
TRANSNET SOC LTD

TENDER No. TNPA 2021/11/0007/RFP

DESCRIPTION OF THE SERVICES: UPGRADE OF LIGHTING IN THE PORT OF DURBAN

ADDENDUM NO. 06

DATED 29 March 2022

The following information is furnished in addition to, in amplification and substitution of, matters contained in the tender documents issued in respect of the above-mentioned work.

1. Part C2: Pricing Data

C2.2 Bill of Quantities

SECTION NO. 2: ELECTRICAL WORK - BILL NO 3 : GENERAL LIGHTING AND POWER

1. CATO CREEK YARD (ZONE 2)

Item 1: Delete the description under item 1 and replace with:

Supply, deliver, offload and install equal or similar approved to Beka Omniblast 1E MAXI 455W 4000k optic 5188, with 10kV surge protection and integrated 7 Nema socket and weatherproof cover for the Nema socket, on existing high masts at the Cato Creek East Yard as indicated on drawing 2127737-1-000-E-LA-0002-01. Nema socket and luminaire must be wired for future automation using Owllet plug in module.

Item 2: Delete item 2 entirely without replacement

~~Item 2: Supply, installation, programming and commissioning of lighting control network system~~

2. MAYDON WHARF YARD (ZONE 4)

Item 25: Delete the description under item 25 and replace with:

Supply, deliver, offload and install one hundred and seventy (170) equal or similar approved to Beka Omniblast 1E MAXI 455W 4000k optic 5188, with 10kV surge protection and integrated 7 Nema socket and weatherproof cover for the Nema socket on existing 17 x 30m High Mast Poles at the Maydon Wharf Rail Yard as indicated in drawing number: 2127737-1-000-E-LA-0004-01, 2127737-1-000-E-LA-0004-02 and 2127737-1-000-E-LA-0004-03. The number of luminaires per pole is clearly illustrated on the aforementioned drawing numbers. Nema socket and luminaire must be wired for future automation using Owllet plug in module.

Item 26: Delete item 26 entirely without replacement

~~Item 26: Supply, installation, programming and commissioning of lighting control network system~~

3. MANGANESE YARD (ZONE 4) - Area Lighting

Item 32: Delete the description under item 32 and replace with:

Supply, deliver, offload and install equal or similar approved to 10 x Beka Omniblast 1E MAXI 455W 4000k optic 5188, with 10kV surge protection and integrated 7 Nema socket and weatherproof cover. for the Nema socket on the existing 30m high mast at Manganese Yard as indicated in drawing number: 2127737-

1-000-E-LA-0004-05. Nema socket and luminaire must be wired for future automation using Owllet plug in module.

4. KINGS REST YARD (ZONE 5)

Item 35: Delete the description under item 35 and replace with:

Supply, deliver, offload and install 220 x equal or similar approved Beka Omniblast 1E MAXI 455W 4000k optic 5188, with 10kV surge protection and integrated 7 Nema socket and weatherproof cover for the Nema socket, on all the high masts as shown in drawing No: 2127737-1-000-E-LA-0005-05. Nema socket and luminaire must be wired for future automation using Owllet plug in module.

Item 36: Delete item 36 entirely without replacement

~~Item 36: Supply, installation, programming and commissioning of lighting control network system~~

5. FYNNLANDS YARD (ZONE 5)

Item 40: Delete the description under item 40 and replace with:

Supply, deliver, offload and install 72 x equal or similar approved to Beka Omniblast 1E MAXI 455W 4000k optic 5188, with 10kV surge protection and integrated 7 Nema socket and weatherproof cover for the Nema socket, in all the High masts as shown in drawing No: 2127737-1-000-E-LA-0005-06. Nema socket and luminaire must be wired for future automation using Owllet plug in module.

Item 41: Delete item 41 entirely without replacement

~~Item 41: Supply, installation, programming and commissioning of lighting control network system~~

6. HOKKAIDO YARD (ZONE 6)

Item 74: Delete the description under item 74 and replace with:

Supply, deliver, offload and install 36 x equal or similar approved to Beka Omniblast 1E MAXI 455W 4000k optic 5188, with 10kV surge protection and integrated 7 Nema socket and weatherproof cover for the Nema socket, in all the Highmasts as shown in drawing No.: 2127737-1-000-E-LA-0006-02. The luminaires per pole and orientation is clearly indicated on the above-mentioned drawing number. Nema socket and luminaire must be wired for future automation using Owllet plug in module.

2. Part C3: Scope of Work

C3.1 Employer's Works Information

1. Clause 4.5.8.1 - Cato Creek East Yard Lighting

Sub-clause e)

Delete this sub-clause and replace with:

e) The *Contractor* shall supply, deliver, offload and install equal or similar approved to Beka Omniblast 1E MAXI 455W 4000k optic 5188, with 10kV surge protection and integrated 7 Nema socket and weatherproof cover for the Nema socket, on existing high masts at the Cato Creek East Yard as indicated

on drawing 2127737-1-000-E-LA-0002-01. Nema socket and luminaire must be wired for future automation using Owllet plug in module.

2. Clause 4.5.10.2 – Maydon Wharf Yard

Sub-clause b)

Delete this sub-clause and replace with:

b) The *Contractor* shall supply, deliver, offload and install one hundred and seventy (170) equal or similar approved to Beka Omniblast 1E MAXI 455W 4000k optic 5188, with 10kV surge protection and integrated 7 Nema socket and weatherproof cover for the Nema socket on existing 17 x 30m High Mast Poles at the Maydon Wharf Rail Yard as indicated in drawing number: 2127737-1-000-E-LA-0004-01, 2127737-1-000-E-LA-0004-02 and 2127737-1-000-E-LA-0004-03. The number of luminaires per pole is clearly illustrated on the aforementioned drawing numbers. Nema socket and luminaire must be wired for future automation using Owllet plug in module.

3. Clause 4.5.10.4 – Manganese Yard

Sub-clause b)

Delete this sub-clause and replace with:

b) The *Contractor* shall supply, deliver, offload and install equal or similar approved to 10 x Beka Omniblast 1E MAXI 455W 4000k optic 5188, with 10kV surge protection and integrated 7 Nema socket and weatherproof cover for the Nema socket on the existing 30m high mast at Manganese Yard as indicated in drawing number: 2127737-1-000-E-LA-0004-05. Nema socket and luminaire must be wired for future automation using Owllet plug in module.

4. Clause 4.5.11.1 – King Rest Yard (Yard Lighting)

Sub-clause f)

Delete this sub-clause and replace with:

f) The *Contractor* shall supply, deliver, offload and install 220 x equal or similar approved Beka Omniblast 1E MAXI 455W 4000k optic 5188, with 10kV surge protection and integrated 7 Nema socket and weatherproof cover for the Nema socket, on all the high masts as shown in drawing No: 2127737-1-000-E-LA-0005-05. Nema socket and luminaire must be wired for future automation using Owllet plug in module.

5. Clause 4.5.11.2 – Fynnlands Yard (Yard Lighting)

Sub-clause f)

Delete this sub-clause and replace with:

f) The *Contractor* shall supply, deliver, offload and install 72 x equal or similar approved to Beka Omniblast 1E MAXI 455W 4000k optic 5188, with 10kV surge protection and integrated 7 Nema socket and weatherproof cover for the Nema socket, in all the High masts as shown in drawing No: 2127737-1-000-E-LA-0005-06. Nema socket and luminaire must be wired for future automation using Owllet plug in module.

6. Clause 4.5.12.5 – Hokkaido (Yard Lighting)

Sub-clause g)

Delete this sub-clause and replace with:

g) The *Contractor* shall supply, deliver, offload and install 36 x equal or similar approved to Beka Omniblast 1E MAXI 455W 4000k optic 5188, with 10kV surge protection and integrated 7 Nema socket and weatherproof cover for the Nema socket, in all the Highmasts as shown in drawing No.: 2127737-1-000-E-LA-0006-02. The luminaires per pole and orientation is clearly indicated on the above-mentioned drawing number. Nema socket and luminaire must be wired for future automation using Owllet plug in module.

7. Clause 2.2 - Parts of the Works which the Contractor is to design

Sub-clause 2.2 12

Add the following to this sub-clause:

Should the *Contractor* provide alternate products than what has been specified, the following documentation (lighting simulations & product brochures) must accompany the tender submission to ensure a fair assessment. Furthermore, the following minimum criteria should also be met, should the *Contractor* provide alternate luminaires to the specified products as shown in the Table 1, clause 4.7.

8. Add new clause: 4.7 – Table 1

| Luminaire Type | Minimum Criteria |
|------------------------------------|--|
| Beka Omniblast MAXI -1-E-455W | <ul style="list-style-type: none"> - Body - Die cast aluminium - Max current - 1400mA - Lumens output - 49560, with appropriate optics - IP Rating - 66 - Nema socket - 7 pin with weatherproof cover. Nema socket and luminaire must be wired for future automation using Owllet plug in module. |
| Beka LEDlume - MIDI 73W Optic 5098 | <ul style="list-style-type: none"> - Body - Marine grade aluminium - Max current - 500mA - Lumens output - 9577, with appropriate optics - IP Rating - 66 |
| Beka LEDlume - Midi LED 52W | <ul style="list-style-type: none"> - Body - Marine grade aluminium - Max current - 350mA - Lumens output - 7052, with appropriate optics - IP Rating - 66 |
| Beka LEDShine 40W | <ul style="list-style-type: none"> - Body - Die-cast aluminium - Max current - 350mA - Lumens output - 2247, with appropriate optics - IP Rating - 65 |
| Beka Teceo 69.5W | <ul style="list-style-type: none"> - Body - Aluminium - Max current - 900mA - Lumens output - 3550 - 10043, with appropriate optics - IP Rating - 65 |
| Beka Kazelle 55W | <ul style="list-style-type: none"> - Body - Marine grade aluminium - Max current - 350mA - Lumens output - 2247, with appropriate optics - IP Rating - 66 |
| Beka LEDlume - Midi LED 138W | <ul style="list-style-type: none"> - Body - Marine grade aluminium - Max current - 700mA - Lumens output - 16886, with appropriate optics - IP Rating - 66 |

| | | | |
|------------------------------|---|---------------|----------------------------------|
| Beka LEDlume - Maxi LED 276W | - | Body | - Marine grade aluminium |
| | - | Max current | - 700mA |
| | - | Lumens output | - 33265, with appropriate optics |
| | - | IP Rating | - 66 |
| Beka LEDlume - Midi LED 73W | - | Body | - Marine grade aluminium |
| | - | Max current | - 500mA |
| | - | Lumens output | - 9577, with appropriate optics |
| | - | IP Rating | - 66 |
| Beka LEDlume - Mini LED 55W | - | Body | - Marine grade aluminium |
| | - | Max current | - 1000mA |
| | - | Lumens output | - 5806, with appropriate optics |
| | - | IP Rating | - 66 |

9. Clause 4.5 - Electrical Engineering Works

Sub-clause 4.5.1.d)

Delete this clause entirely without replacement

10. Clause 1 – Description of the Works

Sub-clause 1.1

Delete the 6th bullet point entirely without replacement

11. Clause 5.9 - Programming constraints

Sub-clause 5.9.1

Add the following to this clause: (Tenderers to note that this supersedes amendments in Addendum 4)

In this regard a total estimated allowance of 20 days TRA (time risk allowance) should be provided in the programme linked to Completion to mitigate any risks of delays to construction activities caused by *Employer's* operational needs. The TRA for the operational yard areas shall be used at the sole discretion of the *Project Manager* as and when these events are realized.

NOTE: WHEN UPLOADING THE TENDER USING THE PORTAL THE FOLLOWING NUMBER IS TO BE USED TO UPLOAD THE DOCUMENTATION - TENDER REFERENCE NUMBER: TNPA/2022/03/0141/RFP



WITNESSES:

1. _____
2. _____

TENDERER / CONTRACTOR

Date: _____

WITNESSES:

1.  _____
2.  _____

TRANSNET SOC LTD

Date: _____

FROM: _____

DATE: _____

TO: Transnet National Ports Authority

237 Mahatma Gandhi Road

Durban, 4001

(Attention Ms M Ngwenya– Email: Mphoyakaomphile.Ngwenya@transnet.net)

Dear Sirs/ Madam

TENDER No. TNPA 2021/11/0007/RFP

DESCRIPTION OF THE SERVICES: UPGRADE OF LIGHTING IN THE PORT OF DURBAN

Receipt of **Addendum No. 06 dated 29 March 2022** is hereby acknowledged.

Kind regards

TENDERER

NOTE: This acknowledgement must be signed and returned to this office on or before closing date of tender.

TNPA 2021/11/0007/RFP

**ANNEXURE A:
UPDATED DOCUMENTS**

PART C3: SCOPE OF WORK

| Document reference | Title | No of page |
|---------------------------|-------------------------------------|-------------------|
| C3.1 | This cover page | 1 |
| | <i>Employer's Works</i> Information | 2 - 110 |
| | Total number of pages | 111 |

C3.1 EMPLOYER'S WORKS INFORMATION

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Section 1

1 Description of the Works

1.1 Executive overview

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

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

- The Supply, Delivery, installation and commissioning of all the associated works for the lighting upgrade.
- Design, supply and installation of lightning protection and earthing of the structures.
- The Supply delivery and Installation of cabling and terminations, to power the lighting and associated infrastructure.
- Commissioning and testing of the entire installation and hand over to the Employer.
- Refurbishment of structural elements based on the structural assessment report included in the list of Annexures.
- ~~The Supply, Delivery, installation and commissioning the dimming control functionality of the high mast yard lighting.~~

1.2 Employer's objectives

The *Employer's* objectives are to construct and commission the Lighting upgrade, at various locations in and around the Port of Durban, for the operations of the Transnet National Ports Authority to meet the necessary statutory requirements.

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

1.3 Terminology

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

| Abbreviation | Meaning given to the abbreviation |
|--------------|--|
| AIA | Approved Inspection Authority |
| BBBEE | Broad Based Black Economic Empowerment |
| CEMP | Construction Environmental Management Plan |
| CD | Compact Disc |
| CDR | <i>Contractor</i> Documentation Register |
| CDS | <i>Contractor</i> Documentation Schedule |
| CRL | <i>Contractor</i> Review Label |
| CSHEO | <i>Contractor's</i> Safety, Health and Environmental Officer |
| CIRP | <i>Contractor's</i> Industrial Relations Practitioner |
| CM | Construction Manager |
| DTI | Department of Trade and Industry |
| DWG | Drawings |
| EO | Environmental Officer |
| HAW | Hazard Assessment Workshop |
| HAZOP | Hazard and Operability Study |

| | |
|--------|---|
| HSSP | Health and Safety Surveillance Plan |
| INC | Independent Nominated Consultant |
| IP | Industrial Participation |
| IR | Industrial Relations |
| IPP | Industrial Participation Policy |
| IPO | Industrial Participation Obligation |
| IPS | Industrial Participation Secretariat |
| IRCC | Industrial Relations Co-ordinating Committee |
| JSA | Job Safety Analysis |
| LV | Low voltage |
| MV | Medium voltage |
| Native | Original electronic file format of documentation |
| PES | Project Environmental Specifications |
| PHA | Preliminary Hazard Assessment |
| PIRM | Project Industrial Relations Manager |
| PIRPMP | Project Industrial Relations Policy and Management Plan |
| PLA | Project Labour Agreements |
| PSIRM | Project Site Industrial Relations Manager |
| PSPM | Project Safety Program Manager |
| PSSM | Project Site Safety Manager |
| ProgEM | Programme Environmental Manager |
| ProjEM | Project Environmental Manager |
| QA | Quality Assurance |
| R&D | Research and Development |
| SANS | South African National Standards |
| SASRIA | South African Special Risks Insurance Association |
| SES | Standard Environmental Specification |
| SHE | Safety, Health and Environment |
| SHEC | Safety, Health and Environment Co-ordinator |
| SIP | Site Induction Programme |
| SMP | Safety Management Plan |
| SSRC | Site Safety Review Committee |
| SCADA | Supervisory Control And Data Acquisition |
| TPT | Transnet Port Terminals |
| TNPA | Transnet National Ports Authority |
| TFR | Transnet Freight Rail |
| ISPS | International Ship and Port Facility Security |
| PSIRA | Private Security Industry Regulatory Authority. |

1.3.1 Where the words ‘Contractor’, ‘Employer’, ‘Project Manager’ and ‘Supervisor’ is described in the Scope of Works, read it to mean ‘Contractor’, ‘Employer’, ‘Project Manager’ and ‘Supervisor’ in the context of NEC3 ECC terminology respectively.

2 Engineering and the *Contractor's* design

2.1 *Employer's* design

2.1.1 The *Employer's* design for the *Works* is:

- **Electrical**

- The design of berth, roadway and railyard lighting, LV reticulation, distribution and protection systems for the lighting.
- The selection of all electrical switchgear associated with the LV systems.
- The selection of all cable associated with these systems.

2.1.2 The *Employer* grants the *Contractor* a licence to use the copyright in design data presented to the *Contractor* for the purpose of the *Works* (and the *Contractor's* obligation under paragraph 2.2 of the *Employer's Works* Information) ONLY.

2.2 Parts of the *Works* which the *Contractor* is to design

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

2.2.2 The Contractor is to design the following parts of the Works and will be responsible in his design for the overall integration of the design of the works with the designs of the Employer.

2.2.3 All supporting infrastructure required to implement all of the Employers' designs. These may include, but is not necessarily limited to, cableways, cable support systems, conduit systems and arrangement, piped systems and pipe support systems, and the selection of fasteners and fastening systems for these items, where not specified, referenced or detailed by the Employer.

2.2.4 All detailed designs of all LV distribution panels and electrical kiosks.

2.2.5 The detailed design of hinged walk-down streetlight poles.

~~2.2.6 The detailed foundation design for a 30-metre High Mast in accordance with the Manufacturers minimum requirements and specifications.~~

~~2.2.7 The detailed design of a steel wall mounted computer screen enclosure.~~

2.2.8 The detailed Earthing and Lightning Protection design in accordance with the Employer's high level designs and minimum requirements and specifications.

2.2.9 The Contractor shall submit detailed drawings and Workshop details for all designs, both Contractor's designs and Employer's designs, to the Project Manager for acceptance by the Employer's Consultant or the Employer's Engineers.

2.2.10 Concrete mix designs, for high mast and street light pole foundations, bases,

2.2.11 All and any equipment, formwork, and temporary work associated with the provision of the Works.

2.2.12 Lighting designs where the Contractor has suggested alternative luminaires. The Contractor shall undertake these designs in compliance with SANS 10389-1. ~~Should the Contractor provide alternate products than what has been specified, the following documentation (lighting simulations & product brochures) must accompany the tender submission to ensure a fair assessment. Furthermore, the following minimum criteria should also be met, should the Contractor provide alternate luminaires to the specified products as shown in the Table 1, clause 4.7.~~

- 2.2.13 Unless expressly stated to form part of the design responsibility of the *Employer* as stated under 2.1 *Employer's* design above and whether or not specifically stated to form part of the design responsibility of the *Contractor* under this paragraph, all residual design responsibility and overall responsibility for the total design solution for the *Works* rests with the *Contractor*.
- 2.2.14 The Contractor shall engage the services of ECSA registered Engineers and/or Technologists for all aspects of the Works for which the Contractor is to design as per Clauses 2.2.1 above.
- 2.2.15 The Contractor shall thus be wholly accountable and responsible for all aspects of his designs, including the implementation of all Statutory Safety, Health and Environmental Regulations of South Africa and the particular requirements, specifications, and regulations of the Employer pertaining to Health and Safety, Environment, Quality and Engineering.
- 2.2.16 The Contractor shall be wholly accountable and responsible for the implementation of the aspects of his designs including commissioning, putting into service, and handover of his constructed designs to the Employer, and his duly appointed ECSA registered Engineers shall be held accountable and responsible for these aspects of the Works for the lifetime duration of the *Works*.
- 2.2.17 Acceptance of documentation by the *Project Manager* will in no way relieve the *Contractor* of its responsibility for the correctness of information, or conformance with his obligation to Provide the *Works*. This obligation rests solely with the *Contractor*.
- 2.2.18 After review, a copy of the original reviewed/marked-up drawing/document, with the *Project Manager's* consolidated comments and document status marked on the *Contractor* Review Label, is scanned and the copy shall be returned to the *Contractor* under cover of the project's Transmittal Note for revision or re-submittal as instructed.
- 2.2.19 The *Contractor* shall allow the *Project Manager* 2 weeks (unless otherwise stated and agreed) to review and respond to the *Contractor's* submission of their documentation, i.e. from time of receipt by the project to the time of despatch. However, work shall proceed without delay in the event of late return of the documentation by the *Project Manager* with prior notification in writing by the *Contractor*.
- 2.2.20 On receipt of the reviewed documentation the *Contractor* shall make any modifications requested/marked-up and resubmit the revised documentation to the *Project Manager* within 2 weeks. Queries regarding comments/changes should be addressed with the *Project Manager* prior to re-submittal.
- 2.2.21 Any re-submittals, which have not included the changes/comments identified, will be returned to the *Contractor* to be corrected. The *Contractor* shall re-issue the revised documentation incorporating all comments and other specified details not included in the previous issue within 2 working days of receipt of the marked-up document.
- 2.2.22 The *Contractor* is required to undertake design safety reviews with the *Project Manager*, the NEC Supervisor, the *Employer's* Engineer's and Professional team, the *Employer's* Health and Safety Officers, the *Employer's* Environmental Officers, the *Employer's* Quality Assurance and Quality Control Officers and any other Specialists and/or Subject Matter Experts (SME) as deemed by the *Employer* necessary for the provision of the *Works*.

2.3 Other requirements of the *Contractor's* design

- 2.3.1 The *Contractor's* design complies with the following:
- All Statutes, Standards, Specifications, Policies, Conventions, Requirements as referenced in Paragraph 4 of this document and all Statutes, Standards, Specifications, Policies, Conventions, Requirements as referenced in any Annexures thereto.

2.4 Use of *Contractor's* design

- 2.4.1 The *Contractor* grants the *Employer* a licence to use the copyright in all design data presented to the *Employer* in relation to the *Works* for any purpose in connection with the construction, re-construction, refurbishment, repair, maintenance and extension of the *Works* with such licence being capable of transfer to any third party without the consent of the *Contractor*.
- 2.4.2 The *Contractor* vests in the *Employer* full title guarantee in the intellectual property and copyright in the design data created in relation to the *Works* as follows:
- All supporting infrastructure required to implement all of the Employers' high level designs. These may include, but is not necessarily limited to, cableways, cable support systems, conduit systems and arrangement, piped systems and pipe support systems, and the selection of fasteners and fastening systems for these items, where not specified, referenced or detailed by the Employer.
 - All detailed designs of all LV distribution panels. The detailed Earthing and Lightning Protection design in accordance with the Employer's high level designs and minimum requirements and specifications.
 - Concrete mix designs, descriptions and properties for high mast and street light pole foundations, bases and wearing and levelling courses
 - The design of light poles, base plates and luminaire fixtures and fittings where required for the provision of the Works.
 - All and any equipment, formwork, and temporary work associated with the provision of the Works.
 - Concrete mix designs, descriptions and properties for wearing and levelling courses
 - All and any equipment, formwork, and temporary work associated with the provision of the works.
 - All lighting designs where the *Contractor* has suggested alternative luminaires.

2.5 Design of Equipment

- 2.5.1 The *Contractor* submits his design details for the following categories of his proposed principal Equipment to the *Project Manager* for his information only:
- Any formwork required to Provide the Works
 - Temporary electrically powered compressed air systems and pneumatic equipment that may be required to Provide the Works
 - Small electrically powered equipment
 - Equipment designed for the lifting of personnel to access any areas necessary to Provide the Works, which are not at ground level.
 - Equipment designed for the lowering of personnel to access any areas necessary to Provide the Works, which are below ground level.
- 2.5.2 The following principal Equipment categories deployed for the *Contractor* to Provide the *Works* require its design to be accepted by the *Project Manager* under ECC Clause 23.1:
- Temporary petrol or diesel powered compressed air systems and pneumatic equipment that may be required to Provide the Works
 - Small petrol or diesel powered equipment
 - Specialist Equipment required to Provide the Works
 - Rigging platforms and specialised rigging Equipment that may be required by the Contractor to Provide the Works.
 - Temporary access platforms, ladders, walkways, scaffolds, and any other temporary structures required to provide the Works.
 - All lighting designs where the *Contractor* has suggested alternative luminaires.
- 2.5.3 The design of Equipment is considered in terms of this contract as *Contractor's* design and any and all applicable requirements of 2.2, 2.3, 2.4, and 2.5 of this document shall apply.

2.6 Equipment required to be included in the *Works*

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

2.7 Access Dates and Sectional Completion Dates

2.7.1 Access Dates

The first *access date* as stated in the Contract Data is to allow the *Contractor* access to establish their site facilities and offices. The *Contractor* shall take cognisance of the fact that the Access Certificate will only be issued by the *Project Manager* if the required documentation is submitted and accepted by the *Project Manager* by the said date. In this regard the Health and Safety Management Plan, Environmental Management Plan, Security Management Plan and Project Quality Plan must be accepted prior to issuance of the access certificate. In addition access will not be granted unless the Contractor has submitted all relevant data for the Employer to timeously apply for a Construction Work Permit for approval by the DOL by the said date. The *Contractor* is reminded that irrespective of the issuance of the access certificate, work activities shall only commence on acceptance by the *Project Manager* of the method statements, risk assessments and quality control plans for the specific work activity envisaged as also indicated elsewhere in this document.

The *access* certificates for the 2nd, 3rd & 4th dates (Zones 4, 5 & 2 respectively) will be issued as stated in the Contract Data provided the *Contractor* has completed their site establishment. The *Contractor* is reminded that irrespective of the issuance of the access certificate, work activities shall only commence on acceptance by the *Project Manager* of the method statements, risk assessments and quality control plans for the specific work activity envisaged as also indicated elsewhere in this document.

Access certificates for the 5th, 6th & 7th date will be issued on completion of the works including the acceptance of quality data packs by the *Project Manager* for Zones 4, 5 & 2 respectively.

2.7.2 Sectional Completion Dates

Sectional Completion Dates as stated in the Contract Data are targeted to meet certain deliverables but more importantly is sequenced to satisfy the operational objectives.

In this regard, the *Contractor* must ensure that all *works* are completed in compliance with the specifications, works information, drawings, health and safety, environmental and quality requirements by the sectional date(s) stated for that zone. The *Project Manager* will only issue a Sectional Completion Certificate when the *Contractor* has fully complied with the following:

- All works are completed, defect free and does not prevent the Employer from using the works and
- All quality data packs are completed, signed off by the *Supervisor*, copied and filed

Failure to meet any of the dates stated in the Contract Data by his own default does not relieve the *Contractor* from his obligation to provide the works and will attract delay damages as stated in the Contract Data.

3 Construction

3.1 Description of the Site/s and its surroundings

3.2 General Description

The Site/s are located in the Port of Durban and can be accessed by all surrounding arterial roads in and around the Port of Durban. The Site/s can be accessed specifically via Quayside Road, Maydon Road, Bayhead Road, Langeberg Road, Ambrose Park Road, Wharfside Road and South Pier Service Road.

The Site/s/ *works* areas are referred to as Zone/s within the Port of Durban, refer to layout Part C4 Site Information:

- **Zone 2** – Cato Creek East Yard Lighting; Cato Creek West Yard Lighting
- **Zone 3** – Tug Jetty Lighting; Ocean Terminal Building (OTB) Lighting; Fresh Produce Lighting; General Street Lighting
- **Zone 4** – Dry Dock Road; Maydon Wharf Road; I & J Tug Jetty & Street Lighting; Manganese Yard
- **Zone 5** – Kings Rest Yard Lighting; Fynnlands Yard Lighting; Bayhead Road Street Lighting; Bayhead Road Rail Track; Sharkmesher Road Street Lighting; Langeberg Road Street Lighting; Ambrose Park Road Street Lighting; Iran Road Street Lighting, Kuwait Road Street Lighting
- **Zone 6** – Wharfside Road Street Lighting, Port Perimeter – Cutler Road, Celebes Road, Formosa/Causeway Roads (Cutler Complex Wall); Abadan Yard Lighting; Umgababa Yard; Hokkaido Yard Lighting; Berth Lighting; Berth 9
- **Zone 7** - South Pier Service Road

All the Site/s have adjacent properties, buildings, structures, public/private roads including pavements and rail sidings, rail yards, heavy vehicle traffic on port roads, pipe racking systems, etc.

Maydon Road, Bayhead Road and Langeberg Road experiences high volumes of container trucks and other vehicular traffic that causes major traffic delays in and around the Port of Durban, the *Contractor* is to take cognisance of the traffic congestion.

The Island View Precinct is a National Key Point security graded area.

3.3 Temporary *Works*, Site services & construction constraints

3.3.1 The *Contractor* shall comply with the requirements of the *Employer* with regard to site entry, security control, permits, and site regulations.

3.3.2 The *Contractor* complies with the following requirements of the *Employer*:

- The Contractor shall attend all necessary Safety Inductions and ensure that all personnel engaged in the provision of the Works are inducted as directed by the Project Manager, NEC Supervisor.

- The Contractor and all personnel engaged in the provision of the Works shall attend all Safety Inductions as required by the Transnet Officer as directed through the Project Manager
 - The Contractor and all personnel engaged in the provision of the Works shall attend all Safety Inductions as required by the Employer's Safety Officer, Employer's Electrical Engineer and/or as directed by the Project Manager.
 - All work carried out on roadways or adjacent to railway lines shall require necessary permits or occupation.
- 3.3.3 The Contractor shall make arrangements for the Transnet official (TNPA manager) to arrange for the necessary permits or occupations with TFR or eThekweni Municipality during the execution of the Works.
- 3.3.4 All personnel working adjacent to railway lines in shunting yards are required to daily advise the TFR Yard Master and indicate the time of entry, time of exit and the details of the work carried out.
- The *Contractor* shall obtain access permits from the TNPA Permit Office, and the TNPA Safety Officer before accessing the sites.
- 3.3.5 The *Contractor* shall obtain the relevant work permits from the *Employer's* Safety Officer before performing any work.
- The Contractor shall at all times comply with the Transnet E7/1 Safety Instructions "Specification for Works On, Over, Under or Adjacent to Railway Lines and Near High Voltage Equipment" whilst providing the Works.
 - The Safety Inductions, Access Permits and Work Permits are part of this contract and the Contractor shall make allowance for it in his Price and Programme.
 - The Contractor shall ensure that all relevant safety inductions and access permits are obtained well before the Site Access Date as reflected in the Contract Data.
- 3.3.6 The Port of Durban, including Island View are designated Security Areas under the ISPS requirement, and in terms of this, all access into the Port area will be strictly controlled. Compliance to these security requirements, including labour transport and access requirements, obtaining and maintaining access cards for the Contractor's personnel on Site is part of this contract, and the Contractor shall make allowance for it in his Price and Programme.
- 3.3.7 The Contractor shall obtain the necessary TNPA and Cutler entry permits for all of the Contractor's personnel within the Port of Durban and Island View in accordance with the access control requirements of the Port and the Contractor shall make allowance for it in his Price and Programme. The Contractor is also required to obtain the relevant permits for his Sub-Contractors and all suppliers. The Contractor is required to make applications for these permits on behalf of his workers, suppliers and Sub- contractors, and is to nominate a single person to liaise with the relevant port, terminal and Cutler authorities. The Contractor shall make allowance for it in his Price and Programme.
- 3.3.8 The Contractor shall provide all staff working within the Port of Durban with Contractor identification cards which detail the person's name, identity number and the foreman / engineer responsible. The provision of construction personnel with ID cards is considered part of this contract and shall be made by the Contractor to a standard acceptable to the Project Manager and the Contractor shall make allowance for it in his Price and Programme.
- 3.3.9 The Contractor is to be in constant consultation and cooperation with the Port's security operations to ensure compliance with all the required security procedures and the Contractor shall make allowance for it in his Price and Programme.

3.4 Restrictions to access on Site, roads, walkways and barricades

- 3.4.1 Access route to the Port

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

3.4.2 Barricades and fencing around sites

- The Contractor is hereby made aware that the works are situated in various areas within the Port precinct, some within the operational yards and some within public space. The Contractor shall take due care when establishing their work space within these areas. Adequate warning signage and personal shall be provided and maintained by the Contractor all in compliance with the local bylaws and South African Traffic Signs Manual (SATSM).
- The Contractor shall be responsible for providing a temporary barricade fence between the port operations, roadway and railway traffic and the construction sites and maintaining, providing, and/or relocating the fence, if required for construction purposes, to ensure the boundary fence is continuous, and the Contractor shall make allowance for it in his Price and Programme.
- The Contractor shall ensure that his site office where equipment may be stored, prepared or refurbished has an access gate that is manned 24hrs a day for the duration of the Works and over any builder's breaks, by a Security Provider acceptable to the Project Manager and registered with the PSIRA and the Contractor shall make allowance for it in his *Price and Programme*.

3.4.3 Restrictions to access on Site/s

- The Contractor is prohibited from entering the Employer's Operational Areas, unless authorised to do so.
- The Contractor plans and organises his work in such a manner so as to cause the least possible disruption to the Employer's operations.
- The Contractor ensures that all his construction staff, labour, and Equipment remains within his allocated and fenced off construction areas.

3.4.4 People restrictions on Site; hours of work, conduct and records:

- The working hours shall be in accordance with the requirements of the Department of Labour or with the agreement of the relevant trade unions. This information

relating to working hours shall be supplied to the *Project Manager* prior to commencement of the proposed working hours.

- The Contractor complies with a nine (9) hour a day, five (5) day a week standard work day/week for all activities to be undertaken by his people (including Sub-contractors) employed on site.
- Work times (i.e. start and end times within a standard work day) shall be as mutually agreed with the Project Manager.
- In the event that the Contractor requests to work overtime to make up for time lost due to his own delays, the Contractor will be liable for the supervision cost required from the Employer's team during the Works.
- The Contractor keeps daily records of his people, Plant and equipment engaged on the Site and Working Areas (including Sub-Contractors) with access to such daily records **signed by the Supervisor and made** available for inspection by the Project Manager at all reasonable times
- **The Employer's team will be available during the hours 07h30 to 16h00 weekdays only. The Contractor must ensure that any inspections of the works that requires the Employer's team's attention should be planned and completed within these stipulated times. This provision excludes the lighting survey that is required to be undertaken at night.**

3.4.5 Minimum requirements of people employed on the Site are as follows:

- South African identity document or passport/ visa and work permit for foreign nationals;
- Employment of local labour only for unskilled and semi-skilled job categories as per PIRPMP;
- Secondment of skilled core/ permanent employees if skills are not locally available;
- Pre-employment medical examinations; and
- Induction in IR matters and conditions of employment on the Project.
- The Contractor complies with the requirements of the IRCC involving the engineering construction Contractors engaged (including all future Contractors) by the Employer.

3.4.6 Health and safety facilities on Site

- The Contractor is referred to the Health and Safety specifications: HAS-STD-0001 Rev 0 as contained in the List of Annexures of this document.
- The Contractor complies with the requirements stated under paragraph entitled "Safety Risk Management" of the Employer's Works Information.

3.4.7 Environmental controls, fauna & flora, dealing with objects of historical interest

- The Contractor is referred to the Standard Environmental Specifications and Construction environmental management plan as contained in the List of Annexures.
- The Contractor complies with the CEMP, SES and PES in the construction of the Works, all as described under paragraph "Environmental constraints and management" of the Employer's *Works* Information.

