Transnet SOC Ltd
Registration No.
1990/000900/30

TRANSNET PORT TERMINALS

To	To all tenderers
From	Thabile Zuma
Date	25 October 2023
Subject	Addendum 1
Pages	2

www.transnet.net

TENDER NO: TPT/2023/10/0049/46636/RFP - iCLM HQ 788/TPT

DESCRIPTION OF WORKS: Complete Engineering, Installation and Commissioning of Tippler, Train Positioner, Feeders, Dust Handling plant at Port of Saldanha Bay, for Transnet SOC Ltd (Reg. No. 1990/000900/30) Operating as Transnet Port Terminals, (Hereinafter Referred to as "TPT").

1. Scope of Works and Annexures H to N

When the RFP for the completion of Engineering, Installation and Commissioning of Tippler, Train Positioner, Feeders, Dust Handling plant at Port of Saldanha Bay, the scope and annexures H to N were erroneously omitted.

We apologise for any inconveniences this may have caused. Please see below the scope and accompanying annexures.

*****Please acknowledge receipt of this Addendum before the closing date of tender.

Regards

Thabile Zuma
Acting Commodity Manager

Transnet SOC Ltd
Registration No.
1990/000900/30

TRANSNET SOC LTD

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ADDENDUM 1 **Date: 25 October 2023**

This is to certify that we _____

have received Addendum 1 dated 25 October 2023

_____
TENDERER

DATE: _____

WITNESSES:1. _____

SCOPE OF WORK Rev 1

TIPPLER CAGE /TRAIN POSITIONER / APRON FEEDERS / DUST HANDLING PLANT / CONTROL SYSTEM (PLC/SCADA)

Document Reference	Title	No of page
	This cover page	1
C3.1	*Employer's* Works Information	
	Total number of pages	**130**

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Tables

Figures

1 Definitions/Abbreviations

Table 1: Definitions and abbreviations

Acronym / Abbreviation	Description
BMH	Bulk Materials Handling
BoQ	Bill of Quantity
EPC	Engineering, Procurement and Construction
HAZOP	Hazard & Operability Analysis
HSEQ	Health, Safety, Environmental and Quality
HSSMP	Health, Safety and Security Management Plan
ITP's	Inspection and Test Plans
Km	Kilometre
MPI	Magnetic Particle Inspection
Mtpa	Million tonnes per annum
NDT	Non-Destructive Testing
P & ID's	Piping and Instrumentation Diagrams
PFD's	Process Flow Diagrams
TFR	Transnet Freight Rail
TIMS	Transnet Integrated Management Systems
TPT	Transnet Port Terminals
WBS	Work Breakdown Structure

2 Standards

Standards shall be prioritized as stated below, the standard stated at the top having the highest priority should there be conflict.

2.1 Project Standards

The documentation listed in the tables below is used as a reference and/or guideline, with the purpose to enhance the interpretation of this document.

Table 2: Transnet specifications

Standard no.	Document Title
EEAM-Q-008	Corrosion Protection
EEAM-Q-009	Quality Management

2.2 National Standards

Table 3: National standards

Standard no.	Document title
SANS 094	The use of high strength friction grip bolts
SANS 10142-1	The Wiring of Premises – Part 1: Low-Voltage Installations
SANS 10142-2	The Wiring of Premises – Part 2: Medium-voltage Installations Above 1 Kv AC Not Exceeding 22 kV AC and Up to and Including 3000 Kw Installed Capacity
SANS 10198	The Selection, Handling of Installation of Electric Power Cables of Rating Not Exceeding 33 kV: Parts 1 to 14
SANS 135	ISO metric bolts, screws and nuts (hexagon and square)
SANS 136	ISO metric precision hexagon head bolts and screws, and hexagon nuts
SANS 1411	Materials of Insulated Electric Cables and Flexible Cords: Parts 1 to 7
SANS 1431	Weldable Structural Steel
SANS 1507	Electric Cables with Extruded Solid Dielectric Insulation for Fixed Installations (300/500 V To 1900/3300 V): Parts 1 to 6
SANS 1520	Flexible Electric Trailing Cables for Use in Mines – Part 1: Low-voltage (640/1100 V And 1900/3300 V) Cables: Parts 1 to 3
SANS 15708	Non-destructive testing - Radiation methods: Parts 1 and 2
SANS 1574	Electric Flexible Cables with Solid Extruded Dielectric Insulation: Parts 1 to 5
SANS 1804	Induction Motors: Parts 1 to 4
SANS 23279	Non-destructive testing of welds - Ultrasonic testing
SANS 3452	Non-destructive testing - Penetrant testing: Parts 1:to 4
SANS 763	Hot dip (galvanized) zinc coatings (other than on continuously zinc coated sheet and wire)
SANS 780	Distribution Transformers
SANS 9934	Non-destructive testing - Magnetic particle testing
SANS 62305-1:2011	Protection against lightning Part 1: General principles

Standard no.	Document title
SANS 62305-2:2011	Protection against lightning Part 2: Risk management
SANS 62305-3:2011	Protection against lightning Part 3: Physical damage to structures and life hazard
SANS 62305-4:2011	Protection against lightning Part 4: Electrical and electronic systems within structures
SANS 10313:2012	Protection against lightning - Physical damage to structures and life hazard
SANS 10161-1:2019	Basis of Structural Design and Actions for Buildings and Industrial Structures Part1: Basis of Structural Design
SANS 10199:2010	The design and installation of earth electrodes
SANS 1063:2011	Earth rods, couplers and connections
SANS 10200:1985	Neutral earthing in medium voltage industrial power systems
SANS 10292:2013	Earthing of low-voltage (LV) distribution systems
SANS 10142-1:2012	The wiring of premises Part 1: Low-voltage installations
SANS 10142-2:2009	The wiring of premises Part 2: Medium-voltage installations above 1 kV A.C. not exceeding 22 kV A.C. and up to and including 3 000 kW installed capacity
SANS 104 00: 2011	National Building Regulations

2.3 International Standards

Table 4: International standards

Standard no.	Document title
AFBMA	Anti-friction bearing manufacturers association (as applicable)
AGMA	American gear manufacturers association (as applicable)
ASME	American Society of Mechanical Engineers (As Applicable)
ASME B16.3	Flanges and Bolting for Pipes, Valves and Fittings.
ASTM	American Society of Testing and Materials (As Applicable)
AWS D1.1/D1.1M	Structural welding code – steel
BS 2634	Surface roughness comparison specimens
BS2573 part 1 1983	Rules for the design of cranes (structures).
BS2573 part 2 1980	Rules for the design of cranes (mechanisms);
BS 3790	Endless wedge belt and v-belt drives
BS 4235	Specification for Metric Keys and Keyways
BS 5228	Occupational noise management
BS 5499	Safety Signs for The Occupational Environment
BS 7608	Code of Practice for Fatigue Design and Assessment of Steel Structures
DIN 22101:2011-12	Continuous Conveyors- Belt conveyors for loose bulk materials
EN 10025	Hot-rolled steel flat products
EN 10025	Carbon steels & carbon manganese steels – hot rolled bars & semi-finished. Products

Standard no.	Document title
EN 10025	Structural Steel – Hot-Rolled Plates, Floor Plates and Slabs
EN 10083	Carbon Steels and Carbon Manganese Steels – Cold Finished Bars
EN 10088	Wrought Alloy Steels – Stainless Steel Bars and Semi-Finished Products
EN 10220	Steel Tubes for Mechanical Purposes
EN 12882	Conveyor Belting of Elastomeric and Steel Cord Construction
EN 13414	Wire-Rope Slings
EN 14399	High Strength Steel Bolts with Associated Nuts and Washers for Structural Engineering
EN 15877	PVC Pipes and Fittings for Pressure Applications
EN 20286	ISO System of Limits and Fits
EN 2560	Covered Electrodes for Welding
EN 583	Non-Destructive Testing – Ultrasonic Testing of Carbon and Low Alloy Steel Plate – Test Methods and Quality Classifications
EN 60204	Electrical Installations – Surface Mines and Associated Processing Plant
EN 60439	Low-Voltage Switchgear and Control Gear Assemblies – Type-Tested and Partially Type-Tested Assemblies
EN 61386	Electrical Installations – Selection of Cables
EN ISO 3743	Acoustics – Determination of Sound Power Levels of Noise Sources
EN ISO 4783	Metric Screws Threads for Fasteners
EN10219	Structural Steel Hollow Sections
FEM Section II 2.131/2.132	Rules for the design of mobile equipment for continuous handling of bulk materials
FM Global	FM Global Fire Protection Approval Standards (As Applicable)
GB/T 1591	High Strength Low Alloy Structural Steel
GB/T 5782	Hexagon Head Bolts
GB/T 5783	Hexagon Head Bolts – Full Thread
IEC 60204	Safety of Machinery
IEC 61508	Functional Safety of Electrical/Electronic/Programmable Equipment
ISO 10816	Mechanical Vibration – Evaluation of Machine Vibrations by Measurements on Non-Rotating Parts
ISO 128	Technical Drawing
ISO 12944	Guide to The Protection of Structural Steel Against Atmospheric Corrosion by The Use Of Protective Coatings
ISO 14520	Gaseous fire-extinguishing systems - Physical properties and system design
ISO 1461	Hot Dip Galvanised Coating of Fabricated Iron and Steel Articles. Specification And Test Methods
ISO 2408	Steel Wire Ropes

Standard no.	Document title
ISO 2631	Evaluation of Human Exposure to Whole-Body Vibration
ISO 281	Rolling Bearings – Dynamic Load Ratings and Rating Life
ISO 4014	ISO Metric Hexagon Bolts and Screws – Product Grade A and B
ISO 4016	ISO Metric Hexagon Bolts and Screws – Product Grade C
ISO 4032	ISO Metric Hexagon Nuts Including Thin Nuts, Slotted Nuts and Castle Nuts.
ISO 4413	Hydraulic Fluid Power – General Requirements for Systems
ISO 4759	Tolerances for ISO Metric Bolts, Screws, Studs and Nuts—Product Grades A, B And C
ISO 5048:1989	Continuous Mechanical Handling Equipment – Belt Conveyors Calculation of Operating Power and Tensile Forces
ISO 5049-1:1994	Mobile Equipment for continuous handling of bulk materials – Part 1: Rules for the design of steel structures
ISO 717	Acoustics – Methods for The Determination of Noise Rating Numbers
ISO 898	Mechanical Properties of Fasteners Made of Carbon Steel and Alloy Steel
ISO 9001:2015	Quality management systems - Requirements

3 Preamble

3.1 Project Background

In 2018 Transnet embarked on the build of a third tippler at Saldanha Iron Ore Terminal.

The contract was awarded to Tenova Takraf, who sub-contracted the design of the wagon tippler to a UK company by the name of Ashton Bulk Ltd (AB). AB Ltd was established in 2010 because of the closure of the Metso MBH in Bristol.

AB Ltd scope of works was to design and detail the wagon unloading plant except for the apron feeders, tippler conveyor and dust extraction plant. The apron feeders and dust extraction plant were left to Tenova Takraf to size and supply, whilst the incline conveyor was designed by CKIT.

Based on differences, the contract with Tenova Takraf was terminated in the 3rd quarter of 2020. This termination left the installation of the tippler plant partially complete.

For this reason, in the 1st quarter of 2022, Transnet issued the designer (AB) of the wagon tippler an inquiry requesting the designer to establish state of equipment installed and BOQ and condition of uninstalled equipment.

The above will be referred to as Phase 1.

Phase 1: **Due diligence** including a **condition assessment** of all works done to date and a full description of the **'scope to go'** to be completed in phase 2.

Phase 2: Design (Engineering) Installation, Commissioning & Hand-over of Tippler 3.

3.2 Project Location

The project is located in the Iron Ore Terminal of Saldanha in the province of the Western Cape.

Figure 1: Aerial View of Tippler 3

4 Scope

Transnet will appoint a Contractor on the basis of Engineering, Procurement and Construction and Management (EPCM) who will be responsible to provide the following Works, namely:

Complete outstanding work as set out in this scope in the final delivery of a functional dual wagon tippler, train positioner and dust handling plant including hoppers and apron feeders; the work is currently in a partial completed state. The works to include engineering, procurement, transportation, installation and commissioning of a dual wagon tippler, train positioner and a dust handling plant and implement the Tippler Control System - Progammable Logic Control (PLC) and Supervisory Control and Data Acquisition (SCADA) system.
Include (Structural/Mechanical/Electrical/C&I – SME and C&I)

- **Tippler and Feeders** (Includes Cage, Positioner, Perways, Train Holding Equipment)
- **Dust Handling Plant**
- **Control System (PLC and SCADA – Tippler; Positioner; Knife Gates; Apron Feeders; Dust Handling Plant)**

Notwithstanding any detail of specific activities provided in these Works Information and Employer's Requirements, it is the responsibility of the Contractor to provide the Works compliant to the specifications contained herein with same being fit for the purpose for which they are intended.

These Employer's Requirements are accordingly not to be construed as constituting instructions to the Contractor on how to execute the Works, but are indicative only, and if any specific activity is not specified or included in the Employer's Requirements same shall not be deemed to be an exclusion of such activity and the Contractor shall undertake whatever activities are necessary to meet his contractual requirements.

4.1 Deliverables

4.1.1. "Functional" and "Compliant" with referenced specifications, control philosophies and assessment reports as listed in Section 27 include:
- 4.1.1.1. Functional and Compliant Dual Wagon Tippler
- 4.1.1.2. Functional and Compliant Train Positioner
- 4.1.1.3. Functional and Compliant Dust Extraction and Handling Plant
- 4.1.1.4. Functional and Compliant Apron Feeders and Knife Gate
- 4.1.1.5. PLC/SCADA
- 4.1.1.6. Auxiliary equipment – Rail Perways, Electrical and Hydraulic Installation

4.1.2. The Contractor is required to review and complete design, fabrication, corrosion protection, lubrication, installation, commissioning on all mechanical, structural, and electrical equipment including all communications and SCADA equipment associated with the equipment within the Contractor's battery limits as defined in the following sub-section.

4.1.3. Battery Limits for the Contractor's Scope:
- 4.1.3.1. Mechanical:
  - 4.1.3.1.1. To include Dual Wagon Tippler
  - 4.1.3.1.2. To include Train Positioner
  - 4.1.3.1.3. To include Wheel Grippers
  - 4.1.3.1.4. To include 5 off Apron Feeders
  - 4.1.3.1.5. To include Dust Collection Plant
  - 4.1.3.1.6. To include all Hoppers and Chutes
- 4.1.3.2. Rail:
  - 4.1.3.2.1. Rail entry point at outer edge of Ingo slab and exit at outer edge of Outgo slab, underside of rail on the Tippler rail level slab.
  - 4.1.3.2.2. Underside of positioner support rail
- 4.1.3.3. Electrical and Communications:
  - 4.1.3.3.1. Main new LV distribution board inside the switch-room, including busbars from the transformer secondary side.
  - 4.1.3.3.2. Complete sub-DB boards and control equipment plus electrical cables and cable management systems, related to the tippler facility under this scope of works.

4.1.3.3.3. All main tippler building monitoring/control, automation, instrumentation and associated communication systems, plus associated cabling, and cable management systems at all required positions inside the building.
4.1.3.3.4. All related software, and licenses, for the monitoring/control, automation, instrumentation, and associated communication systems
4.1.3.3.5. Seamless interfacing, where required, between electrical and communications infrastructure/systems.
4.1.3.3.6. Standardised electrical and electronic equipment, plus software throughout The Contractor shall liaise and obtain all appropriate information from all relevant parties, to ensure successful execution and interfacing of the defined required facilities with others.

4.1.3.4. SCADA and PLC

4.1.3.4.1. PLCs, Server(s), Network Switch and all Software (including tippler control room SCADA)
4.1.3.4.2. PLC systems, to be 100% compatible with current systems in use in the plant (current OEM for PLC systems is SIEMENS)
4.1.3.4.3. Panel to include associated I/O as required by the process and external communications to the communications panel. All PLC hardware, including I/O subsystems, shall be designed to include stand-alone operation and adhere to the specified standards.
4.1.3.4.4. Software configuration programming. PLC Software shall be designed to include stand-alone operation.
4.1.3.4.5. Programming functional specification covering the operation of the equipment, which shall be approved by the Employer before any software programming commences.
4.1.3.4.6. Identification and labelling of all equipment supplied by the Contractor, in accordance with the project standards and mandatory regulatory requirements.
4.1.3.4.7. Provision of detailed single line - schematic - layout and termination diagrams (including any other that may be required)
4.1.3.4.8. Software licenses for all programmable equipment. Software passwords to be supplied by Contractor to Employer
4.1.3.4.9. Contractor's support for the electrical installation both off-Site and on-Site, including remote and off-Site connection to the PLC.
4.1.3.4.10. Interface with Site SCADA (Port Operations)
4.1.3.4.11. Fully programmed and tested SCADA PC. The SCADA to be the same as existing SCADA in use. SCADA programme shall be to be 100% compatible with current Port SCADA systems (Current systems installed is WONDERWARE)
4.1.3.4.12. Contractor to supply and install a standalone SCADA system including software for commissioning the Dual Wagon Tippler Facility. The standalone SCADA application to be integrated into the Site SCADA application (by others in consultation with Contractor) and Employer. SCADA pages and database will be made available at detail design stage.

4.1.3.5. Requirements of the Contractor's Design

4.1.3.5.1. The Contractor's design shall comply with the requirements as set out in:
4.1.3.5.2. 'Technical Specification: PLC - SCADA' Annexure B
4.1.3.5.3. 'Technical Specification: Dual Wagon Tipplers, Feed Hoppers, Apron Feeders and Dust House for the Port of Saldanha' (1924701-2-211-M-SP-0003) - Annexure I
4.1.3.5.4. 'Dual Wagon Tippler Data Sheet' (1924701-2-211-M-DS-0003) - Annexure J
4.1.3.5.5. 'Technical Specification: Apron Feeder' (No 1924701-2-213-M-SP-0003) - Annexure K

4.1.3.5.6.'Apron Feeder Data Sheet' (1924701-2-213-M-DS-0001) - Annexure L
4.1.3.5.7.'Technical Specification: Dust Collection' (1924701-2-214-M-SP-0003) - Annexure M
4.1.3.5.8.'Dust Collection (Bag House) Data Sheet' (1924701-2-214-M-DS-0003) - Annexure N

4.2 Works

4.2.1. The works are to include all as referred to in this scope but with reference to the Appendices; most particularly Annexure A – Ashston Bulk Scoping Inspection Report together with the relevant Appendices of this report with reference to:
4.2.1.1. Appendix B - Site Scope Work
4.2.1.2. Appendix G – Enabling Works
4.2.1.3. Appendix H – Summary Scoping Site Inspection Reports

4.2.2. Survey of tippler, dust extraction plant and in-go & out-go perways.

4.2.3. Design, fabricate, transport to site, off load and install in-go and out-go rail support beam.

4.2.4. Complete installation and commissioning of Train Positioner structural, mechanical, electrical control and instrumentation (SME and C&I).

4.2.5. Complete installation and commissioning of Tippler Cage (SME and C&I)

4.2.6. Complete installation of Train Holding Devices (SME and C&I)

4.2.7. Complete installation and commissioning of Apron Feeders and Knife Gates (SME and C&I)

4.2.8. Complete installation and commissioning of Dust Handling Plant (SME and C&I)

4.2.9. Complete installation of all Field Devices as aligned with Control Philosophy

4.2.10. Complete software development in alignment with the Control Philosophy – to include PLC and SCADA interface.

4.2.11. 3D-Scanned Image of Tippler Cage – to develop model for Finite Element Analysis

4.2.12. Finite Element Analysis (FEA) of Tippler Cage to determine stress patterns to assist in engineering decisions in the alignment correction of all misaligned components (Cage End Rings, Clamp Gear, Cage Links)

4.2.13. Design and manufacture of jacking spreader-beams to jack the tippler cage to enable remedial work – alignment of the end-rings and the installation of locking discs. These beams are to be corrosion protected in compliance with the relevant standards for safe keeping.

4.2.14. Design manufacture of trestles to support tippler cage to enable remedial work – alignment of the end-rings and the installation of locking discs. These trestles to be corrosion protected in compliance with the relevant standards for safe keeping.

4.2.15. Jacking of tippler cage for remedial work – alignment of end rings and the installation of locking discs

4.2.16. Change bearings on tipper cage support wheels.

4.2.17. Removal of Tippler Cage dust cowl and re-instating after completion of all remedial work

4.2.18. Servicing of Drives (Reducer and Motor) and Hydraulic Actuators

4.2.18.1. 2 off Tippler Cage Drives
4.2.18.2. 8 off Positioner Drives
4.2.18.3. 1 off Positioner Main Arm Actuator
4.2.18.4. 1 off Main Arm Latch Actuator
4.2.18.5. 1 off Coupler Release Actuator
4.2.18.6. 1 off Last Wagon Arm Latch Actuator
4.2.18.7. 1 off Last Wagon Arm Rotary Actuator
4.2.18.8. 16 off Wheel Gripper Actuators

4.2.19. Erection and Installation of hydraulic power packs of train holding devices next to the respective train holding devices pits. (Change in design – position of hydraulic power packs)

4.2.20. Installation of the complete grease lubrication system for the train holding devices.

4.2.21. Complete assembly; positioning and erection of tippler cage after end ring alignment on to the tippler support rollers.

4.2.22. Installation of the complete grease lubrication system for the tippler cage drives racks.

4.2.23. Installation of hopper liners and hopper outlet liner panels.

4.2.24. Delivery to site of 5 off Apron Feeders

4.2.25. Installation of 5 off Apron Feeders with Drives

4.2.26. Installation of the complete grease lubrication system for the 5 off Apron feeder Drives and sprockets.

4.2.27. Design review, detail draughting, manufacturing, transporting and fabrication and installation of 5 off Hopper Knife Gates.

4.2.28. Erection completion of hopper outlet liner plates.

4.2.29. Erection completion of dust extraction plant structural, mechanical, electrical control and instrumentation.

4.2.30. Procuring all hydraulic pipes and delivery to site.

4.2.31. Procuring, delivery to site, installing and terminating all power and control cables.

4.2.32. Procuring, delivery to site, installing all power and control cables termination kits.

4.2.33. Procuring, delivery to site, installing missing cable trays.

4.2.34. Erection and placing of the tippler electrical substation electrical panels, junction boxes and local control stations.

4.2.35. PLC Hardware, Software and Programming

4.2.36. SCADA interface of all field devices in line with Control Philosophy

4.2.37. Design, fabricate and installation of field devices brackets.

4.2.38. Inspect all external paintwork ensuring that all repair painting has been carried out in accordance with the Transnet Port Terminals Saldanha Corrosion Protection specification.

4.2.39. Inspect all main structural bolted joints and areas where structure has been drilled for auxiliary equipment. (Cabling, hydraulics, etc). Seal any gaps with an appropriate grade of mastic or similar to ensure water/moisture cannot enter box sections.

4.2.40. Ensure that all erection checks have been completed in accordance with Site installation Method Statement compiled by the Contractor, and that all temporary supports/chocks etc. have been removed where not required.

4.2.41. Inspect all external paintwork ensuring that all repair painting has been carried out in accordance with the Transnet Port Terminals Saldanha Corrosion Protection specification.

4.2.42. Inspect all main structural bolted joints and areas where structure has been drilled for auxiliary equipment. (Cabling, hydraulics, etc). Seal any gaps with an appropriate grade of mastic or similar to ensure water/moisture cannot enter box sections.

4.2.43. Ensure that all erection checks have been completed in accordance with Site installation Method Statement compiled by the Contractor, and that all temporary supports/chocks etc. have been removed where not required.

4.2.44. Check that all lubrication systems have been installed correctly to the Method Statement compiled by the Contractor.

4.2.45. Verify that the installed electrical equipment follows the Installation Method Statement compiled by the Contractor and that the equipment is not visibly damaged.

4.2.46. Final inspection to confirm that the equipment is in accordance with all specifications, fully painted as required and that all extraneous material, tools etc have been removed before cold commissioning starts.

4.2.47. Check to ensure Continuity and Insulation Resistance (IR) Tests as described in the Installation Schedule follows the Installation Method Statement compiled by the Contractor for the new substation M, mini substations, new tippler e-house and all field mounted electrical equipment, has been completed satisfactorily.

4.2.48. Conduct Earth Fault Loop Impedance Tests and record (LV Circuits for new tippler electrical house and field mounted equipment).

4.2.49. Conduct Earth Continuity Return Path Tests and record for the various circuits of the tippler cage, positioner, apron feeder, tippler conveyor CV 308 and dust extraction plant.

4.2.50. Ensure all pre-power checks have been completed in accordance with the Drive Supplier Operating Instructions (Positioner, tippler cage and apron feeder). These checks to be carried out by an approved Drives Commissioning Engineer, which the Contractor will be responsible to appoint and remunerate.

4.2.51. Train Holding devices and positioner arm Hydraulic Systems. Ensure all pre-power checks have been completed in accordance with the Operating Instructions. These checks to be carried out by an approved Hydraulics Commissioning Engineer, which the Contractor will be responsible to appoint and remunerate.

4.2.52. Cold commissioning will take place without wagons and product. Test the overall plant by simulating wagon positioning, wagon tipping, wagon removal, apron feeder operation, conveyor CV 308 and dust extraction plant operations in order to prove the correct interaction between all of the machines' systems and verify performance prior to handling material.

4.2.53. Plant Testing. Conduct the different machine tests according to Contractor's Cold commissioning method statement.

4.2.54. Hot commissioning. Perform live tests and carry out final checking and adjustments in order to prove that the plant can meet the operational requirements and reliability for wagon positioning, wagon tipping, wagon removal, CV 308 product conveying and dust plant extraction and filtration.

4.2.55. Complete Performance Testing as per contract requirements.

4.2.56. Final inspections to confirm that the equipment, including paintwork, is in a good state and that all extraneous materials, tools etc. have been removed from the plant, must be carried out at the end of the performance testing period before the plant is taken over by Transnet Port Terminals Saldanha. Contractor will also be required to clear the erection site of all materials used during the erection of the plant.

4.2.57. As-Built Drawings. A full set of as-built red line drawings incorporating all changes including those of original equipment suppliers must be handed over to Transnet before the Plant is taken over by Transnet Port Terminals Saldanha, final As-Built drawings shall be supplied eight (8) weeks after hand-over.

4.2.58. Take-over Certificate will only be issued by Transnet if Transnet is satisfied that the Contractor has contractually delivered.

4.3 Work included in the Construction and Installation Scope

4.3.1. The Contractor shall provide a Construction and Installation Proposal for all Work associated with the completion of the balance plan for Tippler 3 at the Iron Ore Terminal in Saldanha. Installation shall include, but not necessarily be limited to, all labour, tools, and equipment. The Contractor must include for all the requirements and details contained in this Works Information and the Activity Schedules that are relevant to the Plant. The SOW shall cover the following, but not necessarily be limited to as per below.

4.3.2. Fencing of Contractors erection area, provision of mobile offices for the Contractors staff stores and 24- hour security services for contractor's erection area and mobile offices.

4.3.3. Provision of a diesel generator with sufficient capacity to provide power to the dual wagon tippler, train positioner and dust handling plant for no load commissioning. Sizing of the diesel generator will be done by the Contractor considering the loads for the running of the dual wagon tippler, train positioner and dust handling plant during no load commissioning of the tippler plant. Required for a period of 2 weeks.

4.3.4. The Contractor will have to provide his own Information Systems/Information Technology services for the duration of the works on site.

4.3.5. Transnet Port Terminals will provide the Contractor with potable water at the Contractor's mobile offices. This water is for human consumption purposes only. Due to the size of the site, the Contractor is required to provide mobile ablution facilities next to the erection site, in order to minimize standing time. The ablution facilities shall be serviced on a daily basis by an appointed contractor, which will be contracted by the Contractor.

4.3.6. Welding of structures on-site, including welding consumables, alignment blocks, stillage's, protective canopies over welding for inclement weather and all Non-Destructive testing.

4.3.7. Sandblast of welded sections where welds are not in accordance with AWS D1.1 requirements.

4.3.8. Repairs of welds which are not in accordance with AWS D1.1 requirements.

4.3.9. Non-Destructive testing of weld repairs, allow for MPI.

4.3.10. Sandblast and Painting of welded sections according to Transnet Port Terminals Saldanha Corrosion Protection Specification EEAM-Q-008 included in Section 5 [Drawings and Standard Specifications] of the Contract.

4.3.11. Restoration of paint for all damaged paint caused by transportation, handling, and erection in accordance with Transnet Corrosion Protection Specification EEAM-Q-008.

4.3.12. Provision of all craneage for the manipulation of structures, lifting of structures as well as lifting of all mechanical, hydraulic, and electrical equipment.

4.3.13. Mechanical, structural, electrical installation of the balance of plant.

4.3.14. Provision of specialist services for alignment of couplings or any other equipment requiring precise alignment/setting.

4.3.15. Provision of first fill oils and lubricating greases for the both the automatic and manual grease lubrication systems.

4.3.16. Lubrication, servicing, and maintenance of the Plant and maintaining service records of Work carried out, up to the issue of the Certificate of Take-Over.

4.3.17. Grouting of structures and equipment.

4.3.18. Procuring, supplying, and transporting of all electrical and control cables required for the complete wagon unloading plant.

