

- Use of non-prescription medications and administration of single dose of prescription medication on first visit for any minor injury or discomfort.

Hazard
A source of potential harm in terms of human injury or ill health, or a combination of these.

Hierarchy of Controls
A sequence of control measures, arranged in order of decreasing effectiveness, used to eliminate or minimise exposure to workplace health and safety hazards:

- Elimination – Completely removing a hazard or risk scenario from the workplace.
- Substitution – Replacing an activity, process or substance with a less hazardous alternative.
- Isolation (Engineering) Controls – Isolating a hazard from persons through the provision of mechanical aids, barriers, machine guarding, interlocks, extraction, ventilation or insulation.
- Administrative Controls – Establishing appropriate policies, procedures and work practices to reduce the exposure of persons to a hazard. This may include the provision of specific training and supervision.
- Personal Protective Equipment – Providing suitable and properly maintained PPE to cover and protect persons from a hazard (i.e. Prevent contact with the hazard).

Incident
An event (or a continuous or repetitive series of events) that results or has the potential to result in a negative impact on people (employees, contractors and visitors), the environment, operational integrity, assets, community, process, product, legal liability and / or reputation.

Likelihood
A description of probability or frequency, in relation to the chance that an event will occur.

Lost Time Injury (LTI)

Any occurrence that resulted in a permanent disability or time lost from work of one day/shift or more.

If an employee is injured and cannot return to work in the next shift (will ordinarily miss one whole shift), and the department brings the employee in to only receive treatment by the Supervisor/ Return to Work Coordinator in that shift, this is still considered an LTI.

Lost Time Injury Frequency Rate (LTIFR) - Number of LTI's multiplied by 1 million or 200,000 and divided by labour hours worked.

Light Vehicle

A vehicle that:

- Can be licensed and registered for use on a public road;
- Has four or more wheels, and seats a maximum of 12 adults (including the driver);
- Requires the driver to hold only a standard civil driving licence;
- Does not exceed 4.5 tonnes gross vehicle mass (GVM), which is the maximum loaded mass of the motor vehicle as specified by:
    - The vehicle's manufacturer; or

- An approved and accredited automotive engineer, if the vehicle has been modified to the extent that the manufacturer's specification is no longer appropriate.

Examples of light vehicles include passenger cars, four-wheel drive vehicles, sports utility vehicles (SUVs), pick-ups, minibuses, and light trucks.

Any vehicle falling outside of this definition must be considered mobile equipment.

Medical Treatment Injury (MTI)

A work injury requiring treatment by a Medical Practitioner and which is beyond the scope of normal first aid including initial treatment given for more serious injuries. The procedure is to be of an invasive nature (e.g. Stitches, removal of foreign body).

The following procedures are generally considered medical treatment:

- Application of sutures (stitches).
- Cutting away dead skin (surgical debridement).
- Loss of consciousness due to an injury or exposure in the work environment.
- Positive X-Ray diagnosis (fractures, broken bones etc.).
- Removal of foreign bodies embedded in the eye.
- Removal of foreign bodies from the wound by a physician due to the depth of embedment, size or shape of object or the location wound.
- Reaction to a preventative shot administered because of an occupational injury.
- Sprains and strains - series (more than one) of hot and cold soaks, use of whirlpools, diathermy treatment or other professional treatment.
- Treatment of infection.
- Treatment for second or third degree burns
- Use of prescription medications (except a single dose administered on first visit for minor injury or discomfort.)

Mobile Equipment

A vehicle (wheeled or tracked) that generally requires:

- The driver to hold a specific state or civil license; or
- The operator to hold a nationally recognized certificate of competency.

Examples of mobile equipment include, but are not limited to, dump trucks, water trucks, graders, dozers, loaders, excavators, forklifts, tractors, back-actors, bobcats, mobile cranes, tele-handlers, drill rigs, buses and road-going trucks.

Near Hit

An incident that has occurred that did not result in any injuries, illnesses, environmental or property damage but had the potential to cause an injury, illness, environmental or property damage.

Regulation

In the context of this guideline, 'Regulation(s)' refers to the Construction Regulations, 2014 required by Section 43 of the Occupational Health and Safety Act 85 of 1993, published under Government Notice R 84 in Government Gazette 37305 of February 2014.

Risk
A combination of the likelihood of an occurrence of a hazardous event or exposure and the severity of injury or ill health that can be caused by the event or exposure.

Risk Assessment
A process of evaluating the risk arising from a hazard, taking into account the adequacy of any existing control measures, and deciding on whether or not the risk is acceptable.

Risk Management
The systematic application of management policies, processes and procedures to identifying hazards, analysing and evaluating the associated risks, determining whether the risks are acceptable, and controlling and monitoring the risks on an ongoing basis.

4. Abbreviations

DSTI - Daily Safety Task Instruction

HIRA - Hazard Identification and Risk Assessment

HEALTH AND SAFETY - Integrated Management System

MS - Management System

OHS Act - Occupational Health and Safety Act

SOC - Safety Observation and Conversation

VFL - Visible Felt Leadership

OHS - Occupational Health and Safety

5. SHE Management Plan

The contractor must prepare, implement and maintain a project-specific SHE 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-contractors and suppliers with regard to health and safety requirements and performance (before any contract or purchase order is awarded);
- **Measuring and Monitoring** plans, including a plan for the measuring and monitoring of employee exposure to hazardous substances or agents (e.g. Noise, dust, etc.) In order to determine the effectiveness of control measures;
- **Incident Reporting and Investigation** procedures describing the protocols to be followed with regard to incident reporting, recording, investigation and analysis;
- **Non-conformance and Action Management** procedures concerning the management of corrective actions;
- **Performance Assessment and Auditing** procedures concerning health and safety performance reporting, monthly internal audits to assess compliance with the project health and safety requirements, and daily site health and safety inspections; and
- Details concerning the **Management Review** process followed to assess the effectiveness of health and safety management efforts.

Prior to mobilisation, the HEALTH AND SAFETY Management Plan must be forwarded electronically, and as a hard copy, to the nominated project management representative for review. The plan will be audited for completeness and, if found to be adequate, will be accepted (typically "with comments"). Work may not commence until the plan has been accepted.

Once the plan has been accepted, the contractor must action and resolve any issues within 30 days from the start of work.

If the issues requiring corrective action are not resolved within this 30 day period, the contractor will be required to stop any work related to the outstanding actions until they have been resolved.

Any proposed amendments or revisions to the contractor's Health and Safety Management Plan must be submitted to the nominated project management representative for acceptance.

Should it be identified that the contractor has overlooked a high risk activity, and as a result has omitted the activity and associated control measures from the Health and Safety Management Plan, the plan will not be approved.

6. Policy

The contractor must develop, display and communicate a Health and Safety Policy that clearly states the contractor's values and objectives for the effective management of health and safety as required by OHS Act of 1993, 7(3). These values and objectives must be endorsed by the contractor's management representatives and must be consistent with those adopted for the project.

The policy must be signed and dated, and must be reviewed annually.

The policy must commit to:

- Compliance with all applicable legal requirements;
- The effective management of health and safety risks;
- The establishment of measurable objectives for improving performance and the provision of the necessary resources to meet these objectives;
- The prevention of incidents; and
- Achieving continual improvement with regard to health and safety performance.

All employees of the contractor as well as the employees of any sub-contractors that may be appointed by the contractor must be made aware of the policy. This must be done through Health and Safety Induction Training and Toolbox Talks.

A copy of the policy must be displayed in each meeting room and on each notice board.

7. Hazard Identification and Risk Assessment.

Detailed hazard identification and risk assessment processes must be followed for all work to be performed as well as for all associated equipment and facilities as required by the Construction regulation of 2014, regulation 9(1) – (7).

The client will provide a baseline risk assessment informing contractor on the hazards and risks on site. Contractor must ensure that effective procedures and risk assessment systems are in place to control hazards and to mitigate risks to levels that are as low as is reasonably practicable.

The risk assessment processes must be applied to:

- The full life cycle of the project;
- Routine and non-routine activities;
- Planned or unplanned changes (refer to Section 15);
- All employees, sub-contractors, suppliers and visitors; and
- All infrastructure, equipment and materials.

The risk assessment processes and methodologies must be appropriate for the nature and scale of the risks, and must be implemented by competent persons.

The process of analysing and managing risk must include the following:

- Establishing the context of the risk assessment;
- Identifying hazards and determining possible risk scenarios (unwanted events);
- Evaluating risks and assigning ratings (classification);
- Recording the risk analysis in a risk register;
- Managing risks according to their classification (prioritising for action);
- Identifying and implementing control measures (through the application of the Hierarchy of Controls) to ensure that risks are managed to levels that are as low as is reasonably practicable (ALARP);
- Developing action plans for reducing risk levels (where possible);
- Verifying the completion of actions;
- Re-evaluating the risks and classifications as appropriate; and
- Reviewing and updating the risk register.

7.1 Baseline Risk Assessments

The client must conduct a detailed Baseline Risk Assessment identifying foreseeable hazards and risk scenarios associated with the contractor's scope of work on the project site(s) as required by Construction Regulations of 2014, regulation 5(1)(a) . Details concerning proposed control measures must be included. The risk assessment process must be facilitated by a competent person who has been appointed in writing and must involve the participation of the contractor's site management representatives, supervisory personnel and technical experts (as required). An attendance register must be completed and retained for reference purpose. The Baseline Risk Assessment must be reviewed and approved by the Project Health and Safety Manager and Project Construction Manager.

When carrying out a Baseline Risk Assessment or a Task-Based Risk Assessment (refer to Section 7.2), Hazard (Energy) Types must be specified in accordance with the categorisation detailed in Table 7-1. Risk scenarios must be described indicating the manner in which a person may come into contact with, or be exposed to, a specific hazard.

An initial risk rating must be assigned to each risk scenario without taking any control measures into consideration. Control measures for managing the risks to levels that are as low as is reasonably practicable must then be identified for implementation on the project, and a residual risk rating must be assigned to each risk scenario taking the identified control measures into consideration.

Ratings must be assigned qualitatively using TCP consequence and likelihood scales and descriptors (i.e. TCP 5x5 qualitative risk matrix). Refer to Tables 6-2, 6-3 and 6-4. A Risk Register comprised of all significant risks (i.e. Risks rated as major or catastrophic) identified for the project will be compiled using the information contained in the project Baseline Risk Assessment as well as the contractor's Baseline Risk Assessment. Key control measures for managing each of these risks will be specified in the register.

For the significant risks in particular, action plans will be developed for reducing the risk levels (where possible).

The project Risk Register will be reviewed and, if necessary, updated:

- On a quarterly basis during construction;

- When changes are made to a design and / or the construction scope, schedule, methods, etc. That result in a change to the risk profile; and
- Following an incident.

The contractor must ensure that the hazards, risk scenarios and control measures identified in the contractor's Baseline and Task-Based Risk Assessments are taken into consideration when developing, implementing and maintaining the various elements of the contractor's health and safety management system for the project (e.g. Competence, training and awareness requirements).

All persons potentially affected must be made aware of the hazards, risk scenarios and control measures identified in the contractor's risk assessments. This must be done

through training, Toolbox Talks, and Daily Safe Task Instructions (refer to Sections 10 and 11).

7.2 Task-Based Risk Assessments

The contractor must carry out detailed project-specific Task-Based Risk Assessments which must be reviewed and approved by the Client's Project Health and Safety Manager and Contract Manager prior to the commencement of any work.

The risk assessment process must be facilitated by a competent person who has been appointed in writing in terms CR 9 sub regulation (1). The contractor's site management representatives, supervisory personnel, technical experts (as required) and workforce personnel directly involved with the task being examined must participate in the risk assessment process. An attendance register must be completed and retained.

Please Note: Under no circumstances may a Contractor Health and Safety Officer perform a risk assessment in isolation. The active participation of all persons referred to above is mandatory.

A Task-Based Risk Assessment must at least:

- Be accompanied by a Work Method Statement (describing in sufficient detail how the specific job or task is to be performed in a logical and sequential manner);
- Provide a breakdown of the job or task into specific steps;
- Identify the hazards and potential risk scenarios associated with each step;
- Include consideration of possible exposure to noise, heat, dust, fumes, vapours, gases, chemicals, radiation, vibration, ergonomic stressors, or any other occupational health hazard or stressor;
- Describe the control measures that will be implemented to ensure that the risks are managed to levels that are as low as is reasonably practicable; and
- Assign an initial risk rating (without taking any control measures into consideration) and a residual risk rating (taking the identified control measures into consideration) to each risk scenario.

A Task-Based Risk Assessment must be reviewed and, if necessary, updated:

- On an annual basis (as a minimum);

- When changes are made to the associated Work Method Statement; and
- Following an incident.

7.3 Pre-Task Hazard Assessments

A pre-task hazard assessment must be completed whenever a change is identified while carrying out an activity. Any deviation from what was discussed during the Daily Safe Task Instruction (prior to the activity commencing), or anything that was not discussed, constitutes a change.

Before carrying out the particular task that involves the identified change, a few minutes must be spent identifying the hazards and risks associated with that task as well as suitable control measures.

8. Legal and Other Requirements

The Contractor must comply with the requirements of all applicable legislation as well as Transnet and project-specific standards and procedures as amended from time to time.

The Contractor must compile and maintain a register of all legal and other requirements applicable to the work that will be carried out and / or services that will be provided. This register must be updated regularly to ensure that it remains relevant.

Applicable laws and standards must be appropriately communicated to all employees of the contractor (as well as the employees of any sub-contractors that may be appointed by the contractor) through training, Toolbox Talks, and Daily Safe Task Instructions (refer to Sections 10 and 11).

9. Objectives

In order to drive continual improvement, the contractor must set project-specific objectives, and must develop improvement action plans to achieve these objectives. Eliminating hazards, minimising risks, preventing incidents, injuries and illnesses and ensuring legal compliance must be the primary considerations for setting objectives.

When setting objectives, consideration must be given to the following:

- Leading indicators such as inspection findings, audit findings, hazard reporting and observations;
- Lagging indicators (i.e. Incidents including Near Hits);
- Leading practices and lessons learnt; and
- Injury frequency rates with due understanding that the goal is "no harm".

The objectives must be specific and measurable. The improvement action plans must specify the resources (both human and financial) required to achieve the objectives, the person's responsible, and realistic timeframes for completion. The contractor must ensure that adequate resources are allocated and that progress towards meeting the objectives is monitored regularly.

The objectives and associated improvement action plans must be documented and must be communicated to all contractor employees. Furthermore, to ensure that the objectives remain relevant, they must be reviewed on a quarterly basis and whenever significant change has taken place on the project (i.e. Changes to activities, scope of work, operating conditions, etc.).

Performance reviews must be carried out at quarterly intervals to assess and document performance against these personal or team objectives.

If a reward or incentive scheme is introduced, it must be designed in such a manner that health and safety performance is not compromised in order to maximise financial reward.

10. Resources, Accountabilities and Responsibilities

The Contractor must adequately allocate resources, responsibility and accountability to ensure the effective implementation, maintenance and continual improvement of the contractor's HEALTH AND SAFETY management system on the projects required by Construction regulation 0f 2014, regulation 7(2)(c)

For each role that carries health and safety accountability and / or responsibilities (including legislative requirements), a role description detailing the accountability and / or responsibilities must be documented.

All appointments (i.e. the assignment of specific SHE responsibilities to individuals in accordance with legal or project requirements) must be done in writing. Documented proof of each appointment (i.e. a signed appointment letter) must be retained.

Contractor should not discharge any legal responsibilities to employees who are not legally appointed.

The contractor must comply with the requirements of all applicable legislation concerning health and safety related appointments and delegations for the project.

A Organogram specific to the project must be documented and maintained. All roles that carry SHE accountability and / or responsibilities must be included, and all individuals that carry health and safety appointments must be clearly identified.

The provision of dedicated professionals on the project must be appropriate for the nature and scale of the work to be carried out.

The contractor is solely responsible for carrying out the work under the contract whilst having the highest regard for the health and safety of all persons on the project site(s).

Health and safety is the responsibility of each and every individual on the project site(s), but in particular, it is the responsibility of the contractor's management team who must set the tone.

Visible commitment is essential to providing and maintaining a safe workplace. The contractor's managers and supervisors at all levels must demonstrate their commitment and support by adopting a risk management approach to all health and safety issues. These individuals must consistently take immediate and firm action to address violations of health and safety rules, and must actively participate in day to day activities with the objective of preventing harm.

The contractor's management representatives are responsible and accountable for health and safety performance on the project. Key responsibilities include the following:

- Preparing, implementing and maintaining a risk-based Health and Safety Management Plan specific to the work that will be carried out (refer to Section 4);
- Establishing, implementing and maintaining health and safety programmes and procedures to ensure that all work is carried out in compliance with the requirements of this specification, the contract, and all applicable legislation;

- Establishing, implementing and maintaining effective hazard identification and risk management processes and procedures to ensure that all reasonably foreseeable hazards are controlled in order to minimise risk (refer to Section 6);
- Providing the resources necessary to meet the requirements of this specification (refer to Section 9);
- Ensuring that all contractor employees have clearly defined responsibilities with regard to health and safety, and that these responsibilities are clearly communicated and understood (refer to Section 9);
- Establishing, implementing and maintaining a system for ongoing training and assessment of skills and competence (refer to Section 10);
- Establishing, implementing and maintaining procedures to ensure that only qualified and competent personnel are permitted to work on the project site(s) (refer to Section 10);
- Establishing, implementing and maintaining effective communication and consultative processes concerning health and safety for the duration of the contract (refer to Section 11);
- Maintaining operational control for the protection of all persons on the project site(s) as well as the public (refer to Section 13);
- Establishing, implementing and maintaining effective emergency preparedness and response procedures (refer to Section 14);
- Establishing, implementing and maintaining effective management of change processes and procedures (refer to Section 15);
- Establishing, implementing and maintaining effective incident reporting and investigation processes and procedures (refer to Section 18);
- Establishing, implementing and maintaining effective auditing and inspection processes and procedures (refer to Section 20); and
- Formally reviewing the contractor's Health and Safety Management System annually to ensure that the system continues to be effective in managing health and safety performance and meeting project requirements (refer to Section 21).

All costs associated with meeting these responsibilities shall be borne by the contractor.

Any cost associated with any work stoppage due to non-compliance with a health and safety requirement shall be for the contractor's account.

10.1 Contractor Health and Safety Officers

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). The project site(s) (directly or through sub-contractors), must at least appoint a full-time Health and Safety Officer depending on the scope, complexity, budget and high risk activities involved. The Health and Safety Officer must participate in joint site visit with TNPA on a monthly basis.

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;
- Evaluating (on a daily basis) the content of the Daily Safe Task Instructions (DSTI's) conducted by the contractor's appointed supervisors, 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-contractors), 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 the Health and Safety Officer is adequately equipped to enable him to perform his duties effectively. The 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 over and above the SACPCMP registration as an Officer; 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,NEBOSH or an equivalent training course with accredited health and safety service provider 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.

10.2 Contractor Supervisors

The contractor must ensure that all project is supervised at all times by an adequate number of qualified, competent and appointed supervisors who have experience in the type of work being carried out as required by Construction regulations of 2014, regulation 8(7).

No work may be carried out without an appointed supervisor being physically present in the work area and daily safety task instruction.

Each Contractor Supervisor shall be responsible for:

- Ensuring that all work carried out under his supervision is done so in accordance with the requirements of all applicable legislation, rules, standards, specifications, plans and procedures;
- Participating in Baseline and Task-Based Risk Assessments;
- Ensuring that all employees under his supervision are made aware of the hazards, risk scenarios and control measures identified in relevant risk assessments;

- Ensuring that the control measures stipulated in all relevant risk assessments are in place and are implemented fully for all work carried out under his supervision;
- Ensuring that all employees under his supervision conduct pre-task hazard assessments when necessary;
- Driving the achievement of health and safety objectives set for his team;
- Ensuring that the necessary written appointments are in place for each employee under his supervision (e.g. First aider, mobile crane operator, etc.);
- Ensuring that all employees under his supervision attend all required training;
- Ensuring that no employee carries out any work that he is not competent to perform or has not been appointed to perform;
- Identifying training needs within his team;
- Carrying out Safety Observations and Coaching (one per day);
- Conducting a weekly Toolbox Talk with his team;
- Leading a Daily Safe Task Instruction discussion with his team;
- Attending Health and Safety Meetings as required;
- Maintaining a Health and Safety Management Information Notice Board in the work area for which he is responsible;
- Recording, on a daily basis, a description of the day's activities as well as a breakdown (by occupation) of the personnel on site under his supervision;
- Ensuring that all Safe Work Procedures applicable to the work carried out under his supervision are adhered to and are fully implemented;
- Maintaining discipline and taking the necessary action whenever an employee under his supervision does not adhere to a rule or requirement;
- Carrying out Planned Task Observations;
- Ensuring that emergency response procedures are understood by all employees under his supervision and that these procedures are followed in the event of an emergency;
- Reporting all incidents immediately, participating in incident investigations, communicating the lessons learnt to all employees under his supervision, and implementing corrective actions where required; and
- Carrying out workplace health and safety inspections.

Each supervisor must accept these responsibilities in writing as part of his appointment.

Each supervisor must be equipped with a mobile telephone to ensure that effective communication can be maintained for the duration of the contract.

10.3 Health and Safety Representatives

The team of employees on site must have a health and safety representative deployed on the project site(s), a Health and Safety Representative must be elected and appointed. Taking into consideration the number of employees deployed, the geographical area in which the work is taking place, the different work disciplines, and the shift pattern (if applicable), the contractor must ensure that an adequate number of Health and Safety Representatives (at a minimum ratio of one Health and Safety Representative per 50

employees) are elected and appointed to effectively represent all site personnel as required by the OHS Act 85 of 1993, section 17 - 18.

Each Health and Safety Representative must attend an accredited training course for health and safety representatives. The cost of this training shall be for the contractor's account.

The contractor must make the necessary allowances for the Health and Safety Representatives to carry out their duties as specified in the applicable legislation.

The contractor must ensure that an appropriate sticker is affixed to the safety helmet of each Health and Safety Representative for identification purposes.

10.4 First Aiders

If 10 or more employees are deployed on the project site(s), at least one trained and competent First Aider must be in place and must be appointed. Taking into consideration the number of employees deployed, the geographical area in which the work is taking place, the different work disciplines, and the shift pattern (if applicable), the contractor must ensure that an adequate number of First Aiders (at a minimum ratio of one First Aider per 50 employees) are in place and have been appointed to administer first aid treatment should this be required.