3.4.8 Title to Materials from demolition and excavation

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

3.4.9 Cooperating with and obtaining acceptance of Others

- The *Contractor* performs the *Works* and co-operates with:
 - The *Employer* (including the agents of the *Employer*) who operate on Site during the entire duration of the Contract period
 - The TNPA manager and agents of the TNPA or Cutler Permit Office, as directed by the Project Manager, who operate on Site during the entire duration of the Contract period.
 - Of whom the Contractor is to be notified once appointed by the Employer, who operate on Site during the entire duration of the Contract period.

3.4.10 Publicity and progress photographs

- The Contractor shall obtain the permission and approval of the Project Manager before erecting any notice boards, using the details of the contract in any advertising media or revealing any details of the contract to the public.
- The Contractor does not advertise the contract or the project to any third party, nor communicate directly with the media (in any jurisdiction) whatsoever without the express written notification and consent of the Project Manager.
- The Contractor provides a notice board showing the Employer's details, The Project Manager's details and the Contractor's details at the various Sites.
- The Contractor shall submit the graphic design and the structural support designs of the notice board to the Project Manager for acceptance before fabricating or erecting it.
- The Contractor provides progress photographs at monthly intervals in digital format as part of the Contractor's monthly programme narrative report. The photos shall include detailed, close up photos of construction activities.

3.4.11 *Contractor's* Equipment

- The Contractor keeps daily records of his Equipment used on Site and the Working Areas (distinguishing between owned and hired Equipment) with access to such daily records available for inspection by the Project Manager at all reasonable times.
- The *Contractor* complies with the following permissions and restrictions in the use of Equipment as required by the *Employer*:
 - Equipment used by the Contractor to Provide the Works shall be prepared, painted, assembled and disassembled within the Contractor's Work Area and Site boundaries or lay-down areas as authorised by the Project Manager.
 - The Contractor is required to remove all equipment that is not part of the Works from site after completion of the Works and before de-establishment of the site.
 - All and any equipment used by the Contractor for the provision of the Works shall comply to the Employer's SHEQ regulations and restrictions, or any other statutory Health and Safety requirements as directed by the Project Manager in liaison with the *Employer's* Engineers or the *Employers* Consultants.

3.4.12 Equipment provided by the *Employer*

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

3.4.13 Site services and facilities:

- The *Employer* provides the following facilities for the *Contractor*:
 - For the duration of the Contract, the Project Manager will provide an area, free of charge, for the Contractor to establish his offices, lay down areas, stores, high mast

refurbishment, preparation and painting area, workshops, and other Contractor's Equipment.

- The locations of the site camp/lay down area is: Iran Road, Bayhead (adjacent to the TNPA Pollution Control depot); GPS Co-ordinates: 29°53'52.35"S; 31° 1'6.94"E. Refer to illustration included in part C4 Site Information. The Contractor may establish a site camp anywhere within the boundary of this area that does not impede the provision of the works.
- The Contractor shall ensure that the area used has a suitable continuous security fence and the necessary access gates.
- All preparation and fencing, etc. shall be done by the Contractor and shall be allowed for in his Price, this includes clearing away and leaving clean and clear at Completion.
- The *Contractor* shall provide everything else necessary for providing the *works*.

3.4.14 Connections to services for *Contractor's* use:

- Connections for potable water, electricity and sewer are available in the proposed site camp/lay down area, the Contractor shall conduct a condition assessment on the available connections to ascertain the suitability for the Contract. All associated costs will be for the Contractor's account.
- The Contractor shall provide everything necessary for providing the Works in accordance with this contract and attached Annexures.
- Wherever the *Employer* provides facilities if applicable in the context of this contract, (including, *inter alia*, temporary power, water, waste disposal, telecommunications etc.) for the *Contractor's* use within the Working Areas and the *Contractor* adapts such facilities for use, then the *Contractor* makes good and provides full reinstatement to the land (including all apparatus of the *Employer* and Others in, on or under the land) and surrounding areas to its original standard upon dismantling of such facilities and hand-back to the *Employer*.

3.4.15 Facilities provided by the *Contractor*:

- The Contractor ensures that the site establishment area is compliant with the relevant safety regulations and restrictions, is clearly sign posted, and has a suitable security fence, lighting and the necessary access control gates.
- All costs for preparation of the site establishment area are to be allowed for in the Contractor's Price.
- The Contractor submits details of the layout of his site establishment to the Project Manager for his acceptance.
- The Contractor installs a metering device, which is acceptable to the Project Manager and the Employer's Engineers, immediately downstream at each of the Employer's connections (if applicable in the context of this contract) from where he draws services. The Contractor provides the Project Manager details of his monthly consumption of potable water and power.
- The Contractor is responsible for his own connection to the Employer's services and for the reticulation of his services from the connection point. The cost of meters, connections, reticulation and all other usage costs associated with the provision of services are included in Price.
- The Contractor provides the Project Manager with a "Certificate of Compliance" (COC), by an "Accredited" Person as defined by the OHS Act, in respect of his Construction Power electrical installation. The Project Manager only makes construction power available upon receipt of the COC.
- The Supervisor (or his nominated representative) conducts routine inspections of the Contractor's construction power reticulation and power tools. If found to be un-safe

and / or non-compliant with statutory requirements, the electrical power supply is disconnected until the Contractor rectifies all defaults.

- The Contractor shall be responsible for providing water and power for all other Working Areas where not provided by Employer.
- The Contractor provides, at his cost, a sufficient number of toilets and maintains them in a clean and sanitary working condition.
- The Contractor provides temporary lighting and fencing around every section occupied by him during the construction of the works.
- Such fencing demarcates and secures the construction area. The fencing is erected before any work starts and is removed only upon completion of the work in that area.
- The Contractor includes for all costs for such lighting and fencing, including access control into and out of these restricted areas.
- Wherever the Contractor provides facilities (either his own or for the Project Manager and/or Supervisor) and all items of equipment, involving, inter alia, offices, accommodation, laboratories, materials storage, etc., within the Working Areas, then the Contractor makes good and provides full reinstatement to the land (including all apparatus of the Employer and Others in, on or under the land) and surrounding areas to its original standard, upon dismantling of such facilities and items of Equipment.
- Upon Completion the Contractor completely removes from the Site and Working Areas all his Equipment, including the foundations of any structures, stores, office accommodation or any other asset belonging to him, and leaves the Site and Working Areas in a tidy condition to the satisfaction of the Project Manager.
- No excess or discarded materials or equipment may be buried or dumped within the Port boundary. Waste to be disposed at a registered landfill site, proof of safe disposal must be obtained.
- Demolition of all temporary structures, surfaces etc. shall be first approved by the Project Manager prior to the work being carried out.
- The Employer does not provide any security for the primary site establishment and Working Areas. The Contractor provides same and indemnifies and holds indemnified the Project Manager and Employer against any claims and actions that may arise out of primary site establishment and Working Area security.
- No housing is available for the Contractor's employees. The Contractor makes his own arrangements to house his employees and transports them to Site in a closed vehicle specifically designed for passenger transport (bus or similar) accepted by the Project Manager.
- Wherever the Employer provides facilities for the Contractor's use and the Contractor adapts such facilities for use, then the Contractor makes good and provides full reinstatement to the land (including all apparatus of the Employer and Others in, on or under the land) and surrounding areas to its original standard upon dismantling of such facilities and hand-back to the Employer.
- The Contractor shall provide, maintain and remove lockable portable chemical type toilets.
- The Contractor shall provide a suitably sized construction power supply by means of either municipal supply, or Generation Plant equipment, as required.
- The *Contractor* shall be wholly responsible for the provision of this power supply, and shall make all the necessary arrangements for the supply, and the maintenance of the supply for the duration of the *Works*.

3.4.16 The *Contractor* shall provide the following facilities for the *Project Manager* and *Supervisor*:

- No Facilities will be required for the Project Manager's staff
- Wherever the *Contractor* provides facilities (either his own or for the *Project Manager* and/or *Supervisor*) and all items of Equipment, involving, *inter alia*, offices, accommodation, laboratories, Materials storage, compound areas etc., within the Working Areas, then the *Contractor* makes good and provides full reinstatement to the land (including all apparatus of the *Employer* and Others in, on or under the

land) and surrounding areas to its original standard, upon dismantling of such facilities and items of Equipment.

- Unless explicitly stated as a responsibility of the *Employer*, Site services and facilities, Connections to Services for *Contractors'* use and all residual requirements for the provision of facilities and all items of Equipment necessary for the *Contractor* to Provide the *Works* remains the responsibility of the *Contractor*.

3.4.17 Existing premises, inspection of adjoining properties and checking work of Others

- The Contractor will be held responsible for any damage to the existing structures and surfacing caused by the Contractor during the execution of this contract; fair wear and tear excluded, and shall repair it to the satisfaction of the Supervisor on conclusion of the Works.
- For this purpose a joint inspection with the Supervisor will be carried out prior to occupation of the site(s) and any existing damage noted.
- The Contractor is required to forward a photographic report following the inspection to the Project *Manager* for record purposes.
- The *Contractor* inspects and surveys following areas adjacent to the Site in accordance with this *Works Information* and in conjunction with the *Project Manager*.
- The access road and parking areas used exclusively by the Contractor and the Employers' Personnel involved in the provision of the Works or the administering of the contract. Access roads that are used by both the Contractor and TNPA for their operations are excluded from this requirement.
- A perimeter extending 1.0m beyond the demarcated and fenced off Site Area.

3.4.18 Survey control and setting out of the *Works*

- ~~The Employer provides the following information and survey controls for the Contractor:~~ The Employer provides the following information to the Contractor:
 - ~~Survey control points for the setting out of the Works.~~ Coordinates for the installation of new HML & Street lighting poles. Refer to civil engineering drawings attached as Annexure A1. The Contractor will be responsible for providing control points and benchmarks to facilitate the setting out of the works.
 - The Contractor will be responsible for correct the setting out of the Works.
 - The Contractor validates the information provided by the Employer and notifies the Project Manager of any discrepancies immediately they become known.
 - For the purposes of this contract the datum level shall be Chart Datum (CD) (Port), which is 0.900m below Mean Sea Level (MSL).

| | | |
|-------------------------------|---|-------------|
| For example: +0,00m CD (Port) | = | -0.900m MSL |
| +0.900m CD (Port) | = | +0,00m MSL |

3.4.19 Excavations and associated water control

- The *Contractor* complies with the following requirements:
 - Where applicable, the Contractor protects all excavations against any water ingress whether by seepage, rains, storms, floods or any other means.
 - Where applicable, the Contractor immediately removes any water found in the excavation by pumping and / or bailing and provides all necessary Equipment (pumps, pipes, etc.) to do so.
 - Water may not be pumped to a watercourse, estuary, and river or into the bay.
 - Water is cleared in such a way that it cannot seep or flow back into the excavations.
 - All activities related to excavations and dealing with water control forms part of this contract, and the Contractor shall make allowance for these activities in his price and programme.

- ⊖ The Contractor shall design and install shoring where necessary, in all deep excavations in compliance with the OHS Act and Construction Regulations, making allowance for these activities in their pricing and programme.

3.4.20 Underground services, other existing services, cable and pipe trenches and covers

- Searching for services known and unknown, the *Contractor* undertakes the following:
 - The existing services shown on the drawings are indicative and by no means accurate. These positions are obtained from historic data and may not include all services that may be encountered on site. In this regard the *Contractor* must search for existing services by means of ground penetrating detecting equipment, prior to any excavations taking place. The methodology used must be able to accurately determine and record the type of service, position and depth. Further careful proving of the service by hand excavation to expose the service will be necessary in order to facilitate the works. Once located the service will be recognized as known services and the cost of any repairs resulting from damage to these by the *Contractor's* activities shall be to their account. The positions of all services old and new shall be accurately recorded and included on as-built drawings, submitted to the *Supervisor* for acceptance.
 - The Contractor is required to record all such information on a suitable "marked-up" drawing for reference at all times.
 - In addition to the above, the Contractor shall consult the Project Manager, the Supervisor and the Employer's Engineers, prior to undertaking any excavation work.
 - Where the Contractor encounters existing underground services / existing services cables / pipe trenches, the Contractor is to notify the Project Manager, the Supervisor and the Employers Engineers.
 - A group of cables intersecting or adjoining a trench will be regarded as one service.
 - The existing services shall be protected when excavating.
 - The costs of protecting these services shall be included in the rates for excavation and compaction.
 - All existing services shall be treated as in service and "live". All necessary Safety Instructions of the Employer and statutory requirements as per the OHS Act and its Regulations shall be complied with in the handling of the "live" service.
 - In the case of electrical services, the Contractor shall trace, locate and identify all cables within the service and record the information as per this Works Information above.
 - The Contractor shall also comply with all of the relevant Employer's Specifications in Section 4 below and any annexed thereto in the reinstatement of the services

3.4.21 Control of noise, dust, water and waste

- The *Contractor* complies with the following:
 - Before moving Equipment onto the Site and Working Areas and commencing the Works, the Contractor submits his proposed methods of construction which demonstrate the measures taken to avoid and or reduce any environmental and health issues arising from dust, noise and vibration for acceptance by the Project Manager.
 - The Contractor shall comply with the requirements of "Environmental constraints and management" of Section C3.1 Employer's Works Information.
 - The Contractor shall comply with the requirements of "Safety risk management" of Section C3.1 Employer's Works Information.

3.4.22 Sequences of construction or installation

- The Contractor complies with the following:

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

3.4.23 Giving notice of work to be covered up

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

3.5 Completion, testing, commissioning and correction of Defects

3.5.1 The work to be done by the Completion Date

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

| Item of work | To be completed by |
|---|--|
| Submission of all data packs, site lighting level measurements, quality assurance records and as-built drawings | Prior to Sectional Completion Date of each Zone as stated in the Contract Data |

3.5.2 The *Contractor* is permitted to carry out the following *Works* after Completion:

- The *Contractor* shall not be permitted to carry out any *works* after Completion has been certified.

3.5.3 Use of the *Works* before Completion has been certified

- The *Employer* uses the following part / parts of the *Works* before Completion is certified by the *Project Manager* which do not constitute take over by the *Employer* for the reason(s) stated:
 - All Cable, Switchgear, Protection relays, Control Systems Plant and Software or any other Electrical Plant installed by the Contractor so that the Employer may maintain the functionality of systems and existing Plant that is required by the Employer to conduct the Employer's operational activities, and the operational activities of TNPA.

- All Cable, Switchgear, Protection relays, Control Systems Plant and Software or any other Electrical Plant installed by the Contractor so that the Employer may maintain the continuity of the Electrical Supply to the lighting in the Port of Durban.
- Any temporary or permanent Lighting installation installed by the Contractor that may be required by the Employer to be used for the night time operational activities of TNPA or others, as required by the Project Manager.

3.5.4 Materials facilities and samples for tests and inspections

- The *Contractor* provides the *Employer* with the following materials, facilities and samples during the provision of the *Works*, as per ECC Clause 40.2:
 - The Contractor is required to provide all materials, facilities and samples for any tests required in Section 4 Plant and Material Standards and Workmanship below.
 - The Contractor shall furnish samples of any Plant and Materials that is other than, or different to, that specified by the Employer's Engineers, to the Supervisor for Acceptance by the Employer's Engineers. The Contractor is prohibited from installing said Plant without the required prior authorization from the Employers Engineers.
 - The Contractor shall furnish samples of any Plant and Materials that is other than, or different to, that required by the Employer's Engineering Specifications, that shall be utilised in the Contractor's Designs, to the Supervisor for Acceptance by the Employer's Engineers. The Contractor is prohibited from installing said Plant without the required prior authorization from the Employer's Engineers.
 - The Contractor shall furnish samples of any Plant and Materials that is proposed to be used in the Contractor's Designs, to the Supervisor for Acceptance by the Employer's Engineers. The Contractor is prohibited from designing with, and subsequently installing said Plant and Materials without the required prior authorization from the *Employer's Engineers*.
- Samples, tests and inspections required of the Contractor, shall be as specified in Section 4 of C3.1 or any other standards, specifications or statutory requirements referred to therein or annexed thereto.
- The Contractor shall give notice to the Supervisor of the required inspection not less than 48 hours before the inspection is required.
- The Employer will not provide any materials or facilities for the use of the Contractor, to perform tests and inspections.

3.5.5 Take over procedures

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

3.5.6 Access given by the *Employer* for correction of Defects

- The *Contractor* complies with the following constraints and procedures of the *Employer* where the *Project Manager* arranges access for the *Contractor* after Completion:
 - Access into areas already handed over by the Contractor for correction of any defect shall be subject to the approval of Port's Operations, and these times shall be communicated to the Contractor by the Project Manager.
 - The areas required by the Contractor will need to be temporarily barricaded by the *Contractor* before the *Contractor* commences with any corrective work.

3.5.7 The *Contractor* complies with the following constraints and procedures of the *Employer* where the *Project Manager* arranges access for the *Contractor* after Completion:

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

3.5.8 Performance tests

- The *Contractor* performs the following performance tests after Completion of the installation.
 - The *Contractor* shall be required to measure and record the lighting levels at all areas/zones progressively as the *works* are completed within those areas/zones in the presence of the *Employer's* Engineers. The lighting level shall be measured in a 5m x 5m matrix format.

4 Plant and Materials Standards and Workmanship

4.1 Plant and Materials

- The Contractor provides Plant and Materials for inclusion in the Works in accordance with the Standard Specifications and/or Project Specifications, unless otherwise stated elsewhere in the Works Information provided by the Employer. All Plant and Materials are new, unless the use of old or refurbished goods and/or Materials are expressly permitted as stated elsewhere in this Works Information or as may be subsequently instructed by the Project Manager.
- The Contractor replaces any Plant and Materials subject to breakages (whether in the Working Areas or not) or any Plant and Materials not conforming to standards or specifications stated and notifies the Project Manager and the Supervisor on each occasion where replacement is required.
- No Plant or Materials will be provided "free issue" by the Employer
- The Contractor provides all Plant and Materials necessary for the Works.
- The Contractor supplies all certification including test certificates, user manuals, maintenance manuals and data books with respect to Plant and Materials procured for the *Works*.

4.2 Investigation, Survey and Site Clearance

- The Contractor will be responsible for setting out the Works.

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

4.3 Civil Engineering

4.3.1 Standard Specifications applicable to the *Works*

- The SANS 1200 Series of Specifications are applicable to all Civil Engineering and Structural Works associated with this contract. The following interpretations and meanings shall apply:
 - In case of any conflict in interpretation, ambiguity or discrepancy between any SANS 1200 Specification (whether standard or written as a particular project specification) contained in the Works Information and the conditions of contract, the conditions of contract take precedence within the ECC3 contract.
 - In case of any conflict in interpretation, ambiguity or discrepancy between any SANS 1200 Specification (whether standard or written as a particular project specification) contained in this paragraph "Civil Engineering" of the Employer's Works Information and specific statements contained elsewhere in C3.1 Employer's Works Information, the specific statements contained elsewhere shall prevail, without prejudice to the Project Manager's express duty to resolve any ambiguity or inconsistency in the *Works* Information under ECC3 Clause 17.1.
- Within SANS 1200 A: GENERAL, the following amendments and interpretations shall apply:
 - Where the word or expression "Employer" is used, read "Employer";
 - Where the word or expression "Contractor" is used, read "Contractor";
 - Where the word or expression "Engineer" is used, read "Project Manager" or "Supervisor" as the context requires;
 - Where the word or expression "schedule of quantities" is used, this is deleted in entirety. Assessment and payment is in accordance with the conditions of contract (and the ECC main and secondary options stated therein);
- Within SANS 1200 A: GENERAL 2.3 DEFINITIONS, the following apply:
 - "Acceptable. Approved (Approval)" is interpreted as either a *Project Manager* or a *Supervisor* communication or instruction in relation to *Works* Information compliance, consistent with the *conditions of contract* as the context requires;
 - "Adequate" is deleted. The Project Manager notifies the Contractor where the Contractor has not complied with the Works Information;
 - "Measurement and payment" and the further definitions contained within 6.3 c) are deleted. Assessment and payment is in accordance with the conditions of contract (and the ECC main and secondary options stated therein);
- Within SANS 1200 A: GENERAL 2.6 APPROVAL, the following applies:
 - "Approval" by either the Project Manager and/or the Supervisor is without prejudice to ECC Clause 14.1 and, inter alia, ECC Clauses 13.1, 14.3 and 27.1.

- SANS 1200 A: GENERAL 2.8 ITEMS IN SCHEDULE OF QUANTITIES, is deleted in entirety. Assessment and payment is in accordance with the conditions of contract (and the ECC main and secondary options stated therein).
- SANS 1200 A: GENERAL 3.2 STRUCTURES AND NATURAL MATERIAL ON SITE, applies only to the extent that it is consistent with relevant paragraphs of C3.1 Employer's Works Information.
 - Within SANS 1200 A: GENERAL 7.1 PLANT, the following applies:
 - Where the word or expression "Plant" is used, read "Equipment".
- SANS 1200 A: GENERAL 7.2 CONTRACTOR'S OFFICES, STORES AND SERVICES, applies but the *Project Manager* resolves any inconsistency with statements included within C3.1 *Employer's Works Information*.
- SANS 1200 A: GENERAL 3.1 SURVEY, applies only to the extent that it is consistent with relevant paragraphs of C3.1 *Employer's Works Information*.
 - Within SANS 1200 A: GENERAL 3.2 WATCHING, BARRICADING, LIGHTING AND TRAFFIC CROSSINGS, the following applies:
 - Where the word or expression "specification" is used, read "*Works Information*".
- SANS 1200 A: GENERAL 3.4 PROTECTION OF OVERHEAD AND UNDERGROUND SERVICES applies only to the extent that it is consistent with the specific statements made elsewhere in C3.1 *Employer's Works Information* and in any case and at all times consistent with the *conditions of contract*.
 - Within SANS 1200 A: GENERAL 5 TESTING, the following applies:
 - Where the word or expression "Engineer" is used, read "*Supervisor*".
- SANS 1200 A: GENERAL 8 MEASUREMENT AND PAYMENT, is deleted in entirety. Assessment and payment is in accordance with the conditions of contract (and the ECC main and secondary options stated therein).
- The principles, meanings and interpretation stated and established within paragraphs 6.3.1 to 6.3.15 with respect to SANS 1200 series and to SANS 1200 A: GENERAL equally apply to the other SANS 1200 specification references [state particulars of SANS 1200 used] used within this paragraph 6.3 of C3.1 *Employer's Works Information*.

4.3.2 General Civil Works

4.3.2.1. Scope of Work

- The Contractor shall construct all Civil works including excavations and works to hardstand areas where required in accordance with this section and all other relevant Standards and Specifications even though not necessarily explicitly mentioned herein.
- The Contractor shall construct all Civil works including excavations and works to hardstand areas where required in accordance with this section and all other relevant Standards and Specifications even though not necessarily explicitly mentioned herein

| | |
|-----------------|----------------------------------|
| SANS 1200 DA - | Earthworks (small works) |
| SANS 1200 DB - | Earthworks (pipe trenches) |
| SANS 1200 MFL - | Base (light pavement structures) |

4.3.2.2. Existing services

- Refer to clause 3.1.22

4.3.2.3. Site Clearance, Earthworks & Layer works

4.3.2.3.1. *Scope of Work*

- The works for the site clearance, earthworks and layer works where the contractor is required to trench and lay sleeves etc. according to the Works Information, includes the following:
 - Clearing of Site
 - Exposing of existing services where required
 - Reconstruction of layerworks where disturbed by the contractor.
 - The contractor to make good of the site as it was before they did any construction or site works.
 - Construction of kerbs, fillet and channels where disturbed by the contractor.
 - Grassing and final landscaping where the contractor has disturbed existing greenery.
 - And any other work arising out of or incidental to the above, or required of the Contractor for the proper completion of the works.
 - All haul within the site boundary shall be treated as free-haul.

4.3.2.3.2. *Supporting Specifications*

| | |
|--------------|-------------------------------|
| SANS 1200 C | Site Clearance |
| SANS 1200 D | Earthworks |
| SANS 1200 DB | Earthworks (pipe trenches) |
| SANS 1200 DM | Earthworks (roads, sub-grade) |
| SANS 1200 LC | Cable Ducts |
| SANS 1200 LG | Pipe Jacking |
| SANS 1200 M | Roads General |
| SANS 1200 MM | Ancillary roadworks |
| SANS 1200 MH | Asphalt surfacing |
| SANS 1200 LB | Bedding |
| SANS 1200 MF | Base |
| SANS 1200 MK | Kerbing and Channelling |
| SANS 1200 MJ | Segmented paving |

SANS 1200 ME Subbase

4.3.2.3.2.1. Earth Works (SANS 1200D)

- Notwithstanding the provisions of sub clause 3.1, the materials excavated will not be classified for the purposes of measurement and payment. The unit rate for excavation shall cover excavation in all materials other than hard rock.

4.3.2.3.3. Spoil site

- All excess material shall be spoiled off site in an approved landfill site and proof of safe disposal shall be submitted to the *Project Manager* obtained by the *Contractor*. The *Contractor* is to allow for everything necessary to load, haul, tip, and spread and compact if necessary. Spoiling on Transnet property shall not be permitted unless a specific authority is obtained in writing. The *Contractor* shall provide written confirmation that permission has been obtained from the operator /owner of the spoil site that they have accepted the material and all obligations in regarding to the spoiling of material has been met.
- Where hazardous or contaminated material needs to be spoiled, the *Contractor* shall do so at an approved disposal site. The *Contractor* shall be responsible for receipt of a spoil certificate from the spoil site, which he shall copy to the *Project Manager* and to be kept in the *contractor environment file*.
- The *Contractor* shall indemnify the *Employer* against any claims resulting from the execution of the works regarding spoiling of materials.

4.3.2.3.4. Exposing existing services

- Refer to clause 3.1.22

4.3.2.3.5. Excavation

4.3.2.3.5.1. Cable Crossing at Rail Tracks

The *works* include areas where electrical cables will be required to cross under rail tracks as indicated on the drawings. These will be installed through a 110mm diameter HDPE cable duct sleeve using trenchless methodology. In executing the works, the *Contractor* shall comply with Technical Standard

SASTT-TS-TT3:2017, Edition 1 for trenchless construction works. This document is attached within annexures for ease of reference.

The in-situ materials is expected to be medium dense sandy to slightly cohesive soils and gravel. Available historical geotechnical information is provided in the Site Information Part C4. This may not cover the full extent of the works but may assist the *Contractor* in determining the ground conditions. The *Contractor* shall further determine the conditions by evaluating the entry and exist pits.

Sleeves are to be placed at approximately 1m below surface level. It is envisaged that the length of the sleeve will not be longer than 10m at any one point. The placed sleeve shall be continuous (no joints) and not deviate by more the 100mm from line and level.

The *Contractor* will be required to search for existing services before any trenchless activities take place. When working under rail lines, the *Contractor* shall comply with E7/1 specification attached under annexure B in the document. The *Contractor* must take caution to prevent the formation of voids formed between the sleeve and the surrounding soils in order to prevent any settlement of the trench. Should this occur, the *Contractor's* remedial work methodology to plug the void must be accepted by the *Project Manager*.

The *Contractor* shall be responsible for any temporary works design as they may deem fit for the installation of the service. Temporary designs must be undertaken by a registered Professional Engineer. All designs must be submitted to the *Project Manager* for acceptance. Acceptance of the design by the *Project Manager* in no way diminishes the responsibility of the *Contractor* to provide the design. The *Contractor* is entirely responsible for choosing the appropriate methodology, equipment and resources to successfully install the cable duct sleeves and meeting the requirements of the works information and project objectives.

- The *Contractor* is required to excavate the site area to levels as indicated in the Civil Drawings and other drawings as contained in the List of Drawings.

Unrestricted excavation conditions expected to be encountered classify as "soft excavation" in terms of SANS 1200D: Earthworks.

- Excavations below about 1.0 metre depth will generally be unstable – as such, allowance should be made for temporary lateral support.

- **Materials**

- 4.3.2.a..1 **Disposal of Material**

4.3.2.a..1.1 All vegetation, trees, etc. resulting from site clearance shall be removed off site to a disposal dump and a list of TNPA waste service providers will be provided to the *Contractor*. *Contractor* to use only the approved TNPA waste services providers and waste to be disposed at a registered landfill site. The haulage, dump costs and any levies etc. shall be deemed to be included in his tendered rates. Burning of materials on site shall not be permitted.

- 4.3.2.a..2 **Imported Backfill material**

4.3.2.a..2.1 Backfill material shall be selected from a registered commercial source (or cut to fill material where the in-situ material meets the criteria specified and placed in 100 – 200mm layers provided the compaction effort is achieved. No clay shall be used as backfill.

- 4.3.2.a..3 **Subgrade**

4.3.2.a..3.1 A 150mm G7 sub- base shall be imported from a commercial source. The layer shall be compacted 150 mm layers to 95 % Mod AASHTO density complying with SANS 1200 DM.

4.3.2.a..4 **Sub-base**

4.3.2.a..5 A 150mm G5 sub- base shall be imported from a commercial source. The layer shall be compacted 150 mm layers to 95 % Mod AASHTO density complying with SANS 1200 DM.

4.3.2.a..6 **Base**

4.3.2.a..6.1 The base layer shall be 150mm thick using a G2 graded crushed stone, compacted to 98% MOD AASHTO density. The tolerance on the base levels will be -10mm to 0mm.

4.4 **Structural Works**

4.4.1 **Concrete, Formwork and Reinforcement**

- Specifications for concrete**

4.4.1.a..1 The following specifications shall apply:

4.4.1.a..2 NB: All in situ concrete work (mass and reinforced) shall comply with SANS Specification 1200G ("8 Measurement and Payment" is not applicable) supplemented by the clauses in this section. Where SANS Specification 1200G and the clauses in this section are in conflict the clauses in this section shall take precedence.

4.4.1.a..3 In addition the "Model Preambles for Trades" as recommended and published by the Association of South African Quantity Surveyors, 1999 Edition, shall be read in conjunction with and shall apply to all items in the Bill of Quantities not covered by the 'SANS Standardised Specifications' SANS 1200 Series.

4.4.1.a..4 Where the term "plain concrete" appears in SANS Specification 1200G it shall be read as "mass concrete".

| | |
|-------------------|--|
| SANS 1200 G | Concrete |
| SANS 2001: CC1 | Construction <i>Works</i> : Concrete <i>Works</i> (Structural) |
| SANS 1083: 2006 | Aggregates from natural sources |
| SANS 10100-2:2000 | The Structural use of concrete – Part 2: Materials and execution of work. |
| SANS 50197-1:2000 | Cement – composition, specifications and conformity criteria. Part 1: Common cements |
| SANS 1491-1:2005 | Portland cement extenders – Part 1 Ground granulated blast furnace slag. |
| SANS 1491-2:2005 | Portland cement extenders – Part 2 Fly ash. |
| SANS 1491-3:2006 | Portland cement extenders – Part 3 Condensed Silica Fume |
| S420 (Transnet) | Specification for Concrete work |

- Cement**

Common cements, complying with SANS 50197-1 shall be used for all concrete work. On no account shall masonry cements be used for concrete work, even if the strength designations are the same as for common cements.

The *Supervisor* for test purposes may require samples of cement from any one, or from every consignment. Cement in any consignment from which a sample may have been taken for testing shall not be used until it has been approved. Allowance must be made for possible delay in that tests may take 10 days to carry out.

Bags of cement shall be stacked in a waterproof, solidly constructed shed with a central door and a floor rendered damp-proof with a tarpaulin. The bags of cement shall be closely stacked (but not against walls) in order to reduce air circulation in such a manner that the cement is used in the order in which it was received, i.e. first in first out.

4.4.1.a..1 Alkali reactive concrete

- 4.4.1.a..1.1 Alkali Reactive Aggregates shall not be used in this project. The equivalent Na₂O content of the concrete shall not exceed 2, 0 kg/m³ where % Na₂O equivalent = % Na₂O + (0,658 x %K₂O)

4.4.1.a..2 Aggregates

- 4.4.1.a..2.1 Fine and coarse aggregate shall comply with the relevant clauses of SANS 1083. Where aggregates have constituents, which in the opinion of the *Project Manager*, may give rise to damage due to alkali-aggregate reactions, the provisions of 6.3.3.3 shall be applicable.
- 4.4.1.a..2.2 Evidence of compliance of the aggregates with the requirements of 6.3.3.1 & 6.3.3.2 shall be furnished as early as practical. No aggregate shall be delivered for use in the *Works* until approval is given.
Sand (fine aggregate):
- 4.4.1.a..2.3 The fine aggregates shall comply with the requirements of SANS Specification 1083. Other aggregates may be approved if they have a satisfactory history and / or test results.
- 4.4.1.a..2.4 No aggregate may be used until it has been approved. Samples having a mass of 25kg (16.5 litres) of the proposed aggregate to be used may be required by the *Supervisor* for test purposes. Samples having a mass of 25kg shall be forwarded every 3 months during concreting work and also if the source of supply is changed. Allowance must be made for possible delay in that the tests may take 14 days to carry out.

4.4.1.a..3 Admixtures

- 4.4.1.a..3.1 Admixtures containing chlorides will not be permitted in reinforced concrete.

4.4.1.a..4 Cover blocks

- 4.4.1.a..4.1 Cover blocks used to ensure the cover to reinforcement shall be made of cement mortar.
- 4.4.1.a..4.2 Cover blocks shall be dense and have a minimum 28 day crushing strength of 30 MPa and shall be cured in water for at least 14 days before being used.
- 4.4.1.a..4.3 Cover/spacer blocks made of plastic will not be permitted

• **Concrete quality**

Prior to the start of any concrete work on site, the *Contractor* shall submit a quality assurance plan which will ensure compliance with specification and provide acceptable documentary evidence that all specified operations have been carried out satisfactorily.

Where the minimum dimension to be placed during a single pour is larger than 600mm, and the cement content of the reinforced concrete exceeds the following:

| | | |
|--------------------------------|---|-----------------------|
| Cement Types I and II/ * S | : | 400 kg/m ³ |
| Cement Types II/B-V and II/B-W | : | 450 kg/m ³ |

The *Project Manager* may require that measures be instituted to reduce heat development in the concrete.

4.4.1.a..1 **Unreinforced concrete**

4.4.1.a..1.1 Class A Concrete

4.4.1.a..1.2 Filling to cavity of hollow walls.

4.4.1.a..2 **Unreinforced concrete cast against excavated surfaces**

4.4.1.a..2.1 15 Mpa/19mm Concrete

4.4.1.a..2.2 Surface blinding under footings and bases.

4.4.1.a..3 **Reinforced concrete**

4.4.1.a..3.1 30 MPa/19mm Concrete:

4.4.1.a..3.2 Bases

4.4.1.a..3.3 Foundation beams.

4.4.1.a..3.4 Surface beds cast in panels on waterproofing

4.4.1.a..3.5 Walls in foundations (Provisional)

4.4.1.a..3.6 Columns in foundations (Provisional).

- **Batching**

4.4.1.a..1 All cementitious binders shall be matched by full sack or by mass batching with approved precision weighing equipment.

4.4.1.a..2 All aggregates shall be precisely measured by mass using approved precision weighing equipment, unless otherwise permitted by the *Project Manager*.

4.4.1.a..3 Should any variation in the composition of the aggregate become apparent, the *Project Manager* shall be notified and a further sample of aggregate submitted immediately for his approval.

- **Concrete placing**

4.4.1.a..1 The size, shape and depth of any excavation shall be approved by the *Project Manager* before concrete is placed.

4.4.1.a..2 Unless otherwise permitted by the *Project Manager*, no concrete shall be placed until the fixed reinforcement has been accepted by him and confirmed in writing by way of a release certificate.

- **Construction joints**

4.4.1.a..1 Unless otherwise shown on the drawings, the exact position of horizontal construction joints shall be marked on the formwork by means of grout checks in order to obtain truly horizontal joints.

4.4.1.a..2 Stub columns, stub walls and stays on footings shall be cast integrally with the footing and not afterwards, even where another class of concrete is being used.