4.3.19. Procuring, supplying, and transporting of outstanding cable racking.

4.3.20. Pulling of all electrical and control cables.

4.3.21. Supply of cable termination kits for all the power and instrumentation cables.

4.3.22. Termination of all power and termination cables.

4.3.23. Labour, tools, and equipment to support pre-commissioning and cold commissioning.

4.3.24. Labour, tools, and equipment to support hot commissioning and performance testing.

4.3.25. Overall Project Schedule.

5 General Requirements and Conditions

5.1 Site Conditions

The equipment must be able to operate in a marine foreshore environment subject to the following conditions:

Table 5: Site Conditions

Condition	Description
Altitude:	Sea Level
Ambient Temperature:	0°C to 45°C with solar irradiation in direct sunlight up to 1000 watt/m² which can result in temperatures of 70° and over on metal
Relative Humidity:	Up to 100%
Air Pollution	Heavily saline, corrosive dust laden and industrial fumes
Wind and Rain:	Heavy rain windblown to near horizontal
In-service wind speed	80 km/hr (max)
Out of service wind speed (storm)	130 km/hr (max) up to 20m

5.2 Commodity Properties

The wagon tippler is required to handle multiple commodities defined in Table 7 below.

Table 6: Commodity Properties

Lump Ore	Density	2.6 t/m^3
	Moisture	0.7% average
	Particle Size	-25 +8mm
	Angle of Repose	Between 33 and 35°
Fine Ore	Density	3.0 t/m^3
	Moisture	2.2% average, 2.5% max.
	Particle Size	-5 +0.20mm
	Angle of Repose	Between 35 and 38°
DRS Ore	Density	2.45 t/m^3
	Moisture	0.7% average, max. 1.0%
	Particle Size	-27 +13mm
	Angle of Repose	Between 33 and 35°
C/Sinter	Density	2.3 t/m^3
	Moisture	1.3% average, max. 1.5%
	Particle Size	-8 +5mm
	Angle of Repose	Between 33 and 35°
*** Compressive Strength**	Between 600 and 1000 MPa	

6 Engineering Requirements

In light of the engineering gaps identified as per AB report, the Contractor will carry out the following engineering, to ensure that the tippler will operate as per the original Transnet Scope of Works.

6.1 Tippler Cage and Positioner – 3D Scan and Finite Element Analysis (FEA)

To ensure the dimensional accuracy, operational suitability and fit for purpose of the Tippler and Positioner assembly the contractor should verify the following:

6.1.1. 3-Dimensional structural scanning, and CAD model generation of the Tippler and Positioner to verify the following:

- Manufacturing tolerances to ensure all structural components are dimensionally accurate and accurately aligned.
- Verify structural deformations in the as installed condition, to be compared with the calculated deformations.
- Verify installation and alignment tolerances.

6.1.2. Detailed Finite Element Analysis of Tippler and Positioner structures.

- The contractor is to complete a detailed structural analysis (FEA) substantiated by load and stress calculations based on first principles of the complete Dual Wagon Tippler and Train Positioner Arms to ensure the designs are fit for purpose.
- The Dual Wagon Tippler must be simulated as a complete unit to ensure accurate reaction force verifications, deformations and structural stresses, making use of proven Finite Element analysis and verification techniques that align with International Standards for the design of bulk material equipment.
- Where detailed structural drawings of the Dual Wagon Tippler and Train Positioner structures are not available, the 3D cad models as generated from the scan data must be referenced to ensure the accuracy of the simulations. All inspection hatches must be opened to determine internal stiffeners/gussets position, design and material thickness.
-

On completion of the process as set out the contractor should be able to confirm the suitability of the Tippler and Positioner designs and recommend any modifications that may be required to ensure the Tippler and Positioners would meet performance requirements after commissioning.

6.2 Train Holding Devices

Repositioning of the Gripper HPUs from inside the concrete pits to ground level where they will be easier to monitor, maintain and replace should the need arise. Due to the position of the HPU's, damage by traffic is unavoidable, the Contractor will provide a removable crash barrier around each unit.

6.3 Tippler Dust Cowl

The Contractor will carry out a dimensional survey of the Dust Cowl components. Depending on the outcomes of the survey any modifications required, the Contractor will complete an engineering design of any modifications and update the detail drawing.

6.4 Hopper

6.4.1. The Contractor will complete an engineering design of the fixing details of the liners which need to be installed in the tippler hopper. To date the final engineering to fix the ceramic lined plates to the concrete hopper walls has not been finalized along with the detail of the ceramic liner plates.

6.4.2. The Contractor will carry out a 3D scan of the Hopper and immediate areas to facilitate necessary design work for the fixing of the ceramic lined plates.

6.5 Upper Deflector Wall & Support Roller Dust Shrouds

6.5.1 Deflector Walls

6.5.1.1. Tip Side

Above the concrete hopper is a steel construction Impact Wall consisting of outer face plates and a mounting structure constructed of I beams. When calculating the trajectory of iron ore from the wagons the original contractor neglected to account for the effect of the Tippler Side Beam directing material flow outside of the Tippler profile. Such flow would direct material onto the Impact Wall and necessitate the Wall being designed for high impact rather than cursory deflection and designed for the fixing of necessary ceramic liners. This modification will require additional steelwork and modification to existing steel structure. The contractor is to determine and demonstrate the material flow using Discrete Element Modelling techniques.

6.5.1.2. Non-Tip Side

It was noted that the Non-Tip Side Deflector Wall has insufficient clearance with the Tippler Wagon Clamp Ballast Weights. The Current clearance is unacceptable due to potential clashes. The Contractor is required to increase the clearance between the underside of the clamp ballast and the top of the non-tip side deflector wall to an acceptable operational clearance. This will be inclusive of redesign and remedial structural works.

6.5.2 Support Roller Dust Shrouds

6.5.2.1. The Dust Shrouds at the Hopper ends are too small and short to provide any shrouding effect for the Support Rollers and will be entirely ineffective.

6.5.2.2. The Contractor is required to redesign the Dust Shrouds in order to ensure effectiveness of the dust extraction and containment.

6.6 Apron Feeder Support Steelwork

6.6.1. The apron feeder support structures were designed by the original contractor, the load calculations to verify structural integrity are not available. The Contractor will produce load computations to ensure the structure is in accordance with SANS 10160-1.

6.6.2. The design will be in accordance with the requirements as prescribed in SANS 10160-

6.7 Isolation Knife Gates

6.7.1. The Knife Gate design to be reviewed – the contractor must determine most practical orientation of the current design and develop proposals and design for isolation.

6.7.2. Hydraulic Actuation and HPU of Gates must be designed.

6.8 Electrical and Control Equipment

6.8.1. Tippler MCC

Based on inspections conducted, it was discovered that in certain places the support structures on which the electrical panels are fixed to, appear to be under-designed, to prevent any unforeseen collapse of the floor structure, the Contractor will assess the integrity of the support structure, and implement design improvements.

6.9 Civils & Main Track

6.9.1. Civil Works

The Contractor will be required to update any civil foundation drawings pertaining to the tippler, this is to ensure that the foundations drawings reflect what the final as-built condition is.

6.9.2. Main Rail Tracks

6.9.2.1. The rail tracks have not been installed in the tippler building. Troughs have been cast in the concrete floor slab to allow for the tracks, so that the Top of Main Line Rail (TOR) is nominally at a common elevation with the Tippler building Top of Concrete (TOC).

6.9.2.2. The Contractor is required to provide detail design of the track support beams, to include the fixing method of the support beams to the concrete troughs.

6.10 Engineering Documents

6.10.1. The package of drawings and documents provided to Transnet by the original contractor for the Dust Handling Plant, are of a poor quality and deficient in content. Most of the drawings are not accompanied by bills of material, there is no structured index, and no drawings or documents are provided in soft copy.

6.10.2. The Contractor is therefore required to improve the standard of engineering drawings of the Dust Handling Plant to that of the Dual Wagon Tippler and Train Positioner by way of a harmonisation exercise.

6.11 Programmable Logic Controller / Supervisory Control and Data Acquisition (PLC/SCADA)

6.11.1. The design and development of the PLC program and SCADA control for the plant is outstanding. The Contractor will be required to comply with the following requirements as set out in the Control Philosophy Specification for the PLC design software.

6.11.2. The specification applies to all PLC software developed for the Siemens S7-1500 range of equipment. The specification is generic and where differences in functionality occur due to the variety of machines, these are detailed in the attached appendices.

6.11.3. This scope includes for the design, compilation, testing and commissioning of software modules, blocks, routines, sub-routines and data structures, which are to be loaded into the memory of a programmable logic controller.

6.11.4. The software design for the PLC/SCADA system must have a Failure Modes and Effects Analysis (FMEA) philosophy – Refer specifically to the Technical Specification PLC-SCADA on the software design for fault management Section 4.10 (PLC/SCADA Software Design).

6.11.5. This scope further requires a merge with SCADA Software Design to ensure that the PLC/SCADA interface is compatible.

7 Dual Wagon Tippler (Mechanical and Structural)

7.1 Tippler Support Rollers

Reference Drawings:
Annexure A
Appendix A Drawing List

7.1.1. The Contractor is required to remove the tippler support rollers and replace the bearings and oil seals on all sets of roller pairs (8 off - Ingo and Outgo).

7.1.2. Ensure alignment of all sets of roller assemblies.

7.2 Tippler Structure

Reference Drawings:
Annexure A
Appendix A Drawing List

7.2.1. End Rings & Tippler Cage

7.2.1.1. During the initial Phase1 investigation, after a 3-D site survey it was discovered that the parallelism of the in-go and out-go end rings is not in accordance with the tolerances as specified in the AB assembly drawings.

7.2.1.2. The Contractor will price for the removal of the already installed dust cowl in its entirety. Once the dust cowl has been removed the Contractor will then jack-up the cage and align the end rings for parallelism. The Contractor will design spreader beams to jack the tipper cage. The contractor will supply hydraulic jacks to jack the tipper cage to a practical working height to allow for the alignment of the tippler cage end-rings and the installation of the end ring shrink disks (4 off). All the costs associated with the jacking of the cage and alignment of the end rings will be for the Contractors account, this includes any scaffolding that might be required to gain access to areas which require working at heights.

7.2.1.3. Before the Contractor starts with the adjustment of the end ring parallelism, the Contractor will carry out the following repair works as a minimum, namely:

i. replace the four-cage links. The Contractor will be responsible for the manufacture, delivery to site and installation of the four-cage links. Final welding of the cage links will be carried out once the alignment of the end ring has been carried out.

ii. where practically possible access to the internal box sections of the end rings must be obtained to improve on some of the poor internal welds. Accessibility to be determined

by mutually by the contractor and Transnet representative. Any improvements must be followed by the appropriate NDT which as a minimum will include MPI. Once any weld repair has been accepted, the Contractor will then carry out the necessary paint repairs all in accordance with the Transnet Corrosion Specification

iii. repair of welds is not only applicable to inside box sections of the end rings but any other external welds which are deemed not acceptable. Again, the same procedure will be followed as the internal welds.

iv. repair of welds on Buffer Brackets. Any improvements must be followed by the appropriate NDT which as a minimum will include MPI. Once any weld repair has been accepted, the Contractor will then carry out the necessary paint repairs all in accordance with the Transnet Corrosion Specification.

v. tippler platform: repair of external welds on the tippler platform, any improvements mut be followed by the appropriate NDT which as a minimum will include MPI. Once any weld repair has been accepted, the Contractor will then carry out the necessary paint repairs all in accordance with the Transnet Corrosion Specification.

vi. side beam: repair entry end and exit end underside fillet welds, any improvements must be followed by the appropriate NDT which as a minimum will include MPI. Once any weld repair has been accepted, the Contractor will then carry out the necessary paint repairs all in accordance with the Transnet Corrosion Specification.

vii. ballast beam: repair entry end and exit end underside fillet welds, any improvements mut be followed by the appropriate NDT which as a minimum will include MPI. Once any weld repair has been accepted, the Contractor will then carry out the necessary paint repairs all in accordance with the Transnet Corrosion Specification. The Contractor must also establish that the material thickness of the ballast side beam is in accordance with original designer's drawings

viii. side beam and ballast beams: the Contractor will replace the four Incorrect Shrink Discs with the correct shrink discs in all four locations.

- Replace star shaped end plates with the correct end cap as per original design
- As far as practically possible inspect the inner end of the Pivot Shafts inside the Side Beam and Ballast Beam
- Check and re-adjust, if necessary, torque of fasteners on inner end Shrink Disc.

ix. Torque Reaction Brackets

- The four (4) torque reaction brackets are used to restrain the side and ballast beams that are connected to the End Rings via axial pins in rotary bearings. These brackets are in turn pin jointed to eyes on the rail platform.
- The non-tip side bracket is misaligned with the connecting eyes on the rail platform.
- Effects of the misaligned bracket must be assessed on the developed FEA model.
- Correct (Remedial design) the exit non-tip side torque bracket which is mis-aligned with its rail platform mounted bracket
- Verify plate thickness and conduct dimensional checks of Torque Brackets.

x. Platform pivot shaft: the Contractor will replace the incorrect Shrink Discs with the correct shrink discs as per AB's drawings.

- Check and re-adjust, if necessary, torque the fasteners on inner end Shrink Disc.

xi. Check all the End Ring joint connection bolts (In-Go & Out-Go), to ensure that they are torqued to the correct specification.

xii. Working from the centre of the rail (In-Go & Out-Go), check the rail bolts to ensure that they are torqued to the correct specification.

xiii. Check that the two rail butt joints (In-Go & Out-Go) are smooth and firmly butted together.

xiv. Check that there are no gaps (In-Go & Out-Go) between the rails and the end ring mating surfaces.

xv. Check Torque of clip bolts (In-Go & Out-Go) on rail sections.

xvi. Carry out full survey of the Tippler end rings and record the survey readings (To be included in Quality Control Plan as hold point).

7.2.1.4. After the end ring alignment has been approved in principle by the Transnet Project Manager, before the cage is lowered onto the tippler support rollers the Contractor will carry out the following:

7.2.1.5. The Contractor is required to remove all the surface rust from the end ring racks. Once the rust has been removed the Contractor will coat the rack teeth with a thin layer of graphite grease to ensure the surface rust does not manifest itself again.

7.2.1.6. The Contractor is required to fit the Oleo Buffers on the in-go and out-go end rings.

7.2.2. Wagon Clamp Gear

7.2.2.1. The wagon clamps are of the "plain" type bearing and hence not subjected to localised fretting as in roller bearings. Hence these clamps will not be further inspected.

7.2.3. Tippler Ballast Box

7.2.3.1. The Contractor is advised to record the mass of ballast box without the concrete ballast. Once the box has been weighed, the Contractor will install concrete ballast into ballast box compartments.

7.2.3.2. The Contractor will record the mass of concrete ballast placed in each compartment, and before finalizing the final ballast the Contractor will ascertain the cube strength of the concrete to ensure that the correct number of trim plates are installed. The following information must be provided to the Transnet Project Manager for review and acceptance in principle.

Ballast Box	Ballast Box Mass (tonnes)
Ballast Box Structure	
Concrete Ballast	
Combined Mass	

7.2.3.3. The Contractor will also be required to provide the following information pertaining to the ballast box trim plates to the Transnet Project Manager for review and approval in principle.

Ballast Required	Mass (tonnes)
Number of trim plates installed	
Total mass of trim plates installed	
Total calculated ballast concrete & trim plates	

7.2.3.4. Once the ballasting is complete the Contractor is required to seal the ballast box compartments by bolting on cover plates. The Contractor must ensure cover plates have been sealed with mastic prior to fitting.

7.2.4. Assembly of Tippler Thrust Pads

7.2.4.1. The Contactor will need to remove the Thrust Pads that are installed, and machine required chamfer and re-fit as per the AB design drawings.

7.2.4.2. The Contractor is required to manufacture and fit Access Support Angles and Rail Location Plates as detailed on the AB's drawings.

7.2.4.3. The Cast in foundation bolts locating Thrust Brackets are too short and do not protrude the dimension specified on Tippler & Plant Foundation drawing. The Contractor will remove and replace bolts with new foundation bolts.

7.2.4.4. The Contractor is required to procure and install Rail Clips.

7.2.4.5. The Contractor will check the distance over the land-mounted thrust pads and the gaps at the entry and exit ends and will record these gaps and will ensure that this information is included in the As-built drawings of the tippler.

7.2.5. Assembly of Tippler Limit Switches

7.2.5.1. The Contractor will manufacture and provide tippler limit switch mounting brackets, the Contractor will then align, drill and fit tippler limit switch mounting brackets and strikers as per AB Drawing

7.2.6. Assembly of Tippler Lubrication System

7.2.6.1. The tippler drives are fitted with two types of automatic grease lubrication systems, namely:

7.2.6.1.1. Fully automated stand-alone, electrically driven pump type, progressive, grease lubrication systems with cycle feedback to the PLC and satisfying the lubrication needs of groups of bearings. This system supplies grease to all the pinion bearings, side guide roller bearings, sprung supported roller bearings, main arm pivots and Last Wagon Arm pivot pins.

7.2.6.1.2. Fully automated stand-alone, electrically driven pump type spraying lubricant automatically onto the gear teeth with cycle feedback to the PLC and satisfying the lubrication needs of the rack and pinions.

7.2.6.2. The Contractor will fit both these fully automated stand-alone progressive, grease lubrication systems on the tippler drive frames in an area that will not restrict the servicing of the systems and surrounding equipment.

7.2.6.3. The rack lubrication roller is missing, the Contractor is required to provide a new rack lubrication roller and install the roller in the position as indicted by the AB drawing.

7.2.6.4. The Contractor will then provide and fit all the stainless-steel piping and fittings to respective bearings and open rack and pinions.

7.2.6.5. Once all the piping is complete, the Contractor will run the respective pumps and check that grease is reaching all points that require lubrication (when power is available in conjunction with the electrical site installation method statement).

7.2.6.6. The tippler clamp gear is fitted with a Grouped Manual: (GM)Total loss greasing of individual components by means of nipples grouped together to service a quantity of items. The grouped manual manifolds must be place in an area where maintenance will have access to the manifold block.

7.2.6.7. The Contractor must provide and fit all the stainless-steel piping and fittings to respective clamp gear pivot pins.

7.2.6.8. Once the Grouped Manual: (GM)Total loss greasing system has been installed the Contractor will purge the lines and then attach the pipes to the relevant fittings on the clamp gear pivot pins.

7.2.7. Tippler Drives

7.2.7.1. The 2 off Tippler Drives consist of an electric motor, gear reducer, brake, pinion shaft, drive pinion, shaft bearings all mounted on a sub-frame.

7.2.7.2. The drives have not been aligned, secured or grouted to the foundations.

7.2.7.3. The Contractor is required to remove the tippler drive gear (In-Go & Out-Go) and have the drive gear OEM on site for stripping and inspection, if required a change of bearings and seals must be done at a local workshop (Saldanha).

7.2.7.4. As it is not possible to determine what remedial work will be required, the Contractor must price for a complete refurb listed above (bearings and seals).

7.2.7.5. On completion of the remedial work, Contractor will then undertake the following Works:

7.2.7.4.1. Install Tippler Drive Unit Base Plate onto grout packers as detailed on AB's drawings.

7.2.7.4.2. Grout Drive base plate using full strength grout.

7.2.7.6. Once the tippler drive installation is complete, the Contractor will carry out the following:

7.2.7.5.1. The Tippler Cage is to be driven and checked for rotation clearances, gear mesh and clamp operation in conjunction with the Siemens engineer (drives).

7.2.7.5.2. Check and record drive unit high speed and low speed coupling alignment.

7.2.7.5.3. Position and align each individual drive unit until correct mesh is obtained between the drive pinion and rack.

7.2.7.5.4. Lock drive unit jacking screws, tighten anchor bolts to drive unit base frame as shown on AB's drawings to maintain position.

7.2.7.5.5. Fully tighten anchor bolts and weld enlarged washers to drive unit base frame as shown on AB drawings to maintain position.

7.2.7.7. Tippler Punch Listing

10.2.7.6.1. The Contractor will create Punch Lists on all outstanding works detailing uncompleted items including painting of bolt heads, nuts and sealing of packers. The Contractor will then carry out remedial work to damaged painting in accordance with the Transnet Corrosion Protection specification.

Note:

Edges of ALL packers to be sealed with mastic and painted.

10.2.7.6.2. The Contractor will rectify all the items of the punch list. Once the Contractor is finished with his punch list and he is satisfied that the Transnet QC inspector is allowed to conduct his own punch list, the Contractor will then notify the Transnet Project Manager of all the items punched and corrected and will hand-over the completed punch list for the Transnet QC inspector to review and go through the punch list.

7.2.7.8. Final Inspection

The Contractor will conduct a final inspection to confirm that the equipment, including paintwork, is in a good state and that all extraneous materials, tools etc. have been removed.

7.2.7.9. Final Document Check

Final document check to verify that all specified operations have been completed with satisfactory results, all supporting records are available and all reported non-conformities have been satisfactorily resolved. The Contractor will then present the final documents checks to the Transnet Project Manager for approval in principle.

8 Positioner System

8.1 Reference Drawings:

Annexure A
Appendix A Drawing List

8.2 Train Positioner Track

8.2.1. Positioner Track is installed and fully grouted in position.

8.2.2. Rail clamps on each of the five modules are missing and must be replaced.

8.2.3. Some racks are loose – All racks must be tightened to the correct torque values and the bolts as per drawing are to be HSFG bolts.

8.2.4. The Contractor is required to remove all the surface rust from the positioner racks. Once the rust has been removed the Contractor will coat the rack teeth with a thin layer of graphite grease to ensure the surface rust does not manifest itself again.

8.2.5. The Contractor is required to correct the minor misalignment of the Positioner Track relative to the main track datums.

8.2.6. The Contractor will conduct an inventory check of the positioner track rail clips and will procure and fit track rail clips at all module joints that are missing.

8.2.7. The Contractor will remove a set of the spine bar HSFG bolts and nuts one at a time which are excessively corroded and replace with new HSFG bolts. The contractor will torque the HSFG bolts in accordance with the torque value for the installed bolts.

8.2.8. It was established that Zinc plated washers have been installed instead of HSFG washers at all Module Frame connections. The Contractor will procure and install HSFG washers.

8.2.9. The Contractor is required to verify the torque of all rack to spine bar bolts, and where necessary torque the bolts to the correct torque settings.

8.2.10. The support stool beams for the main line rails (In-Go & Out-Go) have not been manufactured. The Contractor will fabricate, supply, install, level and align the support stool beams. Once the support stool beams are aligned and fitted, the Contractor will cast the support stool beams with concrete, making sure that enough clearance or pockets are allowed to fit the and tighten the rail clip nuts.

8.2.11. Once the concrete is dry the Contractor will fit the mainline rails which will be provided by Transnet Freight Rail. The rail clips will be procured and fitted by the Contractor as well.

8.2.12. Once the main line rails (In-Go & Out-Go) have been fitted, the Contractor will check that the distance between positioner track and main track is set to the clearance as per original designer's drawing.

8.2.13. Although the spine bars and racks are fitted, the Contractor is still required to check the straightness of spine bar. The tolerance will have to be within maximum deviation over total length as required by the AB drawings.

8.3 Positioner Drives

8.3.1. The Contractor will remove all eight (8) positioner drives and will deliver the drives to the drive OEM for stripping and inspection.

8.3.2. The Contractor will notify the Transnet Project Manager once the drive gearboxes has been stripped so that a joint decision with the drive OEM on the remedial actions required to ensure that the positioner drives is fit for purpose.

8.3.3. The Contractor will arrange for the torque limiting clutches/couplings to be bench tested to ensure that the de-clutching torque setting is as per AB's positioner drives calculations. Records of these settings will be recorded and must be included in the positioner maintenance manual for future reference.

8.3.4. Once the positioner drives have been refurbished the Contractor will have the drives transported to site and re-installed on the positioner.

8.3.5. The Contractor will provide and position pad jacks and suitable packers to support the positioner above the track so that the drive pinions are just clear of the rack. Using lifting lugs and suitable lifting beam, the Contractor will lift positioner and lower on to pad jacks.

8.3.6. The Contractor will remove rack sections as required to allow the guide roller to be lowered to the spine bar.

8.3.7. Whilst the positioner drives are being refurbished, the Contractor will remove the eight drive shafts complete with the respective pinions and will remove all the surface rust on the positioner drive pinions. Once the pinions have been cleaned, the Contractor will then fit the pinion-shaft arrangement and will coat the pinions with graphite grease to prevent surface rust manifesting itself again.

8.3.8. The Contractor will rotate drive pinions by hand so that the pinion teeth will mesh with the rack teeth.

8.3.9. The Contractor will lower the positioner onto the track ensuring correct rack and pinion mesh as per original designers AB drawings.

8.3.10. Without the positioner drives, pull the Positioner along track away from removed rack segment positions.

8.3.11. Replace rack segments to the track assembly.

8.3.12. The Contractor will remove Guide Rollers complete, dismantle roller assembly and re-assemble with new bearings and seals.

8.3.13. The Contractor will supply and install packing to correct the elevation of the Guide Rollers.

8.3.14. The Contractor will remove Fixed Support Roller complete, dismantle roller assembly and re-assemble with new bearings and seals.

8.3.15. The Contractor will Remove Sprung Support Roller complete, dismantle roller assembly and re-assemble with new bearings and seals

8.3.16. The Contractor will fit and adjust the sprung support roller as per original designer drawing.

8.3.17. The Contractor will then pull the positioner laterally across the track such that all pinions bottom in the rack teeth. Adjust the twin guide rollers on opposite side of rack to achieve a clearance between the rollers and the spine bar as per the original designer drawing.

8.3.18. The Contractor will then pull the Positioner laterally across the track in the opposite direction, which will withdraw pinions, until the twin guide rollers previously adjusted contact the spine bar.

8.3.19. Adjust the single guide rollers to achieve a clearance as per original designer drawing between the rollers and the spine bar. The Contractor will record the guide roller clearances.

8.3.20. The Contractor will adjust resolver unit as per original designer drawing to obtain correct backlash with racks.

8.3.21. Once the rack, guide rollers and resolver unit clearances have been set the Contractor will proceed to install the eight positioner drives.

8.4 Positioner Main Arm

8.4.1. Whilst the positioner main arm is fitted the Contractor will be required to check the clearance of the main arm and the thrust pads. The Clearance has to be in accordance with the original designer drawings.

8.4.2. The Contractor will be required to remove all the articulation pins, to ensure that the main arm does not collapse the Contractor will only remove one pin at a time. The Contractor will remove

all surface rust with an emery cloth grit designation P180. Whilst these pins are out the Contractor will also repeat the same work on the pivot pin bores. Once the pivot pin and bore are cleaned the Contractor will coat the surface of the pivot pin and pivot pin bore with Copper-slip anti seize compound grease.

8.4.3. The Contractor will grind out and re-weld Front Pedestal front plate to bottom flange weld. Any improvements done to the welds mentioned above must be followed by the appropriate NDT which as a minimum will include MPI. Once any weld repair has been accepted, the Contractor will then carry out the necessary paint repairs all in accordance with the Transnet Corrosion Specification.

8.4.4. The Contractor will complete a 20% sample torque tightness bolt check for each critical bolt group.

8.4.5. The Contractor will send 1 bolt per critical connection for mechanical and chemical analysis.

8.4.6. It's not clear if the main arm ballast box has been filled with Concrete. The Contractor will remove the two inspection covers and verify that the ballast box has been filled concrete. If the ballast box has not been filled with concrete, then the Contractor will price for filling the ballast box with concrete.

8.4.7. Once all the articulation pins have been reinstated and the ballast inside the ballast box has been confirmed, the Contractor will then lift the main arm up and down through its operating range and record the operating dimensions for including in the maintenance manual.

8.5 Last Wagon Arm (LWA)

8.5.1. Similar to the main arm, the last wagon arm was also installed by the OEM and shipped with the positioner to site. Due to the amount of time that the equipment has not been rotated the Contractor will be required to support the last wagon arm and will remove the pivot pin.

8.5.2. The Contractor will remove all surface rust with an emery cloth grit designation P180. Whilst this pivot shaft is out the Contractor will also repeat the same work on the pivot shaft bore. Once the pivot shaft and bore are cleaned the Contractor will coat the surface of the pivot shaft and pivot shaft bore with Copper-slip anti seize compound grease. The Contractor will then re-assemble the pivot shaft.

8.5.3. The Contractor will then proceed to strip the latch assembly and will carry out the removal of surface rust as well as coat of machine surface with copper-slip anti seize compound grease.

8.5.4. The Contractor will remove LWA Pivot Pin, carry out the removal of surface rust, particularly the splined end and coat of machined surfaces with copper-slip anti seize compound grease.

8.5.5. The Contractor will remove Arm Head assembly, dismantle head assembly carry out the removal of surface rust as well as coat of machine surface with Copper-slip anti seize compound grease.

8.5.6. The Contractor will check alignment of LWA latch pin hole with Latch Pin and rectify accordingly.

8.5.7. The Contractor will fabricate, transport to site, and erect Coupler Alignment Tool.

8.5.8. The Contractor will alter Limit Switch Bracket to achieve correct fit.

8.5.9. Shim LWA Latch Pin Bracket to achieve alignment of Pin with LWA.

8.5.10. The Contractor will Remove Arm Head assembly from LWA, dismantle, lubricate, and re-assemble.

8.5.11. The Contractor will complete a 20% sample torque tightness bolt check for each critical bolt group.

8.5.12. The Contractor will Send 1 bolt per critical connection for mechanical and chemical analysis.

8.6 Assembly of Positioner Hydraulic System

8.6.1. The Contractor will provide and install the Positioner hydraulics in accordance with the hydraulic OEM installation method statement. The Installation will include the following:

8.6.1.1. Connect pipework to the last wagon arm pivot shaft actuator.
8.6.1.2. Connect pipework to the last wagon arm coupler actuator.
8.6.1.3. Connect pipework to the last wagon arm latch actuator.
8.6.1.4. Connect pipework to the arm raise cylinder.