First Aid training must be done through an accredited training institution. The cost of this training shall be for the contractor's account.

The contractor must ensure that an appropriate sticker is affixed to the safety helmet of each First Aider for identification purposes.

11. Competence, Training and Awareness

Each employee (including sub-contractor employees) must be suitably trained and competent, and must understand the health and safety hazards, risks and control measures associated with his work as required by the OHS Act 85 of 1993,(14)

The contractor must implement systems and procedures to ensure that:

- The necessary competencies required by employees are identified (by occupation), along with selection, placement and any training requirements;

Please Note: Specific competency profiles and selection criteria (fitness for work) must be developed for all roles where significant health or safety risk exists.

Please Note: A formal training needs analysis must be carried out based on the competency profiles and a training matrix must be developed for the project.

Roles requiring technical certification, registration or licensing are identified and documented, and these roles are filled only by suitably qualified personnel;

- Minimum core health and safety skills required by employees in leadership and supervisory roles are identified and suitable training is provided including hazard identification and risk assessment, incident investigation, and health and safety interactions (i.e. Observation and coaching techniques);
- Competency-based training is provided and it includes operational controls (procedures and work instructions), management of change, and emergency response;

- All employees hold and maintain the required competencies (including appropriate qualifications, certificates and licences) and are under competent supervision;
- A site-specific induction and orientation programme that highlights health and safety requirements, procedures, and significant hazards, risks and associated control measures is in place for all new employees and visitors (understanding must be assessed);
- Personnel are trained and / or briefed on new or amended standards, rules, safe work procedures, risk assessments, etc.;
- Refresher training is carried out as required (e.g. Re-induction following an absence from site);
- Records of education, qualifications, training, experience and competency assessments are maintained on site for all employees; and
- The effectiveness of training is reviewed and evaluated.

Prior to the commencement of any work, including mobilisation and site set-up activities, the contractor must provide, to the satisfaction of the nominated project management representative, current documentation verifying that the contractor's employees as well as the employees of any appointed sub-contractors, are competent and have the necessary qualifications, certificates, licences, job skills, training and experience (as required by this specification and applicable legislation) to safely carry out the work that is to be performed.

The Contractor and sub-contractor must ensure that the following training takes place:

- health and safety induction training pertaining to the hazards prevalent on the site at the time of entry
- training for all persons required to erect, move or dismantle temporary works structures and instruction to perform those operations safely
- training of employees working from a fall risk position
- training to work or to be suspended on a platform which includes at least:
    - how to access and egress the suspended platform safely;
    - how to correctly operate the controls and safety devices of the equipment;
    - information on the dangers related to the misuse of safety devices; and
    - information on the procedures to be followed in the case of-
        - an emergency;
        - the malfunctioning of equipment; and
        - the discovery of a suspected defect in the equipment;
        - an instructions on the proper use of body harnesses.

- Training for all operators of construction vehicles and mobile plant.

A contractor must at all times keep on his or her construction site records of the health and safety induction training and such records must be made available on request to an inspector, the client, the client's agent or the principal contractor;.

Please Note: Only certified copies of certificates, licences, etc. will be accepted.

An Employee Profile (dossier) must be completed for each employee who will be performing work on site. All documentation pertaining to an employee's competence (i.e. certified copies of qualifications, certificates and licences as well as proof of job skills, training and experience) must be maintained in this dossier.

If it is determined through observation that an employee is not yet competent to carry out a particular task in a safe and capable manner, the employee will be required to cease work immediately and must either be reassigned or be retrained at the contractor's expense.

The contractor must provide proof that the training institutions and trainers that are used are appropriately registered with a governing authority (a trainer's registration certificate or registration number alone will not be adequate). The following must be made available for verification purposes:

- Proof of registration of the training institution including the training programmes that the institution is accredited to provide; and
- For each trainer, proof of competency and registration for the specific training programmes presented.

Foreign qualifications held by employees in health and safety critical roles must be verified against the requirements of local legislation.

11.1 Induction Training

Each employee must attend all mandatory Induction Training applicable to the project. No employee will be permitted to enter any project work site until he has attended this training. Each employee must carry proof that he has completed the induction training and may be removed from a site if such proof cannot be produced on request, this as required by the Construction regulations of 2014, regulation 7(5).

Furthermore, employees must attend (where applicable) Area-Specific Training pertaining to the particular hazards identified in the area(s) where the employees will be working. No employee will be permitted to enter a work area until he has attended the relevant area-specific training.

All visitors must receive a visitor induction briefing before entering any project work site. However, this induction does not permit a visitor to enter a site unescorted. Visitors must be accompanied at all times by an appropriately senior employee who has been fully inducted.

11.2 Specific Training and Competency Requirements

The following specific training and competency requirements must be complied with.

Please Note: An employee must be trained, assessed and found competent before he will be given authorisation to perform certain tasks or fill certain roles.

Table 11-1: Specific Training and Competency Requirements

Training	Applicable To
Health and Safety Induction	All employees
Safety Observations and Coaching(Safety Interactions)	All employees
Risk Assessment	All managers and supervisors
Incident Investigation	All managers and supervisors
Safety Leadership	All managers and supervisors
Legal Liability*	All managers and supervisors
Health and Safety Rep*	All elected Health and Safety Representatives
First Aid Levels 1, 2 and 3*	All nominated First Aiders
Fire Fighting (Fire Extinguisher Use)*	All employees
Working at Height*	All employees using a safety harness
Confined Spaces	All Confined Space Entry Officers and Standby Persons
Permit to Work	All Authorised Persons (i.e. Permit issuers) and all Applicants (i.e. Employees who will be applying for permits)
Defensive Driving*	All drivers of light motor vehicles (for work purposes)
Gravel Road Driving*	All drivers of light motor vehicles driven on gravel roads (for work purposes)
Off Road Driving*	All drivers of four-wheel drive vehicles driven off road (for work purposes)
Mobile Equipment Site Licence	All mobile equipment operators

Training requirements marked with an * must be arranged through accredited external training institutions by the contractor. All other training will be provided by Transnet.

12. Communication, Participation and Consultation

The contractor must establish and maintain effective communication and consultative processes (allowing for a two-way dialogue) for the duration of the project to ensure that:

- All personnel are kept up to date with regard to health and safety matters (e.g. Hazards and risks, incidents and lessons learnt, leading practices, performance against objectives, etc.);
- General health and safety awareness levels are kept high;
- Prompt feedback is given to personnel with regard to health and safety issues or concerns that they raise; and
- Relevant, and often critical, health and safety related information (e.g. Design changes, instructions, reporting of hazardous conditions or situations, etc.) Is effectively disseminated.

This must be achieved as follows:

12.1 Toolbox Talks

The contractor must prepare a Toolbox Talk on a weekly basis and must share it with all personnel for which the contractor is responsible (including all sub-contractors). Toolbox

Talks must address health and safety issues that are relevant to the work performed on the project site(s) and must include information and / or knowledge sharing, lessons learnt from incidents that have occurred, information concerning specific hazards and / or risks and control measures to prevent injury, etc.

Attendance records must be kept and maintained in the contractor's health and safety file.

12.2 Daily Safe Task Instructions (DSTI's)

A Daily Safe Task Instruction (DSTI) is a pre-start discussion amongst the members of a work team, led by the appointed supervisor, aimed at anticipating hazards and potential risks associated with the activities planned for the day or shift, and ensuring that the necessary control measures are in place to prevent incidents.

At the start of each day or shift, prior to the start of any work, each appointed supervisor must inspect the work area for which he is responsible and ensure that it is safe. He must then conduct a DSTI with his work team specifically concerning the tasks that they will be performing during the course of the day or shift. The relevant Task-Based Risk Assessment for the activity must be used as the basis for the discussion. The correct work method must be reiterated and the identified hazards, risks and control measures must be discussed with the team (each team member must be given the opportunity to contribute and participate in the discussion).

Any team member arriving late must first be taken through the information that was discussed (work method, hazards, risks and control measures) before being permitted to start working. If the work method changes after activities have already begun, the DSTI must be revisited and updated with the team, and the changes must be signed off by the relevant Contractor Health and Safety Officer.

Every member of the work team must sign the DSTI attendance register. The attendance records must be kept and maintained in the contractor's health and safety file.

The contractor's Health and Safety Officer must evaluate the content of the DSTI's daily to ensure that they are task-specific. Furthermore, the Health and Safety Officer must attend at least one DSTI per day prior to the start of work. The Health and Safety Officer may not lead the DSTI discussions, as this is the responsibility of the appointed supervisor.

12.3 Suggestions

All employees must be encouraged to submit suggestions to enhance health and safety management on the project site(s). A process must be in place for documenting, evaluating, implementing (as appropriate), archiving and recognising the improvement ideas.

12.4 Meetings

12.4.1 Contractor health and safety (OHS Act Section 19)

The contractor must schedule and consistently hold monthly health and safety meetings. These meetings must be chaired by the contractor's Project Manager and the following persons must be in attendance:

- Contractor and sub-contractor management representatives;
- Contractor and sub-contractor supervisors;
- Contractor and sub-contractor appointed Health and Safety (Employee) Representatives;
- Contractor and sub-contractor Health and Safety Officers; and

- The relevant Project Health and Safety Advisor.

The meeting must address the following as a minimum:

- New incidents for the period and corrective actions taken or to be taken;
- Implementation status of outstanding actions associated with previous incidents;
- SOC's, PTO's and DSTI's carried out for the period and action required to correct trends identified;
- Results of any audits, inspections (including H&S Rep inspections) or site visits carried out;
- A look ahead to ensure that appropriate health and safety planning and preparation is done for upcoming work;
- Risk Assessments, Safe Work Procedures, etc. That are outstanding or due for review (as well as the quality of these documents); and
- Any other health and safety related matter.

The contractor must compile minutes of each meeting and attendance records must be kept. These records must be maintained in the contractor's health and safety file.

12.4.2 Site Meetings

In addition to the Contractor Meetings, the Project will schedule monthly Site Meetings that the contractor must attend. These meetings will be chaired by the Contract Manager and the following persons must be in attendance:

- Contractor management representatives;
- Contractor Health and Safety Officers;
- Contractor Environmental Officer
- Contractor Quality Management
- The Project Health and Safety Manager;
- Project Health and Safety Advisors; and
- Client representatives (ad hoc).

The meeting will address the following as a minimum:

- Feedback from the contractor concerning health and safety performance for the period;
- New incidents for the period and corrective actions taken or to be taken;
- Implementation status of outstanding actions associated with previous incidents;
- SOC's, PTO's and DSTI's carried out for the period and action required to correct trends identified;
- Results of any audits, inspections or site visits carried out;
- A look ahead to ensure that appropriate health and safety planning and preparation Is done for upcoming work;
- Risk Assessments, Safe Work Procedures, etc. That are outstanding or due for review (as well as the quality of these documents); and
- Any other health and safety related matter.

13. Documentation and Document Control

The contractor must develop and maintain project-specific documentation required for the effective management of health and safety on the project. All documents related to the contractor's health and safety management system must be effectively controlled.

The document control process must:

- Provide for the review, revision and version control of documents;
- Uniquely identify documents (as appropriate) to control their use and function;
- Require approval of the documents for adequacy prior to issue;

- Clearly identify changes and record the status of any revisions to documents; and
- Provide for the effective distribution of documents to, and where necessary the timely removal of obsolete documents from, all points of issue and use.

The contractor must establish a process for the systematic control of health and safety records and related data. Controls must be in place for the creation, receipt, secure storage, maintenance, accessing, use and disposal of such records and data.

Each record must be legible, identifiable and traceable, and must contain adequate information and data for its purpose.

The confidentiality and security of records and data must be maintained in a manner that is appropriate for the nature of the records and data, and in accordance with any applicable data or privacy protection legislation.
Personal information originating

From medical surveillance and occupational hygiene monitoring must be reported in a form that respects the privacy of the individual, but enables management to fulfil their duty of care obligations to employees. The names of individuals must not be disclosed without their written authorisation.

Retention periods for all records (based on legal requirements and / or knowledge preservation considerations) must be established and documented in accordance with applicable legislation.

14. Operational Control

For project operations and activities, the contractor shall implement and maintain:

- Operational controls, as applicable to the organization and its activities;
- The organization shall integrate those operational controls into its overall OH&S Management System;
- Controls related to purchased goods, equipment and services;
- Controls related to contractors and other visitors to the workplace;
- Documented procedures, to cover situations where their absence could lead to deviations from the OH&S policy and the objectives;
- Stipulated operating criteria where their absence could lead to deviations from the OH&S policy and objectives.

14.1 Project-Specific SHE Standards

For all site health and participation specific this will serve as a guideline. Project-specific SHE standards, incorporating leading practices, legal requirements, and client requirements will be developed and implemented to manage critical risks on the project. The contractor must comply fully with the requirements of these standards. The Safe Work Procedures required of the contractor must be aligned with the requirements of these standards.

14.2 Safe Work Procedures

Procedures to be developed and maintained on site. The contractor must develop, document and implement Safe Work Procedures for all activities involving significant health or safety risk. These procedures must detail the control measures required to

effectively manage the health and safety risks associated with the work activities. Each Safe Work Procedure must be consistent with the Task-Based Risk Assessment completed for the activity. Every person engaged in an activity for which a Safe Work Procedure has been developed must receive suitable training on the procedure.

Furthermore, the contractor must develop, document, communicate and implement formal procedures, work instructions and / or programmes for the operation, maintenance, inspection and testing of all plant and equipment (including protective systems and devices) brought onto the project site(s).

14.3 Planned Task Observations

All contractor, management supervisors must perform Planned Task Observations (PTO's) to verify that the control measures that have been identified in Safe Work Procedures (and associated Risk Assessments) are being adhered to and are being properly implemented, and to provide guidance where deviations are noted.

Each supervisor must complete at least one PTO per day involving one or more employees in his work team.

When an unsafe act or condition is identified, the supervisor must coach the work team to correct the act or condition in line with the Safe Work Procedure.

Where valid changes to the work method are identified, the supervisor must ensure that the Safe Work Procedure and Risk Assessment are updated to reflect the current practice.

Project representatives will carry out PTO's on contractor employees on an ad hoc basis. Should deviations from the contractor's Safe Work Procedures be observed, the work may be stopped until these deviations are rectified.

14.4 General Rules of Conduct

All persons are required to conform to the following rules of conduct while on the site.

The following acts are prohibited:

- Engaging in practical jokes, horseplay, scuffling, wrestling, fighting, or gambling;
- Assault, intimidation, or abuse of any person;
- Insubordination towards any supervisor or manager;
- Refusing to carry out a reasonable and lawful instruction concerning health and safety;
- Entry into any restricted area (including barricaded areas), unless authorised to do so by the responsible person;
- Unauthorised use / operation of any equipment or machinery;
- Negligently, carelessly or wilfully causing damage to any property;
- Destroying or tampering with safety devices, signs, or signals;
- The use of water from fire hydrants or hose reels for any purpose other than extinguishing a fire;
- The wilful and unnecessary discharging of fire extinguishers;
- Refusing to give evidence or deliberately making false statements during incident investigations;
- Bringing alcohol, drugs, or any other intoxicating substance onto site;
- Bringing a firearm, ammunition, or any other offensive weapon onto site;
- Bringing animals onto site;
- Running, except in an emergency;
- The use of an iPod (or similar) whilst working on site;
- Sleeping on the job;

- Building fires on site, unless in a suitably constructed barbequing facility; and
- Pouring / pumping / flushing any substance (chemical / hydrocarbon / waste water) into a storm water drain, onto bare soil, or into any area where the substance is not effectively contained.

Any of the above actions may result in the temporary or permanent removal of the offending person(s) from site, as well as possible prosecution. The decision of the nominated project management representative shall be final and binding in respect of any dispute that may arise from the interpretation of these requirements.

Transnet will not get involved in contractor disciplinary rules and procedures. The contractor will simply be informed (with reasons) that the offending employee(s) will be denied access to the project site. Once the contractor has been informed, the employee(s) must be removed from the site immediately.

14.5 Site Access

The contractor may not hire any security services for the project site unless authorisation has been obtained in writing from a nominated project management representative.

14.5.1 Access Control

The contractor must comply with all access control, procedures and systems applicable to the project site.

Failure to comply with these requirements will be viewed as a serious safety breach and may result in the permanent removal of the individual(s) / contracting company from site or suspension without payment.

Access will be controlled as follows:

- The access will be strictly controlled and managed
- Contract period access – an access card valid for the full contract period will be issued to an individual once the following requirements have been met:
  - Completion of a pre-employment medical examination;
  - Completion of all required project induction training;
  - Completion of special training / licensing if applicable (e.g. Driving/operating Licence); and provision of proof of job / trade-specific qualifications, licences, training, experience and competency (as required).

Note: No access card will be issued unless proof of identification is provided (i.e. an identity document or a valid passport). For foreign labour, an access card will only be issued if a valid work visa is produced.

Note: A driving licence will not be accepted as proof of identification.

14.5.2 Trespassing

The contractor must ensure that no employee trespasses on any land lying beyond the boundaries of the project site. If instructed by a nominated project management representative to do so, the contractor must remove any employee who fails to comply with this requirement from the project. The contractor's activities must be confined to the specified construction areas, and access to these areas may only be by means of specified routes.

14.5.3 Visitors

Visitors (including reps and suppliers) must be advised in advance of the mandatory Personal Protective Equipment (PPE) requirements for the site, and must arrive with all of this PPE. Upon arrival, all visitors must report to the Security Office where they must sign in. All visitors must undergo a visitor induction briefing before entering the site. A visitor access card will be issued to each visitor on conclusion of the induction briefing.

Whilst on site, visitors must be accompanied at all times by an appropriately senior employee who has been inducted fully. The visitor(s) must be met at the Security Office, and when the visit is over, must be escorted back to the Security Office.

When leaving the site, each visitor must return his or her visitor access card to the security personnel posted at the entrance / exit. A visitor will not be permitted to leave the site until he or she produces the access card that was issued.

Note: Visitors are not permitted to perform any work on site.

Note: Any request (typically made by a government official) to carry out a site inspection must be referred to the nominated project management representative. The contractor must not arrange any such inspection without prior approval from the nominated project management representative.

14.5.4 Alcohol, Drugs and Other Intoxicating Substances

The contractor must ensure that all personnel under his authority do not at any time enter the site or perform any work whilst under the influence of alcohol, a drug, or any other intoxicating substance. Selling or possessing drugs, alcoholic beverages or any other intoxicating substance on the site is strictly prohibited.

A drugs and alcohol testing program will be implemented. Persons entering the site will be randomly tested. Any person who tests positive for alcohol or drug consumption will be subject to disciplinary action and shall be permanently removed from the site.

Any person have the opportunity to rather report that he/she is under the influence before accessing the project site – in these case the employee may only be send home for the day by the responsible project manager representative but will then be tested for the following five days (each day) on his return to the project site. If it is found that the same person is frequently reporting that he/she is under the influence before even accessing the project site. It shall be the responsibility of the nominated project management representative to take disciplinary action and remove such a person's form the project site.

Should the actions and / or demeanour of an employee suggest possible narcosis or drunkenness, the employee must be removed from the site. This may be done without testing.

Note: All personnel involved in an incident / accident must immediately be subjected to an alcohol test and a drug test as part of the investigation.

14.5.5 Firearms, Ammunition and Offensive Weapons

Firearms, ammunition and offensive weapons of any kind are strictly prohibited. No person may enter / shall be permitted to enter the site carrying any such item.

14.5.6 Vehicles

All vehicles brought onto site must meet the safety requirements stipulated in Section 14.6. Each vehicle to be used on site must be inspected and approved by the nominated project management representative before a site access permit will be issued for the vehicle / equipment. No vehicle shall be permitted to enter the site unless it is duly authorised. Access permits are vehicle-specific and may not be transferred between vehicles. The contractor must allow any vehicle that is brought onto site (including privately owned vehicles) to be searched at any time while on the premises, or when entering or leaving the premises.

The contractor is solely responsible for the safety and security of all vehicles (including private vehicles) that he brings onto the site. All road-going vehicles used by the contractor on the site must be roadworthy and registered with the relevant traffic authority. A vehicle will not be permitted to enter the site in an un-roadworthy condition. Access will be denied if, for example:

- The vehicle has a defective exhaust system;
- A serious oil or fuel leak is evident;
- The vehicle has unsafe bodywork or is carrying an unsafe load;
- The vehicle is fitted with extraneous or non-standard equipment;
- Passengers are not seated properly;
- The vehicle is not fitted with a seat belt for each occupant; or
- The vehicle has any obvious mechanical defect;
- Pre-inspection requirements are not met.

Overloaded vehicles will not be permitted to enter the site.
The driver / operator of any vehicle / mobile equipment must carry a copy of his appointment with him at all times. Each driver / operator must:

- Comply with all site / project rules and regulations pertaining to traffic and the safe operation of vehicles / mobile equipment;
- No transportation of people at the back of a bakkie / van
- Obey all road signs;
- Obey all instructions given by security or emergency services personnel;
- Remain within the boundaries of the site; and
- Ensure that the vehicle that he is operating is never overloaded, and that loads are always properly secured.

In the interest of safety, only the minimum number of vehicles required by the contractor to complete the work under the contract will be permitted to enter the site. When not in operation, the contractor's vehicles / mobile equipment must be parked within the boundaries of his lay-down area or yard. Parking is only permitted in designated parking areas. All cars are parked on site at the owner's risk. In the event of a vehicle accident on site, the driver(s) must report the incident immediately and must remain at the scene until a nominated project management representative arrives, or until a nominated project management representative authorises him to leave (unless, of course, the driver requires medical attention).

14.6 Mobile Equipment and Light Vehicles

All Contractors must ensure all applicable legislation concerning mobile equipment and light vehicles are complied with at all times. Each contractor must provide evidence to the nominated project management representative that all light vehicles and mobile equipment to be used on the project (light delivery vehicles, and trucks) comply with the

requirements of all applicable legislation. This evidence must be provided prior to the equipment being brought onto the project site. The contractor remains responsible for meeting this requirement even if the equipment to be used is leased or provided by a sub-contractor (i.e. not owned directly by the contractor).

An Equipment Profile (dossier) must be compiled for each light vehicle and each item of mobile equipment to be used on the project site. All mobile equipment and light vehicles (used for work purposes) must be subject to a risk assessment compiled. The assessment must:

- Involve operators and maintenance personnel who will use and work on the equipment; and
- Address all aspects of safe operation including handling, driver vision, brake failure, tyre blow out, and access and egress for operators and maintenance personnel.

