SPECIFICATION FOR ELECTRICAL INSTALLATIONS TO BUILDINGS OTHER THAN DWELLINGS HOUSES

REVISIONS		
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1.0 SCOPE

1.1 This specification covers the requirements with respect to the electrical installation, including the supply of all material and labour necessary to complete the EL&P installation for buildings.

1.2 This specification also applies to electrical alterations and additions carried out to existing installations.

2.0 REFERENCES

2.1 The following publications (latest edition) are referred to herein:

CODES OF PRACTICE

SANS	10313:	Code of Practice for Protection of Buildings against Lightning.
SANS	10086-1:	The Installation and Maintenance of Electrical Equipment used in Explosive Atmospheres.
SANS	10108:	The Classification of Hazardous Locations and the Selection of Electrical Apparatus for use in such Locations.
SANS	10114-1:	Interior lighting Part 1: Artificial lighting of interiors
SANS	10313	Protection against lightning - Physical damage to structures and life hazard
SANS	10142-1:	The Wiring of Premises Part 1: Low-voltage installations

SPECIFICATIONS

SANS	121:	Hot-dip (galvanized) zinc coatings (other than on continuously zinc coated sheet and wire)
SANS	156:	Moulded-case circuit-breakers
SANS	160:	Electric Room Heaters.
SANS	164-1:	Plug and socket-outlet systems for household and similar purposes for use in South Africa Part 1: Conventional system, 16 A 250 V a.c.
SANS	172:	Low-voltage fuses
SANS	181:	Thermostats for electric storage water heaters
SANS	475:	Interior luminaires for fluorescent lamps
SANS	767-1:	Earth leakage protection units Part 1: Fixed earth leakage protection circuit-breakers
SANS	950:	Unplasticized polyvinyl chloride rigid conduit and fittings for use in electrical installations
SANS	1041:	Tubular fluorescent lamps for general service
SANS	1065:	Screwed metal conduit and fittings for electrical wiring
SANS	1085:	Wall outlet boxes for the enclosure of electrical accessories
SANS	1091:	National colour standards for paint
SANS	1274:	Coatings applied by the powder-coating process
SANS	1473-2:	Metal-enclosed busbar trunking systems
SANS	1574	Polyvinyl chloride (PVC)-insulated electric cables and flexible cords
SANS	1663:	Wall and appliance switches.

SANS	1973:	Low-voltage switchgear and control gear assemblies
SANS	10064:	The preparation of steel surfaces for coating
SANS	60947-3:	Low-voltage air-break switches, air-break disconnectors, air-break switch-disconnectors, and fuse-combination units
SANS	60947-4:	Low-voltage switchgear and control gear Part 4- : Contactors and motor-starters
SANS	60079-1:	Flameproof enclosures for electrical apparatus Part 1: International requirements
SANS	61558-2-4:	Isolating transformers and safety isolating transformers

3.0 SERVICE CONDITIONS

3.1 The cable shall be designed and rated for continuous operation under the following conditions :-

3.1.1 Ambient/Environment Conditions :

3.1.1.1 Altitude : Sea level.

3.1.1.2 Ambient temperature : -5° C to +45° C (daily average +35° C).

3.1.1.3 Relative humidity : As high as 96%

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3.1.1.4 Lightning conditions : Severe, with a maximum lightning ground flash density 11 flashes per km^2 per annum.

3.1.1.5 Exposure conditions : Salt laden, industrial atmosphere as well as hazardous gases and dust atmosphere.

3.1.1.6 Electrolytic corrosion conditions prevail in all the areas owing to the proximity of direct current traction system and cathodic protection schemes.

4.0 ELECTRICAL INSTALLATION

4.1 The contractor shall carry out the installation in accordance with SANS 10142-1: Code of Practice for the Wiring of Premises and the requirements of this specification.

4.2 Where the local supply authority requirements differ from those specified herein Transnet Group Capital Electrical Engineer shall be approached for a decision.

4.3 All equipment and material shall comply with the relevant National or International standard specification. Where equipment does not comply it shall be submitted with the Transnet Group Capital Electrical Engineer for approval.

4.4 The system of supply will be three phase, 4 wire or single phase 2 wire 50 Hz. alternating current with earthed neutral at a nominal voltage of 400/230 volts. The voltage may vary within the range of ±5 % of the nominal voltage.

4.5 Wiring

4.5.1 All wiring shall be carried out in cable trunking and/or conduit. Only the loop in system of wiring shall be accepted.

4.5.2 Joints in wiring, nor the cutting away of strands to facilitate connections shall be permitted.

4.5.3 Single core cable smaller than 1,5 mm shall not be used. PVC cables shall not be connected directly to the lampholders for incandescent lamps. Conductors shall terminate in an approved connector in the conduit box directly behind the luminaire, and connection to the lampholder made by means of adequately rated silicone heat resistant wire.

4.5.4 Colour identification of conductors shall be used.

4.5.5 Flameproof equipment shall comply with SANS 60079-1 or BS 229 for installation in hazardous areas, as defined in SANS 10108.

4.5.6 Equipment in hazardous areas shall be installed in accordance with SANS 10086-1.

4.6 The provision and installation of the supply cable to the building, the termination and the connection thereof to the distribution board main incoming isolating shall be the responsibility of the Contractor, as directed by the Engineer.

4.7 The Contractor shall be responsible for the provision and connection of power supplies to electric urns, stoves, geysers, fry-tops, fans etc. provided by others; unless otherwise stated in the Schedule of Requirements.

4.8 The Contractor shall also provide power supplies to air-conditioning equipment. The connection to air-conditioning equipment will be undertaken by others.

4.9 Cables shall be adequately supported to prevent strain on the terminals.

4.10 Drilling or welding of steelwork for the mounting of electrical equipment will not be permitted unless approved by Transnet's Engineer on site. Equipment shall be fixed to the steelwork by means of approved, purpose made clamp/brackets.

4.11 Lightning protection shall be in accordance with the requirements of the local supply authority and SANS 10313: Code of Practice for Protection against lightning - Physical damage to structures and life hazard

5.0 DISTRIBUTION BOARDS

5.1 Architrave type for flush mounting, and surface type for mounting on indoor walls shall comply with SANS 10142-1.

5.1.1 These distribution boards shall be supplied with a cover plate or open window door and

be suitably painted and finished to harmonise with wall finish.

5.1.2 All switches and associated equipment shall be fully enclosed within the distribution board with only the operating handles protruding through the cover plate or door.

5.2 Cubicle type shall comply with IEC publication 439.

5.3 Distribution boards for outdoor use shall be weatherproof and corrosion resistant.

5.4 A substantial earthing terminal shall be firmly attached to the steel work of the distribution board and connected to the earthing bar.

5.5 Entries suitable for all incoming and outgoing cables shall be provided. Glands for bottom entry cables shall not be less than 600mm above floor level.

5.6 Space for mounting of 20% additional control units shall be allowed on all distribution boards. In addition, 20% spare conduits (20mm diameter) shall be provided between flush distribution boards and the ceiling/roof space in pitched roof buildings (minimum 2 conduits).

5.7 All circuits shall be clearly labelled. Labels shall be of the fabricated type and permanently secured. Embossed tape is not acceptable.

5.8 When called for labelling of moulded case circuit breakers shall be labelled by means of numerals. A legend inserted behind a clear plastic window on the inside of the door shall be provided to detail the various circuits.

6.0 ISOLATING SWITCHES

6.1 Isolating switches for machines shall be lockable in the open position.

6.2 Isolating switches shall comply with SANS 60947-3.

7.0 MOULDED CASE CIRCUIT BREAKERS

7.1 Moulded case circuit breakers shall: -

7.1.1 Comply with SANS 156.

7.1.2 Have a breaking capacity as specified.

7.1.3 Be of the fixed pattern, non-adjustable type.

7.1.4 Be suitable for clip-on tray mounting.

8.0 EARTH LEAKAGE PROTECTION UNITS

8.1 Earth leakage protection units shall: -

8.1.1 Be the integral moulded case type and comply with SANS 767-1.

8.1.2 Have a sensitivity of 30 mA.

8.1.3 Be similar in design to moulded case circuit breakers and suitable for clip-on tray mounting.

8.1.4 Have a breaking capacity and current rating as specified.

9.0 FUSE SWITCHES

9.1 Fuse switches shall :

9.1.1 Comply with SANS 60947-3

9.1.2 Be of the double break, horizontal drawout, air insulated type, suitable for flush mounting.

11.1.3 Be of the quick break, dustproof type.

12.0 HIGH RUPTURING CAPACITY FUSE LINKS

12.1 High rupturing capacity fuse links shall :

12.1.1 Comply with SANS 172

12.1.2 Be of the cartridge type with a breaking capacity not less than that shown in the Category of Duty AC 50 table 2 of SANS 172.

12.1.3 Have a class Q1 fusing factor

12.1.4 A spare set of fuse links for each of the different ratings shall be provided and accommodated in the distribution board.

13.0 CONTACTORS

13.1 Contactors shall comply with SANS 60947-4.

14.0 LUMINAIRES FOR INCANDESCENT LAMPS

14.1 Luminaires shall be suitable for accommodating energy saving lamps.

14.2 The insulation of internal wiring shall be heat resistant.

14.3 Bulkhead luminaires shall comply with CKS 199.

14.4 Bowl type luminaires shall have porcelain or acrylic galleries with white opal, high impact acrylic screw-in type bowls.

14.5 Well glass luminaires shall consist of a body of non-corrosive material with a top entry for a 20mm conduit, have a clear glass cover and be completely weatherproof.

15.0 LUMINAIRES FOR FLUORESCENT LAMPS

15.1 Luminaires for fluorescent lamps shall comply with SANS 475.

15.2 Lampholders shall be of the telescopic type.

15.3 The luminaires shall be suitable for 1,2m or 1,5m "rapid start" lamps to SANS 1041, class B, group 2, with rated colour 3. (warm white).

15.4 Anti-corrosive luminaires shall have a body channel constructed of fibre-glass or non-corrosive material with a moulded acrylic enclosing diffuser.

15.5 A gasket shall be provided between the body channel and the diffuser to ensure a reliable seal.

15.6 The enclosing diffuser shall latch to the body channel with captive-type non-corrosive latches.

15.7 It is essential that full descriptions and photometric data of the luminaires and lamps offered, accompany tenders. This information shall include description and drawings of the various items of equipment as well as full photometric data issued by the South African Bureau of Standards.

16.0 INTERIOR LUMINAIRES FOR HIGH INTENSITY DISCHARGE LAMPS

16.1 Interior luminaires for high intensity discharge lamps shall comply with SANS 475 and be suitable for use in an ambient temperature of 40^{o}C.

16.2 Suitable provision shall be made on the ballast housing for eyes or lugs, for the attachment of safety chains.

16.3 The electronic ignition device for high pressure of sodium and metal halide lamps shall be of the three wire type operating on the superposed pulse principle. The circuitry shall be such that at starting, or on failure of a lamp, high voltage pulses will be confined to the high voltage lead between the igniter and centre contact of the lampholder. Igniters incorporating a switching element are not acceptable.

16.4 A fully electronic ignition circuit shall be utilized to trigger the pulse transformer.

16.5 The natural frequency of the electronic ignition circuit shall be in the order of 100kHz.

16.6 The lamp ignition voltage shall remain constant within a mains voltage variation of between 200 and 250 volts.

16.7 Tenderers shall guarantee that pulsing of the igniter on a failed lamp will not have a detrimental effect on the life and efficient operation of the control gear, igniter, lampholders and circuit wiring.

16.8 It is essential that full descriptions and photometric data of the luminaires and lamps offered, accompany tenders. This information shall include description and drawings of the various items of equipment, as well as full photometric data issued by the South African Bureau of Standards.

17.0 ELECTRIC AIR HEATERS

17.1 Electric air heaters shall comply with SANS 160.

17.2 Tubular heaters shall be rated at 260 watt per metre length of tube and have an enclosed entry box containing terminals for incoming line, neutral and earth connections with a suitable entry for a flexible conduit connector.

17.2.1 Tubular heaters shall be mounted with the bottom 200mm above floor level

17.3 Convector Heaters shall:

17.3.1 Be of the natural convection type, of good appearance and suitable for flush or surface mounting.

17.3.2 Have incorporated a manually adjustable control switch, automatic controlling thermostat and indicating neon pilot lighting showing when the heater is on.

17.3.3 Have a mounting box or housing suitable for a 20mm electrical conduit entry.

17.3.4 Be installed with the bottom of the mounting box/housing 200mm above floor level.

17.4 Fan Heaters shall :

17.4.1 Be of the wall mounted type with air flow directional adjustment and locking facilities.

17.4.2 Have a totally enclosed type fan motor fully protected from damp and dust and fitted with self aligning noiseless bearings.

17.4.3 Have a separate manually adjustable control unit incorporating an automatic controlling thermostat. The control unit shall be housed in a adequately ventilated sheet steelcase. Means of protecting and isolating the heater, shall be provided. The control unit circuit shall be arranged such that during summer months the heater can be switched off and the fan used alone for ventilation.

18.0 ROOM THERMOSTATS

18.1 Room thermostats shall comply with BS 3955 Part 2, section 2F, and be to category A.

18.2 An over-riding switch shall be mounted adjacent to the thermostat for manual control.

19.0 LIGHT SWITCHES

19.1 Light switches shall comply with SANS 1663 and be of the rocker type.

19.2 They shall be mounted 1 500 mm above floor level and where possible 200 mm from door frames.

20.0 LIGHT SENSITIVE CONTROL UNITS

20.1 The complete unit shall be of the solid state type and housed in a sealed weatherproof enclosure suitable for mounting in any position.

20.2 The light sensitive cell shall operate in a manner to give an area of detection not less than a hemisphere.

20.3 The unit shall not operate due to light fluctuations of duration less than 5 minutes. They shall incorporate main contacts rated at least to 10 amps and be mounted at a height of not less than 2 400 mm.

20.4 An over-riding switch shall be provided.

21.0 SOCKET OUTLETS

21.1 All 220 volt, 16 amp socket outlets shall comply with SANS 164-1 and be of the 3 round pin shuttered type.

21.2 All 32V, 5A socket outlets for lead lights shall be of the industrial two pin, weatherproof type with a screw cover attached to the socket outlet by a short length of chain.

21.2.1 They shall be mounted on columns/walls 1 500mm above floor level or in recesses provided in inspection pits.

21.3 Welding socket outlets shall be in accordance with IEC publication 309 and be rated for 63A (unless other rating is indicated on the drawing) and be of the 5 pin, 6 h configuration type.

21.3.1 Welding plugs shall be supplied complete with matching male plugs and be mounted 1 500mm above floor level.

21.3.2 The welding plug circuit shall be protected by an earth leakage device that shall be mounted either in the welding plug housing or in the distribution board feeding the welding plug.

22.0 TRANSFORMERS 220V/32V

22.1 The transformers for 32V socket outlets shall be in accordance with SANS 61558-2-4 and be designed for 220V to 250V primary power supply and have an output voltage of 32V.

23.0 ISOLATING AND SAFETY ISOLATING TRANSFORMERS

23.1 Isolating and safety isolating transformers shall comply with SANS 61558-2-4.

24.0 POWER POINTS

24.1 Power points for hot water cylinders shall be equipped with a 2 or 4 pole isolating switch adjacent to the cylinder except for hot water cylinders mounted below sinks.

24.2 Where contactors are necessary for the operation of hot water cylinders, these shall be installed adjacent to the appliance where practicable and in a suitable enclosure.

24.3 Power points for tubular heaters shall be equipped with a flush mounted 100mm x 100mm conduit box, blanked off with a cover plate accommodating a 15A flush mounted switch. Connection to the heater shall be by means of a PVC covered flexible conduit. The flexible conduit shall have sufficient slack to avoid strain but shall not touch the floor.

24.4 Power points for fan heaters shall be equipped with two recessed interconnected conduit boxes, one for connection to the heater and the other for connection to the control unit 1 500mm above floor level.

24.5 Power points for stoves, fry tops and boiling tables shall be equipped with a 2 or 3 pole isolating switch for the appliance shall be 1 500mm above floor level. The outlet for connection to the appliance shall be 500mm above floor level.

24.6 Power points for air-conditioning units shall terminate in a 100mm x 100mm conduit box mounted adjacent to the unit and equipped with a 2 pole isolating switch.

24.7 Power points for extractor fan units shall terminate in a 100mm x 100mm conduit box mounted adjacent to the unit.

24.8 Where a common thermostat is specified for controlling a number of fans, power points shall be so arranged to allow for circuit wiring between the fans and thermostat.

24.9 Power points for smoke detection and CO_2 equipment shall terminate in a 100mm x 100mm conduit box equipped with a 30A, 2 pole isolating switch, lockable in the "on" position, mounted 1500mm above floor level, with connecting facilities to the equipment.

24.10 Power points for air conditioning units shall terminate in a 100mm x 100mm conduit box mounted adjacent to the unit and equipped with a 2 pole isolating switch, with connecting facilities for the unit.

24.11 Power points for machinery shall terminate in a connection box suitable for mounting a 2 or 3 pole isolating switch, with connecting facilities to the machine.

24.12 Power points for lighting shall terminate in a circular conduit box fitted with an unswitched 5A, 3 pin socket outlet.

25.0 CONDUIT AND ASSOCIATED FITTINGS

25.1 Screwed metal conduit shall comply with SANS 1065.

25.2 Non-metallic conduit and fittings shall comply with SANS 950. Non- metallic conduit shall not be cast into concrete.

25.3 Wall outlet boxes shall comply with SANS 1085.

25.4 In areas within 50 km of the coast only galvanised or non- metallic conduit shall be used. Where conduit is exposed to the weather elements only galvanised conduit shall be used or UV T routed P.V.C. pipe.

25.5 Threads of metallic conduit and associated fittings shall be effectively protected against rust by non-corrosive paint where they are exposed to moisture or weather elements.

25.6 Wall outlet boxes shall be positioned with the major dimension vertical and not more than 15 mm below the finished wall surface. Cover plates shall fit plumb and flush with wall surfaces.

25.7 Conduits are to be concealed and chased into plastered brick walls or cast into concrete work as building work proceeds. Where conduit cannot be concealed these shall be installed neatly on the surface as approved by the Engineer.

25.8 Conduits are to be concealed and chased into plastered brickwalls or cast into concrete work as the building work proceeds.

25.9 Chasing of finished walls or concrete work will not be allowed. Under no circumstances will chases be permitted through structural members of the building.

25.10 Chasing of face brick walls will not be permitted. Conduits and outlet boxes shall be built into walls.

26.0 CABLES AND GLANDS

26.1 Polyvinyl-chloride cables shall comply with SANS 1574. Armoured cables shall be of the earth continuity conductor type.

26.2 Cable glands shall be of the compression type, (brass or bronze) and be suitable for termination of earth continuity conductor type cables. Glands shall be supplied with neoprene shroud.

27.0 BUSBAR TRUNKING

27.1 Busbar trunking shall comply with SANS 1473-2.

28.0 CABLE TRAYS

28.1 Cable trays shall be protected against corrosion and be adequately supported so that when fully loaded the deflection does not exceed 10mm. They shall be wide enough to accommodate the power cables in a single layer.

29.0 EARTHING AND BONDING

29.1 The complete electrical installation shall be earthed in accordance with SANS 10142-1: Code of Practice for the Wiring of Premises.

29.2 Earth electrodes shall consist of an exterior copper layer molecularly bonded to a high strength steel core. The copper shall have a minimum thickness of 0.25mm.

29.3 Only approved non-corrosive substances may be used to reduce earth resistivity. The earth resistance as measured with a earth resistance tester shall not exceed 5 ohm.

29.4 Copper tape used for bonding and earthing of waste pipes shall have a minimum cross sectional area of 12mm², and when run along walls shall be fixed by means of non-ferrous screws in plastic plugs at intervals of 300 maximum.

30.0 PAINTING

30.1 All surfaces of distribution boards shall be light orange to SANS 1091 colour No. B26 unless otherwise stated in the Schedule of Requirements attached to this specification.

30.2 All surfaces shall be cleaned according to the appropriate method described in SANS 10064 for the particular surface to be cleaned, the contamination to be removed and the primer to be applied.

30.3 Components that will be powder coated shall be cleaned and prepared in accordance with the requirements of SANS 10064. Powder coating shall comply with the requirements of SANS 1274; Coatings applied by the powder-coating process.

30.4 All specified coatings shall be applied according to the relevant specification and the manufacturer's instructions shall be followed. Coatings shall not be applied in conditions which may be detrimental to the effectiveness of the coating, or the appearance of the painted surface.

30.5 When examined visually the finished product shall have a uniform appearance as far as gloss is concerned and shall show no sign of damage. Damaged areas shall be repaired coat for coat to obtain the desired finish.

31.0 TESTS

31.1 Insulation, continuity and earthing tests in accordance with SANS 10142-1 shall be carried out to the satisfaction and in the presence of the Engineer or authorised deputy on completion of the work.

31.2 An installation Certificate of Compliance for the electrical installation issued by an accredited person as required by the Occupational Health and Safety Act,1993 (Act 85 of 1993) shall be provided.

31.3 The Contractor shall provide the necessary approved instruments.

31.4 Transnet Group Capital reserves the right to use its own instruments should it be considered necessary.

END

SPECIFICATION FOR LOW VOLTAGE DISTRIBUTION BOARDS

This specification covers Transnet Group Capital requirements for low voltage distribution boards

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1. SCOPE

1.1. This specification covers Transnet Group Capital requirements regarding the design, supply, manufacture, population, works testing, delivery to site, site erection, site testing and commissioning of low voltage Distribution Switchboards consisting of fuse switches incorporating high rupturing capacity cartridge fuse links, air circuit breakers, moulded case circuit breakers and auxiliary equipment. The tenderer is required to familiarise themselves with all applicable Standards and Codes of Practice listed herein, and to ensure compliance in the execution of any work in terms of this document.

2. REFERENCES

2.1. The following publications (latest edition) are referred to herein:-

2.1.1. SOUTH AFRICAN BUREAU OF STANDARDS

Codes of Practice

SANS 064	The preparation of steel surfaces for coating
SANS 10111	Engineering Drawings.
SANS 10142	Wiring of premises Part 1: Low voltage installations
SANS 10313	Protection against lightning - Physical damage to structures and life hazard

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SANS 60947	Low-voltage switchgear and control gear
SANS 156	Moulded-case circuit breakers
SANS 60269	Low-voltage fuses
SANS 1091	National colour standards for paint
SANS 1195	Busbars
SANS 1274	Coating applied by the powder coating process
SANS 1973-1	Low-voltage switchgear and control gear assemblies Part 1: Type-tested assemblies with stated deviations and a rated short-circuit withstand strength above 10 kA
SANS 1973-3	Low-voltage switchgear and control gear assemblies Part 3: Safety of assemblies with a rated prospective short-circuit current of up to and including 10 kA
SANS 60529	Degrees of protection provided by enclosures (IP Code)
SANS 1507	Electric cables with extruded solid dielectric insulation for fixed installations (300/500 V to 1 900/3 300 V)
SABS ISO 9000	Quality management systems -- Fundamentals and vocabulary
SANS 1019	Standard voltages, currents and insulation levels for electricity supply
SANS 170	Fasteners

International Electrotechnical Commission

BS 3938	Current Transformers
IEC 61508	Functional Safety of Electrical/Electronic/Programmable Electronic Safety-related Systems.
IEC 60051	Direct acting indicating analogue electrical measuring instruments and their accessories

3. SERVICE CONDITIONS

3.1 The equipment shall be designed and rated for continuous operation under the following conditions:-

3.1.1 Ambient/Environment Conditions:

3.1.1.1	Ambient temperature-	-5° C to +45° C (daily average +35° C).
3.1.1.2	Relative humidity-	As high as 95%
3.1.1.3	Lightning conditions-	Severe, with a maximum lightning ground flash density of eleven (11) flashes per km² per annum.
3.1.1.4	Atmosphere-	Salt laden and corrosive industrial atmosphere

3.1.2 Electrical Conditions:

3.1.2.1 The system of supply shall be three phase, 4 wire, 50 Hz alternating current with solidly earthed neutral at a nominal voltage of 400 / 231 Volts.

3.1.2.2 The voltage may vary within the range of 95% to 105% of the nominal and all equipment installed shall be suitably rated.

3.1.2.3 All equipment shall be adequately rated for prospective fault level ratings.

4 DRAWINGS AND INSTRUCTION MANUALS

4.1 All drawings shall be in accordance with SANS 10111 – Engineering Drawings.

4.2 The successful tenderer shall supply the following instruction manuals, all of which shall be included in the tender price and be to the satisfaction of Transnet Group Capital.

4.2.1 THREE (3) sets of detailed drawings and instruction manuals, with illustrations where necessary and 2 sets of prints of the "As Built" General Arrangement drawings and the schematic and wiring diagrams to facilitate erection and adjustment of the switchgear.

4.2.2 A full set of electronic media including all information requested above.

4.2.3 These instruction manuals and drawings shall be supplied as soon as possible after placing of the order, but before delivery of the equipment.

5. STANDARD OF WORK, EQUIPMENT & MATERIALS

5.1. The distribution board shall conform to the requirements of the latest edition and amendments of SANS 10142-1 Code of Practice for the Wiring of Premises Part 1: Low voltage installations and any additional requirements thereto, described in this specification.

5.2. All equipment and material used shall be of high quality and the work shall be of a high standard of workmanship carried out by qualified staff under proper supervision by experienced and competent officers.

5.3. If any special tools are required for the maintenance of the switchboard, the tenderer shall supply three (3) sets at delivery of the switchboard to site.

6. DISTRIBUTION BOARDS

6.1. The distribution board shall comply with SANS 60439-1

6.1.1. The form of separation will be specified in the project specific documentation.

6.2. The degree of protection shall be to IEC Publication 144/EN60529 and shall conform to the following:

- Inside Substations and MCC Rooms: IP42
- Other Locations: IP65

6.3. The distribution board shall consist of either a framework of substantial steel sections covered with heavy gauge steel plates or of folded sheet steel sections, forming a robust construction.

6.4. Particular attention shall be given to the ventilation of panels, to eliminate build-up of excessive heat caused by the sun or internal heat generation. All necessary precautions shall be taken to ensure that the temperature of the air in any portion of the assembly does not rise more than 15°C above ambient air temperature

6.5. Every board shall be fitted with a suitable gasket incorporated into the frame to ensure that the arrangement is in accordance with the required degree of protection. Sealing strips and gaskets shall be made of durable, non-hardening rubber, neoprene or other synthetic material, suitably fixed to the door or frame to ensure that the seal does not become dislodged during normal operation.

6.6. Where possible the lock and door catch shall comprise of a combination unit. Door latching and delatching operations shall be smooth and quick, whilst ensuring proper compression of the sealing gaskets. Repeated opening and closing of the hinged doors and operations of the door locks and catches shall not cause chipping or scratching of the painted surfaces or any other blemishes to the finished boards

6.7. Lifting lugs shall be provided for floor standing enclosures and as needed for wall mounted enclosures.

6.8. The board shall have a separate latches hinged or removable front cover secured to the board by means of suitable captive type screws or bolts. When the cover is removed/ opened, easy access to that compartments components and wiring shall be possible.

6.8.1. The control units shall be mounted flush with the front cover so that only the operating handles protrude.

6.8.2. Large removable panels shall be supplied with handles for easy handling.

6.8.3. No possibility should exist for panels to come into contact with live parts.

6.9. Due care shall be taken to ensure that the live side of the MAIN SWITCH is suitably protected so that no live conductors are exposed when the panel door is opened or the panel cover is removed.

6.10. The board shall be equipped with a set of 3 phase and neutral copper busbars. The 3 phase busbars shall be continuously rated for the full load of the incoming supply switch. The neutral shall be 100% of the phase busbars. Earth bar shall be rated to fault current and touch voltage.

6.11. All busbars shall be designed, manufactured, marked and tested in accordance with SANS1195.

6.12. Busbar rating shall be 2A/mm^2 up to 630A and 1.6A/mm^2 thereafter.
6.13. Busbar temperature shall not exceed a 40^{0}C temperature rise.

6.14. The busbars shall be adequately braced and supported. The busbars shall be covered with a sufficient number of layers of high quality insulating tape or heat shrinkable sleeving and finished in standard colours.

6.15. Where busbar joints and terminations have not been covered, a kit shall be provided for covering during installation.

6.16. Alternatively, busbars shall be suitable enclosed in a busbar chamber or behind a protective barrier for protection against inadvertent contact with "live" busbars with access panels removed.

6.17. Inter-connectors between the busbars and control units shall be by means of fully insulated, adequately rated conductors firmly bolted to the busbar and secured to the appropriate terminals of the control units using crimped-on terminal lugs. Solid flat conductors shall be used if the rating exceeds 400 A or if the fault current exceeds 25kA rating. No conductor of less than 16mm^2 shall be used between busbars and control units. All conductors shall be suitably rated for the fault level.

6.18. The other terminals of the incoming and outgoing panel units shall be connected by means of conductors conforming to clause 6.17, i.e. they shall be robust, insulated, easily accessible terminals, of adequate size, conveniently located in the distribution board near the incoming and outgoing cable entries but with sufficient clearance and space to enable the incoming and outgoing cables to be connected to their corresponding terminals without difficulty or strain.

6.19. All the outgoing connections of MCCB'S greater than 400A 3 phase shall be done by means of copper bus bars, securely clamped using approved busbar clamping insulators, fixed to a robust metal section of adequate size, conveniently located in the rear of the distribution board to enable the incoming cables to be terminated in the back of the distribution board cubical behind each respective MCCB. This is to allow for the easy termination of the larger incoming cables, with sufficient clearance and space to enable the outgoing cables to be connected to their corresponding busbar terminals without difficulty or strain to the MCCB's. Each MCCB up to 250A shall be fitted with extended terminal complete with phase barriers as supplied by circuit breaker supplier.

6.20. Outgoing cable tails that connect to the busbars in clause 6.19 shall have securing places to enable the cable to be secured with nylon type cable fasteners in an approved manner.

6.21. The busbars that protrude into the back compartment of the distribution board shall be covered with a perspex type barrier and shall have danger signs on each section.

6.22. Removable gland plates shall be provided. These gland plates shall be of adequate thickness or construction for the cables to be terminated without distortion of the gland plate, and shall not be less than 2mm mild steel (zinc passivated). Gland Plates shall not be mounted less than 300mm above ground floor level, alternatively a base frame of suitable depth may be provided.

6.23. Distribution board cases shall be of such dimensions that adequate space is available for manoeuvring and connecting the incoming and outgoing cables.

6.24. All cable entries shall be from the bottom of the distribution board unless stated otherwise.

6.25. Glands shall not be less that 300mm above floor level. Unless otherwise stated.

6.26. The terminals of all incoming and outgoing cables shall be firmly connected to the terminals on the lugs or ferrules, unless they are of a type that will grip the cable without splaying the strands of the conductor.

6.27. A substantial earthing terminal shall be firmly attached to the metal work of the distribution board and connected to an earth bar of cross sectional area not less than 50% of the phase bars, running the full length of the distribution board to which all earthing conductors of the incoming and outgoing circuits shall be firmly connected.

6.28. A removable link shall be provided in the Neutral busbar to ensure that the neutral busbar can be split in two sections for testing purposes. The link shall be secured in position with a bolt and nut arrangement.

6.29. The distribution board manufacturer shall allow for at least 30% capacity for the installation of additional switchgear in the distribution boards.

6.30. Each distribution board shall be fitted with the following labels as needed in suitable positions:

- Live busbars
- Flash signs
- Main label (always required)
- Voltage rating
- Current rating
- Fault level and time
- IP rating
- Job number
- Reference number
- Date of manufacture
- Form of separation
- Fed from
- Each feeder/starter to be labelled

6.31. Each distribution board shall be supplied with a test certificate. This certificate shall include all items as indicated in annexure 1 of SANS 1973–1 and annexure E of SANS 1973–3.

7. ARC DETECTION SYSTEM

7.1. All switchgears shall be equipped with an efficient and reliable arc detection system designed according to IEC 61508 with a safety level meeting at least SIL 2.

7.2. The system shall consist of one or more arc monitoring units and light detectors.

7.2.1. Arc detection system:

Arc detection system shall not be activated by interfering influences such as portable lamps, electro-magnetic fields, vibration or touching. In case of an arc occurring in the switchgear it shall be possible to identify where and when the arc has occurred. This information should be accessible without opening the switchgear door and stored even if power is lost to the system. The HMI shall not affect the IP degree of the cabinet.

7.2.2. Arc monitoring unit and light detector:

The arc detection system shall use light as the main condition for tripping. Detectors shall cover each bus-bar section, respective circuit breaker and in any other areas where the designer of the switch gear considers or finds it as a potential risk for an arc. The detectors shall be made of optical fibre in order to avoid EMC disturbances. Without any extra calibration from the user the system shall not react for a light intensity lower than 3000 lux in order to avoid nuisance tripping. The light intensity shall also be constant regardless the length of the detector.

7.3. The trip signal shall be sent within less than 2 ms to the circuit breaker in an event of an arc

7.4. The arc monitoring unit shall provide at least three high speed solid state tripping outputs to the circuit breaker.

7.5. It shall be possible to configure the detectors to trip different breakers depending on which detector detects the arc.

7.6. The system shall have the possibility to mount up to 30 detectors in the space of the main unit in order to avoid space issues if the system would be extended.

8. FUSE SWITCHES

8.1. Fuse switches shall comply with SANS 152 and SANS 60947 – 3.

8.2. Fuse switches shall be enclosed, triple pole, quick break and dustproof.

8.3. Fuse switch handle shall have an IP rating of IP65 and the handle shall be defeatable to override the door interlock.

8.4. Fuse switches shall be of the double break type and the fuses shall be completely isolated when the switches are in the "OFF" position.

8.5. Fuse switch and handle shall have a test position. It will be possible to have an auxiliary for only indication test position.

8.6. The switches shall be interlocked to prevent the opening of the front covers unless the switches are in the "OFF" position and the closing of the switches with the covers open. The switches shall be lockable in the "OFF" position.

8.7. Fuse Switches shall have a lever or rotary action with a positive spring controlled opening and closing action for making or breaking the circuit under load conditions. Fuse carrier and base contacts shall be designed to give permanent high contact pressure and shall be designed to facilitate location of blown fuses without removal of the carrier. Fuse carriers and bases shall be of the highest grade phenolic mouldings to BS 771 and shall be non-flammable and non-hygroscopic, with a hard gloss black finish.

8.8. It shall be possible to install the fuse switch in any position without derating.

9. FUSE LINKS

9.1. HRC Fuse Links shall be of the high rupturing capacity type, compliant with SANS IEC 60269 –

1:2006. Fuse links shall incorporate a visual indication device to facilitate location of blown fuses and shall be designed to clip into the fuse carrier contacts without the use of fixing screws.

9.2. Breaking capacity of all fuse links shall be not less than Category of duty AC.50 at 415 Volts (SANS IEC 60269 - 1:2006). The Fusing factor of the fuses shall not exceed 1.5 (SANS IEC 60269 Class Q1).

9.3. Fuse current ratings shall be indicated on engraved 20 x 12mm white-black-white trifoliate labels in 4mm letters. The labels are to be fitted at the fuse bases and shall not be obscured by wiring.

9.4. Fifty- percent spare fuses of each size shall be provided in suitable cubicle on the switchboard. The door of this cubicle shall be suitably identified.

10. AIR CIRCUIT BREAKERS (ACB) SHALL CONFORM TO THE FOLLOWING CHARACTISTICS.

10.1. Functional characteristics:

10.1.1. Air circuit breakers for use on the incoming supply side of the distribution board shall comply with SANS 60947.

10.1.2. The circuit breakers shall have a continuous enclosed current rating as indicated on the relevant drawings with a minimum Icu (ultimate breaking capacity) of 42kA at 415 volts. The circuit breakers shall be tested for category P.2, unless specified otherwise.

10.1.3. The circuit breakers shall have an Ics (service capacity) rating equal to the Icu (ultimate breaking capacity) rating.

10.1.4. The circuit breakers shall have an Icw (withstand current) of 1 sec and 3 sec. The 1 sec Icw rating shall be equal to the Icu rating.

10.1.5. The air circuit breakers shall be of the enclosed, ventilated, independent manual spring, draw-out type with a rated service voltage of 690 volts and a rated insulation voltage of 1000 volts and be equipped for shunt tripping from a 115 V DC battery supply. The shunt tripping facility shall be wired so that the ACB shall trip when it's associated high voltage transformer circuit breaker trips.

10.1.6. The circuit-breakers shall have a rated impulse withstand voltage of 12 kV.

10.1.7. The rated uninterrupted current shall be between 100 and 6300 A with the possibility of set trip threshold of L protection from 40A.

10.1.8. Different versions of circuit-breakers shall be available, divided into their category of use: A (current-limiting) and B (selective).

10.1.9. Different versions shall be available with rated ultimate breaking capacity from 42 to 150 kA at 440 V AC and from 42 to 100 kA at 690 V AC for circuit-breakers in category B and with 130 kA at 415 V AC, 85 kA at 690 V AC for circuit-breakers in category A.

10.1.10. The mechanical life shall be at least 12000 operations with a frequency of 60 operations/hour without the need for maintenance of the contacts and arcing chambers

10.1.11. The electrical life at a voltage of 440 V AC shall be (with a frequency of at least 10 operations/hour and without the need for maintenance of the contacts and arcing chambers):

- at least 9000 operations up to 2000 A
- at least 5000 operations up to 3200 A

These values are intended to be valid only for catagory B circuit-breakers.

10.2. Environmental characteristics

10.2.1. Operating temperature: -25 °C...+70 °C (-13 °F...158 °F) and storage temperature: -40

10.2.2. Altitude: operation without derating shall be up up to 2000 metres above sea level. (6600 ft), and with derating up to 5000 metres above sea level. (16500 ft).

10.2.3. Suitability for use in a hot-humid environment. With regard to this, the circuit-breakers shall undergo a tropicalisation process which makes them suitable for use in a hot humid environment, as established by the prescriptions of the main shipping registers and in accordance with the international IEC 60068-2-30 Standards.

10.3. Construction characteristics

10.3.1. All the models shall be available in the 3 and 4 pole versions both in the fixed (with rear horizontal, rear vertical and front terminals) and withdrawable (with rear horizontal, rear vertical, front and rear at terminals) versions.

10.3.2. There shall be total segregation between power and front shield, using double insulation where suitable so as to guarantee maximum operator safety.

10.3.3. Total segregation between the phases shall be guaranteed for safety reasons without need of phase barriers up to 1000V.

10.3.4. It shall be possible to inspect easily the arcing chambers easily and to check main contact wear with the circuit-breaker racked-out, by removing the arcing chambers.

10.3.5. All the circuit-breakers in the range shall have the same height and depth with the aim of standardising the supporting structures of the switchgear and the switchgear itself as far as possible.

10.3.6. IP30 degree of protection shall be guaranteed on the front part and IP20 on the rest of the circuit-breaker (excluding the terminals), with the possibility of having IP54 degree of protection (NEMA 3/3s/13) on the front, using the transparent cover which completely protects the front, but still leaves the panel underneath and the protection unit fully visible with the relative indications.

10.3.7. The whole range of air circuit-breakers shall be fitted with electronic protection releases. It shall be allowed the inter-changeability of protection releases from skilled personnel.

10.4. Special points for withdrawable versions:

10.4.1. The circuit-breakers in the withdrawable version shall be fitted with anti-racking-in locks to prevent racking a moving part into a fixed part with a different rated current.

10.4.2. In the case of the withdrawable version, the presence of a device shall prevent racking-out and racking-in with the apparatus closed.

10.5. Accessories

The following accessories shall be common to the whole range standard:

10.5.1. Electrical accessories:

10.5.1.1. Shunt opening/closing release.

10.5.1.2. Control and monitoring Test Unit - allows continuity of the different versions of the shunt opening releases to be checked;

10.5.1.3. Undervoltage release;

10.5.1.4. Time delay device for undervoltage release - allows release trip delay with established and adjustable times;

10.5.1.5. Geared motor for the automatic charging of the closing springs;

10.5.1.6. Mechanical and electrical signalling of overcurrent release trip;

10.5.1.7. Trip reset release;

10.5.1.8. Auxiliary contacts which allow signalling of the circuit-breaker state;

10.5.1.9. Current transformer for the neutral conductor outside the circuit-breaker;

10.5.1.10. Homopolar toroid for the main power supply earth conductor (star centre of the transformer).

10.5.2. Mechanical accessories:

10.5.2.1. Interlocks between 2 circuit-breakers or among three circuit-breakers can be used horizontally, vertically or in “L” position using different types of flexible cables:

10.5.2.2. Standard version (with maximum distance between two circuit breakers: up to 1200 mm if horizontally interlocked while up to 750mm if vertically interlocked).

10.5.2.3. Extended version (with distance between two circuit breakers: from 1200mm up to 1600 mm if horizontally interlocked while from 750 up to 1000 if vertically interlocked).

10.5.2.4. Mechanical locks to control enabling racking-in/out operations available also with interlocks. IP54 transparent front protection (NEMA 3/3S/13).

10.6. Protection Release

10.6.1. Basic Protection Functions

10.6.1.1. The release shall not require auxiliary power supplies since the power is taken from the current transformers.

10.6.1.2. The signals supplied by the release shall not operate with power supply supplied by internal batteries.

10.6.1.3. The protection against overload (L) with characteristic t=k/I2 shall always have setting ranges with timing adjustable up to 144s with I=3In.

10.6.1.4. The protection of neutral shall be set at 50%, 100%, 200% and OFF of the phase currents without changing any component.

10.6.1.5. All the protection functions except protection against overload shall be excludable.

10.6.2. Measurement Functions

10.6.2.1. The release shall always be able to provide measurement of the currents and voltages in the three phases, in the neutral and of earth fault (ammeter function), both in self-supply and with an auxiliary power supply. Measurement function shall be active, even without external supply, starting from 140 A of single-phase current, independently from the circuit-breaker size. Accuracy of the ammeter measurement chain (current sensor plus ammeter) shall equal or better than 1.5% in the 30% - 120% current interval of In.

10.6.2.2. The release shall not normally require auxiliary power supplies since the power is taken from the current transformers. For measurements and programming at very low currents, a power supply at 24 V DC shall be available. As alternative the release shall be able to receive power supply directly from busbars or terminals, up to line voltage equal to 690 V AC.

10.6.2.3. The release shall be able to acquire the waveforms of electrical values with a sampling frequency selectable from 600 to 4.800 Hz and sampling interval from 3 s to 27 s. Acquisition shall be frozen after a trip or a configurable event. Acquisition data shall be retrieved from an external device (personal computer or similar) for fault analysis purposes. The release shall show voltage measurements on display, with a precision equal or higher than 1%.

10.6.2.4. Measurement functions that shall be available:

- Current measurements
- Voltage measurements
- Power measurements
- Power factor measurements.
- Measurements of frequency and peak factor
- Energy measurements
- Historical measurements
- The last 10 trips information
- Complete trip information on display without batteries
- Data logger included as standard

10.7. Advanced Protections Functions

10.7.1. Thermal memory for functions L (overload protection) and S (short circuit protection).

10.7.2. Protection against over-temperature. It shall be possible to signal the presence of anomalous temperatures on the release by means of two LEDs (Warning and Alarm) and, if decided during the unit configuration phase, when the temperature is over 85 °C, to simultaneously control circuit-breaker opening.

10.7.3. Protection against missing and unbalanced phase (U) with characteristic t=k shall be

possible.

10.7.4. Load control protection (K).

10.7.5. Undervoltage protection (UV)

10.7.6. Overvoltage protection (OV)

10.7.7. Residual voltage protection (RV)

10.7.8. Underfrequency protection (UF)

10.7.9. Overfrequency protection (OF)

10.7.10. Protection against reversal of active power (RP)

10.8. User Interface and Signalling LEDs

10.8.1. An alarm shall indicate by means of LEDs located on the release the disconnection of opening solenoid and current transformers. A trip shall also occur, after a short time delay, when the disconnection is detected.

10.8.2. The release shall allow parameterisation by means of keys and a LCD graphic display.

10.8.3. Access to control and configuration of the unit by means of a password (edit MODE).

10.8.4. The signals given by the permanent indicators shall guarantee maximum reliability.

10.8.5. Indication shall be available directly on display on request of the user for not less than 48 hours even without an auxiliary voltage and batteries and also be given in the case of re-losing on a fault. After 48 hours of inactivity the information shall be retrievable by external devices. Indication shall contain at least the protection tripped.

10.8.6. It shall be possible to read the current values and information on the last 10 measures (current values, protection tripped) at any time through external devices, some of which can transmit data via bluetooth;

10.8.7. In the event of CB tripped, shall be indicated the type of protective function that intervened.

10.8.8. Each alarm or warning alarm shall be clearly shown on the display, when it is active.

10.8.9. On the protection release two (2) led's shall be present.

10.8.10. Warning LED shall be in place indicating at least the following:

- Presence of one or more phases with current values in the 0.9*In< I <1.05*In range
- Presence, between two or three phases, of unbalance higher than the value programmed during configuration
- The first temperature threshold of T=70 °C has been exceeded
- Contact wear > 80%
- Harmonic distortion
- Out of range frequency
- Breaker status error
- Warning threshold override

10.8.11. Alarm LED shall be in place indicating at least following:

- Presence of one or more phases under overload with current values I >1,3*In (Overload Protection - L under timing)
- Timing in progress for protection function S (Selective short circuit protection)
- Timing in progress for protection function G (Earth fault protection)
- The second temperature threshold of T=85 °C has been exceeded
- Contact wear 100%.
- Timing in progress for protection function D;
- Timing in progress for protection function UV(Under Voltage), OV(Over Voltage), RV (Residual Voltage);
- Timing in progress for protection function RP(Reversal of Active Power);
- Timing in progress for protection function
- Timing in case of unbalance between the phases higher than the value set during configuration with trip set to ON;
- Current Sensors disconnected;
- Opening solenoid (Trip Coil) disconnected

10.8.12. The communication function shall be implemented on the release by means of:

- An internal bus, with interface RS485;
- An external bus, with Modbus RS485 protocol 2-Wire Twisted Pair, 19.2 kbit/s max.

10.8.13. There shall be the possibility of setting the release in remote and in local operating mode, and with the latter it shall not be possible to carry out data transmission from the system to the release. It shall be possible to automatically set the local mode by means of an external contact. An 24VDC auxiliary supply shall be used.

10.8.14. The protection release shall be able to send to the system these data:
Protection parameters set, phase and neutral currents, state of the circuit-breaker (open closed), position of the circuit-breaker (connected-isolated), state of the springs (charged discharged), number of circuit-breaker mechanical operations, total and for each protection number of trips, last interrupted current, contact wear, state of the protection functions (pre alarm function. L, timing function. L, S,G…), overtemperature protection function, state of internal communication bus.

10.8.15. The system shall transmit to the protection release the following data: protection parameters, circuit-breaker opening and closing commands, reset for tripping of some protection functions.

10.8.16. Adjustable inverse definite minimum time (IDMT) overcurrent release facilities are required in addition to the instantaneous fault trip for the air circuit breakers.

11. MOULDED CASE CIRCUIT BREAKERS (MCCB) SHALL CONFORM TO THE FOLLOWING CHARACTISTICS.

11.1. Functional Characteristics

11.1.1. AC rated service voltage for currents over 160 A: 690 V AC (50-60 Hz).

11.1.2. DC rated service voltage: 500 V DC for currents of 160 A and 750 V DC for currents over 160A.

11.1.3. Rated uninterrupted current for 1000 V AC or DC applications: 800 A (three and four poles).

11.1.4. Minimum rated insulation voltage for currents equal or over 160 A: 8 kV.

11.1.5. Rated insulation voltage for currents equal or over 160 A: 800 V AC.

11.1.6. Rated uninterrupted current between 160 and 3200 A with trip units settings starting from 1A.

11.1.7. According to IEC 60947-2 (§ 4.4) starting from 400 A the circuit breakers shall be category B

11.1.8. MCCBs shall be available with different ultimate short breaking capacities between 16kA and 200kA @ 380/415 V AC.

11.1.9. Both line up and line down supplying shall be possible without decreasing MCCBs performances or functionality

11.1.10. For rated uninterrupted currents up to160 A, the MCCB limiting features shall be enough to assure its conformity to IEC 60439-1 (§ 8.2.3.1) once installed into a type AS or ANS switchboard as general breakers. This shall be valid up to the MCCB's rated uninterrupted current (limiting versions are excluded).

11.1.11. A test bottom for the correct functionality checking (moving contacts opening) shall be place in front of the breaker.

11.2. Ambient Characteristics

11.2.1. Operating temperature: -25 °C. +70 °C (ambient temperature)

11.2.2. Storage temperature: -40 °C .. +70 °C (ambient temperature)

11.2.3. Reference temperature for setting the thermal element of the thermomagnetic trip unit: +40 °C

11.2.4. Maximum relative humidity: 98%

11.2.5. Maximum altitude: 2000 m above sea level, 5000 m above sea level with derating suitability for being used in hot-humid places. With regard to this, the circuit-breakers shall undergo a tropicalization process to make them suitable for use in hot-humid places, as established in the prescriptions of the major naval registers and in compliance with the International IEC 60068-2-30 Standards.