8.7 Assembly of Positioner Grease Lubrication System

8.7.1. The Positioner is to be fitted with two types of automatic grease lubrication systems, namely:

8.7.1.1. Fully automated Stand-alone, electrically driven pump type, progressive, grease lubrication systems with cycle feedback to the PLC and satisfying the lubrication needs of groups of bearings. This system supplies grease to all the pinion bearings, side guide roller bearings, sprung supported roller bearings, main arm pivots and Last Wagon Arm pivot pins.

8.7.1.2. Fully automated Stand-alone, electrically driven pump type spraying lubricant automatically onto the gear teeth with cycle feedback to the PLC and satisfying the lubrication needs open rack and pinions.

8.7.2. The Contractor will fit both if these Fully automated Stand-alone progressive, grease lubrication systems on-board the positioner in an area that will not restrict the servicing of the systems and surrounding equipment.

8.7.3. The Contractor will then provide and fit all the stainless-steel piping and fittings to respective bearings and open rack and pinions.

8.7.4. Once all the piping is complete, the Contractor will run the respective pumps and check that grease is reaching all points that require lubrication (when power is available in conjunction with the electrical site installation method statement).

8.8 Assembly of Festoon & Travel limit Switches

8.8.1. Although the festoon rails and support structure have already been installed, the Contractor is still required to survey the festoon rail columns and check that the festoon rail columns are at the correct elevation and are vertically aligned. The survey results will be recorded and presented to the Transnet Project Manager for review and approval in principle.

8.8.2. As far as the festoon cable carriers are concerned the majority of the carriers are already in place including the fixed carrier, however the Contractor will inspect that the assembly of the carriers is in accordance with the OEM of the festoon carriers. Any adjustment that are necessary will be carried out by the Contractor. Should the Contractor discover that not all the carriers are in place, then the Contractor will install the missing carriers.

8.8.3. The Contractor will supply and Install festoon, and travel limit switches.

8.8.4. The Contractor will supply and install the positioner and festoon cables in accordance with the festoon cable schedule.

8.9 Assembly of Tippler & Positioner Lasers & Locomotive System

8.9.1. The Contractor will supply and install all the necessary brackets for the position lasers, limit switches and proximity switches required for the accurate position of the rake wagons.

8.9.2. The Contractor will then also supply and install all the necessary lasers, switches, and proximity switches. These in accordance with the standard Transnet Port Terminal specifications.

8.10 Positioner Main Frame

8.10.1. Whilst the condition of the positioner main frame was found to be acceptable and in accordance to the original designer drawings, during the phase 1 condition assessment it was discovered that some major structural welds were not acceptable in line with the load and stresses that the main frame will see during its operating life, therefore the Contractor will carry out weld repairs to the weld located between mainframe trackside web and bottom flange as well as the weld located at the main frame front fixed support roller wheel.

8.10.2. Any improvements done to the welds mentioned above must be followed by the appropriate NDT which as a minimum will include MPI. Once any weld repair has been accepted, the Contractor will then carry out the necessary paint repairs all in accordance with the Transnet Corrosion Specification.

8.10.3. It appears that the lifting plates welded to the positioner main frame for lifting and handling were not removed. The Contractor will remove these plates and grind the parent material free of all welding. Once the weld material has been completely removed then the Contractor will carry out the appropriate NDT which as a minimum will include MPI to the area where the lifting lugs was welded.

8.10.4. The Contractor will fit all missing components, as listed on sub-assembly SIP's.

8.10.5. The Contractor will complete a 20% sample torque tightness bolt check for each critical bolt group.

8.10.6. The Contractor will fit the OLEO buffers.

8.10.7. The Contractor will manufacture and fit new Encoder Guards.

8.10.8. Re-manufacture and fit trackside handrailing to reach Towing Arm and to be turned in at Drive Cartridge end.

8.11 Positioner Punch Listing

8.11.1. The Contractor will create Punch Lists on all outstanding works detailing uncompleted items including painting of bolt heads, nuts and sealing of packers. The Contractor will then carry out remedial work to damaged painting in accordance with the Transnet Corrosion Protection specification.

Note: Edges of ALL packers to be sealed with mastic and painted.

8.11.2. The Contractor will rectify all the items of the punch list. Once the Contractor is finished with his punch list and he is satisfied that the Transnet QC inspector is allowed to conduct his own punch list, the Contractor will then notify the Transnet Project Manager of all the items punched and corrected and will hand-over the completed punch list for the Transnet QC inspector to review and go through the punch list.

8.12 Final Inspection

8.12.1. The Contractor will conduct a final inspection to confirm that the equipment, including paintwork, is in a good state and that all extraneous materials, tools etc. have been removed.

8.13 Final Document Check

8.13.1. Final document check to verify that all specified operations have been completed with satisfactory results, all supporting records are available and all reported non-conformities have been satisfactorily resolved.

9 Assembly of Train Holding Devices

9.1 Foundations

9.1.1. The Contractor is required to survey the foundations for the Entry and Exit Wheel Gripper Pits. In order to do this the Contractor will be required to lift the gripper stools.

9.1.2. The survey results will be recorded and presented to the Transnet Project Manager for review and approval in principle.

9.1.3. The Contractor is required to manufacture and install ladder cleats for the small cat ladders in the four pits.

9.2 Assembly of Entry & Exit Grippers

9.2.1. The Gripper Clamp Assemblies were fully shop assembled, however because of the duration that the grippers have not been used, the gripper mechanism pivot pins are showing considerable amount of surface rust.

9.2.2. The Contractor will dismantle the gripper articulation pivot pins and will remove the surface rust with an emery cloth grit designation P180. Whilst these pivot pins are out the Contractor

will also repeat the same work on the pivot pin bores. Once the pivot pins and bores are cleaned the Contractor will coat the surface of the pivot pins and pivot pins bores with Copper-slip anti seize compound grease. The Contractor will then re-assemble the gripper mechanisms.

9.2.3. The Contractor will check the alignment with the main rail and when positioned correctly on the grout packers, the Contractor will then secure the gripper unit and stools using the foundation bolts supplied – to snug tight condition. Record all dimensions and presented to the Transnet Project Manager for review and approval.

9.2.4. Once the grippers have been levelled and aligned the Contractor will then grout under the foundation frames using full strength grout and allow to cure. Fully tighten foundation and HSFG bolts.

9.2.5. The Contractor will need to price for the supply and replacement of all shims ≤3mm in stainless steel 304L. The shims currently installed are the incorrect shim material for the size mentioned above.

9.3 Entry & Exit Grippers Hydraulic Powerpacks

9.3.1. Whilst the original intention was to mount the individual hydraulic power packs in the respective gripper pits, it was decided that due to the potential of water flooding the powerpacks, the powerpacks will be moved to the outside of the gripper pits. The Contractor will place the hydraulic powerpacks at floor level alongside the respective grippers as long as the powerpacks are clear of any obstruction, i.e. sides of the ore wagons.

9.3.2. To safeguard the powerpacks from being damaged, the Contractor will install an Armco barrier, that will serve as protection from damage.

9.3.3. The Contractor will install the powerpacks with the isolation valves on all units facing away from the centre of the track.

9.3.4. Before the hydraulic powerpacks are installed, the Contractor will flush the powerpacks to remove all contamination from the pipe runs/hoses etc in accordance with the hydraulic OEM installation commissioning schedule.

9.3.5. Once the powerpacks have been flushed, the Contractor will proceed to install, the pipes to the gripper Clamp cylinders.

9.3.6. At this point the Contractor will stroke the cylinders to its full length to ensure free operation, (when power is available in conjunction with the electrical site installation method statement).

9.4 Entry & Exit Grippers Grease Lubrication

9.4.1. The Contractor will install the Gripper fully automated Stand-alone, electrically driven pump type, progressive, grease lubrication systems with cycle feedback to the PLC and satisfying the lubrication needs of groups of articulation pins.

9.4.2. The Contractor will supply and install all grease lubrication piping along with all the correct grease fittings.

9.4.3. Once all the piping is complete, the Contractor will run the respective pumps and check that grease is reaching all points that require lubrication (when power is available in conjunction with the electrical site installation method statement).

9.5 Train Holding Devices Punch Listing

9.5.1. The Contractor will create Punch Lists on all outstanding works detailing uncompleted items including painting of bolt heads, nuts and sealing of packers. The Contractor will then carry out remedial work to damaged painting in accordance with the Transnet Corrosion Protection specification.

Note: Edges of ALL packers to be sealed with mastic and painted.

9.5.2. The Contractor will rectify all the items of the punch list. Once the Contractor is finished with his punch list and he is satisfied that the Transnet QC inspector is allowed to conduct his own punch list, the Contractor will then notify the Transnet Project Manager of all the items punched and corrected and will hand-over the completed punch list for the Transnet QC inspector to review and go through the punch list.

9.6 Final Inspection

The Contractor will conduct a final inspection to confirm that the equipment, including paintwork, is in a good state and that all extraneous materials, tools etc. have been removed.

9.7 Final Document Check

The Contractor will conduct a final document check to verify that all specified operations have been completed with satisfactory results, all supporting records are available and all reported non-conformities have been satisfactorily resolved. The Final documents will be issued to the Transnet Project Manager for review and acceptance in principle.

10 Hoppers & Apron Feeders

Reference Documents:

Annexure J: Apron Feeders Specification

10.1. As conveyor 308 is already in place, the Contractor will check that the centre line of the Feeder Chutes is in line with the centreline of conveyor 308. If alignment not centred then contractor to ensure alignment is corrected.

10.2. The Contractor will before be proceeding with installation of the apron feeders, carry out a dimensional check of the apron feeder chutes, to ensure that the apron feeder chutes are correctly manufactured and installed.

10.3. It appears that all the fixing bolts of the apron feeder chutes, and support structures have all been torqued, to ensure that the correct bolts have been used, the Contractor will remove 5 bolts

from around the structure for mechanical and chemical analysis. Once it's established the correct grade of bolts was used the Contractor will then carry out a random 20% torque tightness checks. If bolts are incorrect then new bolts as per design requirements will be installed. The bolts that are found not be tightened according to the torque requirements of the bolt will be tightened to the correct torque requirements.

10.4. None of the five hopper chutes and hopper outlets have been fitted with the liner panels. The Contractor will install the hopper chutes and hopper outlet liner panels.

10.5. In order to install the isolation gate frame assembly, the Contractor will be required to remove all the removable panels of the apron feeder chutes as well as the temporary spacer chute.

10.6. Once all the removable panels of the apron feeder chute have been removed the Contractor will then proceed to install the isolation gate frame assemblies.

10.7. The Contractor will manufacture and install five Apron Feeder drive Torque Reaction Arm anchor brackets.

10.8. The Contractor will clean end of Head and Tail Drive Shafts before installing Apron Feeder Drives.

10.9. The Contractor will install the five apron feeder assemblies. The Contractor will ensure that the centre lines of the feeders are in line with the centre line of conveyor 308.

10.10. Once the five-apron feeder have been installed, the Contractor will install the five apron feeder drive assemblies in position. The Contractor will ensure that the output coupling half on the feeder drive shaft is correctly positioned, and the locking element fully tightened before fitting the drive unit.

10.11. The Contractor will complete the Bolting of the Apron Feeder Chutes and Underpans to the supporting steelwork which was not completed by original installer.

10.12. The Contractor will procure, supply, transport to site and install shim packs and missing bolts.

10.13. The Contractor will then fit the Tilt Switch Assembly into position in the Feeder Chute, as well as the Material Level Sensors.

10.14. The Contractor will install all the Apron Feeder Safety Guards before the start of cold commissioning.

10.1 Hopper & Hopper Liners

10.1.1. During the phase 1 inspection it was observed that the structural integrity of the impact wall seems to be a very lightweight construction, probably not strong enough to withstand the loads expected from falling material.

10.1.2. In view of the above visual findings, the Contractor is required to review the design, re-design the required strengthening members, manufacture new strengthening members and install suitable strengthening members to the Deflector wall.

10.1.3. The Contractor will procure, supply, and install all the hopper liners in line with the installation drawing compiled by original contractor.

10.1.4. Due to the magnetic arrangement of the liner panels, to ensure that the panels stay fixed and do not slide due to weight of the panels and the material sliding over the panels, its recommended that the Contractor consider welding flat bar for the full length of the hopper walls to serve as a retaining plate for each row of liner panels. If the recommendation is not practical the contractor will provide an acceptable engineering solution and implement the solution.

10.1.5. It was observed during the phase 1 inspection that the counterweights of the wagon clamps will clash with the hopper edge beam on the non-tip side of the hopper. The Contractor is required to review the current design and make the necessary modifications to the hopper edge beam. The structural modifications will be painted in accordance with the EEAM-Q-008 Corrosion Protection specification.

10.2 Hopper Instruments

The Contractor will procure, supply, and install Material Level Sensors as per the Transnet standard.

10.3 Apron Feeder Grease Lubrication systems

10.3.1. The Contractor must take note that there are 5 fully automated Stand-alone, electrically driven pump type, progressive, grease lubrication systems with cycle feedback to the PLC and satisfying the lubrication needs of groups of bearings. This system supplies grease to all the sprocket shaft bearings of the apron feeders.

10.3.2. The Contractor will fit all five of these Fully automated Stand-alone progressive, grease lubrication systems alongside the respective apron feeder in an area that will not restrict the servicing of the systems and surrounding equipment.

10.3.3. The Contractor will then provide and fit all the stainless-steel piping and fittings to respective sprocket shaft bearings.

10.3.4. Once all the piping is complete, the Contractor will run the respective pumps and check that grease is reaching all points that require lubrication (when power is available in conjunction with the electrical site installation method statement).

10.4 Maintenance Equipment (20t Crawl Beam and Hoist)

10.1.6. The Contractor will design, fabricate, deliver to site and install 20ton crawl beam system complete with a Motorized Trolley Chain Hoist Come Along rated for 20-ton lifting capacity. Detailed drawings and design calculations to be submitted by the contractor. All structural material to be corrosion protected as per specification EEAM-Q-008 Corrosion Protection.

10.5 Hoppers & Apron Feeder Punch Listing

10.5.1. The Contractor will create Punch Lists on all outstanding works detailing uncompleted items including painting of bolt heads, nuts and sealing of packers. The Contractor will then carry out remedial work to damaged painting in accordance with the Transnet Corrosion Protection specification.

10.5.2. The Contractor will rectify all the items of the punch list. Once the Contractor is finished with his punch list and he is satisfied that the Transnet QC inspector is allowed to conduct his own punch list, the Contractor will then notify the Transnet Project Manager of all the items punched and corrected and will hand-over the completed punch list for the Transnet QC inspector to review and go through the punch list.

10.6 Knife Gates

10.6.1. The contractor will remove the 5 off spacers currently installed.
10.6.2. The contractor will install the reviewed designed 5 off Knife Gates.
10.6.3. The Knife Gates to be installed with the dedicated HPU.

10.7 Final Inspection

10.7.1. The Contractor will conduct a final inspection to confirm that the equipment, including paintwork, is in a good state and that all extraneous materials, tools etc. have been removed.

10.8 Final Document Check

10.8.1. The Contractor will conduct a final document check to verify that all specified operations have been completed with satisfactory results, all supporting records are available and all reported non-conformities have been satisfactorily resolved. The Final documents will be issued to the Transnet Project Manager for review and acceptance in principle.

11 Dust Extraction & Collection System

Reference Documents:
Annexure C: Technical Specification
Dust Extraction/ Handling Plant

1. Although most of the dust extraction plant structures are in place, the Contractor will survey the dust extraction plant foundations. Due to the state of the plant the elevations will be to the top of base plate of the support structures. The Contractor will record the survey results and will provide the Transnet Project Manager the survey results for review and approval in principle.

2. The Contractor will Design, fabricate, supply, and install ducting modification to suit error in floor slab.

3. The Contractor will arrange for all the big extraction ducting to be collected from the various places around the site and lay the ducting down in close vicinity to where the dust plant is located.

4. Scattered all over the plant is support trestles, which also need to be retrieved and laid down in close proximity to the dust plant. The Contractor will also arrange for the collection of all the dust plant structural steel.

5. As the dust cowl was removed for the lifting of the tippler cage, the installation of the ducting connecting the duct cowl extraction points will only be installed once the dust cowl is re-installed. To ensure that there is continuity of work the Contractor will proceed with the installation of all the outstanding structures and equipment on the dust extraction plant, until such time the dust cowl is re-assembled back into position. Therefore, the contractor will proceed as follows:

6. Structural
    - Install all structural columns.
    - Install all pipe ducting.
    - Install compensator.
    - Install dust monitor access platform.
    - Install extraction fan support structure.
    - Install dust extraction fan ducting.
    - Install ducting pipe 002/D32 followed by ducting pipes 004/D53 to 004/D59.
7. Mechanicals
    - Install bag filter units (Bag filter A & B)
    - Install dust extraction fan, blower fan, blower valve, isolation valve, rotary valve
    - Install dust storage diverter chute.
    - Install dust storage pug mill.
    - Install Dust Storage Ventilation Valve (Pressure Relief)
    - Install Dust Extraction Compressor 1 and Auxiliary components.
    - Install Dust Extraction Air Receiver 1 and Auxiliary valves.
    - Install Dust Extraction Desiccant Dryer 1 - and Auxiliary valves.
    - Install Dust Extraction Dust Collector 1 and Auxiliary components.
    - Install Dust Collector 1 and Auxiliary components.
    - Install Dust Extraction Air Receiver 2 – and Auxiliary valves.
    - Install Dust Extraction Desiccant Dryer 2 - and Auxiliary valves.
    - Install Dust Extraction Desiccant Dryer 2 - Secondary Filter 2
    - Install Dust Extraction Dust Collector 2
    - Install Dust Collector 2 and Auxiliary components.

11.1 Dust Cowl

11.1.1. The dust cowl to be re-installed once all the rotational checks of the tippler cage have been completed, this is to ensure that the cage is able to rotate through the complete angle of normal and maintenance operations.

11.1.2. Once the Contractor is satisfied that the tippler cage is rotating according to design requirements, the Contractor will proceed with the installation of the dust cowl, ensuring accurate fit up of all panels and components.

11.1.3. Once the dust cowl ring beams and panels have been installed the Contractor will then proceed to install the dust cowl access.

11.1.4. During the phase 1 inspection it was discovered that the seal ring at the dust cowl ends did not have the correct clearances, in view of this the Contractor will make the necessary adjustments possibly by cutting and welding, to achieve a consistent gap with Tippler End Rings.

11.1.5. The Contractor is required to engineer, procure, and install a rubber lip seal between Dust Cowl and End Rings on the in-go and out-go sides of the tippler cage.

11.1.6. The Contractor is required to design, manufacture, and install replacement Support Roller Dust Shrouds.

11.2 Dust Extraction Plant Punch List

11.2.1. The Contractor will create Punch Lists on all outstanding works detailing uncompleted items including painting of bolt heads, nuts and sealing of packers. The Contractor will then carry out remedial work to damaged painting in accordance with the Transnet Corrosion Protection specification.

Note: Edges of ALL packers to be sealed with mastic and painted.

11.2.2. The Contractor will rectify all the items of the punch list. Once the Contractor is finished with his punch list and he is satisfied that the Transnet QC inspector is allowed to conduct his own punch list, the Contractor will then notify the Transnet Project Manager of all the items punched and corrected and will hand-over the completed punch list for the Transnet QC inspector to review and go through the punch list.

11.3 Final Inspection

11.3.1. The Contractor will conduct a final inspection to confirm that the equipment, including paintwork, is in a good state and that all extraneous materials, tools etc. have been removed.

11.4 Final Document Check

11.4.1. The Contractor will conduct a final document check to verify that all specified operations have been completed with satisfactory results, all supporting records are available and all reported non-conformities have been satisfactorily resolved. The Final documents will be issued to the Transnet Project Manager for review and acceptance in principle.

12 Electrical Site Testing

12.1. The Contractor will be fully responsible to carry out and supply any consumables required for the electrical site commissioning. The Contractor will ensure that all necessary equipment and resources will be available on site before the start of the electrical site commissioning.

12.2. The Contractor is also fully responsible for the respective OEM's technical staff to be present on site for the full duration of Cold and Hot commissioning. The Costs associated with appointing this technical staff will be for the Contractors account.

12.3 Introduction

This section covers the electrical site testing and commissioning of electrical equipment provided for the Wagon Unloading Station.

12.3.1 Objectives

To verify the installed electrical equipment is in compliance with Contract Specification for the Dual Wagon Unloading Station.

To verify the electrical equipment is not visibly damaged so as to impair safety.

To carry out tests prior to connecting electrical power to the system to establish correctness and suitability of the system for energising.

To carry out live tests on individual items of plant to establish correct operation.

To carry out live tests on the total system to establish correct sequential operation.

12.3.2 General Safety Requirements

Prior to commencing any operation detailed in this schedule the following requirements must be satisfied:

12.3.2.1. All necessary 'Permit to Work' clearances must be obtained from the Transnet Project Manager. Woking at heights and associated equipment costs to be allowed for.

12.3.2.2. The TIMS Health and Safety specifications are to apply to all work on the project. Furthermore, the SHEQ risk assessment will determine all risks and associated SHEQ controls to be applied during the various phases of the project

12.3.2.3. All necessary warning notices must be posted.

12.3.2.4. All necessary safety barriers must be in place as to avoid any possibility of accidental contact with live or moving plant.

12.3.3 Test Conditions

Each section of the electrical site testing and commissioning must be completed before proceeding with tests in the subsequent section.

12.3.4 Results Sheets

12.3.4.1. Results sheets for the tests described in this literature must be produced by the Contractor and presented to the Transnet Project Manager for review and approval in principle. The Contractor will allow the Transnet Project Manager at least 8 hours to review and approve the results test sheet. The Contractor is at liberty to proceed with the testing and

commissioning, if however, the Transnet Project Manager rejects a test sheet, the Contractor will action the immediate correction of such non-compliances and present the correct results to the Transnet Project Manager

12.3.4.2. Each result sheet must be completed as the tests proceed.

12.4 Energising: MCC & PLC

The tests described in this section apply respectively to the circuits within the MCC panel and PLC panel.

12.4.1 Pre-Requisites

12.4.1.1. All checks and tests in previous sections of this schedule have been satisfactorily completed.

12.4.1.2. All necessary 'Permit to Work' clearances must be obtained.

12.4.1.3. Ensure warning labels are fitted to all items where access may be gained to live or potentially dangerous equipment.

12.4.1.4. All necessary safety barriers must be in place so as to avoid any possibility of accidental contact with the respective live or moving plant.

12.4.1.5. Ensure all personnel are competent as to the use of this electrical equipment, are aware of any dangers which may exist and know what action to take in the event of such a situation occurring.

12.4.1.6. As far as is practicable, ensure there will be no load on the equipment when it is energised.

12.4.1.7. At the MCC Panel ensure the supply isolator and all outgoing circuit isolators are open and locked in the OFF position.

12.4.1.8. Ensure all remaining isolation points to sub-circuits, including all remote equipment and devices, are in the OFF position (preferably locked) at all panels.

12.4.1.9. With reference to the Panel Manufacturer Instruction Manual for the MCC Panel ensure any 'Final Check List Before Energising' is complied with.

12.4.1.10. Ensure all equipment will be energised in sequence, starting at the source end of the system, and working towards the load end.

12.4.2 Protection Settings

The Contractor will check that all fuse, overload, and protection settings in the MCC Panel are in accordance with the Single Line Diagrams and relevant schematic drawings. The Contractor will record any deviations and presented it to the Transnet Project Manager.

12.4.3 MCC Panel Incoming Supply Voltage

12.4.3.1. At Electrics House close the 400V supply circuit breaker to MCC Panel. At MCC check that the level of incoming voltage is within 400V ± 5%. Record the results and present to the Transnet Project Manager.

12.4.3.2. Check bus bar voltmeter and selector switch for correct operation.

12.4.4 MCC Panel Distribution Voltages

12.4.4.1. Close the 240V supply circuit breaker. Check that the level of incoming voltage is within 240V ± 5%. Record the results and present to the Transnet Project Manager.

12.4.4.2. Close all the MCB's to 110V AC Check the level of voltage on is within 110V ± 5%. Record the results of this section and present to the Transnet Project Manager.

12.4.4.3. Close all the MCB's to the 240V AC programming outlets. Check the voltage on the outlets is 240V ± 5% and of correct polarity.

12.4.5 Energising PLC

The Contractor will Ensure the PLC is Switched to the Program Stop Position, and carry out the following checks:

12.4.5.1. Close the 240V AC supply MCB on to the PLC.

12.4.5.2. Load the PLC program into PLC. Check that the PLC program is loaded correctly.

12.4.5.3. Check the Profibus Communication network is operating correctly.

12.4.5.4. Ensure all personnel are in safe positions, switch the PLC to the run position: Check that the CPU is operating correctly in accordance with the PLC operating manuals.

12.4.5.5. Close the 110V AC MCB's to the PLC inputs, ensuring that the circuitry is operating correctly before proceeding to the next MCB.

12.4.5.6. Close the 110V AC MCB's to the PLC outputs, ensuring that the circuitry is operating correctly before proceeding to the next MCB.

12.4.5.7. Rectify the problems that cause any MCB's to trip.

12.4.5.8. Using the LED's on the PLC, check out all digital input contacts (switches, push buttons, relay and contactor contacts, etc) against the I/O Schedule to ensure they operate correctly and are of the correct polarity. Rectify any errors found.

12.4.5.9. Mark-up a copy of the I/O Schedule and append to Results Sheets to confirm these digital input checks have been performed and to record any required amendments.

12.4.5.10. Check out all digital outputs against the I/O Schedule to ensure they operate their loads (relays, solenoids, lamps, warning devices, etc) correctly and with correct polarity. Rectify any errors found.

Note 1
The Contractor will Ensure all 415V mains power supplies to final circuits are still isolated before commencing this step.

Note 2
The Contractor will use the respective schematic drawings to determine which contacts need to be temporarily linked out to simulate closed contacts in order to prove the PLC output signals and wiring. Remove all temporary links afterwards.

12.4.5.11. The Contractor will Mark-up a copy of the I/O Schedule and append to Results Sheets to confirm these digital output checks have been performed and to record any required amendments.

12.4.5.12. The Contractor will Check the Following:

- Positioner Encoder
- Tippler Encoder.

The Contractor will Check, as far as is possible at this stage, that all these encoders are operating correctly in accordance with their operating manuals and are correctly addressed and communicating via the Profibus network.

12.5 Energising Intouch SCADA

The following steps will be carried out by the Contractor, namely:

12.5.1. Close the 240V AC supply MCB to the Intouch SCADA Tippler Operators Control Screen.

12.5.2. Check, as far as is possible at this stage that the Intouch SCADA system hardware is operating correctly in accordance with its operating manual.

12.5.3. Check that the Intouch SCADA application program is loaded correctly and running.

12.5.4. Check that Intouch SCADA is communicating with the PLC Ethernet Communication Card and PLC I/O Database.

12.5.5. Toggle the "Cycle Start Pushbutton" on the relevant Intouch SCADA Screen and Check that the PLC receives the correct Signal.

12.5.6. Toggle the status of a known PLC Input or Output and check that the Intouch SCADA shows the correct status.

12.5.7 110V AC Relay and Contactor Circuitry

The Contractor will Check out the correct operation of all the 110V AC relay and contactor circuitry against the schematic drawings. Rectify any errors found.

Note 1

The Contractor will Ensure all 415V mains power supplies to final circuits are still isolated before commencing this step.

Note 2

The Contractor will Use the respective schematic drawings to determine which contacts need to be temporarily linked out to simulate closed contacts in order to prove the operation and wiring. Remove all temporary links afterwards.

12.6 Emergency Stop & Overtravel Circuitry

The Contractor will check out the correct operation of all the emergency stop & overtravel circuitry in schematic drawing. Rectify any errors found.

Note 1

The Contractor will Ensure all 415V mains power supplies to final circuits are still isolated before commencing this step.

Note 2

The Contractor will Use the respective schematic drawings to determine which contacts need to be temporarily linked out to simulate closed contacts in order to prove the operation and wiring. Remove all temporary links afterwards.

12.7 Energising MCC Motor Starter Modules

12.7.1. The tests described in this section apply respectively to all the motor starter modules, which should be fully tested one at a time in the most convenient order by the Contractor:

- Entry Wheel Grippers & Hyd. Pump Motor #1
- Entry Wheel Grippers & Hyd. Pump Motor #2
- Entry Wheel Grippers & Hyd. Pump Motor #3
- Entry Wheel Grippers & Fill Filter Pump #1
- Entry Wheel Grippers & Fill Filter Pump #2
- Entry Wheel Grippers & Fill Filter Pump #3
- Exit Wheel Grippers & Hyd. Pump Motor #1
- Exit Wheel Grippers & Fill Filter Pump
- Positioner Hyd. Pump Motor #1
- Positioner Hyd. Pump Motor #2
- Positioner Fill Filter Pump.

12.7.2. At the MCC terminals, the Contractor will temporarily disconnect and insulate the power supply cable to the motor of the module being tested.

12.7.3. Check the overload is reset.

12.7.4. Close the 110V AC control supply MCB to the respective MCC module.

12.7.5. De-isolate and close the 415V power supply circuit breaker to the respective module.

12.7.6. From all the drive schematic drawings, ensure the respective LOS trip contacts are closed and energise the Safety Relay within the respective modules.

12.7.7. Momentarily force the PLC output signal for its Start Relay inside the respective module to check the following signal is being received correctly at the PLC: -

- "Module" Contactor Closed.

12.7.8. Rectify any problems found.

12.7.9. Record the final status of each module and present to Transnet Project Manager for review and approval in principle.