Each light vehicle and each item of mobile equipment must be serviced and maintained as prescribed by the manufacturer of the vehicle or equipment.
No major repairs or services may be carried out on site.
No repairs may be carried out by a driver or operator. Only suitably qualified and competent persons may carry out repair work.
An appropriate pre-operation safety check based on a risk assessment must be carried out for each light vehicle or item of mobile equipment driven or operated for work purposes. For each vehicle or equipment type, an approved checklist must be in place (and must be used). The pre-operation check must include, but not be limited to, inspection and / or testing of the following safety critical features:

- Brakes (testing method must be provided);
- Wheels and tyres (including the spare);
- Lights and indicators;
- Steering;
- Seats and seat belts; and
- Windscreen and windows, including windscreen wipers and washers.

Should any critical feature be defective or damaged, the vehicle or equipment may not be operated until it has been fully repaired.

Supervisors must review the completed checklists on a daily basis to satisfy themselves that there are no major deficiencies that could place a driver or operator at risk. No person may drive or operate any light vehicle or item of mobile equipment without authorisation. All drivers and operators must be appointed in writing by the contractor's Project Manager.

No driver or operator may be appointed without proof that the individual has been trained, tested and found competent, or is currently licensed.

The appointment letter must specify the type of vehicle or equipment for which authorisation is being given and must clearly confirm that the driver or operator:

- Is 18 (eighteen) years of age or older;
- Has undergone a medical examination and has been declared fit for work by an occupational medical practitioner; and
- Has received suitable training and has been found competent, or is in possession of a valid driving licence issued by a state, provincial or civil authority that is applicable to the class of vehicle or equipment that is to be driven or operated.

The principal accountability for preventing accidents and incidents lies with the driver or operator of a light vehicle or item of mobile equipment, as he is in full control of any given situation at any given time. It must be stressed to each driver and each operator that safety is his prime responsibility – this must be clearly instructed and understood.

Drivers and operators must be empowered to stop driving or operating immediately should an unsafe condition arise, and refuse to drive or operate any light vehicle or item of mobile equipment that is defective and / or has any inoperative safety features. Similarly, a supervisor must never force a driver or operator to drive or operate a defective vehicle or item of equipment.

If a driver or operator does not adhere to the site rules and regulations, his appointment must be withdrawn and he must not be permitted to continue with his duties. If necessary, site access will be denied (either temporarily or permanently) to any driver or operator who is deemed to not be adhering to site requirements.

No person may drive or operate a light vehicle or item of mobile equipment if he suffers from a medical condition that places both him and those around him at risk of injury.
A fit-for-work policy must be in place, incorporating clearly defined maximum levels of drugs (including prescribed medication) and alcohol permitted in the system of a driver or operator. Daily alcohol testing and random drug testing must be carried out.

Supervisors must regularly check on the physical condition of drivers and operators during the course of a shift. A system must be in place to manage driver fatigue. No eating or drinking is permitted while driving or operating a light vehicle or item of mobile equipment. A mobile phone, whether hands-free or not, may only be used by the driver or operator of a light vehicle or item of mobile equipment when the vehicle or equipment is stationary and in a safe location. Behaviour-based observations and coaching must include the operation of light vehicles and mobile equipment

A site-specific traffic management plan must be compiled and submitted to the nominated project management representative for approval. The plan must include, but not be limited to, the following:

- Segregation of pedestrians, light vehicles, and mobile equipment where possible (using barriers where feasible);
- Systems to control the movement of mobile equipment in areas accessible to pedestrians, the movement of mobile equipment into and out of workshops, and pedestrian and light vehicle movement around mobile equipment;
- Setting of appropriate speed limits for vehicle types, road surfaces and environmental conditions;
- Installation and maintenance of road traffic control signs;
- Right-of-way rules (including overtaking restrictions);
- Overtaking protocols;
- Clear communication protocols for interactions between all vehicles and equipment;
- Procedures for light vehicles and / or mobile equipment entering hazardous or restricted areas;
- Standards for safe following distances based on operational circumstances, environmental conditions and near sight (blind spot) limitations of mobile equipment;

- The minimum safe distance to be maintained between light vehicles and mobile equipment (i.e. 50 metres unless positive contact is made);
- Designated parking areas for mobile equipment and light vehicles, including parking associated with maintenance areas;
- Parking procedures (e.g. Safe parking distances, safe parking locations, requirements for reverse parking, etc.);
- Systems to control approaching, refuelling, parking, boarding and disembarking mobile equipment (a driver or operator must exit the cabin and must disembark the vehicle or equipment entirely when his direct involvement with maintenance or servicing is not required);
- Guidelines for abnormal road conditions (e.g. Heavy rain, fog, or high winds) providing "go / no go" criteria and contact details for the person(s) responsible for making the "go / no go" decisions;

Truck loading and unloading procedures to avoid material or objects falling from the vehicle;

- Guidelines for wide or abnormal loads including offsite transport; and
- Systems to control mobile equipment use in the vicinity of overhead power lines.

The design and layout of the road system (including entrance and exit points, intersections and other potential points of interaction between pedestrians, light vehicles and mobile equipment) must be reviewed periodically.

A risk assessment must be carried out prior to any changes being made to traffic movements or road systems.

Designated walkways (both indoors and outdoors) must be provided for pedestrians, and pedestrians must make use of these walkways. Good lighting must be provided along all walkways, particularly at road junctions. Wherever possible, rigid barricading must be used to separate pedestrians from moving light vehicles and / or mobile equipment.

No pedestrians are permitted on haul roads (or as far as this can reasonably be achieved in situations where a haul road runs through an area occupied by a local community). All personnel must be transported to site and must be dropped off at a designated area. Controls must be in place to ensure the safety of people working on roads, including those working on broken-down vehicles.

High visibility clothing must be worn by all persons at all times whilst on the project site. Speed limits and traffic rules must be reviewed regularly and must be rigorously enforced. Local traffic rules must be complied with at all times.

Pedestrians and cyclists must give way to light vehicles and / or mobile equipment except at pedestrian crossings.

All light vehicles and mobile equipment must give way to emergency vehicles.
Pedestrians and light vehicle drivers must be made aware of the blind spots associated with mobile equipment.

The driver or operator of a light vehicle or item of mobile equipment must stop the vehicle or equipment and sound the horn before proceeding at blind corners, where his view of the path or intended path is obstructed, and when entering or leaving a building.

Whenever a light vehicle or item of mobile equipment is stopped or parked, the handbrake (if applicable) must be applied.

Measures (such as chocking or the use of ditches or trenches) must be in place for the immobilisation of parked mobile equipment.
A parked light vehicle must be chocked in situations where the vehicle would roll forwards or backwards if placed in neutral with the handbrake disengaged.

No light vehicle or item of mobile equipment may be left unattended with the engine running or with a key in the ignition.
No light vehicle or item of mobile equipment may be parked so as to cause an obstruction to any roadway, passage or access way.

No light vehicle or item of mobile equipment may be parked within 50 metres of a loading or off-loading point.

Light vehicles and mobile equipment must be loaded safely. All loads must be secure and must be within the load limit of the vehicle or equipment. A load must be properly secured before the vehicle or equipment is set in motion. Adequate precautions must be taken for any overhanging load.
No unauthorised light vehicle or item of mobile equipment may enter a restricted area or building.

14.6.1 Light Vehicles

All Contractors must ensure that Light vehicles have the following minimum safety features:

- Fixed seats and suitable seat (safety) belts for all occupants (i.e. Driver and all passengers);
- Roll-over protection for all vehicles intended to be driven on dirt or steep roads;
- Cargo barriers and load restraints for all vehicles designed for carrying loads (other than passengers), or that are unable to have cargo separated from the occupant-carrying space of the vehicle; and
- An air bag on the driver's side, and where available as a manufacturer fitted item, a passenger's air bag;
- A Reverse Alarm.

All Contractors must ensure that Light vehicles that interact with mobile equipment are equipped or fitted with:

- Systems that enable positive communication with the equipment operators (e.g. A two-way radio);
- A high visibility flag (e.g. A whip flag or buggy whip);
- An amber flashing light (revolving or strobe);
- Reflective taping; and
- High visibility signage (i.e. Vehicle call numbers) facilitating easy and positive identification from a reasonable distance.

Note: Call number signs and reflective tape (magnetic or adhesive) must be applied to the front, back and sides of each vehicle.

All Contractors must ensure that Light vehicles carry:

- Emergency roadside triangles or beacons (three of either);

- Chock blocks for preventing uncontrolled movement of the vehicle when parked;
- A flashlight;
- A fire extinguisher (2.5kg DCP);
- A first aid kit; and
- Survival or emergency equipment (e.g. a vehicle recovery kit) suitable for the operating environment.

A change management process must accompany all vehicle modifications, including the attachment of any equipment. Examples of changes or modifications include, but are not limited to, any change or modification:

- Made to the overall structure or design of the vehicle body;
- Made to the original manufacturer-fitted type of tyres or wheels;
- Made to the suspension system of the vehicle;
- Made to the mechanical system of the vehicle;
- That may adversely alter the centre of gravity of the vehicle;
- That alters the load carrying capacity of the vehicle; and
- That may affect the ability of the vehicle to withstand a crash (e.g. the fitment of a "bull bar").

Vehicle selection must be based on a risk assessment where consideration is given to the tasks, the application, the environment, roll-over protection and the rating of sturdiness in the event of a crash.

All Contractors must have a formal inspection and preventative maintenance system in place to ensure that vehicles are maintained in a safe and roadworthy condition at all times and, as a minimum, are serviced in line with the vehicle manufacturer's service schedule.

Should any safety critical feature be defective or damaged, the vehicle must be withdrawn from service until it has been fully repaired. Inspection and maintenance must be undertaken on critical features such as:

- Wheels and tyres (including the spare);
- Steering, suspension and braking systems;
- Seats and seat belts;
- Lights, indicators and reflectors;
- Windscreen and windows, including windscreen wipers and washers;
- The vehicle structure itself; and
- Other safety-related items on the vehicle body, chassis or engine, including instrumentation.

Persons may only be transported in vehicles equipped with manufacturer fitted or approved seats and seat belts.
Seat belts must be worn by all occupants of a light vehicle (i.e. the driver and all passengers) at all times.

Only the driver and one passenger are permitted in the cab (front) of a light delivery vehicle.
No personnel may be transported in the load-bin of a light delivery vehicle, even if the vehicle is fitted with a canopy. Only tools and equipment may be transported in the load-bin. Furthermore, no persons may be transported in a trailer behind a vehicle.

A pre-operation vehicle safety check and familiarisation system must be in place and must be used by the driver. An approved checklist must be used. All vehicle faults that are recorded must be attended to immediately.

All Contractors must have systems in place to ensure that risks associated with vehicle journeys are managed and controlled. The systems must include, but not be limited to:

- Formulation of journey management plans prior to the commencement of new or changed travel activities;
- Identification and monitoring of the risks associated with the various routes, intersections, etc. In order to minimise the overall exposure;
- Assessment and communication of changed environmental and road conditions at the time of travel;
- Outlining of actions required in the event of an emergency (e.g. Collision or breakdown); and
- Provision to manage driver fatigue.

Light vehicle running lights (low-beam headlights) must be switched on at all times when the vehicle is in operation.

All Contractors must have a system is in place to ensure that drivers receive adequate training to ensure that the vehicle intended to be operated or driven can be operated or driven safely. As a minimum, training must include:

- Behaviour-based defensive driving principles;
- Vehicle familiarisation, taking into account the handling dynamics of the vehicle, maximum number of passengers, load limits and various features;
- Loading and restraining principles where the vehicle to be operated is designed for carrying cargo loads;
- Education and awareness concerning driving and travel risks that may be encountered within the environment where the vehicle may be operated or driven, and the requirements pertaining to traffic rules and speed limits;
- Securing (locking) equipment to prevent unauthorised use;
- Emergency crash and breakdown procedures; and
- Basic mechanical principles, including how to change a tyre and perform an adequate pre-operation check.

A system must be in place to ensure that persons operating any equipment associated with a light vehicle (e.g. Vehicle-mounted cranes and winches) are suitably trained and competent.

14.6.2 Training and Licensing

No person may drive a light vehicle or operate an item of mobile equipment unless he has been trained, tested and found competent, or is currently licensed to drive or operate that specific vehicle or item of equipment.

The training must address hazards and risks assessed for:

- That vehicle; and
- The tasks for which it is to be used.
-

No person may be appointed to drive a light vehicle or operate an item of mobile equipment unless he is in possession of a valid medical certificate of fitness (issued by an occupational medical practitioner).

Each person required to drive a light vehicle or operate an item of mobile equipment on the project site must have a project-specific site licence or appointment to drive or operate that vehicle or item of equipment.

A system must be in place to ensure that the renewal of licences is based on an assessment of competency to drive and / or operate the vehicle or equipment. The frequency of assessment must either be annual, or derived from a risk assessment for each vehicle or equipment type.
No training of drivers or operators may be carried out on site unless authorised by a nominated project management representative.

Each person working on or visiting the project site must receive appropriate project-specific induction training concerning road safety and site vehicle hazards.
Driver must be in position of valid certificate, licence and trained by an accredited service provider.

14.6.3 Tyre and Rim Safety

These requirements apply to tyres and health and safety with a rim diameter of 60cm (24 inches) or greater.
A Tyre Management Plan must be established and reviewed every twelve months.
Safe Work Procedures must be in place for all tyre maintenance and servicing activities and for tyre fire emergency response.

All persons who will be carrying out tyre maintenance and servicing work and / or responding (potentially) to tyre fire emergencies on site must be certified against the requirements of job-specific competency standards for the project, which must address job-specific Safe Work Procedures.
No person may approach a light vehicle or item of mobile equipment within 24 hours of:

- The vehicle or equipment being struck by lightning;
- The vehicle or equipment making contact with high voltage electricity; or
- A tyre fire.

In the event of a tyre fire, an exclusion zone of 300 metres must be established and may only be accessed by emergency services personnel who are shielded while fighting the fire.

Restricted Work Zones must be established for tyre installation, removal and handling processes.
All tyre and rim handling equipment must have fall back prevention in place prior to anyone entering the Restricted Work Zone.

Tyres with split health and safety must be deflated to zero and other tyres to a nominal pressure no greater than 5psi prior to removal of any retaining devices. In a dual assembly both tyres must be deflated.

Tyre inflation is subject to the following requirements:

- All tyre inflation must be carried out remotely;
- Where the risk of ejection of components exists, barricading must be in place;
- A tyre must not be left unattended during inflation; and
- Tyres that have run at less than 80% cold inflation pressure must not be re-inflated. Both tyres in a dual assembly must be dismounted and inspected.

No hot work (e.g. Welding or cutting) may be carried out on a rim (wheel) while the rim is fitted with a tyre – whether inflated or deflated.
A periodic testing and / or inspection regime must be in place for tyres, health and safety (wheels), and assemblies.

All tyres and health and safety (wheels) must be made unserviceable when deemed unfit for service or before being sent off site for disposal.
A tracking system must be in place to track the lifecycle of tyres and health and safety (wheels).

14.6.4 Roads

Design, inspection and maintenance requirements must be in place for all roadways. Every haul road must have two dedicated and clearly demarcated lanes so that vehicles travelling in opposite directions are safely separated (lane demarcation is not applicable to dirt roads).
Systems (such as safety berms) must be in place along roadways and around excavations, dump areas, etc. To prevent vehicles from leaving a roadway or entering a dangerous area.

A storm water management plan must be in place for the site and, in particular, for all roads. Extreme wet weather must be considered. Contractors must ensure that all roads are equipped with drainage system.

Roads with high risks activities and traffic interface shall be controlled by trained flagman
A dust control plan must be in place for the site and, in particular, for all roads. Where required, contractors must ensure that roads are wetted (using a water cart) at regular intervals and whenever instructed by a nominated project management representative. The over-watering of roads must be prevented.

No road may be closed without permission from a nominated project management representative.
Any large rocks in a roadway must be removed immediately. Any spillage in a roadway must be cleaned up immediately.

Ground pollution (e.g. Oil, diesel or hydraulic fluid spillages) must not, and will not, be tolerated. If substances are spilled on a road or any other portion of the site, the contaminated ground must be dug out and the resulting hole back-filled with clean material which must be suitably compacted. The contaminated soil must be disposed of as required by the applicable legislation.

14.7 Signs and Notices

The contractor must ensure that all required safety signs and notices are prominently displayed in accordance with the applicable legislation and good safety practice.
Signs and notices must be in English as well as any other language(s) commonly spoken on the project site.

All symbolic signs must comply with the applicable national standards.
No person may deface or damage any safety sign or notice. No person may remove or alter any safety sign or notice unless authorised to do so.

14.7.1 Training and competency

Only suitably trained, competent and experienced persons who have been authorised in writing by the contractor's project manager are permitted to:

- Evaluate and plan critical lifts;
- Supervise lifting operations;
- Operate cranes and hoists;
- Use lifting equipment, and rig (sling) loads;
- Provide signals for controlling lifts; and
- Inspect, maintain or test cranes, hoists and lifting equipment.

Each operator must meet the competency requirements for the particular class or type of crane or hoist to be operated. Depending on the project location and applicable legislation, operators may need to hold a certificate of competency issued by a recognised training institution.

14.8 Permit to Work

All personnel must comply with the Permit to Work system applicable to the project.
A Permit to Work must be obtained before carrying out any work that involves:

- A hazardous energy source or system, including electricity, compressed fluids (e.g. hydraulics and pneumatics), chemical substances (e.g. toxic, corrosive, flammable or explosive gases and liquids), heat (e.g. steam), radiation, and machinery or materials with potential energy (gravitational and elastic) – isolation and lockout may be required;
- Confined space entry;
- Working at height;
- A critical lift;
- Hot work outside of designated workshops;
- Excavation; or
- A service (e.g. water supply, fire suppression systems, etc.).

Note: A Permit to Work may only be issued by an Authorised Person, and may only be received (or accepted) by an appointed Applicant (see Definitions).

Each Permit to Work that is issued must make reference to an approved Task-Based Risk Assessment for the work that is to be carried out.

The Permit to Work system that is employed must incorporate the following basic procedures:

- Prior to meeting with the Authorised Person, the Applicant must familiarise health and safety with all of the hazards associated with the system, plant, equipment, structure or area on or in which the work must be performed. He must also consider the risks that may arise as a result of the tasks that will be carried out. A Task-Based Risk Assessment must be in place;
- The Applicant must then request permission to carry out the work and must meet with the Authorised Person to discuss and document the scope of the work as well as the hazards, risks and associated control measures. Isolation and lockout requirements must be identified (if applicable). The isolation and lockout process must be initiated by the Authorised Person who must contact the necessary Isolation Officers.

Note: The Applicant must ensure his own safety and that of his team, and has the right to accompany the Isolation Officers to verify that all of the necessary locks have been fitted to all of the isolation and lockout points in accordance with the applicable plant or equipment-specific Isolation and Lockout Procedure.

- Once all of the necessary isolations have been completed and the necessary Clearance Certificates have been issued by the Isolation Officer(s) (if applicable), and the Authorised Person is satisfied that the system, plant, equipment, structure or area is safe to work on or in provided all identified precautions are observed by the Applicant, then he must issue (sign) the Permit to Work to the Applicant;
- The Applicant must accept (sign) the Permit to Work. If equipment has been isolated, the Applicant must attach his Personal Lock to the relevant Isolation Bar (or Local Isolation Point) and must ensure that every other person working on the isolated equipment also attaches his or her Personal Lock to the Isolation Bar (or Local Isolation Point) before starting any work;
- Before commencing with any work, the Applicant must discuss the hazards, risks, control measures, precautions and limitations as stated in the Permit to Work (and associated Task-Based Risk Assessment) with all personnel who will be carrying out the work. A register must be kept and all persons must sign the register once they have been briefed by the Applicant;
- The work performed must be limited to what is described in the Permit to Work;
- When a particular employee has completed his work, he must sign the personnel register to this effect and (if applicable) must remove his Personal Lock from the Isolation Bar (or Local Isolation Point);
- Once all work is complete, the Applicant must:
  - Ensure that all machine guards have been replaced;
  - Ensure that all tools and materials have been removed from the work area;
  - Ensure that the work area is clean and tidy;
  - Ensure that all Personal Locks (including his) have been removed from the Isolation Bar or Local Isolation Point (if applicable);
  - Inform the Authorised Person that the work has been completed; and
  - Sign off the Permit to Work.
- Once the work is complete and the Applicant has signed off the Permit to Work, the Authorised Person must:
  - Ensure that the relevant Isolation Officers perform all of the necessary de-isolations (if applicable);
  - On completion of the de-isolations, sign off the Permit to Work accepting the system, plant, equipment, structure or area back for service; and
  - Inform all relevant personnel that the system, plant, equipment, structure or area is ready to use.
  - Where the work must continue over more than one shift, the Permit to Work must be reviewed at every shift change by an Authorised Person. If the scope of work has changed, the permit must be cancelled and a new permit must be issued.

If any of the original conditions or precautions pertaining to the work is not being complied with, is no longer adequate or is no longer applicable, the Authorised Person must cancel the Permit to Work and must ensure that all work stops until full compliance with either the original or amended (as required) conditions and precautions is achieved and a new permit has been issued.

The Applicant must ensure that the Permit to Work (including the personnel register) is kept where the work is being carried out (i.e. posted on a portable Health and Safety Management Information Notice Board) and that the work is monitored against the permit conditions.

All Permit to Work records must be retained and must be made available for inspection when required.

The implementation of the Permit to Work system applicable to the project must be audited on a regular basis by a nominated project management representative. Furthermore, planned task observations must be carried out periodically.

Note: In addition to obtaining Permits to Work as and when required for specific hazardous activities (identified in this standard), each contractor must obtain a General Work Authorisation from a nominated project management representative on a monthly basis. A General Work Authorisation is valid for one calendar month and authorises the contractor's planned work activities. In order to obtain a General Work Authorisation, the contractor must provide a documented work plan for the month together with the necessary Task-Based Risk Assessments.

Note: No work may commence on a system, plant or equipment until a Permit to Work has been issued by an Authorised Person.

Note: A Permit to Work may only be issued by an Authorised Person once all required Clearance Certificates have been issued by appointed Isolation Officers.