4.4.1.a..3 Joint lines shall be so arranged that they coincide with features of the finished work.

4.4.1.a..4 Where new concrete is to be cast against a hardened concrete surface, neat cement slurry mixed to a creamy consistency shall be brushed onto the cleaned concrete surface.

4.4.1.a..5 Contraction joints shall be smooth and shall have one coat of limewash or PVA applied to the older surface prior to casting the fresher concrete.

- **Grouting**

4.4.1.a..1 25 MPa non-shrink cementitious grout:

4.4.1.a..2 Bedding approximately 25mm thick under base plate including chamfered edges all round.

- **Curing compound**

Unless otherwise directed by the *Project Manager*, the curing compound shall be:

An approved trafficable, resin-based, white pigmented, membrane forming for slopes flatter than 1:1.

An approved clear, aesthetically acceptable, membrane forming for all other concrete surfaces, including beam and slab soffits.

The curing compound shall comply with specification ASTM C309, except that the maximum permissible water loss in the test shall be 0, 40 kg/m².

Alternatively, the curing compound shall be acceptable if the treated concrete retains 90% or more of its mixing water when subject to the test set out in BS 8110 Part 1 – Chapter 6.6.

4.4.1.a..1 **Curing compound application**

4.4.1.a..1.1 The total application rate of the curing compound shall be the greater of the supplier's specification or 0.90 l/m². On textured concrete surfaces, the total application rate shall be 0.90 l/m².

4.4.1.a..1.2 In cases of concrete surfaces with run-off problems, it may be necessary to apply more than one coat of membrane forming curing compound to obtain the specified total or cumulative application rate.

4.4.1.a..1.3 Curing in accordance with SANS 1200 G shall commence on all concrete surfaces as soon as it is practical in the opinion of the *Project Manager*.

4.4.1.a..1.4 On unformed surfaces the curing compound shall be applied after finishing and as soon as the free water on the surface has disappeared and no water sheen is visible, but no so late that the liquid curing compound will be absorbed into the concrete.

4.4.1.a..1.4.1 On formed surfaces, the exposed concrete shall be wet with water immediately after the forms are removed and kept moist until the curing compound is applied.

4.4.1.a..1.4.2 Application of the curing compound shall begin once the concrete has reached a uniformly damp appearance with no free water on the surface.

4.4.1.a..1.4.3 Application of the compound may be done by hand or power spray.

- 4.4.1.a..1.4.4 The compound shall be applied at a uniform rate with two applications at right angles to each other to ensure complete coverage.
- 4.4.1.a..1.4.5 Pigmented compounds, without a thixotropic agent, shall be adequately stirred to assure even distribution of the pigment during application.
- 4.4.1.a..1.4.6 Unless otherwise directed by the *Project Manager*, the initial 24 hour curing of concrete surfaces not covered by formwork shall be carried out by ponding, covering with constantly wetted sand or mats, or continuous spraying in accordance with SANS 1200 G when the following climatic conditions occur:

Wind velocity greater than 5 m/s
and/or
Ambient temperature is above 25 °C
and/or
The relative humidity is below 60 %

- 4.4.1.a..1.4.7 If plastic shrinkage occurs, the concrete, while still plastic, shall be re-vibrated, floated and re-coated with curing compound as if no curing has previously taken place.

4.4.1.a..2 **Curing period**

- 4.4.1.a..2.1.1 The curing period for concrete containing only CEM 1 shall be 7 days.
- 4.4.1.a..2.1.2 The curing period for concrete containing CEM 1 plus cement extenders (MGBS, FA) shall be 10 days.
- 4.4.1.a..2.1.3 The curing period will start on completion of the concrete pour and for formed surfaces shall be included the time for which forms are still in place after the pour.

- **Concrete records**

The *Contractor* shall maintain the following daily records for every part of the concrete structure and shall make these available at all times during the progress of the work for inspection by the *Project Manager*.

- The date and time during which concrete was placed
- Identification of the part of the structure in which the concrete was placed
- The mixed proportions and specified strength
- The type and brand of cement
- The slump of the concrete
- The identifying marks of test cubes made
- Curing procedure applied to concrete placed
- The times when shuttering was stripped and props removed
- The date of despatch of the cubes to the testing laboratory
- The test results

The records shall be delivered to the *Project Manager* each week except in the case of sub-standard concrete, when the *Project Manager* shall be informed immediately.

4.4.1.a..1 **Tolerances**

- 4.4.1.a..1.1 Deviations shall be within the limits listed in SANS 1200 G for degree of accuracy II unless otherwise specified

4.4.1.a..2 **Testing and monitoring**

4.4.1.a..2.1 Frequency of sampling and testing shall be as specified in SANS 1200 G.

4.4.1.a..3 Cost of tests

4.4.1.a..3.1 The costs of making, storing and testing of concrete test cubes as required under clause 7 'Tests' of SANS 1200 G shall include the cost of providing cube moulds necessary for the purpose, for testing costs and for submitting reports on the tests to the *Project Manager*. The testing shall be undertaken by an independent firm or institution nominated by the *Contractor* to the approval of the *Project Manager* (Test cubes are measured separately)

4.4.1.a..3.2 If the quantity of concrete from which samples were taken exceeds 40 m³, it shall be subject to the testing of a minimum of 3 sets of samples per day from each grade of concrete placed in each independent structure

4.4.1.a..3.3 If the quantity of concrete from which samples were taken is less than 40 m³, it shall be subject to the testing of a minimum of 2 sets of samples per day from each grade of concrete placed in each independent structure.

4.4.1.a..3.4 If the *Contractor* disputes the results of the tests on concrete cubes, the concrete represented by the cubes will be considered acceptable if the *Contractor*, at his own cost, proves to the satisfaction of the *Project Manager* that the estimated actual strength of cores taken from the structure, determined in accordance with SANS Standard Method SM 856, is not less than the specified strength.

4.4.1.a..3.5 If the strength of the concrete fails to meet the acceptance criteria stipulated, the *Project Manager* may in his sole discretion and in addition to the options listed in SANS 1200 G:

- Accept the concrete subject to approved remedial measures being undertaken by the *Contractor*; or
- Permit the concrete to remain subject to the payment of a penalty

4.4.1.a..3.6 The penalty referred to will be determined as follows:

$$\text{Penalty} = V \times R \times F$$

Where

V = Volume (in the opinion of the *Project Manager*) of concrete of unsatisfactory strength represented by the test result.

R = Relevant scheduled rate

$$F = 1 - \sqrt{\frac{\text{Average strength of unsatisfactory concrete}}{\text{Specified strength} + 6 \text{ MPa}}}$$

Where the relevant scheduled rate (R) includes the cost of formwork or

$$F = 1 - \frac{\text{Average strength of unsatisfactory concrete}}{\text{Specified strength} + 6 \text{ MPa}}$$

Where the relevant scheduled rate (R) excludes the cost of formwork or where no formwork was involved.

4.4.2 Formwork

Descriptions of formwork shall be deemed to include use and waste only (except where described as left in or permanent), for fitting together in the required forms, wedging, plumbing and fixing to true angles and surfaces as necessary to ensure easy release during stripping and for reconditioning as necessary before re-use

Formwork to sides of bases, pile caps, ground beams, etc. have been measured provisionally and will only be paid for where it is specifically prescribed by the *Supervisor* for design reasons. Formwork necessitated by irregularity or collapse of excavated faces will not be measured and the cost thereof shall be deemed to be included in the allowance for taking the risk of collapse of the sides of the excavations, provision for which is made in Earthworks

a) Rough formwork (degree of accuracy ii)

- Rough Formwork to Sides:
 - Strip footings.
 - Bases.
 - Walls in foundations.
 - Outer face of walls flushes with perimeter of concrete structure.
 - Rectangular columns in foundations.
 - Edges not exceeding 300mm high
 - Rough Formwork to Circular Columns

b) Smooth formwork (degree of accuracy ii)

- Smooth Formwork to sides:
 - Inner face of shaft walls.
 - Edges not exceeding 300mm high

c) Reinforcement (provisional)

High tensile steel reinforcement to structural concrete work:
In various diameters and lengths
Mild steel reinforcement to structural concrete work
In various diameters and lengths
High tensile steel reinforcement to structural concrete work
Fabric reinforcement:
Fabric reinforcement type as specified on structural drawings.

d) Bagged Finish to Concrete

- Concrete surfaces to receive bagged finish shall be prepared by removing sharp projections and making good defects with 3:1 cement mortar. Finish by rubbing over the whole area with wet rough sacking and cement grout to obtain an even surface.

e) "No Fines" Concrete

- "No-fines" concrete, for grading flat concrete roofs and the like to falls, shall be in the proportion of 12 parts 19 iron cubical stone to 1 part cement mixed with 20 litres water per bag of cement and be laid to falls of not less than 15mm per linear metre for mastic asphalt and not less than 20mm per linear metre for sheet roof covering. For heavy load applications special mix designs may be required.

4.4.2.e.1 Fillets against up stands:

4.4.2.e..1.1 Form triangular fillets, size 100 x 100mm, in corners with walls, kerbs, etc. neatly mitred at angles, stopped where necessary and finished smooth ready to receive waterproofing.

4.4.2.e..2 To raised floor, bases, etc.:

4.4.2.e..2.1 No-fines" concrete for raised floors, bases, etc. shall be in the proportions specified. Finished smooth with 3:1 sand/ cement screed to receive waterproofing.

4.4.3 **STEEL WORK**

a) Codes and Standards

| | |
|------------|--|
| SANS 10094 | The use of high strength friction grip bolts and nuts |
| SANS 135 | ISO metric bolts, screws and nuts (hexagon and square) (coarse thread free fit series) |
| SANS 136 | ISO metric precision hexagon-head bolts and screws, and hexagon nuts (coarse thread medium fit series) |
| SANS 435 | Mild steel rivet |
| EEAM-Q-008 | Specification for corrosion protection |

b) Structural Steelwork

- All structural steelwork shall be such as to provide a robust and rigid structure requiring the minimum of maintenance and providing a long service life.
- Non-hollow structural sections and plate used on the structure, in conjunction with the hollow section framework, must comply with the relevant requirements of this specification.
- All steel sections shall be manufactured in accordance with the following standards :-

| | |
|--|--------------------|
| Weldable structural steel: | BS 4360/SANS 50025 |
| Structural steel, hot rolled sections: | BS 4 Part 1 |
| Hot finished hollow sections: | BS 4848 Part 2 |
| Cold formed sections: | BS 6363 |
| Steel castings: | BS 3100 |

c) Fasteners

- All bolts, nuts and rivets shall be manufactured in accordance with the following standards:
- | | |
|---|------------|
| Commercial bolts and nuts Grade 4.6: | SANS 135 |
| Precision bolts and nuts Grade 8.8: | SANS 136 |
| Friction Grip Bolts and nuts Grade General: | SANS 10094 |

Rivets:

SANS 435

- All friction grip fasteners shall be hot dip galvanised, including high tensile bolts (and their nuts and washers), structural rivets and Huck bolts.
- All holding down bolts and nuts and brackets, as well as all fixing bolts, studs, nuts and washers shall be of stainless steel. Fixing rivets shall be of either stainless steel or brass.
- Bolts and set screws shall be locked in an approved manner and shall not be stressed in tightening to beyond the recommended loads.
- The quality of friction grip bolts, nuts and washers, bolt lengths, sizes of holes, tightening standards, surface condition of clamped components, shop and site assembling and acceptance inspection of friction grip joints shall comply with the latest edition of SANS 10094. Certificates shall be supplied for all bolts of grade 8.8 and 10.9.
- All bolt and rivet holes must be accurate to size and location, the centres of holes shall not be placed nearer the edge of a plate than 1,5 diameters with an extra allowance of 3mm for sheared edges. All holes in the structural work shall be drilled or otherwise punched to a diameter not exceeding 1,5mm less than the diameter of the finished hole on the die side, and afterward reamed out to the exact size
- Where possible the adjoining parts forming a connection shall be drilled or reamed together, with holes not exceeding 1,5 mm diameter the rivet or bolt for which it is made. No rough or broken edge shall be left around any of the holes.
- For turned and fitted bolts, the holes shall be accurately drilled or reamed; the diameter of the hole shall not exceed the finished diameter of the bolt by more than 0,25mm.
- The holes, after assembly of the parts, shall be true throughout the thickness of all the parts and perpendicular to the axis of the member.
- Rivets shall be cup-headed or countersunk as required, unless otherwise specified. No rivet head shall contain less metal than does a length of the rivet equal to 1,25 times its diameter. All loose and defective rivets shall be cut and replaced by sound ones; also others when required for the purpose of examining the work. Rivets shall be driven with pressure tools whenever possible and pneumatic hammers shall be used in preference to hand driving.
- All field rivets must be supplied with shanks of suitable length for pneumatic riveting.
- Bolts shall be of such a length as to accommodate a full nut when tightening up, and project at least two thread pitches beyond the nut. Excessive projection of threads beyond the nuts should be avoided.
- All bolts having countersunk heads shall have strong feathers forged on the neck and head to prevent turning and the bolt holes shall be cut to receive same. All nuts and bolts (excluding countersunk bolts) shall be furnished with circular washers of sufficient thickness, the outside diameter being at least twice the nominal diameter of the bolt, and washers fitted correctly.
- Where bolt heads or nuts are seated on bevelled surfaces of beams or channel flanges, bevelled washers must be inserted.

4.4.4 **CORROSION PROTECTION (SPECIFICATION HE9/2/8 - [Version 16] - July 2002)**

a) Scope

- Corrosion protection of Structural steelwork in coastal area (within 10km from coast).

b) Specifications

- The specification covers requirements for protective coating of iron and steel structures, electrical motors, gear boxes etc. against corrosion and must be read in conjunction with the main specification as well as the following (latest editions):
 - SANS 10064 "Preparation of steel surfaces for coating"
 - SABS 121 "Hot-dip (galvanized) zinc coatings"
 - SANS 1091 "National colour standards for paint"
 - BS 5493 "Code of practice for protective coating of iron and steel structures against corrosion"

c) Types of Corrosion Protection to be used.

- The coatings specified in this specification are chosen according to BS 5439, Table 3, part 9, to ensure that the condition of the surface will be at least RE2 on the European scale of degree of rust, after 10 years in an environment of frequent salt spray, chemicals and polluted coastal atmosphere. During the 10 years, the normal maintenance painting will be done.
- The paint manufacturer shall guarantee the paint for at least 10 years.
- Should a tenderer wish to offer coating systems other than those specified, as an alternative, he shall submit full technical details and a list comparing all appropriate details of the alternatives proposed, with the original specified.
- Tenderers must ensure that the different coats they offer in their tenders are compatible with each other.
- The coating of proprietary items must be done according to Clause d.
- All galvanized components including bolts and nuts but excluding walkway gratings, must be painted with the specified system, unless otherwise approved.
- The coating systems to be used must be as per EEAM-Q-008 Specification for Corrosion Protection.
- The paint manufacturer's recommendations for the application of the different coating systems, curing time before handling or application of subsequent coats, health and safety recommendations etc. must be carefully adhered to.
- Paint contractors must have a quality management system which must be submitted to the *Project Manager* for approval before commencement of the work.
- Galvanizing shall be done to SANS 121 heavy duty hot dip galvanizing to a thickness of at least 85µm. Electroplated components in zinc or cadmium are not acceptable.

- All mounting bolts, nuts, washers and brackets as well as all fixing bolts, studs nuts and washers shall be of stainless steel. Fixing rivets shall be of either stainless steel or brass.
- High tensile bolts for friction grip joints must be hot dip galvanized and painted. High tensile bolts must be certificated after galvanizing.
- The full paint system shall be applied to all surfaces which are to be covered with wear pads, linings etc.
- For steelwork which will be transported over long distances and erected on site the two pack epoxy primers is preferred.

d) Propriety Items

- Proprietary items must either be painted according to this specification or where the coating system is equal to or exceeds this specification sufficient proof of the coating system applied must be provided. Items which are nearly equal to this specification shall be given a finishing coat according to this specification's thicknesses and final colours and to the following procedure:
- 4.4.4.d..1 A cross cut test must be done to SANS SM159 to determine if the original coating adheres correctly to the substrate;
- 4.4.4.d..2 The original coating shall be rubbed down to remove any smooth finishing to form a suitable key for the finish coat and any damaged areas prepared and patch primed with a suitable primer;
- 4.4.4.d..3 The item must then be detergent washed to remove any foreign matter, taking care that no dust, solvent etc. contaminates any working part of the item;
- 4.4.4.d..4 A test shall be done on the existing coat to ensure that the finish coat will not react with and cause undue dissolving and lifting of the existing coat. This can be done by applying a small quantity of the finishing coat thinners.
- 4.4.4.d..5 Should any undue dissolving or lifting occur, a suitable intermediate or barrier coat must be applied before the finishing coat is applied.
- 4.4.4.d..6 Proprietary items which failed the cross cut test and which generally have inadequate protection shall be dismantled and the full corrosion protection specification applied.

e) Surface Preparation

- 4.4.4.e..1 All steel surfaces shall be detergent washed and fresh water rinsed to remove all oil, grease and surface contaminates before shot blasting.
- 4.4.4.e..2 Sharp edges shall be radiused and major roughness of welds shall be removed by grinding. Welding spatter and flux shall be removed.
- 4.4.4.e..3 Components manufactured from hot rolled steel sections and steel plate shall be blast cleaned to base metal in accordance with SANS 10064 grade SA2½ - very thorough blast cleaning, to remove all mill scale, rust, weld spatter etc.
- 4.4.4.e..4 " Sharp" chilled iron shot, chilled iron grit, or granular abrasive slag is to be used to produce a proper degree of surface roughness.
- 4.4.4.e..5 Blast profile shall be determined by micrometre profile gauge, Keane-Tator surface profile comparator or Testex press-o-film.

- 4.4.4.e..6 The profile height shall be between 40 and 50µm at any point.
- 4.4.4.e..7 Good quality blast cleaning and spray painting equipment shall be used. Air used for spraying and blast cleaning shall be free from all traces of oil, water and salinity. Water and oil traps must be fitted to all equipment.
- 4.4.4.e..8 When wet blasting is done the primer shall be applied before oxidization starts or surface contamination occurs.
- 4.4.4.e..9 Components manufactured from 3CR12 steel shall be lightly abraded. The components shall then be passivized by using a mixture of 10 - 15% nitric acid in water which is rinsed off after 10 - 15 minutes. The surface shall be neutralized to pH 7 before it is coated.
- 4.4.4.e..10 Hot-dip galvanized components, galvanized bolts and nuts etc. shall be lightly abraded with a galvanizing pre-cleaner. The components shall then be washed with detergent and water and washed down with clean water until a water break free surface is achieved. Allow to dry thoroughly.

f) Joints and Mating Surfaces of Members

- 4.4.4.f..1 Mating (faying) surfaces of members which have to be joined by high tensile steel bolts in friction grip shall be cleaned according to Clause 4 and painted with primer only.
- 4.4.4.f..2 After being assembled joints so formed shall be seal welded and painted or after the intermediate coat was applied the edges shall be sealed with an approved brand of paintable flexible sealant or mastic (e.g. Butyl rubber, polyurethane sealer or two component epoxy), by means of a suitable caulking gun.
- 4.4.4.f..3 All rivets, bolts, welds, sharp edges etc. must be covered with a "stripe coat" of the primer or intermediate coat specified to ensure the correct dry film thickness on sharp edges, as well as sealing of bolt threads to head etc.
- 4.4.4.f..4 All other mating surfaces must be sealed with an approved brand of flexible Butyl rubber, paintable Silicone, polyurethane sealer or two component epoxy sealer, and joined while still wet. All excess compounds must be completely removed.

g) Painting Procedures

- 4.4.4.g..1 Directly before the application of paint, the area to be painted shall be degreased with a suitable degreaser and left to dry.
- 4.4.4.g..2 Paint shall only be applied under the following conditions:
- There is adequate light.
 - The steel temperature is between 5 and 50°C and at least 3°C above the dew point of the air.
 - The relative humidity of the air is between the limits specified by the paint supplier.
 - Wind does not interfere with the method used and sand and dust cannot be blown onto wet paint.
- 4.4.4.g..3 Steelwork shall be supported on trestles, at least 900 mm off the ground for painting purposes.
- 4.4.4.g..4 An adequate number of test readings shall be taken per square meter in order to determine the dry film thickness.

- 4.4.4.g..5 The paintwork shall be acceptable if the average of the test readings taken falls within or exceeds the ranges given.
- 4.4.4.g..6 Paintwork shall not be acceptable if any single test reading is less than the specified minimum thickness.
- 4.4.4.g..7 An ultrasonic or electronic magnetic flux thickness measurement gauge shall be used, but in case of dispute, destructive testing shall be applied. The painted steelwork shall present a clean, neat appearance of uniform colour and gloss as applicable to the paint used. Each coat of paint shall be applied as a continuous, even film of uniform thickness. More than one application of paint may be required to achieve the dry film thicknesses specified or to obliterate the colour of the previous coating.
- 4.4.4.g..8 The use of thinners or solvents at any stage of the work is prohibited, unless specified by the paint manufacturer.
- 4.4.4.g..9 Precautions shall be taken to prevent coatings from being applied to equipment nameplates, instrument glasses, signs etc.

h) Colour Codes

- 4.4.4.h..1 Machinery and equipment shall be painted in the following final colours:

| Area | Colour | Code No. [SABS 1091 and International No's] |
|--|----------------------|---|
| Mobile equipment (cranes, loaders etc.) | | |
| a) Structure, machinery and electrical houses, operator's cabins, chutes, hoppers etc. | Transnet White | RAL 9016 |
| b) Undercarriage, travel bogies, rubber tyred rims | Transnet dark grey | RAL 7024 (Graphitgrau) SABS 1091 GO4 (Bluegrey) BS 381C-633 |
| Industrial buildings, conveyor structures | | |
| a) Roofs and canopies | Pantone cool grey 10 | RAL 7037 (Staubgrau) |
| b) Painted walls | Pantone cool grey 3 | RAL 7035 (Lightgrau) or SABS 1091 G62 (Pale grey) |
| c) Steel columns, rafters, trusses | Pantone cool grey 5 | RAL 7004 (Signalgrau) |
| General | | |
| a) Guards | Golden yellow | SABS 1091-B49 RAL 1003 |
| b) Sheaves | Orange | RAL 2008 |

| | | |
|--|---|-----------------------------|
| c) Cable reels (Stainless steel) | Orange | RAL 2008 |
| Machine buffers and parts of machine which could constitute a serious hazard | Golden Yellow (High Gloss) with Luminous green stripes in chevron pattern | SABS B49 and Luminous green |

| Area | Colour | Code No. [SABS 1091 and International No's] |
|---|-------------------------------------|---|
| e) Any exposed rotating part of machinery, electrical Switch-gear (other than starting and stopping devices and emergency stop control), electrical services e.g. conduit and allied fittings | Light Orange (High Gloss) | SABS 1091 B26 BS 381C-557 |
| f) Low voltage switchgear panels where orange is not aesthetically acceptable | Light grey | SABS 1091-G29 BS 381C-631 |
| g) Medium voltage cable trays, switchgear and motors (3,3 kV and up) | Oxford Blue | SABS FO2 BS 381C-105 RAL5003 |
| h) Starting devices, low voltage cable trays and switchgear | Mid Brunswick green (high gloss) | BS 381C-228 SABS1091-EO4 RAL6005 |
| i) Parts of stationary machinery (Electrical, motors, gearboxes, brakes, transformers, etc.) | Light Grey | SABS G29 BS 381C-631 |
| j) Hand levers, hand wheels, oiling points, handrails on walkways, ladders | Golden Yellow (High Gloss) | SABS 1091 B49 BS 381C-356 |
| k) Stopping devices, grease points , motor fan covers and danger signs (not symbolic safety signs for which see SABS 1186) | Signal red (High Gloss) | SABS 1091 A11 BS 381C-537 RAL3001 |
| l) Walkways (non slip surfaces) (galvanized gratings not to be painted) | Shop floor green | |
| m) Informatory signs and notices (not symbolic safety signs for which see SABS 1186) | White on Emerald Green (High Gloss) | White on SABS 1091 E14 BS 381C- 228 |

| Area | Colour | Code No. [SABS 1091 and International No's] |
|---------------------------|-----------------------------|---|
| Pipe lines | | |
| a) Reclaim water piping | Aluminium | |
| b) Slurry pipe lines | Dark admiralty grey | SABS 1091-G12 |
| c) Fire protection piping | Signal red | SABS 1091-A11 |
| d) Washwater drain pipes | Light grey | SABS 1091-G29 |
| e) Instrument air | White with Strong blue band | White and SABS 1091-F11 |
| f) Plant air | White with Flag blue band | White and SABS 1091-FO4 |
| g) Potable water | Grass green | SABS 1091-D14 |

4.4.4.h..2 Colour bands for pipes shall be 75 mm wide for pipe sizes up to 150 mm diameter and 100 mm wide for 150 mm and above. The colour bands shall be applied to the pipe flanges, valves, junctions, walls or structures etc. in such a manner that the pipe may be easily identifiable. On straight sections the maximum spacing shall be 100 x the pipe diameter.

i) Field Touch-up Painting

- 4.4.4.i..1 Damaged and unpainted areas, fasteners, welds, etc. shall be cleaned by wire brushing with hand tool or power tool in a manner which will minimize damage to sound paint. Grinding will not be allowed. Rust spots shall be cleaned to bright metal. Thick edges of old paint abutting on bare metal surfaces shall be feathered by scraping and sanding.
- 4.4.4.i..2 Where welding is required on areas already coated with the coating system, the coat should be stepped back for ± 30 mm around the weld area.
- 4.4.4.i..3 The paint shall be applied to match the original coats in accordance with the manufacturer's recommendations for the specific paint system.
- 4.4.4.i..4 Note: Inorganic zinc primers shall not be re-covered with an inorganic primer, but only with an organic zinc primer.
- 4.4.4.i..5 Areas of damaged galvanizing shall be repaired with an approved cold galvanizing product or metal sprayed by the wire spraying process with Zinc, and then touched up with the specific paint system.

j) General

- 4.4.4.j..1 All walkways, floors, maintenance platforms etc. must be painted with a durable, non-skid coating of the appropriate colour.
- 4.4.4.j..2 Exposed machined surfaces must be coated with a strippable corrosion inhibitor (e.g. Tectyl).
- 4.4.4.j..3 Where different materials will be in contact with each other and galvanic corrosion can occur the contact areas of the materials must be isolated from each other or the joints made water proof to prevent ingress of moisture.
- 4.4.4.j..4 All components must be designed with corrosion prevention in mind and specifically the following:
- No entrapment of dirt, product, moisture etc.
 - No areas must be inaccessible for maintenance such as too narrow gaps etc.
 - Large flat areas rather than complicated shapes and profiles.
 - No sharp corners and discontinuous welds.
- 4.4.4.j..5 Parts of equipment which are exposed to high temperatures must be coated as per specification EEAM-Q-008 Specification for corrosion protection

k) Maintenance Painting of Structures

Areas which are only lightly corroded must be cleaned by means of high pressure water blasting or wire brushing by power tool as per specification EEAM-Q-008 Specification for corrosion.

- Alternatively, the Noxyde paint system can be used, consisting of two to three coats of water based Noxyde paint to achieve a DFT of 350 to 400 microns. Where the Noxyde system is used on areas other than slightly corroded structural areas, the following additional requirements must be observed:
- 4.4.4.k..1 Very smooth surfaces (e.g. 3CR12, stainless steel or hot-dip galvanized components, bolts, nuts and fittings, and HT bolts): Parts must be thoroughly degreased using OptiDegreaser, washed down with potable water, and immediately when dry, a single coat of OptiPrimeAqua applied.
- 4.4.4.k..2 Paintable flexible sealant/mastic: Only sealant approved by the paint manufacturer may be used, and an initial coat of OptiPrimeAqua applied over it before the further coats of Noxyde are applied.
- 4.4.4.k..3 Bolted/riveted connections: After blasting or and/or cleaning as required, apply a coat of OptiPrimeAqua and an additional stripe coat of Noxyde, in contrasting colour, to all bolt/nut and plate edges and crevices.
- The adhesion of old coatings must be verified by doing a cross cut adhesion test on selected areas.
 - The compatibility of the new paint system on the old coating must be tested and guaranteed in writing by the paint supplier.
 - The work and coating system must be guaranteed for a minimum of 12 months.
 - All heavily corroded areas must be shot blasted to minimum SA2
 - Note: Inorganic zinc primers shall not be re-covered with an inorganic primer, but only with an organic zinc primer.
 - Repairs to the insides of all the enclosed sections of the booms as well as the insides of the crane legs, sill beams, cross beams, pylon cross bracing members etc. shall be done as above but the top coat need not be applied.

4.5 Electrical Engineering Works

4.5.1. Scope of work

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

- a. The Supply, Delivery, installation and commissioning of all the associated works for the lighting upgrade.
- b. The design, supply and installation of lightning protection and earthing of the lighting structures and electrical kiosks.
- c. The Supply delivery and Installation of cabling and terminations, to power the lighting and associated infrastructure.
- ~~d. The Supply, Delivery, installation and commissioning the dimming control functionality of the high mast yard lighting.~~
- e. Commission and testing of the entire installation and hand over to the Employer.

4.5.2. General

- 4.5.2.1 Transnet's Port electrical appointed personnel shall perform all the required switching and control work permits.
- 4.5.2.2 For any required switching, the *Contractor* shall submit a notification to the *Project Manager* seven days prior to the required work being performed.
- 4.5.2.3 For access to all existing high masts distribution boards, the contractor shall request access 2 weeks prior to the required date. Notification for access shall be submitted to the project manager.
- 4.5.2.4 For access to all existing Mini-Subs and kiosks, the contractor shall request access 2 weeks prior to the required date. Notification for access shall be submitted to the *Project Manager*.
- 4.5.2.5 The contractor shall provide high mast winches to lower and raise luminaire rings on the existing high masts. There are currently three different types of winches being used in all of the TNPA yards. The contractor shall handover the winches to the TNPA maintenance department on completion of the works.

4.5.3. Standard of work, Plant & Materials

- 4.5.3.1 The electrical installation shall conform to the requirements of the latest edition and amendments of SANS 10142-1 Code of Practice for the Wiring of Premises and any additional requirements thereto, described in this specification.
- 4.5.3.2 All Plant and Material used shall be of minimum SANS approved all the work shall be carried by qualified and experienced electrician and qualified staff under proper supervision by experienced and competent officers.
- 4.5.3.3 All Plant and Material shall comply with the relevant National or International standard specification.

4.5.4. Generic Specifications

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

| | |
|----------------------------------|---|
| TPD-002-DBSPEC | Technical specification for low voltage distribution boards |
| TPD-003-CABLESPEC | Technical specification for medium and low voltage cables |
| TPD-004-EARTHINGSPEC | Technical specification for earthing and the protection of buildings and structures against lightning |
| TDPLED FLOODLIGHT LUMINAIRE SPEC | Specification For The Supply Of Luminaires For Lighting Of Yards And Highmast Lighting |
| TPD-010A-HIGHMASTSPEC-A | Specification for the design, supply and installation of highmast lighting. |
| TPD-010B-HIGHMASTSPEC-B | Specification for the maintenance and upgrade of highmast lighting structures |
| E7/1 (July 1998) | Specification For Works On, Over, Under Or Adjacent To Railway Lines And Near High Voltage Equipment |
| EEAM-Q-008 | Specification For Corrosion Protection |
| S 420 | Concrete Specification |
| HE 9/2/8 | Corrosion Protection |
| | Steel Galvinised Pole Specification |
| | Glass Fibre Re-in forced Pole Specification |

4.5.5. Service Conditions

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

4.5.5.1 Ambient/Environment Conditions:

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

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

4.5.6. Lightning Conditions

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

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

4.5.7. Normative References

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

| | |
|--------------|---|
| SANS 10313 | Protection against Lightning – Physical damage to structures and life hazard |
| SANS 10064 | Code Of Practice For The Preparation Of Steel Surfaces For Coating. |
| SANS10142-1 | Code Of Practice For The Wiring Of Premises |
| SANS 10389-1 | Exterior Lighting Part 1: Artificial Lighting Of Exterior Areas For Work And Safety |
| OHS Act | Occupational Health And Safety Act Of 1993 |
| SANS 10199 | The Design And Installation Of Earth Electrodes |
| SANS152 | Low Voltage Air Breaker Switches, Connectors, Switch Disconnectors, Fuse Combination Units. |
| SANS 172 | Low Voltage Fuses |
| SANS 767-1 | Earth Leakage Protection Units. |
| SABS 763 | Hot Dip Zinc (Galvanised) Coatings |
| SANS 890-1 | Ballasts For Fluorescent Lamps: |
| SABS 950 | Non-metallic Conduit And Fittings. |
| SANS 1091 | National Colour Standards For Paints. |
| SANS 1012 | Electric Light Dimmers |
| SANS 1065-1 | Metal Conduits And Fittings For Electrical Wiring |
| SABS 1180 | Electrical Distribution Boards |

| | |
|--------------|--|
| SANS 1507 | Electric Cables With Extruded Solid Dielectric Installation For Fixed Installations |
| SANS 1279 | Floodlight Luminaires |
| SABS IEC 439 | Low Voltage Switchgear |
| SABS IEC 309 | Plugs, Socket Outlets And Couplers For Industrial Purposes |
| SABS IEC 742 | Isolating Transformers And Safety Isolating Transformers |
| SANS 10225 | Design and construction of lighting masts |
| SANS 121 | Hot Dip Galvanized coating on fabricated iron and steel articles specifications and test methods |
| SANS 10225 | Glass reinforced polyester Poles |

4.5.8. ZONE 2

4.5.8.1 Cato Creek East Yard Lighting

- a) The *Contractor* shall carry out 210m of the required trench work and area preparation for the installation of new cables to supply the proposed high mast in the Cato Creek East Yard as shown in drawing no: 2127737-1-000-E-LA-0002-01. The *Contractor* shall backfill trenches on completion of the *Works* and current layerworks shall be reinstated.
- b) The *Contractor* shall uninstall all existing LED luminaires on existing high masts at the Cato Creek East Yard which shall be installed on the existing high masts at the Cato Creek West Yard (12 luminaires per mast) as detailed on drawing 2127737-1-000-E-LA-0002-01. The removed luminaires shall be cleaned and tested before being installed as detailed in specification TPD-010B-HIGHMASTSPEC-B.
- c) The *Contractor* shall construct a new reinforced concrete base for the new 30m high mast (HML8) as per drawing 2127737-1-000-S-LA-0001-01. The base shall be positioned as detailed in drawing 2127737-1-000-E-LA-0002-01.
- d) The *Contractor* shall supply, deliver, offload, paint and erect a new 30m high mast (HML8) equal or similar to sectional poles complete with a mounting ring as detailed in specification TPD-010A-HIGHMASTSPEC-A and drawing number: 2127737-1-000-E-LA-0002-01.
- ~~e) The *Contractor* shall supply, deliver, offload and install equal or similar approved to Beak Omni blast MAXI 1 E 455W, 10kV surge protection device, including photocell with 5188 optics on existing high masts at the Cato Creek East Yard as indicated on drawing 2127737-1-000-E-LA-0002-01. The *Contractor* shall supply, deliver, offload and install equal or similar approved to Beka Omniblast 1E MAXI 455W 4000k optic 5188, with 10kV surge protection and integrated 7 Nema socket and weatherproof cover for the Nema socket, on existing high masts at the Cato Creek East Yard as indicated on drawing 2127737-1-000-E-LA-0002-01. Nema socket and luminaire must be wired for future automation using Owllet plug in module.~~
- f) Should the *Contractor* suggest a different luminaire, they are to undertake simulations and submit to the Employer's Engineer for acceptance.
- g) The *Contractor* shall supply, deliver, offload, install and terminate new 230m x 10mm² 4 Core, PVC, ECC, SWA, copper cable for the power supply to the new high mast (HML8) as shown in drawing number: 2127737-1-000-E-LA-0002-01. The *Contractor* shall backfill trenches on completion of the *Works* and ~~current~~ layerworks shall be reinstated.
- h) The *Contractor* shall design, supply and install an earthing and lightning protection system in the new high mast. The *Contractor* shall also design, supply and install hot-dip Galvanized finials and

bonding of the high mast to ground in the all existing high masts. Test results shall be submitted to the Employer's Engineer.