12.8 Commission the Brake Systems

12.8.1 Positioner Brake Systems

12.8.1.1. Commission the Positioner Brake Systems for operation in accordance with their Manufacturer Instruction Manuals. This should include but not be limited to:

- Ensuring all safety devices are fully functional.
- Checking correct operation all associated PLC inputs and outputs for these systems.

12.8.1.2. Force respective PLC outputs as required to check correct operation of all brakes and feedback signals to the PLC.

12.8.2 Commission the Tippler Brake System

12.8.2.1. The Contractor will commission the Tippler Brake System for operation in accordance with the Manufacturer Instruction Manuals. This should include but not be limited to:

- Tippler Entry & Exit Normal Brake
- Tippler Entry & Exit Emergency Brake
- Ensuring all safety devices are fully functional.
- Checking correct operation all associated PLC inputs and outputs for these systems.

12.8.2.2. Force respective PLC outputs as required to check correct operation of all the tippler brake systems and their feedback signals to the PLC.

12.9 Energising: AC VVVF Drive Cubicles

The tests described in this section apply respectively to the following AC drives and their VVVF drive motors which should be fully tested one at a time in the most convenient order by the Contractor:

- Positioner Drive Motor #1
- Positioner Drive Motor #2
- Positioner Drive Motor #3
- Positioner Drive Motor #4

- Positioner Drive Motor #5
- Positioner Drive Motor #6
- Positioner Drive Motor #7
- Positioner Drive Motor #8
- Tippler Entry Drive Motor
- Tippler Exit Drive Motor
- Apron Feeder Drive Motor #1
- Apron Feeder Drive Motor #2
- Apron Feeder Drive Motor #3
- Apron Feeder Drive Motor #4
- Apron Feeder Drive Motor #5.

12.9.1 Pre-Requisites

12.9.1.1. The Contractor will ensure that the Drives Commissioning Engineer shall be involved with all the checking, setting up and testing of the AC drive cubicles described in this section.

12.9.1.2. With reference to the Siemens AC Drive Instruction Manual ensure any 'Final Check List Before Energising' is complied with.

12.9.1.3. All checks and tests in previous sections of this schedule have been satisfactorily completed.

12.9.1.4. All necessary 'Permit to Work' clearances must be obtained.

12.9.1.5. Ensure warning labels are fitted to all items where access may be gained to live or potentially dangerous equipment.

12.9.1.6. All necessary safety barriers must be in place so as to avoid any possibility of accidental contact with the respective live or moving plant.

12.9.1.7. Ensure all personnel are competent as to the use of this electrical equipment, are aware of any dangers which may exist and know what action to take in the event of such a situation occurring.

12.9.1.8. The Tippler and Positioner areas shall be free of wagons.

12.9.1.9. At MCC ensure all the respective main AC drive supply isolators are open and locked in the OFF position.

12.9.1.10. Ensure all respective 110V AC control supply circuit breakers are open.

12.9.1.11. Ensure all respective isolators and circuit breakers are open in the respective AC drive cubicles.

12.9.1.12. Ensure all equipment will be energised starting at the source end of the system and working towards the load end.

12.9.2 Protection Settings

12.9.2.1. The Contractor will check that all fuse, overload, and protection settings in the MCC are in accordance with the relevant schematic drawings.

12.9.3 110V AC DC Control Supply Voltages

The Contractor will carry out the following:

12.9.3.1. At the MCC close the respective 110V AC control supply circuit breakers to all AC drive cubicles.

12.9.3.2. Check the level of incoming control voltages into the AC drive cubicles are within ± 5% of their nominal values. Record the measured results of this section and present to the Transnet Project Manager for review and approval in principle.

12.9.4 240V AC Motor Heater Supplies

The Contractor will carry out the following:

12.9.4.1. Close the Positioner drive motor anti-condensation heater supply circuit breakers within the respective AC drive cubicles.

12.9.4.2. Check for correct operation of the circuitry to each drive motor anti-condensation heater. Rectify any problems found.

12.9.4.3. Check the level of voltage and current at each drive motor anti-condensation heater. Record the measured results.

12.9.5 Software Configuration of AC drives

The Contractor will carry out the following:

12.9.5.1. Check that the software has been correctly installed into all AC drive units by Drives Commissioning Engineer.

12.9.5.2. Perform the procedure as recommended by Drives Commissioning Engineer to confirm that the AC drive software is functioning correctly and is ready for controlling power to the respective VVVF drive motors.

12.9.5.3. Check that the Profibus connections is installed into all AC drive units and the drives are communicating with the PLC CPU.

12.9.6 AC Drive Cubicle Ancillary Circuits

12.9.6.1. The Contractor will perform any additional checks and tests that may be required on the following associated circuits before the AC drives are powered up:

- Drive motor thermistor circuit
- Drive motor tacho speed encoder
- Profibus data communication circuitry
- Emergency stop circuitry.
- Start Contactor circuitry.
- Positioner Encoder circuitry

- Tippler Encoder circuitry.

12.9.6.2. Check for correct operation and direction of rotation of the following items by momentarily forcing the PLC output signal for their Start Relay inside the respective module. Rectify any problems found.

12.10 Commissioning No-Load Operation:

12.10.1 Positioner Drive Motors

12.10.1.1. The procedures described in this section apply to operation of the following motors and their associated control circuitry:

- Positioner Drive Motor #1
- Positioner Drive Motor #2
- Positioner Drive Motor #3
- Positioner Drive Motor #4
- Positioner Drive Motor #5
- Positioner Drive Motor #6
- Positioner Drive Motor #7
- Positioner Drive Motor #8.

12.10.1.2. Pre-Requisites

12.10.1.2.1. The Drives Commissioning Engineer shall be involved with all the checking, setting up and testing of the AC drive cubicles described in this section.

12.10.1.2.2. All checks and tests in previous sections of this schedule have been satisfactorily completed.

12.10.1.2.3. All 'Permit to Work' clearances on the Positioner have been cleared and their associated warning and safety barriers have been removed.

12.10.1.2.4. Special barriers shall be placed around the potentially dangerous areas of the Positioner motor drive pinions going to be rotated during this procedure.

12.10.1.2.5. Ensure all personnel are informed that the Positioner motors could be operating without warning, that they are aware of the potential dangers which will then exist and know what actions to take in the event of such situations occurring.

12.10.1.2.6. The Positioner area shall be free of wagons.

12.10.1.2.7. PLC and Intouch SCADA are fully operational.

12.10.2 Energising the Positioner Motors on No-Load

The Contractor will carry out the following:

12.10.2.1. The Contractor will ensure sufficient sections of rack are removed to allow no-load operation of the individual Positioner drive motors.

12.10.2.2. At the MCC ensure that all the respective Positioner main AC drive supply 400V isolators and 110V AC control supply circuit breakers are closed.

12.10.2.3. At the Positioner AC drive cubicles ensure all respective isolators and circuit breakers are closed.

12.10.2.4. Carry out any remaining AC drive parameter set-up, start-up and tuning procedures as detailed in the Siemens AC Drive Instruction Manual Commissioning Instructions.

12.10.2.5. Carry out tests to confirm the emergency stop circuitry for the Positioner motors is operating correctly.

12.10.2.6. In conjunction with the Siemens Engineer and the PLC Commissioning Engineer ensure that when all VVVF drive brake release signals are energised, that the brakes release and the relevant signals are received at the drives.

12.10.2.7. Operate each Positioner AC drive and its associated drive. Perform functional tests to confirm that each drive 'system' is operating satisfactorily, including brake control, Correct Direction of the motor, the motor's tacho speed encoder, thermistor and anti-condensation heater circuit.

12.10.2.8. Operate the drive at all required speeds and ramps. Operate the drive fast stop circuit and confirm that the drive stops the motor under a fast ramp, without going into current limit or overload.

12.10.2.9. Ensure the following AC drive Profibus signals are communicating and are calibrated correctly:

- Speed reference
- Speed feedback
- Torque feedback (if required).

Note: It will be necessary to have the Positioner brakes available. In conjunction with the PLC Commissioning Engineer, make the relevant temporary changes to allow all the brakes to be released on command of the AC Drive being tested.

12.10.2.10. After the individual Positioner AC drives have been set-up and operated successfully, operate the complete Positioner AC drive 'system' under no load conditions at all speeds, recording the values of voltage, current and frequency.

12.10.2.11. When the Positioner AC Drive no-load have been satisfactorily completed, switch off the Positioner AC drives. Replace the Positioner rack sections.

12.10.2.12. Transnet Port Terminals Saldanha will make available sufficient rail wagons and commodity for the commissioning and testing activities to take place.

13 Commissioning

13.1 Responsibilities

13.1.1 Contractor's Responsibilities

13.1.1.1. The Contractor shall undertake pre-commissioning and no-load commissioning of the Machine.

13.1.1.2. The Contractor under the supervision of the Supervisor shall perform Load Commissioning and Performance Testing.

13.1.1.3. Commissioning of the Machine shall include checking the function and operation of each component of the equipment, pre-commissioning, no-load commissioning, load commissioning and performance testing.

13.1.1.4. The Contractor shall ensure that sufficient spare parts are available on site prior to the commencement of commissioning.

13.1.1.5. The Contractor shall submit to the Project Manager for approval a commissioning manual detailing the sequence, timing and operation of all commissioning and testing work and procedures necessary to complete the Works.

13.1.1.6. The Contractor shall be responsible for engaging experienced personnel or a representative of the manufacturer to perform the commissioning of items of equipment. The attendance of such representatives shall be indicated on the commissioning program.

13.1.1.7. The Contractor shall supply all necessary personnel required during commissioning of equipment supplied by the Contractor including specialists to check out and assist with start-up and calibration of equipment for optimum operation and to meet guaranteed performance. The field personnel provided by the Contractor shall be capable, qualified, and able to perform the duties required to the satisfaction of the Project Manager and shall be vested with authority to make decisions binding on the Contractor.

13.1.1.8. The Contractor shall provide all tools, including special tools, and test equipment having current calibration certificates, which will be required by his personnel for commissioning.

13.1.1.9. The Contractor shall furnish necessary technical services as required to resolve any technical and operating problems as they develop.

13.1.1.10. During commissioning the Contractor shall liaise closely with the Project Manager, particularly regarding availability of ancillary equipment provided by others, e.g., conveyors and wagons which may not always be available to the Contractor.

13.1.1.11. The Contractor shall maintain a diary of all events during commissioning and record all test results. On the completion of commissioning, he shall prepare and submit to the Project Manager a report recording the commissioning of the Machine.

13.1.1.12. The Contractor is fully responsible for the performance of the plant and the involvement of the Transnet Port Terminals Saldanha operators shall in no way relieve the Contractor from his responsibility for the Machine under the Contract.

13.1.1.13. The Contractor shall implement and conduct training. The Transnet Port Terminals Saldanha operators shall be used for plant operation during no-load commissioning, load commissioning and performance testing as detailed in the following sections as a minimum and as further detailed in the Contractor's training manual.

13.1.1.14. The Contractor shall supply all necessary oils and lubricants for equipment requiring oil and lubrication, in accordance with the manufacturer's instructions, and shall be responsible for lubrication of all equipment before and during pre-commissioning and no-load commissioning. The Contractor shall use the Transnet Port Terminals Saldanha's standard lubricants whenever possible.

13.1.2 Transnet Port Terminals Saldanha's Responsibilities

The Transnet Port Terminals Saldanha will make available to the Contractor power and, subject to availability, ancillary equipment during the commissioning period. Transnet Port Terminals Saldanha will provide any operating personnel required for the ancillary equipment.

13.2 Commissioning No-Load Operation:

13.2.1 Tippler Drive Motors

13.2.1.1. The procedures described in this section apply to operation of the following motors and their associated control circuitry and Tippler cells.

- Tippler Entry Drive Motor
- Tippler Exit Drive Motor.

13.2.1.2. Pre-Requisites

13.2.1.2.1. The Drives Commissioning Engineer shall be involved with all the checking, setting up and testing of the AC drive cubicles described in this section.

13.2.1.2.2. All checks and tests in previous sections of this schedule have been satisfactorily completed.

13.2.1.2.3. All 'Permit to Work' clearances on the Tippler have been cleared and their associated warning and safety barriers have been removed.

13.2.1.2.4. Special barriers shall be placed around the potentially dangerous areas of the Tippler motor drive pinions going to be rotated during this procedure.

13.2.1.2.5. Ensure all personnel are informed that the Tippler motors could be operating without warning, that they are aware of the potential dangers which will then exist and know what actions to take in the event of such situations occurring.

13.2.1.2.6. In conjunction with the Mechanical Commissioning Engineer, ensure that there are sufficient restraints applied to the Tippler Cells to prevent any movement during these tests.

13.2.1.2.7. The Tippler area shall be free of wagons.

13.2.1.2.8. PLC and Intouch SCADA are fully operational.

13.2.1.3. Energising Each Tippler Motor on No-Load

13.2.1.3.1. Disconnect the relevant drive couplings to allow no-load operation of the Tippler drive motors.

13.2.1.3.2. At the MCC ensure that all the respective Tippler main AC drive supply 400V isolators and 110V AC control supply circuit breakers are closed.

13.2.1.3.3. At the Tippler AC drive cubicles ensure all respective isolators and circuit breakers are closed.

13.2.1.3.4. Carry out any remaining AC drive parameter set-up, start-up and tuning procedures as detailed in the Siemens AC Drive Instruction Manual Commissioning Instructions.

13.2.1.3.5. Carry out tests to confirm the emergency stop circuitry for the Tippler motors is operating correctly.

13.2.1.3.6. In conjunction with the Drives Engineer and the PLC Engineer ensure that when the VVVF drive normal brake release signals are energised, that the brakes release, and the relevant signals are received at the PLC.

13.2.1.3.7. In conjunction with the PLC Commissioning Engineer ensure that when the emergency stop circuit is complete the tippler emergency brake is released, and the signal is received at the PLC.

13.2.1.3.8. In conjunction with the PLC Engineer ensure that when the emergency stop circuit is tripped the tippler emergency brake is engaged and there is no feedback signal at the PLC.

13.2.1.3.9. Operate each Tippler AC drive and its associated drive motor. Perform functional tests to confirm that each drive 'system' is operating satisfactorily, including the motor's tacho speed encoder, thermistor, and anti-condensation heater circuit.

13.2.1.3.10. Ensure the AC drive Profibus signals are communicating correctly, and the signals are calibrated correctly:

- Speed reference
- Speed feedback
- Torque feedback.

Note

It will be necessary to have the Tippler brakes available. In conjunction with the PLC Engineer, make the relevant temporary changes to allow all the Tippler brakes to be released on command of the AC Drive being tested.

13.2.1.3.11. After the individual Tippler AC drives have been set-up and operated successfully, switch off the Tippler AC drives and replace the drive couplings removed.

13.2.1.4. Operating Tippler on No-Load

13.2.1.4.1. Operate both Tippler AC drives as a 'system' under no load conditions at all the speeds specified in the Results Table, recording the values of voltage, current and frequency.

13.2.1.4.2. Set the maximum 'Maintenance Mode' speed of each Tippler cell to 6.0 degrees/second.

13.2.1.4.3. Isolate the MCC motor starters for the Tippler Brake Motors and remove any temporary PLC changes made.

13.3 Operational Tests in Maintenance Mode

13.3.1 Entry Wheel Grippers (No Wagons)

The Contractor will carry out the following:

13.3.1.1. Pre-Requisites

13.3.1.1.1. All checks and tests in previous have been satisfactorily completed.

13.3.1.1.2. All 'Permit to Work' clearances on the Entry Wheel Grippers have been cleared and their associated warning and safety barriers have been removed.

13.3.1.1.3. Special barriers shall be placed around the potentially dangerous areas of the Entry Wheel Grippers.

13.3.1.1.4. Ensure all personnel are informed that the Entry Wheel Grippers could be operating without warning, that they are aware of the potential dangers which will then exist and know what actions to take in the event of such situations occurring.

13.3.1.1.5. The Entry Wheel Grippers area shall be free of wagons.

13.3.1.1.6. PLC and Intouch SCADA are fully operational.

13.3.1.1.7. The Entry Wheel Grippers released limit switches have been set up in accordance with the relevant drawings.

13.3.1.2. Commission the Entry Wheel Grippers Hydraulic Systems

Commission the Entry Wheel Grippers Hydraulic Power Pack and hydraulic system in accordance with the Manufacturers Instruction Manual. This should include but not be limited to:

- Checking for correct rotation of all Motors & Pumps
- Flushing the system for at least two hours using temporary filters
- Fitting new filters after flushing
- Inspecting all pipework for leaks and rectify any found.
- Ensuring correct pressures are attained.
- Ensuring all safety devices are fully functional.
- Checking correct operation all PLC inputs and outputs at the hydraulic power pack.

Note

This procedure will require the Entry Wheel Grippers Pump Motor and 110V AC control supply circuit breakers to be closed when required at the MCC.

13.3.1.3. Operating the Entry Wheel Grippers #1, #2, #3

13.3.1.3.1. At the Intouch SCADA Station on the Control Desk select Maintenance Mode.

13.3.1.3.2. At the Wheel Grippers Hydraulic Power Pack Check for correct operation of all its functions from all the relevant Local Control Stations (Pump Start / Stop etc).

13.3.1.3.3. With the assistance of the Mechanical Commissioning engineer close the Wheel Grippers and set the closed gaps in accordance with the relevant drawings.

13.3.1.3.4. At its LCS open the Wheel Grippers. Check that the Grippers return to the required set positions.

13.3.1.3.5. Operate the Wheel Grippers to check for correct operation of all the limit / Pressure switches and their signals back to the PLC.

13.3.1.3.6. Operate the Wheel Grippers to measure and record the pressures, operating times, pressure and settings, record results and present the results to the Transnet Project Manager for review and approval in principle.

13.4 Operational Tests In 'Local' Mode

13.4.1 Exit Wheel Grippers (No Wagons)

The Contractor will carry out the following:

13.4.1.1. Pre-Requisites

13.4.1.1.1. All checks and tests in previous sections of this schedule have been satisfactorily completed.

13.4.1.1.2. All 'Permit to Work' clearances on the Exit Wheel Grippers have been cleared and their associated warning and safety barriers have been removed.

13.4.1.1.3. Special barriers shall be placed around the potentially dangerous areas of the Exit Wheel Grippers.

13.4.1.1.4. Ensure all personnel are informed that the Exit Wheel Grippers could be operating without warning, that they are aware of the potential dangers which will then exist and know what actions to take in the event of such situations occurring.

13.4.1.1.5. The Exit Wheel Grippers area shall be free of wagons.

13.4.1.1.6. PLC and Intouch SCADA are fully operational.

13.4.1.1.7. The Gripper limit switches have been set up in accordance with the relevant drawing.

13.4.1.2. Commission the Exit Wheel Grippers Hydraulic System

Commission the Exit Wheel Grippers Hydraulic Power Pack and hydraulic system in accordance with the OEM Instruction Manual. This should include but not be limited to:

- Filling with oil
- Checking for correct rotation of all the motors
- Flushing the system for at least two hours using temporary filters
- Fitting new filters after flushing
- Inspecting all pipework for leaks and rectify any found.
- Ensuring correct pressures are attained.
- Ensuring all safety devices are fully functional.
- Checking correct operation all PLC inputs and outputs at the hydraulic power pack.

Note
This procedure will require the Exit Wheel Grippers Pump Motor supply 400V isolators and 110V AC control supply circuit breakers to be closed when required at the MCC, and Maintenance Mode to be set at the Control Desk.

13.4.1.3. Operating the Exit Wheel Grippers

13.4.1.3.1. At the Intouch SCADA Station on the Control Desk select Maintenance Mode.

13.4.1.3.2. At the Wheel Grippers Hydraulic Power Pack Check for correct operation of all its functions from all the relevant Local Control Stations (Pump Start / Stop etc).

13.4.1.3.3. At its LCS open the Grippers. Check that the Grippers return to the required set positions.

13.4.1.3.4. At its LCS operate the Grippers to check for correct operation of all the limit / Pressure switches and their signals back to the PLC.

13.4.1.3.5. Operate the Grippers to measure and record the pressures, operating times, pressure and settings record results and present the results to the Transnet Project Manager for review and approval in principle.

13.5 Operational Tests In 'Local' Mode

13.5.1 Positioner (No Wagons)

The Contractor will carry out the following:

13.5.1.1. Pre-Requisites

13.5.1.1.1. The Siemens Commissioning Engineer shall be involved with all the checking, setting up and testing of the AC drive cubicles described in this section.

13.5.1.1.2. All checks and tests in previous sections of this schedule have been satisfactorily completed.

13.5.1.1.3. All 'Permit to Work' clearances on the Positioner have been cleared and their associated warning and safety barriers have been removed.

13.5.1.1.4. Special barriers shall be placed around the potentially dangerous areas of the Positioner.

13.5.1.1.5. Ensure all personnel are informed that the Positioner could be operating without warning, that they are aware of the potential dangers which will then exist and know what actions to take in the event of such situations occurring.

13.5.1.1.6. The Positioner area shall be free of wagons.

13.5.1.1.7. PLC and Intouch SCADA are fully operational.

13.5.1.2. Commission the Positioner Lock-off Stop Pushbuttons

Press the Lock-off Stop Pushbuttons and check for correct operation of their associated circuitry. Rectify any problems found.

13.5.1.3. Commission the Positioner Warning Devices

Force respective PLC outputs as required to check correct operation of the Warning Beacon and Warning Siren for the Positioner.

13.5.1.4. Commission the Tippler Warning Devices

Force respective PLC outputs as required to check correct operation of the Warning Beacons and Warning Sirens for Tippler Entry and Tippler Exit.

13.5.1.5. Commission the Positioner Lubrication Systems

13.5.1.5.1. Commission the Positioner Lubrication Systems for operation in accordance with their OEM's Instruction Manuals. This should include but not be limited to:

- Filling with lubricant(s)
- Checking for correct rotation of the pump motor and air compressor
- Inspecting all pipework for leaks and rectify any found.
- Ensuring correct pressures are attained.
- Ensuring all safety devices are fully functional.
- Checking correct operation all associated PLC inputs and outputs for these systems.

13.5.1.5.2. This procedure will require the Positioner Lubrication Pump and 400V isolators and 110V AC control supply circuit breakers to be closed when required at the MCC.

13.5.1.5.3. Force respective PLC outputs as required to check correct delivery of lubricant at each delivery point and feedback signals to the PLC.

13.5.1.6. Commission the Positioner Limit Switches

13.5.1.6.1. Set up the following Positioner travel limit switches in accordance with the relevant drawing:

- Positioner Forward Overtravel Limit
- Positioner Forward Limit
- Positioner Reverse Limit
- Positioner Reverse Overtravel Limit.

13.5.1.6.2. Set up the following Positioner Arm limit switches in accordance with the relevant drawing:

- Positioner Arm Lowered
- Positioner Arm Lowered Slowdown Limit
- Positioner Arm Raised
- Positioner Arm Raised Slowdown Limit
- Commission the Last Car laser.

13.5.1.6.3. Ensure the Last Car laser pair are energised then block the beam to ensure correct operation and feedback signals to the PLC.

13.5.1.7. Commission the Positioner travel motion over normal travel range

13.5.1.7.1. At the Intouch SCADA Station on the Control Desk select Maintenance Mode.

13.5.1.7.2. At the Positioner LCS check for correct operation of all its functions except the arm engage & arm raise pushbuttons.

13.5.1.7.3. From its LCS drive the Positioner along the track over its NORMAL range of travel to perform functional tests to confirm that the mechanical drive 'system' is operating satisfactorily.

13.5.1.7.4. From its LCS drive the Positioner along the track over its NORMAL range of travel to perform functional tests to confirm that the Encoder is operating satisfactorily and feedback to the PLC.

13.5.1.7.5. Operate each of the limit switches to ensure correct operation and feedback signals to the PLC.

13.5.1.7.6. Drive the Positioner along the track at the design speeds, recording the results in Results Table, as the test proceeds.

13.5.1.8. Commission the Positioner travel motion overtravel recovery

13.5.1.8.1. At the Positioner LCS move the Positioner at slow speed into the FORWARD overtravel limit switch. Ensure that the Positioner stops under the action of the Forward Overtravel Limit Switch.

13.5.1.8.2. At the Intouch SCADA panel, acknowledge the overtravel alarm.

13.5.1.8.3. At the Positioner LCS, push and hold the Travel Joystick in the 'back' direction, noting that the alarm sounds, and the Positioner automatically moves back out from the over travelled position. When it is safely within range of NORMAL travel the joystick can be released and the Positioner should stop.

13.5.1.8.4. At the Positioner LCS move the Positioner at slow speed into the REVERSE overtravel limit switch. Ensure that the Positioner stops under the action of the Reverse Overtravel Limit Switch.

13.5.1.8.5. At the Intouch SCADA panel, acknowledge the overtravel alarm.

13.5.1.8.6. At the Positioner LCS, push and hold the Travel Joystick in the 'forward' direction, noting that the alarm sounds, and the Positioner automatically moves forward out from the over travelled position. When it is safely within range of NORMAL travel the joystick can be released and the Positioner should stop.

13.5.1.9. Commission the Positioner Arm

13.5.1.9.1. At the Intouch SCADA Station on the Control Desk select Maintenance Mode.

13.5.1.9.2. Operate each of the Positioner Arm limit switches to ensure correct operation and feedback signals to the PLC.

13.5.1.9.3. From the Positioner LCS, operate the Positioner Arm between the fully Engaged and fully raised positions to ensure correct mechanical operation.

13.5.1.10. Commission the Positioner Encoder

13.5.1.10.1. Using the PLC Programmer to monitor PLC input, ensure the encoder count input to the PLC increases as the Encoder shaft is rotated in the forward direction (if necessary, reverse the Encoder signal to ensure this correct situation).

13.5.1.10.2. To ensure correct set-up and operation of the Encoder, move the Positioner under Maintenance control mode to the fully reversed to Buffer Stop position.

13.5.1.10.3. Use the 'Reset to Pre-set' facility to reset the encoder to its pre-determined value.

13.5.1.10.4. Move the Positioner under Maintenance control to the fully forward to Buffer Stop position and then check the encoder value. If the encoder value is incorrect to the distance travelled re-calibrate the settings within the PLC software and download the new settings to the encoder. Move the positioner and re-check the PLC value change is consistent with the distance travelled.

13.5.1.10.5. When the Encoder/encoder has been set-up correctly as above, move the Positioner to the each of the positions and record the encoder count and present the results to the Transnet Project Manager for review and approval in principle.

13.5.1.11. Commission the Positioner Arm Gap Laser

(Note a rake of 20 wagons central in the tippler will be required, the Contractor will need to plan this in advance and will notify the Transnet Project Manager accordingly).

13.5.1.11.1. Set up the Positioner Arm Gap #1 and Positioner Arm Gap #2.

13.5.1.11.2. Ensuring these lasers are energised, ensure correct operation and feedback signals to the PLC.

13.5.1.12. Check Operation of Positioner temperature and vibration sensors

13.5.1.12.1. Check the temperature and Vibration sensors on all travel drive motors to ensure they are operating correctly.

13.5.1.12.2. Ensure the temperature and Vibration signals are being received correctly at the PLC.

13.6 Operational Tests In 'Maintenance' Mode – Tippler (No Wagons)

The Contractor will carry out the following:

13.6.1. Pre-Requisites

13.6.1.1. The Drives Commissioning Engineer shall be involved with all the checking, setting up and testing of the AC drive cubicles described in this section.

13.6.1.2. All checks and tests in previous sections of this schedule have been satisfactorily completed.

13.6.1.3. All 'Permit to Work' clearances on the Tippler have been cleared and their associated warning and safety barriers have been removed.

13.6.1.4. Special barriers shall be placed around the potentially dangerous areas of the Tippler.

13.6.1.5. Ensure all personnel are informed that the Tippler could be operating without warning, that they are aware of the potential dangers which will then exist and know what actions to take in the event of such situations occurring.

13.6.1.6. The Tippler area shall be free of wagons.

13.6.1.7. PLC and Intouch SCADA are fully operational.

13.6.2. Commission the Tippler Lubrication Systems

13.6.2.1. Commission the Tippler Lubrication Systems for operation in accordance with their Manufacturers Instruction Manuals. This should include but not be limited to:

- Filling with lubricant(s)

- Checking for correct rotation of the pump motor
- Inspecting all pipework for leaks and rectify any found.
- Ensuring correct pressures are attained.
- Ensuring all safety devices are fully functional.
- Checking correct operation all associated PLC inputs and outputs for these systems.

13.6.2.2. Force respective PLC outputs as required to check correct delivery of lubricant at each delivery point and feedback signals to the PLC.

13.6.3. Commission the Tippler Limit Switches

13.6.3.1. Set up the following Tippler limit switches in accordance with the relevant Drawings:

- Overtravel Return Limit
- At Rail Level Limit
- Not Over tipped Limit
- Overtravel Tip Limit.

13.6.3.2. Operate each of the limit switches to ensure correct operation and feedback signals to the PLC.

13.6.4. Commission the Tippler Local Control Stations

13.6.4.1. At the Intouch SCADA Station on the Control Desk select Maintenance Mode.

13.6.4.2. Check the Profibus Communications to the Main PLC CPU from all the Tippler Local Control stations. Correct any malfunctions.

13.6.4.3. At the Tippler LCS station #1 (Tip side) check for correct operation of all its control operators into the PLC.

13.6.4.4. At the Tippler LCS station #2 (non-Tip side) check for correct operation of all its control operators into the PLC.

13.6.4.5. At the Tippler LCS station #1 check for correct operation of all its indicators out from the PLC.

13.6.4.6. At the Tippler LCS station #2 check for correct operation of all its indicators out from the PLC.

13.6.5. Commission the Tippler Entry Clear lasers

Ensure the Tippler Entry Clear laser pair are energised then block the beam to ensure correct operation and feedback signals to the PLC.