The isolation and lockout system that is employed must incorporate the following basic procedures:

- In accordance with a system, plant or equipment-specific Isolation and Lockout Procedure, an appointed Isolation Officer(s) must isolate all points that need to be isolated in order to render the system, plant or equipment safe to work on. An Equipment Lock (and a suitable, highly visible warning tag) must be attached to each isolation point;
- On completion of an isolation (and lockout), the Isolation Officer must clear the area of all persons and must then carry out tests to ensure that the isolation is effective. This may be done by pressing a start button or by asking a control room operator to try to start the equipment. Special care must be taken to ensure that the attempted starting of the equipment has not been deactivated by another interlock forming part of the system, or by a different up-stream isolation. Alternatively, appropriate equipment may be used to test for energy (e.g. voltage verification or continuity tests).

14.9 Manual Handling and Vibration

Any handling or lifting task that can only be done manually must be planned and rehearsed before the task is done.

If more than one person is involved in a task a communication procedure must be agreed in advance. Lowering the load must be done in a controlled manner. Dropping a load is dangerous and must be avoided.

As a guideline 25 kg is considered to be the limit of what a person can safely handle. Where there are loads exceeding 25 kg the risk of handling the load must be mitigated to assure minimal potential for any injury.
When mechanical lifting aids are provided, they should be used.
Extra care should be taken when lifting awkwardly shaped objects.

Position the feet correctly. The feet should be placed hip-width apart to provide a large base. One foot should be put forward and to the side of the object, which gives better balance.
Bend or 'unlock' the knees and crouch to the load. The weight will then be safely taken down the spine and the strong leg muscles will do the work.

Get a firm grip. The roots of the fingers and the palm of the hand should grip the load. This keeps the load under control and permits it to be distributed more evenly.

The following should be considered with conducting the Risk Assessment with regards Manual Handling and also take into consideration the task factors, physical demands and tools involved in the task:

- Load weight/frequency;
- Hand distance from lower back;
- Asymmetrical trunk/load;
- Postural constraints;
- Grip on the load;
- Floor surface;
- Environmental factors;
- Carry distance; and
- Obstacles en route.

Team Manual Handling:

- Load weight;
- Hand distance from lower back;
- Vertical lift region;
- Trunk twisting/sideways bending;
- Postural constraints;
- Grip on the load;
- Floor surface;
- Environmental factors; and
- Communication, co-ordination and control.

As far as possible, exposure to vibration must be eliminated.
However, if this is not possible, short-term solutions to decrease exposure include:

- Reducing the vibration levels;
- Removing the person from the vibrating equipment / tools;
- Reducing the period of time that the person works with the vibrating equipment / tools (at least 40 minutes break after 20 minutes working with a machine that vibrates excessively).

In order to reduce exposure to vibration:

- Consider buying equipment that operates effectively at lower speeds;
- Buy equipment with built-in damping materials;
- Buy lighter tools if they are available - they require less of a grip;
- Maintain the equipment;

- Make sure equipment is balanced and there are no worn parts;
- Use remote controls when they are available;
- Reduce your grip on the equipment when it is safe. The less time you actually have your hands on the equipment the better. Relax your hands during these brief breaks;
- Take scheduled breaks; and
- Do other tasks that allow you to move away from vibrating tools and equipment.

The workplace must be assessed by a competent person for compliance with good design, layout and practice, to avoid or minimise adverse health consequences due to manual handling and vibration issues.

Quantitative evaluations of vibration produced by specific equipment must include the following measurement parameters: direction of movement, frequency, intensity, and variation with time and duration, as per documented methods.

Employees and contractors must be informed of the results of assessments and instructed in appropriate manual handling techniques, where the risk assessment indicates a need.
Workplace vibration sources that could contribute to the exceedance of an Occupational Exposure Limit (hence potential for impact on worker musculo-skeletal fitness) must be identified and adequately characterised.
Manual handling tasks assessed as having the potential to cause a Lost Time Injury (i.e. with potential for impact on worker musculo-skeletal fitness) must be identified and adequately characterised.
Workplace manual / materials handling tasks risk rated as "significant" must be assessed and recorded to include biomechanical factors (e.g. posture, bending, twisting, repetitive motions, working overhead, and exerting force away from the body).

14.10 Personal Protective Equipment

All applicable legislation concerning Personal Protective Equipment (PPE) must be complied with at all times.

As a minimum, the following PPE must be worn by all persons (including visitors) at all times whilst on a project site:

- Safety footwear with steel toe protection;
- Safety glasses (individuals who wear prescription spectacles must be provided with either over-spec safety glasses or prescription safety glasses);
- Safety helmet (hard hat); and
- High visibility protective clothing with reflective taping (long trousers and long-sleeved shirts with collars and cuffs).
- Additional PPE requirements must be determined through hazard identification and risk assessment. This hazard-specific PPE (such as hand protection, hearing protection and respiratory protection) must be worn as required (e.g. when in a certain area, when performing a certain task, or when working with a certain substance);
- The correct PPE must always be worn:
- In accordance with site requirements (as indicated at the entrances to a project site and at the entrances to buildings and / or designated areas on the premises);
- In zoned areas (e.g. noise zones and respirator zones); or
- As required by a Safe Work Procedure, a risk assessment, or a Material Safety Data Sheet (MSDS).

Each contractor must provide each of his employees with all required PPE (at no cost to the employee). The specific PPE that is provided to a particular employee must be based on the nature of that employee's work and the location in which the work is performed (i.e. must be based on the hazards to which the employee is exposed). PPE requirements for a particular job or for a particular area must be determined through a risk assessment for that job or area.

Any employee who does not have all of the PPE that is required for him to perform his duties safely will not be permitted to work.

Each employee must care for his PPE, maintain it in good condition, and inspect it on a daily basis.
If an item of PPE has worn out, has become damaged, or is found to be defective in any way, it must be replaced by the contractor.

PPE must be stored in accordance with the manufacturer's requirements and / or recommendations.

Each employee must receive training in the use, maintenance and limitations of the PPE that is provided to him, and must be made aware of why the PPE is necessary as well as the consequences of not wearing it as instructed (i.e. the potential for injury and / or disciplinary action). Training records must be retained.

Any person who refuses to wear PPE as required must be removed from the site.
Symbolic signs indicating mandatory PPE requirements must be prominently displayed at the entrances to a project site and at the entrances to buildings and / or designated areas on the premises where additional PPE is required. These signs must comply with the applicable national standard (if one exists).

Each contractor must appoint an employee to:
- Control the issuing and replacement of PPE;
- Keep an up-to-date register as proof that items of PPE have been issued to individuals (an employee must sign for the items that he receives);
- Ensure that there is an adequate supply of all required PPE (i.e. maintain PPE stock levels on site); and
- Carry out regular inspections to ensure that PPE is being used correctly, is being maintained in a good, serviceable and hygienic state, and is not being shared between employees.

Head Protection

A safety helmet (or hard hat) worn correctly will help protect the head in the event of:
- An employee being struck on the head by a falling or flying object;
- An employee striking his head against a fixed or protruding object; or
- Accidental head contact being made with an electrical hazard.

A safety helmet must be worn at all times on a project site, with the following exceptions:
- Vehicle and equipment operators inside enclosed cabs;
- In offices and in office or administration buildings; and
- At designated lunch and break areas (provided that no work is in progress in the immediate break area).

A safety helmet must be worn in accordance with the manufacturer's requirements.

A safety helmet must be worn directly on the head. The wearing of a cap or other headgear beneath a safety helmet is prohibited unless the items have been specifically designed to be used in combination (i.e. the arrangement is approved by the safety helmet manufacturer).

The suspension system inside a safety helmet (that acts as a shock absorber) may not be removed.
The painting of safety helmets is prohibited.
Safety helmets may only be cleaned using a mild detergent and water. No solvents may be used.

14.10.1 Eye Protection

If an employee is carrying out, assisting with, or working adjacent to any activity where sparks or projectile particles are being generated, where chemical mists or fumes are being generated, where liquids may splash or spray, where harmful electromagnetic radiation (heat or light) is being generated, or where there is a risk of wind-blown particles entering the eyes, then suitable protective eyewear must be worn at all times (i.e. safety glasses, safety goggles, a face shield, a welding helmet, or a combination of these).

Such activities include:

- Working with rotating equipment (e.g. grinders, drills, mills, lathes, and saws);
- Welding and cutting;
- Chipping, chiselling or caulking;
- Using explosive powered tools;
- Abrasive blasting;
- Sanding; and
- Working with chemical substances (e.g. drilling fluids, acids, solvents, paints, pesticides, etc.).

For certain activities, special eye protection is required (e.g. a heat-resistant face shield is required when working near molten metal).
Double eye protection is required for activities such as:

- Grinding, cutting, chipping, chasing and reaming (employees must wear both a full face shield and safety glasses or goggles); and
- Arc welding (welders must wear both safety glasses and a welding helmet).

Screens must be erected to protect passers-by, where practical.

Safety glasses must be worn at all times on a project site, with the following exceptions:

- Vehicle and equipment operators inside enclosed cabs with the windows fully closed;
- In offices and in office or administration buildings;
- At designated lunch and break areas (provided that no work is in progress in the immediate break area); and
- When another form of eye protection is required (e.g. safety goggles).

All safety glasses used on site must have suitable permanent side protection.

In strong sunlight, dark safety glasses should be worn to reduce eyestrain and fatigue. However, caution must be exercised when employees are required to frequently move between outdoor and indoor environments. Dark safety glasses may not be worn indoors or in poor daylight conditions. Prescription spectacles with tinted lenses are prohibited

inside buildings or other structures with limited illumination unless the lenses are light-sensing and adjust to changing illumination levels.

Employees who wear prescription spectacles (i.e. require corrective lenses) must make use of either:

- Prescription safety glasses (with permanent fixed side shields) that conform to the requirements of a recognised national or international standard (e.g. CSA, ANSI, or equivalent); or
- Over-spec safety glasses or goggles.

The use of contact lenses in certain areas may not be suitable because of increased risk to the eye due to dust or heat.

14.10.2 Hearing Protection

Local regulations concerning occupational exposure to noise and the use of hearing protection must be complied with as a minimum.
"Low noise" tools and machinery must be used wherever possible to reduce noise levels. Where noise cannot be reduced to an acceptable level through engineering and work practice controls, measures must be put in place to minimise the exposure of employees to the noise (i.e. administrative controls and personal hearing protection).

Areas where it is likely that the 95% upper confidence limit of an eight hour L_{eq} mean exceeds 85dB(A), or areas where impulse noise exceeds 140dB(C), must be designated as noise zones. These noise zones must be clearly demarcated and mapped, signs must be posted, and all employees must be made aware of the requirements for working in such an area.

Suitable hearing protection must be worn in all designated noise zones and when carrying out (or working in the vicinity of) any activity where the noise level exceeds 85dB(A).

Where hearing protection is required, a hearing conservation programme (applicable to all personnel and visitors) must be implemented. The programme must include training in the correct use and proper storage of hearing protection devices as well as replacement requirements. Training must be provided when hearing protection is first issued to an employee and refresher training must be carried out at least annually thereafter. Training records must be retained.

At least two types of personal hearing protection must be made available to employees. The hearing protection devices provided must have adequate noise reduction ratings (i.e. must be able to attenuate the noise level to below 85dB(A)).

Personal hearing protection must be issued on an individual basis and must not be shared. In addition to personally issued hearing protection, suitable disposable hearing protection must be made available at the entrances to all noise zones.
All Hearing Protection Devices (except for disposable hearing protection) must be properly inspected and cleaned on a regular basis.

14.10.3 Respiratory Protection

Designated areas (respirator zones) must be established where:

- It is likely that the 95% upper confidence limit of a Similar Exposure Group's mean exposure concentration exceeds the relevant Occupational Exposure Limit (OEL) for agents resulting in chronic effects, such as total inhalable dust, respirable dust, respirable crystalline silica, PAH, fluorides, lead, mercury, asbestos or non-asbestos fibrous materials; or
- The concentration of an agent (particulate, vapour or gas) with an acute effect exceeds 50% of the relevant OEL.

Note: For a particular hazardous agent, the OEL to be adopted must be either the client's OEL or the OEL specified in local legislation, whichever is the most stringent.

These areas must be clearly demarcated and mapped, signs must be posted, and all employees must be made aware of the requirements for working in such an area.

Suitable Respiratory Protection Devices (RPDs) must be worn in all designated respirator zones and when carrying out (or working in the vicinity of) any activity where the risk assessment has identified the need for respiratory protection.

RPD's must be selected based on:

- The type(s) of airborne contaminants that are present (gases, vapours, and particulates and aerosols including dusts, fumes, sprays, mists, and smoke);
- The potential particulate size distribution;
- Substance toxicity; and
- The likely concentrations.

Compatibility with the work tasks and other PPE, comfort (as it affects wear-time), and the ability to communicate adequately, must also be considered.

The risk assessment and method statement for the work to be performed, the information contained in the relevant Material Safety Data Sheets (MSDSs), and the results of any air monitoring associated with the substances to be worked with or activities to be carried out, must be used to ensure that the most suitable RPD is selected.

Only RPDs certified to a recognised standard and approved by the nominated project management representative may be used.

Where respiratory protection is required, a respiratory protection programme (applicable to all personnel and visitors) must be implemented.

The respiratory protection programme must include:

- Periodic inspection of RPDs, including before each use;
- Periodic evaluation (by competent persons) of cleaning, sanitising, maintenance and storage practices;
- Performance of positive pressure and negative pressure fit checks by RPD wearers before each use to ensure that the respirator is functioning properly; and
- Training at first issue of a RPD and regular refresher training thereafter in accordance with regulatory requirements or at least once every two years (the training must cover fit testing, use, cleaning, maintenance, filter cartridge replacement, and storage). Training records must be retained.

RPDs must be used, maintained, and stored in compliance with the manufacturer's requirements as well as the respiratory protection programme.

Suitable facilities must be provided for the cleaning and sanitary storage of RPD's.

As a minimum, qualitative and documented fit testing must be carried out (although quantitative fit testing is preferred) to ensure that the use of negative pressure RPDs (including disposable RPDs) is effective. Fit testing must be performed by a competent person when an RPD is first issued and must be repeated periodically in accordance with legal requirements or every two years as a minimum. A policy must be in place requiring a clean shaven face when using a negative or neutral pressure RPD for routine tasks (otherwise a positive pressure RPD must be used). A medical evaluation including a pulmonary function test may be required to determine whether or not an individual is medically fit to wear a respirator.

For air-supplied RPDs, breathing air must be effectively filtered and / or isolated from plant and instrument air, and isolated from sources of potential contaminants. The supplied air must be tested to determine if the air quality complies with the requirements of applicable standards for breathing air.

For nuisance dust, dust masks with a protection level of at least FFP2 must be worn.

14.10.4 Hand and Arm Protection

Gloves must be worn when handling or working with equipment, materials or substances with the potential to cause injury or illness.
Suitable gloves must be selected based on the task to be performed and the specific hazard against which the employee requires protection, such as:

- Sharp edges;
- Sharp points and splinters;
- Abrasive surfaces;
- Hazardous chemical substances (toxic, corrosive, sensitising, etc.);
- Extreme temperatures; and
- Viruses, bacteria and parasites.

14.10.5 Foot Protection

Safety boots must be worn at all times whilst on a project site, with the exception of offices and office or administration buildings in which closed athletic, business or similar shoes may be worn.
Sandals, slops, slippers, open-toed and high-heeled shoes are not permitted on any project premises.

Safety boots must provide the following protection:

- Steel toe cap to protect against crushing (impact and compression forces);
- Leather uppers that provide resistance against water penetration and water absorption;
- Slip resistant soles;

And where a risk assessment identifies the need:

- Puncture resistant soles (i.e. steel midsoles) for protection against sharp objects;
- Chemical resistant soles for protection against spilt chemical substances (such as solvents, hydrocarbons, acids, and alkalis);

- Heat resistant soles for protection against hot surfaces or molten metal; or
- Electrical shock resistant soles for protection (insulation) against live electrical conductors.
- Gumboots with steel toe caps must be worn when working in water or very wet conditions.

14.10.6 Clothing

All employees working on a project site must wear high visibility protective clothing with reflective taping. Trousers must be long and shirts must be long-sleeved. Shirts must be buttoned at the neck and wrists.

Protective clothing must preferably be made of natural fibres.
Short pants, short-sleeved shirts, sleeveless shirts, and vests are prohibited as outer garments (with the exception of a high visibility vest worn over a long-sleeved shirt).

Loose clothing may not be worn where it may become caught in moving machinery or equipment.
For hot work (e.g. welding, cutting, etc.), work in the vicinity of molten metal, and any work carried out in the vicinity of an open flame, the protective clothing worn (shirt and trousers) must be made of a suitable fire retardant fabric. Underwear and socks must be made of natural fibres (preferably wool) or fire retardant fabric.

No employee may tuck his trousers into his boots when working in the vicinity of molten metal.

14.10.7 Body Protection

Suitable body protection must be provided as required to protect employees against specific hazards. A range of work activities require body protection in one form or another, including but not limited to:

- Working in extremes of temperature, such as firefighting, attending to a heating furnace, working with molten metal, working in refrigerated environments, etc.;
- Hot work (e.g. welding, burning, cutting and grinding);
- Working with hazardous chemical substances (e.g. acids, solvents, pesticides, etc.); and
- Clean up and disposal of hazardous materials and wastes (e.g. asbestos, hydrocarbons, etc.).

A wide variety of protective garments are available, such as firefighting suits, furnace suits, freezer jackets, leather aprons, leather spats, laboratory coats, chemical resistant aprons, chemical resistant (or hazmat) suits, and disposable coveralls. Suitable items must be selected to provide protection against the specific hazard(s) to which an employee is exposed. Hazards must be carefully identified and characterised to ensure that the correct protection is used.

Body protection must be sized properly to prevent tearing, the parting of seams, tripping, or restriction of movement.

14.10.8 Jewellery

Necklaces, dangling earrings, and bracelets may not be worn on a project site.
No ring or watch may be worn where there is a risk that it may become caught in machinery or equipment.

No jewellery or other conductive apparel (such as a key chain or watch) may be worn when carrying out energised electrical work.

14.10.9 Hair

Scalp hair that is longer than the top of the shoulders must be tied up and restrained within the person's safety helmet or within the collar of his or her overalls, shirt or jacket.

For negative or neutral pressure Respiratory Protection Devices, facial hair must not cause the seal between the respirator and facial skin to be broken (or prevent a seal from being formed in the first place).

14.10.10 Task-Specific PPE

In addition to the standard PPE required for a project site (including a safety helmet, safety glasses, safety boots, and high visibility protective clothing), the following task-specific PPE must be used as a minimum by any person carrying out or assisting with such a task:

- Arc Welding – safety glasses and welding helmet (i.e. double eye protection), respiratory protection against the specific airborne contaminants being generated (fumes, gases, dusts, etc.), leather welding gloves, leather apron, leather spats, leather yoke (for work above shoulder height), and knee pads for welders in kneeling positions;
- Gas Welding, Cutting or Brazing – gas cutting or welding goggles with shade 4 filter lenses and full face shield (i.e. double eye protection), respiratory protection against the specific airborne contaminants being generated (fumes, gases, dusts, etc.), leather gloves (long cuff for welding and cutting, short cuff may be used for brazing), leather apron, leather spats, and leather yoke (for work above shoulder height);
- Grinding – safety glasses or goggles and full face shield (i.e. double eye protection), hearing protection, respiratory protection where dust or fumes may be generated, leather gloves, leather apron, and leather spats;
- Abrasive Blasting – respiratory protection (air-supplied hood), hearing protection, leather gloves, and leather apron;
- Spray Painting – respiratory protection (air-supplied hood for confined spaces), safety goggles (if the respirator design does not provide this protection), hearing protection (where air compressors are used), chemical resistant gloves, and chemical resistant disposable coveralls.

14.11 Sun Protection

The contractor must ensure that all personnel are protected in sunlight through the use of long sleeve shirts, long trousers, health and safety to safety helmets and UV factored sunscreen. Shade structures must also be made available to all employees.

The contractor must conduct training and awareness sessions with his employees, advising on the risks associated with working in the heat (including dehydration) and the precautions to be taken (e.g. ensuring adequate fluid intake).

14.12 Smoking

The contractor must not permit smoking on site except within designated smoking areas selected in accordance with the applicable legislation. Such an area must be clearly demarcated and the required signage must be displayed.

Any person found smoking or discarding a cigarette butt outside of a designated smoking area may be removed (temporarily or permanently) from site.
In all designated smoking areas, adequate non-combustible commercial ashtrays and / or cigarette butt receptacles (butt cans) must be provided.

Ashtrays and other receptacles provided for the disposal of smoking materials must not be emptied into rubbish bins or any other container holding combustible materials.
"No Smoking" signs must be strictly observed.

14.13 Housekeeping

The contractor must maintain all work areas in a tidy state, free of debris and rubbish. Unless directed otherwise, the contractor must dispose of all debris, rubbish, spoil and hazardous waste off site in a designated and authorised area or facility. The contractor must familiarise health and safety with the waste management plan for the site including collection and disposal arrangements, and must align his waste management activities accordingly.

In cases where an inadequate standard of housekeeping has developed and compromised safety and cleanliness, a nominated project management representative may instruct the contractor to cease work until the area has been tidied up and made safe.

Neither additional costs nor contract deadline extensions will be allowed as a result of such a stoppage. Failure to comply will result in a clean-up being arranged through another service provider at the cost of the non-complying contractor.

The contractor must carry out housekeeping inspections on a weekly basis to ensure maintenance of satisfactory standards. The contractor must document the results of each inspection. These records must be maintained and must be made available to the nominated project management representative on request.
The contractor must implement a housekeeping plan for the duration of the contract ensuring that the site housekeeping is maintained. Furthermore, at the end of every shift, the contractor must ensure that all work areas are cleaned, all tools and equipment are properly stored, and construction rubble is removed.

Where the contractor fails to maintain housekeeping standards, the nominated project management representative may instruct the contractor to appoint a dedicated housekeeping team for the duration of the project at the contractor's expense.
Littering is prohibited.

14.14 Waste Management

Waste may not be disposed of unless the disposal of that waste is authorised by law. The contractor must therefore ensure that all waste that is generated is handled, stored, transported and disposed of in accordance with the requirements of the applicable legislation / local authority.