- i) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers. The Contractor shall also issue a "RMD 9 certificate" shall be issued for all high masts that have been installed or refurbished.
- j) The Contractor shall undertake a lighting survey at night to measure and record the lighting level in the area where work was undertaken in the presence of the Employer's Engineers. The Contractor shall notify the Employer's Engineer, seven days prior to the lighting survey.

4.5.8.2 Cato Creek West Yard Lighting

- a) The *Contractor* shall uninstall all existing luminaires on existing high masts at the Cato Creek West Yard and issue the removed luminaires to the TNPA maintenance manager at the TNPA Power Supplies and Services Depot (1 Kuwait road).
- b) The *Contractor* shall install all existing LED luminaires taken from the Cato Creek East Yard (12 luminaires per mast) as detailed on drawing 2127737-1-000-E-LA-0002-01 and as detailed in specification TPD-010B-HIGHMASTSPEC-B. Existing luminaires not used shall be returned to the TNPA maintenance manager at the TNPA Power Supplies and Services Depot (1 Kuwait road). The contractor shall supply and install a 10kV surge protection device in the distribution boards of HML 0, HML 1, HML 2 and HML 3.
- c) The *Contractor* shall supply, deliver, offload, paint and install new 2 x 12m hot dip galvanized steel poles with spigots and protection switchgear inside the pole, at Cato Creek West Yard as shown in drawing no: 2127737-1-000-E-LA-0002-01. The poles and spigots shall be prepared and painted as detailed in 4.4.4. The *Contractor* shall on completion of the *Works* reinstate layerworks.
- d) The *Contractor* shall supply, deliver, offload and install new equal or similar approved to 6 x Beka LEDlume-MIDI 73W Optic 5098, 10kV surge protection device with integrated photocell on a NEMA socket on the new steel poles (3 luminaires per pole).
- e) The *Contractor* shall carry out 70m of the required trench work and area preparation for the installation of new cables to supply the proposed additional street light poles (Pole 1 and Pole 2) in the Cato Creek West Yard as shown in drawing no: 2127737-1-000-E-LA-0002-01.
- f) The *Contractor* shall supply, deliver, offload, install and terminate new 80m x 2.5mm² 4 Core, PVC, ECC, SWA, copper cable for the power supply to the new 2 x 12m steel poles as shown in drawing number: 2127737-1-000-E-LA-0002-01. The *Contractor* shall backfill trenches on completion of the *Works* and layerworks shall be reinstated.
- g) The *Contractor* shall terminate the low voltage (LV) cables for the power supply to these two new steel pole fittings on the existing low voltage distribution board in Stanger Street substation as shown in drawing number: 2127737-1-000-E-LA-0002-01.
- h) Alterations to existing Stanger street substation: the *Contractor* shall supply, deliver and install 2 x 10A, three phase circuit breakers in the existing low voltage switchboard of the existing Stanger street substation. These circuit breakers shall be used to supply the lighting circuit as shown in drawing 2127737-1-000-E-LA-0002-01.
- i) The *Contractor* shall design, supply and install a new earthing and lightning protection system for the new steel poles. The *Contractor* shall also design, supply and install hot-dip Galvanized finials and bonding of the pole to ground to all street light poles. Test results shall be submitted to the Employer's Engineer.
- j) Should the *Contractor* suggest a different luminaire, they are to undertake simulations and submit to the Employer's engineer for acceptance.

- k) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers. The Contractor shall also issue a "RMD 9 certificate" shall be issued for all high masts that have been installed or refurbished.
- l) The *Contractor* shall undertake a lighting survey at night to measure and record the lighting level in the area where work was undertaken in the presence of the Employer's Engineers. The *Contractor* shall notify the Employer's Engineer, seven days prior to the lighting survey.

4.5.9. ZONE 3

4.5.9.1 Tug Jetty Lighting

- a) The *Contractor* shall uninstall 75 existing luminaires as shown in the drawing 2127737-1-000-E-LA-0003-01 and issue the removed items to the TNPA maintenance manager at the TNPA Power Supplies and Services Depot (1 Kuwait road). The *Contractor* shall inspect and test all cables in the existing poles. All damaged cables shall be replaced.
- b) The *Contractor* shall supply, deliver and install similar or equal approved to 84 x Beka LEDlume-Midi LED 52W 5098 Optics, 10kV surge protection device, fitted with integrated photocell on a NEMA socket on poles as indicated in drawing number: 2127737-1-000-E-LA-0003-01.
- c) The *Contractor* shall supply, deliver and install 1 x 3.5m fibre-glass street light pole complete with mounting spigot for mounting two luminaires, protection switchgear inside the pole, 2.5mm² trailing cable and protection switchgear inside the pole as illustrated in drawing no: 2127737-1-000-E-LA-0003-01. The *Contractor* shall on completion of the *Works* reinstate layerworks.
- d) The *Contractor* shall supply, deliver and install 1 x 3.5m fibre-glass street light pole complete with mounting spigot for mounting one luminaire, protection switchgear inside the pole, 2.5mm² trailing cable and protection switchgear inside the pole as illustrated in drawing no: 2127737-1-000-E-LA-0003-01. The *Contractor* shall on completion of the *Works* reinstate layerworks.
- e) The *Contractor* shall saw- cut the existing premix and excavation of 50m on both sides, for preparation for installation of new cables to supply the proposed additional street light pole as shown in drawing no: 2127737-1-000-E-LA-0003-01. The *Contractor* shall install 50m x 110mm PVC sleeves for installation of the cable. The *Contractor* shall backfill trenches on completion of the *Works* and layerworks shall be reinstated.
- f) The *Contractor* shall carry out 160m of the required trench work and area preparation for the installation of new cables to supply the proposed additional street light pole as shown in drawing no: 2127737-1-000-E-LA-0003-01. The *Contractor* shall backfill trenches on completion of the *Works* and layerworks shall be reinstated.
- g) The *Contractor* shall supply, deliver, offload, install and terminate new 270m x 2.5mm² 4 Core, PVC, ECC, SWA, copper cable as shown in drawing No: 2127737-1-000-E-003-01. The *Contractor* shall backfill trenches on completion of the *Works* and layerworks shall be reinstated.
- h) The *Contractor* shall reconfigure (orientation and aiming angles) all the newly installed light fittings as indicated in drawing number: 2127737-1-000-E-LA-0003-01.
- i) The *Contractor* shall remove the existing earthing and lightning system and design, supply and install new earthing and lightning protection system for the existing and new poles. The *Contractor* shall also design, supply and install hot-dip Galvanized finials. Test results shall be submitted to the Employer's Engineer.
- j) Should the *Contractor* suggest a different luminaire, they are to undertake simulations and submit to the Employer's engineer for acceptance.

- k) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.
- l) The *Contractor* shall undertake a lighting survey at night to measure and record the lighting level in the area where work was undertaken in the presence of the Employer's Engineers. The *Contractor* shall notify the Employer's Engineer, seven days prior to the lighting survey.

4.5.9.2 OTB Lighting

- a) The *Contractor* shall uninstall 54 existing luminaires and issue the removed items to the TNPA maintenance manager at the TNPA Power Supplies and Services Depot (1 Kuwait road). The contractor shall inspect and test all cables in the existing poles. All damaged cables shall be replaced.
- b) The *Contractor* shall not uninstall existing luminaires that are from Pole 126 to Pole 147 as shown in the drawing: 2127737-1-000-E-LA-0003-02
- c) The *Contractor* shall supply, deliver, offload and install equal or similar approved 36 x Beka TECEO, 5098 OPTICS, 53W luminaires, 10kV surge protection device with integrated photocell on a NEMA socket on poles as indicated on drawing 2127737-1-000-E-LA-0003-02.
- d) The *Contractor* shall supply, deliver, offload and install equal or similar approved 9 x Beka LEDShine, 5098 OPTICS, 43W luminaires, 10kV surge protection device with integrated photocell on a NEMA socket on poles as indicated on drawing 2127737-1-000-E-LA-0003-02.
- e) The *Contractor* shall supply, deliver, offload and install equal or similar approved 15 x Beka LEDlume Midi, 5098 OPTICS, 73W luminaires, 10kV surge protection device with integrated photocell on a NEMA socket on poles as indicated on Drawing 2127737-1-000-E-LA-0003-02.
- f) The *Contractor* shall supply, deliver, offload and install equal or similar approved 4 x Beka Kazelle 55W 5098 Optics fitting, 10kV surge protection device with integrated photocell on a NEMA socket on poles as indicated on Drawing 2127737-1-000-E-LA-0003-02.
- g) The *Contractor* shall remove the existing earthing and lightning system and design, supply and install new earthing and lightning protection system for the existing and new poles. The *Contractor* shall also design, supply and install hot-dip Galvanized finials. Test results shall be submitted to the Employer's Engineer.
- h) Should the *Contractor* suggest a different luminaire, they are to undertake simulations and submit to the Employer's engineer for acceptance.
- i) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.
- j) The *Contractor* shall undertake a lighting survey at night to measure and record the lighting level in the area where work was undertaken in the presence of the Employer's Engineers. The *Contractor* shall notify the Employer's Engineer, seven days prior to the lighting survey.

4.5.9.3 Fresh Produce Lighting

- a) The *Contractor* shall uninstall 18 existing luminaires on poles SL 47 to SL 55 at the fresh produce shed and issue the removed items to the TNPA maintenance manager at the TNPA Power Supplies and Services Depot (1 Kuwait road). The *Contractor* shall inspect and test all cables in the existing poles. All damaged cables shall be replaced.

- b) The *Contractor* shall supply, deliver, offload and install equal or similar approved 18 x Beka LEDlume-MIDI, 5098 OPTICS, 138W luminaires, 10kV surge protection device with integrated photocell on a NEMA socket on poles SL 47 to SL 55 as indicated on drawing 2127737-1-000-E-LA-0003-02.
- c) The *Contractor* shall reconfigure (orientation and aiming angles) all the newly installed light fittings as indicated in drawing number: 2127737-1-000-E-LA-0003-02.
- d) The *Contractor* shall remove the existing earthing and lightning system and design, supply and install new earthing and lightning protection system for the existing and new poles. The *Contractor* shall also design, supply and install hot-dip Galvanized finials. Test results shall be submitted to the *Employer's* Engineer.
- e) Should the *Contractor* suggest a different luminaire, they are to undertake simulations and submit to the Employer's engineer for acceptance.
- f) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.
- g) The *Contractor* shall undertake a lighting survey at night to measure and record the lighting level in the area where work was undertaken in the presence of the Employer's Engineers. The *Contractor* shall notify the Employer's Engineer, seven days prior to the lighting survey.

4.5.9.4 General Street Lighting

- a) The *Contractor* shall uninstall 55 existing luminaires as shown in drawing 2127737-1-000-E-LA-0003-03 and issue the removed items to the TNPA maintenance manager at the TNPA Power Supplies and Services Depot (1 Kuwait road). The *Contractor* shall inspect and test all cables in the existing poles. All damaged cables shall be replaced.
- b) The *Contractor* shall carry out 220m of the required trench work and area preparation for the installation of new cables to supply the proposed additional street light poles and mast as shown in drawing no: 2127737-1-000-E-LA-0003-03. The *Contractor* shall backfill trenches on completion of the *Works* and layerworks shall be reinstated.
- c) The *Contractor* shall saw- cut the existing premix and excavation of 10m on both sides, for preparation for installation of new cable to supply the proposed medium mast as shown in drawing no: 2127737-1-000-E-LA-0003-03. The *Contractor* shall backfill trenches on completion of the *Works* and layerworks shall be reinstated.
- d) The Contractor shall supply, deliver and install 6 x 316 stainless steel mounting brackets, including the 316 stainless steel 180mm dia pipe, the bracket shall be mounted similar to the ones on the existing Schoeman bridge. The 316 stainless steel 180mm dia pipe is for mounting the proposed 6m hot dip galvanized steel poles as shown in detail B in drawing no 2127737-1-000-E-LA-0003-03.
- e) The *Contractor* shall core-drill the existing Schoeman bridge in preparation of installing proposed pole 1, pole 2 and pole 3 as shown in drawing no: 2127737-1-000-E-LA-0003-03. The *Contractor* shall install 90m x 70mm PVC sleeves for installation of the cables to the proposed new Pole 1, Pole 2 and Pole 3, the sleeve shall be installed on the side of the bridge as per the existing installation.
- f) The *Contractor* shall construct a reinforced concrete base for the 30m high mast as per drawing No. 2127737-1-000-S-DE-0001-01. The base shall be positioned as detailed in drawing 2127737-1-000-E-LA-0003-03.
- g) The *Contractor* shall supply, deliver, offload, paint and erect a 30m high mast equal or similar to sectional poles complete with a mounting ring as detailed in specification TPD-010A-HIGHMASTSPEC-A. The mast shall be fully equipped with the distribution board, circuit breakers, and maintenance winch.

- h) The *Contractor* shall supply, deliver, install and paint Hot Dip Galvanised steel, 3 x 9m street light pole complete with luminaire mounting spigots, 2.5mm² trailing cable and protection switchgear inside the pole as illustrated in drawing no: 2127737-1-000-E-LA-0003-03. The poles shall be prepared and painted as detailed in 4.4.4. The *Contractor* shall on completion of the *Works* reinstate layerworks.
- i) The *Contractor* shall supply, deliver, install and paint Hot Dip Galvanised steel, 3 x 6m street light pole complete with luminaire mounting spigots, 2.5mm² trailing cable and protection switchgear inside the pole as illustrated in drawing no: 2127737-1-000-E-LA-0003-03. The poles shall be prepared and painted as detailed in 4.4.4. The *Contractor* shall on completion of the *Works* reinstate layerworks.
- j) The *Contractor* shall supply, deliver, offload and install equal or similar approved 6 x Beka LEDlume-MAXI, 276W, 128LEDs, 5098 Optics, 10kV surge protection device with integrated photocell on a NEMA socket on poles SL 47 to SL 55 as indicated on drawing 2127737-1-000-E-LA-0003-03.
- k) The *Contractor* shall supply, deliver, offload and install equal or similar approved 61 x Beka TECEO, 71W, 700mA, 5098 Optics, 32LED's, 10kV surge protection device with integrated photocell on a NEMA socket to be installed on new and existing steel poles as indicated on drawing 2127737-1-000-E-LA-0003-03.
- l) The *Contractor* shall supply, deliver and install a 30A three phase circuit breaker and a photocell contactor in the existing low voltage Schoeman bridge distribution board. This circuit breaker shall be used to supply the new proposed 15m medium mast lighting circuit shown in drawing no: 2127737-1-000-E-LA-0003-03.
- m) The *Contractor* shall supply, deliver, offload, install and terminate new 110m x 4mm² 4 Core, PVC, ECC, SWA, copper cable as shown in drawing No: 2127737-1-000-E-003-03. The Cable shall be installed into a hot dip galvanised steel pipe 95m x 70mm dia, the *Contractor* shall install this proposed hot dip galvanised steel pipe into the existing Schoeman bridge using saddles and splices that are spaced 1m apart.
- n) The *Contractor* shall supply, deliver, offload, install and terminate new 310m x 2.5mm² 4 Core, PVC, ECC, SWA, copper cable as shown in drawing No: 2127737-1-000-E-003-03. The *Contractor* shall backfill trenches on completion of the *Works* and layerworks shall be reinstated.
- o) Where the cables cross existing rail tracks, the *Contractor* shall install 10m of 110mm diameter sleeve pipes and pipe jacked under the rail tracks as shown in drawing 2127737-1-000-E-LA-0003-03.
- p) The *Contractor* shall design, supply and install a new earthing and lightning protection system for the high mast and steel poles. The *Contractor* shall also design, supply and install hot-dip Galvanized finials and bonding of the pole or high mast to ground in all the street poles and high masts. Test results shall be submitted to the Employer's Engineer.
- q) Should the *Contractor* suggest a different luminaire, they are to undertake simulations and submit to the Employer's engineer for acceptance.
- r) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers. The Contractor shall also issue a "RMD 9 certificate" shall be issued for all high masts that have been installed.
- s) The *Contractor* shall undertake a lighting survey at night to measure and record the lighting level in the area where work was undertaken in the presence of the Employer's Engineers. The *Contractor* shall notify the Employer's Engineer, seven days prior to the lighting survey.

4.5.10. Zone 4

4.5.10.1 Dry Dock Road

- a) The *Contractor* shall saw- cut the existing premix and excavation of 40m on both sides, for preparation for installation of new cable to supply the proposed new street light poles as shown in drawing no: 2127737-1-000-E-LA-0004-04
- b) The *Contractor* shall carry out 560m the required trench work and area preparation for the installation of new cables to supply the proposed new dry dock street light poles as shown in drawing No: 2127737-1-000-E-LA-0004-04. The *Contractor* shall backfill trenches on completion of the *Works* and layerworks shall be reinstated.
- c) The *Contractor* shall install 140m x 10mm² 4-core PVC insulated PVC bedded SWA PVC sheathed 600/1000V copper cable from the existing DB F. the cable shall be installed on an existing cable ladder inside the workshop 24. For cable exiting the workshop 24 the contractor shall core-drill electrical through the existing wall and come out close to the existing TNPA manhole. The contractor shall install the cable through the existing pipe inside the TNPA manhole to the first point of supply (Pile 1) as shown in drawing number: 2127737-1-000-E-LA-0004-04.
- d) The *Contractor* shall supply, deliver, offload and install 700m of 10mm² 4-core PVC insulated PVC bedded SWA PVC sheathed 600/1000V copper cables to supply the proposed new dry dock street light poles. The cables shall be installed direct on ground as illustrated in drawing No: 2127737-1-000-E-LA-0004-04.
- e) The *Contractor* shall terminate the 10mm² 4-core PVC insulated PVC bedded SWA PVC sheathed 600/1000V copper cable that supplies these new dry dock light fittings on the existing the existing workshop 24 building DB F as shown in drawing number: 2127737-1-000-E-LA-0004-04.
- f) The *Contractor* shall supply, deliver and install a 30A three phase circuit breaker and a photocell contactor in the existing low voltage switchboard of the existing workshop 24 building DB F. This circuit breaker shall be used to supply the lighting circuit shown in drawing no: 2127737-1-000-E-LA-0004-04.
- g) The *Contractor* shall supply, deliver, offload and install twelve (12) x 9m fibre glass street light poles with spigots. The proposed poles shall be installed direct on ground complete with spigots, protection switchgear inside the pole and fittings to mount the luminaires as illustrated in drawing no: 2127737-1-000-E-LA-0004-04. The pole spacing and luminaires orientation is also illustrated in drawing no: 2127737-1-000-E-LA-0004-04. The *Contractor* shall on completion of the *Works* reinstate layerworks.
- h) The *Contractor* shall supply, deliver, offload and install similar or equally approved to 12 x Beka LEDLUME midi 32LED-70W-700mA, 10kV surge protection device as illustrated in drawing No: 2127737-1-000-E-LA-0004-04. The luminaires per pole and orientation is clearly indicated on the abovementioned drawing number.
- i) The *Contractor* shall supply and install new earthing and lightning protection for the new installation. The *Contractor* shall also design, supply and install hot-dip Galvanized finials and bonding of the pole to ground in all the street light poles. Test results shall be submitted to the Employer's Engineer.
- j) Should the *Contractor* suggest different luminaires, they are to undertake simulations and submit to the TNPA engineer for acceptance.
- k) The *Contractor* is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.
- l) The *Contractor* shall undertake a lighting survey at night to measure and record the lighting level in the area where work was undertaken in the presence of the Employer's Engineers. The contractor shall notify the Employer's Engineer, seven days prior to the lighting survey.

4.5.10.2 Maydon Wharf Yard

- a) The *Contractor* shall uninstall 156 existing luminaires from the existing 17 x 30m Mast poles and issue the luminaires to TNPA Power Supplies and Services Depot (1 Kuwait road). See drawing 2127737-1-000-E-LA-0004-01, 2127737-1-000-E-LA-0004-02, and 2127737-1-000-E-LA-0004-03 for reference.
- b) ~~The *Contractor* shall supply, deliver, offload and install one hundred and seventy (170) equal or similar approved to Beka Omniblast MAXI 1E 455W, 10kV surge protection device, including photocell with 5188 optics on existing 17 x 30m High Mast Poles at the Maydon Wharf Rail Yard as indicated in drawing number: 2127737-1-000-E-LA-0004-01, 2127737-1-000-E-LA-0004-02 and 2127737-1-000-E-LA-0004-03. The number of luminaires per pole is clearly illustrated on the aforementioned drawing numbers.~~ The *Contractor* shall supply, deliver, offload and install one hundred and seventy (170) equal or similar approved to Beka Omniblast 1E MAXI 455W 4000k optic 5188, with 10kV surge protection and integrated 7 Nema socket and weatherproof cover for the Nema socket on existing 17 x 30m High Mast Poles at the Maydon Wharf Rail Yard as indicated in drawing number: 2127737-1-000-E-LA-0004-01, 2127737-1-000-E-LA-0004-02 and 2127737-1-000-E-LA-0004-03. The number of luminaires per pole is clearly illustrated on the aforementioned drawing numbers. Nema socket and luminaire must be wired for future automation using Owllet plug in module.
- c) The *Contractor* shall reconfigure (orientation and aiming angles) all the newly installed light fittings as indicated in drawing number: 2127737-1-000-E-LA-0004-01, 2127737-1-000-E-LA-0004-02 and 2127737-1-000-E-LA-0004-03.
- d) Should the *Contractor* suggest different luminaires, they are to undertake simulations and submit to the Employer's engineer for acceptance.
- e) The *Contractor* shall test the earthing and bonding on all existing 17 high masts. Test results shall be submitted to the Employer's Engineer.
- f) The *Contractor* is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers. The *Contractor* shall also issue a "RMD 9 certificate" shall be issued for all high masts that have been installed or refurbished.
- g) The *Contractor* shall undertake a lighting survey at night to measure and record the lighting level in the area where work was undertaken in the presence of the Employer's Engineers. The *Contractor* shall notify the Employer's Engineer, seven days prior to the lighting survey.

4.5.10.3 I&J Tug Jetty and Street Lighting

- a) The *Contractor* shall uninstall 19 existing light fittings from all 12 street light poles at the I&J Tug Jetty and adjacent street as indicated in drawing number: 2127737-1-000-E-LA-0004-06 and issue the luminaires to TNPA Power Supplies and Services Depot (1 Kuwait road). The *Contractor* shall inspect and test all cables in the existing poles. All damaged cables shall be replaced.
- b) The *Contractor* shall supply, deliver, offload and install equal or similar approved to 19 x BEKA LEDLUME midi 48 LED 73W, 10kV surge protection device with integrated photocell on new painted galvanised spigots on the existing 12 x 9m street poles at the Tug Jetty as indicated in drawing number: 2127737-1-000-E-LA-0004-06. The luminaires per pole and orientation is clearly indicated on the aforementioned drawing number.

- c) The *Contractor* must supply, deliver, offload and install five (5) new 9m fibre glass street light poles with mounting spigots and protection switchgear inside the pole on positions indicated in drawing number: 2127737-1-000-E-LA-0004-06. The *Contractor* shall on completion of the *Works* reinstate current layerworks.
- d) The *Contractor* shall supply, deliver, offload and install equal or similar approved to 7 x BEKA LEDLUME midi 48 LED 73W, 10kV surge protection device with integrated photocell on the five (5) new 9m street poles with painted galvanised spigots at the Tug Jetty as indicated in drawing number: 2127737-1-000-E-LA-0004-06.
- e) The *Contractor* shall reconfigure (orientation and aiming angles) all the newly installed light fittings as indicated in drawing number: 2127737-1-000-E-LA-0004-06.
- f) The *Contractor* shall saw- cut the existing concrete/premix of 160m on both sides, for preparation for excavation as shown in drawing No: 2127737-1-000-E-LA-0004-06.
- g) Where the cables cross existing rail tracks, the *Contractor* shall install 5m of 110mm diameter sleeve pipes and pipe jacked under the rail tracks as shown in drawing 2127737-1-000-E-LA-0004-06. The *Contractor* shall on completion of the works reinstate layerworks.
- h) The *Contractor* shall carry out the required 80m trench work and area preparation for the installation of new cables to supply the proposed new I&J tug jetty street light poles as shown in drawing No: 2127737-1-000-E-LA-0004-06. The *Contractor* shall backfill trenches on completion of the *Works* and layerworks shall be reinstated.
- i) The *Contractor* shall supply, deliver, offload and install 300m of 4mm² 4-core PVC insulated PVC bedded SWA PVC sheathed 600/1000V copper cables to supply the proposed new dry dock street light poles. The cables shall be installed direct on ground as illustrated in drawing No: 2127737-1-000-E-LA-0004-06.
- j) The *Contractor* shall supply, deliver, offload, install and terminate 4mm² 4-core PVC insulated PVC bedded SWA PVC sheathed 600/1000V copper cable to supply the proposed new street light poles as illustrated in drawing No: 2127737-1-000-E-LA-0004-06. Pole 1a and 1b shall be fed from existing pole 1, pole 7a shall be fed from existing pole 7, pole 2a shall be fed from existing pole 2 and pole 11a shall be fed from existing pole 11.
- k) The *Contractor* shall supply, deliver, offload and install equal or similar approved to 2 x 321W-Beka OMNISTAR Maxi flood lights with HDG bracket, 10kV surge protection device with integrated photocell (flood light 1 and flood light 2) on the existing shed as indicated in drawing number: 2127737-1-000-E-LA-0004-06.
- l) The *Contractor* shall supply and install 100m of 2,5mm² 2-core PVC insulated PVC bedded SWA PVC sheathed 600/1000V copper cables, installed in stainless steel conduit from the floodlights to a new 16A circuit breaker in the existing distribution board A.
- m) Should the *Contractor* suggest different luminaires, they are to undertake simulations and submit to the Employer's engineer for acceptance.
- n) The *Contractor* shall install new earthing and lightning protection for the new installation. The *Contractor* shall also design, supply and install hot-dip Galvanized finials and bonding of the pole to ground in all the street light poles. Test results shall be submitted to the Employer's Engineer.
- o) Should the *Contractor* suggest different luminaires, they are to undertake simulations and submit to the Employer's engineer for acceptance.

- p) The *Contractor* is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.
- q) The *Contractor* shall undertake a lighting survey at night to measure and record the lighting level in the area where work was undertaken in the presence of the Employer's Engineers. The *Contractor* shall notify the Employer's Engineer, seven days prior to the lighting survey.

4.5.10.4 Manganese Yard

- a) The *Contractor* shall uninstall 10 existing luminaires from the existing 30m Mast pole and issue the luminaires to TNPA Power Supplies and Services Depot (1 Kuwait road). See drawing 2127737-1-000-E-LA-0004-05 for reference.
- b) ~~The *Contractor* shall supply, deliver, offload and install equal or similar approved to 10 x 455W Omniblast Maxi 7 E 455W LED fittings with integrated photocell on the existing 30m high mast at Manganese Yard as indicated in drawing number: 2127737-1-000-E-LA-0004-05.~~ The *Contractor* shall supply, deliver, offload and install equal or similar approved to 10 x Beka Omniblast 1E MAXI 455W 4000k optic 5188, with 10kV surge protection and integrated 7 Nema socket and weatherproof cover for the Nema socket on the existing 30m high mast at Manganese Yard as indicated in drawing number: 2127737-1-000-E-LA-0004-05. Nema socket and luminaire must be wired for future automation using Owllet plug in module.
- c) Should the *Contractor* suggest different luminaires, they are to undertake simulations and submit to the Employers engineer for acceptance.
- d) The *Contractor* shall test the earthing and bonding on the existing high mast. Test results shall be submitted to the Employer's Engineer.
- e) The *Contractor* is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers. The *Contractor* shall also issue a "RMD 9 certificate" shall be issued for all high masts that have been installed or refurbished.
- f) The *Contractor* shall undertake a lighting survey at night to measure and record the lighting level in the area where work was undertaken in the presence of the Employer's Engineers. The *Contractor* shall notify the Employer's Engineer, seven days prior to the lighting survey.

4.5.11. Zone 5

4.5.11.1 King Rest Yard (Yard Lighting)

- a) The *Contractor* shall carry out 430m of the required trench work for the installation of new cables to supply the proposed new high masts in the King Rest Yard as shown in the drawing no: 2127737-1-000-E-0005-05. The *Contractor* shall backfill trenches on completion of the *Works* and layerworks shall be reinstated.
- a) Where the cables cross existing rail tracks, the *Contractor* shall install 7m and 3m of 110mm diameter sleeve pipes and pipe jacked under the rail tracks as shown in drawing 2127737-1-000-E-LA-0005-05. The *Contractor* shall on completion of the works reinstate layerworks.
- b) The *Contractor* shall uninstall 240 x 600W HPS from existing high mast light fittings at King Rest yard and issue the luminaires to TNPA Power Supplies and Services Depot (1 Kuwait road). Each of the 30m, High masts are currently fitted with 8 x light fittings.

- c) The *Contractor* shall construct a reinforced concrete base for the 30m high mast (HML - 32) as per drawing no: 2127737-1-000-S-DE-0001-01. The base shall be positioned as detailed in drawing no: 2127737-1-000-E-0005-05.
- d) The *Contractor* shall supply, deliver, offload, paint and erect 2 x 30m High mast (HML - 2 & HML - 6) equal or similar to sectional poles complete with a mounting ring as detailed in specification TPD-010A-HIGHMASTSPEC-A as per drawing no: 2127737-1-000-S-DE-0001-01 and drawing No: 2127737-1-000-E-0005-05.
- e) The *Contractor* shall remove the High mast located in position HML - 29 and reinstall it complete with accessories to the new position HML - 32 as shown in drawing No: 2127737-1-000-E-0005-05. The *Contractor* shall clean the high mast.
- f) ~~The *Contractor* shall supply, deliver, offload and install 220 x equal or similar approved to Beka Omniblast MAXI 1 E 455W, 10kV surge protection device, including photocell with Optic 5188 luminaire on all the high masts as shown in drawing No: 2127737-1-000-E-LA-0005-05.~~ The *Contractor* shall supply, deliver, offload and install 220 x equal or similar approved Beka Omniblast 1E MAXI 455W 4000k optic 5188, with 10kV surge protection and integrated 7 Nema socket and weatherproof cover for the Nema socket, on all the high masts as shown in drawing No: 2127737-1-000-E-LA-0005-05. Nema socket and luminaire must be wired for future automation using Owllet plug in module.
- g) Should the *Contractor* suggest a different luminaire, they are to undertake simulations and submit to the Employer's Engineer for acceptance.
- h) The *Contractor* shall supply, deliver, offload, install and terminate 480m x 10mm² 4 Core, PVC, ECC, SWA, copper cable as shown in drawing No: 2127737-1-000-E-LA-0005-05.
- i) The *Contractor* shall design, supply and install a new earthing and lightning protection for the new and relocated high masts. The *Contractor* shall also design, supply and install hot-dip Galvanized finials and bonding of the high mast to ground in all high masts. The *Contractor* shall also test the existing high masts earthing and bonding. Test results shall be submitted to the Employer's Engineer.
- j) The *Contractor* is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers. The *Contractor* shall also issue a "RMD 9 certificate" shall be issued for all high masts that have been installed or refurbished.
- l) The *Contractor* shall undertake a lighting survey at night to measure and record the lighting level in the area where work was undertaken in the presence of the Employer's Engineers. The *Contractor* shall notify the Employer's Engineer, seven days prior to the lighting survey.

4.5.11.2 Fynnlands Yard (Yard Lighting)

- a) The *Contractor* shall carry out 70m of the required trench work for the installation of new cables to supply the proposed new street light poles as shown in the drawing no: 2127737-1-000-E-LA-0005-06. The *Contractor* shall backfill trenches on completion of the *Works* and layerworks shall be reinstated.
- b) Where the cables cross existing rail tracks, the *Contractor* shall install 7m of 110mm diameter sleeve pipes and pipe jacked under the rail tracks as shown in drawing 2127737-1-000-E-LA-0005-06. The *Contractor* shall on completion of the works reinstate layerworks.
- c) The *Contractor* shall uninstall all the existing 116 light fittings from existing high masts in Fynnlands yard and issue the luminaires to TNPA Power Supplies and Services Depot (1 Kuwait road). Fynnlands yard has 8 x 30m existing High masts.

- d) The *Contractor* shall construct a reinforced concrete base for a 30m high mast (HML – 9) as per drawing No: 2127737-1-000-S-DE-0001-01. The base shall be positioned as detailed in drawing No: 2127737-1-000-E-LA-0005-06.
- e) The *Contractor* shall supply, deliver, offload, paint and erect a 30m high mast (HML -9) equal or similar to sectional poles complete with a mounting ring as detailed in specification TPD-010A-HIGHMASTSPEC-A and drawing No: 2127737-1-000-E-LA-0005-06.
- f) ~~The *Contractor* shall supply, deliver, offload and install 72 x equal or similar approved to Beka Omniblast MAXI 1 E 455W, 10kV surge protection device, including photocell with Optic 5188 luminaire in all the High masts as shown in drawing No: 2127737-1-000-E-LA-0005-06.~~ The *Contractor* shall supply, deliver, offload and install 72 x equal or similar approved to Beka Omniblast 1E MAXI 455W 4000k optic 5188, with 10kV surge protection and integrated 7 Nema socket and weatherproof cover for the Nema socket, in all the High masts as shown in drawing No: 2127737-1-000-E-LA-0005-06. Nema socket and luminaire must be wired for future automation using Owllet plug in module.
- g) Should the *Contractor* suggest a different luminaire, they are to undertake simulations and submit to the Employer's Engineer for acceptance.
- h) The *Contractor* shall supply, deliver, offload, install and terminate 100m x 10mm² 4 Core, PVC, ECC, SWA, copper cable for supply of lighting as shown in drawing No: 2127737-1-000-E-LA-0005-06. The *Contractor* shall supply power to the new high mast pole from the nearest TNPA high mast as proposed in drawing No: 2127737-1-000-E-LA-0005-06.
- i) The *Contractor* shall design, supply and install a new earthing and lightning protection for the new and relocated high masts. The *Contractor* shall also design, supply and install hot-dip Galvanized finials and bonding of the high mast to ground in all high masts. . The *Contractor* shall also test the existing high masts earthing and bonding. Test results shall be submitted to the Employer's Engineer.
- j) The *Contractor* is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers. The Contractor shall also issue a "RMD 9 certificate" shall be issued for all high masts that have been installed or refurbished.
- k) The *Contractor* shall undertake a lighting survey at night to measure and record the lighting level in the area where work was undertaken in the presence of the Employer's Engineers. The *Contractor* shall notify the Employer's Engineer, seven days prior to the lighting survey.