13.6.6. Commission the Tippler Exit Clear lasers.

Ensure the Tippler Exit Clear laser pair are energised then block the beam to ensure correct operation and feedback signals to the PLC.

13.6.7. Check Operation of Tippler Temperature and Vibration Sensors

13.6.7.1. Check the temperature and vibration sensors on the Tippler to ensure they are operating correctly.

13.6.7.2. Ensure the temperature and vibration signals are being received correctly at the PLC.

13.6.8. Commission the Tippler Encoders

13.6.8.1. Using the PLC Programmer to monitor PLC input, ensure the encoder count input to the PLC increases as the Encoder shaft is rotated in the Tippler tip direction.

13.6.8.2. To ensure correct set-up and operation, slowly move the Tippler under Maintenance Mode to the fully tipped Buffer Stop position.

13.6.8.3. Use the 'Reset to Pre-set' facility reset the encoder to the required positional value.

13.6.8.4. Move the Tippler under Maintenance control to the fully returned to Buffer Stop position and then check the encoder count input to the PLC. If the encoder value is incorrect to the rotational angle travelled re-calibrate the settings within the PLC software and download the new settings to the encoder. Move the tippler and re-check the PLC value change is consistent with the rotational angle travelled.

13.6.8.5. When the encoders have been set-up correctly as above, move the Tippler to each of the positions and record the encoder count and present the results to the Transnet Project Manager for review and approval in principle.

13.6.9. Commission the Tippler Drive Motion Over Normal Travel Range

13.6.9.1. At the Intouch SCADA Station on the Control Desk select Maintenance Mode.

13.6.9.2. At the Tippler Cell LCS (Non-Tip Side) check for correct functionality of all the separate operations and equipment controlled from that LCS.

13.6.9.3. At the Tippler Cell LCS (Non-Tip Side) operate the Tippler and check for correct operation electrically and mechanically over the normal operating range of travel.

13.6.9.4. At the Tippler Cell LCS (Tip Side) operate the Tippler and check for correct operation electrically and mechanically over the normal operating range of travel.

13.6.10. Commission the Tippler Overtravel Recovery

13.6.10.1. Temporarily disable (i.e., short circuit the N/C contact and open circuit the N/O contact) the Tippler Overtravel Return and Overtravel Tip limit switches.

13.6.10.2. At the Tippler Cell LCS (Tip Side) move the Tippler at slow speed into the Overtravel Tip limit switches. Ensure that the Tippler stops under the action of that switch.

13.6.10.3. At the Intouch SCADA panel, acknowledge the overtravel alarm.

13.6.10.4. At the Tippler Cell LCS (Tip Side), press and hold the Tippler Return pushbutton, noting that the alarm sounds, and the Tippler automatically moves back out from the over travelled position. When it is safely within range of NORMAL travel the pushbutton can be released and the Tippler should stop.

13.6.10.5. At the Tippler Cell LCS (Tip Side) move the Tippler at slow speed into the Overtravel Return limit switches. Ensure that the Tippler stops under the action of that switch.

13.6.10.6. At the Intouch SCADA panel, acknowledge the overtravel alarm.

13.6.10.7. At the Tippler Cell LCS (Tip Side), press and hold the Tippler Tip pushbutton, noting that the alarm sounds, and the Tippler automatically moves back out from the over travelled position. When it is safely within range of NORMAL travel the pushbutton can be released and the Tippler should stop.

13.6.10.8. Remove the temporary modifications made in step 20.6.9.1 to the Tippler Overtravel Return and Overtravel Tip limit switches.

13.6.11. Tippler Motion No-Load Tests

Set the parameters of the Tippler to the speeds as specified in the Control System Level 1 & 2 Documents as computed and developed by the Contractor, then confirm satisfactory operation at those speeds entering the required data and submitting the data to the Transnet Project Manager for approval in principle.

13.6.12. Over Tipping the Empty Tippler in Maintenance Mode

13.6.12.1. On Intouch SCADA, move the Tippler to the extended tip position.

13.6.12.2. On Intouch SCADA, return the Tippler back to rail level.

13.7 Operational Tests in Semi-Auto Mode (No Wagons)

The Contractor will carry out the following:

13.7.1 Pre-Requisites

13.7.1.1. Drives Commissioning Engineer need to be present for these tests.

13.7.1.2. All checks and tests in previous sections of this schedule have been satisfactorily completed.

13.7.1.3. All 'Permit to Work' clearances on the Positioner have been cleared and their associated warning and safety barriers have been removed.

13.7.1.4. Ensure all personnel are informed that all the Positioner, Tippler and Train Holding Devices will be operating without warning, that they are aware of the potential dangers which will then exist and know what actions to take in the event of such situations occurring.

13.7.1.5. All Positioner, Tippler and Train Holding Device areas shall be free of wagons.

13.7.1.6. PLC and Intouch SCADA are fully operational.

13.7.2 Initialising System for 'Semi-Auto' Mode

13.7.2.1. Ensure the Control System is healthy, i.e., all the Emergency Stop and Lock-off Stop pushbuttons have been reset and the Intouch SCADA, Profibus and Ethernet communications are operating correctly.

13.7.2.2. Ensure the Positioner and Tippler Overtravel Switches are reset.

13.7.2.3. Ensure in Maintenance Mode that:

- Positioner is fully back.
- Positioner Arm is fully raised.
- Train Holding Arm is fully Raised.
- Tippler is at rail level.
- Entry Wheel Grippers are fully released.
- Exit Wheel Grippers are fully released.
- The beam of the Last Car laser pair broken (block with a temporary cover).

13.7.2.4. On Intouch SCADA, ensure Loco Permit is not selected.

13.7.2.5. On Intouch SCADA, acknowledge and reset all alarms. Rectify any alarms that do not readily reset.

13.7.2.6. On Intouch SCADA, select 'Semi-Auto', then press 'Start Auxiliaries' and then check that all auxiliaries have started.

13.8 Operating Complete Car Tippler System In 'Semi-Auto' Mode (Individual Movements Through 'Next Step' Button)

The Contractor will carry out the following:

13.8.1. On Intouch SCADA Press the Next Step Pushbutton, the Entry Wheel Grippers will engage.

13.8.2. On Intouch SCADA Press the Next Step Pushbutton, the Tippler will move to the normal tip position.

13.8.3. On Intouch SCADA Press the Next Step Virtual Pushbutton, the Tippler will travel back to rail level. Wait at least 60 seconds before proceeding with the next step.

13.8.4. On Intouch SCADA Press the Next Step Pushbutton, the Positioner will travel to the arm engage position.

13.8.5. On Intouch SCADA Press the Next Step Pushbutton, the Positioner Arm will extend (Positioner must be in Arm Engage position.

13.8.6. On Intouch SCADA Press the Next Step Pushbutton, the Entry Wheel Grippers will release.

13.8.7. On Intouch SCADA Press the Next Step Pushbutton, the Positioner will travel to the Train Holding Arm Engage position.

13.8.8. On Intouch SCADA Press the Next Step Pushbutton, the Exit Wheel Grippers and train holding arm will engage.

13.8.9. On Intouch SCADA Press the Next Step Pushbutton, the Tippler will move to the normal tip position.

13.8.10. On Intouch SCADA Press the Next Step Pushbutton, the Tippler will return back to rail level.

13.8.11. On Intouch SCADA Press the Next Step Pushbutton, the Positioner arm will retract to the fully retracted position. The positioner will then travel back to the arm engage position. The Entry wheel grippers will engage at the pre-determined position.

13.8.12. On Intouch SCADA Press the Next Step Pushbutton, the positioner arm will engage, the entry & exit grippers will retract, and the Train Holding Arm will raise. The system is now ready to repeat the sequence.

13.9 Operational Tests In 'Auto' Mode (No Wagons)

The Contractor will carry out the following:

13.9.1. Pre-Requisites

13.9.1.1. Siemens Commissioning Engineer need not be present for these tests but should be available to give telephone support if required.

13.9.1.2. All checks and tests in previous sections of this schedule have been satisfactorily completed.

13.9.1.3. All 'Permit to Work' clearances on the Positioner have been cleared and their associated warning and safety barriers have been removed.

13.9.1.4. Ensure all personnel are informed that all the Positioner, Tippler and Train Holding Devices will be operating without warning, that they are aware of the potential dangers which will then exist and know what actions to take in the event of such situations occurring.

13.9.1.5. All Positioner, Tippler and Train Holding Device areas shall be free of wagons.

13.9.1.6. PLC and Intouch SCADA are fully operational.

13.9.2. Initialising System for 'Auto' Mode

13.9.2.1. Ensure the Control System is healthy, i.e., all the Emergency Stop and Lock-off Stop pushbuttons have been reset and the Intouch SCADA Profibus and Ethernet communications are operating correctly.

13.9.2.2. Ensure the Positioner and Tippler Overtravel Switches are reset.

13.9.2.3. Ensure in Maintenance Mode that:

- Positioner is fully reversed.
- Positioner Arm is fully retracted.
- Tippler is at rail level.
- Entry Wheel Grippers are fully released.
- Exit Wheel Grippers are fully released.
- The beam of the Last Car laser pair is broken (block with a temporary cover).

13.9.3. Operating Complete Dual Wagon Tippler System in 'Auto Mode'

13.9.3.1. On InTouch SCADA, select 'Start Cycle' then confirm the following events occur in sequence:

- The Entry Wheel Grippers release
- The Positioner moves to the fully forward position.
- The Entry Wheel Grippers engage.
- The Exit Wheel Grippers engage.

13.9.3.2. Tip Cycle

- The Tippler moves to normal tip position before returning to rail level and at the same time the Positioner Arm raises, and the Positioner returns to the Arm Engage position.
- The Exit Wheel Grippers release.
- The Entry Wheel Grippers engage at a pre-determined positioner position.
- The Positioner moves to the arm engage position.
- The Positioner Arm engages.
- The positioner moves to the fully forward position (THD Engage Position)
- The Exit Wheel Grippers engage.

13.9.3.3. When ready to simulate the end of the train, to conclude the 'Auto' sequence test, uncover the Last Car laser whilst the positioner is travelling forward, then confirm the following events occur in sequence:

- The Tippler moves to normal tip position before returning to rail level and at the same time the Positioner Arm raises, and the Positioner returns to the fully back position.
- The Positioner Travel VVVF drives are de-energised, and the brakes are applied.
- Nothing else occurs.

13.9.3.4. When ready to simulate the hauling away of the wagons select 'Loco Permit' at the Intouch SCADA, then confirm the following events occur in sequence:

- The Exit Wheel Grippers release
- The Entry Wheel Grippers release.

13.9.4. Stopping the 'Auto' Mode by Removal of 'Tippler Permissive' Signal

13.9.4.1. Remove the 'Tippler Permissive' signal while the Tippler is tipping and confirm that the tip/return cycle is completed, and further tipping is inhibited until the signal is re-instated.

13.9.4.2. Remove the 'Tippler Permissive' signal while the Tippler is returning and confirm that the return cycle is completed, and further tipping is inhibited until the signal is re-instated.

13.9.4.3. Remove the 'Tippler Permissive' signal while the Positioner is moving forward and confirm that the Positioner movement continues normally and stops when the next Tippler tip cycle is inhibited. Confirm that further tipping continues when the signal is restored.

13.9.4.4. Remove the 'Tippler Permissive' signal while the Positioner is moving back and confirm that the Positioner movement continues normally and stops when the next Tippler tip cycle is inhibited. Confirm that further tipping continues when the signal is restored.

13.9.4.5. Remove the 'Tippler Permissive' signal while the Entry Wheel Grippers are engaging and confirm that the Lock movements continues normally and stops when the next Tippler tip cycle is inhibited. Confirm that further tipping continues when the signal is restored.

13.9.4.6. Remove the 'Tippler Permissive' signal while the Entry Wheel Grippers are releasing and confirm that the Lock movements continues normally and stops when the next Tippler tip cycle is inhibited. Confirm that further tipping continues when the signal is restored.

13.9.4.7. Remove the 'Tippler Permissive' signal while the Exit Wheel Grippers are engaging and confirm that the Gripper movements continues normally and stops when the next Tippler tip cycle is inhibited. Confirm that further tipping continues when the signal is restored.

13.9.4.8. Remove the 'Tippler Permissive' signal while the Exit Wheel Grippers are releasing and confirm that the Gripper movements continues normally and stops when the next Tippler tip cycle is inhibited. Confirm that further tipping continues when the signal is restored.

13.9.5. Locomotive and Wagon Clearances Through Tippler System

This procedure is to test the clearances of the completed Dual Wagon Tippler system for the passage of locomotive and wagons.

13.9.6. Pre-Requisites

13.9.6.1.1. All checks and tests in previous sections of this schedule have been satisfactorily completed.

13.9.6.1.2. All electrical systems are fully operational.

13.9.6.1.3. A locomotive, and some empty wagons, hereafter in this section called "the train", are available at the entry side for movement through the Car Tippler system as required during this testing procedure.

13.9.7. Testing Locomotive and Wagon Clearances

Ensure in Maintenance Mode that:

- Positioner Arm is fully raised.
- Tippler is at rail level.
- Entry Wheel Grippers are fully released.
- Exit Wheel Grippers are fully released.

13.9.7.1.1. Select Loco Permit at the Intouch SCADA Station. Check that the Loco Lights go green.

13.9.7.1.2. De-select Loco Permit and 'fault' each of the conditions above, ensuring then that Loco Permit cannot be selected, and the Loco Light remains red.

13.9.7.1.3. Ensure that the conditions in above are restored. Select Loco Permit at the Intouch SCADA Station. Check that the Loco Lights go green.

13.9.7.1.4. Arrange for the train to be driven very slowly through the Entry Wheel Grippers, past the Positioner, through Tippler Cells and through the Exit Wheel Grippers

Note

All clearances should be checked at all times whilst the train is moving, and the train stopped before any foul occurs. Rectify any problems found.

13.9.7.1.5. De-select Loco Permit.

13.9.8. Setting Up Train Position Control Points

13.9.8.1. From the Positioner LCS engage the Positioner Arm with the wagons.

13.9.8.2. By slowly operating the Positioner in Maintenance Mode, move the train as required to set-up or confirm the settings for correct operation of the following items:

- Last Car arm lasers
- Tippler Entry Clear lasers
- Tippler Exit Car lasers.
- Positioner Forward Slowdown limit
- Positioner Reverse Slowdown limit
- Positioner Forward Limit
- Positioner reverse Limit
- Positioner Encoder settings
- Positioner Drive systems
- Rectify any problems found.

13.9.8.3. Use the Positioner to haul the wagons along the full range of travel. Check for correct settings of all Positioner VVVF drive parameters.

13.10 Full Operational Test In 'Auto' Mode (Complete Train of full Wagons)

The Contractor will carry out the following:

13.10.1 Pre-Requisites

13.10.1.1. All checks and tests in previous sections of this schedule have been satisfactorily completed.

13.10.1.2. All electrical systems are fully operational.

13.10.1.3. A rake of at least 12 full wagons, i.e., 6 coupled pairs, hereafter in this section called "the train", are available with the 1st and 2nd wagons placed in the correct dumping position on the Tippler.

13.10.2 Initialising System for 'Auto' Mode

Select Auto mode the Intouch SCADA system.

13.10.3 Operating Complete Car Tippler System in 'Auto' Mode

On Intouch SCADA, select 'Start Cycle' then confirm the following events occur in sequence:

13.10.3.1. An alarm sounds for 15 seconds then the Tippler moves to normal tip position before returning to rail level and at the same time the Positioner moves to the arm engage position.

13.10.3.2. The Positioner arm engages.

13.10.3.3. The Entry Wheel Grippers release.

13.10.3.4. The Positioner moves to the fully forward position.

13.10.3.5. The Exit Wheel Grippers engage.

13.10.3.6. The Entry Wheel Grippers engage as the positioner returns to the back limit.

13.10.4 Tip Cycle

13.10.4.1. The Tippler moves to normal tip position before returning to rail level and at the same time the Positioner Arm raises, and the Positioner returns to the fully back position.

13.10.4.2. The Entry Wheel Grippers engage at a pre-set positioner travel position.

13.10.4.3. The Positioner moves to the arm engage position.
13.10.4.4. The Positioner arm engages.

13.10.4.5. The Entry & Exit Wheel Grippers release.

13.10.4.6. The Exit Wheel Grippers engage.

Note

Keep observing the hoppers to ensure no blockages or material overflow.

13.10.4.7. After the automatic movement of wagons that uncovers the beam of the Last Car Arm laser pair, confirm the following events occur in sequence:

- The Tippler moves to normal tip position before returning to rail level and at the same time the Positioner Arm raises, and the Positioner returns to the fully back position.
- The Positioner Travel VVVF drives are de-energised, and the brakes are applied
- Nothing else occurs.

13.10.4.8. When ready to simulate the hauling away of the wagons select 'Loco Permit' at the Intouch SCADA, then confirm the following events occur in sequence:

- The Exit Wheel Grippers release
- The Entry Wheel Grippers release.

14 Mechanical Site Commissioning for the Wagon Unloading Station

14.1 Introduction & General Instructions

14.1.1 General

This section describes as a minimum the method and sequence of commissioning and site testing for all mechanical equipment supplied by the Contractor for the Wagon Unloading Station.

14.1.2 Deviations

14.1.2.1. Any deviation to the tolerance requirements of the drawings produced by the Contactor is to be reported to the Transnet Project Manager in the form of a concession request for review/comment and acceptance or otherwise.

14.1.2.2. Prior to the start of these tests ensure that all downstream conveyors are fully clear.

14.1.2.3. The site "No Load", commissioning and performance "Loaded" tests, shall be performed by the Transnet Port Terminal operations personnel under supervision of the Contractor's technical personnel. All training with respect to Transnet Port Terminals personnel will have been completed prior to Commissioning taking place.

14.1.2.4. Transnet Port Terminals shall prepare wagons loaded with iron ore, measurement instruments, electrical power, etc., and all required personnel for the tests.

14.1.2.5. All hydraulic oil and lubricants for site tests to be supplied by the Contractor.

14.1.2.6. Before commencing any individual or system "Loaded" and commissioning tests the Transnet Project Manager must confirm to the Contractor that all downstream equipment, not of

Contractors design, i.e., conveyors, stackers etc., necessary for the removal of the iron ore are working satisfactorily.

14.1.2.7. The purpose of this section is as follows: -

14.1.2.7.1. To instruct and advise the inspection and test personnel such that they may prepare the Wagon Unloading System for Performance Tests in an accurate, safe, economical, and efficient manner.

14.1.2.7.2. To enable the Transnet Project Manager to review the schedule and therefore comment on any part of it before testing commencing.

14.1.2.7.3. To enable the inspection, test, and Transnet Port Terminals personnel to have all the materials, tools and test equipment available prior to testing commencing.

14.1.2.7.4. To verify the ballast requirements of the Tippler.

14.1.2.7.5. To establish a sequence for inspection and testing and therefore provide the basis for a site programme.

14.2 Hoppers and Apron Feeders

Reference Drawings:
Annexure A
Appendix A Drawing List

Referenced Documents
Annexure

14.2.1. Check that the hoppers and feeders have been installed as per the relevant drawings. Particular attention should be given to the clearances around the feeder. Any deviations from the specified tolerances to be recorded and captured for updating of manufacturing drawings to As-Built drawings.

14.2.2. Check that the electrical system has been installed as per the relevant drawings. Check that all cables are adequately supported and protected from damage from falling ore and mechanical movement.

14.2.3. Check the lubrication systems have been installed as described in the relevant drawings and lubrication schedule of the grease lubrication OEM. Pipes must be adequately supported and protected from damage from mechanical movement.

14.2.4. Check the gearboxes are filled in accordance with the lubrication schedule of the gearbox OEM.

14.2.5. Check that the Hopper material level sensor system has been installed in accordance with the manufacturer's instructions.

14.2.6. Check the Hopper liners have been installed and are secured.

Note - It is very important that the surface of the tiles must be flush with the surface of adjacent tiles. There should be no steps between adjacent edges.

14.2.7. Check the operation of the Knife Gate Assembly ensure that all the knife gates are able to extend and retract.

14.2.8. Select 'Maintenance' on the TOCR. Operation of the feeders will now be carried out from the local control station.

14.2.9. Check operation of all Apron Feeders and clearances between adjacent chutes and skirts.

14.2.10. In the Tippler Control Room, select "Semi-Automatic". The Apron Feeders should now be under full sequential control via the PLC and can be single stepped through its automated cycle.

Note - Non-essential personnel must be restricted from entering the area.

14.2.11. During the feeder operations, observe motor voltages and currents for the feeders.

Feeder Motor	Voltage	Current Amps
No 1		
No 2		
No 3		
No 4		
No 5		

14.3 Train Holding Devices

The Contractor will conduct the following works, namely:

Reference Drawings
Annexure A
Appendix A Drawing List

14.3.1. Check that the Gripper units have been assembled as described in the Contractor's drawings. Particular attention shall be given to each Gripper unit's relationship to the main rails.

14.3.2. Check the security of all bolted components and foundation bolts, particularly the rail clip fasteners.

14.3.3. Set each Gripper bar gap to the dimensions as shown on Contractor's drawings and check that the offset of this gap in relation to the main rail is correct.

14.3.4. Check that the lubrication system has been installed to the requirements the grease lubrication OEM. Check that all pipe runs are secure, primed with grease and all discharge valves are set.

14.3.5. If necessary, operate lubrication pump to ensure that all points requiring grease have been lubricated.

14.3.6. Check that the hydraulic system has been installed to the requirements shown on THE Contractors drawings and the hydraulic OEM requirements. Check that all pipe runs and hoses are secure, and all connections are adequately tightened and free from leaks when the system is pressurised. Work thru OEM Pre-commissioning document.

14.3.7. Check that all electrical supply cables and conduits are connected and restrained in a secure manner.

14.3.8. Select 'Maintenance' at the TOCR. Control of the wheel grippers can now be carried out at their respective local control stations.

14.3.9. Ensure that grippers engage and retract fully.

14.3.10. During operation, check that there is no binding of the pins and bushes.

14.3.11. Check that limit switches are adjusted to trip when the grippers are in the retracted position.

14.3.12. Ensure Gripper units engage and retract within the time allocated on the Plant Time Cycle C07 & C08.

14.3.13. Record the following:

Activity	Entry Grippers	Exit Grippers	Required reading
Time to Engage			2.5s nom.
Time to Release			2.5s nom.
Maximum pressure at cylinders during operation			Bar
Hydraulic Power Unit Motor Current			Amps

14.4 Positioner

The Contractor will conduct the following works, namely:

Reference Drawings

Annexure A
Appendix A Drawing List

Referenced Documents
Annexure

14.4.1. Check that the positioner and track have been assembled and installed as per the Contractors drawings. Particular attention shall be given to the installation and alignment of positioner track and racks and their relationship to the main track as shown on the Contractors drawings. Any setting dimension found not to comply with those specified shall be recorded and submitted to the Transnet Project Manager for assessment. Should any deviations be encountered, such deviations will be corrected before the commissioning can proceed.

14.4.2. Check the secureness of all bolted components and foundation bolts.

14.4.3. Check gearboxes are filled with oil to manufacturers requirements. Record in pre-commissioning protocol.

14.4.4. Check that the lubrication systems have been installed to the grease lubrication OEM requirements. Check that all pipe runs are secure, purged and primed with grease.

14.4.5. Check that the drive brake system has been installed to the suppliers' requirements. Ensure the OEM supplier has commissioned the sub-system prior to integration work off pre-commissioning protocol.

14.4.6. Check that the electrical supply cables and conduits are connected and restrained in a secure manner.

14.4.7. Release and lock off all positioner drive brakes.

14.4.8. Check that the rack is adequately coated with lubricant. Note - this will normally be applied by spray during positioner travel.

14.4.9. Run each travel drive motor on the positioner individually and check that direction of rotation is the same for each pinion by observing the motion of the positioner.

14.4.10. Check positioner pinion mesh and guide roller clearances as required in Contractor's drawings.

14.4.11. Reset brakes.

14.4.12. Ensure that the travel limit switches are correctly assembled and securely mounted on the festoon support system as shown on Contractor's drawings and are functioning in accordance with the Electrical Site Commissioning Method Statement. Ensure that there are no obstructions in the path of movement of the festoon towing arm.

14.4.13. Ensure that lasers are aligned and securely installed as shown on Contractor's drawings and are functioning in accordance with the lasers OEM requirements.

14.4.14. Operate the positioner main arm for several cycles ensuring that there is free movement of all links, pins, and rollers.

14.4.15. Check that the head is capable of lowering to the 908 mm dimension stated on Contractor's drawings from main rail level to underside of head and record below.

Main Rail to Underside Head Dimension	Required Dim
	mm

14.4.16. Check that the arm position limit switches are adjusted to trip in the raised and lowered positions.

14.4.17. Operate positioner last wagon arm for several cycles ensuring that there is free movement of the rotary actuator. Check that the head is capable of lowering to the 840 dimension as per the Contractors drawings from main rail level to centre line of head. Also check that the arm will swing completely to the rest position and record both values below:

	Actual Value	Required Value
Rail to Centreline of Head Dimension		840mm
Arm swing angle		°

14.4.18. Check that the last car arm position limit switches are adjusted to trip in the swung positions.

14.4.19. Operate positioner last wagon arm coupler mechanism for several cycles ensuring that there is free movement of the coupler pin linkage and hydraulic cylinder. Check that the coupler is set for both the engaged and release positions.

14.4.20. Run Positioner along the entire length of track in "inch" mode in both directions with no wagon present. Stop the positioner at regular intervals and check that guide roller and track clearances correspond to those specified in the Contractors drawings. Re-adjust guide rollers if necessary.

14.4.21. Inspect surface of rack for evidence of any hard contact with pinions, indicated by bright polished areas on the tooth face. Check guide roller setting as per Contractor's drawings and adjust if necessary.

14.4.22. Check operation of all travel limit switches.

14.4.23. Repeat actions 21.5.20 - 21.5.22 with positioner at slow speed.

14.4.24. Repeat actions 21.5.20 - 21.5.22 with positioner at full speed.

14.4.25. Run positioner at slow speed to end stops at both ends of travel and check that the hydraulic buffers contact the end stops at the same time. Weld on suitable packing plate to stop face if necessary.

14.4.26. At the same time, check the stroke and freedom of movement of the positioner festoon system. Refer to festoon OEM supplier specification.

14.5 Tippler

Reference Drawings:
Annexure A
Appendix A Drawing List

The Contractor will conduct the following works, namely:

14.5.1. Check that the tippler cage has been assembled and installed as described in the Contractors drawings. Particular attention should be given to support roller settings and main cage assembly tolerances. Any setting dimensions found not to comply with those specified shall be recorded and submitted to the Transnet Project Manager for assessment. Should any deviations be discovered, these shall be rectified first before any further commissioning can carry on.

14.5.2. Check the security of all bolted components and foundation bolts.

14.5.3. Ensure gearboxes are filled with oil to manufacturers requirements.

14.5.4. Check that the lubrication system has been installed to the grease lubrication OEM requirements.

14.5.5. Check that all pipe runs are secure, primed with grease and all discharge valves are set. If necessary, operate lubrication pumps to ensure that all points requiring grease have been purged, pressurised, and lubricated.

14.5.6. Check that tippler racks have been adequately coated with lubricant.

14.5.7. Check that the electrical supply, cables, and conduits are connected and restrained in a secure manner.

14.5.8. Check that all tippler rotation limit switches are set as shown on the Contractors drawings and are functioning correctly.

14.5.9. Check that the platform rails are aligned with the main rails to within ±3mm both laterally and vertically.

14.5.10. Check connection of electrical supply to drive units this must be carried out in conjunction with the Siemen's engineer.

14.5.11. Remove temporary installation beams and restraints to free the tippler cage.

14.5.12. "Inch" rotates the cell through one complete cycle (to 180° and return) to check for correct mesh between the rack and pinion.

14.5.13. Inspect surface of racks for evidence of any hard contact with pinion, indicated by bright polished areas on the tooth face.

14.5.14. Note: This condition, i.e. no wagon during tip cycle, produces the maximum tooth load case for the tippler.

14.5.15. During inch rotation test to 180° also check the following: -

14.5.15.1. Rack and pinion engagement is satisfactory.

14.5.15.2. Working clearances between rotating cage and foundations are satisfactory. Also, between the rotating cage and the dust cowl.

14.5.15.3. Clamp gear operation is satisfactory and contacts their fully tipped stops without any interference.

14.5.15.4. Clearance with locking racks.

14.5.15.5. Clearance with tippler drive pinion bearing cartridges.

14.5.15.6. Observe any signs of lateral movement of end ring rail relative to flanged support rollers.

14.5.15.7. Note: Support roller flanges and rail head must be kept well lubricated during rotation.

14.5.15.8. Check rotational operation of all encoder limits.

14.5.16. During inch rotation test check operation of clamp gear assemblies through their full range of. Ensure there is no binding of links, pins or bushes. Check for lubrication pipework snags over full movement of clamps. In particular check that the tip side clamps are clear of any obstruction from the side pad.

14.5.17. Rotate empty tippler cage through one complete tip and return cycle to 150° at slow speed and repeat checks outlined in 14.6.15 and 14.6.16.

14.5.18. Rotate empty tippler cage through one complete tip and return cycle to 150° at full speed and check for smooth operation.

14.5.19. Back rotate the tippler to confirm that the operation of the overtravel limit switch at -2.5 degrees and that buffers contact the stops at the same time. Weld on suitable packing plate to the stop face if necessary.

14.5.20. Forward rotate the tippler to confirm the operation of the overtravel limit switch at 181° degrees and that buffers contact the stops at the same time. Weld on suitable packing to the stop face if necessary.