No waste may be removed from the project site to a waste storage or disposal facility unless that facility has been approved for use by the nominated project management representative.
An adequate number of waste bins and skips must be provided by the contractor and suitable arrangements must be made to ensure that these bins and skis are emptied regularly.
Hazardous wastes must be kept separate from general wastes.

Waste disposal service providers must be approved by the nominated project management representative before any waste is removed from site. These service providers must be audited on a two-yearly basis (or more frequently if deemed necessary based on risk) in order to ensure compliance with legislation and to help ensure that no liabilities accrue to the project.

14.15 Demarcation

No demarcation of floors is required inside offices, training centres and the like. Where it is impractical to paint floors, yellow lines will be deemed adequate e.g. where heavy traffic necessitates the continual painting of floors.

Temporary demarcation in the form of hazard tape (red and white) may be used to demarcate areas where there is, for relatively simple reasons, restricted access. Where hazards exist and entry must be specifically excluded for safety or health reasons, hazard tape in any form must not be used in isolation. A robust and substantial barrier of timber, rope or other material must be used in conjunction with barrier tape, to prevent entry to unauthorised persons.

Outside storage areas where it is impractical to use floor demarcation, demarcation may take the form of creosote poles and wire rope or similar. Spans between uprights should be painted yellow.

14.16 Occupational Hygiene

The contractor must ensure that the exposure or potential exposure of his employees to any of the following stressors is assessed and measured (a baseline survey must be carried out by an Approved Inspection Authority - this services to be provided by TGC):

- Noise;
- Thermal stress (heat and cold);
- Particulates (dust);
- Silica (free crystalline silica);
- Asbestos;
- Gases or vapours;
- Lead;
- Chemicals;
- Ionising radiation;

- Non-ionising radiation;
- Vibration (hand / arm vibration and whole body vibration);
- Ergonomics; and
- Illumination.

If it is determined that exposure levels for a particular stressor are unacceptable, then a monitoring and control plan must be implemented to manage any risk of overexposure.

Note: Where chemical substances are to be used as part of the construction process, the contractor must ensure that the chemical composition of each substance is known.

Carcinogenic (cancer-causing) ingredients must be specifically identified with due understanding that no chemical known to cause cancer will be permitted for use on site (an alternative will need to be sourced).

14.17 Hazardous Chemical Substances

No chemical substance may be brought onto site unless it has been approved for use by the nominated project management representative and it appears on the Approved Chemical Substances Register which will be made available to all contractors.
The register will contain the following information:

- Trade name / product name of substance;
- Manufacturer / supplier of substance;
- Maximum inventory;
- Storage requirements and precautions;
- Inventory of special emergency items held for handling spillages, fires, etc. (e.g. reagents to neutralise spillages, firefighting foam, etc.); and
- Approved disposal methods.

If the contractor wishes to make use of a chemical substance that does not appear on the register, then the contractor must provide the following information to the nominated project management representative for review PRIOR to bringing the substance onto site:

- A detailed 16-point Material Safety Data Sheet (MSDS) issued by the manufacturer / supplier of the substance;
- The reason for wanting to bring the substance onto site (i.e. the intended use of the substance);
- The proposed method of transportation;
- The proposed arrangements for the safe storage of the substance;
- The quantity to be stored on site;
- The proposed methods for handling / using the substance (including PPE);
- The proposed method of disposal of the waste;
- Proof that the contractor is able to readily provide the necessary first aid measures as specified in the MSDS; and
- A risk assessment covering the transportation, use, handling, storage and disposal of the substance with specific reference to the substance's compatibility with other chemicals.

This information must be provided at least five (5) working days prior to the date on which the contractor intends to bring the substance onto site for use.
Any chemical substance brought onto site without adherence to the requirements stipulated above shall be removed from site immediately.

If the nominated project management representative approves the substance for use, the contractor must ensure that all necessary precautions are taken concerning the transportation, use, handling, storage and disposal of the substance, and that all required PPE and first aid materials / equipment (as stipulated in the MSDS) are readily available on site.

The contractor must ensure that a Material Safety Data Sheet (MSDS) is obtained for each chemical substance brought onto site. A file, or files, containing all of the MSDS's must be maintained and must be readily available to all personnel on site (particularly first aiders) as well as other potentially affected parties (e.g. emergency services personnel, persons from the local community, etc.). The MSDS's must be in the language(s) commonly used on site.

The contractor must appoint a trained and competent Hazardous Chemical Substances Coordinator who understands and is able to evaluate the risks associated with a wide variety of substances. This person shall be responsible for:

- Assessing the hazardous properties and risks associated with all chemical substances brought onto site by the contractor and appointed sub-contractors (using the MSDS's);
- Determining precautions and safe practices for transportation, use, handling, storage and disposal (including PPE requirements) (using the MSDS's);
- Determining first aid and emergency response requirements / procedures (using the MSDS's);
- Maintaining the MSDS file;
- Managing and monitoring the consumption of inventory; and
- Providing an "as needed" service to site personnel and suppliers.

The risks associated with the transportation, use, handling, storage and disposal of all hazardous chemical substances brought onto site must be assessed and managed by the contractor through a process that incorporates risk reduction using the hierarchy of controls as described in Section 6.
Whenever a task-based risk assessment is carried out, consideration must be given to the use of chemical substances (e.g. greases, solvents, etc.).

The contractor must provide Safe Work Procedures for the transportation, use, handling, storage and disposal of all hazardous chemical substances to be used on site.

The contractor must provide his employees with all of the Personal Protective Equipment that is necessary to prevent exposure / injury while handling / using the hazardous chemical substances that they will be required to work with. Appropriate PPE must be selected with consideration given to the potential hazards, permeability, penetration, resistance to damage and compatibility with the work tasks.

The contractor's employees must be trained in the safe transportation, use, handling, storage and disposal of the hazardous chemical substances that they will be required to work with or may come into contact with. The training must specifically address PPE requirements (including the correct selection, fitment and use thereof).
All personnel must be trained to understand the potential health effects associated with exposure to hazardous chemical substances and therefore the importance of Safe Work Procedures and PPE. All personnel must be trained on emergency response procedures and first aid measures.

Behaviour-based observations and coaching must include the use / handling of hazardous chemical substances.

An appropriate occupational exposure monitoring and medical surveillance programme must be in place for all personnel potentially exposed to hazardous chemical substances which have the potential to cause immediate or long-term harm.

Emergency showers and eyewash stations must be provided where required by law, or where a risk assessment indicates a need. The emergency showers and eyewash stations must be appropriately located, signposted, and regularly tested and maintained. Employees must receive training on the location and use of the showers / eyewash stations.

An emergency response plan for incidents involving hazardous chemical substances must be in place. Regular and appropriately staged emergency drills (possibly involving external spill response and ambulance support services) must be held and lessons learnt must be incorporated into the emergency response plan.

The contractor must provide appropriate storage facilities for all hazardous chemical substances to be used on site. The storage facilities must be secure and protected from damage. They must also be designed for easy access for firefighting purposes. Where applicable, the storage facility must protect chemical containers from physical damage due to temperature extremes, moisture, corrosive mists or vapours, and vehicles.

The inventory of hazardous chemical substances stored on site must be kept to a minimum. The quantity of each chemical stored must be justifiable.

Storage and segregation requirements for all hazardous chemical substances to be used on site must be based on:

- The quantities of the substances stored;
- The physical state of the substances (solid, liquid or gas);
- The degree of incompatibility; and
- The known behaviour of the substances.

Access to areas where hazardous chemical substances are stored and handled must be limited and controlled.

Every chemical substance container must be adequately and clearly labelled to identify its contents, to indicate precautionary requirements for the substance, and to indicate the date of expiry (if applicable). Pipes used to transfer / convey / distribute chemical substances must be clearly identified (e.g. colour coding). Directional flow must be indicated where practical.
Before any item, equipment or empty container containing a chemical residue is disposed of as general waste, it must be properly decontaminated (where applicable). Before being disposed of, empty chemical containers must also be rendered unusable for carrying water (by puncturing, cutting or crushing them).

Hazardous chemical substance waste (i.e. redundant / expired hazardous chemical substances, containers containing residues, contaminated items / materials, etc.) must be disposed of in accordance with the applicable legislation.

Maintenance, inspection and testing schedules and procedures must be in place for critical equipment associated with hazardous chemical substances.
A system must be in place to ensure that the risks are assessed before any changes are made to equipment and / or processes for the transportation, storage, handling, use or disposal of a hazardous chemical substance.

A programme must be in place to continually investigate possibilities / opportunities for replacing hazardous substances with safer alternatives.

14.18 Fitness for Work

The contractor must develop and implement a programme to manage employee fitness for work. All employees working on site for whom the contractor is responsible (i.e. direct employees of the contractor as well as the employees of any appointed sub-contractors) must be subject to this programme.

All safety critical jobs (i.e. roles where fatigue or other causes of reduced fitness for work could lead to serious injury, illness or death to employees, significant equipment / plant damage, or significant environmental impact) must be identified and the risks associated with reduced fitness for work in these roles must be assessed.

A programme to manage these risks must be implemented, and it must include:

- Mechanisms for managing fatigue, stress and lack of fitness;
- An alcohol and other (including prescription, pharmaceutical or illicit) drugs policy that includes testing;
- An Employee Assistance Programme providing confidential access to resources and counsellors; and
- Training and awareness programmes.

Each employee has an obligation to present health and safety fit for work at the start of the day / shift, and to remain fit for work throughout the work period. Reporting for work under the influence of alcohol or any other intoxicating substance will not be tolerated. Any transgression concerning the alcohol and other drugs policy applicable to the project may result in the offending employee's access to the project premises being temporarily or permanently withdrawn.

Alcohol and drug testing on the project premises will be carried out randomly (as employees report for duty and during the course of the day / shift), following significant incidents (all persons involved), and whenever there is reasonable suspicion. Alcohol and drug testing may also be carried out as part of a Pre-Employment Medical Examination.

Sleep deprivation during shift work or from excessive working hours is a known cause of fatigue. Fatigued employees are at increased risk of accidents. Shift system design must consider:

- The effect on worker fatigue;
- The effects of activities carried out during scheduled and overtime hours;
- The impact on sleep cycles of activities such as commuting to and from site; and
- The monitoring and control of working hours.

The contractor is responsible for the administration of the working hours of his employees as well as the employees of any appointed sub-contractors. The maximum working hours

per day and the minimum rest times between shifts must be specified in the contractor's Health and Safety Management Plan and must comply with all applicable legislation.

All employees engaged in safety critical jobs must undergo fitness assessments (medical examinations) which must be carried out prior to the commencement of employment on the project, prior to a change in role, periodically based on an employee's individual risk profile, and on termination of employment on the project:

- Pre-Employment Medical Examination – to assess the physical suitability of the person for the role and environment in which he will work (carried out prior to the commencement of employment on the project and prior to induction);
- Periodic (Surveillance) Medical Examination – to assess the ongoing physical condition of an employee to determine if his role is impacting on his health and whether the employee's fitness level is still adequate for the role he holds (these medical examinations are "risk driven" – the specific protocol followed and the frequency of the examinations will depend on the applicable legal requirements and the employee's individual risk profile as determined by his personal fitness, the nature of his role / duties, and the environment in which he works / occupational health hazards to which he is exposed). The periodic medical assessment programme must include:
  - The identification of modifiable risk factors that may impact fitness for work;
  - Education and support to maintain health or address identified risk factors; and
  - Education and support to help employees regain their fitness for work.
- Role Change Medical Examination – to assess an employee's physical suitability for a different role and work environment (carried out prior to a change in role / duties);
- Exit (Post-Employment) Medical Examination – to determine the total physical impact of the work the employee performed (carried out on termination of employment on the project if the employee worked on the project site for more than six months).

Note: The results of an Exit Medical Examination from previous employment will not be accepted as a Pre-Employment Medical Examination.

Note: The medical examinations described above may only be carried out by an occupational medical practitioner (i.e. a medical doctor who holds a qualification in occupational medicine).

A detailed job (role) description and an exposure profile (noise, dust, heat, fumes, vapours, etc.) must be provided for each employee or group of employees. The medical examinations that an employee undergoes must be based on (i.e. the employee's fitness must be assessed against) the information contained in these documents as well as the baseline risk assessment for the work. This information must be made available to the occupational medical practitioner performing the medical examination.

For each role, the medical criteria for fitness must be documented and these must be based on an evaluation of the physical and medical requirements for the role.
Depending on the circumstances, certain vaccinations may need to be provided to employees.
The medical examinations carried out for all drivers and operators must include testing / assessment for medical conditions that could affect the safe operation of vehicles or equipment.

Specific testing / questioning must be carried out to determine if an individual:

- Suffers from epilepsy or any other medical condition deemed to be a risk by the occupational medical practitioner;
- Makes use of chronic medication that could affect performance;
- Is colour-blind; or
- Has poor day or night vision.

The medical examinations carried out for employees that are required to work at height must include testing / questioning to determine if an individual suffers from epilepsy, hypertension (high blood pressure) or any other medical condition deemed to be a risk (with regard to working at height) by the occupational medical practitioner.
Electricians must be tested for colour-blindness.

With regard to the placement of new employees:

- Prospective employees must be referred to a suitable occupational medical practitioner (doctor) for a "Pre-Employment Medical Examination";
- If an individual is found to be medically "unfit for placement", the doctor will indicate which work activities cannot be performed by the person;
- The individual may still be employed on the project if his medical restrictions can be accommodated and provided that no legislation is transgressed.

A process must be established to manage medical restrictions that may be placed on an employee. For every employee with a medical restriction, regular follow up visits with the occupational medical practitioner must be arranged to ensure that each case is proactively managed.

An employee in a safety critical job must report (to his supervisor) any condition that might impair his ability to safely perform the duties associated with his role. A mechanism must be in place for such reports to be referred to an occupational medical practitioner to determine if the employee is fit to continue with his work.
Proof of all medical examinations (i.e. certificates of fitness signed by an occupational medical practitioner) must be kept on site and these records must be readily available for inspection by the nominated project management representative.

An employee's certificates of fitness must be included in his Personal Profile (dossier). If an Employee Personal Profile (dossier) hasn't already been compiled for a particular employee, then this must be done without delay following the employee's Pre-Employment Medical Examination.
No employee in a safety critical role may commence work on site without proof that he has undergone a Pre-Employment Medical Examination.

Occupational medical examinations and data interpretation may only be carried out by medical practitioners that are appropriately qualified and certified to do so.
Occupational medical data contained in reports to management must be grouped and summarised to ensure that the confidentiality rights of each individual employee are maintained.
All occupational medical data and records must be retained for at least 40 years.

15. Emergency Preparedness and Response

The contractor must develop, implement, test and maintain an Emergency Response Plan (incorporating emergency evacuation procedures) that focuses specifically on the

contractor's team and work activities. The plan must be risk-based and must detail the procedures that must be followed when responding to all potential emergency scenarios such as a medical emergency (including first aid response), a fire, an explosion, a hazardous substance spill, flooding, rescue from height, rescue from a confined space, etc.

The contractor's Emergency Response Plan must be aligned with the Emergency Response Plan developed for the project.
Potential off-site emergency scenarios must be included (e.g. emergency scenarios related to the transport of personnel, the transport of hazardous materials, and personnel performing work in remote locations).

Consideration must be given to neighbours, and to the availability and capability of local emergency services. Details of any arrangements with external emergency response service providers must be included.
The Emergency Response Plan must satisfy and comply with all applicable legal requirements.
The plan must be adequately resourced to ensure effective implementation. These resources must include appropriate personnel, external emergency response service providers, emergency response equipment, and warning devices. All equipment and warning devices must be identified, maintained and tested to ensure availability at all times.

Accountability for the Emergency Response Plan must be clearly defined. An Emergency Response Team (ERT) responsible for the implementation, management and execution of the Emergency Response Plan must be established. The roles and responsibilities of each team member must be clearly defined in the plan. Each team member must receive appropriate training to ensure that each role is performed competently.

The process for managing incident communication, notification, and reporting must be incorporated into the Emergency Response Plan. The responsible person(s) must be clearly identified, and the protocols for communicating with internal and external stakeholders must be defined.
Emergency evacuation procedures must be developed and included in the Emergency Response Plan.
A copy of the plan must be provided to the nominated project management representative for approval prior to site establishment.
The Emergency Response Plan must be formally reviewed (and amended if necessary) on at least an annual basis, and following any emergency situation, to ensure that it remains appropriate and effective.
At each project work site:

- A suitable evacuation alarm (siren) must be provided. If work is to be carried out in proximity to an existing operational plant, the alarm provided by the contractor must be distinctly different (in terms of the sound that it generates) to any alarm installed in the operational plant. All persons working in an area where an evacuation alarm is sounded must respond to it immediately.
- Suitable fire-fighting equipment must be provided and maintained, and personnel must be trained in fire-fighting procedures and the use of fire-fighting equipment.
- Suitable first aid equipment and supplies must be provided and maintained, and an adequate number of appropriately trained First Aiders must be in place (refer to Section 14.2).

- Emergency assembly points positioned in safe locations away from buildings, plant and equipment must be designated (and conspicuously signposted). In the event of an evacuation, all persons (i.e. personnel and visitors) must assemble and be accounted for at these emergency assembly points.
- All personnel must receive awareness training on the applicable emergency response procedures, and all visitors entering the site must be properly instructed in these procedures.
- The emergency response procedures must be displayed on each notice board.
- A diagram (site plan) indicating evacuation routes, emergency assembly point locations, and the positioning of emergency equipment (fire extinguishers, first aid boxes, etc.) must be prominently displayed in all buildings and plants, in all offices, on all notice boards, and in other locations on the site as may be required.
- An up-to-date list of emergency telephone numbers must be compiled and maintained. A copy of this list must be posted at each site entrance, in each office, near each telephone, and on every notice board.
- Emergency response drills must be conducted to test the effectiveness of the emergency procedures and equipment, as well as the knowledge and proficiency of the response personnel. Where appropriate, drills must include liaison with and the involvement of external emergency response service providers. A variety of emergency scenarios must be tested including, but not limited to, medical emergencies, fires, rescues, and hazardous substance spills. A drill must be carried out one month after site establishment and six-monthly thereafter.

Each drill must be monitored and the outcomes (highlights and shortcomings) must be documented. Corrective actions must be identified and implemented to address the shortcomings, and the Emergency Response Plan and associated procedures must be amended as required.

15.1 Fire Fighting

The contractor must ensure that Fire Fighting requirements are met.

15.2 First Aid

The contractor must ensure that First Aiders are trained and appointed as described in (Section 9.5)

15.2.1 First Aid Kits

A suitable first aid kit (i.e. appropriate to the level of training) must be readily available to each First Aider. All kits must be provided and maintained by the contractor.

Taking into account the type of injuries that are likely to occur in the workplace, each first aid kit must contain suitable equipment and supplies. First aid equipment and supplies required by applicable legislation must be provided as a minimum.

The contents of each first aid kit must be kept clean and dry. Each kit must be contained in either a portable weatherproof case / bag or a steel box mounted to a fixed structure. Access to first aid equipment / supplies must be limited to train First Aiders only. Access to portable kit bags must be controlled and steel first aid boxes mounted in the workplace must be kept locked.
Approved signage must be in place to indicate the locations of the first aid boxes / bags.

A record of each treatment administered must be kept in a suitable register.

The first aid kits must, as a minimum, contain the following equipment and supplies:

Table 20.2.1-1 Minimum Requirements to be included when equipping first aid boxes

Item 1:	Wound cleaner/ antiseptic – 100ml;
Item 2:	Swabs for cleaning wounds;
Item 3:	Cotton wool for padding – 100g;
Item 4:	Sterile gauze – minimum quantity 10;
Item 5:	1 x Pair of forceps – for splinters;
Item 6:	1 x Pair of scissors – minimum size 100mm
Item 7:	1 x Set of safety pins;
Item 8:	4 x Triangular bandages;
Item 9:	4 x Roller bandages – 75mm x 5m;
Item 10:	4 x Roller bandages – 100mm x 5m;
Item 11:	1 x Roll of elastic adhesive – 25mm x 3m;
Item 12:	1 x Non-allergenic adhesive strip – 25mm x 3m;
Item 13:	1 x Packet of adhesive dressing strips – minimum quantity 10 assorted sizes;
Item 14:	4 x First aid dressings – 75mm x 100mm;
Item 15:	4 x First aid dressings – 150mm x 200mm;
Item 16:	2 x Straight splints;
Item 17:	2 x Pairs large and 2 x pairs medium disposable latex gloves;
Item 18:	2 x CPR mouth pieces or similar devices.

Additional items / supplies may need to be provided depending on the nature of the workplace (specific hazards) and the level of training of the first aider in position of the kit.

16. Management Review

A review of the contractor's Health and Safety Management System must be completed annually to ensure that the system continues to be effective in managing health and safety performance and meeting project requirements.

The review must evaluate if there is any need for change and must identify actions to improve the system.

The review must be led by senior management and the following must be considered:

- The suitability of the policy adopted for the project;
- The impact of changing legislation;
- The management of risk;
- Health and safety objectives and performance indicators;
- Changing expectations and requirements of relevant stakeholders;

- Changes to the contractor's scope, schedule, designs, etc.;
- Changes to the contractor's organisational structure;
- Communication and feedback (particularly from employees, Project representatives, and client representatives);
- The effectiveness of the management of change process;
- Workplace exposure monitoring and medical surveillance;
- The status of corrective actions;
- Performance statistics, including an annual summary of safety statistics, and occupational hygiene monitoring and medical surveillance results;
- Non-conformances (findings) from completed audits;
- Follow up on actions from previous management reviews; and
- Recommendations and opportunities for improving the effectiveness of the management system.

A record of each completed management review must be retained and it must include all decisions and identified actions concerning alterations, modifications or improvements to the management system that demonstrate a commitment to continual improvement.
For occupational hygiene: **Approved Inspection Authority (AIA) for Occupational Hygiene**

17. Management of Change

To ensure that proposed changes do not give rise to unacceptable health or safety risk, the contractor must develop and implement a process for identifying and managing change in the workplace (e.g. changes to scope, schedule, procedures, work methods, site conditions, designs, plans, plant and equipment, materials, processes, etc.) that may impact on health or safety performance.

The management of change process must take into consideration that changes may be planned or unplanned, sudden or gradual, temporary or permanent.

The process must aim to ensure that:

- Changes are identified and assessed before they are implemented;
- Careful consideration is given to managing the risks associated with any change;
- Due diligence can be shown to have taken place;
- The number of unsatisfactory or unnecessary changes is minimised;
- The right people are involved in the change process; and
- All statutory requirements are met.