4.5.11.3 Bayhead Road (Street Lighting)

- a) The *Contractor* shall carry out 70m of the required trench work for the installation of new cables to supply the proposed new street light poles as shown in the drawing no: 2127731-1-000-E-LA-0005-01. The *Contractor* shall backfill trenches on completion of the *Works* and layerworks shall be reinstated.
- b) The *Contractor* shall uninstall all the existing 120 x HPS streetlight fittings in Bayhead road and issue the luminaires to TNPA Power Supplies and Services Depot (1 Kuwait road).
- c) The *Contractor* shall remove 6 damaged streetlight poles and issue the poles to TNPA Power Supplies and Services Depot (1 Kuwait road), as shown in drawing No: 2127731-1-000-E-LA-0005-01.
- d) The *Contractor* shall supply, deliver, offload, paint and erect 7 x 9m new galvanised steel streetlight poles with spigots, protection switchgear inside the pole and PVC, copper trailing cable as shown in drawing No: 2127731-1-000-E-LA-0005-01. The *Contractor* shall on completion of the *Works* reinstate current layerworks.

- e) The *Contractor* shall supply, deliver, offload and install 7 x new back-to-back outreach spigots (to match existing) to the proposed new 9m streetlight poles.
- f) The *Contractor* shall update the numbering (pole number) on the new and existing 51 x 9m streetlight poles. Numbering must suite existing.
- g) The *Contractor* shall supply, deliver and offload 102 equal or similar approved to Beka LEDlume Midi, 5118 optic, 138W, with integrated photocell and 10kV surge protection device as shown in drawing No: 2127731-1-000-E-LA-0005-01.
- h) The *Contractor* shall install the above-mentioned light fittings per streetlight pole as shown in drawing No: 2127731-1-000-E-LA-0005-01. Pole 13 to pole 25 and pole 31 to pole 44 are shown on 5118 optic, 140W, with integrated photocell and 10kV surge protection device as shown in drawing No: 2127731-1-000-E-LA-0005-01. The *Contractor* shall also install luminaires and double spigots on the balance of poles on Bayhead road.
- i) Should the *Contractor* suggest a different luminaire, they are to undertake simulations and submit to the Employer's Engineer for acceptance.
- j) The *Contractor* shall supply power to the new poles, installed from the nearest pole as proposed in drawing No: 2127731-1-000-E-LA-0005-01. The *Contractor* shall install new 80m x 4mm² 2 Core, PVC, ECC, SWA, copper cable to the new lighting as shown on the drawing. The *Contractor* shall backfill all trenches.
- k) The *Contractor* shall design, supply and install an earthing and lightning protection to the new streetlight poles. The *Contractor* shall also design, supply and install hot-dip Galvanized finials and bonding of the street pole to ground in all street poles. Test results shall be submitted to the Employer's Engineer. The *Contractor* shall also test the earthing and bonding on all existing street light poles.
- l) The *Contractor* is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.
- m) The *Contractor* shall undertake a lighting survey at night to measure and record the lighting level in the area where work was undertaken in the presence of the Employer's Engineers. The *Contractor* shall notify the Employer's Engineer, seven days prior to the lighting survey.

4.5.11.4 Bayhead Road Rail Track

- a) The *Contractor* shall uninstall all existing 29 x light fittings from 6m poles on Bayhead Rail Track and issue the luminaires to TNPA Power Supplies and Services Depot (1 Kuwait road). The *Contractor* shall inspect and test all cables in the existing poles. All damaged cables shall be replaced.
- b) The *Contractor* shall supply, deliver, offload and install new 15 x equal or similar approved to Beka LEDlume Mini, 5119 optic; 55W, 10kV surge protection device, with integrated photocell, tilted 10 degrees on the existing 6m streetlight poles as shown in drawing No.: 2127737-1-000-E-LA-0005-03.
- c) The *Contractor* shall uninstall all existing 14 x light fittings on 9m poles on the Bayhead Rail Track perimeter and issue the luminaires to TNPA Power Supplies and Services Depot (1 Kuwait road).
- d) The contractor shall supply, deliver and install new double spigots with a one-sided 0.5m outreach arm facing the rail track on the existing 9m perimeter lighting streetlight poles.
- e) The *Contractor* shall supply, deliver, offload and install back-to-back 28 x equal or similar approved to Beka LEDlume Mini, 5119 optic; 55W, 10kV surge protection device, with integrated

photocell, tilted 10 degrees in the existing 9m streetlight poles with the one-sided 0.5m outreach arm as shown in drawing No.: 2127737-1-000-E-LA-0005-03.

- f) Should the *Contractor* suggest a different luminaire, they are to undertake simulations and submit to the Employer's Engineer for acceptance.
- g) The *Contractor* shall test the existing street light poles earthing and bonding. The *Contractor* shall design supply and install Hot-dip Galvanized finials and bonding of the pole to ground to all existing street light poles. Test results shall be submitted to the Employer's Engineer.
- h) The *Contractor* is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.
- i) The *Contractor* shall undertake a lighting survey at night to measure and record the lighting level in the area where work was undertaken in the presence of the Employer's Engineers. The *Contractor* shall notify the Employer's Engineer, seven days prior to the lighting survey.

4.5.11.5 Sharkmesher Road (Street Lighting)

- a) The *Contractor* shall uninstall all the existing 10 x HPS light fittings in (Sharkmesher road) and issue the luminaires to TNPA Power Supplies and Services Depot (1 Kuwait road).
- b) The *Contractor* shall supply, deliver, offload and install 10 x equal or similar approved to Beka LEDlume Midi, 5119 optics, 138W, 10kV surge protection device, with integrated photocell on the existing 9m streetlight poles as shown in drawing No.: 2127737-1-000-E-LA-0005-08.
- c) Should the *Contractor* suggest a different luminaire, they are to undertake simulations and submit to the Employer's Engineer for acceptance.
- d) The *Contractor* shall test the existing street light poles earthing and bonding. The *Contractor* shall design, supply and install Hot-dip Galvanized finials and bonding of the pole to ground to all existing street light poles. Test results shall be submitted to the Employer's Engineer.
- e) The *Contractor* is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.
- f) The *Contractor* shall undertake a lighting survey at night to measure and record the lighting level in the area where work was undertaken in the presence of the Employer's Engineers. The *Contractor* shall notify the Employer's Engineer, seven days prior to the lighting survey.

4.5.11.6 Langeberg Road (Street Lighting)

- a) The *Contractor* shall uninstall all the existing 53 x light fittings on the existing 30m high masts at Langeberg road and issue the luminaires to TNPA Power Supplies and Services Depot (1 Kuwait road).
- b) The *Contractor* shall supply, deliver, offload and install equal or similar approved to Beka 53 x LEDlume MAXI, 5119 optic, 276W, 10kV surge protection device with integrated photocell and 10kV surge protection device on the existing 30m high masts at in Langeberg Road as shown in drawing No.: 2127737-1-000-E-LA-0005-08. The *Contractor* shall orientate the new luminaires as per existing orientation.

- c) Should the *Contractor* suggest a different luminaire, they are to undertake simulations and submit to the Employer's Engineer for acceptance.
- d) The *Contractor* shall test the existing high masts earthing and bonding. The *Contractor* shall design, supply and install Hot-dip Galvanized finials and bonding of the high mast to ground to all existing high masts. Test results shall be submitted to the Employer's Engineer.
- e) The *Contractor* is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers. The Contractor shall also issue a "RMD 9 certificate" shall be issued for all high masts that have been installed or refurbished.
- f) The *Contractor* shall undertake a lighting survey at night to measure and record the lighting level in the area where work was undertaken in the presence of the Employer's Engineers. The *Contractor* shall notify the Employer's Engineer, seven days prior to the lighting survey.

4.5.11.7 Ambrose Park Road (Street Lighting)

- a) The *Contractor* shall carry out 260m of the required trench work in a grass area and area preparation for the installation of new cables to supply the proposed new street light poles in Ambrose Park Road as shown in drawing no: 2127737-1-000-E-LA-0005-02. The *Contractor* shall backfill trenches on completion of the *Works* and layerworks shall be reinstated.
- b) The *Contractor* shall uninstall all existing 27 LED light fittings in Ambrose Park road and issue the luminaires to TNPA Power Supplies and Services Depot (1 Kuwait road). These lights shall be packaged for minimum damage prior to delivery.
- c) The *Contractor* shall supply, deliver, offload, paint and install new 5 x 9m streetlight poles with spigots and protection switchgear inside the pole as proposed in drawing No: 2127737-1-000-E-LA-0005-02. The poles and spigots shall be prepared and painted as detailed in 4.4.4. The *Contractor* shall on completion of the *Works* reinstate layerworks.
- d) The *Contractor* shall supply, deliver, offload and install equal or similar approved to 32 x Beka LEDlume Midi, 5119 optics, 138W, 10kV surge protection device complete with integrated photocell on the new and existing 9m streetlight poles.
- e) Should the *Contractor* suggest a different luminaire, they are to undertake simulations and submit to the Employer's Engineer for acceptance.
- f) The *Contractor* shall supply, deliver, offload and install 280m x 4mm² 2 Core, PVC, ECC, SWA, copper cable as shown in drawing No: 2127737-1-000-E-LA-0005-02. The *Contractor* shall backfill all trenches.
- g) The *Contractor* shall terminate all cables to relevant termination points and supply the power to the streetlight poles from the nearest existing streetlight pole as shown in drawing No: 2127737-1-000-E-LA-0005-02.
- h) The *Contractor* shall design, supply and install a new earthing and lightning protection to the new streetlight poles. The *Contractor* shall also design, supply and install hot-dip Galvanized finials and bonding of the street pole to ground in all street poles. The *Contractor* shall test the existing street light poles earthing and bonding. Test results shall be submitted to the Employer's Engineer.

- i) The *Contractor* is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.
- j) The *Contractor* shall undertake a lighting survey at night to measure and record the lighting level in the area where work was undertaken in the presence of the Employer's Engineers. The *Contractor* shall notify the Employer's Engineer, seven days prior to the lighting survey.

4.5.11.8 Iran Road (Street Lighting)

- a) The *Contractor* shall uninstall all 50 x LED and 5 HPS existing light fittings in Iran road and issue the luminaires to TNPA Power Supplies and Services Depot (1 Kuwait road). The LED lights shall be packaged for minimum damage prior to delivery. The *Contractor* shall inspect and test all cables in the existing streetlight poles. All damaged cables shall be replaced.
- b) The *Contractor* shall supply, deliver, offload and install equal or similar approved to 50 x Beka LEDlume Maxi, 5119 optics, 276W, 10kV surge protection device on existing 10m streetlight poles tilted 5 degrees inside the Cutler Wall as shown in drawing No.: 2127737-1-000-E-0005-07.
- c) Should the *Contractor* suggest a different luminaire, they are to undertake simulations and submit to the Employer's Engineer for acceptance.
- d) The *Contractor* shall test the existing street light poles earthing and bonding. The *Contractor* shall design, supply and install Hot-dip Galvanized finials and bonding of the pole to ground to all existing street light poles. Test results shall be submitted to the Employer's Engineer.
- e) The *Contractor* is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.
- f) The *Contractor* shall undertake a lighting survey at night to measure and record the lighting level in the area where work was undertaken in the presence of the Employer's Engineers. The *Contractor* shall notify the Employer's Engineer, seven days prior to the lighting survey.

4.5.11.9 Kuwait (Street Lighting)

- a) The *Contractor* shall carry out 1075m of the required trench work and area preparation for the installation of new cables for the proposed new streetlight poles. The *Contractor* shall backfill trenches on completion of the *Works* and layerworks shall be reinstated.
- b) The *Contractor* shall supply, deliver, offload and install 17 x 9m steel, hot dipped galvanised, painted streetlight poles with single side spigots (painted white), protection switchgear inside the pole, and spaced 40m apart as shown in drawing No: 2127731-1-000-E-LA-0005-04. The poles shall be prepared and painted as detailed in 4.4.4. The *Contractor* shall on completion of the *Works* reinstate layerworks.
- c) The *Contractor* shall supply, deliver, offload and install equal or similar approved to 17 x Beka LEDlume Midi, 5119 optics, 138W, 10kV surge protection device with integrated photocell on the new 9m streetlight poles. The *Contractor* shall on completion of the *Works* reinstate layerworks.
- d) The *Contractor* shall supply and install two new IP65, electrical Kiosks with precast concrete plinths next to pole No: 4 and pole No: 11 as shown in drawing No.: 2127737-1-000-E-LA-0005-04.
- e) Should the *Contractor* suggest a different luminaire, they are to undertake simulations and submit to the Employer's Engineer for acceptance.

- f) The *Contractor* shall supply, deliver, offload and install 370m x 10mm² 4-Core, PVC, ECC, SWA, copper cable as shown in drawing No: 2127737-1-000-E-LA-0005-04.
- g) The *Contractor* shall supply, deliver, offload and install 620m x 6mm² 4-Core, PVC, ECC, SWA, copper cable as shown in drawing No: 2127737-1-000-E-LA-0005-04.
- h) The *Contractor* shall supply, deliver, offload and install 160m x 4mm² 4-Core, PVC, ECC, SWA, copper cable as shown in drawing No: 2127737-1-000-E-LA-0005-04. The *Contractor* shall backfill all trenches.
- i) The *Contractor* shall terminate all cables to relevant termination points and supply the power to the 9m street poles from a 63A circuit breaker installed in the low voltage distribution board of Fynnlands substation as shown in drawing No.: 2127737-1-000-E-LA-0005-04.
- j) The *Contractor* shall design, supply and install a new earthing and lightning protection for the 17 x 9m new streetlight poles. The *Contractor* shall also design, supply and install hot-dip Galvanized finials and bonding of the street pole to ground in all the street poles. Test results shall be submitted to the Employer's Engineer.
- k) The *Contractor* is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.
- l) The *Contractor* shall undertake a lighting survey at night to measure and record the lighting level in the area where work was undertaken in the presence of the Employer's Engineers. The *Contractor* shall notify the Employer's Engineer, seven days prior to the lighting survey.

4.5.12. Zone 6

4.5.12.1 Wharf side Road (Street Lighting)

- a) The *Contractor* shall saw- cut the existing premix and excavation of 95m on both sides, for preparation for installation of new cables to supply the proposed additional street light pole 2, Pole 6, pole 8 and Pole 11 on Wharfside road as shown in drawing no: 2127737-1-000-E-LA-0006-01. The *Contractor* shall install 95m x 70mm PVC sleeves for installation of the cable to the proposed new pole 2, Pole 6, pole 8 and Pole 11. The *Contractor* shall backfill trenches on completion of the *Works* and layerworks shall be reinstated.
- b) The *Contractor* shall supply, deliver, offload and installation of 135m of 2.5mm² 4-core PVC insulated PVC bedded SWA PVC sheathed 600/1000V copper cables to supply the proposed additional streetlight pole 2, Pole 6, pole 8 and Pole 11. The supply to the new poles shall be sourced from pole 1, pole 5, pole 7 and pole 12 as illustrated in drawing No: 2127737-1-000-E-LA-0006-01.
- c) The *Contractor* shall uninstall 8 existing luminaires and spigots from the 8 existing 9m poles on Wharfside road and issue the luminaires to TNPA Power Supplies and Services Depot (1 Kuwait road). See drawing 2127737-1-000-E-LA-0006-01 for reference. The *Contractor* shall inspect and test all cables in the existing pole. All damaged cables shall be replaced. The *Contractor* shall supply, deliver, offload, install and paint galvanised steel spigots to all existing streetlight poles.
- d) The *Contractor* shall supply, deliver, offload, install and paint 4 x 9m galvanised steel streetlight poles with galvanised steel spigots and protection switchgear inside the pole. The proposed poles shall be installed complete with fittings to mount the luminaires as illustrated in drawing 2127737-1-000-E-LA-0006-01. The poles and spigots shall be prepared and painted as detailed in 4.4.4. The *Contractor* shall on completion of the *Works* reinstate current layerworks.
- e) The *Contractor* shall supply, deliver, offload and install similar or equal approved to 12 x Beka LEDLUME midi 48 LED 73W OPTIC 5098, 10kV surge protection with integrated photocell on a

NEMA socket on the 4 x 9m new and 8 x 9m existing poles as illustrated in drawing 2127737-1-000-E-LA-0006-01. The luminaires per pole and orientation is clearly indicated on the above mentioned drawing number.

- f) The *Contractor* shall design, supply and install new earthing and lightning protection to the new poles. The *Contractor* shall also design, supply and install hot-dip Galvanized finials and bonding of the street pole to ground in all the street poles. Test results shall be submitted to the Employer's Engineer.
- g) Should the *Contractor* suggest different luminaires, they are to undertake simulations and submit to the TNPA engineer for acceptance.
- h) The *Contractor* is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.
- i) The *Contractor* shall undertake a lighting survey at night to measure and record the lighting level in the area where work was undertaken in the presence of the Employer's Engineers. The *Contractor* shall notify the Employer's Engineer, seven days prior to the lighting survey.

4.5.12.2 Port Perimeter (Cutler Wall)

4.5.12.2.1 Cutler Service Road

- a) The *Contractor* shall carry out 365m of the required trench work and area preparation for the installation of new cables to supply the proposed additional streetlight pole in the Cutler service road as shown in drawing no: 2127737-1-000-E-LA-0006-06.
- b) Where the cable is cross existing rail tracks, the *Contractor* shall install 15m of 110mm diameter sleeve pipes and the pipe shall be pipe jacked under the existing rail tracks as shown in drawing 2127737-1-000-E-LA-0006-06. The *Contractor* shall on completion of the works reinstate layerworks.
- c) The *Contractor* shall supply, deliver, offload, install and paint 8 x 9m galvanized steel streetlight poles with spigots and protection switchgear inside the pole. The proposed poles shall be installed complete with fittings to mount the luminaires as illustrated in drawing no: 2127737-1-000-E-LA-0006-06. The poles and spigots shall be prepared and painted as detailed in 4.4.4. The *Contractor* shall on completion of the *Works* reinstate layerworks.
- d) The *Contractor* shall supply, deliver, offload and install 190m of 2.5mm² 4-core PVC insulated PVC bedded SWA PVC sheathed 600/1000V copper cables from pole 1 to pole 8. See drawing no: 2127737-1-000-E-LA-0006-06.
- e) The *Contractor* shall supply, deliver, offload and install 260m of 6mm² 4-core PVC insulated PVC bedded SWA PVC sheathed 600/1000V copper cables from the existing electrical kiosk to pole 1 as shown on drawing 2127737-1-000-E-LA-0006-06.
- f) Alterations to existing kiosk: the *Contractor* shall supply, deliver and install a 32A three phase circuit breaker in the existing low voltage switchboard of the existing kiosk. This circuit breaker shall be used to supply the lighting circuit shown in drawing 2127737-1-000-E-LA-0006-06.
- g) The *Contractor* shall supply, deliver, offload and install similar or equal approved 8 x Beka LEDLUME midi 48 LED 73W OPTIC 5098, 10kV surge protection with integrated photocell on a NEMA socket on the new poles as illustrated in drawing no: 2127737-1-000-E-LA-0006-06. The luminaires per pole and orientation is clearly indicated on the above-mentioned drawing number.
- h) The *Contractor* shall design, supply and install new earthing and lightning protection for the new installation. The *Contractor* shall also design, supply and install hot-dip Galvanized finials and

bonding of the street pole to ground in all the street poles. Test results shall be submitted to the Employer's Engineer.

- i) Should the *Contractor* suggest different luminaires, they are to undertake simulations and submit to the TNPA engineer for acceptance.
- j) The *Contractor* is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.
- k) The *Contractor* shall undertake a lighting survey at night to measure and record the lighting level in the area where work was undertaken in the presence of the Employer's Engineers. The *Contractor* shall notify the Employer's Engineer, seven days prior to the lighting survey.

4.5.12.2.2 Celebes Road Cutler Wall

- a) The *Contractor* shall carry out 30m of the required trench work and area preparation for the installation of new cables to supply the proposed additional streetlight pole on Celebes road as shown in drawing 2127737-1-000-E-LA-0006-07. The *Contractor* shall backfill trenches on completion of the works and layerworks shall be reinstated.
- b) The *Contractor* shall uninstall 8 existing luminaires with spigots and fittings in Celebes Road along the Cutler wall and issue the removed items to the TNPA maintenance manager at the TNPA Power Supplies and Services Depot (1 Kuwait road). See drawing 2127737-1-000-E-LA-0006-07 as reference. The Contractor shall inspect and test all cables in the existing poles. All damaged cables shall be replaced. The Contractor shall supply, deliver, offload, install and paint galvanised steel spigots to all existing streetlight poles.
- c) The *Contractor* shall supply, deliver, offload, install and paint 1 x 9m galvanised steel streetlight pole with protection switchgear inside the pole. The pole shall be supplied complete with fittings and spigots for mounting the luminaire as illustrated in drawing 2127737-1-000-E-LA-0006-07. The pole and spigots shall be prepared and painted as detailed in 4.4.4. The *Contractor* shall on completion of the *Works* reinstate layerworks.
- d) The *Contractor* shall supply, deliver, offload and install 40m of 2.5mm² 2-core PVC insulated PVC bedded SWA PVC sheathed 600/1000V copper cables to supply the proposed additional streetlight pole. The supply to the new pole shall be sourced from pole 9 as illustrated in drawing 2127737-1-000-E-LA-0006-07.
- e) The *Contractor* shall supply, deliver, offload and install similar or approved to 9 x Beka LEDLUME midi 48 LED 73W OPTIC 5098, 10kV surge protection with integrated photocell on a NEMA socket on the new and existing poles. See drawing No: 2127737-1-000-E-LA-0006-07 for the arrangement of the luminaires. The luminaires per pole and orientation is clearly indicated on the above-mentioned drawing number.
- f) The *Contractor* shall design, supply and install new earthing and lightning protection to the new pole. The *Contractor* shall also design, supply and install hot-dip Galvanized finials and bonding of the street pole to ground in all the street poles. Test results shall be submitted to the Employer's Engineer.
- g) Should the *Contractor* suggest different luminaires, they are to undertake simulations and submit to the TNPA engineer for acceptance.
- h) The *Contractor* is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

- i) The *Contractor* shall undertake a lighting survey at night to measure and record the lighting level in the area where work was undertaken in the presence of the Employer's Engineers. The *Contractor* shall notify the Employer's Engineer, seven days prior to the lighting survey.

4.5.12.2.3 Formosa/Causeway Cutler Wall

- a) The *Contractor* shall saw- cut the existing premix and excavation of 28m both sides, for preparation for installation of new cable to supply the proposed additional street light Pole 6 in Formosa/Causeway road as shown in drawing no: 2127737-1-000-E-LA-0006-05. The *Contractor* shall install 28m x 70mm PVC sleeves for installation of the cable to the proposed new Pole 6. The *Contractor* shall backfill trenches on completion of the *Works* and layerworks shall be reinstated.
- b) The *Contractor* shall uninstall 8 existing luminaires with spigots and fittings to mount new luminaires. The existing fittings shall be issued to TNPA Power Supplies and Services Depot (1 Kuwait road). See drawing 2127737-1-000-E-LA-0006-05. The *Contractor* shall inspect and test all cables in the existing pole. All damaged cables shall be replaced. The *Contractor* shall supply, deliver, offload, install and paint galvanised steel spigots to all existing streetlight poles.
- c) The *Contractor* shall supply, deliver, offload, install and paint 2 x 9m hot dip galvanised steel streetlight pole with protection switchgear inside the pole. The pole shall be supplied complete with spigots and fittings for mounting the luminaire as illustrated in drawing 2127737-1-000-E-LA-0006-05. The new two (2) poles and spigots not excluding the seven (7) existing poles shall be prepared and painted as detailed in 4.4.4. The *Contractor* shall on completion of the *Works* reinstate layerworks.
- d) The *Contractor* shall remove the damaged concrete pole shown on drawing 2127737-1-000-E-LA-0006-05 and replace the pole with one of the new 9m painted, galvanized steel street light poles with spigot and protection switchgear inside the pole. The new pole shall be planted in the same location where the existing pole was removed. The removed pole shall be issued to TNPA Power Supplies and Services Depot (1 Kuwait road). The *Contractor* shall on completion of the *Works* reinstate layerworks.
- e) The *Contractor* shall supply, deliver, offload and install 36m of 2.5mm² 2-core PVC insulated PVC bedded SWA PVC sheathed 600/1000V copper cables to supply the proposed additional streetlight pole as seen on drawing 2127737-1-000-E-LA-0006-05 for details.
- f) The *Contractor* shall supply, deliver, offload and install similar or approved to 9 x Beka LEDLUME midi 48 LED 73W OPTIC 5098, 10kV surge protection with integrated photocell on a NEMA socket and install on the new and existing poles as illustrated on drawing 2127737-1-000-E-LA-0006-05. The luminaires per pole and orientation is clearly indicated on the above-mentioned drawing number.
- g) The *Contractor* shall design, supply and install new earthing and lightning protection to the new poles. The *Contractor* shall also design, supply and install hot-dip Galvanized finials and bonding of the pole to ground in all the street light poles. Test results shall be submitted to the Employer's Engineer.
- h) Should the *Contractor* suggest different luminaires, they are to undertake simulations and submit to the TNPA engineer for acceptance.
- i) The *Contractor* is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

- j) The *Contractor* shall undertake a lighting survey at night to measure and record the lighting level in the area where work was undertaken in the presence of the Employer's Engineers. The *Contractor* shall notify the Employer's Engineer, seven days prior to the lighting survey.

4.5.12.3 Abadan Yard (Yard Lighting)

- a) The *Contractor* shall saw- cut the existing premix and excavation of 35m on both sides, for preparation for installation of new cable to supply the proposed Kiosk to feed new light Poles in Abadan Yard as shown in drawing no: 2127737-1-000-E-LA-0006-04. The *Contractor* shall install 35m x 110mm PVC sleeves for installation of the cable to the proposed Kiosk to feed new light Poles. The *Contractor* shall backfill trenches on completion of the *Works* and layerworks shall be reinstated.
- b) Where the cable is cross existing rail tracks, the *Contractor* shall install 5m of 110mm diameter sleeve pipes and pipe that shall be pipe jacked under the existing rail tracks as shown in drawing 2127737-1-000-E-LA-0006-04. The *Contractor* shall on completion of the works reinstate layerworks.
- c) The *Contractor* shall carry out 560m of the required trench work and area preparation for the installation of new cables to supply the proposed additional streetlight poles on Abadan yard as shown in drawing no: 2127737-1-000-E-LA-0006-04. The *Contractor* shall backfill trenches on completion of the works and layerworks shall be reinstated.
- d) The *Contractor* shall supply, deliver, offload, install and paint 16 x 9m hot dip galvanized steel streetlight poles in section 1 of drawing 2127737-1-000-E-LA-0006-04. The proposed poles shall be installed complete with protection switchgear inside the pole, spigots and fittings to mount the luminaires as illustrated in drawing 2127737-1-000-E-LA-0006-04. The poles and spigots shall be prepared and painted as detailed in 4.4.4. The *Contractor* shall on completion of the *Works* reinstate layerworks.
- e) The *Contractor* shall supply, deliver, offload and install 490m of 2.5mm² 4-core PVC insulated PVC bedded SWA PVC sheathed 600/1000V copper cables from pole 16 to pole 1 of section 1 as seen on drawing 2127737-1-000-E-LA-0006-04.
- f) The *Contractor* shall supply, deliver, offload and install 390m of 25mm² 4-core PVC insulated PVC bedded SWA PVC sheathed 600/1000V copper cables from existing Cutler mini-substation 9 to the proposed pole mounted distribution board in section 1 as seen drawing 2127737-1-000-E-LA-0006-04.
- g) The *Contractor* shall supply, deliver, offload and install a weatherproof pole mounted distribution board complete with fasteners, fittings and accessories as seen on drawing 2127737-1-000-E-LA-0006-04.
- h) The *Contractor* shall supply, deliver, offload, install and paint 13 x 9m galvanized steel streetlight poles in section 8 as illustrated in drawing 2127737-1-000-E-LA-0006-04. The proposed poles shall be installed complete with protection switchgear inside the pole, spigots and fittings to mount the luminaires as illustrated in drawing 2127737-1-000-E-LA-0006-04. The poles and spigots shall be prepared and painted as detailed in 4.4.4. The *Contractor* shall on completion of the *Works* reinstate current layerworks.
- i) The *Contractor* shall supply, deliver, offload and install 360m of 2.5mm² 4-core PVC insulated PVC bedded SWA PVC sheathed 600/1000V copper cables from pole 29 to pole 17 of section 8 as seen on drawing 2127737-1-000-E-LA-0006-04.
- j) The *Contractor* shall supply, deliver, offload and install 320m of 25mm² 4-core PVC insulated PVC bedded SWA PVC sheathed 600/1000V copper cables from to the low voltage distribution board of the existing Fynlands generator substation to pole 29 in section 8 as seen on drawing no: 2127737-1-000-E-LA-0006-04.

- k) The *Contractor* shall supply, deliver, offload and install similar or equal approved 16 x Beka LEDLUME midi 48 LED 73W OPTIC 5098, 10kV surge protection with integrated photocell on a NEMA socket on the new poles in section 1 as illustrated in drawing 2127737-1-000-E-LA-0006-04. The luminaires per pole and orientation is clearly indicated on the above-mentioned drawing number.
- l) The *Contractor* shall supply, deliver, offload and install similar or equal approved 13 x Beka LEDLUME midi 48 LED 73W OPTIC 5098, 10kV surge protection with integrated photocell on a NEMA socket on the new poles in section 8 as illustrated in drawing 2127737-1-000-E-LA-0006-04. The luminaires per pole and orientation is clearly indicated on the above-mentioned drawing number.
- m) Alterations to existing mini-substation No.9: the *Contractor* shall supply, deliver and install a 30A, three phase circuit breaker in the existing low voltage switchboard of the existing mini-substation. The circuit breaker shall be used to supply the lighting circuit shown in drawing no: 2127737-1-000-E-LA-0006-04.
- n) Alterations to existing Fynnlands generator substation: the *Contractor* shall supply, deliver and install 25A, three phase circuit breaker in the existing low voltage switchboard of the existing substation. This circuit breaker shall be used to supply the lighting circuit as shown in drawing 2127737-1-000-E-LA-0006-04.
- o) The *Contractor* shall design, supply and install new earthing and lightning protection for the new installation. The *Contractor* shall also design, supply and install hot-dip Galvanized finials and bonding of the street poles to ground in all the street poles. Test results shall be submitted to the *Employer's* Engineer.
- p) Should the *Contractor* suggest different luminaires, they are to undertake simulations and submit to the TNPA engineer for acceptance.
- q) The *Contractor* is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.
- r) The *Contractor* shall undertake a lighting survey at night to measure and record the lighting level in the area where work was undertaken in the presence of the *Employer's* Engineers. The *Contractor* shall notify the Employer's Engineer, seven days prior to the lighting survey.

4.5.12.4 UMgababa Yard

- a) The Contractor shall saw- cut the existing premix and excavation of 12m on both sides, for preparation for installation of new cables to supply the proposed new light Poles in uMgababa Yard as shown in drawing no: 2127737-1-000-E-LA-0006-03. The Contractor shall install 2 x 12m of 110mm PVC sleeves for installation of the cables to the proposed new light Poles. The Contractor shall backfill trenches on completion of the *Works* and layerworks shall be reinstated.
- b) The *Contractor* shall carry out 360m of the required trench work and area preparation for the installation of new cables to supply the proposed additional streetlight poles in uMgababa yard as shown in drawing 2127737-1-000-E-LA-0006-03. The *Contractor* shall backfill trenches on completion of the works and layerworks shall be reinstated.
- c) The *Contractor* shall supply, deliver, offload, install and paint 8 x 9m galvanized steel streetlight poles. The proposed poles shall be installed complete with protection switchgear inside the pole, spigots and fittings to mount the luminaires as illustrated in drawing 2127737-1-000-E-LA-0006-03. The poles and spigots shall be prepared and painted as detailed in 4.4.4. The *Contractor* shall on completion of the *Works* reinstate layerworks.

- d) The *Contractor* shall supply, deliver, offload and install 230m of 2.5mm² 4-core PVC insulated PVC bedded SWA PVC sheathed 600/1000V copper cables from pole 1 to pole 4 and pole 8 to pole 5 as seen on drawing 2127737-1-000-E-LA-0006-03.
- e) The *Contractor* shall supply, deliver, offload and install 450m of 6mm² 4-core PVC insulated PVC bedded SWA PVC sheathed 600/1000V copper cables from pole 1 and pole 8 to existing CFI substation as seen on drawing 2127737-1-000-E-LA-0006-03.
- f) The *Contractor* shall supply, deliver, offload and install similar or equal approved 8 x Beka LEDLUME midi 48 LED 73W OPTIC 5098, 10kV surge protection with integrated photocell on a NEMA socket on the new poles as illustrated in drawing no: 2127737-1-000-E-LA-0006-03. The luminaires per pole and orientation is clearly indicated on the above-mentioned drawing number.
- g) Alterations to existing CFI substation: the *Contractor* shall supply, deliver and install 2 x 20A, three phase circuit breaker in the existing low voltage switchboard of the existing CFI substation. These circuit breakers shall be used to supply the lighting circuit shown in drawing no: 2127737-1-000-E-LA-0006-03.
- h) The *Contractor* shall design, supply and install new earthing and lightning protection for the new installation. The *Contractor* shall also design, supply and install hot-dip Galvanized finials and bonding of the street poles to ground in all the street poles. Test results shall be submitted to the Employer's Engineer.
- i) Should the *Contractor* suggest different luminaires, they are to undertake simulations and submit to the TNPA engineer for acceptance.
- j) The *Contractor* is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.
- k) The *Contractor* shall undertake a lighting survey at night to measure and record the lighting level in the area where work was undertaken in the presence of the Employer's Engineers. The contractor shall notify the Employer's Engineer, seven days prior to the lighting survey.

4.5.12.5 Hokkaido (Yard Lighting)

- b) The *Contractor* shall carry out 565m of required trench work and area preparation for the installation of new cables to supply the proposed additional high masts at Hokkaido yard as shown in drawing no: 2127737-1-000-E-LA-0006-02. The Contractor shall backfill trenches on completion of the works and layerworks shall be reinstated.
- c) Where the cables cross existing rail tracks, the *Contractor* shall install 2m and 58m of 110mm diameter sleeve pipes and pipe jacked under the rail tracks as shown in drawing 2127737-1-000-E-LA-0006-02. The *Contractor* shall on completion of the works reinstate layerworks.
- d) The *Contractor* shall uninstall and remove all the existing luminaires and 15 streetlight poles in the yard and return to TNPA Power Supplies and Services Depot (1 Kuwait road). See drawing 2127737-1-000-E-LA-0006-02 for reference.
- e) The *Contractor* shall construct 3 x reinforced concrete bases for the 30m high masts as per drawing 2127737-1-000-S-LA-0001-01. The base shall be positioned as detailed in drawing 2127737-1-000-E-LA-0006-02.
- f) The *Contractor* shall supply, deliver, offload, paint and install 3 x hot dip galvanised steel 30m high masts complete with a mounting ring for mounting 6 flood lights per mast as shown in drawing 2127737-1-000-E-LA-0006-02 and detailed in specification TPD-010A-HIGHMASTSPEC-A.