14.6 Dust Extraction System

The Contractor will conduct the following works in accordance with the following, namely:

Reference Drawings
Annexure A

Appendix A: Drawing List

Reference Documents
Annexure C: Technical Specification Dust Extraction/Handling Plant
Annexure F: Dust Extraction Control Philosophy
Annexure D: Electrical Inspection _Dust Plant Report
Annexure N: Data Sheet Dust Collection (Bag House)

The Contractor will develop a commissioning method statement for the dust extraction equipment. The Contractor will be required to provide such a method statement to the Transnet Project Manager for review and approval in principle. The Method statement must align with the requirements of the relevant Dust Extraction System Specifications, Data Sheet and Control Philosophy. (Refer Reference Documents listed ablove). Compliance with the Atmospheric Emissions Licence to be included in reports.

14.7 System No Load Test (Individual Loaded Test)

The Contractor will conduct the following works, namely:

14.7.1 Train Holding Devices

14.7.1.1. Functional operations of the Train Holding Devices are to be carried out in strict compliance with Electrical Commissioning Method Statement.

14.7.1.2. Transnet will provide a minimum rake of 14 empty CR5 wagons.

14.7.1.3. Locate the rake of wagons in the tippler system positioning the rake with the second pair of wagons central in the tippler. Check clearances of the wagon in the tippler as the rake is pushed through.

14.7.1.4. Check that all 8 wagon wheels are aligned with the entry wheel gripper units and engage the wheel grippers. Ensure the gripper bars are contacting the wagon wheel rims and that the wheels are central in the gripper units.

14.7.1.5. Repeat the engage and retract cycle of the entry grippers and record the operating times.

Operation	Recorded Time (sec.)	Required Time (sec.)
Entry Gripper Engage		2.5
Entry Gripper Retract		2.5

14.7.1.6. In conjunction with system "loaded" ensure there is no relative movement of bogie wheels to entry gripper units at any stage due to the ripple effect of the rake of loaded wagons.

14.7.1.7. Check that the 4 wagon wheels are aligned with the exit wheel gripper units and engage wheel grippers. Ensure the gripper bars are contacting the wagon wheel rims and that the wheels are central in the gripper units.

14.7.1.8. Repeat the engage and retract cycle of the exit grippers and record the operating times.

Operation	Recorded Time (sec.)	Required Time (sec.)
Exit Gripper Engage		2.5
Exit Gripper Retract		2.5

14.7.1.9. In conjunction with system "loaded" ensure there is no relative movement of bogie wheels to exit gripper units at any stage due to the ripple effect of the rake of empty wagons

14.7.2 Positioner

14.7.2.1. Travel and functional operations of the positioner are to be carried out in strict compliance with Electrical Commissioning Method Statement compiled by the Contractor. Careful attention must be given to the effective operation of the drive transmission, the travel limits and extent of positioner travel.

14.7.2.2. To ensure that full functional test of the plant equipment can be carried out, a minimum of 14 empty wagons are required.

14.7.2.3. Prior to loco marshalling into the Wagon Unloading system the following conditions must be satisfied: -

- Control System Healthy
- Positioner located at its datum position.
- Positioner main arm raised.
- Positioner last car arm swung out of the way.
- Tippler aligned and stationary at rail level.
- Tippler clamps fully raised. Note - clamp counterweight arms to be in contact with stop faces
- Tippler drive brakes on
- Entry tracks clear.
- All wheel grippers retracted.

14.7.2.4. Bringing in a new train.

14.7.2.4.1. The loco brings in an empty train under locomotive control and positions it such that the coupler between wagons 1 and 2 is located centrally on the tippler platform.

CAUTION
The Contractor must ensure that Locomotive Braking and Accelerating should be minimised whilst the locomotive is travelling through the Tippler. Locomotive driver's mirrors should be folded in flush with the body to maximise clearance with the retracted clamps.

14.7.2.4.2. Check relative clearance between the locomotive and the following components during this operation: -

- End Rings and 'U' Frame Structures & Guide Blocks
- Clamps
- Side Pad & Tip Side Guide Blocks
- Cross Beam Guide Blocks
- End Ring Spill Plates and Covers.

14.7.2.5. Positioner Maintenance Set-Up Operation

14.7.2.5.1. Using the local control station mounted on the positioner, the operator travels the positioner to a position where the arm is in line with the drawbar between wagons 5 and 6.

14.7.2.5.2. Arm locating lasers (mounted on the positioner) to be adjusted to achieve the correct stopping position for main arm engagement.

Note: Whichever direction the positioner is travelling, the first laser coming clear will cause the positioner to ramp down to stop and the second laser will check that it is clear. Both lasers need to be clear before the main arm can be extended.

14.7.2.5.3. The operator then extends the main arm to engage over the drawbar between wagons 5 and 6 and checks that the arm head is clear of any obstructions.

14.7.2.5.4. The operator checks that all the gripper units are retracted and operates the positioner in a forward direction until wagons 3 and 4 are central in the tippler. Checks should also be made that the resolver 'ramp down', 'creep' and stop settings are correct and that the wagon wheels are stationary before the exit grippers are engaged.

14.7.2.5.5. The operator engages the exit wheel grippers.

14.7.2.5.6. Check that the tippler 'entry' lasers are clear, with the wagons held by the exit wheel grippers and that wagons 3 and 4 are correctly positioned in the tippler.

14.7.2.5.7. Raise the positioner main arm and travel back to correctly position the main arm in line with the drawbar between wagons 7 and 8, checking that the resolver 'ramp down' setting and arm laser operation is correct.

14.7.2.5.8. While the positioner is travelling back the operator engages the entry wheel grippers.

14.7.2.5.9. The operator then lowers the main arm to engage over the drawbar between wagons 7 and 8 and checks that the arm head is clear of any obstructions.

14.7.2.5.10. The entry and exit wheel grippers are released.

14.7.2.5.11. The operator moves the positioner in a forward direction until wagons 5 and 6 are central in the tippler. Checks should also be made that the resolver 'ramp down', 'creep' and stop settings are correct and that the wagon wheels are stationary before the exit grippers are engaged.

14.7.2.5.12. The above sequence 14.8.1.7.1 through 14.8.1.7.12 should be repeated until wagons 11 and 12 are central in the tippler and the Contractor site engineer is satisfied with the position set-up.

14.7.2.5.13. The last two wagons are to be positioned in the tippler using the positioner last car arm. At the end of the previous cycle the operator engages the exit wheel grippers.

14.7.2.5.14. The operator raises the main positioner arm and travels the positioner back to its positioner back limit which is located such that it is possible to swing the last car arm.

14.7.2.5.15. While the positioner is travelling back the operator engages the entry grippers.

14.7.2.5.16. The operator swings the last car arm and releases the entry and exit grippers.

14.7.2.5.17. The operator travels the positioner forward at slow speed so that the coupler on the last car arm engages with the rear coupler of the 14th and last wagon. Proper engagement of the couplers is to be checked prior to further travel.

14.7.2.5.18. The operator then travels the positioner forward at slow speed until the 13th and 14th wagons are positioned centrally in the tippler.

14.7.2.5.19. After the exit wheel grippers are engaged the coupler release mechanism is operated to disengage the coupler and the operator travels the positioner back until the last car arm is clear and can be raised.

14.7.2.5.20. The positioner is then travelled back to the positioner back limit.

14.7.2.5.21. Reposition the rake of wagons such that wagons 1 & 2 are positioned centrally on the tippler.

14.7.2.5.22. Using positioner manual control repeat 14.8.2.5.1 to 14.8.2.5.21.

14.7.2.6. Positioner Semi-Automatic Operation

14.7.2.6.1. The operator pre-sets the tippler control system with the number of wagons to be tipped. Pre-setting is achieved via the SCADA system on the control room desk.

Note: Wagon detection lasers must be provided to recognise the last wagon in the event of incorrectly entering the number of wagons.

14.7.2.6.2. With wagons 1 and 2 re-positioned centrally on the tippler platform, the operator travels the positioner to a position where the arm is in line with the drawbar between wagons 5 and 6. The positioner automatically stops in this position using the lasers, which also confirm the gap for the arm.

14.7.2.6.3. The operator then lowers the positioner main arm to engage over the drawbar between wagons 5 and 6.

14.7.2.6.4. The operator checks that all the gripper units are retracted.

14.7.2.6.5. The operator operates the positioner through the normal forward cycle checking for possible positional errors.

14.7.2.6.6. The positioner travels forward and positions wagons 3 and 4 in the tippler.

14.7.2.6.7. The exit grippers are engaged.

14.7.2.6.8. The positioner main arm is raised, and the positioner then travels back two wagon lengths and stops.

14.7.2.6.9. While the positioner is travelling back the entry grippers are engaged.

14.7.2.6.10. The positioner main arm is lowered over the drawbar between wagons 7 & 8.

14.7.2.6.11. The entry and exit grippers are retracted.

14.7.2.6.12. The positioner is then travelled forward two wagon lengths thus positioning the next two wagons centrally in the tippler.

14.7.2.6.13. The exit grippers are engaged.

14.7.2.6.14. The positioner main arm is raised, and the positioner travels back two wagon lengths and stops.

14.7.2.6.15. Steps 14.8.2.6.9 thru 14.8.2.6.14 are repeated until the rake is correctly positioned for last wagon handling as detected by the laser or the number of wagons as previously set have been indexed. In the latter case further cycles will need to be completed by entering a new number of wagons to be tipped and restarting the sequence. Ensure that deceleration and stopping limits are set correctly and to observe positioner arm head location over the drawbar between the wagons and holding arm location over the couplers.

14.7.2.6.16. The last wagon operation is carried using Positioner On-board Manual control.

14.7.2.7. Positioner Automatic Operation

Note: Tippler "No Load" testing to be completed prior to this operation.

14.7.2.7.1. With the plant in manual mode, the positioner in the back position, 'last car arm swung out of the way and positioner main arm raised, retract the wheel grippers to enable locomotive access to reposition the rake of wagons with 1 & 2 on the tippler platform for the following tests.

14.7.2.7.2. The operator selects automatic control.

14.7.2.7.3. Providing the wagons are correctly positioned the entry and exit grippers engage, the tippler rotates, and the positioner travels forward to position the main arm at the gap between wagons 5 and 6.

14.7.2.7.4. The positioner main arm lowers over the drawbar.

14.7.2.7.5. When the tippler has returned to rail level the wheel grippers retract and the positioner travels forward to position the next pair of wagons in the tippler.

14.7.2.7.6. Subsequent automatic cycles continue until the end of the train, or the pre-set number of wagons have been tipped leaving the last two wagons to be positioned using the last car arm.

14.7.2.7.7. Repeat 14.8.2.7.1 to 14.8.2.7.6 using loaded wagons. Note this is to be carried out in conjunction with the other major parts of the plant when they have been fully dry commissioned. This includes the tippler, hoppers & feeders, conveyor 308, dust extraction equipment.

14.7.2.7.8. Ensure the positioner can perform a complete cycle within the time allocated on the plant time cycle and record below when handling CR5 wagons.

Operation handling CR5 Wagons	**Recorded Time (sec.)**	**Required Time (sec.)**
Positioner Forward Travel		37.33
Main Arm Raise		6.5
Positioner Rear Travel		17.4
Main Arm Engage		6.5
Total Cycle		76.5

14.7.2.7.9. Repeat 14.8.2.7.8 handling CR13 or CR14 wagons.

14.7.3 Tippler

14.7.3.1. Functional operation of the tippler is to be carried out in strict compliance with Electrical Commissioning Method Statement compiled by the Contractor. Careful attention must be given to the effective operation of drive transmission, freedom of movement of clamp gear, the extent of any longitudinal movement of cage during rotation.

14.7.3.2. The test operations are to be carried out in conjunction with the Drives Engineer.

14.7.3.3. With the tippler at rail level and using the same rake of 14 CR5 empty wagons position the first two wagons onto the tippler. Check they are positioned correctly.

14.7.3.4. Rotate the tippler at slow speed to 90° and observe operation of clamp gear assemblies.

14.7.3.5. At 90° carry out the following checks: -

- That there is full contact between the side pad and the wagon body.

- That there is a positive clamping action and full contact between all clamps and still faces of wagons.

- That there is a positive clamping action and full contact between wagon wheels and platform rails.
- There is clearance between the clamp arm and the rear face of the side pad.

- That all clamp counterweight arms are not engaged with the stop pads.

14.7.3.6. Continue rotation of the tippler to normal tip position (150°) and repeat checks in 14.8.3.4.

14.7.3.7. Check that the stopping angles for the normal tip condition have not varied.

14.7.3.8. Return the tippler to rail level at slow speed and check the following: -

- That clamp gear assemblies return to the normal retracted position.

- The stopping angles for normal return and over return conditions have not varied

- The platform rail and main rails are aligned to within ±3mm both laterally and vertically in the normal return position.

14.7.3.9. Repeat 14.8.3.3 thru 14.8.3.6 until 4 empty wagons have been checked through the tipping cycle.

14.7.3.10. After completion of with two wagons positioned on the tippler, rotate the tippler at full speed to normal tip position (150°) and repeat checks as 14.8.3.4 and 14.8.3.5.

14.7.3.11. Return the tippler to rail level at full speed and repeat checks as 14.8.3.6.

14.7.3.12. Ensure that all hoppers are clear of material and feeders, conveyors, dust extraction equipment are working.

14.7.3.13. Position two full wagons onto the tippler. Check they are positioned correctly.

14.7.3.14. Rotate the tippler at slow speed to normal tip position (actual tip angle to be recorded) and observe the following: -

- That there is full contact between the side pad and the wagon body.
- That there is a positive clamping action and full contact between all clamp beams and still faces of wagon.
- That there is a positive clamping action and full contact between wagon wheels and platform rails.
- The stopping angle at the normal tip condition has not varied.
- The spillage of material around the end ring spill plates.

14.7.3.15. Return the tippler to rail level at slow speed and observe the following:

- That the clamp gear assemblies return to the normal raised position, (counterweight arms in contact with stop pads).
- The stopping angle at normal return condition has not varied.
- The platform rails and main rails are aligned to within ±3mm both laterally and vertically in the normal return position.

14.7.3.16. Position the next two full wagons onto the tippler and check they are positioned correctly.

14.7.3.17. Repeat checks 14.8.3.12 and 14.8.3.13 with the tippler rotating at full speed.

Note - after 3 full wagon tips of material the feeder gates will open, and the feeders will start to discharge material onto conveyor 308. When the hopper has subsequently been emptied to the low level the feeders will automatically stop leaving a bed of ore in the bottom of the hopper for subsequent tips. Unless the feeders are restarted under manual control to completely empty the hoppers the feeder gates will remain open.

14.7.3.18. Rotate the tippler through a complete cycle and check it can perform this cycle within the time allocated.

14.8 System Loaded Test (Total Sequential Operation)

14.8.1. In conjunction with the Electrical Commissioning Method Statement compiled by the Contractor carry out a total sequential operation under load conditions of the complete system.

14.8.2. Check that all operations function correctly.

14.8.3. Ensure there is no relative movement of the bogie wheels to gripper units, at any stage, due to the ripple effect of the rake of empty wagons.

14.8.4. A loaded train will be provided by Transnet Port Terminals.

Wagons Handled (in pairs with solid drawbar)

	CR5 Ore Wagon	**CR13 & 14 Ore Wagon**
Gross Weight (tonnes)	2 x 104	2 x 120
Tare Weight (tonnes)	2 x 19	2 x 20
Length O/Couplers (m)	2 x 10.5	2 x 10.5
Wagon Height (m)	2.43	2.643 max
Wagon Width (m)	3.0	3.0

14.8.5. Continue tipping until Contractor Site Supervisor as well as TPT Engineering Manager is assured of acceptable operation.

14.8.6 Load Commissioning

14.8.6.1. Load commissioning shall not proceed until all pre-commissioning checks and tests have been completed and signed off by the Transnet Project Manager.

14.8.6.2. The minimum wagons to pass through the tippler during load commissioning shall be: -

- Four trains of 110 CR5 wagons.
- Three trains of 110 CR13 wagons
- Three trains of 110 CR14 wagons.

14.8.6.3. Each of these wagon type trains is to be offloaded within the allotted time as stipulated in performance specification.

Note: The cycle times for positioner and tippler shall be set long initially and gradually decreased whilst performance is monitored closely. The test shall aim to reduce the cycle time to the design value toward the end of the rake.

14.8.6.4. Caution is required when operating the tippler at reduced speeds. Material discharge trajectory is altered, and spillage may occur.

14.8.6.5. The trains are to be unloaded using automatic mode except that the following interruptions shall occur naturally or shall be simulated arbitrarily during commissioning, as per the following: -

- Emergency stops.
- Power loss
- Stop instructions, safeties and interlocks associated with equipment external to the tippler, positioner, wheel grippers, feeders, and conveyor 308 including all auxiliary drives which affect the tippler.
- Stop instructions, safeties and interlocks associated with the tippler, positioner, wheel grippers, feeders, and conveyor 308.

14.8.6.6. Chart recordings shall be made of the following parameters: -

- Position (rotation or linear as appropriate)
- Volts
- Amps
- Frequency
- Kilowatts
- Brake application sequence
- Positioner Main Arm operating time and pressures
- Positioner Last Wagon operating time and pressures
- Gripper's application times and pressures
- Reducer bearing and support roller bearing temperatures.
- Noise emission levels at agreed locations.

14.8.6.7. Recordings are required for no-wagon, empty wagon and maximum CR5, CR13 & CR14 wagon loads at normal operating speed and slow (maintenance) speed.

14.8.7 Performance Testing

14.8.7.1. The performance testing is to be carried out as soon as practicable after Load Commissioning has been completed.

14.8.7.2. The performance test shall operate for a minimum of 5 rakes of 110 CR5 ore wagons and 5 rakes of 110 CR13 or CR14 wagons. During the performance testing, no further adjustments shall be performed.

14.8.7.3. The performance test of the tippler, positioner, wheel grippers, feeders, and conveyor 308 shall achieve the required cycle times and feed rates for each component and the entire system.

14.8.7.4. Time taken for the handling of the train by the locomotive to position the first two wagons and the handling of the last two wagons by the positioner in the Standard Operating Procedure (SOP) Manual control mode is not included in the test time.

14.8.7.5. Timing will start when the tippler commences rotation at the start of the train and finishes when the tippler returns to rail level at the end of the train ready for the last two wagons to be manually positioned in the tippler.

14.8.7.6. Any time required for operator rest, change or breaktime is to be deducted from the overall time taken.

14.8.7.7. Delays caused by failure of equipment not supplied by the Contractor, or abnormal operating conditions such as heavy rain, strong wind, power failure, etc., is to be deducted from the overall time taken.

Note the times taken for each of the trains handled.

Train of CR5 Wagons	A Total Time (min)	B Delay Time (min)	A-B Nett Time (min)	C Wagons Tipped	C x 60/ (A-B) Rate/ Hour
1					
2					
3					
4					
5					

Train of CR13 Wagons	A Total Time (min)	B Delay Time (min)	A-B Nett Time (min)	C Wagons Tipped	C x 60/ (A-B) Rate/ Hour
1					
2					

Train of CR13 Wagons	A Total Time (min)	B Delay Time (min)	A-B Nett Time (min)	C Wagons Tipped	C x 60/ (A-B) Rate/ Hour
3					
4					
5					

Train of CR14 Wagons	A Total Time (min)	B Delay Time (min)	A-B Nett Time (min)	C Wagons Tipped	C x 60/ (A-B) Rate/ Hour
1					
2					
3					
4					
5					

14.8.7.8. Periodic checks on the operation of the tippler, positioner, holding arm, wheel grippers, hoppers, feeders, and conveyor 308 shall be carried out to determine satisfactory operation of equipment. In particular check for:

- Alignment of rails at tippler return to rail level.
- Satisfactory positioning of wagons in the tippler cage
- Positioner main arm gap finding.
- Wheel Gripper engagement.
- Detection of last wagon by photocells.
- Satisfactory gearbox oil temperature.
- Satisfactory bearing temperatures.
- Lubrication of tippler rack satisfactory.
- Lubrication of positioner rack satisfactory.
- Tippler support roller to rail contact and lubrication
- Positioner support & guide roller to rail contact and lubrication.

14.8.7.9. Feeder operation, including trimming to minimise feeder stoppages due to hoppers emptying below low level between tip cycles and prevent delays to subsequent cycles as a result of the hoppers overfilling.

14.8.7.10. Conveyor 308 operation.

14.8.7.11. Operation of Dust Extraction Equipment.

15 Quality Assurance

15.1 General

15.1.1 Quality Control by Equipment Supplier

15.1.1.1. The Contractor is responsible to implement a Quality Assurance (QA) program.

15.1.1.2. The Contractor is responsible for the of preparing and submitting to the Project Manager all the documentation required for the surveillance activities.

15.1.1.3. The Contractor's QA program shall be required to include Inspection and Test Plans (ITPs) with a schedule of inspections and tests to be performed upon each major component or sub-assembly and the stage of production at which each inspection or test shall be performed.

15.1.1.4. The ITPs shall include the work to be completed at each stage, and include the inspection and testing required.

15.1.1.5. The test/inspection controlling specification or procedure reference shall be nominated along with the pass criteria or verifying documentation and results to be recorded. The ITPs shall include a space for "signing off" by the Equipment Supplier's designated QC personnel for each completed stage. Work should not proceed further until each stage has been "signed off" and confirmed as "Inspected – OK" by the Equipment Supplier's QC personnel.

15.1.1.6. All progress shall be reported on an "Inspected – OK" basis.

15.1.2 Witness and Hold Points

15.1.2.1. The ITPs shall clearly identify witness and hold points as nominated and agreed by the Supervisor. The Supervisor will advise the Contractor of the specific stages in the production process, at which the Supervisor wishes to witness tests performed by the Contractor or to perform independent inspection or testing. These points will be nominated following the receipt and review of the Contractor Supplier's ITPs by the Supervisor.

15.1.2.2. Witness points are defined as critical steps in manufacturing and testing, whereby the Contractor shall advise the Project Manager an agreed time in advance of the operation so that it may be witnessed by the Project Manager.

15.2 Responsibility of the Contractor

15.2.1. The Contractor shall bear full responsibility for supply of a product(s) to the Project Manager, in part or in whole, which conform fully to the quality requirements given in the Specification and the quality requirements necessary for the intended application. This responsibility shall include all items or services provided to the Contractor by the Contractor's suppliers and/or sub-contractors, which form, in part or in whole, the product(s) provided to the Project Manager.

15.2.2. The Contractor shall be responsible for providing certification of materials, workmanship and components utilized in the Work, and for performance of tests to verify the quality of the Work. Such certifications and tests shall include, but not necessarily be limited to, those certifications and tests specified in the portion of the Technical Specifications, which pertains to each aspect of the Work.

15.2.3. The Project Manager reserves the right to conduct design audits and field stress level tests on the structures. Defects so identified shall result in the Contractor being responsible to bear the costs of rectification as well as cost of subsequent design audit and field tests. Design review, inspection or testing performed by the Supervisor, or its omission, shall in no way relieve the Contractor of the responsibility to provide product(s) of the required quality.

15.3 Project Manager Supplied Items

15.3.1. The Contractor shall advise the Project Manager of specific quality requirements of any items to be provided by the Project Manager to the Contractor, in order to be consistent with the quality requirements of the final product. Such items may include, but are not limited to: design data, engineering designs and drawings, materials, consumables, foundations, components, sub-assemblies, and/or services.

15.3.2. The Project Manager shall provide certification to the Contractor of supplied items upon request from the Contractor.

15.3.3. In the event of disagreement between the Project Manager and the Contractor regarding quality requirements for Transnet supplied items, the Project Manager decision shall prevail, subject to the provisions of the General Conditions.

15.4 Materials Control

15.4.1 Identification of Materials

The Contractor shall employ adequate materials control procedures to ensure that each different type, grade, or size of materials or components, including Transnet supplied items, remain identifiable until incorporated into the Work.

15.4.2 Records

15.4.2.1. The Contractor shall maintain records to determine the location of each identifiable lot of each type, grade or size of material received at the Contractor's plant(s) and either used in the Work, consumed during fabrication, scrapped, or retained as part of future inventory.

15.4.2.2. These records shall list quantities received arranged by weight, volume, piece count, or other suitable measure, so that an audit of such records may be quantitatively balanced.

15.4.2.3. The Contractor shall make such records available to the Project Manager upon request.

15.4.3 Traceability

15.4.3.1. When traceability is required for individual components or sub-assemblies, the specific requirements will be given in the portion of this Technical Specification, which pertains to the individual component or sub-assembly.

15.4.3.2. The Contractor shall provide the Supervisor with written descriptions and procedures for special processes and test methods to be performed on site by others (e.g., welding, painting, bolt tensioning, NDT, etc.). The procedures shall outline the precautions to be employed to ensure that work performed on site meets the same standards of quality as work performed elsewhere.

15.5 Design Assurance

15.5.1. The Contractor shall provide copies of design calculations and/or design drawings to the Project Manager for independent review when so required by these Technical Specifications or upon request from the Project Manager.

15.5.2. The Contractor shall provide copies of shop (fabrication) drawings and all revisions thereto, upon the Supervisor's request.

15.6 Manufacturing Surveillance

15.6.1 Supervisor Surveillance

15.6.1.1. The Project Manager, through his supervisor, intends to monitor the progress of work and to conduct an independent inspection and testing program to provide verification that the quality of the Work meets required standards.

15.6.2 Release Following Hold Points

The Contractor shall obtain the signature of the Supervisor, upon documents authorising release of items for further processing following hold points for the Supervisor.

15.6.3 Non-Conformance Report

In the event the Supervisor's inspection detects non-conformance to QA requirements at any time after approval by the Contractor's QA, the Contractor will be presented with a copy of a non-conformance report as per TIMS Procedure 013 (Occurrence and Non-Conformance Management) prepared by the Supervisor which outlines the nature of the problem. The Contractor shall then prepare and submit to the Project Manager, in writing, details of corrective action to be taken and dates of implementation. The effect of this on the project program shall be stipulated in this report. Any costs incurred by the non-conformance will be for the Contractor's account.

15.7 Objectives of Supervisor's QA

15.7.1 Evaluation of Contractor's Production and QA

15.7.1.1. A primary objective of the Supervisor's surveillance is to verify that Contractor's manufacturing processes and QA program are performing in a satisfactory manner. Therefore, the occurrence of a small percentage of defects in product components during manufacture will not be considered a non-conformance under the Supervisor's QA program, provided that the Contractor's QC correctly detects the defects and corrective action is undertaken according to established procedures.

15.7.1.2. If the percentage of defective components is unreasonably high, the defects are not correctly identified by Contractor's QC, or identified defects, or non-conformances are not corrected in an approved manner, then the Contractor will be issued a non-conformance report and shall be required to take prompt corrective action.

15.7.2 Supervisor's Quality Inspections

15.7.2.1. Another important objective of the Supervisor's QA program is to verify the quality of the Work by independent inspection and testing entities. The extent and intensity of this independent inspection, performed by the Supervisor at Transnet's cost, will be determined in part by the results of the evaluation of Contractor's work.

15.7.2.2. At the Supervisor's option, the independent inspection may include:

15.7.2.2.1. Re-tests of items tested by the Contractor, using same test methods as the Contractor.

15.7.2.2.2. Re-tests of items tested by the Contractor, using alternative test methods to those used by Contractor.

15.7.2.2.3. Tests of items not tested by the Contractor.

15.7.2.3. Any non-conformances detected by the Supervisor's testing shall be resolved. The Contractor shall be responsible for all costs associated with a failed test.

15.8 Corrections of Non-Conformances

15.8.1. Prior to final approval by the Supervisor, all non-conformances shall be corrected by the Contractor at the Contractor's cost.

15.8.2. If the Supervisor discovers non-conformances to the Specification at any stage after approval by the Contractor's QA, the Supervisor will immediately verbally advise the Contractor and, as soon as practical, in writing, and will request correction as per the preceding paragraph within a time period stipulated by the Supervisor.

15.9 Quality Control Records

15.9.1. Copies of the Contractor's quality control records shall be submitted to the Project Manager, without charge, as required by the Specifications or as requested by the Supervisor.

15.9.2. The Contractors shall retain and archive the originals of the Contractor's Quality Control Records for a minimum of five (5) years following delivery of Contractor's products. Additional copies of these records shall be provided, without charge to the Project Manager, upon request of the Supervisor.

15.10 Quality Control and Documentation

15.10.1 Personnel Qualifications

15.10.1.1. All personnel engaged in design and production of the Work shall be qualified by education, training, testing and/or experience for the work to be performed.

15.10.1.2. The Contractor shall provide to the Project Manager, upfront, on request and/or as required by these Technical Specifications, objective evidence confirming the competency of each person engaged in performance of the Work.

15.10.2 Certification Of Work

15.10.2.1. All work shall satisfy the requirements of all Inspection Authorities having jurisdiction.

15.10.2.2. The Contractor shall obtain all necessary permits and pay all fees in connection therewith, including fees for inspection of drawings; and, upon completion of the Work, shall obtain certification of approval from the Inspection Authorities for the Project Manager.

15.11 Design Review

15.11.1 General

15.11.1.1. As outlined in the Quality Assurance, the Contractor is required to undertake his own Design Verification process.

15.11.1.2. In addition, as part of the Supervisor 's quality surveillance activities, it is Project Manager's intent to perform a separate, independent design review of portions of the Work.

15.11.1.3. It is not planned that the Project Manager will carry out a full review of the Contractor's design; however, the scope of design review may be extended if there is evidence of non-conformance to Agreement design requirements.