All risks associated with a proposed change must be evaluated and ranked. The risks that are ranked as moderate or higher must be managed to prevent serious injury or illness.

It must not simply be assumed that a change will not result in significant risks. All proposed changes must be formally evaluated. The evaluation or review must include:

- An appropriate level of technical expertise;
- The involvement of the workforce potentially affected by the proposed change; and
- Approval of the change by a person with at least the same level of authority as those who control the existing process or item being changed.

18. Incident Reporting and Investigation

The contractor must establish a procedure for the management of all health and safety incidents. This procedure must define the responsibilities, methodologies and processes that must be followed for:

- Reporting an incident;
- Investigating an incident;
- Analysing an incident to determine the root cause;
- Identifying and implementing corrective actions to prevent a recurrence; and
- Communicating information concerning an incident to relevant persons and / or groups.

Please Note: Arrangements must be in place to ensure that proper medical care is provided to any contractor (or sub-contractor) employee that suffers an occupational injury or illness (refer to Section 15). These arrangements must be described in the contractor's Health and Safety Management Plan.

An incident may have multiple impacts. For each impact, the Actual Consequence and the Maximum Reasonable Outcome must be evaluated. Each impact must be evaluated independently, with the most significant classification forming the primary rating of the incident.

A Near Hit is an incident. All Near Hits must be reported.

The Maximum Reasonable Outcome (MRO) is based on a risk evaluation of the maximum reasonable consequence of an impact and the likelihood of the event occurring again given a reasonable failure of existing controls. Using the matrix referred to above, each impact must be evaluated and classified as:

- Low;
- Moderate;
- High; or
- Extreme.

An incident must be reported on the same work day or shift on which it occurs and preliminary details must be recorded
Depending on the Actual Consequence and Maximum Reasonable Potential Outcome of the impact(s), the relevant internal and external parties must be notified in accordance with specified protocols and timeframes, and legislative requirements.

In the event of a significant incident (i.e. an incident with an Actual Consequence of Moderate, Major or Catastrophic, or a Maximum Reasonable Potential Outcome of High or Extreme, work must cease and must only resume once the necessary actions (including the re-evaluation of any relevant risk assessments) have been taken to eliminate or reduce the risk of recurrence. Work must only be permitted to recommence once formal authorisation has been granted by the Project Construction Manager. In the case of incidents with an Actual Consequence of Major or Catastrophic, work must not be permitted to recommence until authorisation has been granted by the relevant government authorities (i.e. the South African Police, the Department of Labour or the Department of Mineral Resources).

The Contract Manager must ensure that an investigation is completed for each incident that occurs, and that appropriately senior personnel participate in, and authorise the

outcomes of, each investigation. Incident investigations must be facilitated by competent and experienced persons who have been trained in the appropriate methodology.

All significant incidents (i.e. incidents with an Actual Consequence of Moderate, Major or Catastrophic, or a Maximum Reasonable Outcome of High or Extreme must be investigated using the approved Transnet investigation methodology. Such an investigation must be facilitated by a trained project representative within 7 calendar days.

For all other incidents (i.e. incidents with an Actual Consequence of Insignificant or Minor, or a Maximum Reasonable Outcome of Low or Moderate other methodologies approved by the Project Health and Safety Manager must be used.

Each incident (including Near Hits) must be investigated to a level of detail that is appropriate for the Maximum Reasonable Potential Outcome of the incident.

Each incident must be analysed to determine the root cause, and corrective actions must be identified and prioritised for implementation to eliminate or reduce the risk(s) in order to prevent recurrence of the incident.

For each corrective action, a responsible person must be designated and an appropriate timeframe (target date) for completion of the corrective action must be specified. Progress on implementing corrective actions (i.e. closing incidents) must be monitored and reported on. The implementation of corrective actions must be verified during monthly audits by the Project Health and Safety Advisors but also no later than 30 calendar days after the conclusion of the incident investigation.
The contractor must document the results of each investigation and a report must be submitted to the nominated project management representative within five working days of the incident occurring.

As a minimum, each incident report must include:

- The date, time and location of the incident;
- A detailed description of the incident, including photographs;
- The names of any injured persons;
- Injury details (if applicable);
- A summary of the first aid and / or medical treatment provided (if applicable);
- The current status of any injured persons;
- The root causes of the incident; and
- Detailed corrective actions, including responsible persons and target dates for implementation.

Each significant incident must be summarised for its lessons learnt following the investigation. This information must be reviewed by the contractor's Project Manager to assure completeness, accuracy and relevance before it is shared with (communicated to) all project personnel.

19. Non-conformance and Action Management

The contractor must establish a process for identifying and recording corrective actions arising from:

- Incident investigations;
- Hazard identification and risk assessment;
- Measurement and monitoring;

- Improvement plans and suggestions;
- Managing change;
- Audits and inspections; and
- Safety observations and coaching (safety interactions).

The contractor must establish a procedure for managing actions that addresses:

- Identification, categorisation and prioritisation of actions;
- Formal evaluation and approval of actions (management of change process);
- Assignment of responsibilities, resources and schedules for implementation;
- Implementation of actions;
- Tracking and reporting on implementation status; and
- Monitoring and verifying the effectiveness of the actions.

20. Performance Assessment and Auditing

The contractor must establish and maintain programmes for measuring and monitoring HEALTH AND SAFETY performance on a regular basis. Metrics must include leading and lagging indicators, and be based on qualitative and quantitative data.

20.1 Inspections

On a monthly basis, the health and safety management system and workplace activities of the contractor will be audited by a Project Health and Safety Advisor to assess compliance with the project health and safety requirements. Any deviation from these requirements (i.e. non-conformance) that places the health or safety of any person in immediate danger will result in the specific activity being stopped until the non-conformance is corrected.

For each non-conformance determined during any audit, the contractor must identify and implement appropriate corrective actions.

For each corrective action, a responsible person must be designated and an appropriate timeframe (target date) for completion of the corrective action must be specified. Progress on implementing corrective actions (i.e. closing non-conformances) must be monitored and reported on. The implementation of corrective actions will be verified during the monthly audits.

Should it be determined that the contractor's level of compliance is unsatisfactory, all work being performed by the contractor on the project site may be stopped (at the contractor's expense) until an investigation into the reasons for the poor performance has been carried out, a corrective action plan has been developed, and corrective actions have been implemented.

In addition to the audit carried out by the Project Health and Safety Advisor, the contractor must carry out an internal audit on a monthly basis to assess compliance with the project health and safety requirements (including the requirements of this specification and the contractor's Health and Safety Management Plan). Furthermore, the contractor must ensure that each appointed sub-contractor is audited and measured to the same standard. Copies of these audit reports must be submitted to the Project Health and Safety Advisor on a monthly basis.

The contractor must carry out internal health and safety inspections as follows:

- General site health and safety inspections on a daily basis; and

- Inspections of plant, tools and equipment prior to establishment or use on site, and at least monthly thereafter.

All audits and inspections must be carried out by competent persons who have been appointed in writing.

A schedule of planned audits and inspections must be compiled and maintained ensuring that:

- All work areas and all activities are covered at regular intervals;
- All applicable legal requirements are complied with; and
- Areas or activities with significant associated hazards or risks receive greater attention.

21. Covid 19 Management

The contractor is to implement occupational health and safety measures to (reduce and eliminate) the escalation of COVID-19 infections in workplaces as set out in the Schedule adopted by the Minister of Employment and Labour, in terms of Regulation 10(8) of the National Disaster Regulations (Act No. 57 of 2002) and comply to all COVID-19 related guidelines issued by the government in this regard.

Annexure A

Applicable Sections

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   - 7.1. Baseline Risk Assessments
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15. Emergency Preparedness and Response
15.1. Fire Fighting
15.2. First Aid
15.2.1. First Aid Kits

16. Incident Reporting and Investigation

17. Non-conformance and Action Management

18. Performance Assessment and Auditing
18.1. Reporting on Performance
18.2. Audits and Inspections

SIGNATORIES

DEVELOPED BY RISK SPECIALIST: _____

_____ _____
SIGNATURE **DATE**

REVIEWED BY PORT RISK MANAGER:_____

_____ _____
SIGNATURE **DATE**

APPROVED BY PROJECT MANAGER: _____

_____ _____
SIGNATURE **DATE**

Annexure D: EMP Guidelines

Port of Durban
EMP Guidelines
(Construction, Operational & Decommissioning)

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Preface

The Environmental Department (HQ) started to develop an Environmental Management Framework (EMF) to incorporate environmental management within TNPA processes. Through this process, it was realized that this sectorial approach was not the most adequate to implement sustainable development within TNPA core business. The decision was then taken to adopt a more integrated and comprehensive approach to address sustainability challenges within TNPA. This strategic shift is the rationale behind the development of a Sustainability Management Framework (SMF).
The SMF purpose is to indicate and clearly depict how and where intervention is required into internal business unit process in order to effectively address sustainability related matters and provide guidance to achieve the sustainable development objectives of the Transnet National Ports Authority.

***Abbreviations*:**

1. **SMF** **:** Sustainability Management Framework
2. EMS **:** Environmental management System
3. EMP **:** Environmental Management Plan/Program
4. CEMP **:** Construction Environmental Management Plan
5. OEMP **:** Operations Environmental Management Plan
6. DEMP **:** Decommissioning Environmental Management Plan
7. Enviro **:** Environment/Environmental
8. SEA **:** Strategic Environmental Assessment
9. EIA **:** Environmental Impact Assessment
10. ES **:** Environmental Specification
11. DEA **:** Department of Environmental Affairs
12. DWA **:** Department of Water Affairs

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1. Introduction

Most of the global environmental assessment practice appears to be directed at the scoping and assessment stages of EIAs. The mitigation, monitoring and management components of EIAs receive less attention. Attention is now being focused on the need to demonstrate that impacts can be monitored and managed. The EMP is recognized as the tool that can provide the assurance that the project proponent has made suitable provision for mitigation. The EMP is the document that provides a description of the methods and procedures for mitigating and monitoring impacts. The EMP also contains environmental objectives and targets which the project proponent or developer needs to achieve in order to reduce or eliminate negative impacts.

The EMP document can be used throughout the project life cycle. It is regularly updated to be aligned with the project progress from construction, operation to decommissioning. EMPs provide a link between impacts predicted and mitigation measures specified in the EIA report, or risk assessment and the implementation and operational activities of the project. EMPs outline the environmental impacts, the mitigation measures, roles and responsibilities, timescales and cost of mitigation.
Three broad categories of EMPs can be recognized in the project lifecycle. They are the construction phase EMP, operational phase EMP and decommissioning EMP. The main objectives of these EMPs are all the same, namely to:

- Identify the possible environmental impacts of the proposed activity; and
- Develop measures to minimize, mitigate and manage these impacts.

The difference between these EMPs is related to the difference in mitigation actions required for the different stages of the project life cycle.
The development and implementation of a successful EMP has benefits beyond merely meeting legal obligations. EMPs are not just required for developments and projects that have undergone an EIA but according to NEMA all activities and development affecting the environment in a negative way must have an EMP. An EMP also contributes to environmental awareness of the workforce and empowers and educates employees on the importance of protecting the environment against possible negative impacts.

2. EMP Development

It is the stated goal of Transnet National Ports Authority (TNPA) to implement sustainable environmental management practices within all South Africa's commercial ports. This applies to the planning, design, construction, operation, restoration, reuse and decommissioning activities and the development of port related infrastructure.

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These guidelines indicate the matters that should be considered in preparing construction and operational environmental management plans (EMPs). These guidelines are not definitive but provide guide to the basic requirements for EMPs.
It is important to note that all development undertaken on port land will require a construction, operational and decommissioning EMP. All these documents will be captured within the lease agreements signed between the parties. With regards to the decommissioning EMP, it might not be possible and necessary for it to formulated and submitted for approval at initiation of project but at a reasonable timeframe (e.g. 6 months-short term leases, 2 years long term leases) before decommissioning and vacation of land or infrastructure. The scope and terms of reference can however be agreed upon signing of the lease. An EMP should always be prepared specifically for the location where the development occurs, having regard to the specific nature of the development activities.

Generic and non-site-specific EMPs will not be accepted. Depending on the nature of construction and operation of the proposed development, technical information may need to be provided. Specialised consultants may need to be engaged to prepare this information.
It is important that anyone requiring or preparing an EMP consider consulting with the Environmental Staff of the Transnet National Ports Authority of South Africa (TNPA). This will allow timely assessment of the EMP and prevent delays as well as submission of unnecessary information. The organization may also be able to assist you in preparing your EMP or have information that you need.

3. Environmental Impact Assessments (EIAs)

EIAs are required for certain types of developments in terms of the Environmental Management Act (Act 109 of 1998) as amended in GNR 385,386 and 387. This set of legislation lists some activities that are subject to the EIA process. Examples of some of these activities are construction in a sensitive area, development of structures below the high water mark e.g. quays, moorings, breakwaters, etc.

The National Environmental Management Act (NEMA) also requires that all construction or development works be accompanied by an EMP irrespective of the nature and scale, so even if an activity does not feature in the ECA's listed activities, it still requires environmental controls to be in place. These CEMP or method statements can also be sent to the Dept. of Environmental Affairs for approval.

4. Construction EMPs
4.1 Background

A construction EMP (CEMP) is a practical and achievable plan of management to ensure that any environmental impact during the construction phase is minimized. The CEMP is accompanied by Method Statements which depicts or describes mitigation measures for their proposed operational methods. In preparing a CEMP, consideration should be given to the issues discussed below. The CEMP must be site specific and detail measures that will be employed on the site to minimize any

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adverse environmental impact. Importantly, the CEMP must include a 'schedule of works' indicating the timing of the construction activity.

For construction and development activities which are initiated by TNPA itself a Construction Environmental Specification (ES) will be compiled. These ESs incorporate specifications, together with guidance for 'good environmental practice' for construction work. It will be prepared by the TNPA Environmental Department which will be responsible for the preparation of tender documentation for the construction of infrastructure. The successful contractor will then be required to submit a CEMP to TNPA to indicate how they intend meeting the TNPA requirements, as stipulated in the ES. In essence this ES will act as the EMP which then indicates the environmental requirements that will need to be met in undertaking the works. The complexity and detail of the ES will vary, based on the nature and scale of the project. In some cases this ES can also be drawn up by independent consultants or alternatively sent for external review.

For construction activities based on application or proposal from an external client or tenant this guide will aid contractors in drawing up an EMP in line with the requirements of TNPA. As mentioned before the EMP must be specific to nature and scale of development as well as be accompanied by an EMP for the operational phase (OEMP). More of the operational EMP (OEMP) will be discussed further in the document.

4.2 Purpose

The purpose of the CEMP is to ensure good environmental management practices are undertaken with all works done in the port and that minimal impact is inflicted on the environment. It also ensures adherence to TNPA Environmental Policy, legislative requirements and those objectives from Strategic Environmental Assessments (SEAs) are met together with the conditions of EIA RoDs, where applicable.

The CEMP should specify all potential environmental impacts, control measures, performance criteria, and mitigation strategies, together with relevant monitoring and reporting procedures.

Annexure 1

These guidelines present an example of a CEMP (only partially). It is not mandatory to use this format; however, it may be used as a guide and demonstrates the type of issues that may need to be addressed on a specific project. Some guidance on the key environmental issues to be addressed can be found in Fig 1.5. In addition, any contingency plans for unforeseen circumstances or impacts that may arise needs to be included in the CEMP.

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The CEMP is a dynamic document, which may be subject to change or modifications as a result of site developments or changes on site.

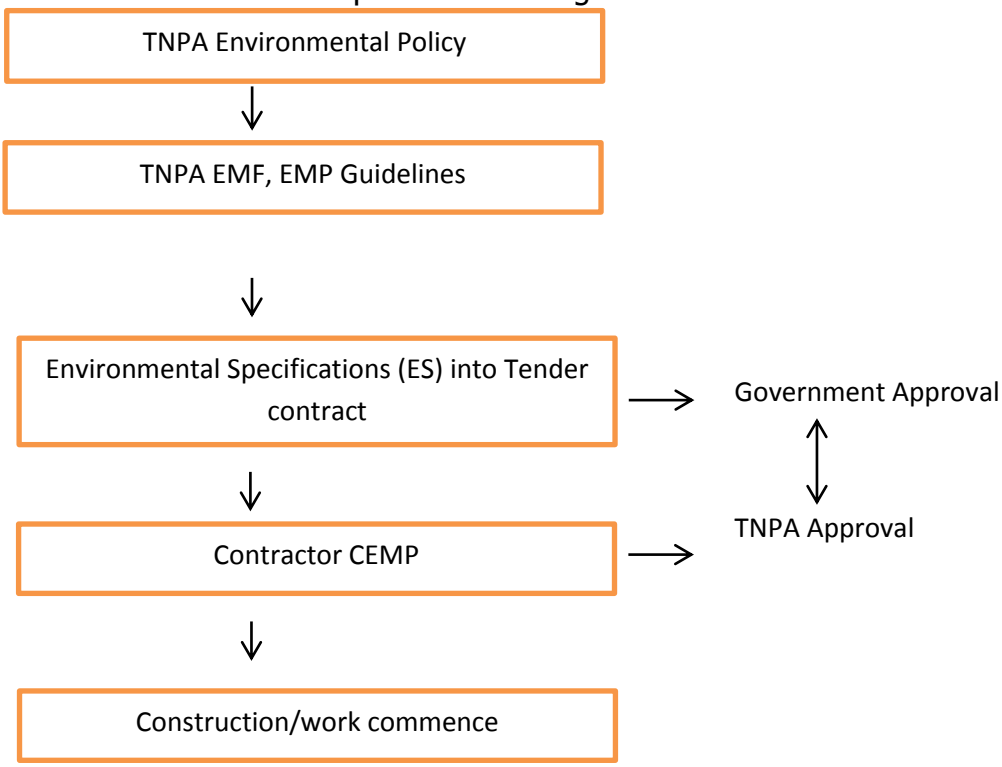
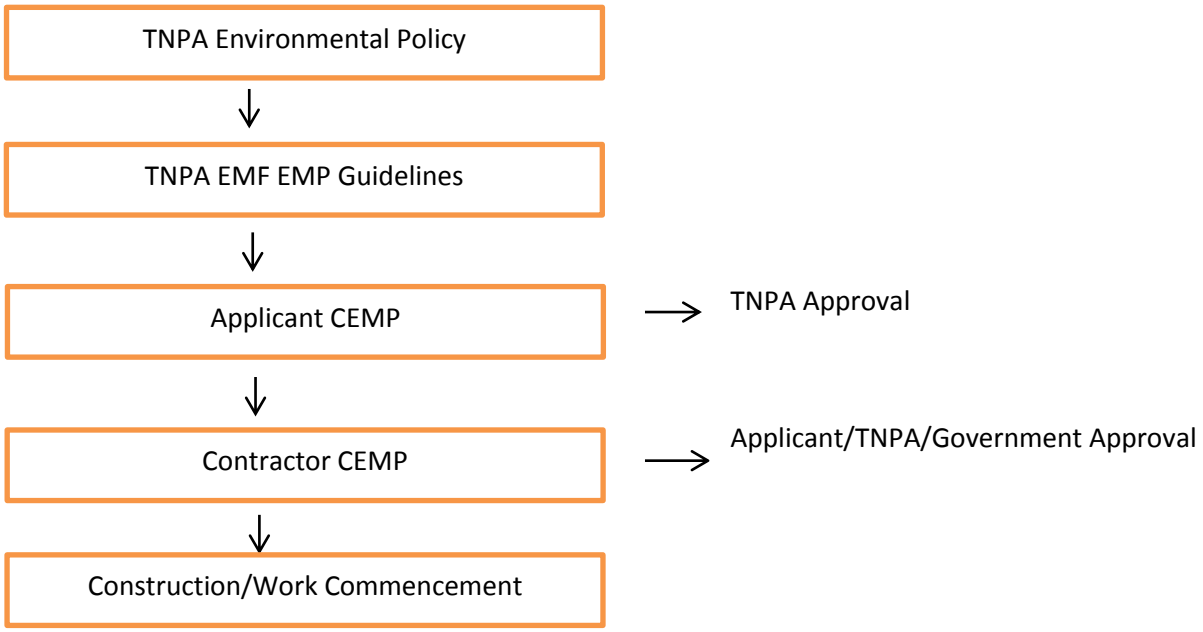


Fig 1.3 TNPA CEMP approval tree for construction and development activities which are initiated by TNPA.



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Fig 1.4 TNPA CEMP approval tree for construction activities based on application or proposal from an external client or tenant.

4.3 Implementation

No construction activities can commence on port property until a CEMP has been accepted in writing by TNPA. Furthermore, no work can commence on the site until the 'pre-start site inspection' has been held on site or appropriate agreement has been reached with the Port's Environmental Department. Ideally, a CEMP will be submitted with the development application; however, where contractors have not been appointed at the time of making the development application, the requirement for a CEMP will be a condition of approval, which will require the document to be lodged at least one week prior to the planned construction commencement date.

4.4 Structure of the CEMP

The following sections detail the various components of the CEMP. The level of detail required is, however, dependent on the size and nature of the development, and the sensitivity of the surrounding environment.

4.5 Introduction

- This should include an overview of proposed works, the scope of the development and the layout of the works site, including size and location. It should contain site-specific details, such as:
- The address and real property description of the site;
- Details of the developer/contractors, and key groups or individuals who may be associated with the project; and
- Details of the type and duration of the construction phase.

Table 1: A summary of key environmental issues associated with the works at the site should be presented.

Key Environmental Issues	
➢ **METHOD STATEMENTS** ➢ **GENERAL SITE PROCEDURES** ➢ Demarcation of Environmentally Sensitive Areas ➢ Location of camp and depot ➢ Demarcation of the site ➢ Access and traffic control ➢ Toilets ➢ Domestic waste water	➢ Materials use, handling, storage and transport ➢ Emergency procedures ➢ Social issues **SITE CLEARANCE** ➢ Removal of endemic and endangered species ➢ Removal of top soil ➢ Stabilisation of steep slopes

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➢ Refuse ➢ Dredging ➢ Protection of the fauna and flora ➢ Defacement of natural features ➢ Protection of archaeological and paleontological sites ➢ Effluent and storm water management ➢ Seawater turbidity levels ➢ Dust control ➢ Noise control ➢ Underwater (and other) blasting	➢ Removal of alien vegetation **SITE REHABILITATION** ➢ Scoping ➢ Landscaping and preparation for re-vegetation ➢ Seeding **MANAGEMENT AND MONITORING**: ➢ General inspection and monitoring ➢ Scientific monitoring ➢ Environmental awareness training/inductions ➢ Documentation ➢ Incentives and penalties ➢ External audit ➢ **MEASUREMENT AND PAYMENT**

The role of this section is to identify those areas, issues or values that may be impacted by the development. Risk assessment methodologies can be used to assess the potential environmental impacts, and prioritize preventative and remedial management strategies or actions.