- g) ~~The Contractor shall supply, deliver, offload and install 36 x equal or similar approved to BEKA Omniblast MAXI 1 E 455W, 10kV surge protection device, including photocell with Optic 5188 luminaires in the Highmasts as shown in drawing No.: 2127737-1-000-E-LA-0006-02. The luminaires per pole and orientation is clearly indicated on the above mentioned drawing number.~~ The Contractor shall supply, deliver, offload and install 36 x equal or similar approved to Beka Omniblast 1E MAXI 455W 4000k optic 5188, with 10kV surge protection and integrated 7 Nema socket and weatherproof cover for the Nema socket, in all the Highmasts as shown in drawing No.: 2127737-1-000-E-LA-0006-02. The luminaires per pole and orientation is clearly indicated on the above-mentioned drawing number. Nema socket and luminaire must be wired for future automation using Owllet plug in module.
- h) The Contractor shall supply, deliver, offload and install 650m of 10mm² 4 core PVC insulated PVC bedded SWA PVC sheathed 600/1000V copper cables to supply the new High mast lighting as seen on drawing 2127737-1-000-E-LA-0006-02.
- i) Alterations to existing switch room: The Contractor shall supply, deliver and install 2 x 32A three phase circuit breakers in the existing low voltage switchboard of the existing switch room. These circuit breakers shall be used to supply the lighting circuit shown in drawing 2127737-1-000-E-LA-0006-02.
- j) The Contractor shall design, supply and install new earthing and lightning protection for the new installation. The Contractor shall also design, supply and install hot-dip Galvanized finials and bonding of the street pole to ground in all the street poles. Test results shall be submitted to the Employer's Engineer.
- k) Should the Contractor suggest different luminaires, they are to undertake simulations and submit to the TNPA engineer for acceptance.
- l) The Contractor is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers. The contractor shall also issue a "RMD 9 certificate" shall be issued for all high masts that have been installed or refurbished.
- m) The Contractor shall undertake a lighting survey at night to measure and record the lighting level in the area where work was undertaken in the presence of the Employer's Engineers. The contractor shall notify the Employer's Engineer, seven days prior to the lighting survey.

4.5.12.6 Berth Lighting (Berths, 1, 2, 3, 4, 5, 6, 7, 8, 10)

- a) The Contractor shall saw- cut the existing premix and excavation of 12m on both sides, for preparation for installation of new cables to supply the proposed Kiosk and new light Poles for berth lighting as shown in drawing no: 2127737-1-000-E-LA-0006-08. The Contractor shall install 2 x 12m of 110mm PVC sleeves for installation of the cables to the proposed kiosk and new light Poles. The Contractor shall backfill trenches on completion of the Works and layerworks shall be reinstated.
- b) The Contractor shall saw- cut the existing premix and excavation of 17m on both sides, for preparation for installation of new cables to supply the proposed wall mounted distribution board and new light Poles for berth lighting as shown in drawing no: 2127737-1-000-E-LA-0006-11. The Contractor shall install 2 x 17m of 110mm PVC sleeves for installation of the cables to the proposed wall mounted distribution board and new light Poles. The Contractor shall backfill trenches on completion of the Works and layerworks shall be reinstated.
- c) The Contractor shall saw- cut the existing concrete of 250m on both sides, for preparation for excavation as shown in drawing No: 2127737-1-000-E-LA-0006-08 and 2127737-1-000-E-LA-0006-11

- d) The *Contractor* shall supply, deliver, offload and install 650m of 35mm² 4-core PVC insulated PVC bedded SWA PVC sheathed 600/1000V copper cables to supply the proposed wall mounted kiosk to feed berth lighting poles as illustrated in drawing No: 2127737-1-000-E-LA-0006-08, 2127737-1-000-E-LA-0006-10, 2127737-1-000-E-LA-0006-11 and 2127737-1-000-E-LA-0006-12. Where the cables are mounted on the existing quay wall the cables shall be supported using cable support system which are saddles and splices at a distance of 1m apart. Where cables are feeding light poles at the berth side, the Contractor shall use stainless steel conduit and fasteners to be core-drilled neat and clean at the edge of the existing concrete walkway
- e) The *Contractor* shall supply, deliver, offload and install 1210m of 16mm² 4-core PVC insulated PVC bedded SWA PVC sheathed 600/1000V copper cables to supply the proposed streetlight poles as illustrated in drawing No: 2127737-1-000-E-LA-0006-08, 2127737-1-000-E-LA-0006-10, 2127737-1-000-E-LA-0006-11 and 2127737-1-000-E-LA-0006-12. Where the cables are mounted on the existing quay wall the cables shall be supported using cable support system which are saddles and splices at a distance of 1m apart. Where cables are feeding light poles at the berth side, the Contractor shall use stainless steel conduit and fasteners to be core-drilled neat and clean at the edge of the existing concrete walkway
- f) The Contractor shall supply, deliver, offload and install 3550m of 10mm² 4-core PVC insulated PVC bedded SWA PVC sheathed 600/1000V copper cables to supply the proposed streetlight poles as illustrated in drawing No: 2127737-1-000-E-LA-0006-08, 2127737-1-000-E-LA-0006-10, 2127737-1-000-E-LA-0006-11 and 2127737-1-000-E-LA-0006-12. Where the cables are mounted on the existing quay wall the cables shall be supported using cable support system which are saddles and splices at a distance of 1m apart. Where cables are feeding light poles at the berth side, the Contractor shall use stainless steel conduit and fasteners to be core-drilled neat and clean at the edge of the existing concrete walkway.
- g) Where the cables are to be installed along the existing pipe racks, the *Contractor* shall design, supply and install hot dipped galvanised steel cable way, complete with all related accessories: horizontal bends, internal bends, external bends, and straight sections to accommodate the power supply to the light poles that are to be installed on the existing pipe rack system. The Contractor shall bond the hot dipped galvanised steel cable way into the existing pipe racks. The Contractor shall make neat of the installation.
- h) Where the cables cross existing entrance gates into the berths, the *Contractor* shall install 9m of 110mm diameter sleeve pipes as shown in drawing 2127737-1-000-E-LA-0006-08, 2127737-1-000-E-LA-0006-10, 2127737-1-000-E-LA-0006-11 and 2127737-1-000-E-LA-0006-12. The Contractor shall on completion of the works reinstate layerworks
- i) The *Contractor* shall supply, deliver, offload and install proposed 1 x weatherproof kiosk complete with fasteners, fittings and accessories as seen on drawing no: 2127737-1-000-E-LA-0006-08.
- j) The Contractor shall supply, deliver, offload and install proposed 6 x weatherproof fibre glass distribution boards complete with fasteners, fittings and accessories as seen on drawing no: 2127737-1-000-E-LA-0006-10, 2127737-1-000-E-LA-0006-11 and 2127737-1-000-E-LA-0006-12.
- k) The *Contractor* shall supply, deliver, offload, paint and install 6 x 6m fibre glass pole heavy duty with spigots. The poles shall be supplied complete with protection switchgear inside the pole, fittings for mounting the luminaire as illustrated in drawing no: 2127737-1-000-E-LA-0006-08 and 2127737-1-000-E-LA-0006-11. The pole base plates shall be core-drilled onto the existing berth concrete. The poles and spigots shall be prepared and painted as detailed in 4.4.4. The Contractor shall on completion of the Works reinstate layerworks.
- l) The Contractor shall design, supply, deliver, offload and install 99 x 2m heavy duty steel hot dipped galvanised purpose made hinged walk-down streetlight poles complete with protection switchgear inside the pole. These poles shall be installed on the existing 8m pipe racks safely and neatly. The hinged walk-down pole shall be supplied complete with spigots and fittings for mounting the luminaire 10m above ground level. The luminaire details are illustrated in drawing

no: 2127737-1-000-E-LA-0006-08, 2127737-1-000-E-LA-0006-10, 2127737-1-000-E-LA-0006-11 and 2127737-1-000-E-LA-0006-12. The poles shall also be prepared and painted as detailed in 4.4.4. The *Contractor* is required to submit detailed drawings to the Employer's Electrical Engineer for acceptance.

- m) The *Contractor* shall uninstall 7HPS on the existing 30m high mast in Berth 1 as illustrated in drawing no: 2127737-1-000-E-LA-0006-08
- n) The *Contractor* shall reconfigure the existing 30m high mast ring in berth 1 to be able to mount, similar or approved to 6 x Beka LEDlume MAXI, 5119 optic, 276W, 128 LEDs, 10kV surge protection device, with integrated photocell on a NEMA socket as illustrated in drawing no: 2127737-1-000-E-LA-0006-08.
- o) The *Contractor* shall supply, deliver, offload and install similar or approved to 100 x Beka LEDlume MAXI, 5119 optic, 276W, 128 LEDs, 10kV surge protection device, with integrated photocell on a NEMA socket on the new poles. See drawing 2127737-1-000-E-LA-0006-08, 2127737-1-000-E-LA-0006-10, 2127737-1-000-E-LA-0006-11 and 2127737-1-000-E-LA-0006-12. The luminaires per pole and orientation is clearly indicated on the above-mentioned drawing number.
- p) The *Contractor* shall supply, deliver, offload and install similar or approved to 6 x Nordland, 160W BLD 150 Zone 1 classification LED luminaires, 10kV surge protection device, with integrated photocell on a NEMA socket on the new poles. See drawing 2127737-1-000-E-LA-0006-08, and 2127737-1-000-E-LA-0006-11. The luminaires per pole and orientation is clearly indicated on the above-mentioned drawing numbers.
- q) Alterations to existing CFI substation: The *Contractor* shall supply, deliver and install a 63A and 20A three phase circuit breakers in the existing low voltage switchboard. The circuit breakers shall be used to supply the proposed berth lighting kiosk and lighting circuit as shown in drawing no: 2127737-1-000-E-LA-0006-08.
- r) Alterations to existing Berth 6 DB: The *Contractor* shall supply, deliver and install 2 x 40A and 30A three phase circuit breakers in the existing Berth 6 low voltage switchboard. The circuit breakers shall be used to supply the proposed berth lighting kiosk and lighting circuit as shown in drawing no: 2127737-1-000-E-LA-0006-10 and 2127737-1-000-E-LA-0006-11.
- s) Alterations to existing TNPA switch-room: The *Contractor* shall supply, deliver and install 63A three phase circuit breakers in the existing low voltage switchboard of the existing switch-room. The circuit breaker shall be used to supply the lighting circuits as shown in drawing no: 2127737-1-000-E-LA-0006-11.
- t) Alterations to existing Fynnlands Generator Substation: The *Contractor* shall supply, deliver and install 63A three phase circuit breakers in the existing low voltage switchboard of the existing Fynnlands Generator Substation. The circuit breaker shall be used to supply the lighting circuits as shown in drawing no: 2127737-1-000-E-LA-0006-12.
- u) The *Contractor* shall design, supply and install new earthing and lightning protection for the new installation. The *Contractor* shall also design, supply and install hot-dip Galvanized finials and bonding of the street poles to ground in all the street poles. Test results shall be submitted to the Employer's Engineer.
- v) Should the *Contractor* suggest different luminaires, they are to undertake simulations and submit to the TNPA engineer for acceptance.
- w) The *Contractor* is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.

- x) The *Contractor* shall undertake a lighting survey at night to measure and record the lighting level in the area where work was undertaken in the presence of the Employer's Engineers. The *Contractor* shall notify the Employer's Engineer, seven days prior to the lighting survey.

4.5.12.7 Berth 9

- a) The *Contractor* shall carry out 370m of the required trench work and area preparation for the installation of new cables to supply the proposed poles in Berth 9 as shown in drawing 2127737-1-000-E-LA-0006-09. The *Contractor* shall backfill trenches on completion of the works and layerworks shall be reinstated.
- b) The Contractor shall saw-cut the existing premix and excavation of 45m on both sides for preparation for installation of new cables to supply the proposed poles in Berth 9 as shown in drawing 2127737-1-000-E-LA-0006-09. The *Contractor* shall backfill trenches on completion of the works and layerworks shall be reinstated.
- c) The Contractor shall supply, deliver and install 75m x 110mm PVC sleeve pipe, for preparation for installation of new cable from Berth 9 mini-substation to supply the proposed lighting poles in Berth 9.
- d) The Contractor shall uninstall and remove 10 x existing luminaires and 6 x 9m streetlight poles and return to TNPA Power Supplies and Services Depot (1 Kuwait road). See drawing 2127737-1-000-E-LA-0006-09 for reference.
- e) The Contractor shall supply, deliver, offload and install 15 x 9m galvanised streetlight poles with spigots. The proposed poles shall be installed complete with protection switchgear inside the pole, spigots and fittings to mount the luminaires as illustrated in drawing 2127737-1-000-E-LA-0006-09. The poles and spigots shall be prepared and painted as detailed in 4.4.4. The *Contractor* shall on completion of the *Works* reinstate layerworks.
- f) The *Contractor* shall supply, deliver, offload and install 550m of 6mm² 4-core PVC insulated PVC bedded SWA PVC sheathed 600/1000V copper cables to supply the proposed additional streetlight poles. The supply to the new poles shall be sourced from pole 9 as illustrated in drawing 2127737-1-000-E-LA-0006-09.
- g) The *Contractor* shall supply, deliver, offload and install similar or approved to 22 x Beka LEDLUME midi 48 LED 73W OPTIC 5098, 10kV surge protection device, with integrated photocell on a NEMA socket on the new and existing poles as shown on drawing 2127737-1-000-E-LA-0006-09. The luminaires per pole and orientation is clearly indicated on the above-mentioned drawing number.
- h) Alterations to existing Berth 9 Mini-substation: The *Contractor* shall supply, deliver and install 40A three phase circuit breaker in the existing low voltage switchboard of the existing mini-substation. The circuit breaker shall be used to supply the lighting circuit shown in drawing no: 2127737-1-000-E-LA-0006-09.
- i) The cables shall be installed in 110mm sleeve pipes across two roadways in as detailed in drawing no: 2127737-1-000-E-LA-0006-09. The *Contractor* shall reinstate the current layerworks of the roadway on completion of the *Works*.
- j) The *Contractor* shall design, supply and install new earthing and lightning protection for the new poles. The *Contractor* shall also design, supply and install hot-dip Galvanized finials and bonding to ground for the new and existing street poles. Test results shall be submitted to the Employer's Engineer.
- k) Should the *Contractor* suggest different luminaires, they are to undertake simulations and submit to the TNPA engineer for acceptance.

- l) The *Contractor* is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.
- m) The *Contractor* shall undertake a lighting survey at night to measure and record the lighting level in the area where work was undertaken in the presence of the Employer's Engineers. The *Contractor* shall notify the Employer's Engineer, seven days prior to the lighting survey.

4.5.13. Zone 7

4.5.13.1 South Pier Service Road

- a) The *Contractor* shall carry out 840m of required trench work and area preparation for the installation of new cables to supply the proposed new streetlight poles in South Pier road as shown in drawing 2127737-1-000-E-LA-0007-01. The contractor shall supply and install a 110mm diameter sleeve pipe that shall be pipe jacked under an existing rail track as shown in drawing no: 2127737-1-000-E-LA-0007-01. The *Contractor* shall backfill trenches on completion of the works and layerworks shall be reinstated.
- b) Where the cables cross existing rail tracks, the *Contractor* shall install 15m of 110mm diameter sleeve pipes and pipe jacked under the rail tracks as shown in drawing 2127737-1-000-E-LA-0007-01. The *Contractor* shall on completion of the works reinstate layerworks.
- c) The *Contractor* shall supply, deliver, offload, install and paint 12 x 9m galvanized steel streetlight poles and spigots. The proposed poles shall be installed complete with protection switchgear inside the pole, spigots and fittings to mount the luminaires as illustrated in drawing 2127737-1-000-E-LA-0007-01. The poles and spigots shall be prepared and painted as detailed in 4.4.4. The *Contractor* shall on completion of the *Works* reinstate layerworks.
- d) The *Contractor* shall supply, deliver, offload and install 530m of 25mm² 4-core PVC insulated PVC bedded SWA PVC sheathed 600/1000V copper cables. See drawing no: 2127737-1-000-E-LA-0007-01.
- e) The *Contractor* shall supply, deliver and install 25mm² 4-core PVC insulated PVC bedded SWA PVC sheathed 600/1000V copper cable joints as shown on drawing no: 2127737-1-000-E-LA-0007-01.
- f) The *Contractor* shall supply, deliver, offload and install 520m of 4mm² 4-core PVC insulated PVC bedded SWA PVC sheathed 600/1000V copper cables. See drawing no: 2127737-1-000-E-LA-0007-01.
- g) The *Contractor* shall supply, deliver, offload and install similar or equal approved 12 x Beka LEDLUME midi 48 LED 73W OPTIC 5098, 10kV surge protection device, with integrated photocell on a NEMA socket on the new poles in section 8 as illustrated in drawing no: 2127737-1-000-E-LA-0007-01. The luminaires per pole and orientation is clearly indicated on the above-mentioned drawing number.
- h) Alterations to existing distribution board: the *Contractor* shall supply, deliver and install a 32A three phase circuit breaker in the existing low voltage switchboard of the existing South Pier substation. This circuit breaker shall be used to supply the lighting circuit shown in drawing no: 2127737-1-000-E-LA-0007-01.
- i) The *Contractor* shall design, supply and install new earthing and lightning protection for the new installation. The *Contractor* shall also design, supply and install hot-dip Galvanized finials and bonding of the street pole to ground in all the street poles. Test results shall be submitted to the Employer's Engineer.

- j) Should the *Contractor* suggest different luminaires, they are to undertake simulations and submit to the TNPA engineer for acceptance.
- k) The *Contractor* is required to test the installation in the presence of the Employer's Engineers and issue electrical "Certificate of Compliance" (COC) for all work done to the satisfaction of the Employer's Engineers.
- l) The *Contractor* shall undertake a lighting survey at night to measure and record the lighting level in the area where work was undertaken in the presence of the Employer's Engineers. The *Contractor* shall notify the Employer's Engineer, seven days prior to the lighting survey.

4.5.13.2 Testing and Commissioning of the Entire Installation

- a) The *Contractor* shall conduct a Factory Acceptance Test (FAT) for all distribution boards and electrical kiosks to be installed as part of the Works to be executed in this Contract prior to delivery to site. The FAT shall be conducted in the presence of the Employer's Engineers. The legal transfer of ownership from the supplier to the *Contractor* shall be held by the *Contractor* until the distribution boards and electrical kiosks are fully installed, tested commissioned on the Employer's designated site.
- b) The *Contractor* shall test the entire installation, including but not limited to the LV installation and the lighting installation as per SANS 10142-1 and hand over all relevant test certificates to the Employers Project Manager for acceptance.

4.5.13.3 Earthing and Lightning protection

- a) The *Contractor* shall design, supply and install earthing and lightning protection to all street light poles and high masts in accordance to specification No. TPD: 004-EARTHINGSPEC; "Transnet Projects Specification for lightning protection and earthing". This component of work shall be undertaken by a specialist earthing and lightning protection *Contractor*.
- b) The high mast shall be provided with a M12 earth bolt welded to the mast with stainless steel nuts. The incoming electrical supply earth conductor and all other electrical equipment shall be connected to the earth bolt.
- c) The earth electrodes and couplers used on all street light poles and high masts shall be manufactured from stainless steel and in accordance to SABS 1063.
- d) The earth electrode resistance shall not exceed the requirements of SANS 10142-1 and SANS 10313.
- e) The *Contractor* shall submit all the proposed designs to the employers engineer for acceptance.

4.5.13.4 Compliance Certificate

- a) The *Contractor* is required to test the installation in the presence of the *Employer's* Engineers and issue compliance certificates for lightning protection and earthing systems (SANS 10313) for all work done to the satisfaction of the *Employer's* Engineers
- b) The *Contractor* is required to test the installation in the presence of the *Employer's* Engineers and issue compliance certificates for Low Voltage Installations (SANS 10142-1) for all work done to the satisfaction of the *Employer's* Engineers
- c) The *Contractor* is required to test the installation in the presence of the *Employer's* Engineers and issue compliance certificates for all high masts installed and refurbished (RMD 9 Certificates) for all work done to the satisfaction of the *Employer's* Engineers

- d) The *Contractor* shall submit a full set of completed and valid compliance certificates to the Employer.

4.6 List of Drawings

4.6.1 Drawings issued by the *Employer*

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

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

| Drawing number | Revision | Title |
|----------------------------|----------|--|
| 2127737-1-000-E-LA-0002-01 | 0A | Zone 2 - Cato Creek East and West Yard Lighting Layout |
| 2127737-1-000-E-LA-0003-01 | 0A | Zone 3 - Tug Jetty Lighting Layout |
| 2127737-1-000-E-LA-0003-02 | 0A | Zone 3 - OTB and Fresh Produce Lighting Layout |
| 2127737-1-000-E-LA-0003-03 | 0A | Zone 3 - General Streets Lighting Layout |
| 2127737-1-000-E-LA-0004-01 | 0A | Zone 4 – Maydon Wharf Yard Highmast Lighting Layout Part 1 |
| 2127737-1-000-E-LA-0004-02 | 0A | Zone 4 – Maydon Wharf Yard Highmast Lighting Layout Part 2 |
| 2127737-1-000-E-LA-0004-03 | 0A | Zone 4 – Maydon Wharf Yard Highmast Lighting Layout Part 3 |
| 2127737-1-000-E-LA-0004-04 | 0A | Zone 4 – Dry Dock Road Lighting Layout |
| 2127737-1-000-E-LA-0004-05 | 0A | Zone 4 – Manganese Yard Highmast Lighting Layout |
| 2127737-1-000-E-LA-0004-06 | 0A | Zone 4 – I&J Tug Jetty Lighting Layout |
| 2127737-1-000-E-LA-0005-01 | 0A | Zone 5 – Bayhead Road Street Lighting Layout |
| 2127737-1-000-E-LA-0005-02 | 0A | Zone 5 – Ambrose Park Road Street Lighting Layout |
| 2127737-1-000-E-LA-0005-03 | 0A | Zone 5 – Bayhead Road Rail Track Street Lighting Layout |
| 2127737-1-000-E-LA-0005-04 | 0A | Zone 5 – Kuwait Road Street Lighting Layout |
| 2127737-1-000-E-LA-0005-05 | 0A | Zone 5 – King Rest Yard Lighting Layout |

| | | |
|---------------------------------|----|---|
| 2127737-1-000-E-LA-0005-06 | 0A | Zone 5 – Fynnlands Yard Lighting Layout |
| 2127737-1-000-E-LA-0005-07 | 0A | Zone 5 – Iran Road Street Lighting Layout |
| 2127737-1-000-E-LA-0005-08 | 0A | Zone 5 – Langeberg Road and Sharkmesher Road Street Lighting Layout |
| 2127737-1-000-E-LA-0006-01 | 0A | Zone 6- Wharfside road lighting layout |
| 2127737-1-000-E-LA-0006-02 | 0A | Zone 6- Hokkaido yard lighting layout |
| 2127737-1-000-E-LA-0006-03 | 0A | Zone 6- Umgababa yard lighting layout |
| 2127737-1-000-E-LA-0006-04 | 0A | Zone 6- Abadan road yard lighting layout |
| 2127737-1-000-E-LA-0006-05 | 0A | Zone 6- Formosa road lighting layout |
| 2127737-1-000-E-LA-0006-06 | 0A | Zone 6- Cutler service road lighting layout |
| 2127737-1-000-E-LA-0006-07 | 0A | Zone 6- Celebes road cutler wall lighting layout |
| 2127737-1-000-E-LA-0006-08 | 0A | Zone 6- Berths 1-3 lighting layout |
| 2127737-1-000-E-LA-0006-09 | 0A | Zone 6- Berth 9 lighting layout |
| 2127737-1-000-E-LA-0006-10 | 0A | Zone 6- Berth 4-6 Lighting Layout |
| 2127737-1-000-E-LA-0006-11 | 0A | Zone 6- Berth 6-8 Lighting Layout |
| 2127737-1-000-E-LA-0006-12 | 0A | Zone 6- Berth 10 Lighting Layout |
| 2127737-1-000-E-LA-0007-01 | 0A | Zone 7- South Pier lighting layout |
| 2127737-1-000-S-DE-0001-01 | 0A | High Mast Foundation – 30m |
| 2127737-1-000-C-LA-1001-01-A-TD | 0A | ZONE 2 & ZONE 3 - GENERAL STREETS, CATO CREEK, OTB |
| 2127737-1-000-C-LA-1002-01-A-TD | 0A | ZONE 3 - GENERAL STREETS, TUG JETTY |
| 2127737-1-000-C-LA-1003-01-A-TD | 0A | ZONE 4 - I&J, MAYDON WHARF 1,2,3, MANGANESE & DRY DOCK |

| | | |
|---------------------------------|----|--|
| 2127737-1-000-C-LA-1004-01-A-TD | OA | ZONE 5 - BAYHEAD ROAD & BAYHEAD RAIL TRACK |
| 2127737-1-000-C-LA-1005-01-A-TD | OA | ZONE 5 - AMBROSE PARK, LANGEBOEG ROAD & SHARKMESHER ROAD |
| 2127737-1-000-C-LA-1006-01-A-TD | OA | ZONE 5 - KINGSREST YARD & FYNLAND |
| 2127737-1-000-C-LA-1007-01-A-TD | OA | ZONE 5 - IRAN ROAD & KUWAIT ROAD |
| 2127737-1-000-C-LA-1008-01-A-TD | OA | ZONE 6 - ISLAND VIEW BERTH 1,2,3,4,5,6,7,8,10 |
| 2127737-1-000-C-LA-1009-01-A-TD | OA | ZONE 6 & ZONE 7 - HOKAIDO ROAD, BERTH 9, CUTLER ROAD, ABADAN ROAD, CAUSEWAY FORMOSA ROAD, SOUTH PIER |

4.7 Table 1

Table 1

| Luminaire Type | Minimum Criteria |
|------------------------------------|--|
| Beka Omniblast MAXI -1-E-455W | <ul style="list-style-type: none"> - Body - Die cast aluminium - Max current - 1400mA - Lumens output - 49560, with appropriate optics - IP Rating - 66 - Nema socket - 7 pin with weatherproof cover. Nema socket and luminaire must be wired for future automation using Owllet plug in module. |
| Beka LEDlume - MIDI 73W Optic 5098 | <ul style="list-style-type: none"> - Body - Marine grade aluminium - Max current - 500mA - Lumens output - 9577, with appropriate optics - IP Rating - 66 |
| Beka LEDlume - Midi LED 52W | <ul style="list-style-type: none"> - Body - Marine grade aluminium - Max current - 350mA - Lumens output - 7052, with appropriate optics - IP Rating - 66 |
| Beka LEDShine 40W | <ul style="list-style-type: none"> - Body - Die-cast aluminium - Max current - 350mA - Lumens output - 2247, with appropriate optics - IP Rating - 65 |
| Beka Teceo 69.5W | <ul style="list-style-type: none"> - Body - Aluminium - Max current - 900mA - Lumens output - 3550 - 10043, with appropriate optics - IP Rating - 65 |
| Beka Kazelle 55W | <ul style="list-style-type: none"> - Body - Marine grade aluminium - Max current - 350mA - Lumens output - 2247, with appropriate optics - IP Rating - 66 |

| | | |
|------------------------------|---|---|
| Beka LEDlume - Midi LED 138W | - Body - Max current - Lumens output - IP Rating | - Marine grade aluminium - 700mA - 16886, with appropriate optics - 66 |
| Beka LEDlume - Maxi LED 276W | - Body - Max current - Lumens output - IP Rating | - Marine grade aluminium - 700mA - 33265, with appropriate optics - 66 |
| Beka LEDlume - Midi LED 73W | - Body - Max current - Lumens output - IP Rating | - Marine grade aluminium - 500mA - 9577, with appropriate optics - 66 |
| Beka LEDlume - Mini LED 55W | - Body - Max current - Lumens output - IP Rating | - Marine grade aluminium - 1000mA - 5806, with appropriate optics - 66 |

SECTION 2

5 Management and start up

5.1 Management meetings

It is the *Employer's* specific intention that the Parties and their agents use the techniques of partnering to manage the contract by holding meetings designed to pro-actively and jointly manage the administration of the contract with the objective of minimising the adverse effects of risks and surprises for both parties.

Depending on the size and complexities of the *works*, it is probably beneficial for the *Employer* to hold a weekly risk register meeting (Clause 16.2). This could be used to discuss safety, environmental, compensation events, subcontracting, overall co-ordination and other matters of a general nature. Separate meetings for specialist activities such as programming, engineering and design management, may also be warranted.

Types of Management Meetings

| Title and purpose | Approximate time & interval | Location | Attendance by: |
|--|---|----------|--|
| Risk register and compensation events | 4 hours every two weeks (or at shorter intervals if required) | On site | <i>Project Manager, Supervisor, Contractor</i> and appropriate key persons |
| Overall contract progress and feedback | 3 hours Every two weeks | On site | <i>Employer, Project Manager, Supervisor, Contractor</i> and appropriate key persons |

| | | | |
|--------------------|-------------------------|---------|--|
| Technical Meetings | 1 hour weekly | On site | <i>Project Manager, Supervisor, Contractor</i> and appropriate key persons |
| SHE meetings | 2 hours Every two weeks | On site | Appointed <i>Contractor</i> and appropriate key persons |

Meetings of a specialist nature may be convened as specified elsewhere in this *Works* Information or if not so specified by persons and at times and locations to suit the Parties, the nature and the progress of the *works*. Records of these meetings are to be submitted to the *Project Manager* by the person convening the meeting within five days of the meeting.

All meetings are to be recorded using minutes or a register prepared and circulated by the person who convened the meeting. Such minutes or register are not to be used for the purpose of confirming actions or instructions under the contract as these are to be done separately by the person identified in the conditions of contract to carry out such actions or instructions.

The *Contractor* attends management meetings at the *Project Manager's* request as set out in the table above. At these meetings the *Contractor* presents all relevant data including safety, health and environmental issues, progress reports, quality plans, *Subcontractor* management reports, as may be required.

5.2 Documentation Control

- 5.2.1 In undertaking the *works* all documentation requirements for the *works* shall be dealt with in accordance with document DOC-STD-0001 – Rev03 (*Contractor* Documentation Submittal Requirements). The control, maintenance and handling of these documents and drawings, using a suitable document control system, remain the sole responsibility of the *Contractor*.
- 5.2.2 The *Contractor* documentation "Starter kit", as contemplated in DOC-STD-0001 – Rev 03, will be issued at the kick-off meeting following award.
- 5.2.3 All contract correspondence is issued through document control. All hardcopy communication will be delivered to the *Employer* via the Lead Document Controller at the project office document control department. In the event of urgent communication, electronic communication can be transmitted directly to the Lead Document Controller.
- 5.2.4 Each supplier of documentation and data to the Project is responsible for ensuring that all documentation and data submitted conforms to the Project Standards and data Quality requirements in terms of numbering, uniqueness, quality, accuracy, format, completeness and currency of information. Data not meeting the Project Standards and data Quality requirements will be cause for rejection and returned to the *Contractor* for corrective action and re-submission.
- 5.2.5 Should any change be made to documentation or data, which has already been submitted to the Project, then new or revised documentation or data shall be issued to replace the out-dated information.
- 5.2.6 All drawings supplied shall comply with the CAD Standards, i.e. ENG-STD-0001, contained in the List of Annexures.
- 5.2.7 It is the responsibility of all Project participants undertaking work on the Project to ensure they obtain and comply with the relevant requirements to suit their deliverables and Scope of Work.
- 5.2.8 The *Contractor* is to ensure that the latest version of the required application software and a suitable 'IT' Infrastructure is in place to support the electronic transmission of documentation.

- 5.2.9 Electronic files submitted to the Project shall be clear of known viruses and extraneous "macros". The supplier of documentation is required to have, at all times, the latest generation of virus protection software and up-to-date virus definitions.
- 5.2.10 The *Contractor* shall be responsible for the supply of all Sub-Supplier/*Contractor*/Manufacturer, etc. documentation and data related to their package of work, and shall ensure that these Sub-Suppliers have the capability to supply the necessary documentation and data in the required time-frame and quality as outlined in the specified standards prior to awarding sub-orders.
- 5.2.11 The required number of copies shall as a minimum be three (3) (1x original + 2 x hard copies), with the corresponding PDF and 'Native' file formats upon final submission.
- 5.2.12 The *Contractor* shall apply "wet signatures" to the original Documentation before scanning the signed original and prior to formal submission to the Project.
- 5.2.13 Final issues of all documentation shall be supplied to the Project in "wet signature" format along with the associated corresponding electronic 'native files' and PDF renditions.
- 5.2.14 The *Contractor* shall ensure adequate resources are available to manage and execute the Document Control function as per the requirements of the Project. (*The Contractor* shall ensure that a dedicated Document Controller is available for the Project)
- 5.2.15 The Contractor is to take note that this project was previously managed by Transnet Group Capital (TGC), hence some of the references, standards or specifications is maintained, although the project is now managed by Transnet National Ports Authority (TNPA). Any reference to TGC shall mean TNPA.

5.3 Procedure for Submission and Acceptance of *Contractor's* Design

- 5.3.1 The *Contractor's* documentation shall be issued to the *Project Manager* under cover of the *Contractor's* Transmittal Note indicating all Contract references (i.e. Project No, Contract No, etc.) as well as the *Contractor's* Project Document Number, Revision Number, Title and chronological listing of transmitted documentation. Formats of *Contractor* data submitted is dependent on the project procedure and shall be specified by the *Project Manager*, upon the notified request of the *Contractor*.
- 5.3.2 The *Contractor* shall deliver both hard copies and electronic media copies (CD Rom) to the *Project Manager* either at the address stated within the Contract Data or at the Project site office.
- 5.3.3 All electronic documentation shall be submitted by the *Contractor* in Adobe Acrobat (.PDF) and native file format
- 5.3.4 Acceptance of documentation by the *Project Manager* will in no way relieve the *Contractor* of him undertaking the *works* (including all incidental services required), the *Contractor* shall conform and adhere to the requirements of the *Contractor* Document Submittal Requirements Standard included within the Annexures (Refer DOC-STD 0001 Rev 03).

5.4 As-built Drawings, Operating Manuals and Data Packs

- 5.4.1 The *Contractor* provides the following:
- 5.4.2 Red Line/Final Documentation
- In undertaking the *works* (including all incidental services required), the *Contractor* shall conform and adhere to the requirements of the *Contractor* Document Submittal Requirements Standard included in the Annexures (Refer DOC-STD-0001 Rev 03).
 - All Red Line information to be signed off by the *Contractor's* responsible Professional/Technologist before issuing to TNPA.
- 5.4.3 Installation, Maintenance and Operating Manuals and Data Books
- The *Contractor* provides manuals in an A4 hard covered, red, grease and waterproof binder, using 2 ring type binders. The manuals are well indexed and user friendly and include a summarized Table of Contents.
 - Drawings and charts larger than A4 are folded and those greater than A3 are enclosed in an A4 plastic pocket of adequate strength.
 - The *Contractor* submits the draft Table of Contents to the *Project Manager* for acceptance prior to the compilation and official submittal of the manuals.
 - The originals of all brochures shall be issued to the *Project Manager*. When a general brochure is applicable to a range of equipment, then the specific item, catalogue number or model number shall be stated, which is best achieved by introducing a separate index page, which cross-references the specific item to a tag number.
 - The address, phone numbers, fax numbers and reference numbers of all Sub-*Contractors* is provided
 - Where manuals include drawings that still need to be revised to "As-Built" status, and such manuals are required prior to 'As-Built' status, the manual will not be considered to be in its final form until the "As-Built" version of each such drawing has been incorporated. The required number of copies of the manual (s) shall be as specified by the *Project Manager* and submitted per type or model number of equipment included in the contract, or as specified by the *Project Manager*.
 - All electronic copies (pdf) of Data Packs to be properly indexed.
 - A typical example of what the binder/file (s) shall be marked with on the spine and the front cover is as follows: -
 - Project No./Name
 - Manual Title, e.g. Installation, Maintenance and Operating Manual
 - FBS No. and Title
 - Manual Numbering (e.g. Volume 1 of 2, etc.)