11.2.6. Circuit-breakers fitted with electronic trip units shall comply with the prescriptions of the International Standards on electromagnetic compatibility.

11.3. Construction Characteristics

11.3.1. The range of moulded case circuit-breakers shall cover a range of rated uninterrupted currents from 160 to 3200 A

11.3.2. By means of the double insulation technique, moulded case circuit-breakers shall guarantee complete separation between the power circuits and the auxiliary circuits.

11.3.3. Moulded case circuit-breakers shall have an operating lever which always indicates the exact position of the circuit-breaker contacts (positive operation), by means of safe and reliable signals (I= closed, O= open, yellow-green line= open due to trip unit).

11.3.4. The operating mechanism shall be designed to operate all poles of the circuit breaker simultaneously for making, breaking and tripping.

11.3.5. Moulded case circuit-breakers shall be suitable for isolation in compliance with § 7.2.7 of the IEC 60947-2 Standard. This indication shall be clearly and indelibly marked on the circuit-breaker (in accordance with § 5.2 of IEC 60947-2) and in a position where it is visible with the circuit-breaker installed.

11.3.6. Moulded case circuit-breakers shall be available in the three-pole and four-pole version both in the fixed, and in any possible plug-in or withdrawable versions.

11.3.7. Circuit-breakers in the plug-in version starting from 250 A shall be available. In the case of a plug-in or withdrawable version, the presence of a device shall prevent racking-in or racking-out with the apparatus closed.

11.3.8. In the withdrawable version, racking-out with the door closed shall be possible.

11.3.9. The same depth and installation on a DIN EN 50022 rail shall be guaranteed up to the rated setting of 250 A inclusive. The same depth shall be guaranteed. This characteristic shall allow the switchboard and their support structures to be standardized.

11.3.10. Moulded case circuit-breakers with rated uninterrupted current up to 250 A shall have a 45 mm high face which makes them suitable for installation on modular panels.

11.3.11. All the installation positions shall be possible without jeopardizing the function of the apparatus. Starting from 630 A up to 1600 A the withdrawable version shall be mounted and operated horizontally.

11.3.12. For the front parts of the circuit-breakers the degree of protection of at least IP20 (excluding the terminals) shall be guaranteed, IP30 when they are installed in switchboards, and up to IP54 for circuit-breakers installed in a switchboard fitted with transmitted rotary handle and special accessory.

11.4. Protection Trip Units

11.4.1. Moulded case circuit-breakers shall be equipped with interchangeable trip units. From 160 A up to 800 A it shall be possible to choose between a thermomagnetic and an electronic protection. For the sizes higher than 800 A, the trip unit shall only be electronic. The trip unit shall be integrated in the volume of the apparatus.

11.4.2. From the 250 A size circuit-breakers, the trip unit shall be interchangeable. Trip units shall be adjustable and it shall be possible to fit lead seals to prevent unauthorised access to the settings

11.5. Thermomagnetic Overcurrent Trip Units

11.5.1. Thermomagnetic trip units shall be fitted with protection threshold against overload (whose thermal element shall consist of a bimetal) and with protection threshold against short circuit.

11.5.2. The protection threshold against overload shall be continuously adjustable starting from 0.7 times the rated current of the trip unit and up to its rated value.

11.5.3. The reference temperature for setting the thermal element of the protection trip unit is 40°C.

11.5.4. The temperature performance of the trip unit shall be indicated as the temperature varies.

11.5.5. The protection threshold against short-circuit shall be either the fixed or adjustable type with continuity from 5 and up to 10 times the rated current of the trip unit. In the four-pole version, the neutral pole shall always be protected. For current values equal to or higher than 125 A, protection of the neutral pole shall, at choice, be at 100% or at 50% of the rated current of the trip unit. Vice versa, for current values of less than 125 A, protection of the neutral pole shall always be 100%.

11.5.6. For circuit-breakers with rated uninterrupted current of 160 A, 250 A, 400 A and 500A, a thermomagnetic trip unit shall be available for generator protection with adjustable thermal threshold, starting from 0.7 x In, and fixed magnetic threshold at 3 x In or adjustable magnetic threshold from 2.5 to 5 x In. Suitability for use in direct current.

11.6. Magnetic only overcurrent trip units

11.6.1. The overcurrent trip units with magnetic only threshold shall be suitable for protection against short-circuit.

11.6.2. The adjustable magnetic only trip units (suitable for motor protection) shall only be available in the three-pole version, whereas those with fixed threshold shall also be available in the four-pole version.

11.6.3. The adjustable magnetic only trip units shall be available for circuit-breakers up to 320 A. Suitability for use in direct current.

11.7. Electronic Overcurrent Release Trip Units

11.7.1. The electronic overcurrent trip units shall be self-supplied and shall be able to guarantee correct operation of the protection functions even in the presence of a single phase supplied with a current value equal to 20% of the phase current. They shall be unaffected by electromagnetic interference in compliance with the EMC directive on the matter.

11.7.2. The basic version shall be fitted with protection functions against overload (function L) and against short-circuit. The latter function can either be of the instantaneous type (function I) or, alternatively, with intentional delay selective short circuit protection (function S). The function of protection against short circuit shall be excludable.

11.7.3. A basic version shall also be provided with only the protection threshold against instantaneous short-circuit which cannot be excluded.

11.7.4. The complete version shall be fitted with protection threshold against overload (function L), against instantaneous short-circuit (function I) and with intentional delay (function S) and also with protection threshold against earth fault (function G). All the protection functions except for protection against overload shall be excludable.

11.7.5. The advanced version shall be suited for zone selectivity protection for the S and G protection functions. An integrated ammeter and many other additional features are provided over and above the protection functions. All the protection functions except for protection against overload shall be excludable.

11.7.6. The advanced version shall be suited for zone selectivity protection for the S and G protection functions. An integrated ammeter and many other additional features are provided over and above the protection functions. All the protection functions except for protection

against overload shall be excludable.

11.7.7. A version dedicated to ultra rapid short-circuit protection (with a detection time less than 5 ms) combined with zone selectivity shall be available.

11.7.8. An advanced version dedicated to motor protection shall be available with protection functions against overload (function L), against instantaneous short circuit (function I), against unbalanced or missing phase (function U) and against rotor block (function R).

11.7.9. A version dedicated to generator protection shall be available (up to 160A), with protection functions against overload (function L), against instantaneous short circuit (function I) and with intentional delay (function S). The S and I protection functions are not an alternative to each other. All these functions are imposed by the major naval registers.

11.7.10. All the advanced trip units shall be available with thermal memory.

11.7.11. All the protection functions shall be characterized by threshold and time tolerances according to the International Standards.

11.7.12. The trip unit shall allow parameterization of the trip thresholds and timing locally or remotely; in the case of any anomalies in remote parameterization, the protection shall automatically use the series of parameters set manually on the front of the circuit breaker.

11.7.13. On the advanced version, access to information and programming shall be allowed by a keyboard and graphic liquid crystal display.

11.7.14. Alarm signals for the protection functions will be available by means of LEDs located on the trip unit (complete version) and/or on the display (advanced version).

11.7.15. The size of the current sensors shall be a minimum of 10 A to a maximum of 3200 A so as to cover the widest possible current range.

11.7.16. Interchangeable rating-plugs shall be available starting from 400 A.

11.7.17. The four-pole circuit-breaker shall always be supplied with the neutral protected at 100% up to 125A excluded, and for higher values with protection selected between 50% and 100% of the rated current of the trip unit. Starting from 630A setting of the neutral at 150% and 200% shall be possible.

11.7.18. The current sensors for external neutral shall be optional.

11.7.19. Moulded Case Circuit breakers equipped with electronic releases shall be available a dedicated function to verify the correct connection between the trip unit, current sensor and trip coil. Eventual anomalies shall be signalled by a red led flashing.

11.8. Accessories for electronic trip units shall be available, such as the test unit for checking functioning of the tripping coil of the electronic trip unit, a trip signalling unit of the protections, a test and configuration unit which allows the electronic trip unit protections to be tested and configured, an actuation unit which allows circuit-breaker opening and closing by means of a motor operator mounted on it, a battery unit which allows trip unit testing when the circuit-breaker and an external unit for wireless communication.

11.8.1. For both the complete and the advanced version a measurement module shall be available, in order to gauge the plant functioning parameters, such as phase and phase to phase voltages, powers and energies. On the advanced version all the available measurements can be displayed on the LCD. Furthermore, for the electronic trip units for motor protection, there shall also be a contactor control unit available.

11.8.2. The advanced version will be provided with a data logger function that automatically records and stores the instantaneous values of all the currents and voltages. Data shall be easily downloaded to any personal computer for elaboration. The data logger function freezes the recording whenever a trip occurs, so that a detailed analysis of faults can be easily performed. The sampling rate shall be adjustable up to 4800Hz, with total sampling time up to 27 s (@ 600Hz sampling rate). Tracking of up to 64 events shall be possible.

11.9. Protections

The minimum performances of the protection functions of the electronic protection trip unit for distribution, where present, shall be:

11.9.1. Function L:adjustable trip threshold I1= (0.4-1) x In, trip curves for the basic version with time settings from 3 to 12 seconds – 2 different trip curves - (at 6 times the set threshold), whereas for the advanced version with time settings from 3 to 18 seconds – 4 different trip curves - (at 6 times the set threshold). For the advanced version, L function according to IEC 60255-3 shall be available. *Cannot be excluded.*

11.9.2. Function S: adjustable trip threshold I2= (1-10) x In, trip curves for the basic version with time settings from 0.1 to 0.25 seconds – 2 different trip curves – (at 8 times the rated current of the trip unit), whereas for the advanced version with time settings from 0.05 to 0.5 seconds – 4 different trip curves with inverse short time with definite time characteristic or curves with definite time – (at 6 times the rated current of the trip unit). For circuit breakers from 250 A to 630 A, in the advanced version, I2= (0.6-10)x In. *Can be excluded.*

11.9.3. Function I: adjustable trip threshold I3= (1-10) x In for the basic version (instantaneous trip), whereas for the advanced version I3= (1.5-15) x In (instantaneous trip). *Can be excluded.*

11.9.4. Function G: adjustable trip threshold I4= (0.2-1) x In with trip time settings from 0.1 to 0.8 s with curve with inverse short time and definite time characteristic. *Can be excluded.*

11.9.5. Function U: adjustable trip threshold I6= (2%…90%) x I1 with trip time settings from 0.5 to 60 s with curve with inverse short time and definite time characteristic. *Can be excluded.*

11.9.6. Function OT: fixed at 85 °C (with instantaneous trip). *Can be excluded.*

11.9.7. Function UV: adjustable trip threshold U8= (0.5-0.95) x Un with trip time settings from 0.1 to 5 s with curve with inverse short time and definite time characteristic. *Can be excluded.*

11.9.8. Function OV: adjustable trip threshold U9= (1.05-1.2) x Un with trip time settings from 0.1 to 5 s with curve with inverse short time and definite time characteristic. *Can be excluded.*

11.9.9. Function RV: adjustable trip threshold U10= (0.1-0.4) x Un with trip time settings from 0.5 to 30 s with curve with inverse short time and definite time characteristic. *Can be excluded.*

11.9.10. Function RP: adjustable trip threshold P11= (-0.3…-0.1) x Pn with trip time settings from 0.5 to 25 s with curve with inverse short time and definite time characteristic. *Can be excluded.*

11.9.11. Function UF: adjustable trip threshold f12= (0.9-0,99) x fn with trip time settings from 0.5 to 3sec with curve with inverse short time and definite time characteristic. *Can be excluded.*

11.9.12. Function OF: adjustable trip threshold f13= (1.01-1.10) x fn with trip time settings from 0.5 to 3 s with curve with inverse short time and definite time characteristic. *Can be excluded.*

11.9.13. The minimum performances of the protection functions of the electronic protection trip unit for motor protection shall be:

- Function L: adjustable trip threshold I1= (0.4-1) x In, trip curves in class 10A, 10, 20 and 30 or 3E, 5E, 10E e 20E in compliance with the IEC 60947-4-1 Standard, with temperature compensation and sensitivity to missing/unbalanced phase. *Cannot be excluded.*

- Function R: adjustable trip threshold I5= (3-10) x I1 + OFF, with 4 different trip curves with definite time with time settings t5= 1...10 s. Automatic exclusion of the function during the motor starting phase, and automatically reactivated after this. *Can be excluded.*

- Function I: adjustable trip threshold I3= (6-13) x In (instantaneous trip) with recognition of the motor starting phase.

- Function U: adjustable trip threshold I6= (0.4-0,9) x I1 e t6= 4 s. *Can be excluded.*

- Possibility of contactor control for trip of functions L and R.

- Possibility of connection to a PTC (temperature probe) inserted in the motor.

11.10. Dialogue

For circuit-breakers from 250 A to 1600 A dialogue shall be available, making the following functions possible:

11.10.1. Remote setting of the protection function parameters, unit configuration and communication.

11.10.2. Transmission of measurements, states and alarms from circuit-breaker to system transmission of events to the system.

11.10.3. Dialogue units able to support different standard market protocols shall be available:

11.10.3.1. Modbus RTU protocol, EIA RS485 physical transmission means, speed 9.6...19,2 Kbit/s, bus architecture.

11.10.3.2. Profibus DP protocol, RS485 physical transmission, speed 9.6...19,2 Kbit/s, bus architecture.

11.10.3.3. Device Net protocol, RS485 physical transmission, speed 9.6...19,2 Kbit/s, bus architecture, Wireless bluetooth protocol.

11.10.3.4. The dialogue unit shall make all the parameterization and measurement information of the protection unit available on the field bus, as well as the state of the circuit-breaker (open/closed, racked-in/racked-out) and of the related trip units. Shall be providing a tool able to analyse all these data by PC.

11.11. Accessories

11.11.1. Electrical Accessories

11.11.1.1. Internal Accessories has to be the same up to 250A as well from 250A to 1000A.

11.11.1.2. Auxiliary contacts: these shall allow the state of the circuit-breaker (open or closed; contact on change-over) and trip unit to be known. Auxiliary contacts for use at 250 V AC/DC, 400V AC and 24 V DC (digital contacts) shall be available.

11.11.1.3. Releases: the shunt opening and under-voltage releases shall be available with different power supply voltages both in AC and DC.

11.11.1.4. With circuit-breakers up to 250 A the electrical accessories shall be available both in the pre- cabled version and with 1m long un-cabled cables.

11.11.1.5. The addition of the electrical accessories shall not increase the volume of the circuit breakers.

11.11.2. Mechanical Accessories

11.11.2.1. Terminals: different types of terminals (both front and rear) shall be available for all the sizes, suitable for connection with copper, copper-aluminium cable and bus bar connections.

11.11.2.2. Up to the 160 A size, the circuit-breakers can be fitted with different types of terminals combined in different ways (higher of one type, lower of a different type). Terminal covers and phase separators shall also be available.

11.11.2.3. Multi-cable terminals shall be available for circuit-breakers for the 250-320-400-630 A size. Support for fixing onto DIN rail: supports for fixing onto DIN EN 50022 rail shall be available up to the rated current of 250 A inclusive.

11.11.2.4. Mechanical interlocks: mechanical interlocks shall be available for the whole series of circuit-breakers; the interlock can be of the front type for circuit-breakers with rated current up to 250 A. It shall be possible to interlock circuit-breakers of different sizes at least up to 250 A and between 250A and 630 A.

11.11.2.5. Rotary handle: a rotary handle operating mechanism both in the direct and transmitted version shall be available for the whole range of circuit-breakers, both padlockable in the open position and fitted, on request, with the following accessories: early contact for under-voltage release, compartment door lock and key lock in open position.

11.11.2.6. The whole range of moulded case circuit-breakers shall be fitted with motor operator (according to the rated current of the circuit-breaker, this can either be of the solenoid type, or with stored energy) for remote operation of the circuit-breaker.

11.12. Residual Current Release

11.12.1. General Aspects

11.12.1.1. The residual current releases used in low voltage installations shall be designed, constructed and tested in compliance with the International Standards and in particular with:

11.12.1.1.1. IEC 60947-2 appendix B and ANNEX M

11.12.1.1.2. IEC 60255-4 and IEC 61000: for protection against unwarranted trips

11.12.1.1.3. IEC 60755 for insensitivity to the continuous current components

11.12.1.2. It shall be possible to install the residual current releases in installations with line-to line voltage up to 690 V.

11.12.1.3. They shall be able to be used in close connection with circuit-breakers and/or switch disconnectors.

11.12.1.4. Shall be guaranteed the normal operating up to -25°C

11.13. Construction Characteristics

11.13.1. It shall be possible to combine the range of residual current releases with all the circuit breakers making up the range of moulded case circuit-breakers so as to cover the whole current range of MCCBs.

11.13.2. It shall be possible to combine the residual current releases with circuit-breakers in fixed, plug-in and withdrawable version.

11.13.3. Their installation on a DIN rail shall be possible.

11.13.4. Control of correct operation shall be possible according to the prescriptions of the reference Standards, by means of a test pushbutton on the front of the apparatus.

11.13.5. Residual current releases shall be available both in the three-pole up to 250A and in the four-pole version.

11.13.6. Dedicated residual current releases shall be available up to 1600 A

11.13.7. Type B residual current protection shall be available

11.13.8. It shall be possible to select the maximum threshold of sensitivity to the residual current fault frequency (3 steps: 400 700 1000 Hz).

11.14. Electrical Characteristics and Performances

11.14.1. Up to the rated current of 250 A, the service voltage shall be between 85 and 500 V AC line-to-line (operation up to 50 V phase-neutral). Trip thresholds Idn starting from 0.03A and up to 10 A shall also be available for the advanced version which shall also allow selection of the trip times (for the basic version, the trip shall be of the instantaneous type).

11.14.2. A contact signalling pre-alarm shall be available in the advanced version and the availability of an input for remote opening.

11.14.3. There shall be type A versions for alternating pulsed current, S selective and E for emergency stop of the residual current release.

11.14.4. The release shall be self-supplied and the power supply can come either from above or below.

11.14.5. Compliance with the International Standards on the matter of electromagnetic compatibility.

11.14.6. There shall be a switchboard residual current unit with voltage varying between 80 and 500 V AC and between 48 and 125 V DC. There shall be availability of several adjustment ranges from 0.03 to 30 A, with trip times from instantaneous to 5 s and pre-alarm threshold adjustment.

11.14.7. The toroidal transformers can either be closed (from 60 to 180 mm in diameter) or open (from 110 to 230 mm in diameter).

12. MINIATURE CIRCUIT BREAKERS SHALL CONFORM TO THE FOLLOWING CHARACTISTICS.

12.1. Functional Characteristics (1 to 63 Amps)

12.1.1. Miniature Circuit Breaker for cable protection according to:
DIN VDE 0641 Teil 11,
EN 60898, IEC 60947-2, EN 60947-2,
UL1077/C22.2 No.235, UL489/C22.2 No.5

12.1.2. Rated short-circuit capacity Icn shall be: 6/10/25 kA unless otherwise indicated.

12.2. Tripping Characteristics/curves shall be as follows

B: In 6/10/13/16/20/25/32/40/50/63 A
C: In 0,5/1/1,6/2/3/4/6/8/10/13/16/20/25/32/40/50/63 A
K: In 0,2/0,5/1/1,6/2/3/4/6/8/10/13/16/20/25/32/40/50/63 A
Z: In 0,5/1/1,6/2/3/4/6/8/10/16/20/25/32/40/50/63 A
Number of poles: 1/2/3/4/1+NA/3+NA
Energy Limiting Class: 3
Rated Voltage Un:
Single-pole: 230/400 VAC
Multi-pole: 400VAC
Max. Operating Voltage UBmax DC:
Single Pole: 72 VDC

Double Pole: 125 VDC
Suitable for isolation acc. IEC 60898-1

12.3. Environmental Characteristics

12.3.1. Operating temperature: -25 °C...+70 °C and storage temperature: -40 °C...+70 °C.

12.3.2. Altitude: operation without derating up to 2000 m (6600 ft), and with derating up to 4000 m.

12.3.3. Suitability for use in a hot-humid environment. With regard to this, the circuit-breakers shall undergo a tropicalisation process which makes them suitable for use in a hot humid environment, as established by the prescriptions of the main shipping registers and in accordance with the international IEC 60068-2-30 Standards.

12.4. Construction Characteristics

12.4.1. Guide edge for labels

12.4.2. Prepared for locking devices

12.4.3. Quick and easy removal of installed device

12.5. Wiring

12.5.1. *Busbars*: Terminals for in and out coming feeder on top of busbars. The MCB shall have a "safe terminal". Each pole shall have 2 connection points. Combining busbar and wire in same terminal shall not be permitted. Combining wire of un-equal sizes in the same terminal shall not be permitted.

12.6. Accessories

12.6.1. Retrofit accessories (extract):

- Universal signal contact/auxiliary contact (right): 1SO
- Auxiliary contact (right): 1SO
- Auxiliary contact (left): 1NO/1NC, 2NO or 2NC
- Bottom-fitting auxiliary contact: 1NO or 1NC
- (bottom fitted without increasing width of MCB)
- Undervoltage- or Shunt trip release
- Hand operated neutral
- Motor operating device (remote control)
- DDA-Block
- Labelling system (marked or blank)
- Locking devices

12.7. Functional Characteristics (80 to 100 Amps)

12.7.1. Miniature Circuit Breaker for cable protection according to:
DIN VDE 0641 Teil 11, DIN VDE 0660 Teil 101, IEC 60898, EN 60898, IEC 60947-2, EN 60947-2

12.7.2. Rated short-circuit capacity shall be minimum: 6 kA unless otherwise stated.

12.8. Tripping Characteristics

12.8.1. B mit In 80/100 A
C mit In 80/100 A
Number of poles: 1/2/3/4

Energy Limiting Class: 3
Rated Voltage:
Single-pole: 230 VAC and 60 VDC
Single-pole: 400 VAC and 125 VDC
Suitable for isolation acc.: IEC 60947-1/-3

12.9. General Features

12.9.1. Label holder

12.9.2. Prepared to get equipped with toggle-locking device

12.10. Wiring

12.10.1. *Busbars*: Terminals for in and out coming feeder on top of busbars.The MCB shall have a "safe terminal". Each pole shall have 2 connection points. Combining busbar and wire in same terminal shall not be permitted. Combining wire of un-equal sizes in the same terminal shall not be permitted.

12.11. Accessories

12.11.1. Auxiliary contact: 2 or 3 contacts (screw-able or push-in-able)

12.11.2. Auxiliary contact (low power): 1 or 3 contacts

12.11.3. Signal contact or signal contact/auxiliary contact: 3 contacts

12.11.4. Undervoltage release or shunt trip

12.11.5. Neutral conductor

12.11.6. Printed labels

12.11.7. Labels for individual printing

12.11.8. Locking devices

12.12. Functional Characteristics (DC Protection)

12.12.1. Miniature Circuit Breaker for cable protection according to: DIN VDE 0641 Teil 12, DIN VDE 0660 Teil 101, IEC 60898, EN 60898, IEC 60947-2, EN 60947-2, UL1077

12.12.2. Rated short-circuit capacity: 4,5/6 kA

12.13. Tripping characteristics shall conform to the following

B: In 6/10/16/20/25 A
K: In 0,2/0,3/0,5/0,75/1/1,6/2/3/4/6/8/10/16/20/25/32/40/50/63 A
In 0,5/1/1,6/2/3/4/6/8/10/16/20/25/32/40/50/63A
Number of poles : 1/2/3/4 (K,Z); 1/2 (B)
Rated Voltage:
Single-pole: 230/400 VAC and 220 VDC
Multi-pole: 400 VAC and 440 VDC

Suitable for isolation acc: IEC 60947-1/-3

12.14. General Features

12.14.1. Label holder

12.14.2. Prepared to get equipped with toggle-locking device

12.15. Wiring

12.15.1. *Busbars*: Terminals for in and out coming feeder on top of busbars. The MCB shall have a "safe terminal". Each pole shall have 2 connection points. Combining busbar and wire in same terminal shall not be permitted. Combining wire of un-equal sizes in the same terminal shall not be permitted.

12.16. Accessories

12.16.1. Auxiliary contact: 2 or 3 contacts shall be (screw-able or push-in-able)

12.16.2. Auxiliary contact (low power): 1 or 3 contacts

12.16.3. Signal contact or signal contact/auxiliary contact: 3 contacts

12.16.4. Undervoltage release or shunt trip

12.16.5. Neutral conductor

12.16.6. Printed labels

12.16.7. Labels for individual printing

12.16.8. Locking devices

13. CONTACTORS

13.1. Contactors shall comply with SANS 60947. Duty cycle shall be AC3. Contactor coil voltage may be either 230V or 400V unless otherwise stated.

13.2. Lighting contactors for 24 to 63 Amps (AC1) shall be DIN mounted on the same rail as the MCBs and feature a DC solenoid actuator and are thus hum-free. They shall have a switching position indicator, integrated coil protection circuits and overvoltage protection for the solenoid coil up to 5kV.

13.3. Contactors from 9 to 38 Amps shall be electronic coils.

13.4. For contactors from 50 to 300 Amps, standard coils will be accepted.

13.5. Contactors from 400 to 2050 Amps shall be electronic coils.

13.6. Mixture of contactors shall not be permitted.

13.7. Ambient characteristics

13.7.1. Climatic withstand according to IEC60068-2-0 AND 60068-2-11

13.8. Construction characteristics

13.8.1. Contactors with electronic coils 9 to 38 Amps AC3 shall have:

13.8.1.1. Maximum of two frame sizes from 9 to 16 amps AC3

13.8.1.2. Width not to exceed 45mm for contactors 9 to 38 amps AC3 rating

13.8.1.3. Contactor up to 16 amps to include built in auxiliary contact

13.8.1.4. Common auxiliaries for contactors 9 to 38 amps AC3

13.8.2. Contactors 9 to 110 Amps with standard coil shall have:

13.8.2.1. Mounting positions: only position 6 not permitted (see appendix 1)

13.8.2.2. Maximum of 4 frame sizes from 9 to 110 amps

13.8.2.3. Quick fixing on mounting rail according to IEC 60715 standards as:-

- 35 x 7.5 mm for 9 to 40 amps contactors
- 35 x 15 mm for 9 to 75 amps contactors
- 75 x 25 mm for 50 to 110 amps contactors
- Terminal with captive screws
- Terminal screws to be of Pozidriv type up to 75 amps AC3
- Terminal screws to be M8 Hexagon socket for main terminals and Pozidriv for coil terminals

13.8.3. Contactors 145 to 750 Amps AC3 with Standard or Electronic Coil shall have:

13.8.3.1. Maximum of 4 frame sizes from 145 amp to 750 amp

13.8.3.2. Mechanical design to incorporate power terminal at base of contactor, operating coil to be mounted on top of contactor. Coil removal to side of contactor shall not be permitted.

13.8.3.3. Shall have front access to coil , with no need to remove the power cables when changing coils

13.8.3.4. Shall have front access to main fixed and moving contacts , without the need to remove the power cables

13.8.3.5. Removal and replacement of the fixed and moving contacts shall be able to be accomplished without the need to remove the power cables

13.8.3.6. Contactor shall have quick release quarter turn screws for easy access to main contact inspection

13.8.3.7. Clear marking of contactor electrical information, marking to be clearly visible on front of contactor

13.8.3.8. Electrical characteristics and performances

13.8.3.8.1. All Contactors shall be electrically coordinated with upstream protection device, whether device or the fuse type, MCCB, or manual motor starter. All coordination to be backed up by Manufactures coordination tables, available on request.

13.8.4. Contactors with electronic coils 9 to 38 Amps AC3

13.8.4.1. Same coil to cover both the AC or DC control supplies

13.8.4.2. Coil to be of torroidal design

13.8.4.3. Coil to have extended voltage operating limits.

13.8.4.4. 4 coil types only covering: 24..500 V 50/60Hz and 20..500 V DC

13.8.4.5. Coil Consumption not to exceed the following limits

13.8.4.6. On pull in 50VA

13.8.4.7. On holding 2.2VA

13.8.4.8. Built-in surge protection to be incorporated

13.8.4.9. Flexible position of Coil terminals i.e. can be transferred from the top to the bottom of contactor

13.8.4.10. With additional coil terminal block, it shall be possible to connect the coil both at the top and at the bottom.

13.8.5. Contactors with standard AC coil 50 to 30 Amps AC3 shall have:

13.8.5.1. Rated operational voltage 690V for contactors up to 40 amp AC3

13.8.5.2. Rated operational voltage 1000V for contactors 50 to 750 amps AC3.

13.8.5.3. Rated making capacity to be equal to 10 x AC3 rated operational current, or greater.

13.8.5.4. Rated breaking capacity to be equal to 8 x AC3 rated operational current, or greater.

13.8.5.5. Coil operating limits (according to IEC60947-4-1) 0.85 ….1.1 x rated Control circuit voltage, at temperature less or equal to 55degrees Celsius

13.8.5.6. Drop out voltage in %age of rated Control Voltage approximately 40 to 65%

13.8.5.7. Contactors 400 amp AC3 upward to incorporate electronic coil technology

13.8.6. Contactors with electronic coils 400 to 750 Amps AC3 shall have:

13.8.6.1. As above but to include the following

13.8.6.2. Same coil to cover both the AC or DC control supplies

13.8.6.3. Coil to have extended voltage operating limits.

13.8.6.4. Can withstand voltage interruptions or voltage dips in control supply up to 20ms.

13.8.6.5. Distinct opening and closing voltages as follows

13.8.6.6. Opening 0.55 x min operating voltage

13.8.6.7. Closing 0.85 x min operating voltage

13.8.6.8. Coil types only covering: 24..500 V 50/60Hz and 20..500 V DC

13.9. Accessories

13.9.1. All auxiliary contacts shall employ the “wipe action” mechanism for the self cleaning of the contact tips.

13.9.2. Front mounted auxiliary contact blocks rated insulation voltage equal to 690V a.c or greater

13.9.3. Rated operation voltage 24…690VAC

13.9.4. Rated making capacity 10 x AC-15 rated operational current

13.9.5. Rated breaking capacity 10 x AC-15 rated operational current

13.9.6. Rated short time withstand current 100amps for 1sec:, 140 amps for 0.1 sec

13.9.7. Electrical durability, max electrical switching frequency 1200 cycles per hour or greater

13.10. Side Mount Auxiliary Contact Blocks shall have:

13.10.1. Rated insulation voltage equal to 690V a.c or greater

13.10.2. Rated operation voltage 24…690V a.c

13.10.3. Rated making capacity 10 x AC-15 rated operational current

13.10.4. Rated breaking capacity 10 x AC-15 rated operational current

13.10.5. Rated short time withstand current 100amps for 1sec:, 140 amps for 0.1 sec

13.10.6. Electrical durability, max electrical switching 1200 cycles per hour or greater.

14. LIGHTNING AND SURGE PROTECTION

14.1. Main Distribution Board

14.1.1. According to the IEC 62305 recommendations, electrical installations shall be protected against direct lightning and surge impulses with din rail Class 1/Type 1 (10/350µs) lightning current arresters.

14.1.2. SPD shall use a triggered spark gap technology to allow high lightning discharge current, unpluggable type to avoid ejection of the cartridge during the discharge of the current and non-blow out technology to avoid fire risks.

14.1.3. The SPD shall provide either common protection in TNC network or common and differential mode protection in TT and TNS network according to the IEC60364 recommendations.

14.1.4. Lightning arresters shall have the following technical specifications:

14.1.4.1. Class of test (IEC 61643-1) I

14.1.4.2. Lightning impulse current: Iimp/pole (10/350µs) ≥ 25kA

14.1.4.3. Nominal voltage Un 230 / 400V

14.1.4.4. Maximum continuous AC voltage Uc 255V

14.1.4.5. Follow current extinguishing capability Ifi ≥ 50kA

14.1.4.6. Protection level Up : 2.5kV

14.1.4.7. Max. back up fuse gG/gL: 125A

14.1.4.8. Visual state indicator: Yes

14.2. Sub-Main Distribution Board

14.2.1. According to the IEC 62305 recommendations to avoid oscillations and magnetic coupling phenomenon, sensible equipments shall be protected against indirect surges with din rail Class 2 / Type 2 (8/20µs) surge arresters.

14.2.2. The SPD shall have a safety reserve system and shall be pluggable for preventive and easy maintenance. The SPD shall provide either common protection in TNC network or common and differential mode protection in TNS and TT network according to the IEC 60 364 recommendations.

14.2.3. In case of common and differential mode protection the SPD shall use an association of MOV and GDT to provide isolation to the ground and low protection level in all protection modes. The associated switching element

14.2.4. (MCB/Fuse) (to insure a safe end of life) shall be the same brand as the SPD to insure a good coordination.

14.2.5. Surge arresters technical specifications:

14.2.5.1. Class of test (IEC 61643-1) II

14.2.5.2. Max. discharge current: Imax/pole (8/20µs) ≥ 40kA

14.2.5.3. Nominal current In / pole ≥ 20kA

14.2.5.4. Nominal voltage Un 230 / 400V

14.2.5.5. Maximum continuous AC voltage Uc 275 / 255V

14.2.5.6. Protection level Up at 20kA ≤ 1.5 kV

14.2.5.7. Protection level Up at 3kA (Class 3 test)

14.2.5.8. Pluggable :Yes

14.2.5.9. Visual status indicator: Yes

14.2.5.10. Safety reserve: Yes

14.2.5.11. Remote indicator :Yes

14.3. Data line / Telecom line

14.3.1. The selection of the surge protection device shall be according the IEC 62305 recommendations and therefore shall be a type C2 SPD.

14.3.2. The SPD shall be pluggable type for easy maintenance and shall provide the dialling tone returns when the cartridge is withdrawn in case of end of life.

14.3.3. The cartridges, whatever the nominal voltage, shall be adaptable onto different base. The base shall be chosen according to the connection of thewire: it can be RJ11, RJ45 or screw connection. The connections to the earthshall be either by a DIN rail contact or by a screw terminal.

14.3.4. The SPD dimension shall not exceed 12.5 mm wide to save space. The SPD shall use two level of protection: the first one by GDT, the second one by zener diode. These two levels shall be coordinated and shall provide common and differential mode protection.

14.3.5. Low current surge arresters technical specifications:

14.3.5.1. Class of test (IEC 61643-21): C2

14.3.5.2. Nominal voltage Un According to the Max.voltage of signal

14.3.5.3. Maximum continuous AC voltage Uc (L-N / N-G): According to the Max. voltage of signal

14.3.5.4. Loading current: 140mA

14.3.5.5. Max. discharge current: Imax / line (8/20µs) ≥ 10kA

14.3.5.6. C2 Nominal discharge current In / line (8/20µs) ≥ 5kA

14.3.5.7. Protection level Up (L-L / L-G): According to the Max. voltage of signal

14.3.5.8. Pluggable: Yes

15. ANTI-CONDENSATION HEATERS

15.1. Anti-condensation 220 Volt heaters shall be provided for all compartments. A switch with thermostat shall be provided to control the heaters.

15.2. The wiring from the heater elements to terminals shall be high temperature insulation covered, a suitable compression type gland shall be fitted for the incoming 231V supply.

16. INDICATING INSTRUMENTS

16.1. A flush mounted, industrial grade, 96 mm square voltmeters and ammeter conforming to SABS 1299 shall be mounted near the centre top of the front panel and connected to measure the busbar voltage and current.

16.2. The calibrated scale length shall be a minimum of 70 mm. Means shall be provided for zero adjustment from the front without any dismantling of the indicating instrument.

16.3. A voltmeters selector switch with phase to phase, phase to neutral, and "off" position shall be provided.

16.4. An ammeter selector switch shall be provided with an "OFF" position.

16.5. Meters shall indicate by means of colours the relevant phase that it is metering.

17. CURRENT TRANSFORMERS

17.1. Current transformers shall comply with BS 3938.

18. MECHANICAL CABLE GLANDS

18.1. Cable glands shall be of the compression type, manufactured in brass and/or bronze, and suitable for termination of earth-continuity conductor type cables where applicable.

18.2. The gland body shall incorporate a knurled cone for clamping the armouring and an integrally cast earth lug, complete with earthing screw.

18.3. All metal portions of the gland shall be electroplated for corrosion resistance.

18.4. The glands shall be supplied complete with weatherproof neoprene shrouds.

18.5. Entries for multi-core PVC, PVC, wire armoured, PVC sheathed cables shall comprise cone grip mechanical type glands mounted on robust gland plates.

18.6. The board shall be supplied complete with all glands for all outgoing and incoming circuits as indicated on the drawing.

19. LIGHT SENSITIVE CONTROL UNIT

19.1. Light sensitive control units shall be supplied by others.

19.2. A suitably rated single pole over-riding switch, for over-riding the unit in 19.1, and moulded case circuit breaker shall be provided, when called for in the drawings or appendices hereto.

19.3. The switch and circuit breaker shall be wired to a suitable terminal strip, mounted within the distribution board, to facilitate connection of the light sensitive control unit when installed.

20. EARTHING

20.1. The components shall be effectively bonded to the main frame of the distribution board, which shall also be bonded to the main earth bar. Earthing shall comply with SANS-10142 code of practice for the wiring of premises.

21. CABLING AND WIRING

21.1. All cables and wires used shall be stranded, 600/1000 V grade and comply with SABS 150, except where special cables have been otherwise specified.

22. LABELS

22.1. Labels shall be provided comprising conspicuous engraved black lettering on white background secured with rivets or screws on or adjacent to the items concerned, and worded in English.

22.2. Labels of embossed tape or labels secured with adhesive are not acceptable.

22.3. All fuse-switches, circuit breakers, isolators, contactors, relays, etc., shall be clearly designated.

22.4. The terminals of all outgoing circuits shall be provided with labels to correspond with the labelling of the units on the panel of the distribution board.

22.5. All terminal connections shall be provided with durable tags or clips, on which shall be clearly and indelibly marked, the identifying code letters of each wire. Such code letters shall correspond to those used on the wiring diagram.

23. PAINTING

23.1. All surfaces of the distribution board shall be light orange to SABS 1091 colour No. B26. (Transnet orange; Pantone 165C / 021U; Coats 50/50; Vermilion MW52; RAL 2004 rein orange; Trichromatic 70% magenta, 90% yellow), unless otherwise specified.

23.2. All surfaces shall be cleaned according to the appropriate method described in SABS 064 for the particular surface to be cleaned, the contamination to be removed and the primer to be applied.

23.3. Blast cleaning of components shall be in accordance with clause 4.3 of SABS 064 to a degree of cleanliness of at least Sa2 for inland exposure components and Sa 1/2 for coastal exposure components. See Table 1 of SABS 064 for the appropriate profile.

23.4. Sheet metal that cannot be blast cleaned shall be cleaned by pickling according to clause 4.6 of SABS 064.

23.5. Components that shall be powder coated shall be cleaned and prepared by the surface conversion process according to clause 5 of SABS 064 to a medium-weight classification of table 2 of that specification.

23.6. Oil and accumulated dirt on steel components where no rusting is present shall be removed according to clause 3 of SABS 064.

23.7. The powder-coating process shall be in accordance with SANS 1242 - type 4 : Corrosion-resistant coatings for interior use and using the thermosetting type high gloss coating.

23.8. All specified coatings shall be applied according to the relevant specification and the manufacturer's instructions shall be followed.

23.9. Coatings shall not be applied under conditions that may be detrimental to the effectiveness of the coating or the appearance of the painted surface.

23.10. When examined visually the finished products shall have a uniform appearance as far as gloss is concerned and shall show no sign of damage. Damaged areas shall be repaired coat for coat to obtain the desired finish.

24. ADDITIONS AND MODIFICATIONS TO EXISTING DISTRIBUTION BOARDS

24.1. Where the contractor needs to make modifications or additions to existing distribution boards, the following minimum criteria shall be adhered to :

24.1.1. Re-labelling and proving of existing circuits in accordance with security of existing terminations to be confirmed

24.1.2. Isolation barriers, cover blanks to be in place where required

24.1.3. Panel modification in terms of architraves, DB covers, and the closing of redundant openings to be undertaken by an accredited switchboard manufacturer.

24.1.4. Wiring to be examined for integrity correct sizing and tidied and/or replaced and neatened as required.

24.1.5. A certificate of compliance shall be issued for the full distribution board and not the additions only.

25. INSPECTION

25.1. Transnet Group Capital reserves the right to carry out inspection of any items of equipment and work at any time during the manufacture at manufacturer's works and to be present at any tests.

25.2. A final inspection by Transnet Group Capital before delivery to site is required.

26. TESTS

26.1. All prescribed tests as referred to in the standard specifications may be called for at the discretion of Transnet Group Capital.

26.2. Transnet Group Capital also reserves the right to carry out any check tests on the equipment.

26.3. Notwithstanding the successful completion of tests, the tenderer shall still be responsible for the efficient operation of the equipment.

26.4. The tenderer shall bear all costs for any tests, which shall be required.

27. GUARANTEE

27.1. The Contractor shall undertake to repair all faults due to bad workmanship and / or faulty materials and to replace all defective apparatus or materials during a period of twelve (12) calendar months, calculated from the date of delivery.

27.2. Any defects that may become apparent during the guarantee period shall be rectified to the satisfaction of, and free of cost.

27.3. The Contractor shall undertake work on the rectification of any defects that may arise during the guarantee period within 7 days of his being notified by Transnet Group Capital of such defects.

27.4. Should the Contractor fail to comply with the requirements stipulated above, Transnet Group Capital will be entitled to undertake the necessary repair work or effect replacement of defective apparatus or materials, and the Contractor shall reimburse Transnet Group Capital the total cost of such repair or replacements, including the labour costs incurred in replacing defective material.

END

SPECIFICATION FOR THE SUPPLY AND INSTALLATION OF MEDIUM VOLTAGE AND LOW VOLTAGE ELECTRICAL CABLES

REVISIONS		
REV	DATE	APPROVED
01	April 2017	S.Sewdayal

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1.1 SCOPE OF WORK

The scope of this specification covers the minimum requirements for the supply installation, testing and commissioning of medium and low voltage cables, instrumentation cables, cable racking, trenching, sleeves and earthing reticulation on Transnet sites on behalf of Transnet Group Capital.

Contractors are required to familiarise themselves with all applicable Standards and Codes of Practice listed herein, and to ensure compliance in the execution of any work in terms of this document. Failure to comply may render the contractor liable for corrections at his own cost.

These Standards and Codes of Practice should be read in conjunction with all other Specifications and drawings as issued for a particular contract. Where discrepancies occur, these must be brought to the attention of Transnet Group Capital in writing before commencement of work. In the event of any conflict between the contents of any documents forming part of a contract (as listed in the Master Index) and this document, the former shall prevail.

1.2 APPLICATION TO WORK ACTIVITIES

The Standards and Codes of Practice contained herein apply to all installations requiring Medium and Low voltage Electrical and Instrument Cabling, Racking, Trenching Sleeves and Earthing Reticulation and include amongst others the following standards:

- Supply of electrical and instrument cable trenches
- Supply, installation of electrical and instrument ladder racking reticulation
- Supply, installation of electrical and instrument dropper reticulation
- Supply, installation and termination of electrical and instrument cabling
- Cable Tagging and Core Identifying standards for electrical and instrument cabling
- Supply, installation of instrument and electrical earthing

2. STANDARDS AND REFERENCES

2.1 The requirements of the materials, design, layout, fabrication, assembly, erection, examination, inspection and testing of equipment and facilities on site shall be in accordance with the relevant sections of codes: -

(a)	SANS 10142-1	2017	Code of Practice for the Wiring of Premises
(b)	SANS 121	1999	Hot-dip (galvanized) zinc coatings (other than on Continuously Zinc-coated sheet and wire
(c)	SANS 1507	2001	Electric cables with extruded solid dielectric insulation For Fixed Installations (300/500 V to 1 900/3 300)
(d)	SANS 1574	2001	Electric cables - Flexible cords and flexible cables
(e)	ASME/ANSI.B31.3	2016	Chemical Plant and Petroleum Refinery piping

(f) ASME/ANSI.B31.4	1998	Liquid Transportation Systems for Hydrocarbons, Liquid Petroleum Gas, Anhydrous Ammonia and Alcohols
(g) SANS 10089-2	2001	The Petroleum Industry Part -2: Electrical Code
(h) SABS 10089 – 2	2017	Installation and Maintenance of Electrical Equipment used in Explosive Atmospheres.
(i) SANS 10198	2004	The Selection, Handling and Installation of Electric Power Cables rating not exceeding 33KV Part 1: Definations and statutory
(j) API 2003	2016	Protection against ignitions arising out of static, Lighting and stray currents
(k) SANS 10313	1999	The Protection of structures against lightning
(l) SANS 10086-1	1997	Earthing of Low Voltage (LV) distribution systems
(m) IEC 79-14		Intrinsic Safety Principles and hazardous areas
(n) SANS 97	2001	Electric cables impregnated paper-insulated metal Sheathed cables for voltages 3.3/3.3Kv to 19/33Kv(Tests after installation)
(o) SANS 60079-7	1990	Apparatus with increased safety (EX e) for use in Explosive gas atmosphere
(p) SANS 808	2013	Cable glands for use on flameproof enclosures (Ex d)
(q) SANS 10108	2017	The classification of hazardous locations and the Selection of apparatus for use in such locations
(r) IEC79-11	2007	Intrinsic Safety Principles and hazardous areas
(s) SABS 150	1986	Machine made textile floor coverings ,determination Thickness
(t) SANS 1339	2015	Electric cables-cross-linked polyethylene (XLPE) Insulated Cables for rated voltages 3,8/6.6Kv to 19/33Kv
(u) IEC 60-1		High voltage techniques

(v) DIN EN 61386-24	1994	Conduit systems for cable management - Part 2-4: Particular requirements for conduit systems buried underground.
(w) BS EN50086-2-4	1994	Specification for conduit systems for cable management. Particular requirements. Conduit systems buried underground

a) Government, local authorities or other statutory bodies' regulations, laws, requirements or customs which are more stringent than those specified in this project specification.

2.2 The following standard specifications are to be used for reference purposes and need to be noted by Contractors in order to signify familiarity and compliance with the requirements. It is expected of Contractors that they be familiar with the applicable clauses and that these will be adhered to in the execution of any work in terms of this specification. Contractors will be required to confirm that they are able to meet these requirements.

a) SANS 10108: 2017 The Classification of hazardous locations and the selection Of electrical apparatus for use in such locations

b) The Occupational Health & Safety (OHS) Act No. 85 of 1993.

c) SABS 0314 Flameproof Enclosures for Electrical Apparatus

d) SABS 0549 Intrinsically Safe Electrical Apparatus

e) API Manual of Petroleum Measurement Standards Chapters 4 to 12
IP Chapter 10 and Papers 2 and 3

f) SANS 61241-1-1: 1999 Enclosures for electrical apparatus for use in class II Divisions 1 and 2 locations (dust –ignition –proof or hose Proof or both)

g) BS 5490 Classification of degrees of protection provided by enclosures

h) Safety Regulations for Contractors

i) Technical Instruction No. 16 - Contractors Work Permit Procedures.

j) VDE Standards

2.3 Where no specific rules, regulations, codes or requirements are contained in this specification nor covered by the above mentioned codes, the contractor shall, in consultation with Transnet Group Capital, adhere to internationally accepted modern design and engineering practices in the Electrical and Petrochemical Industry.

3.0 SERVICE CONDITIONS

3.1 The cable shall be designed and rated for continuous operation under the following conditions :-

3.1.1 Ambient/Environnent Conditions :

3.1.1.1	Altitude	:	Sea level.
3.1.1.2	Ambient temperature	:	-5° C to +45° C (daily average +35° C).
3.1.1.3	Relative humidity	:	As high as 96%
3.1.1.4	Lightning conditions	:	Severe, with a maximum lightning ground flash density 11 flashes per km^2 per annum.
3.1.1.5	Exposure conditions	:	Salt laden, industrial atmosphere as well as hazardous Gases and dust atmosphere.

3.1.1.6 Electrolytic corrosion conditions prevail in all the areas owing to the proximity of direct current traction system and cathodic protection schemes.

3.1.2 Electrical Conditions:

3.1.2.1 The system of supply will be three phase, 3 wire, 50 Hertz, 11KV alternating current for medium voltage and three-phase, 4 wire, 50 Hz 400 Volts alternating current for low voltage.

3.1.2.2 The voltage may vary within the range of 95% to 105% of the nominal and all cable shall be suitably rated.

4.0 RESPONSIBILITY FOR WORK, SAFETY

4.1 The Contractor shall be responsible for all aspects associated with the provision of the cables. This includes items such as supply of testing cable, to test the cables prior to commissioning, provision of site office and storage facilities.

4.2 Occupational Health and Safety Act (Act No 85 of 1993) must be complied with in all respects during the execution of this contract. The onus shall be on the contractor to ensure that staff under his control adheres to the provisions of the act at all times.

5.0 ELECTRICAL CABLE SPECIFICATION

This part of the specification covers the general specification of electrical cables to be used on Transnet sites on behalf of Transnet Group Capital.

5.1 TYPES OF CABLE

5.1.1 CROSS-LINKED POLYETHYLENE (XLPE)

5.1.1.1 Cross-linked Polyethylene (XPLE)-insulated cables shall be individually screened, 3 core, stranded copper conductor, type A, cable manufactured in accordance with SANS.1339: 2015. The cable is to be supplied with an overall graphite coating to the outer PVC sheath.