15.11.1.4. The Contractor shall give all necessary assistance to the Project Manager and his designated representatives to facilitate Project Manager review. However, any independent review carried out by the Project Manager, or his designated representative, shall not relieve the Contractor of his full responsibility for the system dynamic analysis design, detail design, manufacture, shop testing and performance testing of the Work in accordance with the relevant section of these Technical Specifications; and any actions of the Project Manager's design review team shall not diminish the Contractor's obligation.

15.11.1.5. The design of all portions of the Work may be reviewed at the Project Manager discretion.

15.11.1.6. The Contractor shall submit design drawings and calculations for the specific aspects listed to the Project Manager sufficiently in advance of production to permit the Project Manager's design review to take place. Subsequent to the Project Manager's initial review, the Contractor shall be prepared to hold discussions and/or attend meetings to clarify or to reach agreement on possible design modifications.

15.11.1.7. The Contractor shall make allowance in his proposed Schedule of Work for the foregoing activities and shall submit his estimate of their duration to the Project Manager for review. The Project Manager's design review activities shall be incorporated as "hold points" on the Inspection and Test Plan, with the schedule.

16 Submittals

16.1 General

16.1.1. The Contractor shall submit to the Project Manager documentation and drawings, including all revisions thereof, required for the project management, design, furnishing of equipment, fabrication, erection, installation, maintenance, and operation of the Machine.

16.1.2. The Contractor's schedule should be based on a turnaround time of two (2) weeks, not including mail delivery time, for review of drawings and documents by the Supervisor.

16.1.3. All submittals shall be in the English language.

16.1.4. Any rework required because of documents not meeting the requirements of these Technical Specifications shall not be grounds for an extension of time for completion of the Work and/or additional cost to Transnet Port Terminals Saldanha.

16.1.1 Submittals Shall Include the Following as Minimum:

21.1.1.1. Design Brief

21.1.1.2. Project Management Procedures

21.1.1.3. Equipment Specifications

21.1.1.4. Control System Level 1,2 & 3

21.1.1.5. Control System Quality Plan

21.1.1.6. Operators Cab & SCADA Specification

21.1.1.7. PLC I/O Schedule

21.1.1.8. Device Schedule

21.1.1.9. Level 2 PLC Control Sequence Descriptions

21.1.1.10. Drawings

21.1.1.11. Calculations

21.1.1.12. Erection Procedures

21.1.1.13. Commissioning Procedures

21.1.1.14. Installation, Operation, and Maintenance Manuals

21.1.1.15. Quality Assurance Manual

21.1.1.16. Contract Quality Plan

21.1.1.17. Programs.

16.2 Project Management Procedures

To ensure the timely delivery of the Machine, the Contractor shall compile a comprehensive set of Project Management Procedures and submit these to the Project Manager for review at the commencement of the project.

16.3 Drawings

16.3.1 General.

16.3.1.1. All drawings shall be produced in AutoCAD latest release.

16.3.1.2. Drawing submittal schedules shall be established at the time of Notice to Proceed and shall be mutually agreed to between the Supervisor and the Contractor. Drawings shall be issued for review in a sequence schedule and not bunched. Drawings required for cross-referencing during review shall be submitted with the drawings to which they relate.

16.3.1.3. The Contractor shall submit certified drawings for all of the detailed items supplied under the agreement and related equipment provided by others.

16.3.1.4. Drawing transmittals indicating the distribution shall accompany each issue.

16.3.2 Layout Drawings.

The Contractor shall submit certified drawings of all machine layouts or general arrangement drawings including, but not limited to motion extreme positions and limits. The arrangements shall indicate the location of major equipment components with requirements for installation, removal, and maintenance clearances.

16.3.3 Structural Drawings.

The Contractor shall submit general arrangement and detail drawings showing the Machine steel structure and the loads for which it is designed. The drawings shall include but not be limited to:

16.3.3.1. Overall general arrangements showing leading dimensions and the relationship of all the parts of the Machine.

16.3.3.2. Additional drawings as required showing details with dimensions and member sizes of large structural assemblies and sub-assemblies of the Machine.

16.3.3.3. Loading diagrams showing:

- Loads and their points of application.
- External reactions corresponding to the applied loads.
- Internal reactive forces between Machine components.

16.3.3.4. Typical connection details showing welding and bolting requirements. Connection details shall show the relationship between the members comprising the joint.

16.3.4 Mechanical Drawings.

The Contractor shall submit general arrangement and detail drawings showing all mechanical components and equipment assemblies, sub-assemblies and details including proprietary equipment. The drawings shall include but not be limited to:

16.3.4.1. Overall arrangements showing leading dimensions of the Machine.

16.3.4.2. General arrangement and details of each component

16.3.4.3. General arrangement and details of the material transfer points, head chute with deflector plate, liner arrangements, walkways, and platforms.

16.3.4.4. Arrangements, diagrams, and details of all hydraulic, pneumatic, lubrication, and dust suppression systems

16.3.4.5. Manufacturer's certified arrangement and detail drawings of all equipment and components purchased by the Contractor.

16.3.5 Electrical Drawings.

The Contractor shall submit certified drawings of all electrical power and control system equipment including, but not limited to:

16.3.5.1. Electrical Equipment Single Line Diagram

16.3.5.2. General Arrangement drawings showing locations of all major items of electrical equipment, control equipment and lighting fixtures.

16.3.5.3. Control, instrumentation, and alarm system block and wiring diagrams.

16.3.5.4. Main cable/conduit routing drawings and schedules

16.3.5.5. Equipment lists indicating equipment voltages, rating, manufacturer, type and where applicable, fault current ratings.

16.3.5.6. Operator Panel Arrangements to scale

16.3.6 Erection Drawings.

16.3.6.1. The Contractor shall provide erection drawings required for the Machine to be fully assembled and erected on site.

16.3.6.2. Erection drawings shall include, but not be limited to the following:

16.3.6.2.1. Sequence field assembly, installation and erection layouts identifying all components and clearance requirements.

16.3.6.2.2. Weights and centres of gravity of major assemblies

16.3.6.2.3. Connection details for major assemblies showing welding and bolting requirements at all connections.

16.3.6.2.4. Field run conduit and cable drawings, schedules, and wiring diagrams.

16.3.7 As-Built Drawings.

16.3.7.1. The Contractor shall provide the Project Manager with complete sets of certified A3 size As-Built Drawings plus electronic copies in AutoCAD format. The As-Built Drawings shall show all details of the Plant as actually built or constructed.

16.3.7.2. As-Built Drawings shall include Family Tree, all general arrangement drawings, detail drawings, all mechanical component drawings, including fully dimensional detail drawings and material specifications for all internal and external components, drawing index on Excel Format, and all electrical drawings.

16.3.7.3. On completion of any part of the work, the Contractor shall mark-up and provide to the Transnet Port Terminals Saldanha Representative two (2) sets of drawings marked up in red with all the field changes incorporated by the Contractor in the equipment.

16.3.7.4. Final "As-Built" drawings submitted to the Project Manager shall include two (2) copies printed in A3 size and two (2) sets of compact disc copies in AutoCAD format.

16.3.7.5. All As-Built drawings shall be delivered to the Project Manager and accepted by the Project Manager prior to the issue of the Certificate of Total Performance.

16.3.7.6. Layout drawings of all bought-out equipment.

16.3.7.7. As-Built Bill of Quantities of the Plant in Excel format.

16.4 Calculations

The Contractor shall submit for review by the Transnet Project Manager, copies of design calculations and all explanatory notes including, but not limited to the following:

- Hand calculations
- Finite Element Analysis Models
- Power and load calculations
- Other design calculations as requested by the Project Manager.

16.5 Erection Procedures

The Contractor shall submit, within ten (10) working days of Notice to Proceed, a detailed project program for the Project Manager to review.

16.6 Commissioning Procedures

The Contractor shall submit written commissioning procedures, no later than thirty (30) days prior to the commencement of commissioning, for review by the Project Manager.

16.7 Installation, Operation, and Maintenance Manuals

16.7.1. The Contractor shall submit to the Project Manager for review two (2) draft copies of Installation, Operation, Maintenance and Training Manuals for all of the equipment covered by Machine Specifications.

16.7.2. After the Supervisor review, the Contractor shall revise the manuals to the Supervisor satisfaction, issue complete revised sets of Installation, Operation, Maintenance and Training Manuals not less than thirty (30) days prior to the equipment shipment.

16.7.3. The final issue of the manuals shall be six (6) sets of hard copies bound in A4 size, three-ring binders and two (2) sets of electronic files in MS Word and PDF format on compact disks.

16.7.4. The language of these manuals shall follow the Machine Specifications.

16.8 Quality Assurance Manual

The Contractor shall provide two (2) copies of Contractor's Quality Assurance (QA) manual within two (2) weeks of the Notice to Proceed. It shall be supplemented or revised to incorporate all actions necessary to bring the Contractor's quality assurance program into full conformance with the Specifications and submitted with a new revision number.

16.9 Quality Plan

16.9.1. The Contractor shall provide two (2) copies of the detailed Quality Plan intended to be employed for the work. The Quality Plan shall be provided within two (2) weeks of the Notice to Proceed, and shall include:

21.9.2.1. Inspection and Test Plans (ITP's).

21.9.2.2. Quality Assurance (QA) and Quality Control (QC) activities to be performed by the Contractor, his suppliers and sub-contractors.

16.9.2. During the course of production, the Contractor shall periodically update the Quality Plan and schedule to reflect actual conditions and shall provide two (2) copies of each such revision.

16.9.3. At the completion of the work, the Contractor shall submit a quality dossier to the Project Manager incorporating all quality related documentation including but not limited to:

16.9.6.1. Design review checklist

16.9.6.2. Material certificates

16.9.6.3. Dimension sheets

16.9.6.4. Welding inspection reports

16.9.6.5. Heat treatment reports

16.9.6.6. Electrical equipment tests

16.9.6.7. Duly completed ITPs.

16.9.6.8. Initial equipment setting

16.9.6.9. Performance and overload test results

16.9.6.10. Baseline measurements

16.9.6.11. Signed-Off Erection Method Statement

16.9.6.12. Signed-Off Commissioning Method Statement.

17 Technical Documentation

17.1 General

17.1.1. The Transnet drawing system of issue or revision identification shall be used and entered on drawings and documentation. The term "Latest Revision" shall not be used.

17.2 Format Standards

17.2.1. All Contractor furnished drawings, sketches and diagrams shall conform to the following minimum requirements:

17.2.1.1. The drawings shall be created in the AutoCAD format release 2012 or later and submitted in DWG format.

17.2.1.2. The Contractor shall store all the data package information electronically as well as in hardcopy format.

17.2.1.3. Electronic transmission of drawings and data shall also be addressed to the Project Manager via the Project Manager's document control.

17.2.1.4. The Contractor shall note software format and version on all transmissions. The preferred word processing and spreadsheet formats are "MS Word" and "Excel".

17.3 Issuance and Approvals

17.3.1. All drawings and data shall be submitted electronically with a covering numbered Transmittal Note identifying the Contract Number and list all documents included, showing the revision number of each document where appropriate and stating the purpose of the issue i.e., "Issued for Project Manager review".

17.3.2. In the event that the issued drawings and/or data are not approved by the Project Manager, the Contractor shall revise the documentation without delay and issue a new revision not later than 2 weeks after the receipt of the rejected documentation.

17.4 PLC and HMI Programs

The Contractor will provide the Programmable Logic Control (PLC) and Human Machine Interface (HMI) licensed software on the original manufacturer's discs. The customised programs shall be provided in the electronic format on CD's and in hardcopy printout.

17.5 Calculations

17.5.1. Small attachments and computer printouts that would be impractical to file on their own and lacking space for identification, shall be glued to standard blank calculation sheets.

17.5.2. All calculations shall clearly show reference to design codes, design criteria, standards, design data, etc., and conclusions shall be highlighted. All assumptions shall be listed.

17.5.3. Calculations shall be clear, legible, and concise and be set out in such a way as to be easily located, followed, and understood by others.

17.5.4. Each calculation shall carry in its heading the following information:

17.6 Installation, Operation, Maintenance and Training Manuals

17.6.1 General Requirements.

17.6.1.1. The manuals form an integral part of the Contract and shall be submitted in accordance with this specification. It is the Contractor's responsibility to supply manuals for all items of the equipment covered by this specification, which shall require installation, operation or maintenance.

17.6.1.2. The Contractor shall commence compilation of the manuals immediately upon approval of drawings. If drawing approval is not applicable, manual compilation shall commence on receipt of Order/Contract.

17.6.1.3. It is the Contractor's responsibility to ensure that all sub-orders, issued for the equipment supply covered by this Specification, highlight all the requirements for the manuals as stipulated in this Specification.

17.6.1.4. Manuals must be comprehensive and contain simple and valid procedures and instructions to form a reliable and easy source of access to all information necessary for the following functions:

17.6.1.5.1. Safety of personnel and protection of equipment during installation, operation and maintenance of the equipment.

17.6.1.5.2. Installation.

17.6.1.5.3. Commissioning.

17.6.1.5.4. Operation.

17.6.1.5.5. Maintenance.

17.6.1.5. The manuals will be used as an aid to the training of operation and maintenance personnel and should therefore make maximum use of exploded views, technical illustrations, charts, trees and tables.

17.6.1.6. The material in the manual must be presented in logical sequence.

17.6.1.7. It should be remembered that manuals will be required by three distinctly different groups engaged in separate functions:

17.7.1.7.1. The Contractor's personnel for installation and commissioning of the equipment.

17.7.1.7.2. The Transnet Port Terminals Saldanha operators of the equipment.

17.7.1.7.3. The Transnet Port Terminals Saldanha maintenance personnel and maintenance sub-Contractors.

17.6.1.8. Each of these groups will be expected to operate to a large degree independent of each other. It is therefore essential that the manuals for each of these three functions are separate or can be separated without loss of identity or completeness. Some drawings will have to be included in more than one of the installations operation or maintenance manuals to maintain their integrity.

17.6.1.9. The "Draft" submission shall allow for review by Transnet Port Terminals Saldanha and all required amendments. The manuals shall be complete and of such quality that only minor rectification work may have to be necessary to render the manuals acceptable for "Final" issue.

17.6.1.10. The Project Manager may reject reviewed manuals for non-compliance with the Specifications.

17.6.2 Relevant Content

17.6.2.1. Each manual must contain all the relevant information pertaining to the subject equipment.

17.6.2.2. Relevant data in "chart" or "table" form shall be boxed in using heavy black lines to facilitate clear reproduction. Irrelevant information to the equipment shall not be included in the manuals.

17.6.2.3. All irrelevant information that cannot be excluded shall be "boxed" and cross-hatched. The end result must not detract from the overall presentation of the manual.

17.6.2.4. Separate manuals shall be provided for installation, operation, and maintenance. Manuals for proprietary items of equipment may combine these functions in a single manual provided that each function is allocated a separate section clearly marked with a suitable divider.

17.6.2.5. Safety instructions must be included in each section of the manual where applicable.

17.6.3 Drawings and Diagrams.

17.7.4.1. Drawings and diagrams incorporated in the manuals shall be reduced to A3 size and folded twice into boundaries of an A4 size sheet.

17.7.4.2. A complete list of all drawings (by number and title) required to produce the Plant, (subject to exclusions under manufacturers' rights) shall be included. The drawings included in the manual shall be marked with an asterisk.

17.6.4 Content Requirement.

17.6.4.1. The manuals shall include:

17.6.4.1.1. Specifications and technical data for the Plant and each of its components.

17.6.4.1.2. As built general arrangement drawings of the Plant and each of its components.

17.6.4.1.3. Maintenance and lubrication instructions, which shall include but not be limited to maintenance "trouble shooting" guides and instructions for the servicing of components and proprietary items.

17.6.4.2. Preventative maintenance and lubrication instructions to include:

17.6.5.2.1. Preventative maintenance program

17.6.5.2.2. Recommended service interval.

17.6.5.2.3. Service procedures

17.6.5.2.4. Diagram showing service location.

17.6.5.2.5. List of parts, materials and tools required for each service.

17.6.5.2.6. Complete list of lubricants and their characteristics

17.6.5.2.7. Volume of lubricants required for each piece of equipment.

17.6.5.2.8. Base line data for lubricating oil characteristics for an oil sample analysis program.

17.6.5.2.9. Parts details and parts list including identification of the component such as:

- Manufacturer
- Model
- Serial Number
- Location.

17.6.5.2.10. Component cross-section and/or exploded diagram of parts, which shall include reference to a complete part number list.

17.6.5.2.11. Internal wiring diagrams where applicable.

17.6.5.2.12. Detailed instructions on how to order replacement parts, including name, address and telephone number of the component supplier or local alternative Contractor of replacement parts.

17.6.5.2.13. Repair and overhaul instructions to include detailed procedure for repair and overhaul of each component.

17.6.5.2.14. Detailed shop drawings. Information to be provided on detail shop drawings shall include but not be limited to:

- Endplay
- Backlash
- Dimensions and tolerances
- Bolt torque settings
- Pressure settings
- Other relevant data.

17.6.5.2.15. Recommended spare parts list for each component, and approximate replacement lead times.

- Operating instructions and control logic including:
- Detailed operating procedures with step-by-step instructions of the pre-operation requirements, starting, and operating procedures.
- Two (2) weather protected copies, in proper language of routine operating procedures and safety instructions shall be provided for prominent display in the operator's cab.

17.7 Manual Layout Requirements

17.7.1 Installation Manual.

17.7.1.1. **Section 1** – Introduction. This section shall state:

17.7.1.1.1. Equipment Number

17.7.1.1.2. Equipment Description

17.7.1.1.3. Machine Location.

17.7.1.2. **Section 2** – Index. This section shall include two subsections: Section Index and Detailed Index. The "Section Index" shall identify all sections of the manual against divider titles. The "Detailed Index" shall locate equipment data both by section and page numbers. Each item to which an equipment number has been allocated shall be included in this index.

17.7.1.3. **Section 3** - Equipment Function. This section Includes a brief statement of the function of the equipment within the overall Machine equipment.

17.7.1.4. **Section 4** - Installation and Commissioning. This section shall clearly detail all necessary information for the installation and commissioning including at least the following:

17.7.1.4.1. Receipt and storage instructions.

17.7.1.4.2. Safety precautions.

17.7.1.4.3. Test Certificates.

17.7.1.4.4. Special hoisting, slinging, placement, and alignment data including maximum assembly weight.

17.7.1.4.5. Pre-commissioning checks of oil/lubrication levels and types - guard placement - direction of rotation - isolation and stopping methods - protection devices and fuses to be checked - bearing preloads.

17.7.1.4.6. Pre-setting instruction for adjustable items, highlighting any dangers associated with incorrect adjustment.

17.7.1.4.7. Initial start running times - load limits - audio and visual checks, running adjustments - bearing temperature parameters - performance parameters.

17.7.1.4.8. Re-lubrication, re-torquing, re-adjustment, or any other manufacturer's requirements prior to operation.

17.7.1.4.9. Special tools.

17.8 Operation Manual.

17.8.1. **Section 1** – Introduction. The requirement is as for Section 1 - Installation Manual.

17.8.2. **Section 2** – Index. The requirement is as for Section 1 - Installation Manual.

17.8.3. **Section 3** - The requirement is as for Section 1 - Installation Manual.

17.8.4. **Section 4** – Operation. This section shall clearly detail in logical sequence, all the necessary information for the safe operation of the equipment and shall include at least the following:

17.8.4.1. A full technical specification for the Plant.

17.8.4.2. A detailed description and explanation of function of all operator controls.

17.8.4.3. Safety precautions.

17.8.4.4. Pre-start and start-up procedures.

17.8.4.5. Shutdown procedures.

17.8.4.6. Emergency stop facilities.

17.8.4.7. Upper and lower operating limits.

17.8.4.8. Meter readings - flow rates - problem indications.

17.8.4.9. Failure or emergency procedures.

17.8.4.10. Relevant reduced drawings - general arrangements, assemblies and electrical schematics.

17.9 Maintenance Manual.

17.9.1. **Section 1** – Introduction. The requirement is as for Section 1 - Installation Manual.

17.9.2. **Section 2** – Index. The requirement is as for Section 1 - Installation Manual.

17.9.3. **Section 3** - The requirement is as for Section 1 - Installation Manual.

17.9.4. **Section 4** – Maintenance. This section shall clearly detail all the necessary information for the safe and efficient maintenance of the equipment and shall include information on, at least, the following:

17.9.4.1. A full technical manufacturer's specification.

17.9.4.2. A technical description of all components.

17.9.4.3. A full parts list, cross-referenced with section/exploded view drawings and illustrations.

17.9.4.4. Detailed maintenance instruction for all components and including repair, overhaul, change out and installation procedures.

17.9.4.5. Recommended inspections and frequencies.

17.9.4.6. Electrical data and drawings.

17.9.4.7. Lubrication schedules.

17.9.4.8. Logical Troubleshooting charts, in fault tree diagram form, that list potential failures and methods to correct them. Associated times to perform the correction as appropriate.

17.9.4.9. Special Tools.

17.10 Training Manual.

17.10.1. A comprehensive training manual with pictures and text shall be provided to enable Transnet Port Terminals Saldanha Training Department to compile the final training manuals for operator training, including first line maintenance.

17.10.2. Pictures must be in a digital format, preferably in a JPEG high resolution format, supplied on a DVD to enable Transnet Port Terminals Saldanha Training Department to edit their training content.

17.10.3. The pictures supplied of the part must have a description as well as a location of the respective on the machine.

17.10.4. The pictures must also be provided with the following information, namely:

17.10.4.1. Explain the function of the part and what maintenance is required to prevent pre-mature failure.

17.10.4.2. The maintenance intervals for the respective part (minor and major).

17.10.4.3. Describe what maintenance personnel have to maintain, in order to prevent pre-mature failure of the part.

17.10.4.4. Provide a maintenance methodology to follow when maintaining the part.

17.11 Manufacturer's Data Report

17.11.1. The MDR shall be include but not be limited to:

17.11.1.1. Signed-off Inspection and Test Plans
17.11.1.2. Marked-up As-built drawings.
17.11.1.3. Details of Non-Conforming Items/Correction Actions/Concessions
17.11.1.4. Dimensional Inspection Reports
17.11.1.5. Baseline data on measured stress, vibration, thermal imaging, and other measurements taken during testing.

17.11.2. The Contractor shall be responsible for compiling the MDR in a single volume, bound in an A4 size 3-ring binder and indexed. The Contractor shall also be responsible for obtaining the relevant documentation from his sub-constructors and including this documentation in the MDR.

18 Spare Parts

18.1 Requirements

The Contractor shall submit detailed lists, pricing, and delivery times of all recommended spare parts for:

18.1.1. Commissioning and start-up spares required.

18.1.2. Twelve (12) months of operation spares required.

18.2 Strategy

18.2.1. The determination of spare parts shall be broken down into two (2) categories:

18.2.1.1. Wear parts

18.2.1.2. Strategic/critical spares.

18.2.2. Strategic spare requirements shall be proposed by the Contractor.

18.3 Spare Parts Listing

18.3.1. The spare parts list shall contain the following information:

18.3.1.1. Part identification, model and/or serial numbers and description in sufficient detail including size, weight and material

18.3.1.2. Quantity of like parts of each model number of the equipment

18.3.1.3. Recommended quantity of each spare part

18.3.1.4. Unit cost of each part including the price of sets and pairs as required.

18.3.1.5. Delivery lead time for each item

18.3.1.6. Total quantity of items (instrument, pumps, motors, etc) supplied

18.3.1.7. Supplier's name, address, company designation and other information

18.3.1.8. Supplier's designation (shop order numbers, etc) if applicable

18.3.1.9. Total price of all spare parts recommended.

19 Environmental Constraints and Management

19.1. All work is to be conducted in accordance with the principles of the National Environmental Management Act, 1998 (Act No. 107 of 1998) but not limited to other applicable regulations as well as acceptable environmental good practices. In addition, the Contractor is expected to comply with all applicable Municipal bylaws and associated permits, licenses, etc. held by the iron ore Terminal. The following documents included in the Annexures of the works information provide the minimum acceptable standards that shall be adhered to:

19.1.1. TIMS 002 Policy Commitment Statement

19.1.2. TIMS Construction Environmental Management Plan

19.1.3. TIMS Contractor Environmental and Sustainable Specification Guideline

19.2. The above requirements shall be applicable to the main Contractor and its service providers. The Contractor must comply with all the requirements of the Transnet Integrated Management System (TIMS) Procedures. These procedures must strictly be adhered to and shall be monitored.

19.3. The Contractor must sign the Declaration of Understanding as a commitment to abide with TPT Environmental Governance Framework and Project Environmental Specifications. Sufficient

environmental budget must be allocated to meet all the project environmental requirements for the duration of the contract.

19.4. The Contractor shall perform the works and all construction activities within the Site and Working Areas having due regard to the environment and to environmental management practices as more particularly described within the TIMS procedures. The TIMS procedures describe in detail the roles and responsibilities of the project team with respect to Environmental Management. In addition, it describes the main requirements that the Contractor must comply with during the construction phase to ensure that the environment is considered, negative impacts are avoided/minimised and positive impacts are encouraged.

19.5. The TIMS procedures describe the minimal acceptable standards for environmental management for a range of environmental aspects commonly encountered on construction projects and sets environmental objectives and targets, to which the Contractor observes and complies.

19.6. The TIMS procedures describe the specific environmental standards applicable to the works (the site and the working areas) as required by the relevant project environmental authorisations (EA's).

19.7. The Contractor will be required to submit an environmental file to TPT post award of tender. Reference to the TIMS procedures for requirements of the environmental file submission. A Site access certificate shall not be granted until the environmental file has been approved by the Employer.

19.8. The overarching obligations of the Contractor under the Contractors Environmental Plan before construction activities commence on the Site and/or Working Areas is to provide environmental method statements for all construction operations at the Site and/or Working Area by the Contractor and if requested by the Construction Manager and to comply with the following:

- The Contractor shall identify the kinds of environmental impacts that will occur because of their activities and accordingly prepare separate method statements describing how each of these impacts will be prevented or managed so that the standards set out in the TIMS procedures are achieved. The method statements will be prepared in accordance with the requirements set out in the Contractors Environmental Plan. These method statements shall form part of the environmental file. The Contractor shall ensure that his management, foremen and the general workforce, as well as all suppliers and visitors to Site have attended the Environmental Induction Programme prior to commencing any work on Site. If new personnel commence work on the Site during construction, the Contractor shall ensure that these personnel undergo the Environmental Induction Programme and are made aware of the environmental specifications on Site. All associated costs of the above, including waste removal and disposal is for the cost of the Contractor.

19.9. Where required, one of the first actions to be undertaken by the Contractor shall be to erect and maintain a temporary fence along the boundaries of the Site and Working Areas as applicable, and around any no-go areas identified on the layout plans.

19.10. The Contractor shall be responsible for rehabilitating and cleaning all areas to the satisfaction of the Project Manager or Environmental Officer as detailed in the TIMS procedures. Sufficient environmental budget must be allocated to achieve this including all environmental

requirements for the project for the duration of the contract. Compliance to the Atmospheric Emissions License requirements must be adhered to.

19.11. The Contractor must ensure that its Sub-contractors comply with the TIMS Environmental procedures. Costs for waste removal and disposal are for the account of the Contractor.

20 Project Execution

20.1 Strategy

20.1.1. The project has five (5) distinct phases of execution, namely:

- Project Definition and Set-up phase
- Design phase (for work not completed)
- Procurement and fabrication phase
- Construction phase
- Commissioning, handover, and close-out phase.

20.1.2. TPT's project team will fulfil the role of Project Manager and Supervisor. The full extent of the Project Management body of knowledge will be applied during all phases of execution, focussing on the following areas:

- Scope management
- Integration management
- Time (schedule) management
- Cost management
- Risk management
- Human resource management
- Quality management
- Communication management.

20.1.3. Procurement and Contract management will be performed by the Contractor. All contract documentation for construction contracts will be based on the NEC3 Engineering and Construction Contract options A. All contract documentation, including measurement and payment, management of progress, management of early warnings and variation orders will be controlled by the Contractor and supported by Transnet's enterprise management software (SAP).

20.2 Project Definition and Set-up phase:

The set-up activities required to be prepared for the delivery of the project as part of the Contractor's scope of services are as follows:

20.2.1. Develop baseline schedule for the entire project covering all project packages, which shall be configured around the program requirements indicated by latest proposal submitted by the

Contractor at tender stage. This schedule will be further developed once all contracts are awarded and the schedules as prepared by the Contractor's sub-contractors are submitted.

20.2.2. Develop a baseline project cost model which shall include a Work Breakdown Structure (WBS) which shall be used to measure cost and schedule progress, based on cost estimation work completed to date by the Contractor.

20.2.3. Develop scope of works schedules including detailed battery limits, tie-ins, and interface requirements between the various contracts on the project.

20.2.4. Compile a Risk Management Plan in conjunction with the Transnet Risk Manager.

20.2.5. Development supplementary management plans to support the Project Execution Plan, namely:

- Health and Safety Management Plan
- Quality Management Plan
- Project Controls Management Plan
- Document Management Plan
- Engineering Management Plan.

20.3 Managed Contractor's Procurement, Fabrication, and Construction Phases:

20.3.1. The key focus of the Contractor's project team during these phases is to actively manage the Managed Sub-Contractor's project progress and quality for adherence to project schedule, cost, quality and SHEQ objectives.

20.3.2. Once the Contractor establishes on site in Saldanha Bay, the Contractor shall mobilize the Project Manager, Construction Manager, discipline Engineers, Quality Control supervisor, Site Administrator, Health and Safety manager, and a Project Controls lead to site. The site-based team shall co-ordinate the site construction activities of the various site based sub-contractors to avoid delays to the project completion, and to eliminate possible interference with the Transnet Port Terminals Saldanha operations.