- Contract Number
- *Contractor* Name
- Unless otherwise stated in the CDS, the required number of copies of all As-Built/Final/Data Packs shall be:
 - 3 x hard copies (Full size)
 - 3 x CD Roms with Adobe Acrobat (.pdf) and "Native" formats

5.5 Safety risk management

5.5.1 Health and Safety Standard

- The *Contractor* must comply with the requirements of the Health and Safety [Specification](#) and OHS Act No. 85 of 1993 and its applicable Regulations.
- The *Contractor* must comply with Post COVIDD-19 Lockdown Construction Site Health and Safety Guidelines- TNPA-IMS-HS-SOP-009.001 and Disaster Management Act: Regulations relating to COVID-19.
- The *Contractor* must comply with SOP COVID-19 Health Care Waste Management on Construction sites – TNPA-IMS-ENV-SOP-009.001

5.5.2 *Contractor's* General Requirements for Health and Safety

The *Contractor* is solely responsible for carrying out the work under the Contract having the highest regard for the health and safety of its employees, Transnet's employees and persons at or in the vicinity of the Site, the *works*, temporary work, materials, the property of third parties and any purpose relating to the *Contractor* carrying out its obligations under this Contract.

The *Contractor* must initiate and maintain safety precautions and programs to conform to all applicable Health and Safety laws or other requirements, including requirements of any applicable government instrumentality and client corporate, business unit and site requirements. The *Contractor* must, at its own cost, erect and maintain safeguards for the protection of workers and the public. The *Contractor* must manage all reasonably foreseeable hazards created by performance of the work. The *Contractor* must:

- Provide all things and take all measures necessary for maintaining proper personal hygiene, ensuring safety of persons and property and protecting the environment at or near the Site.
- Avoid unnecessary interference with the passage of people and property at or near the Site.
- Prevent nuisance and excessive noises and unreasonable disturbances in performing the Services.
- Be responsible for the adequacy, stability and safety of all of its site operations, of all its methods of design, construction and work and be responsible for all of the work, irrespective of any acceptance, recommendation or consent by TNPA, its *Contractors*, employees, agents and invitees, or any Government Body.

Costs for the above are borne by the *Contractor*.

The *Contractor* must comply and is responsible for ensuring that all of its Sub-Contractors comply with the relevant legislation(s) and statutory regulations for health and safety, the Transnet Health and Safety requirements included in the Contract and other document pertaining to health & safety contained in the Programme Health & Safety Management System and include standards, policies, procedures, guidelines and safe work instructions.

5.5.3 *Contractor's* Health and Safety Management

The *Contractor* must prepare, implement and maintain a project-specific Health and Safety Management Plan. The plan must be based on the requirements set out in this specification as

well as all applicable legislation. It must cover all activities that will be carried out on the project site(s), from mobilisation and set-up through to rehabilitation and decommissioning.

The plan must demonstrate the *Contractor's* commitment to health and safety and must, as a minimum, include the following:

- A copy of the *Contractor's* Health and Safety Policy; in terms of the OHS Act section 7;
- Procedures concerning Hazard Identification and Risk Assessment, including both Baseline and Task-Based Risk Assessments;
- Arrangements concerning the identification of applicable Legal and Other Requirements, measures to ensure compliance with these requirements, and measures to ensure that this information is accessible to relevant personnel;
- Details concerning Health and Safety Objectives – a process must be in place for setting objectives (and developing associated action plans) to drive continual improvement;
- Details concerning Resources, Accountabilities and Responsibilities – this includes the assignment of specific health and safety responsibilities to individuals in accordance with legal or project requirements, including the appointment of a *Project Manager*, Health and Safety Officers, Supervisors, Health and Safety Representatives, and First Aiders;
- Details concerning Competence, Training and Awareness – a system must be in place to ensure that each employee is suitably trained and competent, and procedures must be in place for identifying training needs and providing the necessary training;
- Communication, Participation and Consultation arrangements concerning health and safety, including Safety Observations and Coaching, Toolbox Talks, Daily Safe Task Instructions, project health and safety meetings, and notice boards;
- Documentation and Document Control – project-specific documentation required for the effective management of health and safety on the project must be developed and maintained, and processes must be in place for the control of these documents;
- Processes and procedures for maintaining Operational Control, including rules and requirements (typically contained in Safe Work Procedures) for effectively managing health and safety risks, particularly critical risks associated with working at heights, confined spaces, mobile equipment and light vehicles, lifting operations, hazardous chemical substances, etc.;
- Emergency Preparedness and Response procedures;
- Management of Change – a process must be in place to ensure that health and safety risks are considered before changes are implemented;
- Sub-Contractor Alignment procedures – a process must be in place for the assessment of Sub-Contractors and suppliers with regard to health and safety requirements and performance (before any contract or purchase order is awarded);
- Measuring and Monitoring plans, including a plan for the measuring and monitoring of employee exposure to hazardous substances or agents (e.g. noise, dust, etc.) in order to determine the effectiveness of control measures;
- Incident Reporting and Investigation procedures describing the protocols to be followed with regard to incident reporting, recording, investigation and analysis;
- Non-conformance and Action Management procedures concerning the management of corrective actions;

- Performance Assessment and Auditing procedures concerning health and safety performance reporting, monthly internal audits to assess compliance with the project health and safety requirements, and daily site health and safety inspections; and
- Details concerning the Management Review process followed to assess the effectiveness of health and safety management efforts. Site Supervision
- The *Contractor* shall comply with OH&S Act – Section 8, 9, 13 and 16 and the Construction Regulations 2014.
- The *Contractor* must nominate and appoint a responsible person on site to whom the *Project Manager* may refer in connection with the *works*. Persons are nominated for all shifts worked or whilst any activity relating to the Contract is being performed on site, and must have the authority to bind the *Contractor* with respect to the Contract. (OH&S Act - 16 Section (2)).
- The *Contractor* must ensure that the performance of all specified *works* is supervised throughout by a sufficient number of qualified and competent appointed representatives of the *Contractor*, who have experience in the type of work specified. (OH&S Act – Construction Reg. 8 (1) and 8 (2).)
- Note: No work may commence and or continue without Supervisory Appointees present on site. The *Contractor's* Site Supervisor must be equipped with a mobile telephone with message bank and/or pager or an equivalent communication device so that communication throughout the Contract can be maintained at all times.
- The *Contractor's* Site Supervisor must provide a list of names and contact telephone numbers of all *Contractors* and Sub-Contractor's contact persons on Site. This list is updated as a new *Contractor* or Sub-Contractor employee commences on Site.
- The *Contractor's* Site Supervisor must keep a record of all employees, including date of induction, relevant skills and licences, and be able to produce this list at the request of the *Supervisor*.
- The *Contractor's* Site Supervisor must complete manning sheets describing the day's activities, labour numbers and classifications and issue these to the *Supervisor* prior to 9.00 am on a daily basis.
- The *Project Manager's* Site Safety Representative is notified of any new starter with evidence of induction and site specific induction prior to commencement of work.

5.5.4 ***Contractor's Safety Officer***

The *Contractor* must appoint a full-time Health and Safety Officer for the duration of the contract who is registered with the SACPCMP (The South African Council for Project Construction Management Professions). If more than 100 employees are deployed on the project site(s) (directly or through Sub-Contractors), at least two full-time Health and Safety Officers must be appointed, with an additional Health and Safety Officer appointed for every 100 additional employees thereafter.

The Health and Safety Officer must be on site when work commences at the start of the day and must remain on site until all activities for that day (including the activities of Sub-Contractors) have been completed. A Health and Safety Officer must be present during all shifts, so if work is carried out over more than one shift per day, the *Contractor* must make provision for an additional Health and Safety Officer.

Each *Contractor* Health and Safety Officer shall be responsible for:

- Reviewing all applicable legal and project health and safety requirements and providing guidance to *Contractor* and Sub-Contractor personnel (particularly the *Contractor's Project Manager*) to help ensure compliance at all times;
- Assisting with the implementation of effective hazard identification and risk management processes for all work to be carried out by the *Contractor*;
- Participating in the Baseline Risk Assessment for the *Contractor's* scope of work (prior to site establishment) and ensuring that identified control measures are implemented;
- Participating in all Task-Based Risk Assessments conducted for the work to be carried out by the *Contractor* and ensuring that identified control measures are implemented;
- Conducting *Contractor* health and safety induction training for all *Contractor* and Sub-Contractor personnel;
- Compiling and maintaining all health and safety related documents and records required of the *Contractor*;
- Communicating relevant health and safety information to *Contractor* and sub-*Contractor* personnel (e.g. incidents and lessons learnt, leading practices, hazards, risks and control measures, etc.);
- Carrying out Safety Observations and Coaching (one per day);
- Evaluating (on a daily basis) the content of the Daily Safe Task Instructions (DSTI's) conducted by the *Contractor's* appointed *Supervisors*, and attending at least one DSTI each day;
- Attending monthly *Contractor* and Site Health and Safety Meetings;
- Assisting with the implementation of the *Contractor's* Health and Safety Management Plan and associated Safe Work Procedures;
- Carrying out Planned Task Observations on an ad hoc basis;
- Assisting with the implementation, testing and maintenance of an effective Emergency Response Plan for all *Contractor* and Sub-Contractor activities;
- Responding to workplace incidents (as appropriate);
- Participating in incident investigations;
- Maintaining accurate health and safety statistics (for the *Contractor* and all Sub-Contractors), and compiling health and safety performance reports as required;
- Auditing the health and safety management system and workplace activities of the *Contractor* and each Sub-Contractor on a monthly basis to assess compliance with the project health and safety requirements; and

- Tracking and reporting on the implementation of corrective actions (arising from incident investigations, audits, inspections, etc.).

The *Contractor* must ensure that they have made adequate provision of safety officers as per the *Works Information*. The *Contractor* must ensure that the Health and Safety Officer is adequately equipped to enable him to perform his duties effectively. Each Health and Safety Officer must be provided with the following:

- A computer with access to all necessary systems, including access to e-mail and the internet;
- A mobile telephone on contract or with adequate pre-paid airtime; and
- A vehicle where required or instructed by a nominated project management representative (depending on the size and location of the project site(s)).
- A Health and Safety Officer must be computer literate, fluent in English, and must have the following minimum qualifications, training and experience:
- At least 5 years' experience as a Health and Safety Officer on construction projects;
- SAMTRAC or NEBOSH or Modern SHEQ Risk Management training course as a minimum qualification;
- Experience and appropriate training with regard to implementing and maintaining a health and safety management system compliant with national legislation or an international standard;
- Experience and appropriate training with regard to construction related hazard identification and risk management processes;
- Competence, experience and relevant training with regard to incident investigation procedures and causation analysis;
- Health and safety auditing experience and training;
- A valid First Aid certificate of competency;
- Fire prevention and protection training; and
- A valid Driving Licence (light motor vehicle).
- Registered as a Health and Safety Officer with SACPCMP.
- Before placing a Health and Safety Officer on the project site(s), the *Contractor* must forward a copy of the person's CV to the nominated project management representative or to the Programme Health and Safety manager for review and acceptance. A proposed candidate may be rejected should he not meet the experience and/or qualification requirements, or due to poor work performance on previous projects.

5.5.5 **Contractor's Safety Manual**

The *Contractor* must provide a hard copy of its safety manual, policies and procedures to the *Project Manager* for acceptance prior to the commencement of any site work. The *Contractor* must ensure that his personnel, at all times, strictly observe and comply with the procedures set out therein. The *Project Manager* or the *Project Manager's* nominated Representative may from time to time request safety procedures applicable to the area of operations. The *Contractor* must forward to the *Project Manager* any updates or revisions to its safety manuals, policies or procedures as soon as practicable following revision or update.

The *Project Manager* may require the *Contractor* from time to time to supplement its safety manual, policies and procedures with guidelines and/or operating standards provided to the *Contractor* by the *Project Manager*. The *Contractor* must comply with such requests where the request is consistent with the requirements of the Contract. The *Contractor* must give prompt written notice to the *Project Manager* of any objection to the requested supplement, including

the reasons for objection. The *Project Manager's* rights under this Clause are not intended, and must not be construed, to relieve the *Contractor* from any obligations to ensure compliance with all provisions of this Contract.

5.5.6 Performance Measurement and Reporting

- Health and Safety Statistics

The *Contractor* and each of its Sub-*Contractors* must complete and submit Health and Safety statistics to the *Project Manager* or the *Project Manager's* nominated representative, or as amended by the *Project Manager*, before mid-day on the Friday of each week. The *Contractor* must submit monthly Health & Safety Statistics before mid-day on the last day of each month to the *Project Manager's* nominated representative.

- Safety Management Records

The *Contractor* must submit to the *Project Manager* for acceptance a schedule of the specific Health and Safety records it intends to maintain for the Contract. As a minimum, such records are as specified by applicable legislation. Copies are provided to the *Project Manager* or the *Project Manager's* nominated Representative if requested.

- Field Technical/Safety Audit by the *Project Manager*

The *Project Manager* or the *Project Manager's* nominated Representative has the right to conduct audits/inspections of the Consultant, Professional Service Provider (PSP) and *Contractor* Safety Management Plan implementation, operations, equipment, emergency procedures, etc., at any time, and the *Contractor* must fully cooperate with the *Project Manager* or the *Project Manager's* nominated Representative during such audits/inspections. The *Project Manager's* rights under this clause does not, must not and will not relieve the Consultant, Professional Service Provider (PSP) and *Contractor* of its own obligations to conduct audits and reviews of its own Health and Safety performance.

Where such audits/inspections reveal deficiencies in the *Contractor* procedures, drills, training or equipment, or non-conformities with the *Contractor* accepted project Safety Management Plan, of a minor nature (Risk Rating of 6 or less), the *Contractor* must investigate the cause of the nonconformity and initiate corrective and preventive action to rectify such deficiencies and non-conformities and prevent recurrence as soon as practicable.

Where such audits/inspections reveal deficiencies of a major nature (Risk rating of 7 or greater), the *Contractor* must stop work on the operation/activity concerned, immediately investigate the cause of the nonconformity, and initiate corrective actions to rectify such deficiencies and non-conformities and to prevent recurrence. These corrective action plans is submitted to the *Project Manager* for review and comment within 24 hours of the audit finding.

Where such deficiencies include an unsafe practice or a breach of the statutory or the Contract's requirements, the *Project Manager* or the *Project Manager's* nominated Representative may in accordance with the Conditions of Contract suspend the work associated with the unsafe practice or breach until the deficiency is rectified.

The *Project Manager* or the *Project Manager's* nominated Representative will establish a schedule of regular field safety audits which will be based on an audit tool aligned to the *Contractor* Safety Management Plan and site operations and activities. The *Contractor* audit conformance will be assessed as a percentage and where conformance is better than 90% it will be considered satisfactory and the *Contractor* must develop and implement an action plan within 4 weeks, to be reviewed at the next regular audit. Where the *Contractor* level of conformance is between 75 – 90%, a corrective action plan will be required to be developed and implemented within 2 weeks, and a follow up audit will be carried out. Where the *Contractor* conformance is less than 75% the *Contractor* must stop work until an investigation of the cause/s has been completed and corrective actions have been developed and implemented by the *Contractor*.

The *Contractor* must provide to the *Project Manager* or the *Project Manager's* nominated Representative, at a time to be agreed, but not to exceed monthly intervals, a regular status report on all outstanding corrective actions until they are successfully closed out.

- Unsafe Act/Condition Auditing

The *Contractor* must implement a system to recognize, correct, and report unsafe acts/conditions (Unsafe Act/Condition Auditing) associated with all Site activities.

All such observations must be recorded and delivered to the TNPA Health and Safety Manager.

- Involvement, Communication and Motivation

The *Contractor* and Sub-Contractor's workforce must, through their supervision, safety notice boards, toolbox meetings and daily pre-start meetings be kept aware of safety related matters.

- Safety Meetings

The *Contractor* must implement and comply with OH&S Act, Section 19

The *Contractor* must conduct weekly safety meetings with his employees to foster safety awareness. Copies of minutes and action items arising from such Toolbox meetings is submitted or otherwise made available for review by the *Project Manager* or the *Project Manager's* nominated Representative.

Such meetings should at least address:

- Accident / safety incidents
- Hazardous conditions
- Hazardous materials / substances
- Work procedures
- Protective clothing / equipment
- Housekeeping
- General safety topics
- Job or work look-ahead issues
- Safety statistics
- Significant Safety Occurrences (SSO)

The *Contractor* must conduct at least one formal safety meeting per month and must maintain appropriate records of attendance and meeting content. Such records are made available to the *Project Manager's* Representative. In addition to Daily Safe Task Instructions, the *Contractor* must conduct at least weekly "tool box" meetings to discuss safety issues and procedures.

- Pre Start Safety Briefings

The *Contractor* must hold documented Daily Safe Task Instructions with each work team before the start of each shift. Attendance records and brief topic notes is kept for auditing and record purposes. Safety Review Meetings

- The *Contractor* Site Manager and a Site Safety Representative must take part in weekly safety review meetings between the *Contractor* and the *Project Manager* or the *Project Manager's* nominated Representative.
- The *Contractor* must attend all project safety meetings as outlined in the Project Safety Management Plan.

- Site Safety Review Committee

The *Contractor* complies with the requirements of the SSRC with respect to his own activities and others on the Site and Working Areas.

- HAZOP Review

The *Contractor* participates in HAZOP reviews upon the instruction and direction of the *Project Manager*.

The reviews may include, but not be limited to, studies to ensure that the Plant is built and operated as designed and that personal safety, employee health and environmental protection systems conform to the *Employer's* and legislative requirements.

- Job Safety Analysis

The *Contractor* completes a JSA prior to carrying out any operation on the Site and/or Working Area to the approval of the *Project Manager*.

- Lines of Communication

The following personnel act on behalf of the *Project Manager* and may communicate directly with the *Contractor* and his key persons with respect to the SMP:

- Construction Manager (CM)
- Project Site Safety Manager (PSSM)

5.5.7 Roles and responsibilities

- The roles and responsibilities of the various personnel acting on behalf of the *Project Manager* with respect to the SMP and health and safety issues are as stated in the paragraphs following:

Construction Manager

- The CM is responsible (in the context of the SMP only) for health and safety on the Site and Working Areas and reports to the *Project Manager*.
- The CM specific tasks (in the context of the SMP) are:
 - Implement the safety management system
 - Monitor compliance to the established safety management system
 - Ensure risk is at an acceptable level
 - Ensure *Contractor's* Construction Management Team are competent
 - Provide for:
 - Planning, organisation, leadership and control
 - Particular technical competencies for critical work
 - Supervision and control on each shift
 - Regular monitoring and assessment
 - Workplace inspections

Project Site Safety Manager

- The PSSM is responsible for ensuring that the *Contractor* complies with the SMP. The PSSM acts on behalf of the *Project Manager*.
- The PSSM specific tasks (in the context of the SMP) are:
 - Define, in accordance with the HSSP, the:
 - Safety program (instructions, training, meetings, inspections, incentive)
 - Health and medical program
 - Checks that *Contractors* have issued their Health and Safety plans, PPSPS and procedures before the beginning of work

- Organizes safety awareness campaigns
- Promotes communication on all health and safety matters (awards, incentives, meeting/inspections/audits reports)
- Checks conformance of equipment to technical requirements and regulations.
- Issues and address the site EHS activities reports
- Promotes everybody's best efforts to keep accident frequency and severity ratios at their lowest level
- Promotes a proper and continuous housekeeping of Plant and temporary facilities in order to create the most suitable conditions for workers to work and to be encouraged to follow HSE requirements
- Conducts work site EHS walks with all *Contractors*, and directs appropriate corrective actions
- Monitors that all factors likely to improve health and safety are taken into consideration, particularly those which lead to:
- Promoting personnel protection as an absolute requisite
- Investigating, identifying and neutralizing potential hazards
- Close coordination with all parties involved in construction in order to avoid overcrowded areas and dangerous operations
- Thorough preparation of work critical phases
- Close contacts to local EHS authorities
- Continuous follow-up in order to correct immediately unsafe acts and situations
- In case of accident, he takes actions necessary to:
- Initiate quick interventions of the emergency means.
- Check that first aid and evacuation of injured persons are properly carried out.
- Obtain a clear accident report from the sub-*Contractor* concerned.
- Report immediately to the Construction Manager.
- Investigate to identify the root causes of all incident and near misses.

5.5.8 Commissioning Safety Study

The *Project Manager*, through his Construction Management Team, will facilitate and coordinate a formal Commissioning Safety Study and ensure that required procedures are prepared prior to the commencement of the commissioning phase.

The Commissioning Safety Study will provide a final checkpoint for the completed work and is part of the process for ensuring that all necessary actions have been completed. The elements to be considered include:

- Electrical integrity systems are in place (e.g. equipment tests and inspections of critical equipment, quality control procedures, etc.) which will confirm that construction, equipment and materials are in accordance with design specifications
- Formal hazard analyses for pre-commissioning and commissioning activities have been completed, appropriately documented and communicated, and are available to all personnel.
- Punch-list work has been sufficiently completed so that installations are safe to apply hazardous energy.
- Documentation relevant to any modifications has been created/updated.
- Safe operating, maintenance and emergency procedures are in place.

- Operating and maintenance manuals are available and training of commissioning employees has been completed.
- As Built drawings are available.
- A Commissioning Permit (to apply hazardous energy) is developed and implemented.

The *Project Manager* will ensure that after commissioning there is a formal documented hand over to operations and maintenance personnel and others who will be impacted by hazards that have been identified during project activities. This will involve communication of any changes to the process hazards, procedures and operating philosophy. Safe systems of work will be established and updated throughout the Project. Safe systems of work will be subject to on-going review to ensure their effectiveness. Site-wide Permits to Work will be used as the basis of safe systems of work for specified hazardous activities.

5.5.9 Working at Nights

A site specific health and safety management plan should be well documented and structured so that both *Employers* and employees can benefit from its use. The following are recommended components of a safety management plan for night time *Works*.

- Site personnel responsibility

It should be determined and stated clearly in the site specific health and safety management plan the responsibility of each individual at construction site for night time *Works*. *Project Manager*, Engineers, Designers, Safety Officer and Site Supervisors as well as workers each have their specific responsibility to make sure the highest level of priority are given towards safety and health issues.

The *Contractor* must ensure adequate provision of Safety Officer Personnel are present whenever working at night activities are taking place.

- Permission to work at night

The *Contractor* shall apply in writing for permission to work at night and should be obtained from the relevant authority in this case the *Project Manager*, before any work at night is carried out. It is recommended that TNPA's responsible representative should also be notified about intended night shift work.

- Housekeeping

Accidents can occur as a result of poor housekeeping. Hazards at construction site are the same for both day and night shift while the risks of injury are much higher during night *Works* because of the inherent poor illumination. It is essential that the workplace is kept clean and tidy to ensure safety and prevent accidents.

5.5.10 Emergency Preparedness and Response (EPR)

Contractor should develop and implement the EPR that is specifically for night time environment and submit for approval before work at night is carried out. A well-established EPR can help both *Contractors* and employees to prepare; response and recover should a disaster occur.

- Public safety

When work involves public area, it is important to make sure the safety of the public. The *Contractor* must consider the following when planning for night time work; identify the hazards for example construction vehicle movement or too much glare from lighting equipment and plan for vehicular movement to not interrupt peak hours and make sure adequate supervision is provided for such movement.

Contractor must provide sufficient signage to warn the public and put barriers at a safe distance to keep the public away.

Set up a safe walk ways where it is unavoidable to work near or in public vicinity.

Arrange noisy equipment or machinery at farthest point from the public or adopt an engineering control to reduce the noise.

When overhead crane is operating near the public, clear off the area and make sure adequate supervision is in place.

Schedule for daily cleaning of the adjacent public road and filling up holes as well as uneven surfaces.

- Types of Risks and factors affecting night time work

In order to decide when to conduct night time work, factors (parameters) affecting night time work must be identified. The *Contractor* must ensure the following factors are identified:

- Risk
- Illumination
- Nuisances
- Productivity
- Cost
- Safety

The *Contractor* must ensure that they implement the following step in an effective risk management program as to identify possible risks. Specific concerns related to night time work zones include poor visibility and work quality, staffing issues, unwanted noise and glare, decreased worker and driver alertness, impaired drivers, higher vehicle speeds, increased labour costs, materials and traffic control, and problems in logistics and supervision. These risks are categorized broadly as safety, cost/production and schedule, quality, organizational relationships, technical, construction, economic and environmental.

- Risk

Night time construction introduces numerous risks to a construction project. One clear set of examples is driver and worker fatigue and reduced visibility, which are factors that could increase safety risks. Other major factors contributing to the risks of night time work are human factors such as sleep, stress, work, social or domestic issues, and psychological characteristics, such as appetite and safety. Additional factors associated with the risks of night time construction work zones are reduced work space for machinery and equipment movement, inadequate lighting, high speed of traffic during the night, and long working hours. Working at night does not supersede the requirements of the Project Health and Safety Specification requirements that enforces compliance during day shift.

5.5.11 Document Control

All safety documents shall comply with the Project Document Control Procedures.

5.5.12 Medicals

Pre-employment medicals, including chest X-ray examinations, specific for the Contract will be required for all employees working on the Site regardless of duration spent on Site. Exit medicals, including chest X-ray examinations will be required at the end of the Contract. These medical examinations must be carried out by a registered Occupational Health Practitioner.

The *Contractor* must ensure that budget provision for SHE requirements are in place.

5.6 Environmental constraints and management

- 5.6.1 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, municipal bylaws i.e. schedule trade and occupations bylaws as well as the accepted environmental good practice.
- 5.6.2 All required licences and permits must be obtained from relevant authorities prior to the commencement of project activities.
- 5.6.3 The following documents, included as annexures of the Works Information, provide the minimum acceptable standards that shall be adhered to:
- Transnet Integrated Management Systems (TIMS) Commitment Statement – IMS-GRP-GDL-002-1
 - Standard Environmental Specification (ENV-STD-02 Rev 04).
 - Construction Environmental Management Plan (ENV-STD-01 Rev 04).
 - Standard Environmental Maintenance Management Programme for Maintenance Works
 - COVID 19 Post Lockdown Construction Site Health and Safety Guidelines
 - COVID-19 Health Care Waste Management on Construction sites TNPA-IMS-ENV-SOP-009.001

The Contractor must also comply with the following documents:

- *TNPA list of approved waste services contractors*
- *TNPA Asbestos Management Plan*
- EThekweni Municipality *Schedule Trades and Occupations Bylaws*
- EThekweni Municipality *Interim Code relating to fire prevention and Flammable liquids and substances*

The CEMP describes the main roles and responsibilities of the project team with respect to Environmental Management.

The SES describes the minimal acceptable standard for environmental management for a range of environmental aspects commonly encountered on construction projects and sets environmental objectives and targets, which the *Contractor* observes and complies.

The above requirements shall be applicable to the main *Contractor*, its service providers and suppliers. The *Contractor* must comply with all the requirements of the CEMP, SES and PES as mentioned in section 5.6.3 above.

The *Contractor* must sign the declaration of understanding as a commitment to abide with TNPA Environmental Governance Framework, Project Environmental Specification, COVID 19 Post Lockdown Construction Site Health and Safety Guidelines and COVID-19 Health Care Waste Management. Sufficient environmental budget must be allocated to meet all the project environmental requirements for the duration of the contract.

- 5.6.4 The *Contractor* must appoint an Environmental Officer (EO) to monitor and manage compliance to Environmental Specification and all applicable environmental legislation. The EO must as a minimum have at least 5 years work experience in environmental management within the electrical construction projects.
- 5.6.5 The roles and responsibilities of the Contractor's EO are stated in CEMP. The contractor's EO must be 100% full time on site during working hours.
- 5.6.6 The *Contractor* will be required to submit an environmental file to TNPA post award of tender. Particular requirements of the *Employer* will be made known on award of the contract. Site access certificate shall not be granted until the environmental file has been approved by the *Employer*.
- 5.6.7 The overarching obligations of the *Contractor* under the CEMP before construction activities commence on the Site and/or Working Areas is to provide environmental method statements (as contained under section 5.5 of the CEMP) for all construction operations at the Site and/or Working Area by the *Contractor* and where requested by the CM and to comply with the following:

The *Contractor* shall identify the kinds of environmental impacts that will occur as a result 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 SES document are achieved. The method statements will be prepared in accordance with the requirements set out in the CEMP. 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.

Method statements need to be compiled by the *Contractor* throughout the Construction and Commissioning phase of the project. These Method Statements must be approved by the TNPA Construction Manager and TNPA Environmental Manager or Environmental Officer. Approval must at least be two weeks prior to the proposed commencement of the activity. Emergency construction activity method statements may also be required. The activities requiring method statements cannot commence if they have not been approved by the TNPA Environmental Manager or Environmental Officer.

- 5.6.8 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, to the satisfaction of the *Project Manager*.
- 5.6.9 During the construction period, the *Contractor* complies with the following:

A copy of the CEMP, SES and PES shall be available on Site, and the *Contractor* shall ensure that all the personnel on Site (including Subcontractors and their staff) as well as suppliers are familiar with and understand the specifications.

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

The *Contractor* shall be responsible for rehabilitating and cleaning all areas to the satisfaction of the TNPA Environmental Manager or Environmental Officer as detailed in the SES. Sufficient environmental budget must be allocated to achieve this including all environmental requirements for the project for the duration of the contract.

The *Contractor* must ensure that its Subcontractors comply with the Environmental Specification.

The Contractor must appoint the waste removal Service Providers who is licenced to operate within the Ports as provided in the TNPA list of Waste Services Contractors.

The *Contractor* or Sub-contractors must be in possession of eThekweni Municipality's Schedule Trade and Occupations permit if they are to be engaged in any of the activities contained under eThekweni Municipality Scheduled Trade and Occupations.

The *Contractor* must comply with TNPA Asbestos Management Plan contained within annexures should asbestos contamination be uncovered during excavation.

The Island View area is known to be contaminated with hydrocarbons. There is a possibility that during excavations the contractor may encounter contaminated soils with hydrocarbons. The contractor must consider this especially when it comes to the disposal of hazardous substances and allocate sufficient funds to manage this type of contamination.

5.7 Quality assurance requirements

- 5.7.1 The *Contractor* shall have, maintain and demonstrate its use to the *Project Manager* (and/or the *Supervisor* to satisfy the requirements of the Works Information as appropriate) the documented Quality Management System to be used in the performance of the *works*.
- 5.7.2 The *Contractor's* Quality Management System shall conform to International Standard ISO 9001 (or an equivalent standard acceptable to the *Project Manager*) and as a minimum to the requirements of specification QAL-STD-0001, General Quality requirements for Suppliers and *Contractors* as contained in the Annexure to this Works Information.
- 5.7.3 The *Contractor* submits his Quality Management System documents to the *Project Manager* as part of his programme under ECC Clause 31.2 to include details of:
- Project Quality Plan (PQP) for the contract;
 - Quality Control Plans (QCP)
 - Quality Policy
 - Index of Procedures to be used; and
 - A schedule of internal and external audits during the contract
- 5.7.4 The *Contractor's* PQP includes or references to the quality plans of his Sub-Contractors and Suppliers.
- 5.7.5 The *Contractor* develops and maintains a comprehensive register of documents that will be generated throughout the contract including all quality related documents as part of its Quality Plan.
- 5.7.6 The *Project Manager* indicates those documents required to be submitted for either information, review or acceptance and the *Contractor* indicates such requirements within his register of documents. The register shall indicate the dates of issue of the documents with the *Project Manager* responding to documents submitted by the *Contractor* for review or acceptance within the *period for reply* prior to such documents being used by the *Contractor*.
- 5.7.7 The Project Quality Plan means the *Contractor's* statement, which outlines strategy, methodology, resources allocation, QA and Quality Control co-ordination activities to ensure that the *works* meet the standards stated in the *Works* Information. Site Access will not be granted unless the PQP has been accepted by the *Employer*.
- 5.7.8 The Quality Control plans shall identify all inspection, test and verification requirements to meet Contractual obligations, specifications, drawings and related details including destructive, non-destructive testing, witness and hold points. The *Contractor shall not* commence fabrication or manufacture prior to review and acceptance of the applicable QCP's by the *Employer*.
- 5.7.9 The Index of Procedures means the *Contractor's* system for management of:
- Documentation Control

- Design Control
- Procurement

5.7.10 The Inspection and testing means:

- Quality Control Plans
- Inspection Points
- Schedule of Inspections
- Field Inspection Checklists
- Inspection Notification
- Inspection release
- Inspection and testing
- Special processes
- Welding Procedures
- Material traceability and certification

5.8 Planning Constraints

- 5.8.1 The *Contractor's* construction programme shall correspond with the *Employer's* objectives as stipulated in Section 1 Clause 1 of the *Employer's* Works Information.
- 5.8.2 The *Contractor's* construction programme shall correspond with the stipulations included in under Section 1 Clauses 3 and 4 of the *Employer's* Works Information, which details the minimum construction constraints to be considered in providing the *works*.
- 5.8.3 The *Contractor's* construction programme shall comply with the stipulations included in Section 2 Clause 5.6 of the *Employer's* Works Information, which details the minimum Environmental Management constraints as imposed on the provision of the *works*. In addition hereto the *Contractor's* construction programme shall include, but not be limited to the following specific environmental constraints:
- Requirements for site access and Environmental constraints as included in Environmental Works Information and Environmental inductions including all stipulated provisions associated with COVID-19 compliance as stipulated within the relevant sections of the *Employer's* Works Information.
 - Removal of Contaminated and hazardous material.
 - The Contractor's programme model must demonstrate compliance with all applicable eThekweni municipality bylaws.
 - All other provisions for COVID-19 compliance as stipulated within the relevant sections of the *Employer's* Works Information.
- 5.8.4 The *Contractor's* construction programme shall comply with the stipulations included in Section 2 Clause 5.5 of the *Employer's* Works Information, which details the minimum Health & Safety constraints as imposed on the provision of the *works*. In addition hereto the *Contractor's* construction programme shall include, but not be limited to the following specific Health & Safety constraints:
- Requirements for site access including all stipulated provisions associated with COVID-19 compliance as stipulated within the relevant sections of the *Employer's* Works Information.
 - The *Contractor's* programme model must clearly demonstrate the process of obtaining work/trade permits e.g. hot work permit with specific consideration given to the time required to acquire permits of this nature as well as the validity period of same.