5.1.1.2 The cable shall have embossed on the outer P.V.C. sheath next to the **S.A.B.S.** mark the following letters:

T/G/B

Where T = TRANSNET STANDARD G = GRAPHITE COATED B = BEDDING TEST

Only the above mentioned cable shall be accepted.

5.1.1.3 The cable shall be capable of withstanding continuous operational temperatures up to 90^{O} C.

5.1.1.4 Completed cable runs are subjected to the following tests:-

a. As laid down in SANS 1339:2015 (Appendix "E" paragraph E-1.4)

b. Anti-electrolysis insulation, applied between armouring and earth, tested at 10kV D.C. for one minute. Bedding shall be tested at 4kV D. C. for one minute.

All the above tests shall be carried out in the presence of the Engineer

5.1.2 PAPER INSULATED

5.8.2.1 Fully impregnated hygroscopic paper insulated, Helically lapped, insulated, Three core, Stranded copper conductors, Outer layer numbered for core identification, Seamless pure lead sheath, Covered with bitumen impregnated paper, Single steel wire armoured, extruded plastic sheathed, Operational voltage 6.35 to 11kV.

5.1.2.2 The cable shall have embossed on the outer P.V.C. sheath next to the **S.A.B.S.** mark the following letters:

T/G/B

Where: T = TRANSNET STANDARD
G = GRAPHITE COATED
B = BEDDING TEST

Only the above mentioned cable shall be accepted.

5.1.2.3 The cable is to be supplied with the P.V.C. outer sheath impregnated with a high quality graphite powder coating.

5.1.2.4 Type general purpose copper woven taped screened (Table 19) cable manufactured in accordance with SANS 97: 2001 is required.

5.1.2.5 The cable shall be capable of withstanding continuous operational temperatures up to 70 / 80^{O} C.

5.1.2.6 Completed cable runs are subjected to the following tests

a. As laid down in SANS 97 2001

b. Anti-electrolysis insulation, applied between armouring and earth, tested at 10Kv D. C. for one minute. Bedding shall be tested at 4Kv D.C. for one minute.
All the above tests shall be carried out in the presence of the Engineer

5.1.3 LOW VOLTAGE PVC CABLE

5.1.3.1 Low voltage cables shall be PVC insulated cables with ECC, and shall comply with SANS 1507: 2001.

5.1.3.2 Earth continuity conductors shall be single core PVC insulated copper cables, and shall comply with SANS. 1507: 2001.

5.1.3.3 The cable shall be capable of withstanding continuous operational temperatures up to 70^{O} C.

5.1.3.4 Electrical LV Power cabling installed in hazardous locations (flammable environment) running between Equipment located in the field, LV Panels or Motor Control Centre Panels, Valve Panels and Distribution Boards shall comprise of steel wire armoured, earth continuity conductor (ECC), PVC Insulated, four core cable, as follows:

Conductors.

Core Size : 4 core - Rated as per application (SANS 10142-1)
Stranded untinned copper, 7 strands minimum

PVC Insulated, Insulation Breakdown Voltage to withstand 2 kV 50Hz RMS for a 1 min period.

Insulation Colours : Colored RD-BL-YE/WT-BK (not numbered)

Lay Twist to be 40 – 60 mm (i.e. 16-25 twist per metre)

Inner Jacket

Extruded fire retardant black PVC with rip cord for jacket removal.
Minimum thickness 1.2mm

Outer Jacket

Overall weatherproof thermoplastic PVC jacket – fire retardant and UV resistant (Carbon black added).

Jacket thickness 1.5mm

Jacket to be totally bonded to a steel wire armoured sleeve.

Fire retardant, low halogen (20% Halogen, Blue Stripe) plastics to be used in non-ventilated areas. Fire retardant, high halogen (100% Halogen, Red Stripe) plastics may be used in ventilated areas. Fire retardant, no halogen (0% Halogen, White Stripe) plastics not required to be used.

5.1.3.5 Electrical Control cabling running between the Equipment located in the field, Control System Marshalling Cabinets, LV Panels and Incomer Breaker panels will comprise of steel wire armoured, PVC Insulated, multi-core cable, as follows :

Conductors

Core Size : 7 core – 1.5 mm^2 (Valve Actuators)
12 core – 1.5 mm^2, 19 core – 1.5 mm^2 (Switchgear)

Stranded untinned copper, 7 strands minimum

PVC Insulated, Insulation Breakdown Voltage to withstand 2 kV 50Hz RMS for a 1 min
Insulation Colours: 7 core and less – coloured BL-YE/WT-RD-GR-BK-BR-PR/OR (Not numbered)
12 core and more – black, conductors to be numbered
Lay Twist to be 40 – 60 mm (i.e. 16-25 twist per metre)

Inner Jacket

Extruded fire retardant black PVC with ripcord for jacket removal.
Minimum thickness 1.2mm up to 7 core, 1.5mm for 12 and 19 core

Outer Jacket

Overall weatherproof thermoplastic PVC jacket – fire retardant and UV resistant.
Jacket thickness 1.5mm up to 7 core, 2.0mm for 12 and 19 core
Jacket to be totally bonded to a steel wire armoured sleeve.

Fire retardant, low halogen (20% Halogen, Blue Stripe) plastics to be used in non-ventilated areas. Fire retardant, high halogen (100% Halogen, Red Stripe) plastics may be used in ventilated areas. Fire retardant, no halogen (0% Halogen, White Stripe) plastics not required to be used.

5.1.3.6 Completed cable runs are subjected to the following tests as laid down in SANS 10142-1: 2017.Insulation resistance test between Phases, Phases and Neutral, Phases and ECC, Neutral and ECC.

5.1.4 INSTRUMENTATION CABLING

5.1.4.1 Instrument Cabling as defined within this and other Transnet Group Capital Specifications includes the following types of cabling:

1. PVC SWA Multicore instrument cables running between Instrument Junction Boxes in the field and PLC Cabinets (IS and non-IS rated)
2. PVC SWA Multicore instrument cables running between instruments in the field and PLC Cabinets (IS and non-IS rated)
3. Dekabon armoured instrument cables running between Junction Boxes in the field and the instruments themselves (IS and non-IS rated)

5.1.4.2 All Instrumentation Cabling will comply in all respects to the specifications as contained in the Scope of Work attached to an Order. In the absence of cable specifications being detailed in the Scope of Work attached to an Order, the following cable specifications will apply.

5.1.4.3 Instrument cabling will be marshalled on Instrument racking and trenching as defined elsewhere within this specification.

5.1.4.4 Instrument multi-core cabling running between the Field Junction Boxes and the Control System Marshalling Cabinets will comprise of steel wire armoured, PVC Insulated, individual and overall screened multi-core cable. Note that Transnet has standardised on 1 pair, 2 pair, 8 pair and 16 pair cable – prior approval from Transnet will be required to deviate from these specifications.

Conductors

Core Size : 1.0 mm^2

Stranded untinned copper, 7 strands minimum

PVC Insulated, Insulation Breakdown Voltage to withstand 2 kV 50Hz RMS for a 1 min.

Insulation Colours : Black and White

Multi-pair cores to be numbered (numeric on both conductors of the pairs)
Lay Twist to be 40 – 60 mm (i.e. 16-25 twist per metre)

Shield/Screen

Individual & overall screened – plasticised aluminium foil (100%) coverage
Stranded tinned copper drain wire 0.5 mm^2

Inner Jacket

Extruded fire retardant black PVC with rip cord for jacket removal.
Minimum thickness 1.2mm up to 8 pair, 1.5 mm for 16 to 36 pair

Outer Jacket

Overall weatherproof thermoplastic PVC jacket – fire retardant and UV resistant (Carbon Black added).
Jacket thickness 1.5mm up to 8 pair, 2.0 mm for 16 to 36 pair.
Jacket to be totally bonded to a steel wire armoured sleeve.

Fire retardant, low halogen (20% Halogen, Blue Stripe) plastics to be used in non-ventilated areas. Fire retardant, high halogen (100% Halogen, Red Stripe) plastics may be used in ventilated areas. Fire retardant, no halogen (0% Halogen, White Stripe) plastics not required to be used.

IS Circuits: Jacket colour light blue Non IS Circuits: Jacket colour black.

5.1.4.5 Individual Instrument cabling running between the Field Junction Boxes and the individual field mounted Instruments will comprise of Dekabon armoured, PVC Insulated, individual and overall screened multi-core cable. Note that Transnet has standardised on 1, 2, 4 and Triad cable prior approval from Transnet will be required to deviate from these specifications.
(Note that this specification only applies to cabling running on racks above the ground, all Instrument cables running in trenches will need to comply with the Instrument Multi-core Cable Specifications detailed above).

Conductors.

Core Size : 1.5 mm^2
Stranded untinned copper, 7 strands minimum
PVC Insulated, Insulation Breakdown Voltage to withstand 2 kV 50Hz RMS for a 1 min
Insulation Colours : Black and White
Multipair cores to be numbered (alphanumeric on both conductors of the pairs)
Lay Twist to be 40 – 60 mm (i.e. 16-25 twist per metre)

Shield/Screen

Individual & overall screened – plasticised aluminium foil (100%) coverage
Stranded tinned copper drain wire 0.5 mm^2

Inner Jacket

Extruded fire retardant black PVC with ripcord for jacket removal.
Minimum thickness 1.2mm

Outer Jacket

Overall weatherproof thermoplastic PVC jacket – fire retardant and UV resistant (Carbon black added).
Jacket thickness 1.5mm.
Jacket to be totally bonded to an inner waterproof aluminium sleeve, with a ripcord under the sleeve for jacket removal.

Fire retardant, low halogen (20% Halogen, Blue Stripe) plastics to be used in non-ventilated areas. Fire retardant, high halogen (100% Halogen, Red Stripe) plastics may be used in ventilated areas. Fire retardant, no halogen (0% Halogen, White Stripe) plastics are not required to be used.

IS Circuits: Jacket colour light blue Non IS Circuits: Jacket colour black.

6.0 CABLE TERMINATIONS

6.1 Medium and Low Voltage cables shall be terminated to busbars and switchgear in the panels, distribution boards and kiosks using suitable cable lugs. Cable earth wires shall be brought into glands on gland plates. The insulation between cable armouring and cable earth wires shall be maintained at terminations. The separate earth conductor cable shall terminate to the main earth bar.

6.2 All materials necessary for installing all cable terminations shall be provided by the Contractor and the cost thereof shall be included in the tender price.

6.3 Glanding

6.3.1 All instrument and electrical cables will be glanded at both ends using the appropriate sized gland and will include associated adaptors, washers, ferrules, bands, etc. Provision for all glands, adaptors, washers, ferrules, bands etc. shall be included in the Tenderer's offers. All cable glands shall comply with the following specification, unless otherwise specified in the Scope of Work attached to an Order:

6.3.2 Dekabon Armoured Cabling (Instrumentation)
Increased Safety Ex"e" rated compression gland, IP68 rated, complete with UV resistant black shroud where required, in accordance with SANS 60079-7 1990.

6.3.3 PVC SWA Cabling (Instrument & Electrical motors)
Increased Safety Ex"e" rated non-compression gland, IP68 rated, complete with SWA protection (CCG Corrosion Guard or similar), in accordance with SANS 60079-7 1990.

6.3.4 PVC SWA Cabling (Ex"d" rated Valve Actuators)
Flameproof Ex"d" rated non-compression gland, IP68 rated, complete with SWA protection (CCG Corrosion Guard or similar), in accordance with SANS 808: 2013.

6.3.5 PVC SWA Cabling (Electrical and PLC Panels located within buildings rated as Safe Areas in terms of Hazardous Area Classifications SANS 10108: 2017)
Non-Flameproof rated, non-compression gland, IP68 rated, complete with UV resistant (black) shroud where required.

All glands will be waterproof and in the case of Hazardous Areas, correctly rated in terms of the Explosion Proof Classification of the equipment housings to which they are installed.

6.4 Termination

6.4.1 All cables will be terminated at field instrumentation, electrical equipment, field junction boxes, switchgear panels and control room marshalling cabinets according to manufacturers specifications, instrument hook-up diagrams and control system specifications as provided/approved by Transnet.

6.4.1.1 **Instrument Dekabon Cabling**

- Outer Dekabon armouring shall be stripped back to the entry point into the associated termination/junction box. Protrusion of cable sheath/armouring into termination/junction box (through the compression gland) shall be a minimum of 15mm and a maximum of 50mm.

- Cable pair inner aluminium foil shall be stripped back to the point at which the individual cores leave the PVC Trunking to be terminated onto the respective terminal rails. Ends of the inner foil shall be neatly taped/heat shrunk so as to prevent unravelling.

- Individual cable ends shall be sealed with the use of heat shrink tubing applied over the cable sheath/armouring at the point of entry into the termination/junction box/panel, in order to protect the cable and prevent the ingress of moisture.

- Both cable overall (drain wire) and individual screens shall be insulated with the use of appropriately sized green coloured sleeving, to prevent inadvertent contact with metallic surfaces.

- All individual cable cores (including spares) will be left long enough to accommodate 200mm slack, i.e. taking into account the routing via the trunking.

- Excess lengths of individual cable cores will be neatly folded and tied within the trunking provided. All spare cores shall be terminated into terminals so provided.

- Termination of individual cable cores in the termination strips will be such that all Control System related cabling will be terminated to one side of termination strips, whilst all field instrumentation/equipment cabling will be connected to the other side of termination strips.

In the case of Field Junction Boxes with dual terminal strips, multi-core cabling will be glanded in the centre of the gland plate and terminated into terminal rails provided, running from the centre PVC Trunking outwards. Individual Instrument cables will then be terminated into the terminal rails provided, running from the outermost PVC Trunking inwards.

In the case of Field Junction Boxes with single terminal strips, multi-core cabling will be glanded on the right side of the gland plate and terminated into terminal rails provided, running from the right hand side of the panel inwards. Individual Instrument cables will then be terminated into the terminal rails provided, running from the left hand side of the panel inwards.

- All cables connected to individual instruments/equipment will be provided with a single loop of minimum diameter of 150mm. All loops will be neatly strapped.

- All cores (including spares) will be terminated into allocated termination strips/rails in the respective Instrumentation, Termination and Field Junction Boxes

6.4.1.2 **Instrument PVC SWA Multi-core Cabling**

- Cable SWA armouring shall be stripped back to the entry point into the associated marshalling cabinet/junction box and shall be glanded in such a manner so as to ensure electrical continuity with the gland. When terminated in hazardous areas, cable armouring shall be bonded to the panel equi-potential bonding system via means of earthing rings provided as an integral part of the gland. Contact between the gland and the gland plate shall not be considered as sufficient for bonding purposes.

- Protrusion of cable inner PVC sheaths into the marshalling cabinet will be a minimum of 25mm and a maximum of 50mm.

- Cable inner aluminium foil shall be stripped back to the point at which the individual cores leave the PVC Trunking to be terminated onto the respective terminal rails. Ends of the inner foil shall be neatly taped/heat shrunk so as to prevent unravelling.

- Cable ends shall be sealed with the use of heat shrink tubing applied over the cable inner sheath at the point of entry into the termination/junction box/panel, in order to protect the cable and prevent the ingress of moisture.

- Both cable overall and individual screens shall be insulated with the use of appropriately sized green coloured sleeving, to prevent inadvertent contact.

- All individual cable cores (including spares) will be left long enough to accommodate 200mm slack, i.e. taking into account the routing via the trunking.

- Excess lengths of individual cable cores will be neatly folded and tied within the trunking provided. All spare cores shall be terminated into terminals so provided.

- Termination of individual cable cores in the termination strips will be such that all Control System related cabling will be terminated to one side of termination strips, whilst all field instrumentation/equipment cabling will be connected to the other side of termination strips.

In the case of Field Junction Boxes with dual terminal strips, multi-core cabling will be glanded in the centre of the gland plate and terminated into terminal rails provided, running from the centre PVC Trunking outwards. Individual Instrument cables will then be terminated into the terminal rails provided, running from the outermost PVC Trunking inwards.

In the case of Field Junction Boxes with single terminal strips, multi-core cabling will be glanded on the right side of the gland plate and terminated into terminal rails provided, running from the right hand side of the panel inwards. Individual Instrument cables will then be terminated into the terminal rails provided, running from the left hand side of the panel inwards.

- All cores (including spares) will be terminated into allocated termination strips/rails in the respective Instrumentation, Termination and Field Junction Boxes

6.4.1.3 **Electrical Power and Control Cabling (Low Voltage)**

- Cable SWA armouring shall be stripped back to the entry point into the associated equipment housing/termination box/panel and shall be glanded in such a manner so as to ensure electrical continuity with the gland. When terminated in hazardous areas, cable armouring shall be bonded to the panel equi-potential bonding system via means of earthing rings provided as an integral part of the gland. Contact between the gland and the gland plate shall not be considered as sufficient for bonding purposes.

- (Option 1) Cable inner PVC sheath shall be cut back at the point of entry into the equipment housing/termination box/panel, protrusion of the inner sheath into the associated switchgear cabinet/equipment housings shall be a minimum of 25mm and a maximum of 50mm. Heat shrink tubing shall be applied at the point of entry into the equipment housing/termination box/panel, in order to protect the cable and prevent the ingress of moisture.

  (Option 2) Where cables are glanded into panels, cable inner PVC sheaths may be taken directly into trunking/marshalling arrangements, with the inner PVC sheaths cut back at point of termination. Note that in this instance, heat shrink need not be applied at the point of entry into the cabinet.

- All individual cable cores (including spares) will be left long enough to accommodate 200mm slack, i.e. taking into account the routing via the trunking.

- Excess lengths of individual cable cores will be neatly folded and tied within the trunking provided.

- Termination of individual cable cores in the termination strips will be such that all Starter related cabling will be terminated to one side of termination strips, whilst all field cabling will be connected to the other side of termination strips.

- All cables connected to individual instruments/equipment will be provided with a single loop of minimum diameter of 150mm. All loops will be neatly strapped.

6.5 **Cable Core Lugging**

All individual cable cores will be neatly terminated. Appropriately sized lugs will be attached to all core ends, using the appropriate crimping tool (not side cutters or ordinary pliers). The colouring of crimps will match the size of the associated cable core. All cable lugs utilised shall comply with the following specification, unless otherwise specified in the Scope of Work attached to an Order:

- Instrument Cables - bootlace ferrules
- Electrical Power Cables -spade lugs for compression terminals, ring lugs for screw terminals (pin lugs are not acceptable)
- Electrical Control Cables - spade lugs for compression terminals, ring lugs for screw terminals (pin lugs are not acceptable)

6.6 **Cable Screening – Instrument Cabling**

6.6.1 **Individual Screens**

6.6.1.1 All Individual Instrument Cable Pair Screens shall be terminated into terminals provided within the Instrument Termination Boxes as well as the Field Junction Boxes, and shall be grounded to a common insulated earth rail to be provided in each of the Control System Marshalling Cabinets, alongside the Termination Rails provided. Individual Screens shall be terminated in such a manner so as to be continuous from the Instrument/Instrument Termination Box to the Control System Marshalling Cabinets i.e. individual instrument cables as well as multi-pair cables.

6.6.1.2 Individual screen terminals shall be insulated in the Termination Boxes and Field Junction Boxes provided, thus ensuring that the individual cable pair screens are not grounded at instrument/equipment ends, i.e. to prevent common mode noise. Where Instrument Cables terminate directly into Instrument housings, individual screens shall be cut back and insulated within the Instrument housing using heat shrink sleeving, to prevent inadvertent contact with any conducting surfaces.

9.6.1.3 All individual screen earth rails in the Control System Marshalling Cabinets will be connected to the existing panel Instrument Earth bar via means of a 25mm insulated earth cable, which shall in turn be connected at two points via means of PVC Cu 70mm^2 insulated earth cables (Yellow/Green in colour), to the Instrument Earth bar located within the control room.

6.6.2 **Overall Screens**

6.6.2.1 All Instrument Cable Overall Screens/Drain wires shall be terminated to insulated earth bars provided within the Field Junction Boxes, and shall be earthed to a common electrical earth bar to be provided in each of the Control System Marshalling Cabinets. Overall Screens /Drain Wires shall be cut back and insulated within the Instrument Termination Boxes and Instrument housings (where applicable) to prevent inadvertent contact with the Termination Box housing, utilising heat shrink sleeving. Overall Screens shall be terminated in such a manner so as to be continuous from the Instrument Junction Box to the Control System Marshalling Cabinets.

6.6.2.2 The electrical earth bar shall be earthed to the Cabinet Frame, and connected at two points via means of PVC Cu 70mm^2 insulated earth cables (Yellow/Green in colour), to the Electrical Earth bar located within the control room.

6.7 **Cable Screening – Electrical Cabling (Power & Control)**

6.7.1 All electrical cable screens/drain wires (where applicable) will be grounded to a common electrical earth bar to be provided in each of the Control System Marshalling Cabinets/Switchgear Cubicles. The electrical earth bar shall be earthed to the Cabinet Frame, and connected at two points via means of PVC Cu 70mm^2 insulated earth cables (Yellow/Green in colour), to the Electrical Earth bar located within the control and switchgear rooms.

7 ADDITIONAL REQUIREMENTS FOR EX IA/IB INSTALLATIONS

7.1 All I.S. (Ex ia/ib Intrinsically Safe) Installations shall be in strict compliance with IEC 79-14 Electrical Installations in Hazardous Areas, and in particular Chp 12 "Additional Requirements for type protection Intrinsic Safety", inclusive of the under mentioned items.

7.2 **Clause 12.2.**

In installations with Zone 1 and 2 classifications, IS apparatus and the intrinsically safe parts of associated apparatus shall comply with at least category "ib". Note that Transnet has standardised on category "ia" protection, and permission will need to be sought in writing for relaxation to "ib".

7.3 **Cables – General**

Where multi stranded cables are used in a hazardous area, the ends of the conductor shall be protected against separation of individual strands, by means of cable lugs.

Where cable screens are required, these shall be connected to earth at one point only, normally in the non-hazardous area. (Refer to Section 9.6 and 9.7 of this specification).

Cable armouring shall normally be bonded to the equi-potential bonding system via the cable entry devices (glands), at the end of each cable run. Where interposing Junction Boxes exist or other apparatus, the armouring shall be similarly bonded to the equi-potential bonding system at these points. In this regard and where earthing rings are provided as an integral part of the gland, use of these is recommended in serving this function. Contact between the gland and the gland plate shall not be considered as sufficient for bonding purposes.

Conductors of intrinsically safe circuits and non-intrinsically safe circuits shall not be carried in the same cable.

Conductors of intrinsically safe circuits and non-intrinsically safe circuits in the same bundle or duct shall be separated by an intermediate layer of insulated material or by an earthed metal partition. No segregation is required if metal sheaths or screens are used for intrinsically safe or non-intrinsically safe circuits. Note that Transnet has standardised on physical separation regardless of whether the cabling is screened or not, and permission will need to be sought in writing for relaxation.

7.4 **Cables – Marking**

Un-armoured Cables containing intrinsically safe circuits shall be marked. If outer sheaths are marked by colour, the colour used shall be light blue. Note that whilst armoured cabling is not required to be marked in terms of IEC79-14, Transnet has standardised on the principle of marking all cable outer sheaths carrying intrinsically safe circuits by colour (light blue), whether armoured or not, and that this will need to be complied with in all instances.

7.5 **Cable Insulation Tests**

All cables carrying intrinsically safe circuits shall be proven to be capable of withstanding an RMS AC test voltage of twice the normal voltage of the intrinsically safe circuit with a minimum of 500 V between the armouring and screens joined together and the individual conductors. Tests shall be conducted in accordance with manufacturer's specifications. Where no such method is available, tests shall be carried out as follows:

- Voltage shall be an ac voltage of sinusoidal waveform at a frequency of between 48 and 62 Hertz
- Voltage shall be derived from a transformer of at least 500 VA output
- Voltage shall be increased steadily to the specified value in a period of not less than 10 seconds and maintained for a period of not less than 60 seconds.

7.6 Cable Termination

All terminals shall be reliably separated from non-intrinsically safe circuits (for example by a separating panel or gap of at least 50mm). Terminals of intrinsically safe circuits shall be marked as such. Transnet has standardised on marking by colour - the specified colour being light blue. All terminals, plugs and sockets shall satisfy the requirements of IEC79-11: Sections 6.3.1 and 6.3.2 respectively (6mm creepage and clearance rules 4mm to earth).

7.7 Zone 1 Installations - Surge Protection

All equipment installed in Zone 0 areas and exposed to hazardous potential differences (e.g. lightning surges), shall have a surge protection device installed between each non-earth bonded conductor/core and the local earthed structure as near as is practically possible. The surge protection device shall be capable of diverting a minimum peak discharge current of 10kA (8/20 microsecond impulse according to IEC60-1, 10 operations). The bonding connection between the protection device and the structure shall have a minimum cross sectional area equivalent to 4 mm^2 copper.

Note that Transnet has extended these requirements to include all analogue transmitters installed in the field, whether in hazardous areas or not, and will need to be complied with in all instances.

8. CABLE JOINTS

8.1 MEDIUM VOLTAGE CABLE JOINTS

8.1.1 The contractor shall give the Engineer advance notice of his intention to do jointing of medium voltage cables to enable arrangements to be made for measuring and inspection.

8.1.2 The complete cable installation, including all joints shall be fully insulated from earth throughout.

8.2 LOW VOLTAGE CABLE JOINTS

8.2.1 The low voltage cable through joints shall be of the epoxy resin filled type. The low voltage joints shall be constructed according to manufacturer's instructions.

9. CABLE ROUTES

9.1 All low voltage cables and associated earth continuity conductors shall be installed as shown in layout drawings.

10. SURVEY OF ROUTE

10.1 The drawings showing the proposed cable route listed in the "Schedule of Drawings" shall not be taken to show the precise final cable route. The Contractor shall within 30 days after being awarded the Contract carry out a final route survey, which shall include digging test holes, and using the routes shown on the drawings as a general guide, to determine a suitable route.

10.2 The Contractor shall submit details of the cable routes selected in final survey to the Engineer for approval. No excavation of any section of the cable route shall commence until the Engineer has authorised the commencement of work on the section concerned.

10.2.1 After completion of all cable laying and jointing and before commissioning of any cable the Contractor shall carry out a final "as laid" survey of the cable routes and hand to the Engineer cable route plans. The cable route plans shall include the following information:

(i) Overall length of each cable.

(ii) Centre to centre distances between all joints and between final joints and terminations of each cable including auxiliary cables.

(iii) Accurate indications of the position of each cable joint and cable marker preferably by triangulation, i.e. indicating two distances to each joint or marker from structures not likely to be moved such as permanent buildings, bridge piers, etc.

(iv) Tables showing all information regarding each high-voltage cable necessary for cable fault location by the reflected pulse method.

(v) Soil thermal resistivity and temperature values as determined on final survey shown on the plans at the positions where they were determined.

11. EXCAVATIONS

11.1 Excavations shall be carried out in strict compliance with the specification for works on, over, under or adjacent to a railway line No. E.7 (July 1998) (Part 1) that forms part of the tender documents.

11.2 The procedure and the order of doing the work shall be subject to the approval of the Engineer.

11.3 The Contractor shall, before trenching commences, familiarise himself with the route and conditions on site. The Contractor shall be advised of any known buried services such as cables, pipes, etc., in the vicinity of the cable route. However, the Contractor shall at all times exercise care to ensure that any uncharted services are not damaged.

11.4 Power driven mechanical excavators may be used for trenching operations provided that they are not used in close proximity to other cables, water mains, or any other plant liable to be damaged by the use of such plant. Their use along sections of the route shall in each case be subject to approval of the Engineer.

11.5 Trenches shall be as straight as possible and each trench shall be excavated to the dimensions indicated in this specification. The Contractor shall provide shuttering for use in places where danger exists should the sides of the trench collapse. The strength of such shuttering must be adequate especially where railway tracks in proximity are concerned and the shuttering must be braced across the trench. Provision of shuttering will be paid for per metre length of shuttered trench.

11.6 The bottom of each cable trench shall be as firm as conditions permit and be of smooth contour.

11.7 In sections where the soil or water level conditions indicate that the cable trench will endanger rail tracks or any nearby structures, the Contractor must restrict the length of continuous open trench to a distance to be indicated by the Engineer.

11.8 The Contractor shall take all reasonable steps to ascertain if the cables will be liable to be subjected to chemical or other damage or electrolysis action and shall submit his recommendations for approval, of any precautionary measures to be taken, in such instances.

11.9 The material excavated from each trench shall be placed adjacent to the trench in such a manner as to prevent nuisance or damage to adjacent ditches, railway lines, drains, gateways and other properties and shall be stacked so as to avoid undue interference with traffic. Where, owing to certain considerations, this is not permissible, the excavated materials shall be removed from the site and be returned for refilling the trench on completion of laying.

11.10 Surplus material shall be disposed of by the Contractor at his cost. Where the possibility exists that railway line ballast may be fouled by excavated material or material brought on site, the Contractor shall take precautions as directed by the Engineer.

11.11 The Contractor shall not trench beneath any railway line without departmental supervision. Should the contractor wish to carry out such work the Engineer must be advised not less than 14 working days before hand to arrange for the necessary supervision. The cost of such supervision shall not be charged to the Contractor.

11.12 Prior to laying the cable, the trench shall be inspected thoroughly by the Engineer or his authorised representative to ensure that it is free from all objects likely to damage the cable either during or after cable laying operations. Cable laying shall not proceed unless the Engineer or his authorised representative is satisfied with the condition of the trench.

11.13 When trenching, the Contractor shall take all precautions necessary to prevent damage to any other cables, water mains, roads, pavements, drainage systems, building or any structure etc. Should any of the above be damaged by the Contractor's staff, it shall be reported immediately to the Engineer, who shall arrange for the necessary repairs. The Contractor is responsible for the cost of repairs.

11.14 Should it be necessary for any reason to remove accumulated water or other liquid from the trench, this shall be done by the Contractor at his expense and should be taken into account at the time of tendering. The Contractor is to provide all pumps and appliances required to carry out this operation. Water or any other liquid removed shall be disposed of without creating any nuisance or hazard.

14.15 Trenching procedure shall be programmed in advance with the Engineer and the programme approved by the Engineer shall not be departed from save with his consent.

11.16 Programming of trenching shall be on the basis of the Contractor giving the Engineer an assurance that any length of trench opened on a particular day will be back-filled and compacted to an adequately firm surface on the same day where possible. If it is anticipated that trenching will remain open for longer periods, the Contractor shall first obtain the approval of the Engineer. No new sections of trenching shall commence if previously uncompleted sections still exist. Under no circumstances may sections greater than 300 metres be opened.

Where such approval is given, the onus shall be on the Contractor to safeguard the works to the satisfaction of the Engineer during the extended period such trenches remain open. Where cables have already been laid, but not covered, steps shall be taken by the Contractor to protect cables and the personnel around.

11.17 The near side of any cable trench shall preferably not be less than 2500mm from any adjacent railway line. Approval from the Engineer will be required if the above clearances cannot be achieved. The conditions of clause 13.1 shall apply.

11.18 The removal of obstructions along the cable routes shall be subject to the approval of the Engineer and shall be paid for at pre-agreed rates.

11.19 The area traversed by the cable routes has been used for many years. It is inevitable that there will be uncharted services. On encountering any such service the Contractor shall promptly advise the Engineer who shall direct what action shall be taken.

11.20 Transnet Group Capital reserves the right to alter any cable route or portion thereof in advance of cable laying. Payment in respect of any additional or wasted work involved shall be at scheduled rates.

11.21 Any existing electrical cables obstructing the cable routes shall be removed or deviated as appropriate by the Contractor. The work shall be paid for at scheduled rates.

11.22 The bottom of the trench shall be filled with 200mm of suitable soil sifted through a 6mm mesh and levelled off. Only soil with a satisfactory thermal resistivity may be used for this purpose and ash which occurs on the route shall not be used. Where no suitable soil is

available in proximity, imported fill shall be arranged. The manufacturer's assurance is required that the current rating of cables is not reduced by the ground conditions.

12.0 TRENCH/EXCAVATION SPECIFICATION

Separate Trenches shall be supplied to cater for the following cable types:

12.1 ELECTRICAL HV/MV TRENCHES

Trench Dimensions	:	1200 mm deep by 500 mm wide (two cables), add300m width for additional cables
River Sand Bedding	:	PVC Piping – 75 mm above pipe, 50mm under pipe
	:	Direct Burial – 100 mm
Identification	:	PVC or Concrete Interlocking Tiles at a depth of 350mm
Cable Markers	:	Concrete with engraved anodised aluminium ID plates Cable Marker Colour – Brilliant Green
Cabling	:	Medium and High Voltage Power Cabling > 400 VAC
Separation	:	400 mm (LV cabling), 800mm (Instrument cabling)

12.2 ELECTRICAL LV TRENCHES

Trench Dimensions	:	800 mm deep by 300 mm wide
River Sand Bedding	:	PVC Piping – 75 mm above pipe, 50mm under pipe
		Direct Burial – 100 mm
Identification	:	Polythene Marker Tape (150mm wide, yellow and Marked with the words “Electric Cable” at a depth of 350mm
Cable Markers	:	Concrete with engraved anodised aluminium ID plates. Cable Marker Colour – Black
Cabling	:	Low Voltage Power Cabling 400 VAC/230 VAC (e.g. Actuators, Aux Motors, DB circuits)

	:	Control Cabling (E.g. MV Breaker Inter-tripping cables, Actuator control signals, Aux Motor local stop/start panels etc.)
Separation	:	400 mm (HV/MV cabling), 800mm (Instrument cabling)

12.3 **INSTRUMENT TRENCHES**

Trench Dimensions	:	500 mm deep by 300 mm wide
River Sand Bedding	:	PVC Piping – 75 mm above pipe, 50mm under pipe
	:	Direct Burial – 100 mm
Identification	:	PVC Tiles / Polythene Marker Tape (150mm wide, yellow ked with the words "Electric Cable" at a depth of 350mm
Cable Markers	:	Concrete with engraved anodised aluminium ID plates Cable Marker Colour – Light Blue
Cabling	:	Instrument Multi-core & Single Pair Cabling (IS and non IS)
Separation	:	800mm (HV/MV/LV Electrical cabling)

13. CABLE LAYING

13.1 CABLES BURIED UNDERGROUND.

13.1.1 HV, MV, LV AND Instrument cables shall be spaced as indicated in Table 1 below. Pilot cables shall be laid beside the associated power cable. Cables crossing beneath railway tracks, roads, etc., shall be enclosed in 150mm diameter uPVC pipes. Where more than one length of pipe is required for a crossing, uPVC couplings with PVC glue, shall be used to prevent water from penetrating the joint. Cable pipes must maintain or exceed the specified cable spacing.

Table 1

CABLE	MINIMUM SPACING BETWEEN CABLES
MV TO MV	300mm

MV TO LV	400mm
LV TO LV	300mm
MV TO instrumentation	800mm
LV TO instrumentation	800mm

13.1.2 All pipes laid beneath the railway lines, roads, pavements shall be laid with their tops not less than 900mm below the formation level, and shall where possible extend at least 2000mm on either side of the centre of the outer most line. Where there is more than one line crossed and in the case of roads and pavements at least 900mm on either side of the road and 1 or pavement. All pipes shall be graded for water drainage the required grade is 75mm in 30m.

13.1.3 All Low voltage cables shall be laid at a depth of 750mm. All cable depth measurements shall be made to the top of the cable when laid direct in the ground, otherwise to the top of the duct concerned.

13.1.4 Except where ducts, tunnels or pipes are provided and unless instructed to the contrary by the Engineer, the Contractor shall lay the cables direct in the ground.

13.15 Rollers may be used during the laying of cables, but they shall have no sharp projecting parts liable to damage the cables. They shall be carefully placed in the trench or duct in such a manner that they will not readily capsize during cable laying operations.

13.1.6 The Contractor shall ensure that all cable is laid in the same direction. No crossing of conductors inside through joints or end boxes will be permitted.

13.1.7 Where cables have to be drawn around corners, skid plates shall be used for this purpose and these plates shall be well lubricated. The skid plates shall be securely fixed between rollers and shall be constantly examined during the cable laying operations.

13.1.8 Cable shall be visually inspected for damage during and after laying.

13.1.9 Cable pulling and laying shall preferably be done manually whenever possible. Mechanical means such as winches and the like may only be used subject to the Approval of the Engineer. No cable shall be subjected to a tension exceeding that stipulated by the cable manufacturer.

13.1.10 In the event of mechanical means of cable pulling being approved, the Contractor shall establish means of communication between the operator of the winch or other pulling device and the persons tending the drum from which the cable is being run off, to the satisfaction of the Engineer.

13.1.11 The contractor shall be wholly responsible for making his own arrangements for transporting all materials to and from and on the working sites.

13.1.12 At locations where cables run under concrete bridges, the cables shall be supported on suitable brackets secured on the side of concrete wall. These brackets shall be spaced a

maximum of 500mm apart. Brackets and fixing material shall be of robust design and shall meet with Engineer's approval. Drawing of proposed bracket shall accompany tender. Brackets shall be galvanised in accordance with SANS 121:1999, and thereafter painted to the satisfaction of the Engineer.

14.0 CABLES LAID IN DUCTS, CABLE TRAYS AND LADDERS

14.1.1 Cables installed in ducts shall be supported by cable ladder installed along the walls of the ducts or installed on the duct floor. If the cable ladder is installed on the duct floor, it shall be supported at +/- 50mm from the duct floor.

14.1.2 Cables installed in perforated cable trays and cable ladder shall be secured by means of heavy duty cable ties, cable clamps, etc.

14.1.3 Where medium and low voltage cables share the same wire-ways a reasonable space shall be left between the medium voltage and low voltage cables.

15.0 CABLE SLEEVING

15.1 All areas subject to vehicle traffic, rail crossings and paved areas shall be sleeved.

15.2 Sleeves shall be designed and installed so as to ensure 25 % spare capacity.

15.3 Sleeve Specifications

Material	:	PVC or PHD Polyethylene
Dimensions	:	100 mm OD min
Standards	:	DIN EN 61386-24: 1994 , BS EN50086-2-4:1994

16.0 DRAW BOXES

16.1 Where cable sleeves are utilised and to facilitate the hauling of cables, brick draw boxes shall be provided at all trench junctions, complete with concrete slab, as detailed below:

Draw box Dimensions (min)	:	Internal 450 mm square, 3 courses of stock brick deep.
Base & Top	:	Concrete 50mm thick

17. COVERING, BACKFILLING AND REINSTATEMENT

17.1 Filling in of trenches shall not be commenced until the Engineer or his authorised representative has inspected and approved the cables in situ in the section of trench concerned. Such inspection shall not be unreasonably delayed.

17.2 Where in the opinion of the Engineer, the soil on site is unsuitable for riddling or backfilling, the Contractor shall arrange for the importation of approved material. A 75mm thick layer of soil sifted through a 6mm mesh shall be laid above the high-tension cables and consolidated by hand ramming only. The conditions of clause 13.20 apply in this case also.

17.3 All excavations made (whether for the purpose of cable laying, joint bays or trial holes) shall be back-filled in 150mm layers, the earth in each layer being well rammed and consolidated and sufficient allowance being made for settlement. The back-filling shall be completed to the satisfaction of the Engineer.

15.4 The refilled trench shall be maintained by the Contractor at his expense in a thoroughly safe condition for the duration of the contract. In the case of tarmac surfaces, until such time as this surface has been restored.

17.5 All backfilling of road crossings shall be mechanically rammed by means of approved type of mechanical power driven rammer.

17.6 The replacement of made up surfaces, such as roads, pavements, tarred aprons, verandas, floors, etc., necessitated by trenching or other works shall be arranged by the contractor at his cost. The price thereof shall be included in the tender price.

17.7 Concrete cable protection slabs shall be laid on top of the 75mm layer of soil referred to in clause 15.2 before the trenches are backfilled. Cable protection slabs shall be laid close butted, convex end to concave end, directly above each cable throughout the underground portion except where otherwise protected such as by pipes, etc. Three coloured slabs to drawing PPD-PA-9 shall be provided to give the indication of the route in the case of a change of direction. Only unbroken cable protection slabs, and those actually laid will be paid for.

17.8 When back filling of cable trench has reached a level, after consolidation, approximately 150mm below the normal level of the surface of the surrounding area the Contractor shall lay a continuous plastic cable warning tape directly above each cable for the full length of the cable trench before completing the backfilling.

17.9 Concrete cable markers shall be provided and installed by the Contractor at his cost. The price thereof shall be included in the tender price. Initial cable markers shall be installed as close as possible to cable terminations, thereafter at approximately 60m intervals and at cable joints, also on either side of crossings of oil pipelines and at ends of underground cable pipes.

17.10 Changes of direction and joints in cable runs shall be indicated by installing two markers at such positions in an understandable manner to be finalised on site. The markers shall be coloured orange with oxide mixed into the concrete. Cable markers shall project approximately 25mm above normal ground level except where projecting cable markers could be a hazard to pedestrians such as in shunting yards, walkways, pavements, etc. In such cases the cable markers shall be flush with the surface.

17.11 If more than one cable is laid in one trench, only one row of cable markers shall be placed on the centre line of the trench to define the general route of the cables.

18. CABLE TESTING AND TEST DATA

18.1 All tests on completed cables shall be carried out in the presence of a representative of Transnet Group Capital. Not less than 14 working days notice of the Contractor's intention to carry out such tests shall be given to the Engineer.

18.2 On completion of the jointing and termination of cables, the 11kV cables are to be subjected to the test laid down in paragraph E-1.4 of Appendix E of SANS 1339:2015 and the low voltage type cables to be tested for insulation and loop resistance.

18.3 The anti-electrolysis insulation of each 11kV cable run complete, shall withstand for 1 minute, a test voltage of 10kV D.C., applied from the cable armouring to earth. The bedding shall withstand a test voltage of 4kV D.C. between screen and armouring for 1 minute.

18.4 As a graphite coating is required to be applied to the PVC oversheath (in accordance with British Standard), a D.C. voltage test will be carried out on all cables after installation. The D.C. voltage test can only be carried out on the installed system if the joints are suitably insulated from earth, otherwise the D.C. voltage test should be carried out prior to jointing.

18.5 The contractor shall obtain written confirmation from the manufacture of all cables, joints and terminations -etc. that the test that Transnet Group Capital requires the contractor to carry out in terms of this specification meets with the manufacturers approval. Such confirmation must be obtained prior to any, tests commencing.

18.6 The electrical Contractor shall on completion of the tests submit three copies of all test Results. The costs of all the tests mentioned above shall be borne by the contractor

18.7 In addition the cable manufacturer shall provide test sheets of each manufactured cable drum length together with the cable drum numbers which shows all the test results.

18.8 Transnet Group Capital reserves the right to carry out any further tests deemed necessary itself, using either the Contractor's instruments and cable, or its own, or both. The costs of such tests shall not be charged to the Contract.

18.9 **Cable Testing – Low Voltage Cables (< 1 kV)**

Each individual core of all cables (including spares) will be checked for continuity and insulation breakdown, in accordance with SABS 150 **(**PVC):

- Insulation Resistance shall be measured with a 1000V Megger and the readings tabulated And certified.
- Similarly, earth continuity resistance shall be measured and recorded.
- All cables will be checked for correct termination.

18.10 **Cable Testing – Medium Voltage Cables (< 22 kV)**

Each section of laid and jointed cable shall be tested, in accordance with SANS 97 (PILC/SWA):

- Insulation Resistance shall be measured with a 1000V Megger, followed by the relevant
  Pressure test .Readings shall be tabulated and certified.
- AC test voltage must be applied to each phase in turn for one minute, or alternatively the DC test voltage for fifteen minutes .Leakage current shall be measured and recorded for Each test.
- All cables will be checked for correct termination.

19. MEASUREMENTS OF CABLES

19.1 All measurements for payment purposes shall be made jointly by representatives of the Contractor and Transnet Group Capital and shall be agreed and approved by both parties.

19.2 Measurements of cable length shall be made from centre to centre of cable joints and to the cable ends and will exclude any wastage due to jointing and terminating.

19.3 Measurements of trench width and depth shall be made to the nearest 50mm and shall not take into account subsidence or unnecessarily large excavations. No allowance shall be made where trenches have to be widened at the bottom to accommodate cables, cable Joints and protection slabs.

END

SPECIFICATION FOR EARTHING AND THE PROTECTION OF BUILDINGS AND STRUCTURES AGAINST LIGHTNING.

REVISIONS		
REV	DATE	APPROVED
01	MARCH 2017	S.Sewdayal

1. Scope
2. Standards, Specifications and Codes of Practice
3. Service Conditions
4. Equipment and Materials
5. Lightning Protection Requirements
6. Design of Lightning Protection
7. Installation
8. Statutory Requirements
9. Responsibility of work
10. Applicable Information
11. Protection against Corrosion
12 Earthing Code of Practice
13 Inspection and Guarantee

1.0 SCOPE

1.1 This specification covers Transnet Group Capital requirements with respect to the protection of buildings and structures against lightning and the requirements for air terminal systems, down conductors and earthing of installation of this specification

1.2 This specification applies to assessing, testing and upgrading of existing lightning protection systems and earthing on existing buildings and structures.

2.0 STANDARDS, SPECIFICATIONS AND CODES OF PRACTICE

2.1 The following publications (latest editions and amendments) are referred to herein.

South African National Standards and International Electro-technical Commission Standards

2.2 In designing the lightning protection system (LPS), the design process as discussed in SANS 62305-3, section E.4 shall be followed. Furthermore, for the design or upgrade of LPS for the existing structures, the contractor/ designer must evaluate the need for protection and cost effectiveness of implementing the protection measures as per the procedure discussed in SANS 62305-2.

2.3 The requirements of the materials, design, layout, fabrication, assembly, erection, examination, inspection and testing of an earthing system on site shall be in accordance to the relevant sections of codes listed below:-

SANS 10313	-	The protection of structures against lightning.
SANS 10089-1	-	Electrical Code for Petroleum Industries
SANS 10121	-	Cathodic Protection of Buried and Submerged Structures
SANS 10142	-	Code of practice for the wiring of premises
SANS 10123	-	The Control of Undesirable Static Electricity
SANS 10198-12	-	Installation of Earthing System
SANS 10199	-	The design and Installation of an Earth Electrode
SANS 10200	-	Neutral Earthing in Medium Voltage Industrial Power Systems
SANS 10292	-	Earthing of Low Voltage Distribution Systems
SANS 1063	-	Earth Rods and Couplers
SANS IEC 61000-5	-	Electromagnetic Compatibility (EMC) Part 5: Installation and Mitigation Guidelines Section 2: Earthing and Cabling
SANS IEC 61312-1	-	Protection against Lightning Electromagnetic Impulse (LEMP) Part 1: General Principles
SANS IEC 61312-2	-	Protection against Lightning Electromagnetic Impulse (LEMP)

		Part 2: Shielding of Structures, Bonding inside Structures & Earthing
SANS IEC 61312-4		Protection against Lightning Electromagnetic Impulse (LEMP) Part 4: Protection of Equipment inn Existing Structures
SANS IEC 61024-1	-	Protection of Structures against Lightning Part 1: General Principles
SANS IEC 61024-1-1	-	Protection of Structures against Lightning Section 1: Guide A – Selection of Protection Levels for Lightning Protection Systems
SANS IEC 61024-1-2	-	Protection of Structures against Lightning Part 1-2: Guide A – General Principles Guide B – Design, Installation, Maintenance and Inspection of Lightning Protection Systems
SANS IEC 62305 -1	-	Protection against Lightning Part 1: General Principles
SANS IEC 62305 -2	-	Protection against Lightning Part 2: Risk Management
SANS IEC 62305 -3	-	Protection against Lightning Part 3: Physical Damage to Structures and Life Hazard
SANS IEC 62305 -4	-	Protection against Lightning Part 2: Electrical and Electronic Systems within Structure

OCCUPATIONAL HEALTH AND SAFETY ACT OF 1993 (ACT 85 OF 1993).

2.4 Statutory Requirements

a. The contractor shall ensure that the installation satisfies the requirements of all relevant South African Statutory Regulations.

b. Where applicable, equipment items shall carry the SABS mark to demonstrate compliance with the regulations.

3.0 SERVICE CONDITIONS

3.1 The cable shall be designed and rated for continuous operation under the following conditions :-

3.1.1 Ambient/Environment Conditions :

3.1.1.1	Altitude	:	Sea level.
3.1.1.2	Ambient temperature	:	-5° C to +45° C (daily average +35° C).
3.1.1.3	Relative humidity	:	As high as 96%

.

3.1.1.4 Lightning conditions : Severe, with a maximum lightning ground flash density (Ng) Refer to SANS 10313, Table C.1 for specific Ng values

3.1.1.5 Exposure conditions : Salt laden, industrial atmosphere as well as hazardous gases and dust atmosphere.

3.1.1.6 Electrolytic corrosion conditions prevail in all the areas owing to the proximity of direct current traction system and cathodic protection schemes.

4.0 EQUIPMENT AND MATERIALS

4.1 Equipment and materials to be used, shall be of high quality, and shall comply with all relevant specifications, codes as mentioned in this specification as well as the Occupational Health and Safety Act of 1993(Act 85 of 1993).