4.5.1 Summary of Key Environmental Issues

A summary of key environmental issues associated with the works at the site should be presented (Table 1). Issues to be covered may include:

- Erosion and sediment control (including wind and water erosion, depending on the environment)
- Acid sulphate soil management
- Water-quality management
- Waste management
- Air-quality management (dust and vehicle emissions)
- Historical or cultural heritage
- Noise management
- Flora and fauna
- Land contamination

The role of this section is to identify those areas, issues or values that may be impacted by the development. Risk assessment methodologies can be used to assess the potential environmental impacts, and prioritise preventative and remedial management strategies or actions. The erosion and sediment-control management plan should also pay attention to the management of existing gully inlets downstream of the construction site.

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4.5.1 Management responsibilities

This section should outline tasks associated with the development and implementation of the CEMP, and nominate the responsible staff members. It may include the roles and responsibilities of the following people:

- Project Manager
- Site Supervisor
- Project Engineer
- Site Foreman
- Site SHE Officer/Manager
- Employees (and sub-contractors)

4.5.2 Monitoring & Reporting

This section outlines the key elements to be monitored and reported over the duration of the project, including the maintenance period. These may include Environmental Audits, Environmental complaints and corrective action reports and register, and scheduled inspections by TNPA and government officials.
The CEMP is to acknowledge that a *'pre-start inspection'* meeting is to be held – to ensure the approved CEMP, including the specified environmental controls for the site, is understood by all parties (contractors/developers/TNPA etc.). Additionally, the TNPA may also conduct audits throughout the construction phase as follows:

- *'project half complete inspection'* – to ensure work is being carried out in accordance with the approved CEMP;
- *'pre-completion inspection'* – to ensure all parties are clear on what will occur in the final stages of the construction work and what environmental issues are to be addressed; and
- *'project completion inspection'* – to ensure work has been completed in accordance with the approved CEMP and that no other matters require further work.

TNPA staff may also conduct spot inspections at any time during the project.

4.5.3 Key Management Plans

For each issue identified, key management plans should be prepared. These can be presented in tabular format (refer **Annexure1**), which outlines:

- The management requirement;
- The action required to address the management requirement;
- The responsible person undertaking the action
- The timing for completing the action.

The CEMP provides the framework for managing environmental issues on the site during the construction phase. TNPA actively monitors (audits) the performance of the CEMP through site inspections and detailed environmental audits. The CEMP therefore forms part of the contract obligation since the EMP Guidelines and ES will accompany the tender and contract documentation.

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4.5.5 Site Plan

A site plan must be attached to the CEMP. The plan should detail the spatial location of any proposed key developments on the site (building structure etc.), natural features (waterways, sensitive vegetation etc.), and any environmental control measures, e.g. erosion controls. A copy of this plan should be displayed at the site office at all times, and be updated and amended as works progress.

5. Operating EMPs
5.1 Introduction

An Operational Environmental Management Plan (OEMP) is focused on sound environmental management practices, which will be undertaken to minimize adverse impacts on the environment through normal operation of the facility. In addition, an OEMP identifies what measures will be put in place or will be required to manage any incidents and emergencies that may occur during the operation of the facility.

All activities undertaken on Port property require OEMPs as part of the TNPA lease agreement. The OEMP will be assessed as part of the lease adjudication process and forms an integral part of the lease agreements to be undersigned between TNPA and tenants of the Ports. Where the development involves an Environmental Impact Assessment (EIA) and approval of the OEMP might be undertaken National or Provincial government, Departments of Environmental Affairs (DEA).

An OEMP can also form the basis for an Environmental Management System (EMS) to be implemented both if development is to be undertaken with a construction phase before operations as well as when within existing infrastructure. TNPA encourages the implementation of an EMS based on the principles of the ISO 14001 international standards. A broad overview and implementation schedule needs to be provided in advance.

5.2 Mandatory Information

All information listed below is mandatory for an OEMP. If the OEMP forms part of a development application, most of the information below will be included in any case. **Note** that the applicant will typically be the entity undertaking construction or the entity undertaking the activity on site once it has been constructed. All applicants will also not necessarily be developing on port land but may also utilize existing infrastructure, in this case an OEMP and EMS outline must still be submitted in the prescribed format.
Information that must be provided about the proposal and associated OEMP includes:

- A real property description of the subject land;
- The postal address of the subject site (where possible);
- Full name and postal address of the applicant;
- The applicant's company name where applicable);

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- Details of the activities that are to be undertaken and how activities will be managed;
- A scaled (dimensional) site plan (concept), including buildings, structures, drains and other site features relevant to the OEMP;
- Plans (concept) showing the proposed locations of all discharge and emission points to the environment, including where air, noise, liquids, dust, wastewater, smoke, vapours and any other contaminants are emitted; and
- Specific details and design of individual components/devices (such as dust/emission/odour extractors, waste water treatment facilities, etc.).

Note that as much information as possible should be included in a plan. Using a plan clearly indicates the site-specific features as they are to be located on the site. A report should accompany the plans to complete the information required for review of the OEMP.

5.3 Detailed description of the proposed activity

It is essential that the applicant includes detailed description of the proposed activity in the OEMP, as it may form the basis for any licensing/permit conditions that may be requested by the organization or government departments, e.g. Dept. of Environmental Affairs (DEA), Dept. of Water Affairs (DWA), etc.

The description to include information on:

- Processes being undertaken and any emissions associated with the activity;
- Plans of the site and surrounding area, and location of any discharge points;
- Any nearby activities or environmental attributes that may be of relevance to the activity;
- An outline of the proposed operations and activities, including transport movements; and
- An assessment of risks and hazards, and measures to minimise these.

5.4 Details of any (actual & potential) emissions or other wastes and contaminants

This section is to provide details of the scale, intensity and regularity of actual and potential emissions expected as part of normal operations. Information that should be provided includes:

- Quantity, regularity, concentration and description of actual and potential emissions and contaminants;
- The name and exact location of equipment giving rise to such discharges and emissions;
- The name and exact location of equipment used in the processing, reprocessing, treatment and/or discharge of wastes (on and off site);
- Treatment, recycling and/or reprocessing either on or off site; and
- Disposal and/or storage on or off site.

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5.5 Site Environmental Induction

All personnel entering or working in the site must receive an induction covering all relevant environmental, safety, health and security issues. The extent of the induction should be based on the length of time for which the person will be on site, the activities that they will be undertaking and the risks to which they will be exposed. In particular, the induction must provide information on known environmental risks relating to site activities and site emergency plans. No person will be issued with Port access permits unless proof of induction is provided.

5.6 Environmental Complaints

An OEMP must address how any complaints relating to the operation are to be managed. An OEMP can include details of:

- The system for recording complaint details, including time, details of complainant, complaint specifics and follow up action;
- Investigation of environmental complaints;
- Notification of the relevant person or entity that complaints have been received; and
- Registration of complaints, including details of measures undertaken to satisfactorily address the complaint.

5.7 Environmental Incidents

An OEMP must detail how any environmental incidents are to be recorded and managed. Such detail must include:

- The requirement to immediately take appropriate action, such as the use of spill response kits;
- The process for informing the relevant persons and/or authorities (preferably in the Dept. of Environmental Affairs prescribed manner.)
- The recording and investigation of all incidents as part of the OEMP;
- The reports prepared and circulated on the investigation; and
- Recommendations on steps to avoid similar events.

5.8 Monitoring

An OEMP must provide details of any program to be undertaken to monitor the environmental aspects and effects resulting from the operation on site. As part of the approval process, specific conditions may be placed on the applicant/operator to measure and monitor environmental performance. Monitoring may be the requirement of a specific license/permit, such as storm water discharge, or based on a site-specific complaint, such as dust monitoring.

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5.9 Auditing

The implementation of an OEMP must be monitored continually as indicated in 4.8 above. Periodic auditing by an external entity would be beneficial, and such aspects should also be detailed in the OEMP.

5.10 Responsibilities

Any OEMP must specify the individuals, positions/ or entities (together with contact details) responsible for all aspects of implementing the OEMP. In particular, the OEMP must clearly identify the individuals or otherwise responsible for:

- Receiving the reporting of monitoring, remedial action, environmental complaints and emergencies;
- Ensuring the measures/action plans are undertaken; and
- Verification, reporting and auditing of such measures/actions.

This should also include after-hours contact details for emergencies.

5.11 Supporting Information

There may be a requirement to undertake other studies or prepare other plans in support of an OEMP. These will typically be prepared for sites as part of a development proposal, but may be specifically prepared for a facility. These may include:

- A risk and hazard analysis with an action programme;
- An emergency response plan;
- Lighting plan;
- An acoustic report;
- Geotechnical report;
- Flora/fauna report; or
- Details of consultation with relevant public authorities.

6. Decommissioning EMPs (DEMPs)

6.1 Introduction

As the final phase in the project cycle, decommissioning may present positive environmental opportunities associated with the return of the land for alternative usage and the cessation of impacts associated with operational activities. However, depending on the nature of the operational activity, the need to manage risks and potential residual impacts may remain well after operations have ceased. Examples of potential residual impacts and risks include contamination of soil groundwater, stock that has been abandoned (e.g. oil drums, scrap equipment, old chemicals, etc.) and old (unserviceable) structures.

The decommissioning phase EMP provides specific guidance with respect to the management of the environmental risks associated with the decommissioning stage

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of a project. The decommissioning phase EMPs are typically encountered with storage before the ex/importing of minerals, base metals and other bulk commodities in Ports. As mentioned earlier in the document all three types of EMPs will be captured in the formal lease agreements with the latter only being required for approval on an agreed upon timeframe before vacation of land or infrastructure which should ideally be 2 years for long-medium term leases and 6 months for shorter term leases. This will enable decommissioning and rehabilitation to take place sufficiently and according to specified requirements.

6.2 Implementation

All EMPs (construction, operational and decommissioning) will be captured in the lease agreements to ensure commitment to the compliance to TNPA environmental requirements, legal requirements and the implementation of an environmental management system (formal or informal). CEMP and OEMP must be submitted for approval before commencement of work or occupation of land and infrastructure. The DEMP must be submitted before lease agreement lapses in order to undertake proper decommissioning and/or rehabilitation. In the case of long and medium term lease agreements the ideal timeframe would be two years before lease lapse and for short term lease agreements 6 months before lease lapse. Adherence to these requirements will be monitored by the Property Department/Business Unit and implementation overseen by the Environmental Department/Business Unit.

6.3 Auditing

TNPA will, where possible and necessary, conduct due diligence audits on newly acquired land as well as before land or a portion of land is leased to a tenant or operator. In most cases the tenants vacating the land will be required to conduct a due diligence audit to ascertain the environmental status of the land after their operational activities took place thereon. If TNPA is satisfied with the condition of the land then report can and will be communicated to the next tenant which will then act as his baseline status. If TNPA is not satisfied with the status of the land further rehabilitation and clean-up is to be undertaken by the vacating tenant. The due diligence audit will form the basis for all decommissioning and rehabilitation.

6.4 Key environmental issues to be addressed

All key issues identified and addressed in the CEMP and OEMP must be looked at and the residual effects and impacts addressed accordingly. The immediate and residual effects of the following substances and materials should also be looked at, if not mentioned in CEMP or OEMP:

- Air Emissions
- Waste and Wastewater Management

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- Materials/Commodity Handling & Storage
- Solid Waste Management
- Hazardous Waste
- Radioactive Waste
- Asbestos Containing Materials (ACMs)
- Polychlorinated BI-Phenyls (PCBs)
- Ozone Depleting Substances
- Odour, Dust and Smoke Nuisances
- Soil and Groundwater

6.5 Rehabilitation plan

A rehabilitation plan should be submitted to TNPA for approval before rehabilitation commences. This rehabilitation plan must address all issues as per the OEMP as well as listed above but is not limited to that. TNPA will reply in writing to the applicant to continue with decommissioning and rehabilitation. This rehabilitation plan should also be sent to the Department of Water Affairs and Forestry since it is a legal requirement for all major rehabilitation plans to have their approval before commencement. Once again, only after written approval from DWAF can rehabilitation commence.

6.6 Key management plans

For each contaminant or area required rehabilitation identified, key management plans should be prepared accordingly. These can be presented in tabular format (refer **Annexure3**), which outlines:
- the management requirement;
- the action required to address the management requirement;
- the responsible person undertaking the action
- the timing for completing the action.

The DEMP provides the framework for managing the rehabilitation process on the site. TNPA actively monitors (audits) the performance and progress of the DEMP through site inspections and detailed environmental audits.

6.7 Monitoring

TNPA officials will continuously monitor the decommissioning and rehabilitation process to ensure compliance to plans and conditions provided or submitted.

6.8 Site plan

A site plan should be submitted to TNPA indicating the rehabilitation intentions, methods and contamination levels. This site map will be used during monitoring.

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7. Annexure 1

Examples of Construction and Operational Environmental Management Plan defined in elements tables. These tables represent examples of how to address environmental aspects, as per Table 1 **(Key Environmental Issues).**

Element 1: Noise Management (construction phase)

EXAMPLE ONLY

It is acknowledged that, during the construction phase of a development, there is the potential for some generation of noise from on-site activities. The table below outlines the proposed management strategy to address issues relating to noise management that will be fully implemented prior to and during the construction phase of the development.

Table A – CEMP: Noise Management

ELEMENT	**NOISE MANAGEMENT**		
Objective	To manage activities on site to reduce the impact on surrounding properties.		
	To comply with relevant legislation.		
Management Strategy	Noise to be managed primarily through administrative controls during the construction phase.		
		Responsible Person	**Time frame**
Actions	All construction activities to be restricted to between 08h00 -17h00 during week days only;	Site Manager	Throughout construction phase
	All equipment used during construction phase to be regularly maintained to ensure efficient operation; and		
	Noise dampening equipment to be used on equipment with excessive noise-generating characteristics.		
Performance indicators	Lack of complaints/requests for attention by community/TNPA	Site Manager	Throughout construction phase

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	officials/authorities		
Monitoring	Daily inspection of the work site to occur;	Site Manager	Throughout construction phase
	Service logs of equipment/machinery used on site to be monitored.		
Reporting	Any complaints or incidents to be reported immediately to the Site Manager, who should then record this in a logbook.	Site Manager	Throughout construction phase
Corrective action	Investigate cause of excessive noise;	Site Manager	Throughout construction phase
	Implement corrective measures prior to the recommencement of site works;		
	Possible rescheduling of noise generating activities to reduce noise annoyance.		
Interfaces	Individual contractors/sub-contractors EMPs must address and comply with any other TNPA EMP or controls which exist for the Ports.	Site Manager	Throughout construction phase

Element 2: Erosion and Sediment Management (CONSTRUCTION PHASE)

EXAMPLE ONLY

It is acknowledged that, during the construction phase of the development, there is a potential for ground disturbance, traffic movements and on-site drainage, which may increase the rate of erosion and sediment export from the site, and therefore impact the surrounding environment. Accordingly, the table below outlines the proposed management strategy to address issues relating to erosion and sediment management, which will be fully implemented prior to and during the construction phase of the development.

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Table B – CEMP: Erosion and Sediment Management Plan

ELEMENT	**EROSION AND SEDIMENT CONTROL**	
Objective	To manage activities that exacerbate erosion, and provide on-site controls that reduce erosion and contain any transported material within the subject site.	
Management Strategy	Implementation of engineering measures and a comprehensive management strategy.	
Actions	**Responsibility**	**Time Frame**
Prior to the commencement of site works, an Erosion and Sediment Control Plan must be implemented. The following controls should be included in the plan: • Perimeter control measures (e.g. sediment control fencing) prior to the commencement of works; • Run-off water diversion measures around site works, where practicable; • Measures to control the tracking of site material onto surrounding sites and roads (e.g. crushed rock pads, vibration grids etc.), so as not to impede existing traffic flows; • Clearly marked stockpile areas with associated control measures; • Geofabric to be placed over field gullies and/or side entry pits during construction phase; • Straw bales to be placed to divert runoff from adjoining blocks around the site; • Clearly delineated 'no-go' movement areas; • Access and egress points to the site. The following measures must also be implemented during the construction phase: • Landscaping work to commence as soon as practicable to reduce exposure time of exposed soil; • Exposed areas to be covered with mulch material to reduce impacts of rainfall on the site; • Existing outfalls from the site to be modified to limit concentration and velocity of site flows; • Dust control measures to be used where required	Site Manager	Throughout construction phase

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Performance Indicators • Erosion and sediment movement should not exceed natural rates; • Lack of complaints/requests for attention by PBC staff.	Site Manager	Throughout construction phase
Monitoring • Daily visual inspections of the work site and engineering structures should occur and be logged in the CEMP log book. Inspect immediately after a significant rainfall event.	Site Manager	Throughout construction phase
Reporting • Any erosion and/or sedimentation issues should be reported to the site manager immediately. The site manager should record such incidents in a log book and report on corrective actions taken before the recommencement of site works.	Site Manager	Throughout construction phase
Corrective Actions • Investigate cause of incident; • Restore control measures prior to the recommencement of site works.	Site Manager	Throughout construction phase
Interfaces • Individual contractors'/subcontractors' EMPs must address and accord with any other EMP contained in this report.	Site Manager	Throughout construction phase

Element 3: Waste Management (OPERATIONAL PHASE)

EXAMPLE ONLY

It is acknowledged that waste may be generated during the operational phase of the development. The table below details those actions required to properly manage this waste.

Table C – OEMP: Waste Management

ELEMENT	WASTE MANAGEMENT
Objective	➢ To minimize the potential for environmental impact of wastes generated on the operational site. ➢ To comply with all approvals and or licenses issued to the site as well as the total Port.

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Management Strategy	To efficiently manage the subject site and activities that may lead to generation of wastes.	
Actions	**Responsibility**	**Time Frame**
➢ All waste material to be removed off site shall be contained on site prior to disposal, using appropriate storage containers. ➢ All waste materials from operational activities shall be regularly cleared off site and disposed of at an approved landfill site. ➢ Maintain high level of housekeeping on the site, ensuring that all waste materials are handled correctly and not left at large. ➢ Undertake staff training upon commencement of employment to ensure compliance.	Site/Terminal Manager	Throughout operational phase
Performance indicators		
No wastes evident on site except in designated areas and containers.	Site/Terminal Manager	Throughout operational phase
Complaints from TNPA Official/Authorities		
Monitoring		
Regular inspections of the site.	Site/Terminal Manager	Throughout operational phase
Reporting		
Logs to be kept of regular inspections as well as disposal certificates to be kept in a register.	Site/Terminal Manager	Throughout operational phase
Corrective action		
Where a non-conformance has occurred, a detailed report of the incident and the cause shall be prepared and kept.	Site/Terminal Manager	Throughout operational phase
Control measures are to be rectified and/or replaced in the event of non-conformance.		
Interfaces		
Individual site EMPs must address and comply with any other TNPA EMP or controls which exist for the Ports.	Site/Terminal Manager	Throughout operational phase

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Element 4: Hydrocarbon Contamination Rehabilitation (decommissioning phase)

EXAMPLE ONLY

It is acknowledged that during the operational phase of an organization or business that there might be instances of pollution that has taken place on site or degradation of the quality of the land due to the nature of its activities. Therefore the affected areas have to be rehabilitated to its original state or to an acceptable level for TNPA and the authorities. The table below details how a typical action plans that can be drawn up to depict the rehabilitation process.

Table D – DEMP: Hydrocarbon contamination Rehabilitation

ELEMENT	**DEMP: HYDROCARBON CONTAMINATION REHABLITION**	
Objective	To reduce the levels of hydrocarbons in the contaminated soil to less than 1000ppm. To comply with all conditions and requirements of the due diligence audit findings.	
Management Strategy	To efficiently rehabilitate the subject site to TNPA and legal requirements or to the condition the site was before operations.	
Actions	**Responsibility**	**Time Frame**
➢ All waste material to be removed off site shall be contained on site prior to disposal, using appropriate storage containers. ➢ All severely contaminated soil to be excavated approx. 30cm deeper than contamination level and taken for remediation. ➢ All areas that has medium to low contamination levels will be treated with bioremediation products.	Site/Terminal Manager	Throughout decommissioning phase
Performance indicators	Site/Terminal Manager	Throughout decommissioning phase
➢ Acceptable hydrocarbon levels of less than 1000PPM ➢ Complaints from TNPA Official/Authorities		
Monitoring	Site/Terminal Manager	Throughout decommissioning phase
➢ Regular inspections of the site. ➢ All treated areas to be tested for hydrocarbon levels after completion of remediation works.		
Reporting	Site/Terminal	Throughout

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Logs to be kept of regular inspections as well as disposal certificates to be kept in a register.	Manager	decommissioning phase
Corrective action	Site/Terminal Manager	Throughout decommissioning phase
Where hydrocarbon levels still exceed legislative levels a brief action plan with completion dates shall be prepared and kept.		
Control measures are to be rectified and/or replaced in the event of non-conformance.		
Interfaces	Site/Terminal Manager	Throughout decommissioning phase
All DEMPs and rehabilitation plans must be approved by TNPA and in certain cases by the Authorities.		

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C4: Site Information – Port of Cape Town

- **4.1. Information about the site**

1. Site Location

The Sturrock, Robinson and Synchrolift Docks are situated on the Western and South Eastern ends of the port of Cape Town, as shown in figure 1 below:



Figure 1: Synchrolift, Robinson and Sturrock Docks Location

2. Access Limitations

2.1. Working Hours

Normal working hours at the Port of Cape Town are from 08:00 to 16:30, Monday to Friday, Inclusive.

2.2. Access Permit Controls

There is a card access system to enter the Port Area. The Port Staff will arrange the required access permits and issue them to the contractor free of charge. Should any person loose his/her access permit these will be replaced at a cost of R 360-00 per person, to be paid by the service provider. This will also apply if permits are not returned at the end of the project completion.