- The *Contractor's* programme model must clearly demonstrate the process for undertaking the *Employer's* induction procedure as stipulated under the relevant section(s) of the *Employer's* Works Information, with specific consideration given to the time required and the frequency of undertaking same. **In this regard, the Contractor provides for the Employer's inductions prior to the access date and repeated annually at the beginning of each year.**
 - The *Contractor's* programme model must clearly demonstrate the process for the *Employer's* undertaking of the Construction Work Permit with the Department of Labour, taking cognisance of the required timeframe for the *Contractor* to prepare the required documentation required for submission to the *Employer* as stipulated within the relevant section(s) of the *Employer's* Works Information. The *Contractor's* submission of the required documentation must be undertaken within 2 (two) weeks of the contract starting date as stipulated under Contract Data Part 1.
- 5.8.5 The *Contractor's* construction programme shall comply with the stipulations included in Section 2 Clause 5.7 of the *Employer's* Works Information, which details the minimum Quality Assurance constraints as imposed on the provision of the *works*. In addition hereto the *Contractor's* construction programme shall include, but not be limited to the following specific Quality Assurance constraints:
- Requirements for site access including all stipulated provisions associated with COVID-19 compliance as stipulated within the relevant sections of the *Employer's* Works Information.
 - Project Quality Plan Acceptance.
 - Approval of supplier and materials tracking.
 - Squad Checks.
 - Quality Checks on materials.
 - Maintenance manuals
 - All other provisions for COVID-19 compliance as stipulated within the relevant sections of the *Employer's* Works Information.
- 5.8.6 The *Contractor's* construction programme shall include any reasonable foreseen and unforeseen constraints, assumptions and conditions which may arise in line with the overall scope as outlined under but not limited to Sections 1 and 2 of the *Employer's* Works Information.
- 5.8.7 The *Contractor's* construction programme shall be aligned with the sequence for construction as per Part C3 of the *Employer's* Works Information, inclusive of all sheets listed in the Annexures and shall be in line with the overall scope, Works Information, specifications and any other documentation as annexed to this contract.
- 5.8.8 The *Contractor's* construction programme shall be aligned with the specific stipulations and constraints pertaining to construction as stipulated under Section 1 Clause 3 and 4 of the *Employer's* Works Information, and shall be in line with the overall scope, Works Information, specifications and any other documentation as annexed to this contract.
- 5.8.9 Access to site will be issued in accordance with the dates stipulated within *Contract Data Part One*; pending approval of *Project Manager*. Specific conditions for site access include but are not limited to the following:
- Site access shall be granted pending approval of all the relevant documentation including Health and Safety submissions, Environmental submissions, and Quality submissions.
 - No activity shall be undertaken on site in the absence of a task specific Method Statement, Quality Control Plan and Risk Assessment fully approved by the NEC *Supervisor* and *Project Manager*.
 - The *Contractor* shall undertake a joint site inspection with the NEC *Supervisor* in order to conduct a condition assessment to the satisfaction of the NEC *Supervisor* prior to site access being granted to the *Contractor*. Further, the *Contractor's*

- construction programme shall make provision for undertaking any activities which may be identified through undertaking a condition assessment on site.
- The *Contractor's* programme submission shall demonstrate the searching and proving of services prior to any excavating activities being undertaken, in order to identify existing services. As such no physical work shall take place until such time as the *Project Manager* has approved reports detailing existing services.
 - The *Contractor's* programme submission shall demonstrate the extent to which provisions shall be undertaken in order to secure the working area prior to any activity being undertaken on site.
 - Requirements for site access in line with the provisions associated with COVID-19 compliance as stipulated within the relevant sections of the *Employer's* Works Information. The *Contractor* shall fully comply with the *Project Manager's* requirements pertaining to any conditions related to working with *Others*, including providing appropriate access to portions of his working area, collaborating and arranging and planning resourcing, activities under construction and proposed site layout such that *Others* are suitably able to execute their scope within their appointed timeframe. In this regard, the *Contractor's* execution plan shall be iteratively reviewed in order to support the effective interfacing with that of *Others'* work.
- 5.8.10 Completion for the *works* as detailed in the relevant section(s) of the Works Information will be in accordance with the dates stipulated within Contract Data Part One; pending approval of *Project Manager* and the aforementioned stipulations as detailed. In addition the *Contractor's* programme submission shall demonstrate the provisions for preparation and hand-over of all as-built and closeout documentation as stipulated within the relevant sections of the *Employer's* Works Information to the satisfaction and approval of the NEC *Supervisor* and *Project Manager*. Completion certificates shall not be issued by the *Project Manager*, in the absence of complete close-out documentation as approved by the NEC *Supervisor* and *Project Manager*.
- 5.8.11 The *Contractor* shall comply with the provisions of NEC ECC Clauses 25.1, 27.1 and 27.2 when providing occupations to the Working Areas to allow for potential works to be undertaken by *Others*.
- 5.8.12 Key Dates for works as detailed in the relevant section(s) of the Works Information will be in accordance with the dates stipulated within Contract Data Part One; pending approval of *Project Manager* and subject to the requirements as stipulated in NEC ECC Clause 25.3.
- 5.8.13 The *Contractor* is required to comply with the *Employer's* stipulations regarding all required approvals, permissions, licences and permits, prior to commencing *works* and or specific activities.
- 5.8.14 The *Contractor's* programme shall specifically demonstrate the stipulated process for day-to-day access to the Transnet Durban Container Terminal in order to provide the *works*, as stipulated within the relevant sections of the *Employer's* Works Information.
- 5.8.15 The *Contractor* is required to comply with all Environmental, Health and Safety and Quality Assurance stipulations. The *Project Manager* as agent of the *Employer* shall have the right to enforce the specific requirements and conditions as stipulated within the various specifications, authorizations and permits as issued by the *Employer* and or the Competent Authority, and shall withhold site access and or approval to proceed in the event that the *Contractor* has not adequately demonstrated an understanding of these constraints and requirements within the relevant documentation issued for approval, including Method Statements, Quality Control Plans, Risk Assessments, programme submissions, submission of proposed Key people and or sub-contractors for approval by the *Project Manager*.

5.9 Programming constraints

- 5.9.1 When planning the *works*, the *Contractor* will not be granted access to all zones at the same time, but will be allowed to work in three (3) zones simultaneously. When planning the works, the *Contractor* must take cognizance of the conditions stipulated in the Contract Data and Works Information. Early access to subsequent zones may be granted, provided all *works* are

complete and all documentary requirements for the current zone are met in order for the *Project Manager* to issue an Access Certificate for the subsequent zone, due consideration being given to operational activities. The *Contractor* must note that operational activities in operational yards take precedence over construction activities. The *Contractor* may be required to stop construction activities at any time or experience delays in obtaining a work permit in that area. The *Contractor* is required to plan their works in such a manner that should they experience any issues due to operations, they are able to move to other areas to continue the works and return when availability resumes. The *Contractor* must allow adequate time risk allowances in their programme when planning their activities. **In this regard a total estimated allowance of 20 days TRA (time risk allowance) should be provided in the programme linked to Completion to mitigate any risks of delays to construction activities caused by Employer's operational needs. The TRA for the operational yard areas shall be used at the sole discretion of the Project Manager as and when these events are realized."**

5.9.2 The programme Work Breakdown Structure (WBS) shall be aligned with the *Contractor's* proposed approach including Method statements, Quality Control Plans and Risk Assessment for the activities as required, and as a minimum shall include but not be limited to the following WBS Elements:

- Where applicable, design, approval of designs, plant, equipment, materials and any other resources, as required to provide both temporary and permanent works.
- Preparation and submission of task based Quality Control Plans, Method statements and Risk Assessments and the subsequent approval process for the same as undertaken by the NEC Supervisor and Project Manager.
- Process for appointing and approval by the Project Manager, of all Key Persons
- Process for appointing and approval by the Project Manager, of all critical sub-contractors and service providers.
- Where applicable, procedure for Contractor's design, submission and approval of any portion of the works and/or plant and equipment as stipulated under the relevant section(s) of the Employer's Works Information in accordance with stipulations for submission, acceptance and approval as stipulated, including any other additional design requirements and or alterations in existing design which may stem from the aforementioned.
- Where applicable, manufacturing and or fabrication both on and off-site which may include but is not limited to; Plant, equipment, materials and any other resources, as required to provide both temporary and permanent works.
- Preparation, submission and acceptance of relevant Health and Safety, Environmental and Quality Files, including any other associated requirements.
- Approval of any applicable permits, permissions and licenses, including inductions
- All Covid-19 compliance requirements. Approval of any applicable permits, permissions and licenses, including inductions.
- Procurement and delivery of all long lead items necessary to Provide the works in line with the stipulations of the Employer's Works Information. Long lead items include but are not limited to; Plant, equipment, materials and any other resources, as required to provide both temporary and permanent works.
- Approval of any applicable permits, permissions and licenses, including inductions
- Site establishment and mobilisation
- Proving of services.
- Electrical LV infrastructure Installation *works*:
 - a. LV installations by a certified installer.
 - b. LV installations in a hazardous location by a certified installer.

- c. Commissioning of LV distribution systems.
 - d. LV cable laying, jointing and termination.
 - e. Installations of earthing, bonding and lightning protection systems.
 - f. Installation of LV cable ways, cable racking, cable trays and cable management systems.
 - g. Installation of lighting control system hardware and plant.
 - h. Installation of mast bases.
 - i. Installation of high masts.
 - j. Installation of electrical infrastructure in mast structures.
 - k. Installation of luminaires.
 - l. Rigging of high masts and street light poles.
 - m. Testing and commissioning.
- Correction of Defects, testing and commissioning, as-built, hand-over and close-out procedures in accordance with but not limited to the stipulations of relevant section(s) of the Works Information.
 - Preparation, submission and approval of as-built and close out documentation as per the stipulated requirements of the *Employer's* Works Information.
 - Any other work arising out of or incidental to the above, or required of the *Contractor* for the proper Completion of the Works in accordance with recognized standards, true meaning and intent of the Contract. Correction of Defects, testing and commissioning, as-built, hand-over and close-out procedures in accordance with but not limited to the relevant section(s) of the *Employer's* Works Information. Preparation, submission and approval of as-built and close out documentation as per the stipulated requirements of the *Employer's* Works Information.
- 5.9.3 The *Contractor's* construction programme shall correspond with the *Contractor's* Method Statements, Quality Control Plans and Risk Assessments, as drafted in line with the *Employer's* stipulations.
- 5.9.4 The *Contractor* uses Primavera Professional version 19.12 for his programme submissions, or similar approved software with the prior written consent of the *Project Manager*. In the event that the *Contractor* will be using earlier or later versions of the software, the onus is on the *Contractor* to ensure that a conversion is done in order for the XER file to be compatible with Primavera Professional version 19.12.
- 5.9.5 The *Contractor* shows on each programme he submits to the *Project Manager*, the requirements of the [CEMP, SES, PES and SMP] as described under the relevant sections of the Works Information, together with the associated environmental method statements.
- 5.9.6 The *Employer* (including the agents of the *Employer*) operates on *Site* during dates or timings when the *Contractor* has completed certain elements of the *works* and/or during the contract period as stipulated in this *Works* Information.
- 5.9.7 *Others* operate on *Site* during dates or timings when the *Contractor* has completed certain elements of the *works* as stipulated in this Works Information.
- 5.9.8 The *Contractor's* first programme submitted for acceptance shall be prepared to the satisfaction of the *Project Manager* during the pre-contract negotiation period, and no later than the period stipulated under Contract Data Part One.

- 5.9.9 The *Contractor* complies with the *Employer's* programme when he submits his first programme for acceptance. The *Contractor* shows on his first programme submitted for acceptance and all subsequently revised programme submissions showing the critical path or paths and all necessary logic diagrams demonstrating sequence of operations with specific focus on demonstrating the interfaces between, as well as construction and operational requirements, constraints and conditions.
- 5.9.10 The *Contractor* presents all programme submissions including but not limited to his tender programme, first programme submitted for acceptance and all subsequently revised programmes (see ECC Clauses 31.2 and 32.1) in hard copy and soft copy format, with the programme model being of Level 4 decomposition i.e. decomposed to appropriate levels of detail in order to accurately substantiate activity duration estimates as well as the chosen methodology for executing the activity in question.
- 5.9.11 ~~The *Contractor's* programme shows duration of operations in working days as per the stipulated definition of the work days and hours in the relevant section(s) of the *Employer's* Works Information. In addition the *Contractor's* programme shall demonstrate a standard 3 week Builder's Break during December and January of each year, as well as all South African public holidays as non-work days.~~ The *Contractor's* programme shows duration of operations in working days as per the stipulated definition of the work days and hours in the relevant section(s) of the *Employer's* Works Information. Refer to clause 3.4.4. In addition the *Contractor's* programme shall demonstrate a standard 3 week Builder's Break during December and January of each year, (usually taken between the 16th December and the 6th January). The *Contractor* also includes all South African public holidays and any periodic promulgated holidays (eg. Local and National Government election days) as non-working days
- 5.9.12 Each programme submitted by the *Contractor* to the *Project Manager*, is fully Cost and Resource Loaded (People, Equipment, Plant, Materials & Other Resources) to the *Project Manager's* satisfaction, with the exception of the *Contractor's* tender programme submission.
- 5.9.13 The *Contractor* shows on each programme he submits to the *Project Manager*, the requirements as listed in the NEC 3, ECC, Clause 31.2.
- 5.9.14 The *Contractor* attends, participates in and makes a meaningful contribution to, planning initiation & set-up meetings held during the pre-contract negotiation period and thereafter to set-up - including but not limited to - the first programme for acceptance; monitoring, control and reporting requirements; calculation of physical progress, proposed templates and planning/scheduling procedures to be complied with for the duration of the project, to the requirements, satisfaction and approval of the *Project Manager*.
- 5.9.15 The *Contractor* shows on each revised programme he submits to the *Project Manager* a resource histogram showing planned progress versus actual, deviations from the Accepted Programme and any remedial actions proposed by the *Contractor*, including a spread sheet identifying instances of resource over-allocation and/or conflicts, accompanied by proposed resolutions.
- 5.9.16 The *Contractor's* programme shows the following levels:
- Level 1 Master Schedule – defines the major operations and interfaces between engineering design, procurement, fabrication and assembly of Plant and Materials, transportation, construction, testing and pre-commissioning, commissioning and Completion.
 - Level 2 Project Schedule – summary schedules 'rolled up' from Level 3 Project Schedule described below.
 - Level 3 Project Schedule – detailed schedules generated to demonstrate all operations identified on the programme from the starting date to Completion. Individual operations will be assigned a code. The *Employer* notifies any subsequent layouts and corresponding filters on revised programmes.
 - Level 4 Project Schedule –detailed discipline/speciality level schedule decomposed to the appropriate levels of detail in order to accurately substantiate activity scope and activity duration estimates; developed and maintained by the *Contractor*

relating to all operations identified on the programme representing the daily activities by each discipline, with activities and operations adequately decomposed in order to accurately represent the effort required to execute said activity/operation and support accurate duration estimates.

- A narrative status report, which includes but is not limited to status and performance of operations on the Site and Working Areas; status and performance of operations outside the Working Areas; manpower histograms; S-curve of overall progress; critical action items (top 10) and deviations from the Accepted Programme and action plan to rectify.
- Basis of Programme/Schedule document detailing but not limited to the following minimum requirements:
 - Basis of latest accepted programme, including an overview of assumptions, constraints, specific and quantified resource allocations, productivity assumptions and basis of calculation, identification and justification of general scheduling provisions such as calendars and working times, lags, date constraints, activity durations longer than one reporting period, etc.
 - Description of network logic and sequencing.
 - Description of general construction approach.
 - Description of approach to allocation, use and management of all resources dedicated to the project.
 - Description of and trend analysis of critical risks as identified through schedule risk analysis and included in schedule contingency and or Time Risk Allowance provisions.
 - Discussion regarding the basis, method of calculation and validity of the critical path and near critical paths, (interrogate longest path and total float as contained in the programme).
 - Reporting on change management, i.e. identify and record any deviations/changes that have taken place within the previous reporting cycle, and their resultant impact on the remaining *works* and as identified and highlighted in the current revision of the programme for acceptance.
 - Identification critical activities, as well as top 10 near critical activities and undertake tends analysis on such activities with the aim of identify any deviations from planned performance.
 - Identification of any recovery and or mitigation action required in order to neutralise any deviations.

5.10 Reporting and Monitoring

- 5.10.1 The *Contractor* attends meetings as included but not limited to Section 2 Clause 5 of the *Employer's Works Information*.
- 5.10.2 The *Contractor's* programme submissions shall be decomposed to a level of detail deemed satisfactory by the *Project Manager*.
- 5.10.3 The *Contractor* attends weekly planning meetings. Meeting agenda to include (but not limited to) progress reporting as detailed within the relevant section(s) of the *Employer's Works Information*, recovery/optimisation, contractual matters in line with NEC ECC core clauses 31, 32 and main option clause, Option B.
- 5.10.4 The *Contractor* submits programme narrative report to the *Project Manager* at weekly intervals as well as daily status/target sheets detailing planned/targeted activities and actuals at daily intervals in addition to the intervals for submission of revised programmes stated under Contract Data Part One. The *Contractor* also submits fortnightly expediting report and monthly programme narrative report to *Project Manager*. The aforementioned reports shall be developed and finalised in line with the requirements of the *Project Manager*.
- 5.10.5 The *Contractor* completes an assessment of all activities in progress and to completion to determine physical percentage complete, forecasted completion dates, deviations from the

latest programme submitted for acceptance/ latest Accepted Programme and proposes remedial action to rectify deviations.

- 5.10.6 The *Contractor's* progress measurement methodology and all reporting and progress measurement tools shall be solely determined by the *Project Manager* and shall be in line with the *Employer's* policies, procedures and standards pertaining to Planning and Scheduling and shall at a minimum be representative of physical work completed on site, expressed through the use of the weighted activity, discreet effort and physical progress measurement principles as outlined within the "Project Management Institute Practice Standard for Scheduling".
- 5.10.7 The *Contractor* shows on each revised programme he submits to the *Project Manager* a resource histogram showing planned progress versus actual, deviations from the latest programme submitted for acceptance/latest Accepted Programme and any remedial actions proposed by the *Contractor*.
- 5.10.8 The *Contractor* submits the programme narrative report detailing the status and performance of operations on the Site and Working Areas, status and performance of operations outside the Working Areas, man-power histograms, Plant and equipment histograms, S-curve of overall progress, and critical action items (top 10). Report shall indicate "progress this period" and "progress to date".
- 5.10.9 The *Contractor's* **weekly** project progress report (narrative report) includes but is not limited to:
- Level 4 Project Schedule – decomposed to appropriate levels of detail in order to accurately substantiate activity duration estimates and to the satisfaction and approval of the *Project Manager*, and showing two separate bars for each task i.e. the primary bar must reflect the current forecast dates and the secondary bar the latest programme submitted for acceptance/ latest Accepted Programme.
 - Progress spreadsheet detailing actual progress achieved daily (target/planned quantity versus actual quantity) on current (critical) activities for the previous week, planned progress for the current week, deviations and proposed recovery for each activity in question, and developed to the satisfaction of the *Project Manager*. A 1-week Look Ahead spreadsheet in line with the aforementioned stipulations to be included. Priority to be given to identification of critical and near critical activities, progress and any deviations from planned performance in this regard.
 - 3-week Look Ahead Schedule showing two separate bars for each task i.e. the primary bar must reflect the current forecast dates and the secondary bar the latest programme submitted for acceptance/ latest Accepted Programme.
 - Dependencies/Deliverables matrix detailing interim approvals and/or any other inputs/requirements from *Employer/Supervisor/Project Manager/Others* or any other project stakeholder in line with the activities identified in the 1 and 3- week Look Ahead Schedules.
 - Interfacing Matrix, detailing timeous identification of any requirements for providing the *works* and/or works to be executed by Others and any other Stakeholders party to this contract in line with the stipulations of the Works Information.
 - Identification critical activities, progress and any deviations from planned performance.
 - Adherence and actual performance achieved with regards to Environmental, Health & Safety and Quality Management.
- 5.10.10 The *Contractor's* **fortnightly** expediting report includes but is not limited to:
- The Contractor shall submit to the *Project Manager*, every week, a report on progress of any off-site manufacturing activities undertaken during the previous week.
 - Based on latest programme submitted for acceptance/ latest Accepted Programme, the *Contractor* submits a cash flow forecast report that details the anticipated monthly cash flow, represented by the expected assessment of the amounts due, to the *Project Manager*. The cash flow forecast is to be extrapolated from the latest programme submitted for acceptance/ latest Accepted Programme through the mechanism of the resource and cost

loaded schedule or other similar methodologies with the prior acceptance of the *Project Manager*.

5.10.11 The *Contractor's* **monthly** project progress report includes but is not limited to:

- Monthly, the *Contractor* completes an assessment of the physical progress of all activities in progress and to completion, accordingly calculates physical progress complete for the project overall (represented as a percentage) in line with the methodology and resultant tools; revises and submits the updated programme for acceptance and cash flow forecast report; detailing any variances and proposes remedial actions to rectify deviations.
- The *Contractor's* monthly programme narrative report is submitted a week before the last Friday of each month, or as required by the *Project Manager*. The report shall indicate "progress this period" and "progress to date" and shall include, but is not limited to, the following:
 - Summary of progress achieved during the reporting period.
 - Latest Accepted Programme / latest programme submitted for approval
 - Deviations from the latest programme submitted for acceptance/ latest Accepted Programme and action plans to rectify
 - Project milestones table – planned versus actual and forecast
 - Status and performance of operations on the site and working areas
 - Status and performance of operations outside working areas
 - Cash flow forecast report in line with latest programme submitted for acceptance/ latest Accepted Programme
 - Digital photographic record of the progress of the works
 - Control spreadsheet detailing specific current and future over-allocation and/or conflicts in allocation of resources, plant and equipment.
 - Overall progress
 - Critical action items list (top 10)

5.11 Other Conditions

- 5.11.1 The *Contractor* shall comply with the specific provisions of NEC ECC Clauses 24.1 when supplanting any planning resources previously appointed in line with the provisions of this contract. All candidates proposed in line with the aforementioned procedure are to be subjected to an interview and assessment process deemed fit and conducted by the Employer's (including the agents of the Employer). Appointment shall follow upon written approval of the *Project Manager*.
- 5.11.2 The *Employer* (including the agents of the *Employer*), reserves the right to exercise the provisions of NEC 3 ECC Clause 24.2, where deemed necessary in order to meet the *Employer's* objectives as stipulated in Section 1.2 of the Works Information.
- 5.11.3 When demonstrating entitlement to a change to the Completion Date(s), the *Contractor* must take cognisance of the requirements of the NEC ECC core Clauses 62, 63, 64, 65 and main option clause, Option B; that is, the *Contractor* must demonstrate the impact of the compensation event on the remaining work at the specific point in time the compensation event started to occur.

5.12 *Contractor's* management, supervision and key people

- 5.12.1 The *Contractor* shall make an adequate, experienced and stable project team available for the duration of the contract. Every effort must be exercised by the *Contractor* to minimise the replacement of project team members in order to ensure optimum contract management continuity and efficiency.

5.12.2 The *Contractor* employs full time, fully qualified and experienced key persons who have been delegated sufficient authority to manage the contract efficiently on Site during completion of the *works* including and not limited to:

- Contracts Manager
 - The Contracts Manager should at least have a minimum qualification of a BSc. Eng./ B.Tech./ National Diploma in Electrical Engineering and a ECSA/SACPCMP registration as Pr. Eng/Pr. Tech. Eng./ Pr. Cert Eng./ Pr. CPM with at least 10 years of experience in Electrical LV projects. The Contracts Manager must have experience working with the NEC3 Engineering and Construction Contract in at least 3 separate projects, with at least 1 project in excess of R35m in electrical *Works* (LV switchgear, high mast lighting and street lighting) component value.
- Construction Manager X 1
 - The Construction Manager should at least have a minimum qualification of a B.Tech/National Diploma in Electrical Engineering and a ECSA/SACPCMP registration as Pr. Eng/ Pr. Tech. Eng./ Pr. Cert Eng./ Pr. CM with at least 10 years of experience in LV and area lighting construction projects. The Construction Manager must have experience working with the NEC3 Engineering and Contract in at least 1 project in excess of R25m in electrical works (LV switchgear, high mast lighting and street lighting) component value.
- Installation Electrician X 2
 - The Installation Electrician must have at least 10 years of experience in Low Voltage (LV) installations and be registered with Department of Labour as an installation electrician.
- Foremen
 - Foreman (Electrical LV) x 2
 - The Electrical Foreman must have a minimum of NTC 4 Trade Certificate in Electrical Engineering with at least 10 years of experience in Electrical LV Projects and be registered with Department of Labour as an installation electrician.
- Planner X 1,
 - The planner should at least 5 years of experience working both in Electrical roadway and area lighting LV Projects as planner.
- Quality Assurance Officer X 1,
 - Quality Assurance officer should have a Diploma or Certified qualification in quality systems with relevant quality experience in construction. At least 5 years of experience in a quality systems environment and relevant experience in electrical/civil construction projects is required.
- Environmental Officer X 1,

- Environmental Officer should have a Bachelor's Degree in Environmental Management/Science or equivalent with at least 5 years of experience in electrical construction projects.
 - Health & Safety Officer X 1,
 - Health and Safety Officer: Should have a least a B-Tech/Diploma in Environmental Health or Safety Management. Registered as Health and Safety Officer with SACPCMP with at least 5 years of experience on LV electrical/civil construction projects, and have a SAMTRAC or NEBOSH or modern SHEQ risk management training course as a minimum qualification.
 - Document Controller X 1,
 - Document controller should have at least 5 years of experience working in construction and experience working with the NEC3 Engineering and Construction Contract Option chosen for this contract.
- 5.12.3 The *Contractor* employs personnel listed above but not limited to those mentioned in order to perform the functions of key persons under NEC3 ECC Clause 24.1. These appointments shall have the necessary experience and be suitably qualified.
- 5.12.4 The *Contractor* provides an Organogram of all his key people (both as required by the *Employer* and as independently stated by the *Contractor* under Contract Data Part Two) and how such key people communicate with the *Project Manager* and the *Supervisor* and their delegates all as stated at paragraph 2.5 of C3.1 *Employer's Works Information*.

5.13 Training Workshops

- 5.13.1 The *Contractor* facilitates the following requirements for training workshops:
- The *Contractor* will be required to provide training in the use of the plant to the responsible staff of the *Employer*.
 - On completion, each delegate to be given a handbook that covers the training undertaken.
 - A safety pre-mobilisation workshop.
 - *Contractor* employee safety training programme.
 - The *Contractor* shall utilise local people for staffing up some of his requirements and shall ensure that there is adequate skills transfer taking place.
 - Any other training as required by law or specifications referred to in this document

5.14 Insurance provided by the *Employer*

- 5.14.1 The insurance that will be provided by the *Employer* is as per the procedure manual contained in the List of Annexures.
- 5.14.2 The procedure manual further details the cover to be arranged by the *Contractor* and Sub-Contractor as well as exclusions and deductibles.
- 5.14.3 The *Contractor* liaises with the *Employer* and the *Project Manager* at the Contract Date to declare the ECC3 contract details to the *Employer's* insurance brokers, Willis Towers Watson.
- 5.14.4 Where the *works* involve the assembly, erection and installation of Plant, the *Contractor* declares the full replacement value and not the value included in the ECC3 contract.
- 5.14.5 The *Contractor* liaises with the *Employer* and the *Project Manager* when a claim is made and assists in completing the Claims Advice Forms that shall be provided. Contract change management
- 5.14.6 No additional requirements apply to ECC Clause 60 series.

5.15 Contract change management

- 5.15.1 For ease of communication standard templates shall be used for contract change management. The *Contractor* forwards all correspondence with respect to contract change management, i.e. Early Warnings and notifications of Compensation Events, on the standard templates provided.

5.16 Provision of bonds and guarantees

- 5.16.1 The form in which a bond or guarantee required by the conditions of contract is to be provided by the *Contractor* is given in Part 1 Agreements and Contract Data, document C1.3, Sureties.
- 5.16.2 The *Contractor* provides a bond or guarantee as required by the conditions of contract concurrently with the execution by the Parties of the form of agreement for the ECC contract.

5.17 Records of Defined Cost, payments & assessments of compensation events kept by *Contractor*

- 5.17.1 The *Contractor* keeps the following records available for the *Project Manager* to inspect:
- Records of design employees location of work or professional engineers engaged by the *Contractor*
 - Records of people and Equipment within the Working Areas
 - Records of Equipment used and people employed outside the Working Areas
 - Records of quotations, invoices and pay slips.

6 Procurement

6.1 Code of Conduct

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

- The Transnet Detailed Procurement Procedure (DPP);
- Section 217 of the Constitution - the five pillars of Public PSCM (Procurement and Supply Chain Management): fair, equitable, transparent, competitive and cost effective;
- The Public Finance Management Act (PFMA);
- The Broad Based Black Economic Empowerment Act (BBBEE); and
- The Anti-Corruption Act.

This code of conduct has been included in this contract to formally apprise the *Employer* Suppliers of the *Employer's* expectations regarding behaviour and conduct of its Suppliers.

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

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

- 1 *The Employer will not participate in corrupt practices and therefore expects its suppliers to act in a similar manner.*
 - *The Employer* and its employees will follow the laws of this country and keep accurate business records that reflect actual transactions with and payments to our suppliers.
 - Employees must not accept or request money or anything of value, directly or indirectly, to:
 - Illegally influence their judgement or conduct or to ensure the desired outcome of a sourcing activity;
 - Win or retain business or to influence any act or decision of any decision stakeholders involved in sourcing decisions; or
 - Gain an improper advantage.
 - There may be times when a supplier is confronted with fraudulent or corrupt behaviour of *the Employer* employees. We expect our Suppliers to use our “Tip-offs Anonymous” Hot line to report these acts (0800 003 056).
2. *The Employer is firmly committed to the ideas of free and competitive enterprise.*
 - Suppliers are expected to comply with all applicable laws and regulations regarding fair competition and antitrust.
 - *The Employer* does not engage with non-value adding agents or representatives solely for the purpose of increasing BBBEE spend (fronting)
3. *The Employer’s relationship with suppliers requires us to clearly define requirements, exchange information and share mutual benefits.*
 - Generally, Suppliers have their own business standards and regulations. Although *The Employer* cannot control the actions of our suppliers, we will not tolerate any illegal activities. These include, but are not limited to:
 - Misrepresentation of their product (origin of manufacture, specifications, intellectual property rights, etc.);
 - Collusion;
 - Failure to disclose accurate information required during the sourcing activity (ownership, financial situation, BBBEE status, etc.);
 - Corrupt activities listed above; and
 - Harassment, intimidation or other aggressive actions towards *the Employer* employees.
 - Suppliers must be evaluated and approved before any materials, components, products or services are purchased from them. Rigorous due diligence is conducted and the supplier is expected to participate in an honest and straight forward manner.
 - Suppliers must record and report facts accurately, honestly and objectively. Financial records must be accurate in all material respects.

Conflicts of Interest

1. *A conflict of interest arises when personal interests or activities influence (or appear to influence) the ability to act in the best interests of the Employer.*
 - Doing business with family members
 - Having a financial interest in another company in our industry

6.2 The Contractor's Invoices

- 6.2.1 When the *Project Manager* certifies payment (see NEC3 ECC Clause 51.1) following an assessment date, the *Contractor* complies with the *Employer's* procedure for invoice submission.
- 6.2.2 The invoice must correspond to the *Project Manager's* assessment of the amount due to the *Contractor* as stated in the payment certificate.
- 6.2.3 Invoices must be submitted by the 18th of the month forecasted to the 25th of the month.
- 6.2.4 The invoice states the following:
 - Invoice addressed to Transnet Limited;
 - Transnet Limited's VAT No: 4720103177;
 - Invoice number;
 - Registered name of the *Contractor*;
 - Address (Physical and Postal) of the *Contractor*;
 - The *Contractor's* VAT Number; and
 - The Contract number : TNPA 2021/11/0007/RFP
- 6.2.5 The invoice contains the supporting detail:
 - The amount paid to date;
 - Amount for payment (excluding VAT);
 - VAT amount;
 - Amount for payment (including VAT);
 - Any retention monies to be deducted from the invoice;
 - Any interest payable;
 - Escalation formula used where applicable;
 - Settlement discount;
 - Proof of ownership of Materials supplied;
 - A statement is to accompany each invoice
- 6.2.6 The invoice is presented either by post or by hand delivery on the last working day of the assessment month. Statements must accompany invoices.
- 6.2.7 Invoices submitted by post are addressed to:

Transnet National Ports Authority
Queens Warehouse
237 Mahatma Gandhi Road
Durban
4000

For the attention of The Lead Contracts Administrator: Iqbal Hoosen, TNPA
- 6.2.8 Invoices submitted by hand are presented to:

Transnet National Ports Authority
Queens Warehouse
237 Mahatma Gandhi Road
Durban
4000

For the attention of The Lead Contracts Administrator: Iqbal Hoosen, TNPA

- 6.2.9 The invoice is presented as an original.
- 6.2.10 The *Contractor* ensures that the *Employer* has his correct banking information to make the electronic payment transfer.
- 6.2.11 All payments are provisional and subject to audit. The *Contractor* preserves his records for such a period of time as legislation requires, but in any event not less than five (5) years.
- 6.2.12 The *Employer* deducts any amount owed by the *Contractor* to the *Employer* from any amount payable by the *Employer* to the *Contractor*.

6.3 People

6.3.1 Minimum requirements of people employed on the Site are as follows:

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

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

The *Contractor* shall provide the services of a competent Project Industrial Relations Officer (Part Time 10%) for the duration of the project. The incumbent must have relevant qualifications and a minimum of five (5) years' experience working in construction projects to manage and co-ordinate their industrial relations activities and to assist in the speedy resolution of disputes that may arise on site and to ensure that labour harmony prevails. The PIRO shall comply in all respects to Transnet's Contractor Industrial/Employee Relations Requirements Document attached as Annexure U of the Works Information.

6.4 Subcontracting

- 6.4.1 The *Contractor* shall not appoint or bring Sub-Contractors onto Site without the prior acceptance of the *Project Manager*, and all Sub-Contractors will be required to conform to the requirements as set out herein as if they were employees of the *Contractor*.
- 6.4.2 The *Contractor* shall not deviate from an approved Sub-Contractors list without prior acceptance of the *Project Manager*
- 6.4.3 It is a specific condition that the *Contractor* subcontracts a minimum of **30%** of the value of the contract in terms of Preferential Procurement Regulations, 2017

The *Contractor* must engage with the local municipal district/wards business forums business entities within the immediate surroundings of the Site/*Working Area* to maximise business

opportunities to satisfy the above requirements. This is to ensure any possible risk pertaining to local business forums are mitigated by the *Contractor* through demonstrating evidence to local business forums when enquired during the execution of the contract.

6.4.4 Subcontract documentation, and assessment of subcontract tenders:

- The *Contractor* is required to appoint his Sub-Contractors under the NEC3 Engineering Contract Sub Contract unless accepted otherwise by the *Project Manager*, and all Sub-Contractors will be required to conform to the requirements as set out herein as if they were employees of the *Contractor*.
- The *Contractor* shall ensure that the quality assurance, health and safety, industrial relations, environmental, documentation control and all other requirements placed on him under this contract are transferred into any subcontracts.

7 List of Annexures

All the annexures listed hereunder shall be deemed to form part of the *Works* Information.

The Annexures listed in the Table below are available **only** in the soft copy format (CD).

| Annexure | Description / Discipline | Document No(s) |
|----------|--|--|
| A | Drawings | As per list in 4.6 |
| B | Technical Project Specifications | As per list in 4.5.4 |
| C | Health and Safety Guidelines | HAS-GL-0001 |
| D | Site Emergency Management | HAS-P-0001 - Rev 0 |
| E | Occurrence Reporting and Investigation | HAS-P-0002 - Rev 0 |
| F | Guidelines for Managing Common Hazardous Activities and Tasks | HAS-GN-0001 rev 0 |
| G | Transnet Integrated Management System (TIMS) Policy Commitment Statement | IMS-GRP-GDL-002-1 |
| H | Asbestos Management Plan | Transnet National Ports Authority AMP |
| I | CAD Standards | ENG-STD-0001 |
| J1 | Construction Environmental Management Plan (CEMP) | ENV-STD-001 Rev 04 |
| J2 | Standard Environmental Specifications (SES) | ENV-STD-002 Rev 04 |
| J3 | TNPA list of approved waste services Contractors | |
| J4 | EThekweni Municipality Scheduled Trades and Occupations | Provincial Gazette No. 40991 dated 22 March, 1979 |

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|---|--|---|
| K | Contractor Documentation Submittal Requirements | DOC-STD-0001 rev 3 |
| L | General Quality Requirements for Suppliers and Contractors | QAL-STD-0001 rev 0 |
| M | Project Control Insurance Details | |
| N | TNPA's High Level Commissioning Plan | |
| O | Structural Assessment Report | ENG-RPT-2127737-S-01 |
| P | Post COVID-19 Lockdown Construction Health and Safety Guidelines | TNPA-IMS-HS-SOP-009.001 |
| Q | COVID-19 Health Care Waste Management on Construction Sites | TNPA-IMS-ENV-SOP-009.001 |
| R | EThekweni Municipality Interim Code relating to fire prevention and Flammable liquids and substances | Provincial Gazette No. 5417 dated 23 March, 2000 |
| S | Standard Environmental Maintenance Management Programme(EMPr) for Maintenance Works | |
| T | TGC IR | |
| U | SASTT-TS-TT3 | Horizontal Directional Drilling Technical Standard |