4.2 Where equipment and material does not comply with the relevant specifications it shall be submitted to Transnet Project's Engineer for approval.

4.3 All materials used for the lightning protection system shall withstand the electric and electromagnetic effects of lightning current and predictable stresses without being damaged.

4.4 Materials and sizes shall be chosen bearing in mind the possibility of corrosion of either the lightning protection system or the structure to be protected.

4.5 Components of the lightning protection system may be manufactured from the materials listed in SANS 10313, provided they have sufficient electrical conductivity and corrosion resistance

5.0 LIGHTNING PROTECTION REQUIREMENTS

5.1 The contractor shall carry out the installation in accordance with SANS 10313: Code of Practice for the protection of structures against lightning and the requirements of this specification.

5.2 Where the local supply authority requirements differ from those specified herein Transnet Group Capital's Electrical Engineer shall be approached for a decision.

5.3 All equipment and material shall comply with the relevant National or International standard specification. Where equipment does not comply it shall be submitted to the Transnet Group Capital Electrical Engineer for approval.

5.4 The system of protection will be finials/air terminals, down conductors and earth spike or roof conductors, down conductors and earth spike.

5.5 The earth resistance for separate earth electrodes if down conductors are not connected to a ring earth shall be not exceed the following;

Rt = 10 Ohm for category A structures
Rt = 15 Ohm for category B and C structures.

6.0 DESIGN OF LIGHTNING PROTECTION

The designer of lightning protection shall take into consideration the following principles and requirements during the design of the system.

6.1 GENERAL PRINCIPLES

6.1.1 Basic Principles of Lightning Protection: the requirements of the basic principles of lightning protection as detailed in SANS 10313 shall be taken into consideration to ensure proper protection of structures against lightning.

6.1.2 Evaluation of Risk: The risk of lightning stroke shall be evaluated as described in SANS: IEC 62305-2, and the lightning protection system shall be designed to ensure that the loss or injury to human and loss of service to public is below minimum allowable values specified in SANS: IEC 62305-2.

6.1.3 Effective height of a structure (He): The effective height of the highest point shall be determined by considering the average height of building, trees and structures and land profile of the surrounding area.

6.1.4 Ground flash density (Ng): The ground flash density (Ng) for general buildings, structures and installations shall be estimated from the average ground flash density given in table C.1 of SANS 10313 as a general guide. For important structures and installations the value of the ground flash density shall be determined on the basis of at least 5 lightning years, or from existing records

6.1.5 Number of flashes to structure per 100 year (Nt): The number of flashes to structures per 100 year shall be determined taking into consideration type and the height of the structure as described in SANS 10313.

6.2 HAZARD CATEGORY

6.2.1 Buildings and structures where lightning protection system will be installed shall be categorised prior to the installation. Hazard categories are based on the nature of the building, its content and occupancy.

6.2.2 The Hazard categories are classified for the protection of buildings structures against lightning. This classification is dependent on location of the structure to be protected, the classifications are categorised as below;

Category A: High Hazard

Category A1: Structures and areas containing explosives of Category Z.

Category A2: Structures and areas classified as
a) Division 0 areas in accordance with SANS 10089: Part II, or
b) Class I, Division 0 locations in accordance with SANS 10108-2.

Category A3: Strategic control and communications installations such as airport towers

Category A4: Thatched-roof structures of historic values or that contain irreplaceable works of art or like values.

Category B: Medium Hazard

Category B1: Structures and areas containing explosives of Category X or Y.

Category B2: Structures and areas classified as
a) Division 1 or 2 areas in accordance with SANS 10089, Part II, or
b) Class I, Division 1 or 2 locations, or Class II, Division 1 location in accordance with SANS

10108.

Category B3: All structures not included in Category A and to which the public normally has access or which are of historic value.

Category B4: Large temporary structures used for exhibitions and entertainment.

Category B5: Thatched roof dwelling houses.

Category B6: Communications towers, water towers and reservoirs.

Category B7: Caravans and Yachts.

Category B8: Buildings and areas used for livestock, fuel or flammable material.

Category C: Low Hazard

Category C1: Small buildings that are infrequently occupied.

Category C2: Dwelling houses other than thatched-roof houses.
Category C3: Farm buildings, other than those included in category B8.

6.3 ZONES PROTECTION AND SHIELDING ANGLES

6.3.1 The zone of protection shall be the area covered by either one of the following types of protection:

a) Single Vertical air terminal
b) Single horizontal air terminals
c) Area between two or more air terminals
d) Area between roof conductors.

6.3.2 The shielding angles Þ and ß are given in SABS 10313, Code of practice for the protection of buildings and structures against lightning.

6.3.3 The zone protection for Shielding Angles on Steep Slopes and High Ridges is not considered effective beyond a horizontal distance from the nearest air terminal of greater than 2He, where He is the effective height of the part of the air terminal above its immediate surroundings.

6.3.4 In roof areas away from the edges of tall structures (generally of He > 50m), shielding angles given in SANS 10313 can be used appropriate to hazard category of the roof area so protected and the effective height He of the air terminal above the roof area.

6.4 SELECTION OF AIR TERMINAL

6.4.1 Mast Protection: An air terminal consisting of one or more masts that cover the structure or area to be protected with the appropriate shielding angle will, with the possible exception of a few weak lightning strokes, successfully intercept lightning strokes.

6.4.2 Air Terminals as Part of the Structure: An air terminal as part of the structure may be one or more of the following:

a) A continuous metal roof.

b) A metal roof structure supporting a metal roof
c) The metal reinforcement in the roof of a reinforced concrete structure with peripheral conductors and finials where necessary.
d) Roof conductors and finials, where necessary, on a non-conducting roof.
e) Finials in chimney, gable ends, parapet walls, etc.

6.4.3 Air Terminal Systems For Category A Hazards: The protection is based on the principle that a primary air terminal system must be provided for the interception of major lightning strokes with, if necessary a secondary air terminal system for the interception of those weak lightning strokes that might penetrate the protection of the primary air terminal system. The secondary air terminal system shall not be intended to carry currents of major lightning strokes.

One of the following lightning protection systems shall be used as detailed in SANS 10313.

- Mast protection used as a primary air terminal
- Metal roof used as primary air terminal system
- Reinforced concrete structure used as primary air terminal system.

6.5 MASTS AND CATENARY CONDUCTORS OVER THE STRUCTURE TO BE PROTECTED

6.5.1 GENERAL

6.5.1.1 A lighting protection system consisting of free standing masts separate from the structure provides the highest degree of protection, subject to the correct positioning of the mast and to the correct choice of shielding angle.

6.5.1.2 The number and height of masts (and, where necessary, the provision of the catenary conductors between the masts) shall be based on cost, aesthetics, shielding angles and mechanical consideration

6.5.2 CLEARENCE FROM STRUCTURES

6.5.2.1 A safe clearance distance shall be kept between the mast and the catenary conductor strung between the masts and the structure to be protected by the mast or the catenary conductor. The clearance distance depends to various factors detailed in SANS 10313.

6.5.2.2 Where a common earth electrode is provided for mast and structures in close proximity, the following clearance distance “d” shall be maintained with a minimum of 100 m.

a) Between the mast and any point of structure: $d \geq 0{,}06.h$ m.
b) Between the catenary conductor and any part of the upper surface of the structure: $d \geq 0{,}1.(L/2)$ m for Category A hazard, and $d \geq 0{,}06.(L/2)$ m for Category B and C hazards.
c) Between a network of conductors and any part of the upper surface of the structure:
$d \geq 0{,}1.(D + (L – D)/N)$ m for Category A hazard, and
$d \geq 0{,}06.(D + (L – D) / n)$ m for Category B and C hazards.

Where *L* = *length of path measured from the base of one mast along the catenary conductor to the base of the other mast between which the catenary conductor is suspended, m.*
D = *spacing between the mesh of the network measured along the catenary conductor, m*
h = *height of structure, m*
n = *number of cross bonds between two catenary conductors.*

6.5.2.3 Where the earth electrode of a mast is separate from the metal water main, other services or the earth electrode of a structure, the following clearance distance "d" shall be maintained with a minimum of 1.00 m:

a) Between the mast and any point of the structure: d ≥ 0,06.h + 0,1. Rs m.
b) Between a horizontal catenary conductor and any part of the roof of the structure: d ≥ 0,06.)L/2) + 0,1. Rs m.

Where Rs = numerical value of the earth electrode resistance of the mast or, where masts are connected together by a catenary conductor, of the mast thus connected together, measured in ohms.

6.5.2.4 The minimum clearance distance "d" where the structure has no earth electrode and has limited water or electricity supply, shall be maintained within the following minimum clearance distances:

a) d ≥ 1, 00 m between the mast or catenary conductor and any part of the structure.
b) D ≥ 0,1 Rs m between the mast and any water pipe or electric cable, whether buried or above ground unless the mast electrode is bonded to the metal pipe of the underground water main. If Rs is not known, the clearance distance D must be at least 3m.

6.5.3 MAST PROTECTION IN THATCHED ROOFS

6.5.3.1 Thatched roofs shall be protected by one or more free-standing masts only. The zone of protection of the masts must include gable ends, chimneys, antennas, vent pipes and any other metal objects.

6.5.3.2 Telephone wires, overhead services connections to the electricity supply, or other overhead metal wires or pipes, shall not enter the structure through or close to the thatch.

6.5.3.3 On remote chimneys or gable ends close to imaginary surface of the protection zone, install a finial and down conductor well away from the thatch.

6.5.3.4 Metal wires and metal-coated insulating sheets used in the construction of the thatched roof shall be bonded together and to the earthed metal water main or electrode of the structure.

6.5.3.4 Where metals used in the construction of the roof are not bonded and earthed, a minimum clearance distance c of 1m between metals of the roof and water pipes, vent pipes, tanks, gas pipes, antennas, telephone and bell wires, bugler alarms and electrical wiring and conduits shall be maintained.

7.0 INSTALLATION

7.1 AIR TERMINALS ON THE STRUCTURE TO BE PROTECTED.

7.1.1 The purpose of an air terminal on a structure to be protected shall be to intercept lightning strokes at preferential points of an air terminal, thereby:

a) Minimizing penetration of a lightning discharge current which could have followed a random path in the roof structure with possibility of a resultant fire.
b) Preventing the loosening of masonry or the cracking of precast panels or reinforced concrete.

7.1.2 The selection of the air terminal system and the position of down conductors shall be so selected such that at any likely point of incidence of lightning stroke, there are at least two parallel paths for the current to flow to earth.

7.1.3 Parallel routes shall not be necessary in the following cases.

a) An air terminal on a small structure having only one prominent point of incident.
b) Dead-ended conductors, i.e. those conductors of the air terminal for which it is not feasible to provide a connection to a down conductor.

7.1.4 Where a peripheral roof conductor is required for the protection of the outer side edge of a structure, the conductor shall be installed as close to the edge as is practicable (preferable not more than 100mm from the outer edge)

7.1.5 Where buttresses or parapet walls are not already equipped with an air terminal in the form of continuous metal cladding or similar metalwork and peripheral conductors are to be provided at an effective height He of 15 m or more, finials shall be added on all exposed outer corners and at intervals not exceeding 30 m between outer corners. The finials shall be placed as close as possible to the outer edge, and so position the down conductors such that their connection to the peripheral conductor is close to the finial.

7.1.6 Concrete masonry chimneys or gables ends that are not protected with the appropriate shielding angle of another structure shall be protected by means of a finial or metal cap. Where the chimney or gable end is of masonry, a peripheral conductor along the gable or around the chimney shall be used instead.

7.1.7 Where it is not feasible to provide a down conductor at one end of an air terminal or a connection to another part of the lightning protection system, a dead ended conductor shall be used provided it is not longer than 10 m an generally flows a horizontal or downward course from the free end to end connected to the remaining part of the lightning protection system.

7.1.8 Where a dead-ended conductor partly flows an upwards course, the dead-ended conductor shall be not longer than 7.5 m. If the top of the protected part is considerably lower than the ridge conductor to which the dead-ended conductor is connected, a finial shall not be used at the free end, unless it is required for the enhancement of the protection of the surrounding area, in which case an additional down conductor at the free end is recommended.

7.1.9 Metal gutters shall be bonded along the outside perimeter of the roof to the nearest down conductor, or to the metal of the roof, where applicable.

7.2 METAL ROOFS AND NON-METAL ROOFS SUPPORTED BY METAL ROOF STRUCTURES

7.2.1 Structures having roofs covered with electrically continuous metal sheets do not require air terminals, but shall be earthed by down conductors.

7.2.2 Sheet metal separated from each other by insulating strips or by epoxy or plastic coating s, may be regarded as providing continuous metal roof. However where sparking between such roofing is considered undesirable because of magnetic interference, all sheets adjacent to the ridge conductor or peripheral conductor shall be bonded.

7.2.3 A non-metal roof consisting of non-combustible roofing material held by metal fasteners to a roof supporting structure of metal construction may be considered to be a metal if the metal structure is earthed by down conductors, or supported by earthed metal columns, and spacing between roof beams does not exceed 15m for Category B and C hazards.

7.3 REINFORCED CONCRETE STRUCTURES

7.3.1 Reinforced steel shall not be used as parallel paths to enable lightning discharge current to flow safely to general mass of the earth.

7.3.2 Air terminals or finials and where necessary peripheral conductors shall be installed, taking into consideration the likely points of incidence of lightning and the path of the current through internal down conductors.

7.3.3 Where the outer support columns of the structure may be regarded as continuous from roof to basement, the peripheral and air terminal conductors shall be bonded to the internal or external down conductors.

7.3.4 Peripheral conductors and finials shall be used for medium height structures with reinforced concrete. Where the peripheral conductor is on a parapet wall that surrounds a metal roof or the air terminals of other structures, the other air terminal shall be connected to the peripheral conductor, preferably close to a down conductor. The peripheral conductor and other air terminal shall be connected to internal or external down conductor.

7.3.5 If the upper edge of the structure with chimneys and cooling towers and of medium height is not metal clad, horizontal conductors around the upper circumference of the structure, equipped with finials at intervals of not more than 15 m, with a minimum of two shall be installed.

7.3.6 On tall reinforced concrete structures, one of the following shall be installed in order to increase the protective efficiency, depending on the risk and the degree of protection required, height and slenderness of the structure:

a) At intervals of not more than 10 m, install oblique finials along the upper perimeter, pointing upwards and outwards such that the tip of each finial points outwards at an angle of 30° to the vertical through the outer edge of the structure, and is at least 400mm above the structure, each finial being connected to a peripheral conductor.
b) A horizontal conductor that follows the contour of the structure and that is so raised on oblique struts of length at least 500 mm that the conductor is displaced outwards at an angle of 30° to the vertical through the outer edge of the structure.
c) Oblique finials spaced as in (a) above, positioned on a horizontal conductor arranged as in (b) above and in line with the oblique struts, each finial pointing upwards and outwards at an angle of 30 to the vertical through the outer edge of the structure, and of length such that the tip of the finial is at least 800 mm above the outer edge of the structure.

Where the structure is slender, an air terminal as in (b) or (c) above is to be preferred to that in (a)

The air terminal shall be bonded to the internal down conductor at intervals not exceeding 10m , or where the circumference exceeds 60 m, at appropriate intervals not exceeding 30m with a minimum of six bonds.

7.4 FINIALS AND ROOF CONDUCTORS

7.4.1 Roof conductors and finials shall be installed along the ridges of the roof and on other projections, in accordance to SANS10313 – code of practice for the protection of structures against lightning.

7.4.2 Protruding metal objects shall be bonded in a horizontal or in a downwards direction to the nearest roof or down conductor where the distance between the metal object and the conductor is less than 7.5m otherwise provide a separate down conductor. In all cases where the pitch of the roof is less than 30°, metal gutters and roof conductors shall be bonded or eaves conductors shall be provided.

7.4.3 In the case of large roofs of non-conducting material, additional conductors shall be installed across the surface of the roof, perpendicular to the long side of the roof and at extremely equal spaces not exceeding 15m. If the width of the roof exceeds 15m install conductors to form a grid at approximately equal spacing not exceeding 15m in either direction.

7.4.4 Roof conductors, finials and roof conductor grids shall be connected to the closest down conductor.

7.5.5 All roof conductors shall be manufactured from SABS approved single-core bare aluminium conductor with a minimum cross sectional area of 25mm^2.

7.5 DOWN CONDUCTORS

7.5.1 Down conductors shall be installed close to the point of the air terminal that are most likely to be struck by lightning and preferably run them vertically along the most direct route to the earth electrode.

7.5.2 At least two down conductors shall be provided in a building, such that in plan view no point of a structure is more than 15m from the nearest down conductor , except for masts and small structures having only one prominent point of incident, such as rondavels, these need only one down conductor.

7.5.3 Each down conductor shall be supplies with a separate earth electrode. This will reduce the current flow per down conductor, resulting in a lower voltage drop across the down conductor caused by the surge impedance of the conductor.

7.5.4 Down conductors shall not be placed close to doorways or entrances to buildings. Maintain a minimum clearance distance of the order of 1 m from the door and window frames, balustrades and other large metal objects.

7.5.5 Where down conductors deviate from a vertical route due to sharp bends and loops required to carry a conductor over eaves and parapet walls, shall be permitted, provided that all requirements stated in SANS 10313, are met.

7.5.6 Steel columns and internal metal storm water drain-pipes shall be used as down conductors only if they are joined by screwing, bolting or welding.

7.5.7 External metal stair cases, fire escapes or other large frames shall be used as down conductors if they are electrically continuous over their full height. If not electrically continuous they shall be bonded to the lightning protection system at the top or at the bottom of the framework.

7.5.8 In the case of structures of Hazard Category A, Test joints shall be installed in down conductors at convenient heights above finished ground level.

7.5.9 Internal reinforcing steel of vertical concrete column, particularly those on the outer corners can be used as down conductors, provided that the reinforcement is electrically continuous.

7.5.10 Vertically discontinuous reinforcement shall be bonded between the reinforcement of each section to provide a continuous path to ground or an external down conductor shall be installed.

7.5.11 Large external metal frames, balconies and metal cladding on the top floors of tail structures (typically 30 floors or more) that may be exposed to direct lightning strokes must be bonded to the reinforcement of the structure or to a down conductor that is connected to the reinforcement of the roof.

8.0 STATUTORY REQUIREMENTS

8.1 The Contractor shall ensure that the installation satisfies the requirements of all relevant South African Statutory Regulations

8.2 Where applicable, equipment items shall carry the SABS mark to demonstrate compliance with the regulations.

9.0 RESPONSIBILITY FOR WORK

9.1 The tenderer shall be responsible for the complete installation of the lightning protection system including testing, earthing conductors, surge protection devices, spikes etc. as required for various buildings and structures. These installations shall include the review and the upgrading of the existing lightning protection systems. Due considerations shall be taken of the effects of lightning covered herein below in clause 8, in providing the lightning protection system.

9.2 The tenderer shall undertake to repair all faults due to bad workmanship and/or the use of faulty materials and to replace all defective materials within six months after the installation date.

9.3 The tenderer shall rectify all the defects to the satisfaction of Transnet Group Capital that may become apparent during the guarantee period.

9.4 The tenderer may be required to carry out builders work such as cutting of concrete columns and coring of holes for testing of the continuity of the existing steelwork or cabling. Good contact between reinforcing bars should be ensured.

10 APPLICABLE INFORMATION

10.1 **Electrical effect** – The current discharged through the earth electrode resistance produces a resistive volt drop which may raise the potential of the system to a high value relative to true earth.

10.2 **Side-flashing** – The point of strike may be raised to a high potential, and there is a risk of flashover from the protection system to any metal or in the structure.

10.3 **Thermal effect** – The thermal effect of a lightning discharge is confined to the temperature rise of the conductor through which the current passes.

10.4 **Mechanical effect** – When a high current is discharged along parallel conductors in close proximity or along a single conductor with sharp bends, a different mechanical effect is exerted by a lightning flash. This is due to a sudden rise of 30 000K in air temperature and the resulting explosive expansion of the adjacent air in the channel along which the charge is propagated.

11.0 PROTECTION AGAINST CORROSION

11.1 The tenderer shall ensure that atmospheric, chemical and or electrolytic corrosion of copper and other metals is prevented from occurring when used for the lightning protection system.

11.2 The contact surfaces of dissimilar metals shall be kept completely dry and protected against ingress of moisture to prevent the acceleration of electrolytic corrosion.

11.3 Although copper is highly resistant to many types of chemical attack, lead coating shall be recommended wherever subjected to severe corrosion due to presence of sulphur compounds.

11.4 Stainless steel material of similar grading shall not be used unless prior approval is obtained.

12.0 TECHNICAL REQUIREMENTS

12.2.1 General

a) A common integrated station earthing system shall be provided for electronic and electrical systems equipment, static and lightning protection in accordance with the requirements of this document.

b) A soil resistively survey shall be carried out by a specialist earthing consultant/contractor. The consultant/contractor shall prepare a detailed report on the conditions identified and provide the survey data recordings together with proposals, for a basis of the earthing system design.

c) Major electrical equipment such as switchgear, transformers, lighting boards, floodlight towers on poles, control panels etc. and associated metallic support frameworks, shall be connected to the station safety earth via Electrical Earth bars located nearby.

Use of embedded conductors within a power cable (spare core earth) may be utilised as the primary equipotential bonding system provided the following conditions are met: (SANS 10086-1:2001)

The embedded conductor has a cross-sectional area equal to those of the live and neutral conductors.

In addition, a second visual earth connection shall be provided to each item of electrical equipment, to prevent the potential to earth of such equipment rising above spark potential. (SANS 10089-2:2002)

d) The neutrals of generators and transformers shall be connected to the main earth grid either directly or via an earthing resistor, as required. Where neutrals of transformers are connected directly to earth, this shall be done via means of connections to both an individual earth rod located nearby as well as to the station earth mat by means of Electrical Earth bar located within the Switchgear Room.

e) Frames of motors shall be connected to the earthing system in accordance with the following table:

Motors kW Rating	**Minimum Earth Conductor Size**
Up to 30	16 mm^2
37 – 132	50 mm^2

150 – 175	70mm^2

Note:
In order to minimize the number of different sizes of earth conductor, the above three sizes only shall be used throughout, unless specifically stated otherwise.

f) Cables supplying lighting fixtures shall be 3 core for single-phase supplies and 5 core for 3 phase supplies, of which one core shall be used as the earth conductor.

g) Plant Infrastructure such as manifold piping, tanks and metallic support frameworks, shall be connected to the station safety earth, either directly or by means of Electrical earth bars located nearby.

h) Flanged joints in metallic pipelines shall be considered inherently continuous provided the surfaces of one of the bolts are cleaned and identified for earthing. Flanges of metallic pipelines that have insulated linings for purposes other than cathodic protection shall be bonded to ensure electrical continuity.

Pipelines shall only be connected to the earthing system where they enter and leave the battery limits.

i) Storage tanks that are not cathodically protected shall be earthed through at least two separate connections to the tank. Tanks shall be earthed in accordance with the relevant SANS code.

Electrically continuous structural steel columns may be used as down conductors by means of which elevated tanks, vessels, etc. shall be deemed to be connected to the earthing system.

All tank covers, gauge floats and stirrers etc. as well as all pipes entering the tanks shall be earthed.

The steel roof shall be in a direct electrical contact with, or bonded to the tank shell.

Earthed grids, gauges, gratings and the like placed in or across the inlets of tanks are not to be used as a means of static discharge. Individual bonding shall be made to the earthing system.

j) Cable trays and cable racks shall have continuous earth continuity. This shall be ensured by installing 10mm^2 earth straps across the racking fishplates (joints). Cable Trays shall be connected to the earthing system in two places - where they enter and leave the battery limits.

k) Earthing connections to all equipment and process plant shall comprise of welded earth bosses in compliance with SANS 10089 Part II regulation 5.1.4K with properly provided terminations i.e. 10mm diameter earth studs. Anchor bolts shall not be used.

Earth connections to all equipment shall be effectively bolted, using crimped lugs.
All cable connections shall be fitted with a “star” or serrated washer in addition to the back nut, to ensure good earth contact.

l) All earthing connections between the station earth system and respective earth bars/lightning protection systems shall where possible be made above ground, by means of bolts, crimped lugs and PVC taped.

All cable connections shall be fitted with a “star” or serrated washer in addition to the back nut, to ensure good earth contact.

Earth connection points shall be clearly labelled.

In cases where earth connection points are required to be made underground (e.g. to earth rods), inspection wells shall be provided comprising of pre-cast concrete/PVC surrounds complete with covers, to facilitate periodic inspection.

m) Earthing conductors rising through paving or other concrete work shall be run in suitable protective sleeves which shall project above finished level.

n) Earthing and bonding conductors shall be sized and installed in compliance with regulations detailed in the current SAIEE Standard Regulations for the Wiring of Premises and in SANS 10142 1&2 as applicable.

o) Extendable earthing rods shall be manufactured from stainless / copper clad / galvanized steel (dependant on soil acidity and chlorides and existence of cathodic protection systems) 16mm diameter, 1200 mm long sections, and shall have molecular bond between the two metals to prevent moisture ingress. Where it is necessary to join earth rods together, a non-ferrous corrosion resistant coupling device shall be used which shall prevent the ingress of moisture into the joint.

p) Lightning and static earthing protection shall be provided for all tall steel, masonry and concrete structures, towers, vessels, tanks etc, as well as all buildings used to house sensitive electrical/electronic equipment. Lightning protection systems shall be connected both to individual earth rods as well as bonded to the station earth mat. Where possible, the mesh method (as defined in SANS 10313) should be utilised in the protection of buildings against lightning strikes i.e. the use of masts and catenary conductors are to be avoided.

Tall steel structures such as towers or structure columns, provided they are electrical continuous, shall be considered inherently protected against lightning by their connection to the earth.

q) **The resistance of the common earthing system to the general mass of earth shall not exceed 1 Ohm.**

r) Where a separate system is installed for other than electrical equipment in remote locations, e.g. storage tanks; its resistance to the general mass of earth shall not exceed 7 Ohms. (Note: This applies only for Lightning Protection and remote valve chambers that are not connected to the Station Earth).

12.2.2 Station Safety Earth

In cases where a new Station Safety Earth Mat is required to be provided, the following specifications shall apply:

The **Earth Mat** shall consist of a completely buried, lattice network of 40x3mm, bare copper tape. All the crossover points of the lattice shall be braised or cad welded and protected with PVC insulation tape. Buried joints or splices shall not be clamped or bolted. The earth mat shall be buried, 1000mm minimum, below finished grade.

The interconnecting conductors shall be radially interconnected to form a common earthing system, for all electrical equipment, lightning protection and static earthing in accordance with relevant SANS requirements.

If required, additional earth electrodes may be installed to achieve the specified resistance, of the common earthing system to the general mass of earth. Where earth rods are paralleled in a group to reduce the earth resistance to the permissible value, they shall be spaced apart for a distance at least equal to their buried depth length.

12.3 Switchgear Room Building and Equipment

12.3.1 A Main Safety/Electrical Earth Bar comprising of a copper bar, 50mm x 5mm min shall be installed in the basement/false floor of the Switchgear Room. Where possible, this Earth Bar shall be designated as the Primary Test Point for the station earthing system with the following equipment directly connected:

- **Station Earth Mat**. Where possible, a minimum of four separate connections shall be taken into the Switchgear Room via separate routes from the Earth Mat, by means of 40mm x 3mm Cu Earth tape. Connection to the Main Safety Earth bar shall be made in two places by means of 70mm^2, 600-volt class, green coloured, PVC insulated, stranded copper conductor, to facilitate testing of the Earth System.
- **Transformers**. By means of 70mm^2, 600-volt class, green coloured, PVC insulated, stranded copper conductor
- **MV/LV Panels**. By means of dual 70mm^2, 600-volt class, green coloured, PVC insulated, stranded copper conductors
- **Generator**. By means of 70mm^2, 600-volt class, green coloured, PVC insulated, stranded copper conductor
- **Instrument Earth**. By means of dual 70mm^2, 600-volt class, green coloured, PVC insulated, stranded copper conductors
- **Manifold Earth**. By means of dual 70mm^2, 600-volt class, green coloured, PVC insulated, stranded copper conductors

Note that on existing sites, the earth mat has been connected to the station earthing system in multiple places (namely; the Switchgear Room, Control Room and Manifold), and thus designation of a single Primary Test point is not possible. Multiple test points have thus been defined as follows: Switchgear Room, Control Room and Manifold Mainline Pumps 1 & 4 (where possible).

12.3.2 All secondary earthing within the substation shall be attached to this station earth bar at appropriate demarcated points.

12.4 Control Room Building and Equipment

12.4.1 A secondary Safety/Electrical Earth Bar comprising of a copper bar, 50mm x 5mm min shall be installed in the basement/false floor of the Equipment/Control Room in an easily accessible position. Where possible, this Earth Bar shall be directly connected to the Main Safety/Electrical Earth bar

located in the Switchgear Room, by means of dual 70mm^2, 600-volt class, green coloured, PVC insulated, stranded copper conductors.

Note that all marshalling and equipment panels shall have an electrical earth bar, separate from an insulated instrument earth bar, installed and to which all electrical equipment earths shall be connected.

12.4.2 An Instrument Earth Bar comprising of a copper bar, 50mm x 5mm min shall be installed in the basement/false floor of the Equipment/Control Room in an easily accessible position. Where possible, this Earth Bar shall be directly connected to the Main Safety Earth bar located in the Switchgear Room, by means of dual 70mm^2, 600-volt class, green coloured, PVC insulated, stranded copper conductors.

Note that all marshalling and equipment panels shall have an insulated instrument earth bar, separate from the electrical earth bar, installed and to which all clean/instrument earths shall be connected.

12.4.3 Instrument and Electrical Earth systems shall be clearly labelled.

12.5 Manifold Area and Equipment

12.5.1 All manifolds shall have an insulated manifold earthing system installed, comprising of the following specifications:

- 40mm x 3mm min flat copper tape, to run the entire length of the main electrical racking reticulation and supported off of insulators at distances of no more than 2m apart. Use of existing electrical racking reticulation supports shall be permitted. All joints will require to be braised. Earthing reticulation shall be installed in such a manner so as to be unobtrusive and yet accessible and shall be positioned so as to avoid obstruction to walkways and access routes.
- The Manifold Earth bar shall be connected to the main safety/electrical earth located in the Switchgear Room, by means of dual 70mm^2, 600-volt class, green coloured, PVC insulated, stranded copper conductors.

  Note that on existing sites, the earth mat has been connected to the earthing system in multiple places (namely; the Switchgear Room, Control Room and Manifold), and thus designation of a single Primary Test point is not possible. Secondary test points have thus been defined where possible as follows: Switchgear Room, Control Room and Manifold Mainline Pumps 1 & 4.

12.4.2 All process plant and equipment located within the manifold area shall be attached to this manifold earth bar at appropriate demarcated points, via appropriately sized insulated PVC copper cable (green/yellow colored insulation), as follows:

- All electrical equipment shall be earthed via two separate earths, namely via the power cable earth core back to the respective Starter Panel electrical earth bar, and secondly via a separate visual earth from the motor frame to the manifold earth bar. Use of cable armouring as an earth conductor is not acceptable.

- All instrument stands and field junction boxes shall be separately earthed via means of an insulated 16mm2 min PVC copper cabling.

- All process vessels (tanks, vessels and piping) and racking reticulation shall be earthed via insulated 70mm2 min PVC copper cabling in two separate places.

All earth conductors utilized shall comprise of stranded, PVC insulated copper conductors with crimped cable lugs. All connections shall be fitted with a “star” or serrated washer in addition to the back nut, to ensure good earth contact.

12.6 Earth System Identification Standards

12.6.1 Earth Bar Labels

Earth bars shall be clearly labelled according to their functionality (e.g. “EB xx” to denote an electrical earth bar, “IB xx” to denote an instrument earth bar, where xx denotes a unique consecutive number). The Functional Identifier “EB 00” shall always denote the Station Earth Mat.

In addition, earth bars designated as Test Points shall be labelled accordingly.

Labels shall comprise of equal or similar approved to Traffolyte engraved type, and fixed by means of stainless steel screws. Finish shall comprise of black letters against a white background, with text 40mm height.

Labels shall be readable/visible after the wiring has been done.

12.6.2 Earth cable Identification

Earth cables may be divided into two types, namely primary earth cabling running from subsystem earth bars directly or indirectly to the main station earth (and used for testing purposes), and secondary earth cabling running between the subsystem earth bars and equipment or infrastructure.

Only Primary earth cabling (i.e. those used for testing purposes) is required to be identified, by means of a Functional Identifier denoting both source and destination earth bars.

Identification numbers will comprise of the following specification:

- Equal or similar approved to Grafoplast Targa Metal TGT System (Carrier Rail 58mm in length) 316 Stainless Steel Markers, with punched text 6 mm height minimum, fastened onto the cable at both ends via means of Stainless Steel cable ties

Examples:

EB01 – EB00 Cable Identifier for Earth cable running between Electrical Earth bar EB01 and the Station Earth Mat

IB01 – EB00 Cable Identifier for Earth cable running between Instrument Earth bar IB01 and the Station Earth Mat

12.7 Testing

12.7.1 Earth Resistivity and Electrode Testing

It will be the Contractors responsibility to carry out all necessary earth resistivity tests on site, where applicable. Tests will be in accordance with the requirements of SANS.10199.

After all earth electrodes/trench earth's have been installed, an earth megger shall be used to test the earth resistance at the earth bar or connection point to the main station earth and the results recorded. Note that all ECC connections, and any other bonding material shall be disconnected from the earth connection point whilst the earth is being tested.

Earth Continuity Testing.

Earth continuity readings shall be measured and recorded from the earth bar to each item of equipment and process plant, and shall include all piping, vessels, transformers, motors, actuators, switchgear cabinets, marshalling enclosures and instrumentation.

12.7.2 The following are the maximum acceptable earth electrode resistances:

Electrical Earth
a) Main substation - 1 ohm
b) Miniature substations and kiosks - 2 ohms
c) Highmasts - 5 ohms.

Instrument Earth
a) Instrument Earth - < 1 ohm

13.0 INSPECTION AND GUARANTEE

13.1 Transnet Group Capital reserves the right to inspect the installation and the equipment to be used.

13.2 All lightning protection systems shall be inspected and certified by an accredited person after completion of the installation, to verify conformance as required by Code of Practice, SANS 10313.

13.3 All components of the lightning protection system shall be inspected to ensure that they are in good condition and are capable of performing their designed functions.

13.4 The tenderer shall ensure that all elements of the electrical installation have been incorporated into the protected space by bonding or extensions to the lightning protection system.

13.5 The mechanical condition of all conductors, bonds, joints and earth electrodes shall be checked and the observations noted. .

13.6 The tenderer shall undertake to repair and replace all faults and faulty materials due to bad workmanship during a period of six months.

13.8 The tenderer shall be required to guarantee the installation for a period of twelve (12) months.

END

Transnet Port Terminals Health and Safety Management

Project Health and Safety Specifications

HAS-PHSS-0001

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1. Purpose

This health and safety specification development guideline identifies and encompass the working behaviours and safe work practices that are expected of all Transnet Port Terminals (TPT) employees, EPCM Contractors, Consultant, Visitors and Suppliers, engaged on the TPT managed projects as required by Construction Regulation of 2014, regulation 5(1)(b).
All contractors and service providers must take careful note of these requirements and must ensure that adequate provision has been made to ensure compliance.
This Health and Safety Specification development guideline has been compiled to cover a wide range of construction activities and should serve as a guideline for Safety Agents to develop site specific specifications for construction projects. In order to determine which requirements are applicable, the contractor must conduct a health and safety risk assessment specific to the project and specific to the contractor's scope of work. All applicable requirements must be addressed in the Contractor's Health and Safety Management Plan.

This Health and Safety Specification development guideline will be reviewed and updated periodically as and when necessary) to address and / or include:

- Changes in legislation;
- Client requirements;
- Leading practices; and
- Lessons learnt from incidents.

The health and safety specification development guideline provides the minimum requirements for site specific specification and should be used as a guide to develop the site specific specification as it is required by the Construction Regulation of 2014.

2. Scope

This Health and Safety Specification applies to all project sites, and to all persons working on or visiting the Transnet Port Terminals managed projects. The requirements specified in this document are applicable to the contractor as well as any sub-contractors, EPCM Contractors, Consultant, Vendors and Visitors that may be appointed by Transnet Port Terminals as an Employer. It is the contractor's responsibility to ensure that all sub-contractors comply fully with all legal requirements as well as the requirements of this health and safety specification.

3. Definitions

Acceptable Risk

A risk that has been reduced to a level that can be tolerated having regard for the applicable legal requirements and the Health and Safety Policy adopted for the project.

ALARP (As Low As Reasonably Practicable)

The concept of weighing a risk against the sacrifice needed to implement the measures necessary to avoid the risk. With respect to health and safety, it is assumed that the measures should be implemented unless it can be shown that the sacrifice is grossly disproportionate to the benefit.

Applicant (Permit to Work)
A person requesting permission to perform work for which a Permit to Work is required. Applicants must be authorised (in writing) to receive (or accept) Permits to Work and must be competent to do so by virtue of their training, experience and knowledge of the area or plant in which the work is to be performed.

Authorised Person (Permit to Work)
A person (typically a Project employee or an employee of the client) who has been authorised (in writing) by the nominated project management representative to issue Permits to Work within the scope of his designation. A person may only be appointed to issue Permits to Work if he has undergone training and has been assessed and found competent in systems, plant and equipment operation within the scope of his designation.

Barricade
A temporary structure that is erected as a physical barrier to prevent persons from inadvertently coming into contact with an identified hazard.

Battering
Sloping the sides of an excavation to a predetermined angle (usually less than the natural angle of repose) to ensure stability.

Benching
The creation of a series of steps in the sides of an excavation to prevent collapse.

Consequence
The outcome of an event expressed qualitatively or quantitatively.

Contractor
An employer performing construction work, or providing related or supporting services, on a project site.

Competent Person
A person who has in respect of the work or task to be performed the required knowledge, training, experience and as per act cr2014.

Construction Supervisor
A competent person responsible for supervising construction activities on a construction site

Clearance Certificate
A signed declaration by an Isolation Officer that a specified hazardous energy source associated with a particular system, plant or item of equipment has been isolated in accordance with an approved Isolation and Lockout Procedure.

Discipline Lock (many locks with a restricted number of identical keys)
Attached at a Lockout Station or at a Local Isolation Point in order to lock out a system, plant or equipment. A Discipline Lock (e.g. A Low Voltage Electricity Discipline Lock) is owned by an Isolation Officer who has been authorised in writing to isolate and lockout a particular hazard (e.g. Low voltage electricity).

Equipment Lock (many locks with one unique key)
Attached directly to pieces of equipment in order to lock them out. Equipment Locks may only be used by Isolation Officers who have been authorised in writing to perform isolation and lockout procedures. The key must have a solid key ring that fits over an Isolation Bar.

Excavation
Any man-made cut, cavity, pit, trench, or depression in the earth's surface formed by removing rock, sand, soil or other material using tools, machinery, and / or explosives. Tunnels, caissons and cofferdams are specifically excluded and are not addressed in this standard.

First-Aid Injury (FA)
A first-aid injury is any one time treatment and any follow up visit for observation of minor scratches, cuts, burns, splinters and the like which do not normally require medical care. Such treatment is considered to be first aid even if administered or supervised by a medical practitioner. First aid includes any hands on treatment given by a first aider. (E.g. Band-Aid, washing, cleansing, pain, relief). The following procedures are generally considered first aid treatment:

- Application of Antiseptics.
- Application of Butterfly adhesive dressing or sterile strips for cuts and lacerations.
- Administration of tetanus shot(s) or booster(s). However, these shots are often given in conjunction with more serious injuries, consequently injuries requiring these shots may be recordable for other reasons.
- Application of bandages during any visit to medical personnel.
- Application of ointments to abrasions to prevent drying or cracking.
- Inhalation of toxic or corrosive gas, limited to the removal of the employee to fresh air or the one time administration of oxygen for several minutes.
- Negative X-Ray diagnosis.
- Removal of foreign bodies not embedded in the eye if only irrigation is required.
- Removal of foreign bodies from a wound if procedure is uncomplicated, for example by tweezers or other simple technique.
- Treatment for first degree burns.
- Use of non-prescription medications and administration of single dose of prescription medication on first visit for any minor injury or discomfort.

Hazard
A source of potential harm in terms of human injury or ill health, or a combination of these.

Hierarchy of Controls
A sequence of control measures, arranged in order of decreasing effectiveness, used to eliminate or minimise exposure to workplace health and safety hazards:

- Elimination – Completely removing a hazard or risk scenario from the workplace.
- Substitution – Replacing an activity, process or substance with a less hazardous alternative.
- Isolation (Engineering) Controls – Isolating a hazard from persons through the provision of mechanical aids, barriers, machine guarding, interlocks, extraction, ventilation or insulation.
- Administrative Controls – Establishing appropriate policies, procedures and work practices to reduce the exposure of persons to a hazard. This may include the provision of specific training and supervision.
- Personal Protective Equipment – Providing suitable and properly maintained PPE to cover and protect persons from a hazard (i.e. Prevent contact with the hazard).

Isolation and Lockout Procedure
A plant or equipment-specific procedure that describes the method, and sequence to be followed, for rendering equipment, plant and systems safe to work on.

Isolation Bar
A device used at a Lockout Station to which anyone is able to attach a Personal Lock making it impossible for an Isolation Officer to remove the key to the Equipment Locks, thus preventing the de-isolation of a system, plant or equipment while it is still being worked on. A Discipline Lock must always be the first lock attached to an Isolation Bar and last to be removed.

Isolation Officer
A person (typically a Project employee or an employee of the client) who has been authorised (in writing) by the nominated project management representative to perform isolation and lockout procedures. A person may only be appointed as an Isolation Officer if he has undergone training and has been assessed and found competent in the isolation and lockout of systems, plant and equipment within the scope of his designation.

Incident
An event (or a continuous or repetitive series of events) that results or has the potential to result in a negative impact on people (employees, contractors and visitors), the environment, operational integrity, assets, community, process, product, legal liability and / or reputation.

Likelihood
A description of probability or frequency, in relation to the chance that an event will occur.

Lost Time Injury (LTI)

Any occurrence that resulted in a permanent disability or time lost from work of one day/shift or more.

If an employee is injured and cannot return to work in the next shift (will ordinarily miss one whole shift), and the department brings the employee in to only receive treatment by the Supervisor/ Return to Work Coordinator in that shift, this is still considered an LTI.

Lost Time Injury Frequency Rate (LTIFR) - Number of LTI's multiplied by 1 million or 200,000 and divided by labour hours worked.

Light Vehicle

A vehicle that:

- Can be licensed and registered for use on a public road;
- Has four or more wheels, and seats a maximum of 12 adults (including the driver);
- Requires the driver to hold only a standard civil driving licence; and
- Does not exceed 4.5 tonnes gross vehicle mass (GVM), which is the maximum loaded mass of the motor vehicle as specified by:
    - The vehicle's manufacturer; or
    - An approved and accredited automotive engineer, if the vehicle has been modified to the extent that the manufacturer's specification is no longer appropriate.

Examples of light vehicles include passenger cars, four-wheel drive vehicles, sports utility vehicles (suvs), pick-ups, minibuses, and light trucks.

Any vehicle falling outside of this definition must be considered mobile equipment.

Medical Treatment Injury (MTI)

A work injury requiring treatment by a Medical Practitioner and which is beyond the scope of normal first aid including initial treatment given for more serious injuries. The procedure is to be of an invasive nature (e.g. Stitches, removal of foreign body).

The following procedures are generally considered medical treatment:

- Application of sutures (stitches).
- Cutting away dead skin (surgical debridement).
- Loss of consciousness due to an injury or exposure in the work environment.
- Positive X-Ray diagnosis (fractures, broken bones etc.).
- Removal of foreign bodies embedded in the eye.
- Removal of foreign bodies from the wound by a physician due to the depth of embedment, size or shape of object or the location wound.
- Reaction to a preventative shot administered because of an occupational injury.
- Sprains and strains - series (more than one) of hot and cold soaks, use of whirlpools, diathermy treatment or other professional treatment.
- Treatment of infection.
- Treatment for second or third degree burns
- Use of prescription medications (except a single dose administered on first visit for minor injury or discomfort.)

Mobile Equipment

A vehicle (wheeled or tracked) that generally requires:

- The driver to hold a specific state or civil license; or
- The operator to hold a nationally recognized certificate of competency.

Examples of mobile equipment include, but are not limited to, dump trucks, water trucks, graders, dozers, loaders, excavators, forklifts, tractors, back-actors, bobcats, mobile cranes, tele-handlers, drill rigs, buses and road-going trucks.

Near Hit
An incident that has occurred that did not result in any injuries, illnesses, environmental or property damage but had the potential to cause an injury, illness, environmental or property damage.

Personal Lock
A single lock with one unique key controlled by the owner. Used for personal protection.

Regulation
In the context of this guideline, 'Regulation(s)' refers to the Construction Regulations, 2014 required by Section 43 of the Occupational Health and Safety Act 85 of 1993, published under Government Notice R 84 in Government Gazette 37305 of February 2014.

Risk
A combination of the likelihood of an occurrence of a hazardous event or exposure and the severity of injury or ill health that can be caused by the event or exposure.

Risk Assessment
A process of evaluating the risk arising from a hazard, taking into account the adequacy of any existing control measures, and deciding on whether or not the risk is acceptable.

Risk Management
The systematic application of management policies, processes and procedures to identifying hazards, analysing and evaluating the associated risks, determining whether the risks are acceptable, and controlling and monitoring the risks on an ongoing basis.

4. Abbreviations

DSTI - Daily Safety Task Instruction

CR – Construction Regulations

EPC - Engineering Procurement and Construction

EPCM - Engineering Procurement and Construction Management

HIRA - Hazard Identification and Risk Assessment

IMS - Integrated Management System

MS - Management System

OHS Act - Occupational Health and Safety Act

SOC - Safety Observation and Conversation

TPT - Transnet Port Terminals

VFL - Visible Felt Leadership

OHS - Occupational Health and Safety

SACPCMP - The South African Council for Project and Construction Management Professions, here in refer to as they register of Health and Safety Professionals

5. Health and Safety Management Plan

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.

Prior to mobilisation, the Health and Safety Management Plan must be forwarded electronically, and as a hard copy, to the nominated project management representative for review. The plan will be audited for completeness and, if found to be adequate, will be accepted (typically "with comments"). Work may not commence until the plan has been accepted.

Once the plan has been accepted, the contractor must action and resolve any issues within 30 days from the start of work.

If the issues requiring corrective action are not resolved within this 30 day period, the contractor will be required to stop any work related to the outstanding actions until they have been resolved.

Any proposed amendments or revisions to the contractor's Health and Safety Management Plan must be submitted to the nominated project management representative for acceptance.

Should it be identified that the contractor has overlooked a high risk activity, and as a result has omitted the activity and associated control measures from the Health and Safety Management Plan, the plan will not be approved.

6. Policy

The contractor must develop, display and communicate a Health and Safety Policy that clearly states the contractor's values and objectives for the effective management of health and safety as required by OHS Act of 1993, 7(3). These values and objectives must be endorsed by the contractor's management representatives and must be consistent with those adopted for the project.

The policy must be signed and dated, and must be reviewed annually.

The policy must commit to:

- Compliance with all applicable legal requirements in the TPT regulatory universe;
- The effective management of health and safety risks;
- The establishment of measurable objectives for improving performance, and the provision of the necessary resources to meet these objectives;
- The prevention of incidents; and

- Achieving continual improvement with regard to health and safety performance.

All employees of the contractor as well as the employees of any sub-contractors that may be appointed by the contractor must be made aware of the policy. This must be done through Health and Safety Induction Training and Toolbox Talks (refer to Sections 10 and 11).

A copy of the policy must be displayed in each meeting room and on each notice board.

7. Hazard Identification and Risk Assessment (OHS Act, Constr. Regulations 9)

Detailed hazard identification and risk assessment processes must be followed for all work to be performed as well as for all associated equipment and facilities as required by the Construction regulation of 2014, regulation 9(1) – (7).

The client will provide a baseline risk assessment informing contractor on the hazards and risks on site. Contractor must ensure that effective procedures and risk assessment systems are in place to control hazards and to mitigate risks to levels that are as low as is reasonably practicable.

The risk assessment processes must be applied to:

- The full life cycle of the project;
- Routine and non-routine activities;
- Planned or unplanned changes (refer to Section 15);
- All employees, sub-contractors, suppliers and visitors; and
- All infrastructure, equipment and materials.

The risk assessment processes and methodologies must be appropriate for the nature and scale of the risks, and must be implemented by competent persons.

The process of analysing and managing risk must include the following:

- Establishing the context of the risk assessment;
- Identifying hazards and determining possible risk scenarios (unwanted events);
- Evaluating risks and assigning ratings (classification);
- Recording the risk analysis in a risk register;
- Managing risks according to their classification (prioritising for action);
- Identifying and implementing control measures (through the application of the Hierarchy of Controls) to ensure that risks are managed to levels that are as low as is reasonably practicable (ALARP);
- Developing action plans for reducing risk levels (where possible);
- Verifying the completion of actions;
- Re-evaluating the risks and classifications as appropriate; and
- Reviewing and updating the risk register.