20.3.3. Discipline Engineering resources will be mobilised to site during the construction phase to supervise, manage, and inspect work performed by the various construction teams which form part of the Managed Contractor's construction and erection contingent.

20.3.4. Where deviations from requirements are detected in the activities performed by the Managed Contractor's sub-contractors, the Contractor's project team will issue appropriate directions for corrective actions to be taken and will apply prudent management practices to minimize detrimental impacts on project outcomes.

20.3.5. Deviations detected in the activities performed by other consultants and contractors outside the Contractor's scope of management will be brought to the attention of TPT for corrective action to be taken.

20.3.6. The Quality Assurance Management of off-site procurement, fabrication work, and on-site construction activities must be described in the project Quality Management Plan to be

submitted by the Contractor. Critical activities or components requiring inspection will be determined during the design review process and initial review of the Managed Contractor's Inspection and Test Plans (ITP's) and Quality Control Plans (QCP's).

20.4 Commissioning, Hand-Over and Close-Out Phase:

The site-based Contractor's project team will manage and co-ordinate all testing, commissioning, and training activities that will be carried out by the respective construction sub-contractors. This will include:

20.4.1. Preparation of an overarching testing and commissioning plan for integration of the Contractor's testing and commissioning plans with Transnet Port Terminals Saldanha operating environment.

20.4.2. Continuous review of the Contractor's detailed testing and commission plans.

20.4.3. Manage the overall testing and commissioning process such that this is under the control of the Managed Contractor and is properly co-ordinated with Transnet Port Terminals Saldanha's operations for operation of the plant overall and for facilitating involvement of Transnet Port Terminals Saldanha's operations personnel as part of operational readiness training.

20.4.4. Witnessing the actual commissioning tests that will be carried out by the Contractor's sub-contractors and ensure that the performance of the machines comply with the specified parameters.

20.4.5. Co-ordinate the operational readiness training that will be delivered by the Managed Contractor training personnel.

20.4.6. Reviewing all hand-over documentation including drawings, operating and maintenance manuals and critical equipment settings lists etc., which shall include red-lining of drawings for back-draughting by the Managed Contractor's design office to produce the final as-built documentation.

20.5 Constraints

The execution of the project shall be subject to the following constraints, which shall be managed by the project team within the limitations placed upon them by these factors:

20.5.1. Existing operations:

No site activity performed by any of the Contractor's sub-contractors may restrict Transnet Port Terminals Saldanha off-loading activities, unless it is a planned shutdown arranged through the proper procedures with the Transnet Port Terminals Saldanha operational team. The management of the tie-ins with the existing installation of the electrical works, controls, and instrumentation with the Terminal Control Sysytem, will be co-ordinated by the Transnet Project Manager with the assistant of the Contractor.

20.5.2. Environmental:

The management of the site activities shall at all times consider the preservation of the environment, and all steps shall be taken to manage any environmental risk during construction.

20.6 Dependencies

The successful commissioning and handing over of the Plant and supporting infrastructure are dependent on the following related activities:

20.6.1. The integration of the tippler PLC controller with the Terminal Control System (TCS).

20.6.2. The co-ordination between the various designers and sub-contractors responsible for the above-mentioned works, for timely completion of the works.

20.7 Project Management

20.7.1. The Contractor will provide with his submission a comprehensive organogram with all the responsible disciplines along with the Curriculum Vitae of all the disciplines which will be involved.

20.7.2. The Contractors Project Manager will ultimately be responsible for the successful delivery of the project. He will manage the project team assigned to the project to execute the various disciplines successfully.

20.7.3. The Project Manager will initially during the set-up and design phases be based in the Contractor's home office, and travel to the site location for occasional site meetings and reporting sessions with the stakeholders.

20.7.4. The Contractor will be responsible to manage pre-compiled procedures, guidelines, document templates, and work instructions to guide the project team through different stages of the project and perform work of a standard and uniform nature whenever required to act in response to a specific challenge.

20.7.5. The Contractor Project Manager will be the single responsible person and point of contact on behalf of the Contractor.

20.8 Construction

20.8.1 Construction Organisation and Responsibilities

20.8.1.1. The Contractors construction management organisation must be structured to supervise the work of the Contractor's sub-contractors and to co-ordinate the various other contract construction activities to deliver the total project scope. The full extent of the construction organization will be documented in the Contractor's Construction Management Plan, a document to be developed during the course of the early stages of the project once the Contractor has been appointed.

20.8.1.2. A Hazard risk identification session prior to the commencement of construction and erection shall be conducted and facilitated by the Contractor risk manager. The objective of this session

shall be to identify all risks associated with the construction and erection on site, and to have a risk management plan in place to ensure that all risks are acknowledged and addressed.

20.8.2 Work Package Management

The Contractor's Construction Manager will have staff designated to supervise construction activities, and supervisors will be appointed in terms of the **NEC3: Engineering and Construction Contract Option A**.

20.8.3 Site Administration

Contractor's supervisors will be co-ordinated by the Contractor's Project Manager and for site management and related aspects report to the Construction Manager.

20.8.4 Construction Project Procedures

20.8.4.1. The Managed Contractor will provide the majority of the construction procedures and documents applicable to the construction of the Plant and all its associated mechanical, electrical, control, instrumentation, and dust extraction infrastructure. The procedures and documents that will be provided to the TPT representative for review and approval shall include the following:

20.8.4.1.1. Erection Method Statements for the completion of the train unloading station and balance of plant.

20.8.4.1.2. Erection drawings and Bills of Materials

20.8.4.1.3. Electrical installation scope of works

20.8.4.1.4. Lift studies including associated method statement and risk assessments.

20.8.4.1.5. TIMS Contractor Compliance File

20.8.4.1.6. List of specialist resources required during the construction and installation.

20.8.4.1.7. Erection company/s site organogram and applicable labour resource plans and procedures.

20.8.4.2. The Construction Manager will ensure that the employees of the Contractor will comply with Transnet Site Specific SHEQ procedures for the duration of the erection and commissioning phases.

20.8.5 Constructability Plan

A constructability plan will be compiled in close co-operation with the Contractor's Project Manager, Engineering Manager and appointed Erection Sub-Contractor Site Manager. The constructability plan will be reviewed by the Project Manager in conjunction with Transnet Port Terminals Saldanha Operations and Engineering.

20.8.6 Security and Access Procedures

Security and access procedures will be in accordance with Transnet Port Terminals Security and Access procedures. The Contractor construction manager will ensure that the sub-contractors comply fully with Transnet Port Terminals requirements.

20.8.7 Quality Assurance, Inspection and Testing Procedures

Quality Assurance, inspection and testing procedures will be in strict compliance with the specified standards, procedures, and specifications listed in this document. The Contractor's construction manager with assistance from the Contractor's discipline engineers and supervisors will sign-off important milestones in accordance with the contract specifications.

20.8.8 Field Engineering Including As-Built Drawings

The Contractors construction manager will ensure that the Contractor updates drawings with the latest changes as erection of the different structures are completed. It's expected that the Contractor will place on site relevant engineers authorized to red-line drawings for revision by the Contractor's Engineering Office. All field engineering decisions will be reviewed and approved by the Contractor's design engineers before implementation. The TPT discipline engineers will ensure that the field engineering has been approved and signed-off by the Contractor's Engineering Office before its implementation.

20.8.9 Completion and Hand-Over

20.8.9.1. Completion of erection and hand-over of each section of work to the Contractor's commissioning team will only take place once all the steps identified in the erection method statements have been properly followed and signed-off by all (Site Engineer, Erection sub-contractor Site Manager, Erection sub-contractor Quality Assurance & Control Supervisor, TPT Project Manager and Supervisor).

20.8.9.2. Hand-over of the different section of the Works to the Contractor commissioning team will only happen once the Contractor commissioning team has signed off approval of the completed erected plant and all the erection defects list items have been rectified and accepted in Principle by the Transnet Project Manager.

20.9 Safety

20.9.1. All project personnel shall comply with the project's commitment to a safe workplace with the focus on ZERO HARM.

20.9.2. Transnet Port Terminals Saldanha is the owner/client as referenced to in the Occupational Health & Safety Act and Regulations, 85 of 1993 (OHS Act).

20.9.3. In relation to SHEQ issues, Transnet Port Terminals Saldanha Tippler 3 Project Director appoints the Project Manager for the project with authority to exercise such authority as is necessary in conformity with the OHS Act.

20.9.4. The Contractor's primary legal obligations are to:

20.9.4.1. Comply with all relevant SHEQ legislation.

20.9.4.2. Comply with all specific Transnet Port Terminals Saldanha policies.

20.9.4.3. Comply with all contractual requirements for Health and Safety, including ISO 45001: 2018 Occupational Health and Safety Management Systems - Requirements.

20.9.4.4. Comply with relevant industry standards and codes of practice contingent with the scope of works.

20.9.4.5. Consider the lessons learned from past projects and apply these to the current project where applicable.

20.9.5. A full-time, site-based Health and Safety manager will be mobilized to site once construction activities by the Contractor commence on site. The responsibilities of this SHEQ manager shall be as follows:

20.9.5.1. Ensure that all contract personnel complete the required site safety inductions; in accordance with TPT SHEQ induction.

20.9.5.2. Ensure that all site-based staff have completed site entry medical examinations.

20.9.5.3. Ensure compliance by all site-based contractors of OH&S legislation, site Health and Safety regulations, safe work procedures, and SHEQ best practice processes.

20.9.5.4. Perform regular SHEQ audits on site-based contractors.

20.9.5.5. Ensure that H&S statistics are regularly submitted for reporting purposes to the Project Manager.

20.9.5.6. Ensure that all sub-contractors submit Method Statements and Risk Assessments of all activities identified in the SHEQ Management Plans for review and approval prior to commencement of the activity.

20.9.5.7. Ensure that incident reporting, notifications, and investigations are done in accordance with Transnet Port Terminals TIMS 013 procedure.

20.9.5.8. Conduct regular Health and Safety awareness campaigns amongst all contract personnel on site.

20.9.5.9. Ensure that all legal appointments in terms of legislation are in place.

20.9.5.10. Ensure that contractors have daily toolbox talks, SHEQ review meetings, and safety talks.

20.9.5.11. Attend HAZOP and Hazard risk identification sessions with sub-contractors when required.

20.9.5.12. Ensure that injury management plans are in place at all work locations.

20.9.5.13. Supervise regular testing on site for alcohol and illegal substances of all site-based staff.

20.9.5.14. Ensure that all contractors maintain site records of SHEQ documentation.

20.9.5.15. Ensure that all contractors are aligned with Transnet Port Terminals Saldanha's emergency response plans and evacuation procedures.

21 Project Controls

21.1 Document Management

21.1.1. The Contractor document controller is responsible for the registration, issue, distribution, filing and subsequent reporting of all project deliverables produced on the project relating to the scope of work executed by the Contractor that requires revision and version control.

21.1.2. The document controller's specific duties on the project shall be as follows:

21.1.2.1. Manage the distribution, review update, revision control, and final issuing for use of all Aurecon internally produced deliverables including any deliverables that require distribution monitoring.

21.1.2.2. Collate, archive, and distribute reference documents.

21.1.2.3. Collate, archive, and distribute supplier/contractor's documentation (where relevant).

21.1.2.4. Collect, archive, and distribute technical and progress reports (weekly/monthly/annually, etc.).

21.1.2.5. Re-production and subsequent distribution of technical documents for use by site staff.

21.1.2.6. Collect, archive, and distribute to originator's (TPT) and any other third-party review comments.

21.1.2.7. Document Distribution to project members, both internally and externally, including TPT, Contractors sub-contractors and Contractors Consultants.

21.1.2.8. Any associated Document Control reporting actions throughout the duration of the project.

21.2 Project Reporting

Followed to determine overall project progress.

21.3 Baseline Management

Three (3) different baselines are applicable to the project.

21.3.1. **Initial Baseline**. This baseline, with its associated budget and schedule is the agreed baseline at the start of the process.

21.3.2. **Approved Baseline**. The approved baseline consists of the initial baseline plus any approved changes with its associated cost and scheduled impact.

21.3.3. **Control Baseline**. The control baseline consists of the approved baseline plus any unapproved changes with its associated cost and scheduled impact.

21.3.4. **Re-baseline**. A re-baseline has the effect of re-setting the Approved baseline to a new initial budget, thereafter one will again have approved and unapproved changes which creates new approved and control baselines.

21.4 Change Types

21.4.1. Various types of changes can be identified. Typically, the following Change Types will originate through the course of a project (list is not exhaustive):

21.4.1.1. Budget Shifts.

21.4.1.2. Scope Changes.

21.4.1.3. Technical Changes.

21.4.1.4. Schedule Changes.

21.4.2. The Contractor will then assign an appropriate engineering resource to the change request to perform a change impact assessment – all possible aspects of the impact will be assessed.

21.4.3. The Contractor will then issue the Change Request with all supporting documentation to TPT.

21.4.4. A TPT Change Committee will review the assessment findings; either rejects it, refers for further assessments, or recommends the change to Transnet Port Terminals Saldanha.

21.4.5. If the change is approved by Transnet Port Terminals Saldanha, the Contractor will then be requested to generate a Variation Order and issue for implementation. The Contractor and TPT will both be responsible to update the project Change Register.

21.4.6. Once changes are formally approved a Contract Variation Order or Compensation Event (process as defined in the Contract) will be registered (if required by the change itself) by the TPT Commercial Administrator to formally complete the Commercial aspect of the Change Management Process.

21.5 Issue Management

21.5.1. An "Issues Register" schedule will be maintained by the Contractor Project Manager and used to track the progress with resolving issues of importance which require resolution and actions to be taken. The sources of issues to be logged in this register can be any of the following:

21.5.1.1. Action items from progress meetings.

21.5.1.2. Instructions from the Project Manager raised in formal meetings or via other communication methods.

21.5.1.3. Issues noted during site inspections, surveillances of Contractors' activities, or documentation.

21.5.1.4. Health, Safety, or Environmental issues noted by any team member requiring further action.

21.5.2. Contractor resources will be allocated to each issue requiring further action and will be prioritized in accordance with the possible impact it may have on the project if not resolved by the deadline noted. The Issues Register will be revisited at each progress meeting and updated by the Contractor for distribution to TPT.

21.6 Project Control Processes

The following project controls processes will be used by the Contractor:

21.6.1. Engineering progress measurement: Manage the engineering process by breaking the effort down into work packages and deliverables. Progress percentages will be attributed to each deliverable to obtain an accurate measurement of overall progress and earned value performance.

21.6.2. Planning and Scheduling: Primavera P6 R8.3 software is a widely used tool for planning projects and programs, and a software system that is compatible is prescribed for use on this project.

21.6.3. Document Control: One-drive Microsoft.

22 Progress Measurement and Performance

22.1. Progress will be tracked at task level on the various schedules. As activities are completed progress per activity will be accrued, which will roll up to summary level, and eventually to Work Package level.

22.2. The following sections deals with overall progress at a rolled-up level and also provides guidelines for measurement at a detailed level should the need arise.

22.3 Overall Project Progress

Total project physical progress will bring together the project elements of Engineering, Procurement, Fabrication, Demolishing, Construction and Commissioning as a single measure even though work of a differing nature and complexity is being undertaken by various functions and entities.

22.3.1. Planned installed works packages curves will be generated by the quantities in the Control Budget with dates in the Baseline Schedule.

22.3.2. Actual installed works packages will be extracted from a combination of the installation contractors, quantity surveyors, project engineers, construction supervisors and project controls staff depending on requirements of the project.

22.3.3. Actual progress within the individual works packages will be measured as a percentage of the equivalent installed quantities over budgeted quantities.

22.4 Commissioning Progress

22.4.1. Overall commissioning progress shall be based on the ratio of the number of test sheets completed divided by the total number of test sheets for the commissioning pro-rated to the activity costed weight.

22.4.2. Test sheets shall be grouped by systems to be commissioned in order to report system completion.

23 Reporting

23.1 Calendar

The project reporting calendar key dates include the information in **Table 24** below.

Table 7: Reporting timetable

Event	Date
All month end contributions issued to TPT PM	Last working day of each month
Draft monthly report available for internal review	5th working day of each month
Final monthly report issued to Transnet Port Terminals Saldanha	7th working day of each month
Period cut off	25th day of every month
Invoice cut off	25th day of every month
Weekly Report information issue to TPT PM	Issued by COB every Monday
Weekly reports	Issued to Transnet Port Terminals Saldanha by COB every Tuesday

23.2 Monthly Progress Report

23.2.1. The Monthly Project Progress Report involves the collation of baseline data and distributing performance information to stakeholders. The report will be distributed by the Contractor Project Manager on a monthly basis and will require input with regard to cost, progress, issues, health and safety, quality, and risks from all Discipline Leads and Contractors sub-contractors. These inputs will be requested at regular intervals as agreed, but additional requests may be made on an ad-hoc basis.

23.2.2. A detailed monthly report will be published by COB Day 7th working day of each month and highlights (not limited to, sections only included when appropriate):

- Executive Summary
- Project Management
- SHEQ Management
- Engineering Management

  - Project Interfaces and Boundary Limits.
- Project Controls
  - Cost.
  - Schedule.
- Quality Management
- Risk Management
- Fabrication and Manufacturing
- Construction
  - Permits and Approvals.
- Commissioning.

23.3 Weekly Report

A weekly report will be published by COB Tuesdays and highlight:

- Safety
- Schedule – Milestone Reporting
- Activities (this week and look ahead).

23.4 Formal Health and Safety Reporting

TPT and the Contractor H&S officers will agree the deliverables and reporting that will take place as well as the formats thereof.

23.5 Project Meetings

The following recurring meetings will be held on the project:

Project Progress Meetings are scheduled between the Project Teams of TPT and Transnet Port Terminals Saldanha. These meetings may involve the Contractor and/or other Consultants.

23.5.1. TPT Internal Monthly Progress and Review Meetings

At these meetings the focus will be on obtaining and confirming information provided by the Contractor Project Manager for compilation of the Monthly Progress Report for the period including safety, progress, status of deliverables and detailed cost reports with s-curves, and project costs showing planned, earned, forecast and actual costs, cash flow indication for the next period. Review meetings will assess the status of the project and decide on any action that needs to be taken, if any.

23.5.2. Health and Safety Meetings

Once site has established various H&S meetings will take place on a weekly and monthly basis, including alignment meetings with TPT and the Contractors sub-contractors.

23.5.3. Formal Design Review Meetings

Formal reviews with the Contractors Project Team will be scheduled at milestones or critical project stages in line with the relevant procedures.

23.5.4. Contractors' Sub-Contractor's Kick-Off Meetings

Contractors' sub-contractor's kick-off meeting will be carried out with prior to work commencing for all new Contractors. The kick-off meeting will:

23.5.4.1. Introduce TPT team members to the Contractors.

23.5.4.2. Define lines of communication and levels of authority; and

23.5.4.3. Confirm the scope of the project, design basis, parameters, and performance expectations.

23.5.5. Site Meeting with Contractor

Site meetings will be held between the Contractor and TPT in accordance with the Contractor's Construction Management Plan.

23.5.6. Steercom Meetings

These meetings will be held every 6 weeks to discuss high level issues.

24 Project Quality Assurance

24.1 Project Quality Management Plan

The Quality Management services will be provided by the Contractor during the design, fabrication and construction phases of the Project will cover the following:

24.1.1. Review of the designs by the Contractor for compliance with all specified quality standards and specifications.

24.1.2. Review of the designs by the Contractor for compliance with all statutory requirements.

24.1.3. Preparation of a Project Quality Management plan integral to the Project Execution Plan (PEP).

24.1.4. Review and assess the Contractor's quality plan, inspection, and test plans (ITPs), QCP's and other key quality related documentation.

24.1.5. Perform any supplementary audits on the Quality Management systems and processes if necessary.

24.1.6. Review the quality audits performed by the Contractor on their key suppliers, sub-contractors, and manufacturers, and perform additional reviews of the quality management processes followed by these entities if necessary.

24.1.7. Once QCP's are submitted, determine which sections of the works will be subjected to "Hold" and "Witnessed Inspections" on the most cost-effective manner. The value of the section of works will be taken into consideration when these decisions will be made, and attention will be focused on the high value, long lead critical components which have been identified during the Risk Management process as those items which have the largest impact and probability to affect the project outcome negatively.

24.1.8. Facilitate the identified Quality Control surveillance interventions as required during the manufacturing and construction phases in accordance with the QCP's submitted by the managed Contractor and agreed.

24.1.9. Submit to TPT details of the 3rd party inspection individuals to be used for selected quality control surveillance inspections. These individuals, once approved by TPT, will be utilized to perform selected Quality Control inspections at the premises of key component suppliers and manufacturers to ensure that quality management processes are followed, as well as to perform random sampling testing and surveillance according to the approved QCP for the particular section of the works.

24.1.10. The abovementioned surveillance inspections will be done on a cost-efficient basis, and duplication of surveillance activities will be avoided.

24.1.11. Should non-conformances be identified, these will be recorded in a register by the Contractor's Quality Manager with follow-up actions consisting of either a corrective action plan submitted by the originator of the non-conformance, or the submission of concession application for consideration. The review of a concession will entail the submission of the concession in the format as described in the Contractor's Quality Management Plan, and review by TPT of the proposed deviation for final approval or rejection.

24.1.12. Site quality control during construction will be done by the Contractor's discipline engineers on site, assisted by the Contractor Quality Lead where required.

24.1.13. Liaise with the Contractor's sub-contractor's QA/QC personnel to ensure compliance with the agreed quality management systems.

24.1.14. Ensure that Manufacturer's Data Records are submitted and finally included in the equipment data books to be compiled by the Contractor at the end of the project.

24.1.15. Control the release for shipment of equipment by authorizing release certificates, this will be subject to TPT release.

24.2 Review and Audits

24.2.1 Vendor Quality Audits

24.2.1.1. TPT will review the outcome of the Quality Management system audits done on the quality management systems in place of the preferred equipment suppliers, major vendors and fabricators which will be employed on this project by the Contractor.

24.2.1.2. Should any issues require review or assessment, the TPT Quality manager will issue a report on the outcome to the Contract Project Manager. A decision will then be made between the

two parties on further auditing requirements and/or corrective actions to be taken by the Contractor Project Manager on the preferred equipment suppliers, major vendors and fabricators which will be employed on this project.

24.2.1.3. These audit results will be scrutinized for compliance with acceptable best practices and specific project requirements, as well as compliance with TPT and Transnet standards of Quality management. Should further audits or corrective actions be required, the Contractor will be notified to take the necessary step to ensure alignment and compliance at his own cost.

25 Transition to Operations

25.1 Approval Criteria

The approval criteria to signify handover to Transnet Port Terminals Saldanha will be specified in the Commissioning and Hand-over plan to be prepared by the Contractor and submitted to TPT for review and approval. The metrics to be recorded to confirm compliance with the specified performance criteria, the methods of measurement, and the duration of tests shall be as specified in the engineering technical specifications that form part of the Contract between Transnet and the Managed Contractor. Concessions to the recording and measurement durations will only be considered if operational requirements limit the full duration of the testing to determine if specified performance has been achieved, or if the feed rate of material required to prove compliance with capacity specifications cannot be achieved.

25.2 Hand-Over

25.2.1. On completion of the tests as specified and agreed in the Commissioning and Hand-over Plan to be prepared by the Contractor, the Contractor shall supply completion test certificates and such prescribed statutory documents as are required certifying that the Plant is in complete working order and that all working parts have been lubricated according to manufacturers' instructions.

25.2.2. The Contractor's work shall be considered acceptable upon demonstration of conformance to the Technical Specifications and Standards contained in the Contract, and its suitability for the commencement of commercial service and that the performance tests have been successfully completed.

25.2.3. The TPT Construction Manager will ensure that all relevant pre-commissioning and commissioning activities have been successfully completed before presenting the Plant to Transnet Port Terminals Saldanha Operations for approval.

25.3 Training

Training shall be as specified in the technical specifications contained in the Contract, and shall consist of the following:

25.3.1 Operational Training

25.3.1.1. The Contractor shall train selected Transnet Port Terminals Saldanha operational personnel during Commissioning and Performance testing to operate the Plant during load conditions

and certify the level of satisfactory competency on completion. Training will consist of theoretical; classroom-based training, as well as hands-on practical operational training.

25.3.1.2. Six (6) sets of the operational training manual shall be compiled by the Contractor for distribution to and retention by the Transnet Port Terminals Saldanha operators.

25.3.2 Maintenance Training

The Commissioning Engineers from the Contractor shall train Transnet Port Terminals Saldanha maintenance staff in all technical maintenance aspects of the respective Plant. Six (6) sets of the full maintenance training manual shall be compiled for distribution to and retention by the Transnet Port Terminals Saldanha maintenance teams.

25.3.3 Operational Support

The defects liability period shall be 12 months from date of handover to Transnet Port Terminals Saldanha. For details of the operational support to be provided by the Contractor during the defect's liability period, refer to the Contract.

25.3.4 Operational Readiness

1.1.1.1.1. At least 3 months prior to commencement of commissioning, Transnet Port Terminals Saldanha shall nominate the Operational Readiness team consisting of the following:

31.3.4.1.1. The operators that will be operating the Plant.

31.3.4.1.2. The maintenance team responsible for planned and emergency maintenance of the Plant.

31.3.4.1.3. Any management or engineering team members involved in planning or management functions.

25.3.4.1. The Operational Readiness team shall during the period leading up to commissioning, participate in the project execution activities as much as possible, to ensure that the team becomes familiar with the technical aspects of the new Plant. The team shall also shadow the project commissioning team during commissioning and hand-over to witness the operations and performance of the Plant.

25.3.4.2. Transnet Port Terminals Saldanha will nominate from the ranks of the Operational Readiness team those members that will be trained by the Contractor.

26 Project Close-Out

26.1 Project Close-Out Review

26.1.1. The Transnet Project Manager shall arrange the project close-out review in conjunction with the Contractor Project Manager prior to final completion of the commissioning and hand-over. The objective of the project Close-Out Review is to achieve total project closure in a controlled and organised manner, following hand-over of the completed works. This will ensure that all

accountabilities relating to the project are either discharged or handed over to Transnet Port Terminals Saldanha operations as appropriate.

26.1.2. The scope of the Close-Out Review will include the following activities:

26.1.2.1. Review the efficiency of the project in meeting the original time, cost, and resources targets as set during the planning phase.

26.1.2.2. Record and communicate any lessons which can be beneficial (to either or both Transnet Port Terminals Saldanha and the TPT Project Management Team) for future projects.

26.1.3. Ensure that all project documentation (i.e., Deliverable-Documents, Reports, Quality Files, As-Built Drawings, and Training Manual, as appropriate) have been submitted and accepted, and that copies thereof have been properly archived.

26.1.4. Ensure that transfer of control from the Project Team to the Owner (i.e., operations) is carried out smoothly; it covers (and should address any pertaining to) project aspects such as conformance to quality requirements, operational readiness on the part of the Owner, legal accountability. In a nutshell, this activity concerns itself with two (2) items:

26.1.4.1. Extent to which the completed Plant is "fit-for-purpose", and

26.1.4.2. Readiness of the Owner to take control of the completed facility.

26.1.5. To establish the extent to which engineering designs and construction works have satisfied operational requirements, the Project Team will conduct a Technical Review, following Handover and Approval.

26.1.6. Ensure that all supplies and services have been delivered as per orders and contracts, and that the TPT Contracts Administrator along with the Contractor Project Manager has verified that that all claims are documented and resolved, that final payments have been made, and that all project accounts are reconciled and formally closed.

26.2 Project Close-Out Report

The Project Close-Out Report will be drafted in-line with Transnet requirements. The project Close-Out Report will include the following headings:

26.2.1. Outstanding Risks, Issues and Deliverables: Any risks, issues, and deliverables that will be identified as outstanding at the time of project Close-Out shall be listed together with a definition of their nature, proposed resolution, and accountability (i.e., person responsible and timelines).

26.3 Warranty And Supplier Support

The warranty of the Plant is twelve months from the date of handover to Transnet Port Terminals Saldanha. Once the Plant has been handed over to Transnet Port Terminals

Saldanha Operations, the responsibility of the Plant transfers from the Contractor Project Team to Transnet Port Terminals Saldanha Operations. Any breakdowns of the equipment due to poor quality of manufacture, installation and erection will have to be addressed to the Contractor's after-sales team who should have a representative on site for the first six (6) months after hand-over to deal with any breakdowns associated quality related issues of manufacture, installation, or erection.

27 Annexures (Supporting Documents)

Annexure A: Ashton Bulk Report Train Unloading System _Balance of Plant

Appendix A	Drawings List
Appendix B	Site Scope Work
Appendix C	Tippler Alignment Survey Report
Appendix D	Electrical Inspection _Dust Plant Report
Appendix E	Site Inspection Photos
Appendix G	Schedule of Enabling Works
Appendix H	Scoping Site Inspection Reports
Appendix I	Design Engineering and IP

Annexure B: Technical Specification PLC SCADA

Annexure C: Technical Specification: Dust Extraction/Handling Plant

Annexure D: Technical Specification Mechanical/Electrical

Annexure E: Master Operating Philosophy Plant (Tippler Unit/Apron Feeders/Dust Collection)

Annexure F: Dust Extraction Control Philosophy

Annexure G: Apron Feeder Control Philosophy

Annexure H: Knife Gate Control Philosophy

Annexure I: Technical Specification (Wagon Tipplers, Feeders, Dust House)

Annexure J: Data Sheet (Dual Wagon Tippler)

Annexure K: Technical Specification Apron Feeder

Annexure L: Data Sheet Apron Feeder

Annexure M: Technical Specification Dust Collection

Annexure N: Data Sheet Dust Collection (Bag House)