2.3. Health and Safety

Transnet National Ports Authority has a strict health and Safety policy in Place. No persons may enter the site and undertake work on the site until undergoing the mandatory induction. The induction will be arranged by the Port staff at no cost to the Contractor

3. Description Of Existing Facilities

The ship repair facility at the Port of Cape Town has been in operation since the late 1880s and as a result the infrastructure is starting to age and most of it needs to be replaced. TNPA will continue to own and operate current Ship Repair facilities. It has therefore become necessary for the Port of Cape Town to restore the Ship Repair business in the port to healthy operating state.

There is a total number of twenty-nine (29) capstans at the Port of Cape Town, twelve (12) at Sturrock dry dock, ten (10) at Robinson dry dock and seven (7) at the Synchro-lift dock. A visual condition assessment of the Capstans was conducted at the Port of Cape Town. At the end, the assessment revealed that the Capstans are not in a good state and need to be replaced.

In summary, TNPA needs a solution to deal with the following business threatening risks:

- 22 AC driven capstans which are on the brink of mechanical collapse (10 at Robinson, 4 at Sturrock and 7 at Synchro lift Dry docks).
- 8 DC driven capstans with obsolete prime movers (At Sturrock Dry Dock).
- Unavailability of spares (critical and/or long lead time spares)

<u>DC capstans (only in Sturrock Dry Dock)</u>

Pit Dimensions

- DC capstan concrete slab height = 240 cm
- Length = 6.320 m
- Breadth = 3.380 m
- Length from concrete slab to the pit = 1.730 m

Capstan

- Capstan Drum Output Pulling Force = 20 ton
- Height = 1.180 m
- Diameter = 1.140 m
- Motor: Double Series
- Power = 80 Hp (55kW)
- Voltage = 230 V

- Current = 250 A
- Speed = 0-1500 r.p.m

AC capstans 22

- Drum Output Pulling Force = 5 ton
- Diameter = 888 cm
- Height = appr. 1.06 m
- Motor Power = 15 kW
- Voltage = 400 V
- Current = 60 A

4. Robinson Dry Dock

Table 1 below shows the key specifications of Robinson dry dock, built and commissioned in the 1880's.

Table 1. Key Robinson Dry Dock Dimensions

Dimension	Description	Measure
Length	Maximum Available Dock length	161m
Width	At Cope Level	21m

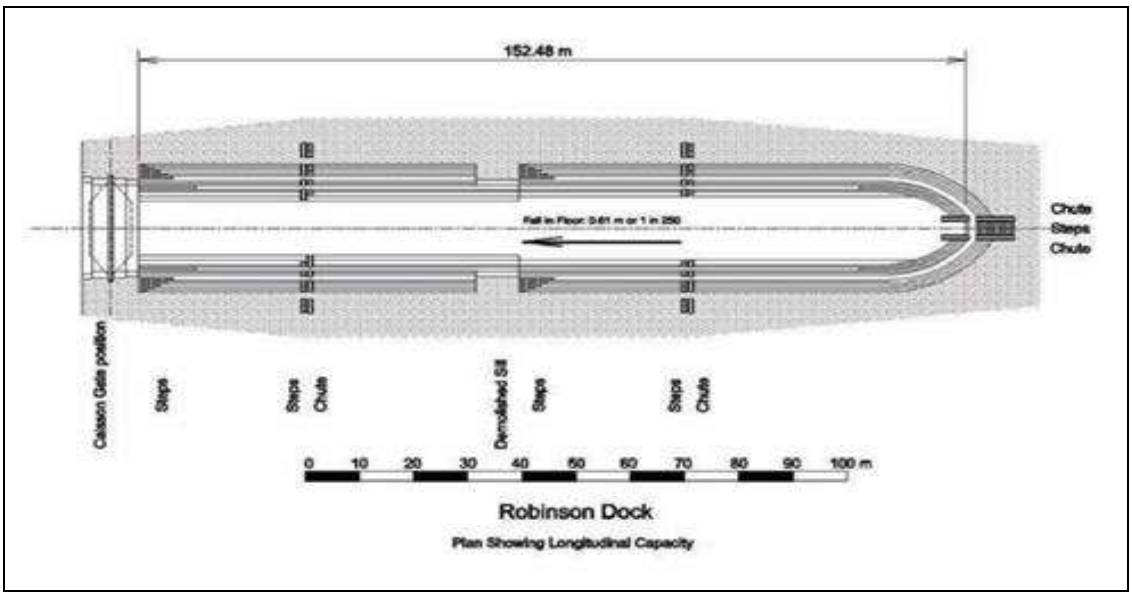


Figure 1. Robinson Dry Dock plan

4.1. Robinson Dry Dock Capstans Current Status

The Robinson Dry Dock consists of 9 AC driven Capstans. Figure 4 below shows the position of the existing set up of the capstans at the Robinson Dry Dock.

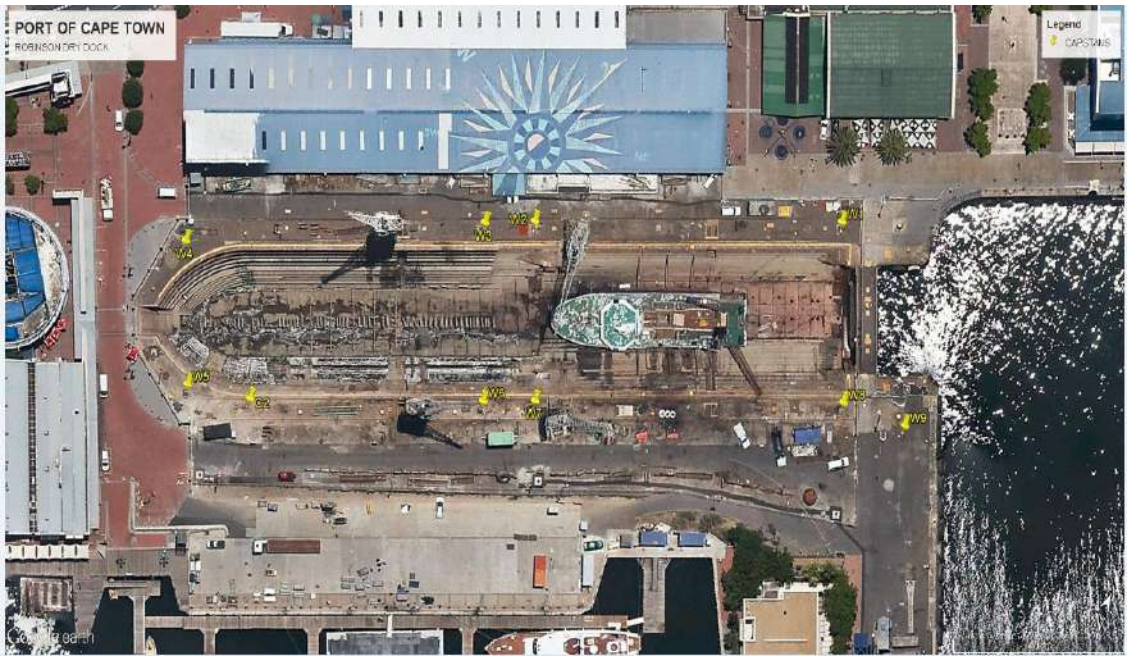


Figure 3: Robinson Dry Dock Capstans

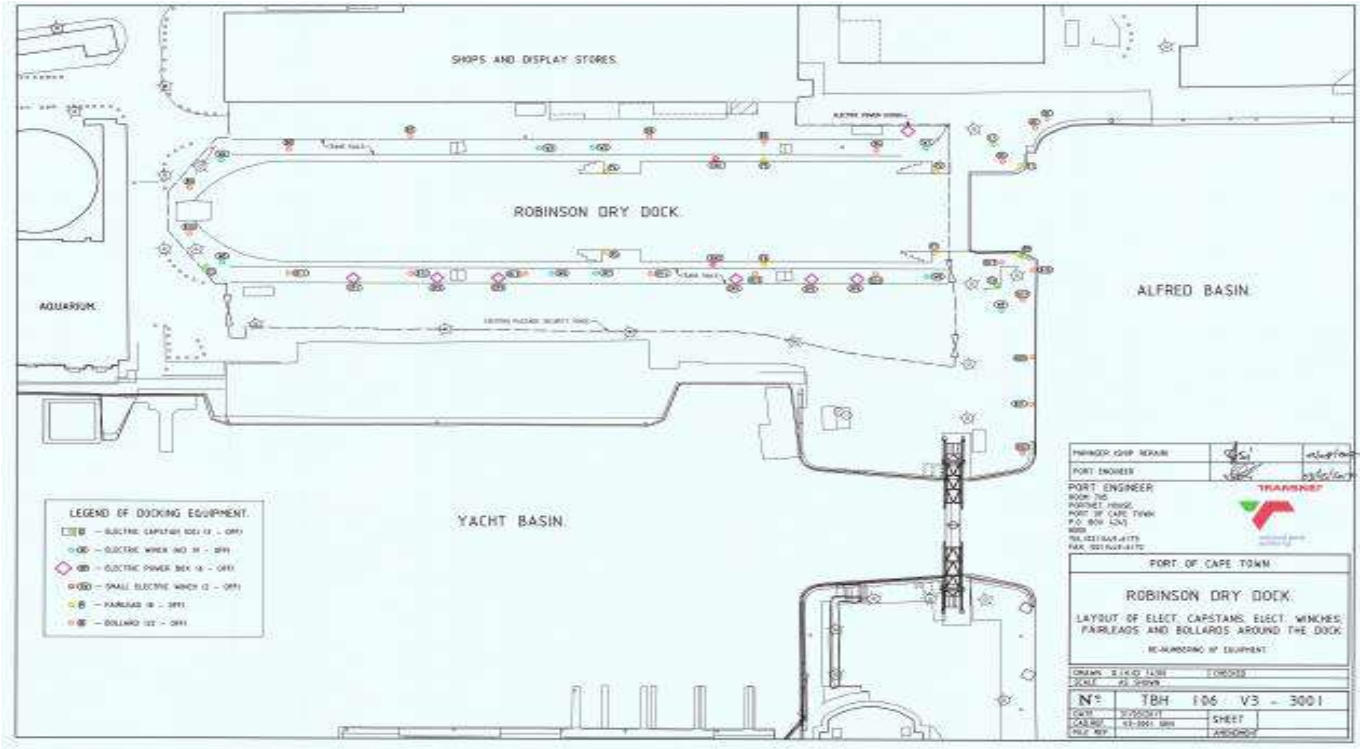


Figure 4: of Location of Robinson Dry Dock Capstans (for information only)



Figure 5: 5 ton AC Drive Capstan Robinson Dry Dock with coupling box

5. Sturrock Dry Dock

The Sturrock dry dock was put into operation on the 18th of September 1945 after an agreement between the South African and British governments. Table 2 and figure 5 below show the key specifications:

Table 2. Sturrock Dry Dock Dimensions

Dimension	Description	Measure
Length	Maximum Available Dock length	359m
	1st Alternative division into two	132m + 216m
	2nd Alternative division into two	205m + 143m
Width	At Cope Level	45m
	At Gutter level	37m
	Draft Over Sill	12m below LAT

5.1. Sturrock Dry Dock Current Status

The Sturrock Dry Dock consists of 12 Capstans, (8 DC and 4 AC driven). The current layout of the Capstans is depicted in figure 6 below:



Figure 6: Overview of Sturrock Dry Dock

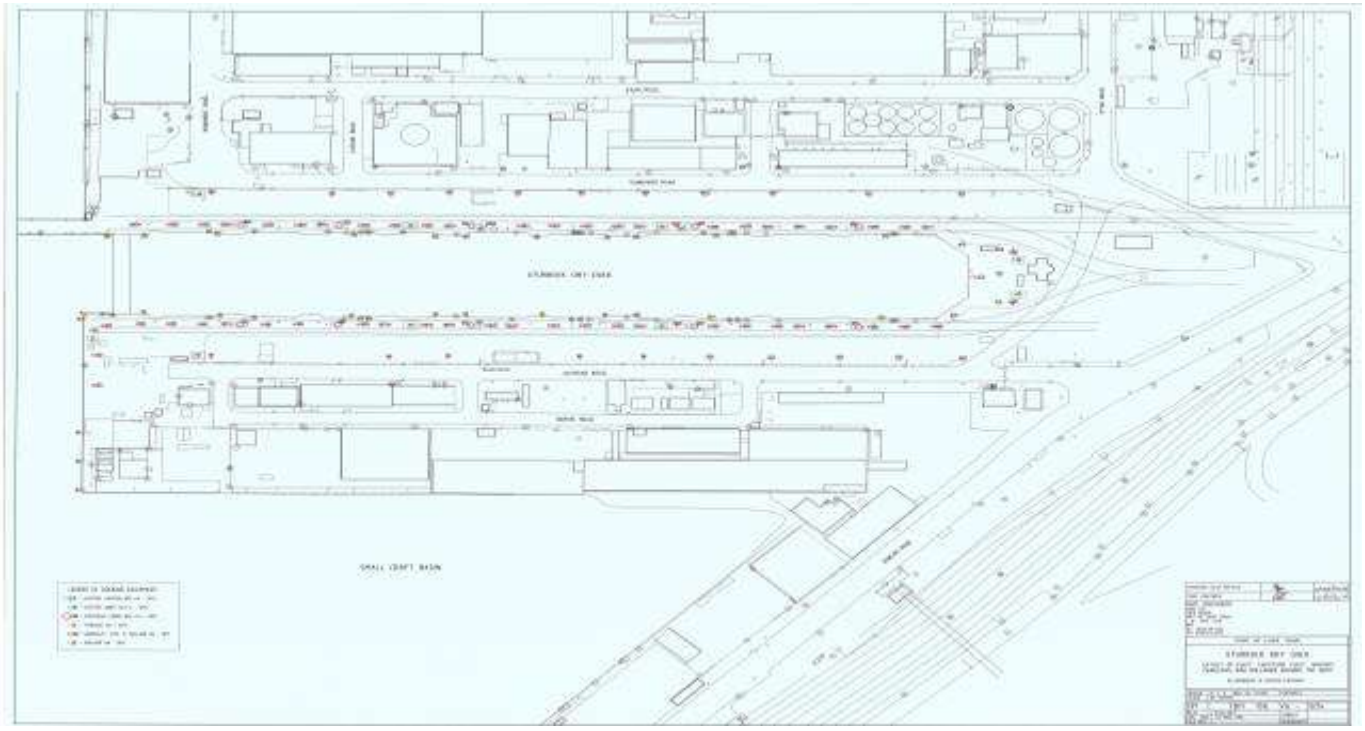


Figure 7: Location Sturruck Dry Dock Capstans



Figure 8: 20 ton DC Capstan in Sturruck Dry Dock with 250 mm slab



Figure 9: 20 ton DC Capstan in Sturruck Dry Dock



Figure 10: 5 ton AC Capstans in Sturrock Dry Dock

6. Synchrolift Dock

Table 3 below shows the key specifications of the Synchro-lift Dry Dock.

Table 3. Synchrolift Dock Dimensions

Dimension	Description	Measure
Safe Working Load	Maximum Vessel Weight	1 806kg
Vessel Dimensions	Width	15m
	length	61m

6.1. Synchrolift Dock Current Status

The synchrolift Dock consists of eight (8) AC driven Capstans. The existing Capstans arrangement for the Synchrolift Dock is depicted in figure 7 below:



Figure 11: Overview of Synchrolift Dock

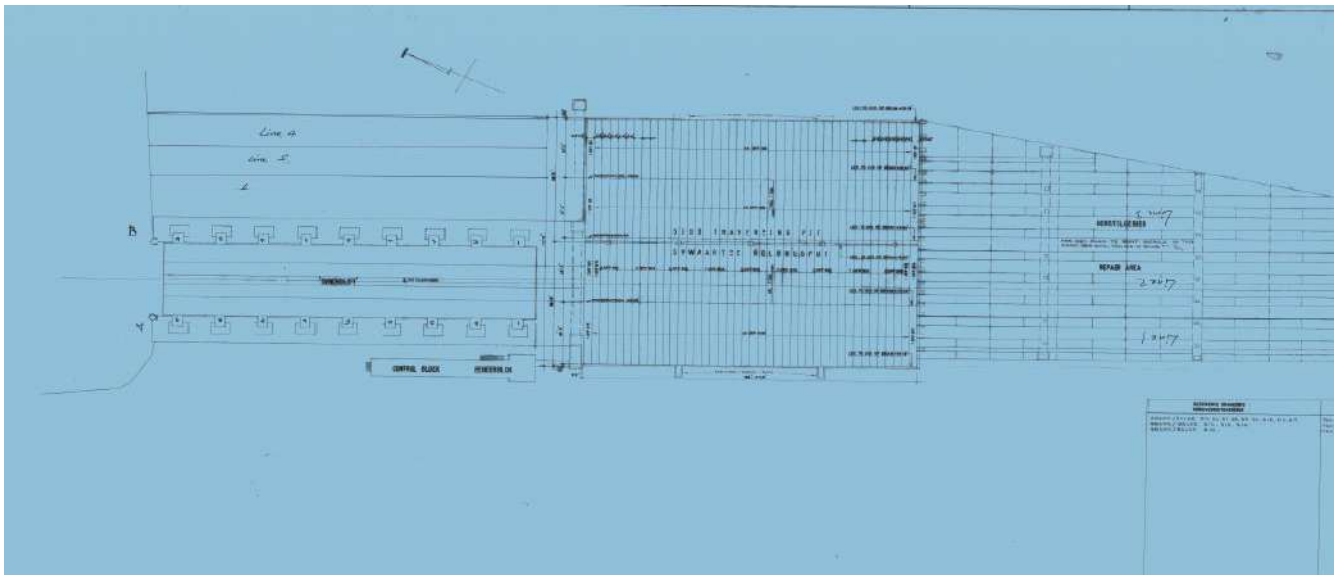


Figure 12: Typical Diagram Synchro Lift Capstans



Figure 13: 3 ton Capstan



Figure 14: 5 ton Capstan at Synchro-Lift



Figure 15: 5 ton Capstan at Synchro-Lift

7. Other reports and publicly available information

The Dry-Dock is exposed to extreme weather conditions such as high wind gusts and high humidity in the summer resulting in the concrete reaching surface temperatures in excess of 50 degrees Celsius.

PART C4: SITE INFORMATION – PORT OF DURBAN

Document reference	Title	No of pages
	This cover page	1
	Site Information	2-4
	Total number of pages	4

1. Description of the Site and its surroundings

1.1. General description

Durban Prince Edward Graving Dock site is located at the Port of Durban, corner of South Coast Road and Bayhead Road. The Graving Dock is a mass concrete structure that is drained of water to allow the inspection and repair of a ship's hull. The Durban Prince Edward Graving Dock has the following dimensions:

Overall docking length: 352,04 m

Length on keel block: 327,66 m

Length on bottom: 352,04 m

Width at entrance top: 33,52 m

Width at coping: 42,21 m

Capstans are operated when and only required during docking and undocking. The primary function of the capstans is that of warping the vessels into position during docking as well as keeping the vessels in position during the servicing and repairs of the vessels at the dock. In order to perform this functions, the capstans exert a force on a rope, which is in turn tied to some areas of the vessel.

There are generally different kinds of capstans drive mechanisms, all of which serve the same function. The hydraulic drive was selected as part of the solution for the docks at the Ports of Durban. This is mainly due to the high torque levels that can be attained as well as the energy savings that can be realised. Prospective contractors shall attend the site inspection and acquaint themselves with the nature of the Works, the condition under which the work is to be performed, and the means of access to site, any limitations or other authorities and in general will all matters that may influence or affect the contractor.

Address:
Dry Dock
Gate A Bayhead Road, Port of Durban,4001

All Works are located at the Prince Edward dry dock, Port of Durban, shown in the following diagram:



The Graving dock was conceptualised in 1911, to accommodate repair works for war vessels and to be the largest dock in the world.

- Feasibility – Designs & geotechnical investigation Period – 1912 to 1919 (7 years)
- Execution – Construction works Period – 1920 to 1925 (5 years)
- Contractor – South African Rails & Habours
- Commercialisation – 04th June 1925
- Age – 99 years

GRAVING DOCK			
Parameters		Operating capacity	
Length (m)	350	Tugs	4
Width (m)	33.5	Fishing Boats	8
Design depth (CD)	11.3	1st, 2nd, 3rd Generation Vessels	2
Max Avail depth (m)	10.8	Panamax Vessels	
Cranes	6	(max length - 240m)	2

Figure 1: Prince Edward Dry Dock



Figure 2: Prince Edward Dry Dock Capstans Position

The construction site-camp that will be available to the Contractor will be advised at the site clarification meeting.

The Contractor shall attend the site clarification meeting and acquaint himself with the nature of the Works, the conditions under which the work is to be performed, and the means of access to the site, any limitations or other authorities and in general with all matters that may influence or affect the contract. The Contractor is to take cognisance of the traffic congestion on Bayhead Road.
Contractors shall be deemed to have allowed in their tender for any additional cost to be involved due to the foregoing.

1.2. Existing buildings, structures, and plant & machinery on the Site

The Dry Dock has Cranes on the South and Northern side. The cranes are used for ship repair operations. The Dry-Dock is highly operational and the construction work is to be conducted in such a way so as not to disrupt operations, and safe working distances from the construction fences are to be maintained at all times. Vessels will be docked during construction execution.

The Contractor shall allow for working under these conditions. Access to areas adjacent to the construction site shall be maintained at all times. Access to site will be via the existing service road off Bayhead Road.

1.3. Other reports and publicly available information

The Dry-Dock is exposed to extreme weather conditions such as high wind gusts and high humidity in the summer resulting in the concrete reaching surface temperatures in excess of 50 degrees Celsius.

1.4. Access Limitations

1.4.1. Working Hours

Normal working hours at the Port of Durban are from 08:00 to 16:30, Monday to Friday, Inclusive.

1.4.2. Access Permit Controls

There is a card access system to enter the Port Area. The Port Staff will arrange the required access permits and issue them to the contractor free of charge. Should any person loose his/her access permit these will be replaced at a cost of R 360-00 per person, to be paid by the service provider. This will also apply if permits are not returned at the end of the project completion.

1.4.3. Health and Safety

Transnet National Ports Authority has a strict health and Safety policy in Place. No persons may enter the site and undertake work on the site until undergoing the mandatory induction. The induction will be arranged by the Port staff at no cost to the Contractor