7.1 Baseline Risk Assessments

Prior to site establishment, the client must conduct a detailed Baseline Risk Assessment identifying foreseeable hazards and risk scenarios associated with the contractor's scope of work on the project site(s) as required by Construction Regulations of 2014, regulation 5(1)(a) . Details concerning proposed control measures must be included. The risk assessment process must be facilitated by a competent person who has been appointed in writing and must involve the participation of the contractor's site management representatives, supervisory personnel and technical experts (as required). An attendance register must be completed and retained for reference purpose. The Baseline Risk Assessment must be reviewed and approved by the Project Health and Safety Manager and Project Construction Manager.

When carrying out a Baseline Risk Assessment or a Task-Based Risk Assessment (refer to Section 6.2), Hazard (Energy) Types must be specified in accordance with the categorisation detailed in Table 6-1. Risk scenarios must be described indicating the manner in which a person may come into contact with, or be exposed to, a specific hazard.

An initial risk rating must be assigned to each risk scenario without taking any control measures into consideration. Control measures for managing the risks to levels that are as low as is reasonably practicable must then be identified for implementation on the project, and a residual risk rating must be assigned to each risk scenario taking the identified control measures into consideration.

Ratings must be assigned qualitatively using TPT consequence and likelihood scales and descriptors (i.e. TPT 5x5 qualitative risk matrix). Refer to Tables 6-2, 6-3 and 6-4.

Table 7-1: Hazard (Energy) Types

Gravitational							
Falling or Rolling Object	Person Falling from Height	Slip, Trip or Fall (Same Level)	Collapsing Structure	Collapsing, Slumping or Flowing Material or Substance			
Mechanical							
Moving Component of Fixed Machinery	Moving Component of Powered Tool	Projectile	Moving Hand Tool	Sharp Object	Moving Mobile Equipment or Light Vehicle	Moving Person	Moving Object (Mechanically or Manually)
Elastic							
Object under Tension or Compression	Compressed Fluid (Gas or Liquid)						
Acoustic							
Noise							
Vibrational							
Hand / Arm Vibration	Whole Body Vibration						
Electrical							
Electricity	Electro-Magnetic Field						
Radiation							
Ionising Radiation	Non-Ionising Radiation						
Illumination							
Lighting							
Thermal							
Heat	Cold						
Fire							
Fire							
Explosion							
Explosion							
Particulates and Aerosols							
Dust	Fibres	Fume	Spray	Mist	Smoke		
Chemical							
Corrosive Substance	Irritant	Asphyxiate	Narcotic / Anaesthetic	Poison	Allergen / Sensitizer	Carcinogen	Teratogen / Mutagen	Venom

Microbiological			
Virus	Bacterium	Parasite	Fungus
Weather			
Lightning	High Wind	Flooding	Hail
Physiological			
Stress		Fatigue	
Ergonomic			
Exertion	Repetitive Movement	Awkward Posture	Awkward Movement

Table 7-2: Consequence Descriptors

Consequence	Insignificant	Minor	Moderate	Major	Catastrophic
Health	Reversible health effects of little concern, requiring first aid treatment at most.	Reversible health effects of concern that would typically result in medical treatment.	Reversible health effects of concern that would typically result in a lost time illness.	Single fatality, or irreversible health effects or disabling illness.	Multiple fatalities or permanent disabling illness to multiple people.
Safety	Low-level, short-term subjective inconvenience or symptoms. Typically a first aid case requiring no medical treatment.	Reversible injury requiring treatment, but not leading to restricted duties. Typically a medical treatment case.	Reversible injury or moderate irreversible damage or impairment. Typically a lost time injury.	Single fatality, or considerable irreversible damage or impairment.	Multiple fatalities or permanent disabling injury to multiple people.

Table 7-3: Likelihood Descriptors

Likelihood	Likelihood Description	Frequency	Substance Exposure
Almost Certain	Recurring event during the life-time the project.	Typically occurs more than twice per year.	Frequent (daily) exposure at > 10 x OEL.
Likely	Event that may occur frequently during the life-time of the project.	Typically occurs once or twice per year.	Frequent (daily) exposure at > OEL.
Possible	Event that may occur during the life-time of the project.	Typically occurs once in 5 years.	Frequent (daily) exposure at > 50% of OEL. Infrequent exposure at > OEL.
Unlikely	Event that is unlikely to occur during the life-time of the project.	Typically occurs once in 10 years.	Frequent (daily) exposure at > 10% of OEL. Infrequent exposure at > 50% of OEL.

Likelihood	Likelihood Description	Frequency	Substance Exposure
Conceivable but improbable	Event that is very unlikely to occur during the life-time of the project.	Typically occurs once in 100 years.	Frequent (daily) exposure at < 10% of OEL. Infrequent exposure at > 10% of OEL.

Table 7-4: Risk Matrix

Risk Calculator		Consequence				
		Insignificant	Minor	Moderate	Major	Catastrophic
Likelihood		1	2	3	4	5
Almost Certain	5	Moderate (5)	High (10)	High (15)	Extreme (20)	Extreme (25)
Likely	4	Low (4)	Moderate (8)	High (12)	Extreme (16)	Extreme (20)
Possible	3	Low (3)	Moderate (6)	Moderate (9)	High (12)	High (15)
Unlikely	2	Low (2)	Low (4)	Moderate (6)	Moderate (8)	High (10)
Conceivable but improbable	1	Low (1)	Low (2)	Low (3)	Low (4)	Moderate (5)

A Risk Register comprised of all significant risks (i.e. Risks rated as major or catastrophic) identified for the project will be compiled using the information contained in the project Baseline Risk Assessment as well as the contractor's Baseline Risk Assessment. Key control measures for managing each of these risks will be specified in the register.

For the significant risks in particular, action plans will be developed for reducing the risk levels (where possible).

The project Risk Register will be reviewed and, if necessary, updated:

- On a quarterly basis during construction;
- When changes are made to a design and / or the construction scope, schedule, methods, etc. That result in a change to the risk profile; and
- Following an incident.

The contractor must ensure that the hazards, risk scenarios and control measures identified in the contractor's Baseline and Task-Based Risk Assessments are taken into consideration when developing, implementing and maintaining the various elements of the contractor's health and safety management system for the project (e.g. Competence, training and awareness requirements).

All persons potentially affected must be made aware of the hazards, risk scenarios and control measures identified in the contractor's risk assessments. This must be done through training, Toolbox Talks, and Daily Safe Task Instructions (refer to Sections 10 and 11).

7.2 Task-Based Risk Assessments

The contractor must carry out detailed project-specific Task-Based Risk Assessments which must be reviewed and approved by the Client's Project Health and Safety Manager and Project Construction Manager prior to the commencement of any work.

The risk assessment process must be facilitated by a competent person who has been appointed in writing in terms CR 9 sub regulation (1). The contractor's site management representatives, supervisory personnel, technical experts (as required) and workforce personnel directly involved with the task being examined must participate in the risk assessment process. An attendance register must be completed and retained.

Please Note: Under no circumstances may a Contractor Health and Safety Officer perform a risk assessment in isolation. The active participation of all persons referred to above is mandatory.

A Task-Based Risk Assessment must at least:

- Be accompanied by a Work Method Statement (describing in sufficient detail how the specific job or task is to be performed in a logical and sequential manner);
- Provide a breakdown of the job or task into specific steps;
- Identify the hazards and potential risk scenarios associated with each step;
- Include consideration of possible exposure to noise, heat, dust, fumes, vapours, gases, chemicals, radiation, vibration, ergonomic stressors, or any other occupational health hazard or stressor;
- Describe the control measures that will be implemented to ensure that the risks are managed to levels that are as low as is reasonably practicable; and
- Assign an initial risk rating (without taking any control measures into consideration) and a residual risk rating (taking the identified control measures into consideration) to each risk scenario.

A Task-Based Risk Assessment must be reviewed and, if necessary, updated:

- On an annual basis (as a minimum);
- When changes are made to the associated Work Method Statement; and
- Following an incident.

7.3 Pre-Task Hazard Assessments

A pre-task hazard assessment must be completed whenever a change is identified while carrying out an activity. Any deviation from what was discussed during the Daily Safe Task Instruction (prior to the activity commencing), or anything that was not discussed, constitutes a change.

Before carrying out the particular task that involves the identified change, a few minutes must be spent identifying the hazards and risks associated with that task as well as suitable control measures.

8. Legal and Other Requirements

The Contractor must comply with the requirements of all applicable health and safety legislation as well as Transnet Port Terminals and project-specific standards and procedures as amended from time to time.

The Contractor must compile and maintain a register of all legal and other requirements applicable to the work that will be carried out and / or services that will be provided. This register must be updated regularly to ensure that it remains relevant.

Applicable laws and standards must be appropriately communicated to all employees of the contractor (as well as the employees of any sub-contractors that may be appointed by the contractor) through training, Toolbox Talks, and Daily Safe Task Instructions (refer to Sections 10 and 11).

9. Health and Safety Objectives

In order to drive continual improvement, the contractor must set project-specific health and safety objectives, and must develop improvement action plans to achieve these objectives. The contractor's objectives must be aligned with the objectives set for the project as a whole as required by the Construction regulations of 2014, regulation 7.

Eliminating health and safety hazards, minimising health and safety risks, preventing incidents, injuries and illnesses, and ensuring legal compliance must be the primary considerations for setting objectives.

When setting objectives, consideration must be given to the following:

- Leading indicators such as inspection findings, audit findings, hazard reporting, and observations;
- Lagging indicators (i.e. Incidents including Near Hits);
- Leading practices and lessons learnt; and
- Injury frequency rates with due understanding that the goal is "no harm".

The objectives must be specific and measurable. The improvement action plans must specify the resources (both human and financial) required to achieve the objectives, the person's responsible, and realistic timeframes for completion. The contractor must ensure that adequate resources are allocated and that progress towards meeting the objectives is monitored regularly.

The objectives and associated improvement action plans must be documented and must be communicated to all contractor employees. Furthermore, to ensure that the objectives remain relevant, they must be reviewed on a quarterly basis and whenever significant change has taken place on the project (i.e. Changes to activities, scope of work, operating conditions, etc.).

Each contractor employee must have a personal health and safety plan or must be part of a team plan with documented objectives that support the contractor's Health and Safety Management Plan and the project-level objectives.

Performance reviews must be carried out at quarterly intervals to assess and document performance against these personal or team objectives.

If a reward or incentive scheme is introduced, it must be designed in such a manner that health and safety performance is not compromised in order to maximise financial reward.

10. Resources, Accountabilities and Responsibilities

The Contractor must adequately allocate resources, responsibility and accountability to ensure the effective implementation, maintenance and continual improvement of the contractor's health and safety management system on the projects required by Construction regulation 0f 2014, regulation 7(2)(c)

For each role that carries health and safety accountability and / or responsibilities (including legislative requirements), a role description detailing the accountability and / or responsibilities must be documented.

All health and safety appointments (i.e. the assignment of specific health and safety responsibilities to individuals in accordance with legal or project requirements) must be done in writing. Documented proof of each appointment (i.e. a signed appointment letter) must be retained.

Contractor should not discharge any legal responsibilities to employees who are not legally appointed.

The contractor must comply with the requirements of all applicable legislation concerning health and safety related appointments and delegations for the project.

A health and safety organisational chart specific to the project must be documented and maintained. All roles that carry health and safety accountability and / or responsibilities must be included, and all individuals that carry health and safety appointments must be clearly identified.

The provision of dedicated health and safety professionals on the project must be appropriate for the nature and scale of the work to be carried out.

The contractor is solely responsible for carrying out the work under the contract whilst having the highest regard for the health and safety of all persons on the project site(s).

Health and safety is the responsibility of each and every individual on the project site(s), but in particular, it is the responsibility of the contractor's management team who must set the tone.

Visible commitment is essential to providing and maintaining a safe workplace. The contractor's managers and supervisors at all levels must demonstrate their commitment and support by adopting a risk management approach to all health and safety issues. These individuals must consistently take immediate and firm action to address violations of health and safety rules, and must actively participate in day to day activities with the objective of preventing harm.

The contractor's management representatives are responsible and accountable for health and safety performance on the project. Key responsibilities include the following:

- Preparing, implementing and maintaining a risk-based Health and Safety Management Plan specific to the work that will be carried out (refer to Section 4);

- Establishing, implementing and maintaining health and safety programmes and procedures to ensure that all work is carried out in compliance with the requirements of this specification, the contract, and all applicable legislation;
- Establishing, implementing and maintaining effective hazard identification and risk management processes and procedures to ensure that all reasonably foreseeable hazards are controlled in order to minimise risk (refer to Section 6);
- Providing the resources necessary to meet the requirements of this specification (refer to Section 9);
- Ensuring that all contractor employees have clearly defined responsibilities with regard to health and safety, and that these responsibilities are clearly communicated and understood (refer to Section 9);
- Establishing, implementing and maintaining a system for ongoing training and assessment of skills and competence (refer to Section 10);
- Establishing, implementing and maintaining procedures to ensure that only qualified and competent personnel are permitted to work on the project site(s) (refer to Section 10);
- Establishing, implementing and maintaining effective communication and consultative processes concerning health and safety for the duration of the contract (refer to Section 11);
- Maintaining operational control for the protection of all persons on the project site(s) as well as the public (refer to Section 13);
- Establishing, implementing and maintaining effective emergency preparedness and response procedures (refer to Section 14);
- Establishing, implementing and maintaining effective management of change processes and procedures (refer to Section 15);
- Establishing, implementing and maintaining effective incident reporting and investigation processes and procedures (refer to Section 18);
- Establishing, implementing and maintaining effective auditing and inspection processes and procedures (refer to Section 20); and
- Formally reviewing the contractor's Health and Safety Management System annually to ensure that the system continues to be effective in managing health and safety performance and meeting project requirements (refer to Section 21).

All costs associated with meeting these responsibilities shall be borne by the contractor.

Any cost associated with any work stoppage due to non-compliance with a health and safety requirement shall be for the contractor's account.

10.1 Contractor Construction Manager

The Contractor must appoint a competent Construction Manager who shall be responsible for the successful and safe completion of all work to be carried out by the contractor as required by the Construction regulations of 2014, regulation 8(1).

The contractor's Project Manager shall be responsible for:

- Ensuring that a Health and Safety Policy that clearly states the contractor's values and objectives for the effective management of health and safety on the project is in place and is communicated to all contractor and sub-contractor employees;

- Ensuring that all applicable legal and project health and safety requirements are identified and complied with at all times;
- Ensuring that effective hazard identification and risk management processes are established and implemented 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);
- Participating in (and approving) all Task-Based Risk Assessments conducted for the work to be carried out by the contractor;
- Driving the achievement of agreed health and safety objectives;
- Ensuring that the necessary resources are made available for the effective implementation of the contractor's Health and Safety Management Plan;
- Ensuring that all work is adequately and competently supervised;
- Ensuring that all contractor employees have clearly defined responsibilities with regard to health and safety (assigned in writing), and that these responsibilities are clearly communicated and understood;
- Ensuring as far as is reasonably practicable that each contractor and sub-contractor employee is competent to perform his role, and has received appropriate workplace health and safety training and instruction;
- Managing all appointed sub-contractors with regard to health and safety performance;
- Establishing and maintaining effective communication and consultative processes to ensure that all contractor and sub-contractor employees are kept up to date with regard to health and safety information (e.g. Incidents and lessons learnt, leading practices, hazards, risks and control measures, etc.) And that feedback is provided promptly regarding issues and / or concerns raised;
- Chairing monthly Contractor Health and Safety Meetings and attending monthly Site Health and Safety Meetings;
- Implementing programmes that encourage continual improvement and providing recognition for suggestions made by contractor and sub-contractor employees;
- Implementing the contractor's Health and Safety Management Plan and associated Safe Work Procedures;
- Acting consistently and strictly against any contractor or sub-contractor employee who transgresses a health and safety rule or requirement;
- Ensuring that an effective management of change process is in place;
- Implementing, testing and maintaining an effective Emergency Response Plan for all contractor and sub-contractor activities, and ensuring that the plan is adequately resourced;
- Ensuring that workplace exposure of contractor and sub-contractor employees to hazardous substances or agents is measured and monitored to determine the effectiveness of controls and compliance with legal (and project) requirements;
- Ensuring that all incidents are reported without delay and are investigated thoroughly;
- Participating in investigations into significant incidents;

- Ensuring that accurate health and safety statistics are maintained, and that health and safety performance reports are compiled as required;
- Providing the necessary resources for regular health and safety audits and inspections to be conducted, and supporting the auditing process;
- Participating in health and safety audits, and carrying out workplace inspections;
- Ensuring that corrective actions (arising from incident investigations, audits, inspections, etc.) Are implemented, and that adequate resources are provided for this purpose; and
- Participating in an annual review of the contractor's Health and Safety Management System.

10.2 Contractor Health and Safety Officers

The contractor must appoint a full-time Health and Safety Officer for the duration of the contract who is registered with the SACPCMP (The South African Council for Project Construction Management Professions). The project site(s) (directly or through sub-contractors), must at least appoint two full-time Health and Safety Officers depending on the scope, complexity, budget and high risk activities involved, as required by the Construction regulations of 2014, regulation 7(2)(c).

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.);
- 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 each 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 over and above the SACPCMP registration as an Officer; be computer literate, fluent in English, and must have the following minimum qualifications, training and experience:

- At least 5 years' experience as a Health and Safety Officer on construction projects;
- SAMTRAC, NEBOSH, Modern SHEQ Risk Management or an equivalent training course with accredited health and safety service provider as a minimum qualification ;
- Experience and appropriate training with regard to implementing and maintaining a health and safety management system compliant with national legislation or an international standard;
- Experience and appropriate training with regard to construction related hazard identification and risk management processes;
- Competence, experience and relevant training with regard to incident investigation procedures and causation analysis;
- Health and safety auditing experience and training;
- A valid First Aid certificate of competency;
- Fire prevention and protection training; and
- A valid Driving Licence (light motor vehicle).
- Registered as a Health and Safety Officer or Health and Safety Manager with SACPCMP depending on the size of the project and on the risk.

Before placing a Health and Safety Officer on the project site(s), the contractor must forward a copy of the person's CV to the nominated project management representative or to the Programme Health and Safety manager for review and acceptance. A proposed candidate may be rejected

should he not meet the experience and / or qualification requirements, or due to poor work performance on previous projects.

10.3 Contractor Supervisors

The contractor must ensure that all project and / or construction works are supervised at all times by an adequate number of qualified, competent and appointed supervisors who have experience in the type of work being carried out as required by Construction regulations of 2014, regulation 8(7).

No work may be carried out without an appointed supervisor being physically present in the work area and conducting a daily safety task instruction.

Each Contractor Supervisor shall be responsible for:

- Ensuring that all work carried out under his supervision is done so in accordance with the requirements of all applicable legislation, rules, standards, specifications, plans and procedures;
- Participating in Baseline and Task-Based Risk Assessments;
- Ensuring that all employees under his supervision are made aware of the hazards, risk scenarios and control measures identified in relevant risk assessments;
- Ensuring that the control measures stipulated in all relevant risk assessments are in place and are implemented fully for all work carried out under his supervision;
- Ensuring that all employees under his supervision conduct pre-task hazard assessments when necessary;
- Driving the achievement of health and safety objectives set for his team;
- Ensuring that the necessary written appointments are in place for each employee under his supervision (e.g. First aider, mobile crane operator, etc.);
- Ensuring that all employees under his supervision attend all required training;
- Ensuring that no employee carries out any work that he is not competent to perform or has not been appointed to perform;
- Identifying training needs within his team;
- Conducting a weekly Toolbox Talk with his team;
- Leading a Daily Safe Task Instruction discussion with his team;
- Attending Health and Safety Meetings as required;
- Maintaining a Health and Safety Management Information Notice Board in the work area for which he is responsible;
- Recording, on a daily basis, a description of the day's activities as well as a breakdown (by occupation) of the personnel on site under his supervision (e.g. 5 bricklayers, 2 carpenters, 3 welders, 22 general workers, and 1 supervisor);
- Ensuring that all Safe Work Procedures applicable to the work carried out under his supervision are adhered to and are fully implemented;
- Maintaining discipline and taking the necessary action whenever an employee under his supervision does not adhere to a rule or requirement;
- Carrying out Planned Task Observations (one per day);

- Ensuring that emergency response procedures are understood by all employees under his supervision and that these procedures are followed in the event of an emergency;
- Reporting all incidents immediately, participating in incident investigations, communicating the lessons learnt to all employees under his supervision, and implementing corrective actions where required; and
- Carrying out workplace health and safety inspections.

Each supervisor must accept these responsibilities in writing as part of his appointment.

Each supervisor must be equipped with a mobile telephone to ensure that effective communication can be maintained for the duration of the contract.

10.4 Health and Safety Representatives

The team of employees on site must have a health and safety representative deployed on the project site(s), a Health and Safety Representative must be elected and appointed. Taking into consideration the number of employees deployed, the geographical area in which the work is taking place, the different work disciplines, and the shift pattern (if applicable), the contractor must ensure that an adequate number of Health and Safety Representatives (at a minimum ratio of one Health and Safety Representative per 50 employees) are elected and appointed to effectively represent all site personnel as required by the OHS Act 85 of 1993, section 17 - 18.

Each Health and Safety Representative must attend an accredited training course for health and safety representatives. The cost of this training shall be for the contractor's account.

The contractor must make the necessary allowances for the Health and Safety Representatives to carry out their duties as specified in the applicable legislation.

The contractor must ensure that an appropriate sticker is affixed to the safety helmet of each Health and Safety Representative for identification purposes.

10.5 First Aiders

If 10 or more employees are deployed on the project site(s), at least one trained and competent First Aider must be in place and must be appointed. Taking into consideration the number of employees deployed, the geographical area in which the work is taking place, the different work disciplines, and the shift pattern (if applicable), the contractor must ensure that an adequate number of First Aiders (at a minimum ratio of one First Aider per 50 employees) are in place and have been appointed to administer first aid treatment should this be required.

First Aid training must be done through an accredited training institution. The cost of this training shall be for the contractor's account.

The contractor must ensure that an appropriate sticker is affixed to the safety helmet of each First Aider for identification purposes.

11. Competence, Training and Awareness

Each employee (including sub-contractor employees) must be suitably trained and competent, and must understand the health and safety hazards, risks and control measures associated with his work as required by the OHS Act 85 of 1993,(14)

The contractor must implement systems and procedures to ensure that:

- The necessary competencies required by employees are identified (by occupation), along with selection, placement and any training requirements;

Please Note: Specific competency profiles and selection criteria (fitness for work) must be developed for all roles where significant health or safety risk exists.

Please Note: A formal training needs analysis must be carried out based on the competency profiles and a training matrix must be developed for the project.

Roles requiring technical certification, registration or licensing are identified and documented, and these roles are filled only by suitably qualified personnel;

- Minimum core health and safety skills required by employees in leadership and supervisory roles are identified and suitable training is provided including hazard identification and risk assessment, incident investigation, and health and safety interactions (i.e. Observation and coaching techniques);
- Competency-based training is provided and it includes operational controls (procedures and work instructions), management of change, and emergency response;
- All employees hold and maintain the required competencies (including appropriate qualifications, certificates and licences) and are under competent supervision;
    - A site-specific induction and orientation programme that highlights health and safety requirements, procedures, and significant hazards, risks and associated control measures is in place for all new employees and visitors (understanding must be assessed);
    - Personnel are trained and / or briefed on new or amended standards, rules, safe work procedures, risk assessments, etc.;
    - Refresher training is carried out as required (e.g. Re-induction following an absence from site);
- Records of education, qualifications, training, experience and competency assessments are maintained on site for all employees; and
- The effectiveness of training is reviewed and evaluated.

Prior to the commencement of any work, including mobilisation and site set-up activities, the contractor must provide, to the satisfaction of the nominated project management representative, current documentation verifying that the contractor's employees, as well as the employees of any appointed sub-contractors, are competent and have the necessary qualifications, certificates, licences, job skills, training and experience (as required by this specification and applicable legislation) to safely carry out the work that is to be performed.

The Contractor and sub-contractor must ensure that the following training takes place:

- health and safety induction training pertaining to the hazards prevalent on the site at the time of entry
- training for all persons required to erect, move or dismantle temporary works structures and instruction to perform those operations safely
- training of employees working from a fall risk position
- training to work or to be suspended on a platform which includes at least:
    - how to access and egress the suspended platform safely;
    - how to correctly operate the controls and safety devices of the equipment;
    - information on the dangers related to the misuse of safety devices; and
    - information on the procedures to be followed in the case of-
        - an emergency;
        - the malfunctioning of equipment; and
        - the discovery of a suspected defect in the equipment;
        - an instructions on the proper use of body harnesses.

- Training for all operators of construction vehicles and mobile plant.

A contractor must at all times keep on his or her construction site records of the health and safety induction training and such records must be made available on request to an inspector, the client, the client's agent or the principal contractor;.

Please Note: Only certified copies of certificates, licences, etc. Will be accepted.

An Employee Profile (dossier) must be completed for each employee who will be performing work on site. All documentation pertaining to an employee's competence (i.e. certified copies of qualifications, certificates and licences as well as proof of job skills, training and experience) must be maintained in this dossier.

If it is determined through observation that an employee is not yet competent to carry out a particular task in a safe and capable manner, the employee will be required to cease work immediately and must either be reassigned or be retrained at the contractor's expense.

The contractor must provide proof that the training institutions and trainers that are used are appropriately registered with a governing authority (a trainer's registration certificate or registration number alone will not be adequate). The following must be made available for verification purposes:

- Proof of registration of the training institution including the training programmes that the institution is accredited to provide; and
- For each trainer, proof of competency and registration for the specific training programmes presented.

Foreign qualifications held by employees in health and safety critical roles must be verified against the requirements of local legislation.

11.1 Health and Safety Induction Training

Each employee must attend all mandatory Health and Safety Induction Training applicable to the project. No employee will be permitted to enter any project work site until he has attended this training. Each employee must carry proof that he has completed the induction training and may be removed from a site if such proof cannot be produced on request, this as required by the Construction regulations of 2014, regulation 7(5).

Furthermore, employees must attend (where applicable) Area-Specific Health and Safety Induction Training pertaining to the particular hazards identified in the area(s) where the employees will be working. No employee will be permitted to enter a work area until he has attended the relevant area-specific training.

All visitors must receive a visitor induction briefing before entering any project work site. However, this induction does not permit a visitor to enter a site unescorted. Visitors must be accompanied at all times by an appropriately senior employee who has been fully inducted.

11.2 Specific Training and Competency Requirements

The following specific training and competency requirements must be complied with.

Please Note: An employee must be trained, assessed and found competent before he will be given authorisation to perform certain tasks or fill certain roles.

Table 11-1: Specific Training and Competency Requirements

Training	Applicable To
Health and Safety Induction*	All employees
Risk Assessment*	All managers and supervisors
Incident Investigation*	All managers and supervisors
Safety Leadership*	All managers and supervisors
Legal Liability*	All managers and supervisors
Health and Safety Rep*	All elected Health and Safety Representatives
First Aid Levels 1, 2 and 3*	All nominated First Aiders
Fire Fighting (Fire Extinguisher Use)*	All employees
Working at Height*	All employees using a safety harness
Confined Spaces*	All Confined Space Entry Officers and Standby Persons
Permit to Work*	All Authorised Persons (i.e. Permit issuers) and all Applicants (i.e. Employees who will be applying for permits)
Isolation and Lockout*	All Authorised Persons (i.e. Persons who authorise work that requires Isolation and Lockout), all Isolation Officers, and all Applicants (i.e. Persons who request permission to work on systems or equipment requiring Isolation and Lockout)
Defensive Driving*	All drivers of light motor vehicles (for work purposes)
Gravel Road Driving*	All drivers of light motor vehicles driven on gravel roads (for work purposes)
Off Road Driving*	All drivers of four-wheel drive vehicles driven off road (for work purposes)
Mobile Equipment Site Licence*	All mobile equipment operators

Training requirements marked with an * must be arranged through accredited external training institutions by the contractor if it is applicable to this project. All other training will be provided by Transnet Port Terminals at the TPL Anton Lembede Offices.

12. Communication, Participation and Consultation

The contractor must establish and maintain effective communication and consultative processes (allowing for a two-way dialogue) for the duration of the project to ensure that:

- All personnel are kept up to date with regard to health and safety matters (e.g. Hazards and risks, incidents and lessons learnt, leading practices, performance against objectives, etc.);
- General health and safety awareness levels are kept high;
- Prompt feedback is given to personnel with regard to health and safety issues or concerns that they raise; and
- Relevant, and often critical, health and safety related information (e.g. Design changes, instructions, reporting of hazardous conditions or situations, etc.) Is effectively disseminated.

This must be achieved as follows:

12.1 Toolbox Talks

The contractor must prepare a Toolbox Talk on a weekly basis and must share it with all personnel for which the contractor is responsible (including all sub-contractors). Toolbox Talks must address health and safety issues that are relevant to the work performed on the project site(s) and must include information and / or knowledge sharing, lessons learnt from incidents that have occurred, information concerning specific hazards and / or risks and control measures to prevent injury, etc.

Attendance records must be kept and maintained in the contractor's health and safety file.

12.2 Daily Safe Task Instructions (DSTI's)

A Daily Safe Task Instruction (DSTI) is a pre-start discussion amongst the members of a work team, led by the appointed supervisor, aimed at anticipating hazards and potential risks associated with the activities planned for the day or shift, and ensuring that the necessary control measures are in place to prevent incidents.

At the start of each day or shift, prior to the start of any work, each appointed supervisor must inspect the work area for which he is responsible and ensure that it is safe. He must then conduct a DSTI with his work team specifically concerning the tasks that they will be performing during the course of the day or shift. The relevant Task-Based Risk Assessment for the activity must be used as the basis for the discussion. The correct work method must be reiterated and the identified hazards, risks and control measures must be discussed with the team (each team member must be given the opportunity to contribute and participate in the discussion).

Any team member arriving late must first be taken through the information that was discussed (work method, hazards, risks and control measures) before being permitted to start working. If the work method changes after activities have already begun, the DSTI must be revisited and updated with the team, and the changes must be signed off by the relevant Contractor Health and Safety Officer.

Every member of the work team must sign the DSTI attendance register. The attendance records must be kept and maintained in the contractor's health and safety file.

The contractor's Health and Safety Officer must evaluate the content of the DSTI's daily to ensure that they are task-specific. Furthermore, the Health and Safety Officer must attend at least one DSTI per day prior to the start of work. The Health and Safety Officer may not lead the DSTI discussions, as this is the responsibility of the appointed supervisor.

12.3 Health and Safety Suggestions

All employees must be encouraged to submit suggestions to enhance health and safety management on the project site(s). A process must be in place for documenting, evaluating, implementing (as appropriate), archiving and recognising the improvement ideas.

12.4 Health and Safety Meetings

12.4.1 Contractor Health and Safety Meetings (OHS Act Section 19)

The contractor must schedule and consistently hold monthly health and safety meetings. These meetings must be chaired by the contractor's Project Manager and the following persons must be in attendance:

- Contractor and sub-contractor management representatives;
- Contractor and sub-contractor supervisors;
- Contractor and sub-contractor appointed Health and Safety (Employee) Representatives;
- Contractor and sub-contractor Health and Safety Officers; and
- The relevant Project Health and Safety Advisor.

The meeting must address the following as a minimum:

- New incidents for the period and corrective actions taken or to be taken;
- Implementation status of outstanding actions associated with previous incidents;
- SOC's, PTO's and DSTI's carried out for the period and action required to correct trends identified;
- Results of any audits, inspections (including H&S Rep inspections) or site visits carried out;
- A look ahead to ensure that appropriate health and safety planning and preparation is done for upcoming work;
- Risk Assessments, Safe Work Procedures, etc. That are outstanding or due for review (as well as the quality of these documents); and
- Any other health and safety related matter.

The contractor must compile minutes of each meeting and attendance records must be kept. These records must be maintained in the contractor's health and safety file.

12.4.2 Site Health and Safety Meetings

In addition to the Contractor Health and Safety Meetings, the Project will schedule monthly Site Health and Safety Meetings that the contractor must attend. These meetings will be chaired by the Project Construction Manager and the following persons must be in attendance:

- Contractor management representatives;
- Contractor Health and Safety Officers;
- The Project Health and Safety Manager;
- Project Health and Safety Advisors; and
- Client representatives (ad hoc).

The meeting will address the following as a minimum:

- Feedback from the contractor concerning health and safety performance for the period;
- New incidents for the period and corrective actions taken or to be taken;
- Implementation status of outstanding actions associated with previous incidents;
- PTO's and DSTI's carried out for the period and action required to correct trends identified;
- Results of any audits, inspections or site visits carried out;
- A look ahead to ensure that appropriate health and safety planning and preparation Is done for upcoming work;
- Risk Assessments, Safe Work Procedures, etc. That are outstanding or due for review (as well as the quality of these documents); and
- Any other health and safety related matter.

12.5 Health and Safety Performance Boards

The contractor must provide and maintain a Health and Safety Performance Board to be approved by the nominated project management representative and to be positioned at the entrance to the contractor's site office area. This board must display the following information as a minimum:

- The contractor's logo;
- Current manpower (heads) on site;
- Man-hours worked for the current month and project to date;
- Lost Time Injury Frequency Rate (LTIFR);
- Dates of last injuries (FAI, MTI and LTI);
- Number of hours worked since the last recorded LTI; and
- Names and contact telephone numbers for the appointed Project Manager and the Health and Safety Officers.

12.6 Health and Safety Management Information Notice Boards

The contractor must provide, for each appointed supervisor, a portable Health and Safety Management Information Notice Board to be placed in the work area. The following information and documentation, as a minimum, must be posted on these boards:

- The relevant Method Statements, Risk Assessments and Safe Work Procedures for the work that is being performed that day;
- The DSTI for the day;
- The most recent Toolbox Talk;
- Where applicable, all required permits and permissions for the work that is being performed;
- Material Safety Data Sheets (MSDS's) for any chemical substances being used;
- The health and safety objectives for the work team;
- Details of the last incident involving the work team;
- The most recent weekly health and safety report (refer to Section 20);
- Emergency procedures;
- A site plan indicating evacuation routes and emergency assembly point locations;
- First Aider names and contact telephone numbers; and
- The appointed supervisor's contact details.

12.7 Involvement (Other)

The participation of all contractor (and sub-contractor) employees in activities that promote improvements in health and safety performance must be encouraged. In particular, this must include their appropriate involvement in:

- Hazard identification, risk analysis and determining control measures;
- Incident investigation; and
- Reviewing policy and objectives.

All regulations, instructions, signage, etc. Must be communicated in a language understood by all employees.

Health and safety personnel must be actively involved in planning activities so that they have the opportunity to highlight hazards and risks associated with upcoming work well in advance to ensure sufficient time to arrange and / or implement the necessary control measures.

13. Documentation and Document Control

The contractor must develop and maintain project-specific documentation required for the effective management of health and safety on the project.

All documents related to the contractor's health and safety management system must be effectively controlled.

The document control process must:

- Provide for the review, revision and version control of documents;
- Uniquely identify documents (as appropriate) to control their use and function;
- Require approval of the documents for adequacy prior to issue;
- Clearly identify changes and record the status of any revisions to documents; and
- Provide for the effective distribution of documents to, and where necessary the timely removal of obsolete documents from, all points of issue and use.

The contractor must establish a process for the systematic control of health and safety records and related data. Controls must be in place for the creation, receipt, secure storage, maintenance, accessing, use and disposal of such records and data.

Each record must be legible, identifiable and traceable, and must contain adequate information and data for its purpose.

The confidentiality and security of records and data must be maintained in a manner that is appropriate for the nature of the records and data, and in accordance with any applicable data or privacy protection legislation.
Personal information originating

From medical surveillance and occupational hygiene monitoring must be reported in a form that respects the privacy of the individual, but enables management to fulfil their duty of care obligations to employees. The names of individuals must not be disclosed without their written authorisation.

Retention periods for all records (based on legal requirements and / or knowledge preservation considerations) must be established and documented in accordance with applicable legislation.

13.1 Contractor Health and Safety File Requirements

The contractor must compile and maintain a file containing all necessary health and safety related documentation. The client should provide construction work permit and to be kept on site at all times. The contents of the file will be audited by a Project Health and Safety Advisor on a monthly basis.
Required documentation includes, but is not limited to, the following:

- Letter of Good Standing from the Workman's Compensation Commissioner (where applicable) must have dol stamp;
- Proof of Public Liability Insurance;
- Scope of Work under the contract;
- List of Contacts and their Telephone Numbers;
- Health and Safety Policy;
- Health and Safety Management Plan;
- Legal Register;
- Organisational Chart for the project;
- Appointment Letters (appointment of the contracting company, and appointments for all persons with health and safety related responsibilities);
- Notifications to the relevant authorities that construction work is in progress;
- Baseline and Task-Based Risk Assessments;
- Health and Safety Objectives, and associated Improvement Action Plans;
- Safe Work Procedures, Work Instructions and Work Method Statements;
- Planned Task Observations;
- Fall Protection Plan (for work at height);
- A dossier (Equipment Profile) for each fuel-driven vehicle or machine;

- Inspection Registers, Forms and Checklists (e.g. For portable electrical tools, ladders, safety harnesses, light vehicles, mobile equipment, lifting equipment and lifting tackle, first aid boxes, fire extinguishers, etc.);
- PPE Issue Registers;
- Material Safety Data Sheets;
- Emergency Response Procedures;
- Incident Records;
- A dossier (Employee Profile) for each employee containing:
- A copy of the employee's Identity Document or Passport;
- Certificate of Fitness (Pre-Employment Medical Examination);
- Proof of Induction Training;
- Other Training Records;
- Copies of Qualification Certificates and / or Certificates of Competency; and
- Copies of Licences;
- Health and Safety Meeting Minutes;
- Health and Safety Performance Reports;
- Copies of Inspection and Audit Reports; and
- Daily Safe Task Instructions (DSTI's) and Toolbox Talks.

The contractor must ensure that an equivalent file is compiled and maintained by each appointed sub-contractor.

14. Notification of Construction Work

A contractor who intends to carry out any construction work other than work contemplated in CR regulation 3(1), must at least 7 days before that work is to be carried out notify the provincial director in writing in a form similar to Annexure 2 if the intended construction work will—

- include excavation work;
- include working at a height where there is risk of falling;
- include the demolition of a structure; or
- include the use of explosives to perform construction work.

A contractor who intends to carry out construction work that involves construction of a single storey dwelling for a client who is going to reside in such dwelling upon completion, must at least 7 days before that work is to be carried out notify the provincial director in writing in a form similar to Annexure 2 of the CR regulations.

15. Operational Control

Refer to Transnet Port Terminals Health and Safety Management Guidelines for Managing Common Hazardous Activities and Tasks: HAS-GN-0001.

For project operations and activities, the contractor shall implement and maintain:

- Operational controls, as applicable to the organization and its activities;
- The organization shall integrate those operational controls into its overall OH&S Management System;
- Controls related to purchased goods, equipment and services;
- Controls related to contractors and other visitors to the workplace;

- Documented procedures, to cover situations where their absence could lead to deviations from the OH&S policy and the objectives;
- Stipulated operating criteria where their absence could lead to deviations from the OH&S policy and objectives.

15.1 Project-Specific Health and Safety Standards

For all site health and participation specific this will serve as a guideline

Project-specific health and safety standards, incorporating leading practices, legal requirements, and client requirements will be developed and implemented to manage critical risks on the project.

The contractor must comply fully with the requirements of these standards.

The Safe Work Procedures required of the contractor must be aligned with the requirements of these standards.

15.2 Safe Work Procedures

Procedures to be developed and maintained on site

The contractor must develop, document and implement Safe Work Procedures for all activities involving significant health or safety risk. These procedures must detail the control measures required to effectively manage the health and safety risks associated with the work activities.

Each Safe Work Procedure must be consistent with the Task-Based Risk Assessment completed for the activity.

Every person engaged in an activity for which a Safe Work Procedure has been developed must receive suitable training on the procedure.

Furthermore, the contractor must develop, document, communicate and implement formal procedures, work instructions and / or programmes for the operation, maintenance, inspection and testing of all plant and equipment (including protective systems and devices) brought onto the project site(s).

15.3 Planned Task Observations

All contractor, management supervisors must perform Planned Task Observations (PTO's) to verify that the control measures that have been identified in Safe Work Procedures (and associated Risk Assessments) are being adhered to and are being properly implemented, and to provide guidance where deviations are noted.

Each supervisor must complete at least one PTO per day involving one or more employees in his work team.

When an unsafe act or condition is identified, the supervisor must coach the work team to correct the act or condition in line with the Safe Work Procedure.

Where valid changes to the work method are identified, the supervisor must ensure that the Safe Work Procedure and Risk Assessment are updated to reflect the current practice.

Project representatives will carry out PTO's on contractor employees on an ad hoc basis. Should deviations from the contractor's Safe Work Procedures be observed, the work may be stopped until these deviations are rectified.

15.4 General Rules of Conduct

All persons are required to conform to the following rules of conduct while on the site.

The following acts are prohibited:

- Engaging in practical jokes, horseplay, scuffling, wrestling, fighting, or gambling;

- Assault, intimidation, or abuse of any person;
- Insubordination towards any supervisor or manager;
- Refusing to carry out a reasonable and lawful instruction concerning health and safety;
- Entry into any restricted area (including barricaded areas), unless authorised to do so by the responsible person;
- Unauthorised use / operation of any equipment or machinery;
- Negligently, carelessly or wilfully causing damage to any property;
- Destroying or tampering with safety devices, signs, or signals;
- The use of water from fire hydrants or hose reels for any purpose other than extinguishing a fire;
- The wilful and unnecessary discharging of fire extinguishers;
- Refusing to give evidence or deliberately making false statements during incident investigations;
- Bringing alcohol, drugs, or any other intoxicating substance onto site;
- Bringing a firearm, ammunition, or any other offensive weapon onto site;
- Bringing animals onto site;
- Running, except in an emergency;
- The use of an ipod (or similar) whilst working on site;
- Sleeping on the job;
- Building fires on site, unless in a suitably constructed barbequing facility; and
- Pouring / pumping / flushing any substance (chemical / hydrocarbon / waste water) into a storm water drain, onto bare soil, or into any area where the substance is not effectively contained.

Any of the above actions may result in the temporary or permanent removal of the offending person(s) from site, as well as possible prosecution. The decision of the nominated project management representative shall be final and binding in respect of any dispute that may arise from the interpretation of these requirements.

Transnet Port Terminals will not get involved in contractor disciplinary rules and procedures. The contractor will simply be informed (with reasons) that the offending employee(s) will be denied access to the project site. Once the contractor has been informed, the employee(s) must be removed from the site immediately.

15.5 Site Access

The contractor may not hire any security services for the project site unless authorisation has been obtained in writing from a nominated project management representative.

15.6.1 Access Control

The contractor must comply with all access control, procedures and systems applicable to the project site.

Failure to comply with these requirements will be viewed as a serious safety breach and may result in the permanent removal of the individual(s) / contracting company from site or suspension without payment.

Access will be controlled as follows:

- The access will be strictly controlled and managed
- Contract period access – an access card valid for the full contract period will be issued to an individual once the following requirements have been met:
  - Completion of a pre-employment medical examination;

- Completion of all required project induction training;
- Completion of special training / licensing if applicable (e.g. Driving/operating Licence); and
- Provision of proof of job / trade-specific qualifications, licences, training, Experience and competency (as required).

Note: No access card will be issued unless proof of identification is provided (i.e. an identity document or a valid passport). For foreign labour, an access card will only be issued if a valid work visa is produced.

Note: A driving licence will not be accepted as proof of identification.

15.5.2 Trespassing

The contractor must ensure that no employee (including sub-contractor employees) trespasses on any land lying beyond the boundaries of the project site.

If instructed by a nominated project management representative to do so, the contractor must remove any employee who fails to comply with this requirement from the project.

The contractor's activities must be confined to the specified construction areas, and access to these areas may only be by means of specified routes.

All required barricading (fencing) must be erected and maintained by the contractor.

15.5.3 Visitors

Visitors (including reps and suppliers) must be advised in advance of the mandatory Personal Protective Equipment (PPE) requirements for the site, and must arrive with all of this PPE.

Upon arrival, all visitors must report to the Security Office where they must sign in.

All visitors must undergo a visitor induction briefing before entering the site.

A visitor access card will be issued to each visitor on conclusion of the induction briefing.

Whilst on site, visitors must be accompanied at all times by an appropriately senior employee who has been inducted fully. The visitor(s) must be met at the Security Office, and when the visit is over, must be escorted back to the Security Office.

When leaving the site, each visitor must return his or her visitor access card to the security personnel posted at the entrance / exit. A visitor will not be permitted to leave the site until he or she produces the access card that was issued.

Note: Visitors are not permitted to perform any work on site.

Note: Any request (typically made by a government official) to carry out a site inspection must be referred to the nominated project management representative. The contractor must not arrange any such inspection without prior approval from the nominated project management representative.

15.5.4 Alcohol, Drugs and Other Intoxicating Substances

The contractor must ensure that all personnel under his authority do not at any time enter the site or perform any work whilst under the influence of alcohol, a drug, or any other intoxicating substance.

Selling or possessing drugs, alcoholic beverages or any other intoxicating substance on the site is strictly prohibited.

A drugs and alcohol testing program will be implemented. Persons entering the site will be randomly tested. Any person who tests positive for alcohol or drug consumption will be subject to disciplinary action and shall be permanently removed from the site.

Any person have the opportunity to rather report that he/she is under the influence before accessing the project site – in these case the employee may only be send home for the day by the responsible project manager representative but will then be tested for the following five days (each day) on his return to the project site. If it is found that the same person is frequently reporting that he/she is under the influence before even accessing the project site. It shall be the responsibility of the nominated project management representative to take disciplinary action and remove such a person's form the project site.

Should the actions and / or demeanour of an employee suggest possible narcosis or drunkenness, the employee must be removed from the site. This may be done without testing.

Note: All personnel involved in an incident / accident must immediately be subjected to an alcohol test and a drug test as part of the investigation.

15.5.5 Firearms, Ammunition and Offensive Weapons

Firearms, ammunition, and offensive weapons of any kind are strictly prohibited. No person may enter /shall not be permitted to enter the site carrying any such item.

15.5.6 Vehicles

All vehicles brought onto site must meet the safety requirements stipulated in Section 14.6.
Each vehicle to be used on site must be inspected and approved by the nominated project management representative before a site access permit will be issued for the vehicle / equipment. No vehicle shall be permitted to enter the site unless it is duly authorised. Access permits are vehicle-specific and may not be transferred between vehicles.
The contractor must allow any vehicle that is brought onto site (including privately owned vehicles) to be searched at any time while on the premises, or when entering or leaving the premises.
The contractor is solely responsible for the safety and security of all vehicles (including private vehicles) that he brings onto the site.
All road-going vehicles used by the contractor on the site must be roadworthy and registered with the relevant traffic authority.
A vehicle will not be permitted to enter the site in an un-roadworthy condition. Access will be denied if, for example:

- The vehicle has a defective exhaust system;
- A serious oil or fuel leak is evident;
- The vehicle has unsafe bodywork or is carrying an unsafe load;
- The vehicle is fitted with extraneous or non-standard equipment;
- Passengers are not seated properly;
- The vehicle is not fitted with a seat belt for each occupant; or
- The vehicle has any obvious mechanical defect;
- Pre-inspection requirements are not met.

Overloaded vehicles will not be permitted to enter the site.
The driver / operator of any vehicle / mobile equipment must carry a copy of his appointment with him at all times. Each driver / operator must:

- Comply with all site / project rules and regulations pertaining to traffic and the safe operation of vehicles / mobile equipment;
- Obey all road signs;
- Obey all instructions given by security or emergency services personnel;
- Remain within the boundaries of the site; and

- Ensure that the vehicle that he is operating is never overloaded, and that loads are always properly secured.

In the interest of safety, only the minimum number of vehicles required by the contractor to complete the work under the contract will be permitted to enter the site.
When not in operation, the contractor's vehicles / mobile equipment must be parked within the boundaries of his lay-down area or yard.

Parking is only permitted in designated parking areas.

All cars are parked on site at the owner's risk.
In the event of a vehicle accident on site, the driver(s) must report the incident immediately and must remain at the scene until a nominated project management representative arrives, or until a nominated project management representative authorises him to leave (unless, of course, the driver requires medical attention).

15.6 Mobile Equipment and Light Vehicles

All Contractors must ensure all applicable legislation concerning mobile equipment and light vehicles are complied with at all times.

Each contractor must provide evidence to the nominated project management representative that all light vehicles and mobile equipment to be used on the project (including, but not limited to, lift and carry cranes (or mobi-lifts), mobile cranes, forklifts, mobile elevating work platforms (e.g. Cherry pickers), tractors, dozers, dump trucks, haul trucks, graders, excavators, loaders, back-actors, drill rigs, and road-going cars, light delivery vehicles, and trucks) comply with the requirements of all applicable legislation. This evidence must be provided prior to the equipment being brought onto the project site. The contractor remains responsible for meeting this requirement even if the equipment to be used is leased or provided by a sub-contractor (i.e. not owned directly by the contractor).

An Equipment Profile (dossier) must be compiled for each light vehicle and each item of mobile equipment to be used on the project site.
All mobile equipment and light vehicles (used for work purposes) must be subject to a risk assessment compiled. The assessment must:

- Involve operators and maintenance personnel who will use and work on the equipment; and
- Address all aspects of safe operation including handling, driver vision, brake failure, tyre blow out, and access and egress for operators and maintenance personnel.

Each light vehicle and each item of mobile equipment must be serviced and maintained as prescribed by the manufacturer of the vehicle or equipment.
No major repairs or services may be carried out on site.
No repairs may be carried out by a driver or operator. Only suitably qualified and competent persons may carry out repair work.
An appropriate pre-operation safety check based on a risk assessment must be carried out for each light vehicle or item of mobile equipment driven or operated for work purposes. For each vehicle or equipment type, an approved checklist must be in place (and must be used). The pre-operation check must include, but not be limited to, inspection and / or testing of the following safety critical features:

- Brakes (testing method must be provided);
- Wheels and tyres (including the spare);
- Lights and indicators;
- Steering;

- Seats and seat belts; and
- Windscreen and windows, including windscreen wipers and washers.

Should any critical feature be defective or damaged, the vehicle or equipment may not be operated until it has been fully repaired.

Supervisors must review the completed checklists on a daily basis to satisfy themselves that there are no major deficiencies that could place a driver or operator at risk.
No person may drive or operate any light vehicle or item of mobile equipment without authorisation.
All drivers and operators must be appointed in writing by the contractor's Project Manager.

No driver or operator may be appointed without proof that the individual has been trained, tested and found competent, or is currently licensed.

The appointment letter must specify the type of vehicle or equipment for which authorisation is being given and must clearly confirm that the driver or operator:

- Is 18 (eighteen) years of age or older;
- Has undergone a medical examination and has been declared fit for work by an occupational medical practitioner; and
- Has received suitable training and has been found competent, or is in possession of a valid driving licence issued by a state, provincial or civil authority that is applicable to the class of vehicle or equipment that is to be driven or operated.

The principal accountability for preventing accidents and incidents lies with the driver or operator of a light vehicle or item of mobile equipment, as he is in full control of any given situation at any given time. It must be stressed to each driver and each operator that safety is his prime responsibility – this must be clearly instructed and understood.

Drivers and operators must be empowered to stop driving or operating immediately should an unsafe condition arise, and refuse to drive or operate any light vehicle or item of mobile equipment that is defective and / or has any inoperative safety features. Similarly, a supervisor must never force a driver or operator to drive or operate a defective vehicle or item of equipment.

If a driver or operator does not adhere to the site rules and regulations, his appointment must be withdrawn and he must not be permitted to continue with his duties. If necessary, site access will be denied (either temporarily or permanently) to any driver or operator who is deemed to not be adhering to site requirements.

No person may drive or operate a light vehicle or item of mobile equipment if he suffers from a medical condition that places both him and those around him at risk of injury.
A fit-for-work policy must be in place, incorporating clearly defined maximum levels of drugs (including prescribed medication) and alcohol permitted in the system of a driver or operator.
Daily alcohol testing and random drug testing must be carried out.

Supervisors must regularly check on the physical condition of drivers and operators during the course of a shift.
A system must be in place to manage driver fatigue.
No eating or drinking is permitted while driving or operating a light vehicle or item of mobile equipment.

A mobile phone, whether hands-free or not, may only be used by the driver or operator of a light vehicle or item of mobile equipment when the vehicle or equipment is stationary and in a safe location.
Behaviour-based observations and coaching must include the operation of light vehicles and mobile equipment.

A site-specific traffic management plan must be compiled and submitted to the nominated project management representative for approval. The plan must include, but not be limited to, the following:

- Segregation of pedestrians, light vehicles, and mobile equipment where possible (using barriers where feasible);
- Systems to control the movement of mobile equipment in areas accessible to pedestrians, the movement of mobile equipment into and out of workshops, and pedestrian and light vehicle movement around mobile equipment;
- Setting of appropriate speed limits for vehicle types, road surfaces and environmental conditions;
- Installation and maintenance of road traffic control signs;
- Right-of-way rules (including overtaking restrictions);
- Overtaking protocols;
- Clear communication protocols for interactions between all vehicles and equipment;
- Procedures for light vehicles and / or mobile equipment entering hazardous or restricted areas;
- Standards for safe following distances based on operational circumstances, environmental conditions and near sight (blind spot) limitations of mobile equipment;
- The minimum safe distance to be maintained between light vehicles and mobile equipment (i.e. 50 metres unless positive contact is made);
- Designated parking areas for mobile equipment and light vehicles, including parking associated with maintenance areas;
- Parking procedures (e.g. Safe parking distances, safe parking locations, requirements for reverse parking, etc.);
- Systems to control approaching, refuelling, parking, boarding and disembarking mobile equipment (a driver or operator must exit the cabin and must disembark the vehicle or equipment entirely when his direct involvement with maintenance or servicing is not required);
- Guidelines for abnormal road conditions (e.g. Heavy rain, fog, or high winds) providing "go / no go" criteria and contact details for the person(s) responsible for making the "go / no go" decisions;
- Truck loading and unloading procedures to avoid material or objects falling from the vehicle;
- Guidelines for wide or abnormal loads including offsite transport; and
- Systems to control mobile equipment use in the vicinity of overhead power lines.

The design and layout of the road system (including entrance and exit points, intersections and other potential points of interaction between pedestrians, light vehicles and mobile equipment) must be reviewed periodically.

A risk assessment must be carried out prior to any changes being made to traffic movements or road systems.

Designated walkways (both indoors and outdoors) must be provided for pedestrians, and pedestrians must make use of these walkways. Good lighting must be provided along all walkways,

particularly at road junctions. Wherever possible, rigid barricading must be used to separate pedestrians from moving light vehicles and / or mobile equipment.

No pedestrians are permitted on haul roads (or as far as this can reasonably be achieved in situations where a haul road runs through an area occupied by a local community). All personnel must be transported to site and must be dropped off at a designated area.
Controls must be in place to ensure the safety of people working on roads, including those working on broken-down vehicles.

High visibility clothing must be worn by all persons at all times whilst on the project site.
Speed limits and traffic rules must be reviewed regularly and must be rigorously enforced. Local traffic rules must be complied with at all times.

Pedestrians and cyclists must give way to light vehicles and / or mobile equipment except at pedestrian crossings.

All light vehicles and mobile equipment must give way to emergency vehicles.
Pedestrians and light vehicle drivers must be made aware of the blind spots associated with mobile equipment.

The driver or operator of a light vehicle or item of mobile equipment must stop the vehicle or equipment and sound the horn before proceeding at blind corners, where his view of the path or intended path is obstructed, and when entering or leaving a building.
Whenever a light vehicle or item of mobile equipment is stopped or parked, the handbrake (if applicable) must be applied.

Measures (such as chocking or the use of ditches or trenches) must be in place for the immobilisation of parked mobile equipment.
A parked light vehicle must be chocked in situations where the vehicle would roll forwards or backwards if placed in neutral with the handbrake disengaged.

No light vehicle or item of mobile equipment may be left unattended with the engine running or with a key in the ignition.
No light vehicle or item of mobile equipment may be parked so as to cause an obstruction to any roadway, passage or access way.

No light vehicle or item of mobile equipment may be parked within 50 metres of a loading or off-loading point.

Light vehicles and mobile equipment must be loaded safely. All loads must be secure and must be within the load limit of the vehicle or equipment. A load must be properly secured before the vehicle or equipment is set in motion. Adequate precautions must be taken for any overhanging load.
No unauthorised light vehicle or item of mobile equipment may enter a restricted area or building.

15.6.1 Light Vehicles

All Contractors must ensure that Light vehicles have the following minimum safety features:

- Fixed seats and suitable seat (safety) belts for all occupants (i.e. Driver and all passengers);
- Roll-over protection for all vehicles intended to be driven on dirt or steep roads;

- Cargo barriers and load restraints for all vehicles designed for carrying loads (other than passengers), or that are unable to have cargo separated from the occupant-carrying space of the vehicle; and
- An air bag on the driver's side, and where available as a manufacturer fitted item, a passenger's air bag;
- A Reverse Alarm.

All Contractors must ensure that Light vehicles that interact with mobile equipment are equipped or fitted with:

- Systems that enable positive communication with the equipment operators (e.g. A two-way radio);
- A high visibility flag (e.g. A whip flag or buggy whip);
- An amber flashing light (revolving or strobe);
- Reflective taping; and
- High visibility signage (i.e. Vehicle call numbers) facilitating easy and positive identification from a reasonable distance.

Note: Call number signs and reflective tape (magnetic or adhesive) must be applied to the front, back and sides of each vehicle.

All Contractors must ensure that Light vehicles carry:

- Emergency roadside triangles or beacons (three of either);
- Chock blocks for preventing uncontrolled movement of the vehicle when parked;
- A flashlight;
- A fire extinguisher (2.5kg DCP);
- A first aid kit; and
- Survival or emergency equipment (e.g. a vehicle recovery kit) suitable for the operating environment.

A change management process must accompany all vehicle modifications, including the attachment of any equipment. Examples of changes or modifications include, but are not limited to, any change or modification:

- Made to the overall structure or design of the vehicle body;
- Made to the original manufacturer-fitted type of tyres or wheels;
- Made to the suspension system of the vehicle;
- Made to the mechanical system of the vehicle;
- That may adversely alter the centre of gravity of the vehicle;
- That alters the load carrying capacity of the vehicle; and
- That may affect the ability of the vehicle to withstand a crash (e.g. the fitment of a "bull bar").

Vehicle selection must be based on a risk assessment where consideration is given to the tasks, the application, the environment, roll-over protection and the rating of sturdiness in the event of a crash.

All Contractors must have a formal inspection and preventative maintenance system in place to ensure that vehicles are maintained in a safe and roadworthy condition at all times and, as a minimum, are serviced in line with the vehicle manufacturer's service schedule.

Should any safety critical feature be defective or damaged, the vehicle must be withdrawn from service until it has been fully repaired. Inspection and maintenance must be undertaken on critical features such as:

- Wheels and tyres (including the spare);
- Steering, suspension and braking systems;
- Seats and seat belts;
- Lights, indicators and reflectors;
- Windscreen and windows, including windscreen wipers and washers;
- The vehicle structure itself; and
- Other safety-related items on the vehicle body, chassis or engine, including instrumentation.

Persons may only be transported in vehicles equipped with manufacturer fitted or approved seats and seat belts.
Seat belts must be worn by all occupants of a light vehicle (i.e. the driver and all passengers) at all times.

Only the driver and one passenger are permitted in the cab (front) of a light delivery vehicle.
No personnel may be transported in the load-bin of a light delivery vehicle, even if the vehicle is fitted with a canopy. Only tools and equipment may be transported in the load-bin. Furthermore, no persons may be transported in a trailer behind a vehicle.

A pre-operation vehicle safety check and familiarisation system must be in place and must be used by the driver. An approved checklist must be used. All vehicle faults that are recorded must be attended to immediately.

All Contractors must have systems in place to ensure that risks associated with vehicle journeys are managed and controlled. The systems must include, but not be limited to:
- Formulation of journey management plans prior to the commencement of new or changed travel activities;
- Identification and monitoring of the risks associated with the various routes, intersections, etc. In order to minimise the overall exposure;
- Assessment and communication of changed environmental and road conditions at the time of travel;
- Outlining of actions required in the event of an emergency (e.g. Collision or breakdown); and
- Provision to manage driver fatigue.

Light vehicle running lights (low-beam headlights) must be switched on at all times when the vehicle is in operation.

All Contractors must have a system is in place to ensure that drivers receive adequate training to ensure that the vehicle intended to be operated or driven can be operated or driven safely. As a minimum, training must include:
- Behaviour-based defensive driving principles;
- Vehicle familiarisation, taking into account the handling dynamics of the vehicle, maximum number of passengers, load limits and various features;
- Loading and restraining principles where the vehicle to be operated is designed for carrying cargo loads;
- Education and awareness concerning driving and travel risks that may be encountered within the environment where the vehicle may be operated or driven, and the requirements pertaining to traffic rules and speed limits;
- Securing (locking) equipment to prevent unauthorised use;
- Emergency crash and breakdown procedures; and

- Basic mechanical principles, including how to change a tyre and perform an adequate pre-operation check.

A system must be in place to ensure that persons operating any equipment associated with a light vehicle (e.g. Vehicle-mounted cranes and winches) are suitably trained and competent.

15.6.2 Mobile Equipment

All Contractors must ensure that Mobile equipment have the following minimum safety specifications:

- Fixed seats and seat belts for all occupants;
- Adequate lighting, including headlights, tail, turn and brake lights, and an amber flashing light (revolving or strobe);
- An identified isolation and lockout point;
- Adequate walkways, railings, steps and grab handle combinations, and boarding facilities including an alternative path of disembarking in the event of an emergency;
- Collision-avoidance technology and / or procedures;
- A reversing alarm or warning device;
- Chock blocks for preventing uncontrolled movement of rubber-tyred equipment when parked;
- A horn;
- Effective windscreen wipers;
- Effective guarding on accessible moving parts;
- A speedometer (if the mobile equipment is capable of exceeding the lowest applicable speed limit);
- High visibility signage (i.e. Mobile equipment call numbers) facilitating easy and positive identification from a reasonable distance; and
- A security system to prevent unauthorised operation.

Mobile equipment must have the following minimum safety specifications, unless a risk assessment stipulates otherwise:

- Approved or certified roll-over protection;
- Fail-to-safe brakes;
- A fire detection and suppression system capable of being activated from both ground level and cabin level (for certain types of mobile equipment, a suitably sized fire extinguisher may be adequate);
- A non-handheld two-way radio or another form of communication;
- Falling object protection (a protective structure over the operator cabin);
- An enclosed and tight-sealing air-conditioned cabin with suitable protective glass; and
- A means of moving supplies and personal items into and out of the operator cabin that enables an operator to continuously maintain three points of contact while boarding and disembarking the equipment (e.g. A backpack or shoulder strap bag).

When purchasing or hiring equipment, the ergonomics of the cabin must be considered, specifically with regard to the seating, operator controls and retrofitted devices.

Fleet and control consistency must be considered in order to minimise the possibility of operator error when changing machines.

For all new (to site) and modified mobile equipment, a formal risk-based selection and acceptance process must be followed prior to the equipment being used on site.

Selection of equipment, and any modification, must be subject to a rigorous change management process.

An inspection and maintenance programme must be in place for all mobile equipment.
A procedure and checklist system, including a brake functionality test, must be in place for pre-operation inspection by the operator. Registers must be maintained and audited, and must be kept on the machine.

Procedures must be in place to ensure that mobile equipment is only operated on sufficiently stable surfaces and on gradients that are within the limits of safe operation.

Seat belts must be used in all cases, by all occupants. Apart from the driver or operator, only an appointed flagman may be transported in mobile equipment (with the exception of buses) and **only if** the equipment is fitted with a passenger seat. No passengers are permitted on a lift and carry crane (or mobi-lift), mobile crane, forklift, mobile elevating work platform (e.g. A cherry picker), tractor, dozer, dump truck, grader, excavator, loader, back-actor, drill rig, or similar.

Risk assessments must be carried out as part of the planning process for mobile equipment operations and associated activities, and must consider the following:

- Maintenance activities;
- Risks associated with loading, unloading, towing and recovering mobile equipment; and
- The risk of fire.

Procedures must be in place for the safe isolation and lockout of mobile equipment.

Where two or more items of mobile equipment must be operated in proximity to each other, or where an item of mobile equipment must be operated in proximity to persons on foot, a risk assessment involving all persons who will be working in the area must be conducted prior to the work commencing. The risk assessment must be approved by the nominated project management representative. In such a work area:

- No item of mobile equipment may be driven to within 5 metres of another item of mobile equipment without the operator first making eye contact with, and signalling his intentions to, the other operator who must acknowledge that he understands and that it is safe to proceed.
- No person on foot may work or be positioned within 5 metres of an item of mobile equipment that is in operation. Before approaching mobile equipment on foot, a person must make eye contact with, and clearly signal his intentions to, the operator of the equipment. The operator must cease to operate the equipment, and must indicate that he understands and that it is safe to approach.

In certain circumstances (determined through risk assessment), mobile equipment may only move and operate with dedicated flagmen in place:

- Where flagmen are used, it must be ensured that the flagmen, mobile equipment operators, and all other personnel working in the vicinity of the mobile equipment, receive suitable training with regard to signals and signalling to ensure effective communication. The training must be formal and recorded, and competency must be tested.
- A flagman and the mobile equipment operator that he is directing must maintain eye contact. The flagman must never position himself where the equipment operator cannot see him.
- Should a mobile equipment operator lose sight of his flagman, he must stop his activities immediately until contact has been re-established.

A tyre management system must be in place to address issues including fire, heating, explosion, electrical contact, separations, maintenance, tyre changes, etc.

Site-specific induction must be carried out prior to a mobile equipment operator starting work on site. Area-specific induction must be carried out prior to an operator starting work in a new area on site.

Operators must report conditions and practices that do not conform to procedure.

15.6.3 Training and Licensing

No person may drive a light vehicle or operate an item of mobile equipment unless he has been trained, tested and found competent, or is currently licensed to drive or operate that specific vehicle or item of equipment.
The training must address hazards and risks assessed for:

- That vehicle; and
- The tasks for which it is to be used.
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No person may be appointed to drive a light vehicle or operate an item of mobile equipment unless he is in possession of a valid medical certificate of fitness (issued by an occupational medical practitioner).

Each person required to drive a light vehicle or operate an item of mobile equipment on the project site must have a project-specific site licence or appointment to drive or operate that vehicle or item of equipment.

A system must be in place to ensure that the renewal of licences is based on an assessment of competency to drive and / or operate the vehicle or equipment. The frequency of assessment must either be annual, or derived from a risk assessment for each vehicle or equipment type.
No training of drivers or operators may be carried out on site unless authorised by a nominated project management representative.

Each person working on or visiting the project site must receive appropriate project-specific induction training concerning road safety and site vehicle hazards.
Driver must be in position of valid certificate, licence and trained by an accredited service provider.

15.6.4 Roads

Design, inspection and maintenance requirements must be in place for all roadways.
Every haul road must have two dedicated and clearly demarcated lanes so that vehicles travelling in opposite directions are safely separated (lane demarcation is not applicable to dirt roads).
Systems (such as safety berms) must be in place along roadways and around excavations, dump areas, etc. To prevent vehicles from leaving a roadway or entering a dangerous area.

A storm water management plan must be in place for the site and, in particular, for all roads. Extreme wet weather must be considered. Contractors must ensure that all roads are equipped with drainage system.

Roads with high risks activities and traffic interface shall be controlled by trained flagman
A dust control plan must be in place for the site and, in particular, for all roads. Where required, contractors must ensure that roads are wetted (using a water cart) at regular intervals and whenever instructed by a nominated project management representative. The over-watering of roads must be prevented.

No road may be closed without permission from a nominated project management representative. Any large rocks in a roadway must be removed immediately. Any spillage in a roadway must be cleaned up immediately.

Ground pollution (e.g. Oil, diesel or hydraulic fluid spillages) must not, and will not, be tolerated. If substances are spilled on a road or any other portion of the site, the contaminated ground must be dug out and the resulting hole back-filled with clean material which must be suitably compacted. The contaminated soil must be disposed of as required by the applicable legislation.

15.7 Signs and Notices

The contractor must ensure that all required safety signs and notices are prominently displayed in accordance with the applicable legislation and good safety practice.
Signs and notices must be in English as well as any other language(s) commonly spoken on the project site.

All symbolic signs must comply with the applicable national standards.
No person may deface or damage any safety sign or notice. No person may remove or alter any safety sign or notice unless authorised to do so.

15.8 Machinery

The contractor must ensure that all plant and equipment brought onto the site is:

- Appropriate for the type of work to be performed
- Approved, inspected, tested, numbered and tagged (if appropriate) before being brought onto site
- Properly maintained in accordance with the manufacturer's recommendations; and
- Placed on a register and checked at least once per month or as required by the applicable legislation.

The contractor must supply, at his cost, all items of plant and equipment necessary to perform the work and must maintain all items in good working order.
Should any plant or equipment become inoperable for a period that is having or will have a significant impact on the work schedule, the contractor must, on instruction from the nominated project management representative, remove the out of service plant or equipment and replace it with similar fully operational plant or equipment at no additional cost.

No item of plant or equipment delivered to site for use on the contract may be removed from the site prior to the completion of the contract without approval in writing from the nominated project management representative.

Items of plant or equipment brought onto site by the contractor or his sub-contractors may be inspected by a nominated project management representative. Should the nominated project management representative determine that any item is inadequate, faulty, unsafe or in any other way unsuitable for the safe and satisfactory execution of the work for which it is intended, the contractor must, on instruction from the nominated project management representative, immediately remove the item from the site and replace it with a safe and adequate substitute. In such a case, the contractor or his sub-contractor shall not be entitled to additional payments or deadline extensions in respect of any delay caused.

15.9 Barricading

All applicable legislation concerning barricading must be complied with at all times.

Each contractor required to erect barricading on the project site(s) must develop, document and implement Safe Work Procedures that are aligned with the requirements of this standard.

Barricading must be erected to:

- Prevent persons from making contact with an identified hazard;
- Provide warning of the existence of a hazard;
- Prevent unauthorised access (by people, vehicles and mobile equipment) into an area where a hazard exists or where a hazardous activity is being carried out;
- Define the boundaries of a hazardous location and / or restricted area; and
- Allow a work team to perform hazardous tasks without persons unfamiliar with the hazard(s) accessing the area.

Although not limited to these situations, barricading must be erected or installed:

- Around excavations (trenches, pits, etc.) (refer to the Excavation Standard);
- To protect openings and edges (to prevent persons from falling, all openings and edges associated with floors, stairs, and the open sides of buildings and structures during the course of construction must be protected by sturdy, rigid barriers capable of withstanding a force of at least 110 kilograms applied in any direction at any point) (refer to the Working at Heights Standard);
- To prevent access into areas where overhead work is in progress;
- To route vehicles safety through (or around) construction areas; and
- To protect members of the public who may be in the vicinity of a work or construction site (by preventing access).

In all cases, the erection of barricading must be a temporary measure. It must only remain in place until the hazard is eliminated or the potentially dangerous situation is rectified.

A barricade must present a sturdy physical barrier to entering an area. Therefore, plastic cones, post and chain systems, "danger tape" and "snow netting" will not be accepted as barricading and may only be used for the purposes of low risk demarcation.

For example, snow netting may be used for the demarcation of lay down areas.

Acceptable forms of barricading include:

- Hoarding panels (no less than one metre in height) that can be securely fastened together to form a fence line may be used. Hoarding panels may be constructed from a variety of materials (e.g. wooden board, steel sheeting, wire mesh on a steel frame, etc.)
- Wire mesh fencing (no less than one metre in height with sturdy posts spaced at intervals of no more than 3 metres) may be used in certain circumstances, e.g. Around excavations.
- Sturdy, rigid, and securely fixed (i.e. bolted, welded, clamped, etc.) Metal guard rails may be used, particularly for protecting openings, holes and edges associated with floors, platforms, walkways, etc. The top rail must be positioned at a height of one metre above the working surface, and a mid-rail must be provided.
- Concrete Jersey barriers must be used for the routing of traffic and when work is being conducted in or alongside a roadway.

Regardless of the type of barricade used, the following requirements must be met:

- The installation, alteration and removal of barricades must be supervised by a competent person;

- The barricading must be uniformly and intelligently configured;
- The barricading must be stable, conspicuous and effective;
- The barricading must completely surround the work or hazardous area;
- General access requirements around the work or hazardous area (such as pedestrian walkways, operational access, or general thoroughfares) must be taken into consideration when erecting a barricade;
- The extent of the area that is barricaded must be kept to a minimum so as not to unnecessarily restrict access to other areas. If access routes to other areas are blocked by the barricade, alternative routes must be identified and signposted
- All barricaded areas must have properly designated points of entry and exit for persons and / or vehicles. Each pedestrian access point must be fitted with a self-closing gate. A sign indicating, "DESIGNATED ACCESS POINT – AUTHORISED PERSONNEL ONLY", must be fitted to each gate;
- Additional signage providing warning of specific hazards (e.g. falling objects, electricity, etc.) Including, "NO UNAUTHORISED ENTRY", must be attached to all gates and, where required, to the barricading itself. The signage must be visible from all angles and must be large enough to be read from a distance of 10 metres;
- Barricading must be clearly visible at all times (day and night). If necessary, flashing warning lights must be used;
- Tags must be attached to the barricading displaying the name and cell phone number of the person responsible for the barricade, and specifying the reason for the barricading and the date on which it is scheduled to be removed;
- Should a person require access to a barricaded area, authorisation must be obtained from the person responsible for the erection of the barricade. The hazards that are present and the Personal Protective Equipment that must be worn within the barricaded area must be communicated to the person seeking access;
- Each barricade must be listed in a register, and each must be inspected daily to ensure that it is still intact and that its positioning is still effective;
- All barricades must be properly maintained and repaired as required;
- When the work has been completed and the hazard has been eliminated, all barricading must be removed without delay. A barricade may not be left in place if no hazard exists;
- Before a barricade is removed (allowing general access), the area must be inspected by the person responsible for the work that was carried out, to ensure that the area is once again safe. If applicable, the person accepting the area back for general use shall do so on completion of his own safety inspection;
- Authorisation to remove (or modify) a barricade may only be granted by the person responsible for the erection of the barricade.

15.10 Excavations

All applicable legislation concerning excavation work must be complied with at all times.

Each contractor carrying out excavation work on the project site(s) must develop, document and implement Safe Work Procedures that are aligned with the requirements of this standard.
All excavation work must be properly planned. Site-specific conditions and hazards must be considered, including traffic, overhead and buried utilities, proximity to nearby structures, soil properties, presence of surface and / or ground water, position of the water table, and weather conditions.

Excavation work may only be carried out under the personal supervision of a competent Excavation Supervisor who has been appointed in writing.

Before any excavation work is carried out, a Permit to Work authorising the activities must be obtained.

Similarly, no person may enter an excavation unless a Permit to Work has been issued providing authorisation for specific tasks to be carried out within the excavation.

Before issuing a Permit to Work for excavation works, the Authorised Person (i.e. Permit issuer) must verify that:

- A detailed Risk Assessment has been conducted for the work to be performed;
- A Safe Work Procedure is in place; and
- No buried services are present in the area where the excavation works are to be carried out.

As a minimum, the Risk Assessment must consider hazards and risks associated with:

- A person being trapped or buried as a result of an excavation collapsing;
- A person being struck by an object falling into an excavation;
- A person falling into an excavation;
- A person being exposed to a hazardous atmosphere within an excavation (i.e. An oxygen deficiency, explosive or flammable gases, and / or harmful concentrations of a contaminant);
- Contact with belowground services; and
- Mobile equipment and / or light vehicle movement in proximity to an excavation.

On a plan (drawing) of the work area, the contractor must accurately indicate the position and dimensions of each intended excavation in order for it to be determined whether or not buried services would (or may) be encountered, such as electrical cabling, communications cabling, gas, fuel, potable water, fire water, effluent, sewage, or storm water pipelines.

In addition to a desk top review of existing drawings, a field survey must be carried out to verify the presence or absence of buried services. The positioning of all known belowground services must be accurately demarcated in the field before any excavation work commences.
Should there be any uncertainty, a pipe or cable locator must be used to determine if buried services are present, and if so, the positioning of the services.

If buried services are identified (or are suspected to be present) then the excavation plan must be altered if necessary to avoid these services. If the excavation plan cannot be altered then safe work methods (e.g. careful excavation by hand) must be specified and measures (e.g. Isolation and lockout of the service) must be put in place to minimise risk to personnel and prevent damage to the service(s).

Machinery may not be used to excavate material lying within one metre of any belowground service (i.e. Cable or pipe).

Excavation work that is carried out must be limited to what is described in the Permit to Work. All controls, precautions and restrictions identified in the Permit to Work (and Risk Assessment) must be strictly observed and fully implemented. The Excavation Supervisor must discuss these controls, precautions and restrictions with all persons who will be carrying out the work.
All excavation work must be carried out by persons who have been trained and are competent to perform the work.

All personnel working in or near any excavation must wear high visibility protective clothing.
Unexpected structures (e.g. Tanks, brick work, concrete work, etc.) Or services (e.g. Cables, pipe lines, etc.) As well as unusual conditions (e.g. inconsistent materials, voids, etc.) That are encountered during excavation work must be reported immediately. All work must cease until the nominated project management representative provides authorisation to continue.

If an excavation is more than 1.2 metres deep and people have to enter it, then the sides of the excavation must be suitably battered, benched, or shored, unless a registered professional geo-technical engineer confirms in writing that there is no risk of the excavation collapsing (i.e. That the sides of the excavation are stable without battering, benching or shoring).

If the sides of an excavation are battered (sloped), then this must be done at an angle that is suitable for the given soil conditions (to be determined by a registered professional geo-technical engineer).

When it is not possible to batter (or bench) the sides of an excavation to a safe angle, then the sides of the excavation must be suitably shored. Shoring may only be installed, altered or removed under the personal supervision of a competent person using a predetermined safe method. Only approved shoring systems and equipment may be used. Shoring requirements must always be determined and designed by a competent person for the specific conditions encountered at the excavation site.

All material removed from an excavation (spoil) must be placed no closer than three times the depth of the excavation away from the edges of the excavation.

The profile of this spoil must be flattened out to prevent the material from being washed back into the excavation by rain water.
Scaling must be carried out on the sides of all excavations to remove loose material.
Protective shields or barriers must be erected (when required) between the sides of an excavation and the work area in order to protect employees from falling, rolling or slumping rock, soil, or materials.

Persons may not work on the faces (sides) of battered (sloped) or benched excavations at levels above other persons.

Tools, equipment and materials may not be placed within two metres of the edges of an excavation.
Alternatively, a suitable retaining device may be used to prevent tools, equipment and materials from falling, rolling or sliding into an excavation.
No vehicle or item of mobile equipment is permitted near an edge of an excavation.
Mobile equipment may not operate in or near an excavation whilst persons are working within the excavation.

To ensure that adjacent structures (such as buildings, walls, or sidewalks) remain stable during excavation work, support systems such as shoring, bracing, or underpinning must be provided if required. Excavation below or near the base or footing of any foundation or retaining wall is prohibited unless:

- A support system (designed by a registered professional geo-technical or Structural engineer) is provided, such as underpinning; or

- A registered professional geo-technical engineer determines that the structure is far enough away from the excavation that no hazard exists.

To prevent persons and / or mobile equipment from accidentally falling into an excavation and to prevent unauthorised entry into an excavation, rigid barricading must be erected around every excavation that is deeper than 500mm. Warning signage must be prominently displayed and, if necessary, flashing warning lights must be used at night.

The barricading must remain in place for as long as the hazard (i.e. the excavation) exists. Sections of barricading around an excavation may only be removed (and then only temporarily) to enable excavation work to continue (refer to the Barricading Standard).

For each excavation more than 1.2 metres deep, safe means of access and egress (e.g. Ladders, steps or ramps) must be provided for persons working in the excavation. Safe entry and exit points must be located every 15 metres along the side(s) of an excavation (i.e. an exit point must not be more than 7.5 metres away from any person working in the excavation).

If a hazardous atmosphere exists within any excavation (i.e. an oxygen deficiency, the presence of explosive or flammable gases, and / or harmful concentrations of a contaminant) or if there is a possibility that a hazardous atmosphere may develop, then the excavation must be declared a confined space. Furthermore, an excavation must be considered a confined space if any risk of entrapment or engulfment exists. If an excavation is declared a confined space then all precautions and requirements pertaining to confined spaces must be implemented and complied with (refer to the Confined Spaces Standard).

Internal combustion engines may not be used in or near the edge of an excavation unless the exhaust emissions are ducted away or suitable mechanical (forced air) ventilation is used to maintain a safe atmosphere within the excavation.
Any water and / or sludge present within an excavation must be removed completely before any work commences in the excavation.

Using ditches, dykes, sumps and pumps, or other suitable means, surface water must be prevented from entering an excavation and areas lying adjacent to an excavation must be adequately drained.
If equipment is used to prevent water from entering an excavation or to prevent water accumulation within an excavation, then the equipment must be monitored by a competent person to ensure that it remains operational and effective.

Suitable lighting must be provided in and around any excavation in which work must be carried out at night.
A high standard of housekeeping must be maintained in and around all excavations.
Tools that are not in use, and materials that are no longer required, must be removed from an excavation to prevent these items from causing injury or being lost (buried).
A register of all excavations must be compiled and maintained.

A competent person (i.e. an appointed Excavation Supervisor) must inspect each excavation as well as the areas around it:

- At the start of each day (or shift) before work commences within the excavation;
- After any alteration is made to the excavation or shoring;
- After rainfall;
- After any blasting activity carried out in the vicinity of the excavation; and

- After any event that may have affected the strength or stability of the excavation or the shoring.

An excavation must be inspected for collapses, signs of instability, failures or signs of overloading of protective systems and equipment, hazardous atmospheres, water accumulation, and any other hazardous condition that may arise.

The sides of an excavation as well as the surface of the ground around the excavation must be carefully inspected for signs of instability including fissures (cracks), slumping, and bulging. Shoring must be carefully inspected for signs of overloading (e.g. Distortion).

If a hazardous condition is identified, no person may enter the excavation until suitable corrective actions have been taken and / or suitable controls have been put in place to either eliminate the hazard or reduce the risks to acceptable levels.

A record of each inspection (including date, time, findings, and signature of the Excavation Supervisor who carried out the inspection) must be captured in the excavations register. Each inspection record must include a declaration as to whether the excavation is safe to work in or not. All excavations must be monitored closely throughout each work day (or shift) by the Excavation Supervisor.

If an excavation has been declared a confined space, a safety observer (who will be able to initiate emergency response procedures if required and identify the location of any trapped or buried persons in the event of a collapse) must be stationed at ground level outside of the excavation whenever work is being carried out in the excavation.

If a hazardous condition is identified while work is being carried out in an excavation, then all persons in the excavation must be evacuated to safety without delay.
Under no circumstances may a person work alone in an excavation that is more than 1.2 metres deep without at least one other person being present in the immediate vicinity of where the work is being carried out.

Excavations must be backfilled as soon as possible, and the material used (usually the original material) must be properly compacted.

Where belowground services are present, the material used to backfill an excavation must be such that the services will not be damaged.
A layer of a material that is dissimilar to the general backfill material must be placed immediately above any buried service.

An excavated area must be restored to its original condition if at all possible.

Use of Explosives

All excavation work must be carried out without the use of explosives.
Explosives may not be brought onto the site or be used without written authorisation from the nominated project management representative.

If blasting operations are unavoidable, the contractor must:

- Provide a justification and obtain approval from the nominated project management representative;
- Strictly observe the provisions of all applicable legislation; and
- Carry out a detailed risk assessment covering the transportation, handling, storage and use of the explosives.

No explosives or detonators may be stored on site.
Detonators and other explosives must never be carried in the same box.

15.11 Cranes and Lifting Equipment

All applicable legislation concerning cranes and lifting equipment must be complied with at all times. Each contractor carrying out lifting operations on the project site(s) must develop, document and implement Safe Work Procedures that are aligned with the requirements of this standard.

15.11.1 Planning and Risk Assessment

For each critical lift that must be carried out on site, a documented and detailed lift plan and risk assessment must be prepared to address all associated hazards.

Only suitably qualified, competent and experienced persons (lift planners) may evaluate critical lifts and prepare lift plans.

The lifting supervisor, crane operators, riggers and spotters responsible for carrying out a critical lift must have input into the lift plan and risk assessment and must be consulted before these documents are finalised.

All lift planners, lifting supervisors, crane operators, riggers and spotters (safety observers) must be appointed in writing.
No critical lift may commence until the lift plan and risk assessment have been authorised by the nominated project management representative and a Permit to Work has been issued.

Critical lifts include:

- All multiple (including dual) crane lifts;
- Lifts where the operational arcs of two or more cranes can overlap;
- Lifts over operating facilities where this may endanger personnel;
- Lifts over or adjacent to power lines;
- Any lift carried out in close proximity to equipment or a vessel containing a flammable or toxic substance;
- Lifts where the centre of gravity of the load could change;
- Any lift where the total weight on the hook exceeds 20 tonnes;
- Lifts near the rated capacity of the crane (i.e. Exceeding 85% of the rated capacity at the working radius);
- Any lift when the wind speed (including gusting) exceeds 30 kilometres per hour;
- Lifts involving a man basket (safety cage);
- Lifts to and from water;
- Lifts requiring specialised equipment or involving complicated lifting or rigging configurations;
- Lifts requiring non-standard rigging or slinging techniques;
- Lifts involving the simultaneous use of more than one hoist on the same crane; and
- Any other lift deemed to be critical by the nominated project management representative, or assessed as critical during a risk assessment.

The lift plan for a critical lift must include:

- General Information – crane manufacturer, crane model, items to be lifted, and reason for lift;
- Lift Data – load weight, lifting block and hook weight, hoist rope weight, rigging weight, total weight, height of lift, radius of lift, surface area of load, and centre of gravity of load;
- Rigging Data – sling material (chain, wire rope, or synthetic), sling diameter, sling length, sling configuration, sling capacity, hook type, shackle size and capacity;
- Lift Computation – boom length, jib length, radius of lift, crane capacity as configured, size of outrigger footplates, and wind speed;
- Proximity to Power Lines and Process Areas – mobile cranes working in proximity to energised power lines must operate under a Permit to Work, which must define exclusion zones and spotter duties;
- Local Hazards and Controls – including the route for the crane, ground stability, proximity of people or equipment, and agreed communication method; and
- Diagrams (sketches) – a rigging diagram, and a crane set-up diagram illustrating the positioning of the crane(s) in relation to surrounding structures and the initial and final positions of the load (including crane boom movement).

Lifts that are not subject to detailed lift plans (i.e. Lifts that are not considered critical) must nevertheless be subject to a risk assessment, and be properly planned and executed.
The use of a crane-suspended man basket (safety cage) may only be considered when all other avenues to safely perform the work (e.g. Scaffolding, mobile elevating work platform, etc.) Have been exhausted (refer to the Working at Heights Standard).

Cranes used to lift or suspend personnel must be approved as suitable for this purpose.
If a crane must be operated in proximity to energised overhead power lines (or any other exposed electrical conductors) then minimum clearance distances (specified by the electrical power utility or the nominated project management representative) must be observed. Whenever possible, power lines must be de-energised and isolated while lifting operations are carried out (refer to the Electrical Safety Standard).

15.11.2 Operation

At the start of every day or shift, the operator of a crane or hoist must carry out a pre-operation safety check using a prescribed checklist.
The specific requirements of the pre-operation safety check (and associated checklist) must be based on:

- A risk assessment that addresses all aspects of safe operation of the crane or hoist; and
- The inspection recommendations of the manufacturer.

As a minimum, the pre-operation safety check must include:

- A thorough visual inspection of all wire ropes, chains, hooks and safety latches, hook blocks, sheaves, hydraulic hoses, electrical cables, and the general condition of the crane or hoist;
- Checks to confirm the serviceability of the operating controls;
- Tests to confirm the correct operation of all limit switches, emergency shutdowns, load indicators, alarms and other safety devices; and
- A thorough visual inspection of all lifting equipment (tackle) to be used.

The operator must:

- Check for any loose or missing parts;
- Make sure that the wire rope (or chain) of the hoist is properly seated in its drum and sheave grooves without any slack or overlapping;

- Operate each control to make sure it functions properly, releases immediately, and does not stick. Each control must be labelled to indicate its function;
- Listen for any unusual mechanical noises and look for any jerky movements while operating the crane and / or hoist several feet in each direction that it travels;
- Check the functionality of the upper and lower hoist limit switches (if applicable) by slowly raising and then lowering the block to trip the respective switches;
- Check all hooks. Hooks must not be cracked, stretched, bent or twisted. Each hook must have a safety latch that automatically closes the throat of the hook. If the latch is bent, has a broken spring, or is otherwise damaged, it must be repaired before use. Hooks must rotate freely in the block assembly without any "grinding" felt or heard;
- Check the wire rope by lowering the block to its lowest level and looking for the following signs of damage:
  - Reduced rope diameter. This may indicate that the rope has been stretched, has lost its inner core support, or has worn outside wires;
  - Broken wire strands (any number);
  - Kinked, crushed, cut, or "bird caged" wiring, or wiring with heat damage.
- Check all chains for damage including wear at contact points, cracks, or distorted links (bent, twisted or stretched). All mechanical coupling links must be inspected to ensure that the linking pins are secure and in good condition. The capacity rating of each chain must be adequate for the load and the attachment method;
- Check the condition and capacity of wire rope and synthetic web slings. Capacity ratings must be legible on the manufacturer's label. The capacity of the sling being used must be adequate for the load and the attachment method. A sling must be replaced immediately if it is excessively worn.

The operator must report any fault, defect or damage to his supervisor immediately.
A crane or hoist must not be operated if any safety device is out of order or defective, or if any rope, chain, hook or other component is worn or damaged.

Completed checklists must be made available (on request) for inspection by the nominated project management representative. Wherever possible, these checklists must be kept with the crane or hoist.

All lifting operations must be supervised by suitably qualified, competent and experienced supervisors.

An effective method of communication between the crane operator and those assisting with the lift must be in place. This must be documented and approved by the nominated project management representative.

Documented Safe Work Procedures must be in place to ensure the following:

- Access into an area where lifting operations are being carried out must be restricted. Such an area (i.e. where there is a risk of a load falling and striking a person) must be barricaded and only authorised persons may enter (i.e. those directly involved with the lifting operations). Warning signage must be conspicuously displayed;
- Where a load is being moved from one location to another (i.e. The lifting operations are not being carried out in a discrete area that can be barricaded), measures must be taken to ensure that all persons in the path of the suspended load are made aware of the approaching hazard and that they move, and remain, well clear of it. All persons potentially affected must be given warning before the load is lifted;

- A lift must be directed and controlled by a single person (a suitably qualified, competent and experienced rigger);
- Dedicated spotters must be in place during lifting operations to observe and provide warning (if necessary) to prevent incidents and ensure that safety protocols are adhered to;
- Before commencing with a lift, it must be verified that the load being lifted is both within the rated capacity of the crane (or hoist) and lifting equipment and within the limits set out in the lift plan and / or risk assessment. The rated load capacities of the crane, hoist, rope, chains, slings or other components may never be exceeded;
- Only certified lifting equipment (tackle) may be used to lift a load;
- No equipment (tackle) that has been used for towing may be used for lifting operations;
- Only an approved material box (skip box) may be used for lifting loose items or materials;
- Before commencing with a lift, it must be verified that no safety devices (including load limiting devices) have been bypassed, overridden or disconnected;
- To prevent the load from swinging as it is lifted, the hoist must be centred over the load (when using slings or chains) or positioned directly above the lifting point of the load;
- Hoisting ropes must be kept vertical. No side loading of a crane boom is permitted (i.e. A crane may not be used to make a side pull);
- Two full wraps of rope must remain on the hoisting drum at all times. If a lower hoist limit switch has been fitted, and it is working correctly, it should not be possible to lower the block below the point where less than two full wraps of rope are on the drum;
- Before commencing with a lift, it must be verified that all rigging connections are correct and secure. Slings, chains, or other lifting devices must be fully and securely seated in the saddle of the hook;
- Slack must be removed from the slings, chains and / or hoisting ropes before lifting the load. It must be ensured that multiple lines are not twisted around each other and that the hoist rope is not wrapped around the load;
- To ensure that the load is properly secured and balanced, it must initially only be lifted a few centimetres. Slings must be repositioned if required;
- Before moving a suspended load, it must be lifted high enough to clear all obstructions. The load must only be lifted to the height necessary to clear obstructions, and no higher;
- Directional movement must be made smoothly and deliberately (there must be no sudden acceleration or deceleration of the moving load). Abrupt, jerky movements of the load in any direction must be avoided;
- Tag lines must be used in situations where a load needs to be steadied or guided while suspended;
- When using tag lines to steady or guide a suspended load that is being moved using a mobile crane, personnel on foot must remain in sight of and in communication with the crane operator at all times, must never walk between the crane and the load, and must remain clear of the load and the crane at all times (at least 5 metres). The load must be moved at a slow walking speed;
- A suspended load must be monitored closely at all times;
- If a crane operator's view of a suspended load is unavoidably obscured (completely or partially), or if a suspended load is unavoidably obscuring (completely or partially) a crane operator's view, then suitably positioned spotters must be in place to provide guidance to the crane operator;
- A load MAY NOT be moved over, or be suspended above, any person or any occupied building. No person may walk beneath, or position himself below, a suspended load;
- No person may pass or work beneath the boom of a crane;

- No person may be positioned between a suspended load and a solid object where there is a risk of being crushed should the load swing;
- No person may be positioned within the radius of the boom of a crane unless directly involved with the lift;
- Under no circumstances may any person ride on a crane's hook or on a load;
- No load may be left suspended unless the operator is at the controls and is monitoring the load. In such a situation, the load must be kept as close as possible to the ground or floor to minimise the possibility of injury should the load drop;
- The controls of a crane or hoist may never be left unattended while a load is suspended. If it becomes necessary to leave the controls, the operator must lower the load to the ground or floor;
- With the exception of pick-up and carry operations, no lifting may be carried out using a mobile crane unless the outriggers have been deployed and are locked in position;
- Load spreaders or packing under the outriggers must be used irrespective of the underfoot conditions;
- Before a mobile crane is moved into position to carry out a lift, the area must be inspected by a suitably qualified person who must verify that the underfoot conditions are satisfactory;
- When using a mobile crane, slewing to test the effectiveness of the outriggers must be carried out prior to commencing with a lift;
- Slew pins must be securely in place while a mobile crane is travelling;
- Unauthorised use of a crane or hoist must be prevented by removing the keys, locking the cabin, isolating the controls, etc. When lifting operations have been completed;
- When not in use, lifting equipment must be stored off the ground and must be protected from the elements (rain, harsh sunlight, etc.) And contamination (dust, solvents and other chemicals) in order to prevent damage and / or deterioration.

A crane or hoist or an item of lifting equipment may only be used for the purposes for which it was designed.

15.11.3 Inspection, Testing and Maintenance

Any crane or hoist brought onto the project premises must have a current test certificate and record of inspection as well as a suitable checklist (derived from the crane or hoist manufacturer's inspection recommendations) for use by the operator(s) when carrying out pre-operation safety checks.

An Equipment Profile (dossier) must be compiled for each crane.
A register of all cranes, hoists and lifting equipment (tackle) brought onto the project premises must be compiled and maintained.

Each crane, hoist and item of lifting equipment must have a unique identification code or number, which must be referenced in the register.

For each crane, hoist and item of lifting equipment, the following documentation must be kept on site and must be made available (on request) to the nominated project management representative for inspection:

- Test records and certificates;
- Inspection records;
- Maintenance records; and
- Details of any modifications or repairs made.

All cranes, hoists and lifting equipment must be inspected, tested and confirmed fit for purpose (i.e. Safe for use):

- Before being operated or put into service;
- Before being returned to service following any repair or modification; and
- Periodically as follows (unless local regulations require examination more frequently):
  - Each crane or hoist (including all ropes, chains, hooks or other attaching devices, sheaves, brakes and safety devices that form an integral part of the crane or hoist) must be thoroughly examined by a competent, experienced and appointed person every 6 months;
  - Each crane or hoist must be subjected to an annual performance test (i.e. A load test) by a competent, experienced and appointed person; and
  - All lifting equipment (tackle) must be thoroughly inspected by a competent, experienced and appointed person every 3 months.
  - The system of inspection and testing must provide verification that each crane or hoist is able to function to its design specifications, and must verify the integrity of:
- Mechanical and electrical components;
- Controls;
- Cables and all lifting attachments;
- Structural components including boom, hoist, brakes, wheels, hooks, baskets, out-riggers, hook-blocks and rails; and
- Load limiting devices, hoist limit switches, alarms or warning devices, and other safety devices and control systems (including independent fail-safe braking systems, devices to stop the crane or hoist such as a dead man's switch, and emergency shut-off switches).

A preventative maintenance system must be in place to ensure that all cranes and hoists are maintained in a safe and serviceable condition.

For any crane or hoist, all inspections, testing, maintenance and repairs must, as a minimum, be carried out in compliance with the requirements and specifications of the manufacturer as well as all applicable regulatory requirements (in terms of both the frequency of inspection, testing and maintenance, and the physical condition of the crane or hoist).

Repairs to a crane or hoist may only be carried out by competent persons. After repairs have been made, the crane or hoist must be tested and recertified fit for purpose (unless the repairs did not affect the integrity of the lifting mechanism).

Any modification to a crane or hoist must be subject to the approval of the original equipment manufacturer and a rigorous change management process.
Each item of lifting equipment (tackle) must be tagged following each quarterly (3-monthly) inspection. Details of these inspections must be recorded in the lifting equipment register which must be made available to the nominated project management representative on request.

The following colour coding system must be used for the tagging of all lifting equipment:

Table 15-1 colour coding system for lifting equipment

Quarter	Tag colour
January – march	Blue
April – June	Red
July – September	Green
October – December	Yellow

The tag placed on an item of lifting equipment must be traceable to an entry in the lifting equipment register where the following information concerning the inspection of that item of equipment must be recorded:

- Item description;
- Unique item identification code or number;
- Item owner;
- Item location;
- Date of inspection;
- Name and signature of competent person who carried out the inspection; and
- Any comments concerning the inspection.

Any item of lifting equipment that is found to be damaged or defective must be removed from service (and tagged, "out of service") immediately and must then either be repaired and recertified (if possible) or destroyed to prevent further use.
Similarly, any lifting equipment that is known (or is suspected) to have been overloaded must be removed from service immediately and destroyed to prevent further use.
If an item of lifting equipment is removed from service or destroyed (scrapped), this must be indicated in the lifting equipment register.
Any item of lifting equipment without a tag or with an out-of-date inspection may not be used.

15.11.4 Training and competency

Only suitably trained, competent and experienced persons who have been authorised in writing by the contractor's project manager are permitted to:

- Evaluate and plan critical lifts;
- Supervise lifting operations;
- Operate cranes and hoists;
- Use lifting equipment, and rig (sling) loads;
- Provide signals for controlling lifts; and
- Inspect, maintain or test cranes, hoists and lifting equipment.

Each operator must meet the competency requirements for the particular class or type of crane or hoist to be operated. Depending on the project location and applicable legislation, operators may need to hold a certificate of competency issued by a recognised training institution.

15.12 Working at heights

All applicable legislation concerning work performed from an elevated position must be complied with at all times.
Fall prevention or fall protection measures must be in place whenever the potential exists for a person to fall 2 metres or more.

15.12.1 Fall prevention

15.13.1.1 Work platforms

Wherever practical, a safe working area must be provided in the form of a work platform with fixed edge protection. This may include:

- a permanent work platform or walkway (i.e. A fixed steel structure);
- a fixed or mobile scaffold; or
- an elevating work platform such as a scissor lift, man lift, boom lift or cherry picker.

All work platforms and walkways elevated one metre or more must have complete floors, and edge protection must be in place in the form of toe boards and sturdy guard rails properly secured (i.e.

bolted, welded, clamped, etc.) To prevent accidental displacement. Safe means of access and egress must be provided.

Guard rails must be capable of withstanding a force of at least 100 kilograms applied in any direction at any point.
The top rail must be positioned at a height of one metre above the working surface, and a mid-rail must be provided.

15.13.1.2 Floor openings, holes and edges

Any opening or hole (temporary or permanent) in a floor, platform or walkway must be protected by sturdy guard rails (removable if required) or a cover to prevent a person from stepping into or falling through the gap. Covers must be strong enough to support the loads that will be imposed on them and must be secured to prevent accidental displacement.

Ladder way floor openings and platforms must be protected by guard rails of standard construction and toe boards must be fitted along all edges, except at the entrance to an opening where a gate must be installed and so arranged that a person cannot walk directly into the opening.

When open, hatchways and floor openings must be protected by removable guard rails and toe boards of standard construction. When these openings are not in use, covers of adequate strength must be put in place and must be secured to prevent accidental displacement.

Where doors or gates open directly onto a stairway, a platform must be provided and the swing of the door or gate must not reduce the effective width of the platform to less than 500mm.

15.13.1.3 Wall openings

Wall openings, from which there is a drop of more than one metre, must be guarded as follows:

- When the height and position of the opening in relation to the working surface is such that standard guard rails will effectively eliminate the risk of accidentally falling through the opening, then these must be provided. The bottom edge of the opening must be fitted with a toe board. The guard rails and toe board may be removable if required;
- Alternatively, the opening may be closed using a screen. Wall opening screens must be of such construction and mounting that they are capable of withstanding a force of at least 100 kilograms applied horizontally at any point on the near side of the screen. A screen may be of solid construction, of grillwork, or of slat work.

An extension platform outside a wall opening, onto which materials can be hoisted, must have sturdy guard rails (or equivalent edge protection) on all sides. One side of the extension platform may have removable railings in order to facilitate the handling of materials.

15.13.1.4 Stairways

Each flight of stairs having four or more risers must be fitted with handrails.
Handrails must be installed on both sides of every stairway.
Riser height and tread width must be uniform throughout any flight of stairs, including any foundation structure used as one or more treads.

Stairways must be free of hazardous projections, such as protruding nails. No materials, equipment or waste may be placed on or beneath any stairway.
All stairways must be well lit.

15.12.2 Fall protection

Whenever there is a risk of falling 2 metres or more, whenever there is a risk of falling onto dangerous equipment or machinery even if the potential fall distance is less than 2 metres, or whenever work must be carried out within 2 metres of an opening through which (or an edge over which) a person could fall, no work may commence unless:

- a fall protection (and rescue) plan is in place (prepared by a competent person, approved by the nominated project management representative, and implemented by the contractor);
- A detailed task-specific risk assessment has been carried out;
- A safe work procedure is in place for the task to be performed;
- A permit to work has been obtained; and
- Each person has been provided with suitable fall protection equipment.
- All employees to work at heights have been trained, certified and found competent and in working at heights.

Fall protection equipment (either fall restraint or fall arrest equipment) must be used at all times whilst the work is being carried out.
To prevent persons from falling, fall restraint equipment must be used whenever work must be carried out within 2 metres of an opening through which (or an edge over which) a person could fall.
Fall arrest equipment must be used whenever the potential exists for a person to fall 2 metres or more.

A person has been provided with suitable fall protection equipment if he is secured by means of an approved full body harness (well fitted) with two shock absorbing lanyards or an inertia reel (when fall arrest equipment is required) or two short restraining lanyards (when fall restraint equipment is required), double or triple action snap hooks (or karabiner type rings), and secure anchorage points (a person's lanyard may be attached either directly to an anchorage point or indirectly through the use of a variety of systems that incorporate a lifeline).

A dual lanyard system must be used to ensure that at least one connection point is maintained at all times.
Note: When selecting fall arrest equipment, care must be taken to ensure that the potential fall distance is greater than the height of the person plus the length of the lanyard with its shock absorber deployed (taking the height of attachment into account).

Anchorage points must, where practical, be above the head of the person, and must ensure that in the event of a fall the person will neither swing nor touch the ground.
All permanent anchorage points must be designed and approved by a professional structural engineer.

All anchorage points must be periodically inspected and tested by a competent person to ensure that they are secure and can support the required load. A system must be in place to identify anchorage points as authorised for use.
Temporary anchorage points (and lifeline systems) may only be used if a competent person has certified them safe to use.

If an elevating work platform is used, such equipment must be fitted with a fixed anchorage point for the attachment of fall protection equipment.

The use of fall protection (fall restraint or fall arrest) systems must be avoided wherever and whenever possible through design, the installation of physical barriers that protect persons from falling, and employing alternative methods of working.
Only if physical barriers protecting against free falls cannot be installed must fall protection equipment be used.

Fall protection (fall restraint or fall arrest) systems are items of personal protective equipment and, if required, must be purchased, installed and provided to employees.
Prior to commencing with any work at height, an assessment must be conducted to determine if the work requires the use of fall protection equipment, and if so, which fall protection system is the most appropriate for the work.

There must be a system for ensuring that fall protection equipment is:

- Tested and certified for use;
- Inspected by the user before use; and
- Destroyed following a fall or where inspection has shown evidence of excessive wear or mechanical malfunction.

All persons that are required to work at height (in order to carry out routine or non-routine tasks) must first be trained and certified competent to do so. Furthermore, each person must be in possession of a valid medical certificate of fitness specifically indicating that the person is fit to work at height.

All persons required to use personal fall protection equipment must be trained and certified competent in the correct selection, use, maintenance and inspection of such equipment.

All fall protection equipment must be thoroughly inspected on a monthly basis by competent persons appointed in writing and each item of equipment must be tagged to show when it was last inspected. All inspections must be recorded in a register.
On finding defective or damaged equipment, appropriate action must be taken by the competent person (i.e. the destruction of the equipment to prevent further use).

Persons making use of personal fall protection equipment must do so in strict accordance with the instructions or requirements specified by the manufacturer or supplier of the equipment or system. Specific pre-use inspection, maintenance and fitting protocols must be established in accordance with the manufacturer's requirements or guidelines and these protocols must be followed by all users of the fall protection equipment.

Solvents may not be used to clean fall protection equipment. Only manufacturer-approved cleaning solutions may be used.

No person required to use personal fall protection equipment may work in isolation (a minimum of two persons working together is required).
Competent supervision must be in place at all times for all work carried out at height. Supervisors must be appointed in writing.

Emergency response (rescue) procedures for the rapid retrieval of suspended persons in the event of a fall from height must be prepared and tested.

Note: Even though there is no risk of free fall, fall protection equipment may be required in situations where there is a risk of falling, slipping or sliding down a slope of more than 45 degrees.

Note: The maximum service life of fall protection equipment manufactured of synthetic fibre shall be 5 years from the date of first use and / or manufacture unless otherwise specified by the manufacturer.

A person may climb or descend a ladder without fall protection provided that he is able to use both hands and legs to do so, faces the ladder, and uses one step at a time. The ladder must be tied off or supported at its base.

Prior to any roof work being performed, or prior to persons accessing a roof, a structural engineer must verify that the roof is of sound construction and that it is capable of supporting the weight of the persons as well as any equipment that may be required. Should the engineer's findings be to the contrary, alternative methods of performing the work must be found. Particular care must be taken when work is carried out on an asbestos cement roof or a fibreglass roof.

15.12.3 Risk Assessment and Permitting

The following documentation is required for any work where fall protection is required (i.e. where a risk of falling exists):

- A Fall Protection (and Rescue) Plan;
- A Risk Assessment for the task to be performed;
- A Safe Work Procedure for the task to be performed; and
- A Permit to Work.

As part of the Risk Assessment and planning processes, the following must be considered:

- Hazards relating to accessing the location at height;
- The nature of the work location;
- The nature of the work activities to be undertaken at height;
- Environmental and weather conditions;
- The presence of nearby persons who may be at risk due to falling objects (potentially) or who's activities may be affected by the work being performed at height;
- The selection of fall protection equipment (considering fall clearances) and / or access equipment;
- The selection of anchorage points;
- The load ratings of access platforms, work areas, anchorage points, etc.;
- The condition of supporting structures such as roofs;
- The need for the work to be carried out by multiple persons and the means of communication;
- A rescue plan that addresses retrieval or rescue contingencies;
- Working above open furnaces or molten metal;
- Exposure to heat sources;
- The use of a mobile elevating work platform, man basket, suspended scaffold or boatswain's chair; and
- Any other conditions that may affect the safe execution of the task.

15.12.4 Elevating Work Platforms

Before hiring or purchasing an elevating work platform (e.g. a scissor lift, man lift, boom lift, cherry picker or similar equipment), the certification of the equipment (with regard to suitability of design and construction) must be verified.

Before using an elevating work platform, it must be verified that the equipment is in good working order and has been serviced regularly. The service record and instruction manual must be kept on

site. A system must be in place to ensure that the equipment is maintained and inspected as required by the manufacturer and / or local regulations.

Persons (operators) must be formally trained through an accredited training provider and certified competent in the operation of the equipment. Once a person has been issued with the necessary licence or qualification as required under local regulations, he must be appointed in writing to operate the equipment.

Before using an elevating work platform, the operator must inspect the equipment and a pre-use checklist must be completed.
The operator of an elevating work platform must be in the "basket" unless it can be demonstrated to the satisfaction of the nominated project management representative that this is not possible or practical.

Every person in the "basket" must keep his feet on the floor at all times.
Every person in the "basket" must be secured at all times by means of personal fall protection equipment attached to an approved anchorage point, and systems must be in place to prevent tools and equipment from falling.

A mobile elevating work platform must not be driven unless the "basket" has been lowered and secured in a stable position.
Every elevating work platform that is used must be equipped with a dead man's switch or foot pedal at the operator controls.
An elevating work platform must only be operated on a firm surface with the outriggers extended (where fitted).

An elevating work platform must not be operated on a grade or slope beyond the capability of the machine (every mobile elevating work platform that is used must be fitted with an inclinometer which sounds an audible alarm before the maximum safe incline has been reached).

The area beneath the "basket" and the boom must be barricaded.
A second competent operator of the mobile elevated work platform to be in place on the ground level – to ensure that the elevated work platform could be lowered in case of an emergency.
A spotter must be used at all times when moving a mobile elevating work platform and when the "basket" is in an elevated position.

15.12.5 Man Baskets, Suspended Scaffolds and Boatswain's Chairs

The use of a man basket, suspended scaffold or a boatswain's chair may only be considered when all other avenues to safely perform the work (e.g. ladder, scaffolding, mobile elevating work platform, etc.) have been exhausted. Authorisation to use a man basket, suspended scaffold or a boatswain's chair must be obtained from the nominated project management representative. If permission is granted, the use of such equipment must be in strict compliance with all applicable legislation.

A person working from a man basket or a suspended scaffold must remain within the basket and must keep his feet on the floor at all times.

Each person working from a man basket, suspended scaffold or a boatswain's chair must be in possession of a valid medical certificate of fitness and must be trained (and assessed competent)

in the Safe Work Procedures pertaining to the use of the equipment, as well as the Fall Protection Plan.

Each person working from within a man basket or suspended scaffold or from a boatswain's chair must wear personal fall protection equipment at all times (i.e. an approved full body harness connected by means of a shock absorbing lanyard to an anchorage point or lifeline that does not form part of the basket or chair).

If suspended using a crane, the man basket, suspended scaffold or boatswain's chair must be visible to the crane operator at all times. A suitable means of communication must be in place to ensure that the suspended person(s) are able to communicate with the crane operator and personnel on the ground.

The crane operator must remain at the controls at all times while the man basket, suspended scaffold or boatswain's chair is occupied.
Where feasible (and if it is safe to do so), tag lines must be used to stabilise the man basket, suspended scaffold or boatswain's chair.

A man basket or suspended scaffold (including the suspension system) must be designed by a qualified engineer.
Only an approved and certified man basket or suspended scaffold may be used. Regulations may require approval by an authority or certification to a national or international standard. The manufacturer's procedures and conditions for use must be strictly complied with at all times.
Each man basket or suspended scaffold must be fitted with an information plate indicating the maximum weight and number of persons that may be lifted. Copies of the welding x-rays and engineering drawings must be kept on site.

Any work involving the use of a man basket, suspended scaffold or boatswain's chair must be carried out under the supervision of a competent person who has been appointed in writing.
A man basket, suspended scaffold or boatswain's chair must be thoroughly inspected (examined for damage) by a competent person prior to use (every time the equipment is used) and the results of each inspection must be recorded in a register. The crane or hoist as well as all lifting equipment (tackle) that is used to suspend the man basket, suspended scaffold or boatswain's chair must be tested and inspected as stipulated in the Cranes and Lifting Equipment Standard.

All suspended scaffold erectors, operators and inspectors must be appointed in writing and proof of competency must be provided.

Persons carrying out welding or flame cutting work from within a man basket or suspended scaffold or from a boatswain's chair must take precautions to ensure that they do not accidentally cut or burn through the cables or wire ropes that are suspending them.

15.12.6 Falling Objects

In the process of planning work activities, the risks associated with falling objects (i.e. materials, tools or equipment) must be assessed and appropriate control measures must be identified, implemented, and monitored taking the following hierarchy of controls into consideration:

- Preventing objects from falling – by using containment sheeting, toe boards, lanyards to secure tools (to a person or to the structure), ropes or chains to secure equipment (to the structure), lift boxes, brick cages, etc. and by properly securing loads when lifted by crane or hoist;

- Protecting people from falling objects – by establishing barricaded exclusion zones, installing catch platforms or catch nets, displaying warning signage, and posting safety watchers and / or traffic controllers; and
- Personal Protective Equipment (particularly safety helmets and safety boots) – protective equipment is a last line of defence and must be worn.

Where overhead work is being carried out, barricading must be erected around the work area (at the level at which the work is taking place and at every level below including ground level) to prevent persons from entering such an area and potentially being struck by falling objects.
Wherever hazards related to falling objects exist, appropriate warning signage (i.e. "Overhead Work In Progress" and "No Unauthorised Access") must be prominently displayed.

No items are permitted to lie loose in elevated positions (e.g. nuts and bolts must be securely stored) and good housekeeping standards must be maintained at all times.
No tools, equipment, material, debris, waste, etc. may be dropped from height. Objects must be lowered or chuted to ground level in a safe and controlled manner.

15.12.7 Scaffolding

15.13.7.1 Training, Competency and Supervision

Scaffolding may only be erected, maintained, altered or dismantled under the strict personal supervision of a competent Scaffolding Supervisor (or Scaffolding Inspector) who has been appointed in writing.

Scaffolding may only be erected, maintained, altered or dismantled by competent and appointed Scaffolding Erectors (or Scaffolding Builders). It is the Scaffolding Supervisor's responsibility to ensure that all persons carrying out such work are suitably trained and experienced.
A certificate of competency issued by a reputable (i.e. accredited and approved) training provider must be produced for each Scaffolding Supervisor and each Scaffolding Erector.

15.13.7.2 Erection and Dismantling of Scaffolding

Only approved scaffolding components may be used to erect a scaffold. Scaffolding must be erected, modified and used in accordance with the manufacturer's guidelines or recommendations, and in strict compliance with all applicable legislation and standards.

A free-standing scaffold must not exceed a height of three times the smallest dimension of its base. Scaffolds with a height to base width ratio of more than 3:1 must be restrained from tipping over by guying, tying, or bracing.
Guy wires and ties prevent scaffolding from tipping away from the building or structure, and braces are rigid supports that prevent the scaffolding from tipping into the building or structure.

Scaffolding must be secured to the structure every 6 metres vertically and every 9 metres horizontally (as a minimum). Adequate underpinning, sills or footplates must be provided for scaffolds erected on filled or otherwise soft ground (including sand or gravel).

If the scaffolding is to be load bearing (i.e. other than normal access and workplace storage) then full calculations and a design must be prepared and authorised in writing by a structural engineer. The load limits specified by the scaffolding manufacturer may not be exceeded under any circumstances.

Scaffolds must be plumb and level at all times.

All scaffolding components must be in good condition (i.e. undamaged and free of corrosion).
All scaffolding components must be properly connected or secured and scaffolding must be effectively braced (diagonal bracing).

Each person erecting, maintaining, altering or dismantling scaffolding must use fall protection at all times (i.e. a full body safety harness with two shock absorbing lanyards fitted with scaffold hooks). The work must be planned to enable every Scaffolding Erector to be securely anchored at all times. A suitable lanyard length (not exceeding 2 metres) must be selected taking the potential fall distance and height of attachment (height of anchorage point) into account. If the lanyard is too long or the anchorage point is too low, the person may hit the ground, a platform, or objects below him before the lanyard is able to break his fall.

The area around the base of a scaffold must be barricaded to prevent unauthorised access into the work area. When scaffolding is erected or dismantled on a level, platform, or floor lying above ground level and the potential exists for components to fall to levels below the level on which the scaffolding is positioned, then the area directly below the scaffolding on each of those levels must also be barricaded. Appropriate warning signage (i.e. "Overhead Work In Progress" and "No Unauthorised Access") must be prominently displayed.

Hoists, lifts and approved material baskets must be used (where available) to lift scaffolding components to elevated positions.

Where components are passed from hand to hand during the erection or dismantling of a scaffold, each Scaffolding Erector must always stand on three boards and not directly above the person below him. During this process, each Scaffolding Erector must remain within the confines of the scaffold and must expose as little of his body as possible to minimise the risk of being struck by a falling component. Good communication between team members must be maintained at all times. No scaffolding components, tools, or any other material may be dropped from height or thrown from one level to another. Components, tools and materials must be lowered or lifted in a controlled manner. Use may be made of a chute.

Each tool must be secured to the wrist, harness or structure by means of a lanyard. A tool bag (around the waist or over the shoulder) may be used for carrying tools up and down a scaffold structure. Tools or equipment may not be carried by hand up or down a structure, as both hands must be used for climbing. If necessary, a rope must be used for lifting or lowering tools or equipment.

While a scaffold is being erected or dismantled, no scaffolding components may be stacked on the scaffold structure unless it has been designed for that purpose. Any loading of a scaffold structure must be authorised in writing by a structural engineer.

For special scaffolding, a design must be prepared by the appointed Scaffolding Supervisor and this design must be authorised in writing by a structural engineer before the scaffolding is erected. Scaffolding may not stand on steel grating unless the grating is adequately supported from below. Scaffolding must rather stand on the structure that supports the grating.

Empty drums, crates or bricks may not be used to prop up, support or anchor scaffolding.
Before scaffolding is erected in close proximity to an electrical installation or live conductors, an electrical engineer (employed by Project or the client) must inspect the area and determine whether or not the scaffolding must be earthed. Should the scaffolding require earthing, this must be done as soon as possible while the scaffolding is being erected.

Scaffolding may not be erected if it is raining or in winds stronger than 32 km/h.

A green tag (displaying the words, "Scaffold Safe for Use") or a red tag (displaying the words, "Danger: Do Not Use Scaffold") must be prominently displayed on each scaffold at all times. The tag must be positioned close to the base of the ladder or staircase provided for safe access. The wording on the tags must be in English and any other language commonly used on site.
As a minimum, a green tag must display the Scaffolding Supervisor's name, the date that the scaffold was erected, and the date that the scaffold was last inspected.
Only an appointed Scaffolding Supervisor may attach, change, update the information on, or remove these tags.

Scaffolding must not be:

- Left partially erected or partially dismantled except for normal work stoppages (for example, over weekends);
- Left in an unsafe condition (if scaffolding is unavoidably in an unsafe condition, barricading must be in place to prevent unauthorised access and the required red tags must be prominently displayed on the scaffold structure); or
- Moved or altered while work is in progress.
-

Mobile scaffolding must be equipped with brakes, which must be engaged at all times when the scaffolding is in use. A scaffold may not be moved if any person is on the structure.

15.13.7.3 Safe Access

Safe and convenient access must be provided to every scaffold platform by means of properly installed ladders or approved stairways, which must remain unobstructed at all times. Climbing up or down a scaffold on the braces or ledgers is forbidden.

All ladders used to access scaffolding must be securely attached to the scaffold structure.
Hook-on and attachable ladders must be specifically designed for use with the type of scaffolding being used.

If a ladder is used to access a scaffold platform at a height greater than 1.5 metres above the ground, then the ladder must be secured internally (i.e. within the scaffold structure) and there must be an opening (closed with a trap-door) in the platform at the top of the ladder.

If the scaffold platform is at a height of less than 1.5 metres above the ground, then the ladder may be attached externally provided the guard rails around the platform are modified to allow access (the opening in the guard rails must be kept closed using a self-closing gate). No person may climb over or through the guard rails to gain access to a platform.

If a vertical ladder used on scaffolding is more than 5 metres in length it must be equipped with a ladder cage extending from a point 2 metres from the base of the ladder to a height of 1 metre above the platform (or the uppermost platform) that the ladder is providing access to.
Circular ladder cages must have an internal diameter of no more than 700mm. Square ladder cages must have internal dimensions of no more than 700mm by 700mm.

The requirement for a ladder cage may be waived if platforms are provided at height intervals not exceeding 4 metres, with the vertical ladder secured on the inside of the scaffolding framework and an opening (closed with a trap-door) in each platform.

Vertical ladders must be braced at three metre intervals (as a minimum) to prevent undue movement.

All vertical ladders providing access to a platform must be left in place for as long as the scaffold remains in place and must be inspected as part of the scaffold structure.
Any deviation from the requirements stipulated above must be subjected to a risk assessment and the nominated project management representative must authorise the deviation in writing.

15.13.7.4 Scaffolding Platforms

Safe work platforms must be provided.

Every work platform must be complete (i.e. from ledger to ledger and from transom to transom without any gaps) in order to prevent personnel, materials, tools, etc. from falling through the platform.

Every work platform must be constructed from manufactured steel scaffold boards (planks) of equal thickness (height). Timber boards are not permitted under any circumstances.

Each steel scaffold board must be securely hooked (fastened) onto the ledgers or transoms that support it.

On all sides except the one facing the structure, every scaffold platform must be provided with:

- Sturdy guard rails positioned 500mm above the platform floor (the mid rail) and 1000mm above the platform floor (the top rail); and
  Steel toe boards that are at least 150mm high and securely attached such that no gap exists between the toe boards and the platform floor.
-

Note: Wire mesh infill panels incorporating a toe board may be used instead of a mid-rail.

Scaffold platforms must be as close to the structure as is practicable (but not closer than 75mm) except where personnel need to sit on the edge of the platform while they work in which case the distance may be increased to no more than 300mm.

Scaffold platforms must, at all times, be kept free of waste, protruding objects, and any other obstructions. Platforms must be cleaned if necessary to ensure that they are maintained in a non-slip state.

15.13.7.5 Inspection of Scaffolding

Every scaffold structure must be inspected by a competent Scaffolding Supervisor:

- Prior to use after erection, and at least weekly thereafter;
- After inclement weather (heavy rain, strong winds, etc.);
- After any incident resulting in jarring, tilting or overloading;
- After any alteration is made; and
- Before being dismantled.

On completion of an inspection, the Scaffolding Supervisor must update the information on the scaffold tag.

A record of each inspection (date and time of inspection, location of scaffolding, findings, etc.) must be captured in a register. The register(s) must be maintained by the Scaffolding Supervisor(s) carrying out the inspections.

15.13.7.6 Using Scaffolding

The user of a scaffold (i.e. the responsible supervisor) must inspect the erected structure prior to acceptance and must ensure, as far as is reasonably possible, that the scaffold is safe and fit for purpose before allowing his team to make use of the scaffold.

In particular, the user must ensure that:

- The scaffold and the platforms have been constructed to meet the loading requirements of the work that is to be carried out (the Scaffolding Supervisor must be consulted in this regard);
- The Scaffolding Supervisor has checked that adequate ties and braces are in place;
- The work platforms are in the correct positions and are complete with toe boards and guard rails;
- Safe and convenient access has been provided (ladders and / or stairways); and
- A green ("Scaffold Safe for Use") tag has been attached to the scaffold by the Scaffolding Supervisor.

Use of an incomplete or unsafe scaffold is prohibited.
Unsteady or non-rigid scaffolds must not be used and inadequacies must be reported to, and rectified by, the responsible Scaffolding Supervisor.

The user of a scaffold must ensure that every person in his team is aware that no alterations to the scaffold may be made by the team during the course of their work, and that if any alterations are required, they must be made by competent Scaffolding Erectors under the supervision of an appointed Scaffolding Supervisor.

A scaffold may not be used:

- If a red tag is displayed indicating that the scaffold is not safe to use; or
- During inclement weather, defined as wind speeds greater than 40km/h, thunderstorms, or heavy rain (in excess of 40mm/h).

Note: With due consideration of possible educational limitations, the contractor must ensure that all persons understand what green and red tags mean.

The area around the base of a scaffold must be appropriately barricaded to prevent unauthorised access into the work area. Appropriate warning signage (i.e. "Overhead Work In Progress" and "No Unauthorised Access") must be prominently displayed.

Loose tools and / or materials on scaffold platforms must be secured using lanyards, wire or fibre rope, or must be placed in secured containers.
Where appropriate, "catch nets" deemed may be installed as an additional safety measure to prevent materials or tools from falling to the ground.

The storage or placement of materials on scaffolding platforms must be kept to a minimum. Debris as well as tools and materials that are no longer required must be removed from all working platforms at least once per day.

Scaffolding platforms must be cleaned regularly.

A heavy load may not be placed on a scaffolding platform unless the scaffold has been designed and constructed specifically for that purpose. Any loading of a scaffold structure must be authorised in writing by a structural engineer.

Scaffolds may not be used as hoisting towers or to support piping or equipment.
Each person working from scaffolding must wear fall protection (i.e. a full body safety harness with two shock absorbing lanyards fitted with scaffold hooks) and must be securely anchored at all times.

All work must be carried out from properly constructed work platforms. Standing on railings or braces in order to perform work is forbidden.
Drums, boxes and other makeshift substitutes for scaffolding may not be used under any circumstances.

Where work on an electrical system is to be undertaken from a scaffold, an electrical engineer (employed by Project or the client) must determine whether or not the scaffolding structure requires bonding and earthing. The scaffolding may not be used until this has been determined, and if required, until the structure has been bonded and earthed.

15.13.7.7 Identification and Inspection of Scaffolding Components

All scaffolding components belonging to a contractor must be properly marked or uniquely coloured to enable positive identification.

Prior to erecting a scaffold, all scaffolding components must be carefully inspected by a competent Scaffolding Supervisor.

Components found to be defective during an inspection must be conspicuously marked and removed to a suitably demarcated quarantine area for destruction, repair, refurbishment or removal from site. Deformed and bent wedges must be straightened and inspected for cracks before being put back into service.

15.13.7.8 Storage of Scaffolding Components

All scaffolding components must be stored in a demarcated storage area in such a manner that they are not exposed to environmental extremes and will not cause injury to persons. Suitable barricading or fencing must be erected and warning signage must be posted (e.g. No Unauthorised Entry).

Within a storage area, scaffolding components must be stacked such that pathways (750mm in width) are maintained between the stacks. Each stack must be stable and components must be neatly placed to ensure that no ends protrude into any pathway. The various components must be stacked separately.

The weight of scaffolding components must be considered when stacking them in elevated positions.

Any storage area for scaffolding components must be positioned such that it will not interfere with any onsite activity (including the operation of any plant or equipment), block any access way, or obstruct access to any plant or equipment. Before establishing a storage area, the location must be agreed with the nominated project management representative.

15.12.8 Ladders

All ladders used on site must be of sound construction and adequate strength.

Only non-conductive ladders made of wood or fibreglass may be used for electrical work or work being performed in proximity to energised electrical equipment. Metal ladders and ladders with metal reinforcing may not be used.

The use of makeshift ladders is forbidden.
All ladders must be numbered, listed in a register, and inspected by a competent person on a monthly basis (the results of each inspection must be recorded in the register).
Before using a ladder, the user must inspect it for damage.

Ladders with missing, broken, cracked or loose rungs, split stiles, missing or broken spreaders (stepladders) or any other form of damage or defect may not be used.
A damaged ladder must be removed from service (and tagged, "Out of Service") without delay and must then either be repaired (if possible) or destroyed to prevent further use.
Persons must receive instruction in the correct use and proper care of ladders.

Ladders may only be used as a means of access and egress. The use of ladders as working platforms is prohibited, except for inspection and carrying out minor tasks (i.e. light work and short duration) such as changing a light bulb.

Ladders may not be positioned horizontally and used as walkways or runways or as scaffolding.
All portable ladders must be fitted with non-skid safety feet (or some other means to prevent the base of the ladder from slipping) and the feet must always be placed (stand) on a firm level surface.
The use of bricks, stones, wood or any other material to level the stiles of a ladder is prohibited.
Ladders may not be placed on movable bases such as boxes, tables, trucks, etc.

The base or foot of a ladder must always be secured to prevent it from slipping. The ladder must be held by an assistant if the base cannot be secured in any other way (e.g. tied off).
A straight ladder must extend at least one metre above its support (or above the working platform that it is providing access to). The top of the ladder must be tied off (or otherwise secured to its support) to prevent accidental movement.

A straight ladder must be placed at a safe angle, i.e. tilted at a ratio of approximately 4:1, meaning that the base of the ladder must be one metre away from the wall (or other vertical surface) for every four metres of height to the point of support.

A stepladder may never be used as a straight ladder. A stepladder must be opened fully and the spreaders must be locked securely.
When using an extension ladder, at least four rungs must always overlap at the centre of the ladder.
Ladders may not be joined together unless they have been specifically designed and manufactured for that purpose.

A suspended ladder (i.e. not standing on a base) must be attached in a secure manner to prevent undue swinging or swaying, and to ensure that it cannot be displaced.

A ladder may not be placed against a window, glass or any other material which is unlikely to withstand the force exerted on it by the top of the ladder.

A ladder may not be placed in front of a door or window that opens towards the ladder unless the door or window has been locked or barricaded.

When a ladder is used near an entrance or exit, the base of the ladder must be barricaded.
Materials and / or equipment may not be placed in close proximity to the base or landing of any ladder.

When ascending or descending a ladder, a person must always face the ladder and use both hands (i.e. maintain three points of contact).

Nothing may be carried up or down a ladder if it prevents the person from holding on to the ladder with both hands. Tools must always be properly secured. This can be achieved by attaching them to the wrist using lanyards or placing them in a tool belt around the waist. Tools and materials may also be carried in a bag over the shoulder or hoisted to the landing using a tool bag and rope.
Only one person at a time may use (i.e. be positioned on) a ladder.

No person may stand or step above the third rung from the top of a straight ladder or above the second highest step of a stepladder.

Overreaching from a ladder is prohibited. If the target is not within comfortable reach, the person must climb down and reposition the ladder.
No person may run up or down a ladder, or jump from the lower rungs or steps to the ground.
All ladders must be properly maintained and cared for.
Ladders must be stored under cover and should be hung in a horizontal position from several brackets.

No ladder may be left lying on the ground or be left exposed to the weather. A ladder left lying on the ground presents a tripping hazard and it may be damaged by vehicles running over it.
No ladder may be left in such a position where it may fall over, be accidentally knocked over, or be blown over by the wind.

Ladders may not be painted, as the paint may conceal damage, defects, labels or other markings. Instead of paint, clear varnish or wood oil may be used to preserve wooden ladders.
Ladders must be kept clean, as dirt may conceal damage or defects. Oil or grease accumulation on the rungs of a ladder may cause a person to slip.

Before making use of a ladder, each person must make an effort to remove mud, oil, grease, etc. from his boots.

15.13 Permit to Work

All personnel must comply with the Permit to Work system applicable to the project.
A Permit to Work must be obtained before carrying out any work that involves:

- A hazardous energy source or system, including electricity, compressed fluids (e.g. hydraulics and pneumatics), chemical substances (e.g. toxic, corrosive, flammable or explosive gases and liquids), heat (e.g. steam), radiation, and machinery or materials with potential energy (gravitational and elastic) – isolation and lockout may be required;
- Confined space entry;
- Working at height;
- A critical lift;
- Hot work outside of designated workshops;
- Excavation; or

- A service (e.g. water supply, fire suppression systems, etc.).

Note: A Permit to Work may only be issued by an Authorised Person, and may only be received (or accepted) by an appointed Applicant (see Definitions).

Each Permit to Work that is issued must make reference to an approved Task-Based Risk Assessment for the work that is to be carried out.

The Permit to Work system that is employed must incorporate the following basic procedures:

- Prior to meeting with the Authorised Person, the Applicant must familiarise himself with all of the hazards associated with the system, plant, equipment, structure or area on or in which the work must be performed. He must also consider the risks that may arise as a result of the tasks that will be carried out. A Task-Based Risk Assessment must be in place;
- The Applicant must then request permission to carry out the work and must meet with the Authorised Person to discuss and document the scope of the work as well as the hazards, risks and associated control measures. Isolation and lockout requirements must be identified (if applicable). The isolation and lockout process must be initiated by the Authorised Person who must contact the necessary Isolation Officers.

Note: The Applicant must ensure his own safety and that of his team, and has the right to accompany the Isolation Officers to verify that all of the necessary locks have been fitted to all of the isolation and lockout points in accordance with the applicable plant or equipment-specific Isolation and Lockout Procedure.

- Once all of the necessary isolations have been completed and the necessary Clearance Certificates have been issued by the Isolation Officer(s) (if applicable), and the Authorised Person is satisfied that the system, plant, equipment, structure or area is safe to work on or in provided all identified precautions are observed by the Applicant, then he must issue (sign) the Permit to Work to the Applicant;
- The Applicant must accept (sign) the Permit to Work. If equipment has been isolated, the Applicant must attach his Personal Lock to the relevant Isolation Bar (or Local Isolation Point) and must ensure that every other person working on the isolated equipment also attaches his or her Personal Lock to the Isolation Bar (or Local Isolation Point) before starting any work;
- Before commencing with any work, the Applicant must discuss the hazards, risks, control measures, precautions and limitations as stated in the Permit to Work (and associated Task-Based Risk Assessment) with all personnel who will be carrying out the work. A register must be kept and all persons must sign the register once they have been briefed by the Applicant;
- The work performed must be limited to what is described in the Permit to Work;
- When a particular employee has completed his work, he must sign the personnel register to this effect and (if applicable) must remove his Personal Lock from the Isolation Bar (or Local Isolation Point);
- Once all work is complete, the Applicant must:
  - Ensure that all machine guards have been replaced;
  - Ensure that all tools and materials have been removed from the work area;
  - Ensure that the work area is clean and tidy;
  - Ensure that all Personal Locks (including his) have been removed from the Isolation Bar or Local Isolation Point (if applicable);
  - Inform the Authorised Person that the work has been completed; and
  - Sign off the Permit to Work.

- Once the work is complete and the Applicant has signed off the Permit to Work, the Authorised Person must:
  - Ensure that the relevant Isolation Officers perform all of the necessary de-isolations (if applicable);
  - On completion of the de-isolations, sign off the Permit to Work accepting the system, plant, equipment, structure or area back for service; and
  - Inform all relevant personnel that the system, plant, equipment, structure or area is ready to use.
  - Where the work must continue over more than one shift, the Permit to Work must be reviewed at every shift change by an Authorised Person. If the scope of work has changed, the permit must be cancelled and a new permit must be issued.

If any of the original conditions or precautions pertaining to the work is not being complied with, is no longer adequate or is no longer applicable, the Authorised Person must cancel the Permit to Work and must ensure that all work stops until full compliance with either the original or amended (as required) conditions and precautions is achieved and a new permit has been issued.

The Applicant must ensure that the Permit to Work (including the personnel register) is kept where the work is being carried out (i.e. posted on a portable Health and Safety Management Information Notice Board) and that the work is monitored against the permit conditions.

All Permit to Work records must be retained and must be made available for inspection when required.

The implementation of the Permit to Work system applicable to the project must be audited on a regular basis by a nominated project management representative. Furthermore, planned task observations must be carried out periodically.

Note: In addition to obtaining Permits to Work as and when required for specific hazardous activities (identified in this standard), each contractor must obtain a General Work Authorisation from a nominated project management representative on a monthly basis. A General Work Authorisation is valid for one calendar month and authorises the contractor's planned work activities. In order to obtain a General Work Authorisation, the contractor must provide a documented work plan for the month together with the necessary Task-Based Risk Assessments.

15.14 Isolation and Lockout

Isolation and lockout procedures that make it impossible to inadvertently energise any system, plant or equipment so isolated, must be in place for all work where hazardous energy sources exist, including electricity, compressed fluids (e.g. hydraulics and pneumatics), chemical substances (e.g. toxic, corrosive, flammable or explosive gases and liquids), heat (e.g. steam), radiation, and machinery or materials with potential energy (gravitational and elastic). These procedures must be strictly enforced.

All personnel must comply with the isolation and lockout system and procedures applicable to the project.

All Isolation and Lockout Procedures must incorporate the following basic requirements:

- The issuing of a formal Permit to Work for any work that requires the isolation of any system, plant or equipment;
- The use of defined Equipment, Discipline and Personal Locks (see Definitions), and multiple lockout systems (i.e. Isolation Bars and lockout hasps);
- Clear identification of all isolation and lockout points ensuring there is no duplication;
- Isolation of the main energy source;

- The use of slip plates or the blanking off of pipelines or ducting, in addition to the chaining and locking of valves, as determined by a risk assessment;
- Suitable methods of preventing the movement of equipment; and
- Methods to test the effectiveness or completeness of the isolation.

Note: No work may commence on a system, plant or equipment until a Permit to Work has been issued by an Authorised Person.

Note: A Permit to Work may only be issued by an Authorised Person once all required Clearance Certificates have been issued by appointed Isolation Officers.

The isolation and lockout system that is employed must incorporate the following basic procedures:

- In accordance with a system, plant or equipment-specific Isolation and Lockout Procedure, an appointed Isolation Officer(s) must isolate all points that need to be isolated in order to render the system, plant or equipment safe to work on. An Equipment Lock (and a suitable, highly visible warning tag) must be attached to each isolation point;
- On completion of an isolation (and lockout), the Isolation Officer must clear the area of all persons and must then carry out tests to ensure that the isolation is effective. This may be done by pressing a start button or by asking a control room operator to try to start the equipment. Special care must be taken to ensure that the attempted starting of the equipment has not been deactivated by another interlock forming part of the system, or by a different up-stream isolation. Alternatively, appropriate equipment may be used to test for energy (e.g. voltage verification or continuity tests).

Note: In the case of electrical isolation, a test for voltage must be carried out, after the switching device, to ensure the absence of voltage.

- The Isolation Officer must place the key to the Equipment Locks on an Isolation Bar (at a Lockout Station) and must then attach a Discipline Lock (to prevent the key from being removed) before issuing a Clearance Certificate;
- The Discipline Lock must remain in place when handing over to subsequent shifts. All Discipline Locks for a particular discipline (e.g. low voltage electricity) must be keyed-alike so that any Isolation Officer appointed for that discipline (and issued with a key) can open any of the Discipline Locks used for that discipline.
  This enables an Isolation Officer to de-isolate equipment that may have been isolated by another Isolation Officer during an earlier shift. Appointed Isolation Officers for a particular discipline are the only persons permitted to hold keys to the Discipline Locks used for that discipline.

Note: Local isolations do not require the use of Equipment Locks (a Discipline Lock may be attached to the Local Isolation Point by the Isolation Officer, followed by the necessary Personal Locks).

Note: For local isolations, if the Isolation Officer is the only person who will be working on the isolated equipment, then he must attach his Personal Lock to the Local Isolation Point.

- Once all required Discipline Locks are in place (i.e. attached to the Isolation Bar) and all Clearance Certificates have been issued, the Permit to Work may be issued by the Authorised Person;

- Each person who will be working on the isolated system, plant or equipment must then attach his or her Personal Lock to the Isolation Bar before starting any work (including the Isolation Officer, if he intends to work on the isolated unit);
- The attachment of a Personal Lock to the Isolation Bar prevents the removal of the key to the Equipment Locks even if the Discipline Lock is removed;
- When called (by an Authorised Person) to de-isolate the system, plant or equipment (on completion of the work under the Permit to Work), the Isolation Officer must ensure that all Personal Locks have been removed from the Isolation Bar before removing the Discipline Lock and the key to the Equipment Locks;
- Before removing the Equipment Locks and de-isolating the energy source, the Isolation Officer must inspect the system, plant or equipment that was worked on to ensure that it is safe to perform the de-isolation. This includes guard inspections, housekeeping, ensuring that all doors and covers are in place, and most importantly, ensuring that no persons are present;
- Once all Equipment Locks have been removed and the system, plant or equipment is safe for use, the Isolation Officer must cancel the Clearance Certificate and inform the Authorised Person that the unit has been de-isolated.

Where a system, plant or equipment is sequence interlocked and a hazard could be created through the inadvertent start up or shut down of a system, plant or equipment lying before or after the unit to be worked on, then that system, plant or equipment must also be isolated and locked out.
Redundant or out of service equipment must, in addition to being isolated and locked out using the relevant Discipline Lock, be fitted with a tag indicating why it is out of service, who performed the lockout, and the hazards associated with that equipment.

Where it is necessary to work on live equipment for the purposes of commissioning, testing, adjusting and sampling, such work must be carried out in accordance with a written Safe Work Procedure and controls must be in place to prevent unauthorised access into the work area.
The implementation of the isolation and lockout system and procedures applicable to the project must be audited on a regular basis by a nominated project management representative. Furthermore, planned task observations must be carried out periodically.

15.14.1 Personal Locks

A Personal Lock must be such that it can only be unlocked by the person to whom it belongs. Combination locks may not be used.

A Personal Lock, as well as the key(s) to the lock, must be kept under the exclusive control of the person to whom the lock belongs.

A Personal Lock must be issued to each person who requires one, and the person's details must be clearly and permanently engraved directly onto his Personal Lock. Alternatively, a thick durable plastic identification tag may be used that clearly displays the company's name, the employee's name, the employee's company number, and a contact telephone number (the tag must be securely fastened to the Personal Lock). Where the above is hand written, it must be done using a permanent marker pen and it must be legible.

Each person issued with a Personal Lock must be trained and certified competent in the correct use of such a lock.

A Personal Lock may NEVER be removed by anyone other than the person to whom it belongs, except if the removal (cutting) of the lock is authorised by the nominated project management representative (in the absence of this person, authorisation can only escalate upwards).

Furthermore, the removal of the lock must be done under the personal supervision of the nominated project management representative, and in accordance with a written procedure. The removal (cutting) of a Personal Lock may be required if the person who applied the lock is unable or unavailable to remove it on completion of the work (e.g. lost his key, failed to remove his lock before going home, etc.).

15.15 Electrical Safety

All electrical work must be carried out by competent personnel in accordance with all legal requirements, codes, design criteria and safety standards applicable to the project.
Each contractor carrying out electrical work on the project site(s) must develop, document and implement Safe Work Procedures that are aligned with the requirements of this standard.
All persons who will be carrying out electrical work must be certified against the requirements of job and equipment-specific electrical competency standards for the project, which must address job and equipment-specific Safe Work Procedures.

Each person potentially exposed to electrical hazards must receive electrical hazard training at the commencement of his employment on site and thereafter on an annual basis. The training must address the equipment and conditions specific to the area where the individual will be working. The training material must be documented and training records must be kept.

15.15.1 Electrical Installations

Each electrical installation (temporary or permanent) installed or worked on by a contractor must be inspected by a nominated project management representative to ensure that the installation complies with all statutory requirements, codes, design criteria and safety standards applicable to the project.

A nominated project management representative must approve all electrical work before the installation is energised. Any installation deemed unsatisfactory by a nominated project management representative must be removed, repaired or modified by the contractor at his expense.

For every permanent or temporary electrical installation, a certificate of compliance must be issued by a competent and appropriately qualified electrician. These certificates must be available for inspection.

Single line diagrams (with supporting documentation) must be produced and maintained for all electrical installations. This information must include system fault calculations, equipment details, electrical protection discrimination curves, and cable ratings.

Work on electrical installations (new installations, and modifications or repairs to existing installations) may only be carried out by qualified and authorised personnel (i.e. electricians).
Electrical safety devices (specifically, earth leakage protection and overcurrent protection) must be installed on all distribution circuits and the settings must be established by suitably qualified personnel.

A suitable numbering and / or labelling system must be used so that each circuit breaker or earth leakage device can be clearly and readily matched with the outlet or equipment that it protects.
To ensure the safety of the user, each distribution panel must be completely enclosed, must be of the dead-front type, and must be properly constructed and earthed.

All electrical cabling must be covered (e.g. in cable trenches) or elevated (in cable trays) to protect it from damage and to eliminate tripping hazards.

All permanent and temporary electrical installations (cabling, sockets, distribution panels, transformers, switchgear, etc.) must be inspected and tested by a competent and suitably qualified electrician on a monthly basis. The testing must include a grounding (earthing) continuity test and testing of the electrical safety devices. Details of these inspections and tests must be recorded in a register which must be made available to the nominated project management representative for inspection.

A rigorous Isolation, Lockout and Permit to Work system must be applied to all electrical work (i.e. work on electrical installations, machinery or equipment). All personnel must comply with the system and procedures applicable to the project.

Before any work on an electrical installation or equipment is carried out, the installation or equipment must be de-energised.

No electrical work may be performed live, regardless of the voltage, unless written approval is obtained from the nominated project management representative (a justification as to why it is necessary for the work to be carried out with the equipment in an energised state must be provided).

For all energised electrical work, a Safe Work Procedure must be in place and, with the exception of voltage testing and where no tools are used, a Permit to Work (specifically authorising energised electrical work) must be issued.
When carrying out any energised electrical work, approved electrically insulated gloves, blankets, mats and other protective equipment must be used.

Control centres, switchgear rooms, substations, generators, transformers, capacitor banks, and other similar electrical plant and equipment must be appropriately guarded and labelled and, with the exception of emergency shut-off mechanisms, must be made inaccessible to unauthorised personnel (i.e. plant or equipment of this nature must be positioned within rooms or fenced enclosures which must be kept locked).

Appropriate warning signage must be prominently displayed within, and at all entrances to, these rooms or enclosures. The signage must indicate that unauthorised persons are prohibited from entering, that unauthorised persons are prohibited from handling or interfering with any electrical plant or equipment, the procedure to be followed in the event of a fire, and the first aid procedure to be followed should a person suffer electric shock. Suitable fire-fighting equipment must be provided in all such rooms or enclosures.

All electrical panels must be kept locked (using keyed-alike padlocks). Keys may only be issued to authorised personnel.

All un-insulated (bare) or partially insulated conductors must be enclosed and protected to prevent accidental contact therewith. Measures must be taken to prevent unauthorised access and appropriate warning signage must be conspicuously displayed.

Only authorised persons may enter rooms or enclosures housing electrical plant or equipment, and only authorised persons may access electrical panels or cabinets, and cable ducts or trenches. If any work must be carried out in such an area or on such equipment, a Permit to Work must first be obtained from the nominated project management representative.

No connection to any electrical system may be made without prior approval and a valid Permit to Work from the nominated project management representative.

No electrical equipment or apparatus may be modified without written authorisation from the nominated project management representative.

Conductive ladders may not be used in proximity to non-insulated electrically energised lines or equipment.
All permanent and temporary electrical cables, whether energised or not, must at all times be handled as if they are energised.

Only appropriately certified intrinsically safe electrical equipment may be used in flammable or potentially explosive atmospheres such as in confined spaces.
Any equipment or structure on which electric charges may accumulate (such as storage tanks) must be grounded (earthed).

Lightning protection must be provided on all tall structures and buildings.

Grounding (earthing) and lightning protection systems and devices must be designed, engineered, selected and installed based on site-specific requirements.
Before carrying out any excavation work, a Permit to Work (specifically authorising the excavation activities) must be obtained from the nominated project management representative. Such a permit must not be issued until it has been verified that no buried hazards or services exist where the excavation work is to be carried out (refer to the Excavation Standard).

15.15.2 Arc Flash Safety

Depending on the scope and nature of the work, a documented arc flash protection programme must be in place that specifies:

- The methodology for calculating incident energies and determining flash protection boundaries; and
- The PPE required (specific to a task and the equipment on which the task is performed) and associated procedures to mitigate the hazard.

The method of calculation must be based on regional electrical code requirements, or if none exist, the Institute of Electrical and Electronics Engineers (IEEE) Standard 1584, or the United States National Fire Protection Association "Standard for Electrical Safety in the Workplace" (NFPA 70E), or published equivalent.

An Arc Flash Hazard Assessment must be carried out based on accurate and current data.
All electrical cabinets where the potential for an arc flash hazard exists must be labelled in accordance with the hazard assessment and the potential incident energies calculated.

A process must be in place for updating the Arc Flash Hazard Assessment and labelling as changes and electrical upgrades occur that might affect the available short circuit current on the system.
In order to mitigate the hazard, Safe Work Procedures must be in place and all persons potentially exposed to arc flash hazards must be trained in these Safe Work Procedures and must be supplied with appropriate arc flash PPE.

15.15.3 High Voltage Power Lines

Before any mobile equipment (such as a crane, bulldozer, back-actor, boom truck or drill rig) is mobilised to a work site, an assessment must be carried out (including a thorough inspection of the work site and the access route) in order to clearly identify any overhead or underground power lines.

A system must be in place to mitigate the risks associated with working in close proximity to power lines and suitable measures must be taken to prevent personnel or equipment from coming into contact with power lines. Extreme caution must be exercised.
Where possible, exclusion zones (based on minimum clearance distances specified by the electrical power utility or the nominated project management representative) must be created with rigid barriers and warning signs.

Only in exceptional circumstances, and then only after a detailed method statement and risk assessment has been approved, all necessary mitigation or control measures are in place (including the use of a spotter), and a Permit to Work has been issued by the nominated project management representative, may equipment be operated within one boom length of energised overhead power lines. Suitable protective insulating barriers may need to be used.

If possible, the power lines must be de-energised and isolated while the work is carried out.
All equipment operators and rigging personnel must be trained in the hazards and the applicable safe approach distances (exclusions zones) associated with overhead power lines.

A procedure must be in place for the evacuation of mobile equipment or a vehicle in the event of accidental contact with power lines. All operators must be trained in this procedure and must follow it implicitly.

Scaffolding may not be erected within 5 metres of power lines or overhead track equipment.

15.15.4 Portable Electrical Equipment

Prior to site establishment, each contractor must provide a complete inventory of all portable electrical equipment that he and his sub-contractors intend to use on the site (including plant, machines, appliances, generators, hand tools, lighting, extension cords, etc.). The nameplate data for each item of equipment must be included.

All portable electrical equipment to be used on the site must be supplied and maintained in a serviceable condition.
Any electrical equipment that is in poor condition or is not in proper operating order may not be used. Any electrical equipment that a nominated project management representative deems to be unsafe or unsuitable must be removed from site.

Electrical repair work or diagnostic work on electrical equipment may only be performed by personnel who are competent and authorised to perform this work (i.e. qualified electricians).
With the exception of double-insulated equipment, all electrical equipment must have an equipment grounding (earthing) conductor that connects the frame of the equipment being utilised to the grounding (earthing) conductor of the electricity supply system.

All electrical equipment and all electricity supply systems used (including generators) must be inspected and tested by a registered and competent electrician to ensure that all equipment is properly grounded (earthed).

All electrical equipment used on site must be supplied electricity through (i.e. must be protected by) an approved and tested residual current device (or earth leakage device or unit). If a socket outlet does not have a residual current device in the circuit, a portable residual current device must be used. Outlets without residual current device protection must be labelled as such.
Any electrical equipment that causes an earth leakage device to trip or deactivate the circuit may not be used again until an electrician has inspected and tested the equipment and has recorded in a register that the equipment is safe to use.

Interlocks may never be removed or modified, and fuse terminals may never be bypassed to keep current flowing in any circuit.
All generators must be fitted with suitable overcurrent protective devices (i.e. circuit breakers or fuses).
All generators must be used in compliance with the manufacturer's requirements. Any proposed modification to a generator must be authorised in writing by the manufacturer prior to the modification being made.
Each welding machine used on site must be fitted with a Voltage Reduction Device (VRD). If this is not practical (i.e. for arc welding processes other than stick welding), a dead man's (isolation) switch in the electrode circuit (operated by a trained observer) may be used as an alternative. All welding machines must be properly grounded (earthed).

All portable electrical hand tools used on the site must be double-insulated.

Electrical equipment must be disconnected or unplugged when not in use.
Portable lights must be stable and each light bulb must be protected by a substantial guard.
Temporary festoon lighting must be double-insulated and must be supported at least 2.5 metres above the floor, if possible.

Handheld lights must be of the all-insulated type and must be extra low voltage (i.e. not exceeding 32V). 120V or 240V handheld lights are not permitted.
Any lighting used in hazardous locations (i.e. potentially explosive atmospheres, confined spaces, and damp or wet areas) must be operated at a maximum of 32 volts, unless earthed and protected by earth leakage devices.
No person may wear a watch or any jewellery, or carry any metal objects such as a lighter or keys, while working on any electrical system or equipment.
No person may work on or use electrical equipment if his clothing is wet or any part of his body is in contact with water.

No person may handle electrical equipment, equipment cords or extension cords with wet hands or if the floor or ground surface is wet.
Fire extinguishers filled with carbon dioxide must be used to fight electrical equipment fires (water may never be used). If possible, the electrical equipment should be de-energised before fire-fighting activities commence (refer to the Fire Protection and Prevention Standard).
When cleaning or performing maintenance work on an item of electrical equipment, the equipment must be unplugged.

Equipment may not be unplugged while that equipment is switched on. Nor may equipment be plugged into a receptacle (socket) with the equipment's switch turned on.
Electrical equipment that has a defective plug or wiring may not be used. Repair work to defective or damaged electrical equipment may only be carried out by a qualified electrician.
Extension cords may be used for temporary applications only. Permanent cabling must be installed for long-term needs.

Extension cords may not be run through doors, windows, ceilings or holes in walls.
An extension cord must be uncoiled completely before it is used.
An extension cord must be of sufficient current-carrying capacity to power the equipment that it is supplying electricity to. Cords must not be overloaded.
Extension cords must be unbroken and continuous (i.e. no joins or splices in the cord are permitted).

Extension cords may not be daisy-chained (i.e. one extension cord plugged into another extension cord).
Extension cords and equipment cords may not be modified to fit a receptacle (socket).
Two-conductor extension cords may not be used. A three-conductor extension cord (i.e. a grounded or earthed cord) must be used even if the equipment that it is supplying electricity to uses a two-prong plug.

Extension cords that are frayed, have insulation tears, cracks or abrasions, have exposed conductors, or have bent, broken or "spread" plug prongs may not be used.
Extension cords that will be used outdoors must have heavy duty insulation and must be weather and UV resistant.

All electrical equipment cords and extension cords must be covered or elevated to protect them from damage and to eliminate tripping hazards.

Each contractor is responsible for protecting his electrical equipment from the weather and from possible mechanical damage.

All portable electrical equipment (including generators) must be inspected, tested and tagged by a competent and appropriately qualified electrician on a monthly basis. Details of these inspections and tests must be recorded in a register which must be made available to the nominated project management representative for inspection.

The inspection and testing must include a continuity test of the grounding (earthing) conductor (as applicable) and a complete examination of the equipment or system to assure safe use.
The following colour coding system must be used for the tagging of all electrical equipment:

Table 15-2 Colour Coding System for Electrical Equipment

Month		Tag Colour	Month	Tag Colour
January		Red	July	Red
February		Blue	August	Blue
March		Orange	September	Orange
April		Green	October	Green
May		White	November	White
June		Yellow	December	Yellow

The tag placed on a piece of equipment must be traceable to an entry in a register where the following information concerning the inspection and testing of that piece of equipment must be recorded:

- Date of inspection and testing;
- Equipment description;
- Equipment owner;
- Equipment location;
- Name, signature and licence number of the electrician who carried out the inspection and testing; and
- Comments concerning the inspection and testing, and details of any repair work carried out or required.

Any item of electrical equipment that does not pass an inspection or test must be removed from service (and tagged, "Out of Service") immediately and must then either be repaired (if possible) or removed from site.
Any item of electrical equipment without a tag or with an out-of-date inspection or test may not be used.

Any item of electrical equipment found without a tag or with an out-of-date inspection or test must be removed from service until it has been inspected and tested. If it is found that more than one item of equipment being used by a contractor has not been inspected and tested as required, all work with electrical equipment must be stopped until it can be demonstrated to the satisfaction of the nominated project management representative that the contractor's systems and controls are adequate and fully implemented.

In addition to the formal monthly inspections and testing carried out by an electrician, electrical equipment (particularly extension cords, portable hand tools, welding machines, compressors and pumps) must be visually inspected by the user on a daily basis prior to use. Users must be trained

to look for cracks in casings, loose casings, outer cord sheathing that is not being held firmly in position at the equipment, cuts or cracks in cord or cable insulation, exposed conductors, damaged plugs or sockets, and missing covers. Damage and / or defects must be reported immediately.

Personnel must immediately stop using and report any electrical equipment or machinery that is shocking, sparking, overheating or smoking. Corroded outlets, switches and junction boxes must also be reported.

15.16 Confined Spaces

Entry into a confined space occurs when a person's whole body, upper body or head is within the confined space. This is not intended to prevent an authorised, competent person from inserting only his arm into the space to test for hazards using appropriate monitoring equipment. Precautions must be taken to prevent persons from being overcome by atmosphere escaping from the confined space.

Before any person enters a confined space, a detailed risk assessment must be carried out, including the need for an authorised person to assess such things as oxygen levels, contaminants, temperature extremes and concentration of flammable substances.

Confined space training must be provided for all persons before entering a confined space by a competent and accredited service provider, they must be found competent and issued with competency certificates.

As a minimum the risk assessment shall address the following:

- Isolation and lockout procedures required for chemical substances, mechanical or electrical energy, steam, pressure, heat, gases, liquids and solids;
- Venting, purging, draining and cleaning prior to entering the confined space;
- Hazards created by carrying out particular tasks or through the use of chemical substances in the confined space. Task-Based (or Issue-Based) Risk Assessments and/or Written Safe Work Procedures must be available for work in confined spaces - in particular for abrasive blasting, welding, flame cutting, grinding, chemical/steam cleaning, rubber lining and painting;
- Entry, exit and escape routes as well as barricading;
- The electrical safety, intrinsic safety and other safety specifications of equipment to be used in the confined space (explosive atmospheres must be considered);
- The need to test for presence of toxic/asphyxiant substances, radioactivity, oxygen, temperature extremes and flammable substances prior to entry and during the performance of work;
- Provision of suitable mechanical ventilation and personal protective equipment e.g. lifejackets etc. and in particular the use of respiratory protection such as compressed air breathing apparatus; and
- A ventilation rate suitable for general use must take into account factors such as air contaminant type, rate of generation, rate of oxygen depletion, temperature, efficiency of ventilation distribution and contaminant removal from the breathing zone. Therefore each situation needs to be evaluated on its own merit by a risk assessment that will select a combination of ventilation method and respiratory protection that suits the particular circumstances. This must be achieved by consultation between competent operations personnel, engineers and a ventilation specialist.

Entry and work inside a permitted confined space must be controlled and regulated by the project Isolation / Lockout and Permit to Work control systems. The Authorised Person issuing the Permit

to Work may only do so if the conditions applying to the specific confined space entry have been satisfied and documented.

As a minimum, the following must be included in the permitting process:

- Access barriers to prevent unauthorised entry;
- Isolation procedures for contaminants and other energy sources;
- The need for breathing apparatus / ventilation requirements;
- The sign-in and sign-out of all persons entering the confined space;
- Display of the permit;
- Communication procedures and/or equipment;
- Safety specifications of equipment to be taken into the confined space;
- Barricading of entrances and exits;
- Rescue plan and equipment;
- Standby person(s); and
- A completion and lock-in procedure (to ensure that space is evacuated and adequately secured).

The Permit to Work process must require competent rescue persons with suitable communication, rescue and firefighting equipment to be present where any of the following may exist:

- Compressed air breathing apparatus is required;
- There is a high risk of fires or explosions;
- The atmosphere can rapidly become unsafe for breathing purposes if the mechanical ventilation fails;
- There is a high risk of flooding or engulfment;
- Narrow tunnels or pipes are entered or where exit or escape routes cannot readily be accessed
- Work is done in remote areas; and
- A single person, who cannot be observed directly or is isolated from other workers, does the work.

Where testing for toxic/asphyxiate substances, radioactivity, oxygen, temperature extremes and other health hazards as well as for flammable substances is carried out, it may only be done by persons trained, tested and certified competent in writing to do so.
The ventilation method and quantity must be adequate to ensure oxygen levels and explosive or toxic gas levels remain within acceptable defined limits. Where ventilation is required, this must be covered by an approved documented procedure.

As a minimum standard, the volume of air pumped in and circulated in a confined space needs to be equivalent to 20 times the volume of the space per hour.

Where breathing apparatus or respiratory equipment is required, the contractor's Health and Safety Officer must be consulted with regard to the specification and selection of suitable equipment.
All persons required to use respiratory protection must be medically fit and trained in the correct use of the equipment.

Safe and convenient entry, exit and escape routes from the confined space must be provided where possible and practical. Where this cannot be achieved effectively, the risk assessment must determine if a competent rescue person must be on duty at the confined space when work is in progress.

Where a standby/rescue person is required, they will have no other duties and will be positioned outside the confined space entry point at all times while personnel are within the space.

15.17 Conveyors

The contractor must ensure that no person attempts to cross / climb over or under any conveyor. Instead, a safe passageway (a crossover or an underpass fitted with safeguards) must be used.
No person may climb onto, sit on, stand on, or walk on a conveyor at any time. Riding a conveyor belt is strictly forbidden.

No person may operate a conveyor other than trained, competent and appointed conveyor operators.

Only authorised maintenance personal are permitted to work on conveyors and only if all energy sources have been effectively isolated and locked out and a Permit to Work has been issued by an Authorised Person.

Working on an operational conveyor is strictly prohibited.
No work may be carried out within three metres of an operational conveyor.

15.18 Arc Welding

All welding machines must be fitted with voltage reducers.

The supply cable to every welding machine must be correctly rated and fitted with an approved plug to be used only with an approved matching plug socket.
The electrical circuit to every plug socket must be protected by a correctly rated circuit breaker and a supply voltage rated earth leakage unit.

Welding cables must be properly insulated and correctly rated for the welding machines on which they are to be used.

Welding cable terminals must either be covered with a properly designed, constructed and installed cover so that inadvertent human contact with the terminals is impossible, whether the cables are connected or not, or the welding cables must be fitted with insulated plugs so that inadvertent human contact with any live part is impossible when the cables are plugged into the machine. Also the plug socket should be such that when the cables are not plugged in, inadvertent contact with a live part of the socket is impossible.

Earth cable clamps and electrode holders must be of an approved type. Earth clamps and electrode holders must be fixed to welding cables with eye terminals and bolts.
All welding machines and safety devices must be subjected to regular planned maintenance and a monthly electrical inspection. The inspection must include a test to ensure that the voltage reducer is functioning properly, by measuring and confirming that the open circuit output voltage is reduced.

Before using a welding machine, the welder must ensure that he is wearing all the required and approved protective clothing and equipment:

- Persons assisting the welder must also wear all of the required personal protective Welding hood;
- Leather welding gloves;
- Safety boots with steel toe protection;
- Flame resistant overalls; and

- Any other clothing or equipment necessary to perform his work safely and efficiently.
- equipment.

When changing electrodes or moving the earth clamp, the welder or his helpers must wear gloves to avoid possible skin contact with live electrical parts and to prevent burns.
When attaching welding cables to the terminals of the welding machine, the welder or his helpers must wear gloves, or preferably, the machine should be switched off to avoid possible electric shock.

Helpers who may be holding the work piece being welded must wear gloves and protective goggles. Where practicable the welder should place protective screens around the area where he is welding, to prevent injury to the eyes of passers-by.

The welder must ensure that the earth cable follows the shortest practical route between the welding machine and the work piece. The earth connection must be directly between the welding machine and the work piece and no building or other structure must form part of the earth return path.

As far as is practicable, the welder should avoid welding under wet or damp conditions. If this is unavoidable, the following precautions should be taken:

- Use only oil filled or other watertight type welding machine;
- Keep the electrode holder as dry as is practical;
- Keep as dry as possible. Stand on an elevated surface out of the water and wear watertight boots and a rain suit. Also ensure that the gloves are in good condition, free of holes.
- Under conditions that result in high perspiration levels, the following measures should be implemented:
- Use an insulated electrode holder;
- Change clothing regularly (if possible);
- Use insulated material like rubber mats and/or timber tuck board to separate yourself from the work piece;
- Wear dry gloves on both hands during welding;
- Use fans and air-conditioning to reduce humidity and temperature; and
- Use an observer capable of responding in an emergency.

When working inside metal vessels or under other conditions where parts of his body may come into contact with conducting surfaces, the welder must take precautions to insulate himself from such surfaces.

When working in confined spaces, the welder must take steps to ventilate the area to prevent inhalation of fumes, which may endanger his health and the health of any assistants.
Engine powered welding machines must not be used in any place that is not very well ventilated since the welder and his helpers may be overcome by carbon monoxide fumes.

The welder should take the necessary precautions when welding objects that may catch alight, explode or release poisonous fumes or gases.

15.19 Gas Welding and Burning

Welding or cutting torches and hoses shall not be connected to cylinders when stored.
When work is stopped and equipment is unattended, all valves at the gas and oxygen cylinders shall be closed. The hoses shall be bled and a check shall be made later for possible pressure build-

up. Torches shall be removed from the hoses prior to putting them into the toolbox. Smoking SHALL NOT be permitted during this stopping procedure.

Special care shall be taken during overhead cutting and welding operations to safeguard and prevent falling sparks from starting a fire.
Warning signs shall be posted around and at each level below the area of each overhead welding or burning operation. Fire extinguishers shall be available and fire blankets shall be used for protection.

When welding or cutting, adequate ventilation must be ensured / provided.
Hoses shall be kept clear from passageways, ladders and stairs. When hoses are subject to damage, they shall be properly protected. Hoses shall be inspected daily.
Fire extinguishers shall be ready for instant use in locations where cutting is performed.

Flash-back arrestors must be fitted to all cutting torches at the torch and at the bottle (a total of four arrestors).
Lighting of the cutting and welding torches must only be done using a striker and not an open flame.

Soap Leak tests must be performed on all flash-back arrestors.

Hoses may only be secured using approved hose clips, and not by wire, cable ties or any other means.
Special care shall be taken when welding with respect to piping that has been painted, as toxic fumes may be emitted in some cases. The supervisor's advice should be sought prior to the above welding operations being carried out.

15.20 Compressed Gas Cylinders

The contractor must establish a suitable storage area for oxygen, acetylene, LPG and argon cylinders in compliance with the following requirements:

- The storage area must be located at least 10 metres away from any building, and must be well ventilated;
- The storage area must have a concrete floor;
- The storage area must be enclosed using wire mesh fencing (as this will ensure adequate ventilation). This enclosure must be kept locked. Access into the storage area must be limited and controlled;
- A protective covering or roof must be fitted to the enclosure to provide shade;
- The enclosure may not be used for the storage of any other materials / equipment, and must be kept completely free of all combustible materials at all times;
- Appropriate warning signage (i.e. "No Smoking" and "No Naked Flames") must be prominently displayed on the enclosure;
- A 9kg dry chemical powder fire extinguisher must be mounted near the entrance to the enclosure
- If electrical lighting is required, it must be of an approved intrinsically safe type;
- Oxygen, acetylene, argon and LPG cylinders must be stored separately in the enclosure. Furthermore, full and empty cylinders must be separated. Separate storage sections must be clearly designated within the enclosure for the different gas types, and for full and empty cylinders, i.e. oxygen – full, oxygen – empty, acetylene – full, acetylene – empty, etc.;
- When a cylinder is empty, the cylinder cap must be replaced to protect the valve. Empty cylinders must be clearly marked (there must be no need to open valves to check if cylinders are full or empty);

- All cylinders must be stored in an upright position and must be secured in this position by chaining, strapping or clamping them individually to a wall, a cylinder trolley, rack or carrier, or some other rigid structure;
- Cylinders must be stored in rows (when necessary due to the number of cylinders) with aisles between the rows to facilitate easy and rapid removal in the event of a fire;
- Oxygen cylinders may never be stored near highly combustible materials, particularly oil and grease, or near fuel gas cylinders. When in storage, oxygen cylinders must be separated from fuel gas (LPG and acetylene) cylinders by a distance of 6 metres or by a 2 metre high wall made of fire-resistant material;
- The total quantity of gases stored on site must be limited to a 2 week supply.

Compressed gas cylinders must always stand upright (i.e. when being used, stored or transported) and must be properly and individually secured to prevent them from falling over.
Cylinders must be protected from flame, heat and from being struck by moving equipment and falling objects.

When handling gas cylinders (whether full or empty), care must be taken to prevent sudden impacts.
Whenever a cylinder is not in use, the protective cap must be in place to prevent the valve from being damaged.
Gas cylinders may not be carried, dragged, rolled or slid across a floor or surface.
When gas cylinders are to be moved / used, they must be placed in a proper cylinder trolley fitted with a 1.5kg dry chemical powder fire extinguisher.

Gas cylinders may not, under any circumstances, be used as rollers or work supports.
If transported by crane, hoist or derrick, compressed gas cylinders must be placed in a suitable cradle, net or skip box. Cylinders may NEVER be lifted using wire rope, fibre rope, a web sling or a chain sling. Before moving / transporting a gas cylinder, the regulator must be removed and the protective valve cap must be replaced.

Gas cylinders may not be taken into a confined space. Gas hoses that are run into a confined space must be removed during breaks.
Gas cylinders may not be placed on scaffolding.

Cylinder valve keys must be in place. If no suitable valve key is available then the cylinder may not be used. Nothing but the manufacturer-supplied key may be used to open the valve.
A flashback arrestor and a check valve (non-return valve) must be installed between the regulator and the hose and between the hose and the torch on the oxygen line and on the fuel (acetylene) line.

Connection fittings may not be forced and safety devices associated with cylinder valves or regulators may not be altered / tampered with.
Gas hoses may not be joined. Only approved hose connectors of the crimp type are permitted. Wire and jubilee clamps are prohibited.
Only high quality ancillary equipment may be used. This includes flashback arrestors, hoses, clamps, spindle keys, nozzles and torches.
Only trained and competent personnel may operate gas welding / cutting equipment and appliances.

When an employee opens the valve to a cylinder, he must stand to one side and open it slowly. Valves may never be left partly open – they must either be closed or be opened fully.
Leaking cylinders must immediately be removed from service and the workplace (if it is safe to do so).

Suitable firefighting equipment must be at hand wherever gas cylinders containing oxygen and / or fuel gas are being used.
Gas cylinders must be prevented from coming into contact with electrical circuits, e.g. welding leads. Never strike an arc on a cylinder.
Oxygen may only be used for the purpose for which it is provided. Do not use oxygen in pneumatic tools or tyres, as an explosion may occur.
Empty cylinders must immediately be marked as such and must be removed to the cylinder storage area at the end of each day / shift.

15.21 Electrically Powered Tools and Equipment

All powered hand tools, such as circular saws, drills, chainsaws, percussion tools, jigsaws etc., must be equipped with a constant pressure switch that will shut off the power when the pressure is released. (Exception: this requirement does not apply to concrete vibrators, concrete breakers, powered tampers, jack hammers, rock drills, and similar hand operated power tools).

Electrical power tools must be of the approved double-insulated type. The electric cord, pneumatic or hydraulic supply line of powered tools must not be used for hoisting or lowering of the tool.
Loose clothing, jewellery or gloves that could get caught in the tool must not be worn when operating powered tools. Operators of powered tools who have long hair must keep their hair tied up.

The power source must be disconnected from the tool before making any repairs, servicing, adjustments, or replacing attachments such as drill bits.

15.21.1 Angle Grinders

The following personal protective equipment must be worn when using angle grinders:

- Safety helmet;
- Gloves;
- Safety glasses (or safety goggles) and a full face shield (i.e. double eye protection);
- Overalls with long sleeves and long pants, avoid any form of loose clothing;
- Safety boots with steel toe protection;
- Hearing protection;
- Breathing apparatus where dust or fumes may be generated;
- Where grinding machines are used, a face shield is to be worn as extra protection to the safety glasses; and
- Certain tasks may require the use of a leather apron as determined by a risk assessment.

A 230mm angle grinder may not be used for free cutting purposes. Exceptions may be approved only if alternative methods evaluated proved more hazardous or no alternative exists. The risk assessment for the task must then specifically include mitigating measures to ensure the safest possible way of performing the task.

The use of 230mm angle grinders for grinding purposes is acceptable, however should this form of grinding be required, the 115mm or 125mm grinders would be preferable.
All angle grinders must have a dead man switch incorporated, with a pressure switch in the handle.
A 230mm electrical angle grinder unit must incorporate a soft start to reduce the starting strain and a braking system to reduce run on after the unit has been switched off.

All angle grinders must have a spindle lock to assist with changing the disc or grinding wheel.
Anti-vibration handles are recommended to further reduce the stress if used for extended periods.
Angle grinders must be equipped and operated with disc guarding at all times.
Angle grinder must not be stored with fitted discs, as this will lead to damaging of the discs.

Before use and mounting of discs it is essential to check the safety codes and specifications printed on the upper side of the disc. Such specifications include the following:

- Revolutions per minute (RPM). The allowable speed of the disc must be equal to or greater than the maximum achievable speed of the grinder;
- Physical dimensions of the disc must meet grinder specification; and
- The disc must be suitable for the material type to be cut / ground as indicated on the disk. Cutting discs must never be used for grinding and vice versa.

It is critical that the correct disc mounting procedure is followed:

- Check that the machine is plugged out;
- Check the machine spindle, backup washer and thread;
- Check the condition of spindle nut - ensure spanner drive holes are not elongated;
- Ensure spindle nut spanner is the tool recommended by machine manufacturers;
- Do not use a hammer, pipe or chisel to tighten the nut, or apply additional mechanical advantage to nut torque. A firm "nip" is sufficient to retain the disc;
- Ensure the spindle diameter is suited to disc bore. Excessive clearance will cause the machine to vibrate due to eccentricity;
- Check to see that the nut and backup washer do not "bottom out". This will result in the disc not being correctly clamped on the spindle;
- Ensure the spindle speed is marked on the grinder and that it is less than the allowable disc speed; and
- Fit the disc, with the metal ring or writing to the nut side.

15.22 Pneumatically Powered Tools and Equipment

Pneumatic powered tools must only be driven by filtered compressed air with an in-line lubrication system, or be lubricated prior to use if there is no in-line lubrication system. When using pneumatic powered tools the designated tool pressure must be attained by the use of a regulator.

Pneumatic powered tools must be disconnected when not in use. They must not be disconnected from the air supply until all the residual pressure has been released or contained by a shut-off device. Hoses must not be kinked as a means of containment.

Employees operating pneumatic powered tools, and any potentially affected employee in the vicinity of use, must wear suitable personal protective equipment.
All rotary compressed air tools (e.g. drills) must have the rated revolution per minute (RPM) permanently marked on the casing. Only attachments of compatible RPM must be used with these machines.

The actual RPM of the tool must be checked every three months to ensure that the speed is as rated to manufacture specifications.

Pneumatic powered tools must be secured to the air supply hose by an approved positive means to prevent the tool from becoming accidentally disconnected. Safety clips or retainers must be

securely installed and maintained on pneumatic impact (percussion) tools to prevent attachments from being accidentally expelled.

All pneumatically driven nailers, staplers, and other similar equipment provided with automatic fastener feed, which operate at more than 100 kPa pressure at the tool, must have a safety device on the muzzle to prevent the tool from ejecting fasteners unless the muzzle is in contact with the work surface.
Compressed air must not be used for cleaning purposes except where reduced to less than 30 kPa, and then only with effective chip guarding and personal protective equipment in place. The 30 kPa requirement does not apply to concrete form, mill scale and similar cleaning purposes. The use of compressed air for cleaning purposes must be approved by the nominated project management representative. Compressed air must not be pointed at any part of the body or used for cleaning clothing.

Airless spray guns of the type which atomize paints and fluids at high pressures must be equipped with automatic or visible manual safety devices which will prevent pulling of the trigger to prevent release of the paint or fluid until the safety device is manually released. A diffuser nut which will prevent high pressure, high velocity release while the nozzle tip is removed, plus a nozzle tip guard which will prevent the tip from coming into contact with the operator, or other equivalent protection must be provided in lieu of the above.

Abrasive cleaning nozzles must be equipped with an operating valve, which must be held open manually to enable operation. A support must be provided on which the nozzle may be mounted when it is not in use.

15.23 Fuel Powered Tools and Equipment

Fuel powered tools must be shut down and allowed to cool before being refuelled, serviced, or maintained. Fuel must be transported, handled, and stored in approved fuel containers. Where possible, diesel driven engines must be used in preference to petrol driven engines. All fuel powered tools must be included on the contractor's Equipment Register and the register must be submitted to the nominated project management representative prior to the relevant work commencing.

When fuel powered tools are used in enclosed spaces, the space must be ventilated and the atmosphere monitored to measure toxic gas concentrations. Persons in the space must wear the necessary personal protective equipment. Confined Space Entry clearance may apply. This type of activity must only be undertaken in exceptional circumstances and requires the approval of the nominated project management representative.

15.24 Hydraulically Powered Tools and Equipment

Hydraulic powered tools must use only approved fluid that retains its operating characteristics at the most extreme temperatures to which it will be exposed. The manufacturer's stated safe operating pressures for hoses, valves, pipes, filters and fittings must not be exceeded.
Only manufacturer approved hoses, valves, pipes, filters and fittings must be used.

15.25 Explosive Powered Tools

All operators shall be trained by the contractor.
The contractor shall ascertain that the explosive charges to be used are of the correct strength for the purpose.

Projectiles from explosive powered tools shall NOT be driven into:

- Tile, terracotta, glazed brick, glass, marble, granite, thin slate or other brittle substances;
- High tensile steel, cast iron or steel hardened by heat treatment; or

- Concrete that contains aggregate that will not pass wholly through 25mm mesh screens.

Under no circumstances shall a tool be fired in such a manner as to cause the projectile to fly free. Suitable safety glasses and hearing protection shall be worn by operators when firing an explosive powered tool.

At all times when a tool is being used, the operator shall display clearly legible signs at or near the place where the tool is in use. Sign should read: WARNING: EXPLOSIVE POWERED TOOL IN USE – KEEP CLEAR.
The operator shall warn all other employees in the vicinity of the area in which the tool is about to be used.

Tools shall never be stored in a loaded state. Cartridges and tools shall be stored separately in lockable containers.
A logbook must be kept of the number of cartridges used and returned.

15.26 Hand Tools

Employees required to use hand tools must receive training relevant to the tool and have their competency assessed in the operation, inspection and maintenance of the tool. Where necessary, additional applicable personal protective equipment must be worn when using hand tools.

Wrenches, including adjustable, pipe, end, and socket wrenches, must not be used when the jaws are sprung to a point where slippage occurs. Impact tools such as drift pins, wedges and chisels, must be kept free of mushroomed heads. The wooden handles of tools must be kept free of splinters or cracks.

Adjustable wrenches must not be used in lieu of ring or open-end type spanners, unless a risk assessment has been conducted and the use of the adjustable wrench is approved by the nominated project management representative. Wherever possible, ring spanners must be used in preference to open end spanners.

Correct hand tools for the job must be used, e.g. screwdrivers must not be used as chisels, and pliers must not be used as hammers.
All wedges and drifts that may spring, fly or fall to lower levels upon impact must be fitted with an attachment which attaches a safety "lanyard" to a solid structure to restrain the impact tool from becoming a projectile.

All hand tools used in elevated areas, that may be dropped or fall to lower levels must be fitted with safety lanyards and attached to solid structures or in the case of podges, scaffold keys etc., attached by wrist lanyard to the user.
Purpose built tools and equipment may not be used unless a risk assessment has been conducted and authorised by the nominated project management representative.

15.26.1 Stanley Knives / Utility Knives

A utility knife must be used as a last resort, when it is the safest tool to use. Always consider alternatives that pose less of a risk to the operator.

Whenever a utility knife is used, ensure that a complete risk assessment is done and that all possible hazards have been addressed.

Only utility knives with retractable blades are to be used. The blade is to be retracted at all times when the knife is not in use or is being stored.

Before using the utility knife, ensure that the tool is in a good condition and the blade is secure in the holder (seated correctly and that there is no play).
Ensure that the blade is always sharp and in good condition. This will prevent the use of excessive force.

Always wear cut resistant gloves and safety glasses when using a utility knife. There is always a risk of the blade breaking under tension and becoming a projectile.
Always ensure that you cut away from your body, and that no part of your body is in the firing line.
Always ensure cleanliness of all equipment in use during the cutting operations.

15.27 Inspection of Equipment and Tools

All tools must be inspected by the user before, during and after use. If any faults are identified, the tool must be taken out of service and not used until repaired. Faulty tools that are not able to be repaired must be tagged "out of service" and removed from site.

15.28 Manual Handling and Vibration

Any handling or lifting task that can only be done manually must be planned and rehearsed before the task is done.
If more than one person is involved in a task a communication procedure must be agreed in advance. Lowering the load must be done in a controlled manner. Dropping a load is dangerous and must be avoided.

As a guideline 25 kg is considered to be the limit of what a person can safely handle. Where there are loads exceeding 25 kg the risk of handling the load must be mitigated to assure minimal potential for any injury.
When mechanical lifting aids are provided, they should be used.
Extra care should be taken when lifting awkwardly shaped objects.

Position the feet correctly. The feet should be placed hip-width apart to provide a large base. One foot should be put forward and to the side of the object, which gives better balance.
Bend or 'unlock' the knees and crouch to the load. The weight will then be safely taken down the spine and the strong leg muscles will do the work.

Get a firm grip. The roots of the fingers and the palm of the hand should grip the load. This keeps the load under control and permits it to be distributed more evenly.

The following should be considered with conducting the Risk Assessment with regards Manual Handling and also take into consideration the task factors, physical demands and tools involved in the task:

- Load weight/frequency;
- Hand distance from lower back;
- Asymmetrical trunk/load;
- Postural constraints;
- Grip on the load;
- Floor surface;
- Environmental factors;
- Carry distance; and
- Obstacles en route.

Team Manual Handling:

- Load weight;
- Hand distance from lower back;
- Vertical lift region;
- Trunk twisting/sideways bending;
- Postural constraints;
- Grip on the load;
- Floor surface;
- Environmental factors; and
- Communication, co-ordination and control.

As far as possible, exposure to vibration must be eliminated.
However, if this is not possible, short-term solutions to decrease exposure include:

- Reducing the vibration levels;
- Removing the person from the vibrating equipment / tools;
- Reducing the period of time that the person works with the vibrating equipment / tools (at least 40 minutes break after 20 minutes working with a machine that vibrates excessively).

In order to reduce exposure to vibration:

- Consider buying equipment that operates effectively at lower speeds;
- Buy equipment with built-in damping materials;
- Buy lighter tools if they are available - they require less of a grip;
- Maintain the equipment;
- Make sure equipment is balanced and there are no worn parts;
- Use remote controls when they are available;
- Reduce your grip on the equipment when it is safe. The less time you actually have your hands on the equipment the better. Relax your hands during these brief breaks;
- Take scheduled breaks; and
- Do other tasks that allow you to move away from vibrating tools and equipment.

The workplace must be assessed by a competent person for compliance with good design, layout and practice, to avoid or minimise adverse health consequences due to manual handling and vibration issues.

Quantitative evaluations of vibration produced by specific equipment must include the following measurement parameters: direction of movement, frequency, intensity, and variation with time and duration, as per documented methods.

Employees and contractors must be informed of the results of assessments and instructed in appropriate manual handling techniques, where the risk assessment indicates a need.
Workplace vibration sources that could contribute to the exceedance of an Occupational Exposure Limit (hence potential for impact on worker musculo-skeletal fitness) must be identified and adequately characterised.
Manual handling tasks assessed as having the potential to cause a Lost Time Injury (i.e. with potential for impact on worker musculo-skeletal fitness) must be identified and adequately characterised.
Workplace manual / materials handling tasks risk rated as "significant" must be assessed and recorded to include biomechanical factors (e.g. posture, bending, twisting, repetitive motions, working overhead, and exerting force away from the body).

15.29 Personal Protective Equipment

All applicable legislation concerning Personal Protective Equipment (PPE) must be complied with at all times.

As a minimum, the following PPE must be worn by all persons (including visitors) at all times whilst on a project site:

- Safety footwear with steel toe protection;
- Safety glasses (individuals who wear prescription spectacles must be provided with either over-spec safety glasses or prescription safety glasses);
- Safety helmet (hard hat); and
- High visibility protective clothing with reflective taping (long trousers and long-sleeved shirts with collars and cuffs).
- Additional PPE requirements must be determined through hazard identification and risk assessment. This hazard-specific PPE (such as hand protection, hearing protection and respiratory protection) must be worn as required (e.g. when in a certain area, when performing a certain task, or when working with a certain substance);
- The correct PPE must always be worn:
- In accordance with site requirements (as indicated at the entrances to a project site and at the entrances to buildings and / or designated areas on the premises);
- In zoned areas (e.g. noise zones and respirator zones); or
- As required by a Safe Work Procedure, a risk assessment, or a Material Safety Data Sheet (MSDS).

Each contractor must provide each of his employees with all required PPE (at no cost to the employee). The specific PPE that is provided to a particular employee must be based on the nature of that employee's work and the location in which the work is performed (i.e. must be based on the hazards to which the employee is exposed). PPE requirements for a particular job or for a particular area must be determined through a risk assessment for that job or area.

Any employee who does not have all of the PPE that is required for him to perform his duties safely will not be permitted to work.

Each employee must care for his PPE, maintain it in good condition, and inspect it on a daily basis. If an item of PPE has worn out, has become damaged, or is found to be defective in any way, it must be replaced by the contractor.

PPE must be stored in accordance with the manufacturer's requirements and / or recommendations.

Each employee must receive training in the use, maintenance and limitations of the PPE that is provided to him, and must be made aware of why the PPE is necessary as well as the consequences of not wearing it as instructed (i.e. the potential for injury and / or disciplinary action). Training records must be retained.

Any person who refuses to wear PPE as required must be removed from the site.
Symbolic signs indicating mandatory PPE requirements must be prominently displayed at the entrances to a project site and at the entrances to buildings and / or designated areas on the premises where additional PPE is required. These signs must comply with the applicable national standard (if one exists).

Each contractor must appoint an employee to:

- Control the issuing and replacement of PPE;
- Keep an up-to-date register as proof that items of PPE have been issued to individuals (an employee must sign for the items that he receives);
- Ensure that there is an adequate supply of all required PPE (i.e. maintain PPE stock levels on site); and
- Carry out regular inspections to ensure that PPE is being used correctly, is being maintained in a good, serviceable and hygienic state, and is not being shared between employees.Head Protection

A safety helmet (or hard hat) worn correctly will help protect the head in the event of:

- An employee being struck on the head by a falling or flying object;
- An employee striking his head against a fixed or protruding object; or
- Accidental head contact being made with an electrical hazard.

A safety helmet must be worn at all times on a project site, with the following exceptions:

- Vehicle and equipment operators inside enclosed cabs;
- In offices and in office or administration buildings; and
- At designated lunch and break areas (provided that no work is in progress in the immediate break area).

A safety helmet must be worn in accordance with the manufacturer's requirements.
A safety helmet must be worn directly on the head. The wearing of a cap or other headgear beneath a safety helmet is prohibited unless the items have been specifically designed to be used in combination (i.e. the arrangement is approved by the safety helmet manufacturer).

The suspension system inside a safety helmet (that acts as a shock absorber) may not be removed.
The painting of safety helmets is prohibited.
Safety helmets may only be cleaned using a mild detergent and water. No solvents may be used.

15.29.1 Eye Protection

If an employee is carrying out, assisting with, or working adjacent to any activity where sparks or projectile particles are being generated, where chemical mists or fumes are being generated, where liquids may splash or spray, where harmful electromagnetic radiation (heat or light) is being generated, or where there is a risk of wind-blown particles entering the eyes, then suitable protective eyewear must be worn at all times (i.e. safety glasses, safety goggles, a face shield, a welding helmet, or a combination of these).

Such activities include:

- Working with rotating equipment (e.g. grinders, drills, mills, lathes, and saws);
- Welding and cutting;
- Chipping, chiselling or caulking;
- Using explosive powered tools;
- Abrasive blasting;
- Sanding; and
- Working with chemical substances (e.g. drilling fluids, acids, solvents, paints, pesticides, etc.).

For certain activities, special eye protection is required (e.g. a heat-resistant face shield is required when working near molten metal).
Double eye protection is required for activities such as:

- Grinding, cutting, chipping, chasing and reaming (employees must wear both a full face shield and safety glasses or goggles); and

- Arc welding (welders must wear both safety glasses and a welding helmet).

Screens must be erected to protect passers-by, where practical.

Safety glasses must be worn at all times on a project site, with the following exceptions:

- Vehicle and equipment operators inside enclosed cabs with the windows fully closed;
- In offices and in office or administration buildings;
- At designated lunch and break areas (provided that no work is in progress in the immediate break area); and
- When another form of eye protection is required (e.g. safety goggles).

All safety glasses used on site must have suitable permanent side protection.

In strong sunlight, dark safety glasses should be worn to reduce eyestrain and fatigue. However, caution must be exercised when employees are required to frequently move between outdoor and indoor environments. Dark safety glasses may not be worn indoors or in poor daylight conditions. Prescription spectacles with tinted lenses are prohibited inside buildings or other structures with limited illumination unless the lenses are light-sensing and adjust to changing illumination levels.

Employees who wear prescription spectacles (i.e. require corrective lenses) must make use of either:

- Prescription safety glasses (with permanent fixed side shields) that conform to the requirements of a recognised national or international standard (e.g. CSA, ANSI, or equivalent); or
- Over-spec safety glasses or goggles.

The use of contact lenses in certain areas may not be suitable because of increased risk to the eye due to dust or heat.

15.29.2 Hearing Protection

Local regulations concerning occupational exposure to noise and the use of hearing protection must be complied with as a minimum.
"Low noise" tools and machinery must be used wherever possible to reduce noise levels.
Where noise cannot be reduced to an acceptable level through engineering and work practice controls, measures must be put in place to minimise the exposure of employees to the noise (i.e. administrative controls and personal hearing protection).

Areas where it is likely that the 95% upper confidence limit of an eight hour L_{eq} mean exceeds 85dB(A), or areas where impulse noise exceeds 140dB(C), must be designated as noise zones. These noise zones must be clearly demarcated and mapped, signs must be posted, and all employees must be made aware of the requirements for working in such an area.

Suitable hearing protection must be worn in all designated noise zones and when carrying out (or working in the vicinity of) any activity where the noise level exceeds 85dB(A).

Where hearing protection is required, a hearing conservation programme (applicable to all personnel and visitors) must be implemented. The programme must include training in the correct use and proper storage of hearing protection devices as well as replacement requirements. Training must be provided when hearing protection is first issued to an employee and refresher training must be carried out at least annually thereafter. Training records must be retained.

At least two types of personal hearing protection must be made available to employees. The hearing protection devices provided must have adequate noise reduction ratings (i.e. must be able to attenuate the noise level to below 85dB(A)).

Personal hearing protection must be issued on an individual basis and must not be shared.
In addition to personally issued hearing protection, suitable disposable hearing protection must be made available at the entrances to all noise zones.
All Hearing Protection Devices (except for disposable hearing protection) must be properly inspected and cleaned on a regular basis.

15.29.3 Respiratory Protection

Designated areas (respirator zones) must be established where:

- It is likely that the 95% upper confidence limit of a Similar Exposure Group's mean exposure concentration exceeds the relevant Occupational Exposure Limit (OEL) for agents resulting in chronic effects, such as total inhalable dust, respirable dust, respirable crystalline silica, PAH, fluorides, lead, mercury, asbestos or non-asbestos fibrous materials; or
- The concentration of an agent (particulate, vapour or gas) with an acute effect exceeds 50% of the relevant OEL.

Note: For a particular hazardous agent, the OEL to be adopted must be either the client's OEL or the OEL specified in local legislation, whichever is the most stringent.

These areas must be clearly demarcated and mapped, signs must be posted, and all employees must be made aware of the requirements for working in such an area.

Suitable Respiratory Protection Devices (RPDs) must be worn in all designated respirator zones and when carrying out (or working in the vicinity of) any activity where the risk assessment has identified the need for respiratory protection.

RPD's must be selected based on:

- The type(s) of airborne contaminants that are present (gases, vapours, and particulates and aerosols including dusts, fumes, sprays, mists, and smoke);
- The potential particulate size distribution;
- Substance toxicity; and
- The likely concentrations.

Compatibility with the work tasks and other PPE, comfort (as it affects wear-time), and the ability to communicate adequately, must also be considered.

The risk assessment and method statement for the work to be performed, the information contained in the relevant Material Safety Data Sheets (MSDSs), and the results of any air monitoring associated with the substances to be worked with or activities to be carried out, must be used to ensure that the most suitable RPD is selected.

Only RPDs certified to a recognised standard and approved by the nominated project management representative may be used.

Where respiratory protection is required, a respiratory protection programme (applicable to all personnel and visitors) must be implemented.

The respiratory protection programme must include:

- Periodic inspection of RPDs, including before each use;
- Periodic evaluation (by competent persons) of cleaning, sanitising, maintenance and storage practices;
- Performance of positive pressure and negative pressure fit checks by RPD wearers before each use to ensure that the respirator is functioning properly; and
- Training at first issue of a RPD and regular refresher training thereafter in accordance with regulatory requirements or at least once every two years (the training must cover fit testing, use, cleaning, maintenance, filter cartridge replacement, and storage). Training records must be retained.

RPDs must be used, maintained, and stored in compliance with the manufacturer's requirements as well as the respiratory protection programme.

Suitable facilities must be provided for the cleaning and sanitary storage of RPD's.

As a minimum, qualitative and documented fit testing must be carried out (although quantitative fit testing is preferred) to ensure that the use of negative pressure RPDs (including disposable RPDs) is effective. Fit testing must be performed by a competent person when an RPD is first issued and must be repeated periodically in accordance with legal requirements or every two years as a minimum. A policy must be in place requiring a clean shaven face when using a negative or neutral pressure RPD for routine tasks (otherwise a positive pressure RPD must be used). A medical evaluation including a pulmonary function test may be required to determine whether or not an individual is medically fit to wear a respirator.

For air-supplied RPDs, breathing air must be effectively filtered and / or isolated from plant and instrument air, and isolated from sources of potential contaminants. The supplied air must be tested to determine if the air quality complies with the requirements of applicable standards for breathing air.

For nuisance dust, dust masks with a protection level of at least FFP2 must be worn.

15.29.4 Hand and Arm Protection

Gloves must be worn when handling or working with equipment, materials or substances with the potential to cause injury or illness.
Suitable gloves must be selected based on the task to be performed and the specific hazard against which the employee requires protection, such as:

- Sharp edges;
- Sharp points and splinters;
- Abrasive surfaces;
- Hazardous chemical substances (toxic, corrosive, sensitising, etc.);
- Extreme temperatures; and
- Viruses, bacteria and parasites.

15.29.5 Foot Protection

Safety boots must be worn at all times whilst on a project site, with the exception of offices and office or administration buildings in which closed athletic, business or similar shoes may be worn. Sandals, slops, slippers, open-toed and high-heeled shoes are not permitted on any project premises.

Safety boots must provide the following protection:

- Steel toe cap to protect against crushing (impact and compression forces);

- Leather uppers that provide resistance against water penetration and water absorption;
- Slip resistant soles;

And where a risk assessment identifies the need:

- Puncture resistant soles (i.e. steel midsoles) for protection against sharp objects;
- Chemical resistant soles for protection against spilt chemical substances (such as solvents, hydrocarbons, acids, and alkalis);
- Heat resistant soles for protection against hot surfaces or molten metal; or
- Electrical shock resistant soles for protection (insulation) against live electrical conductors.
- Gumboots with steel toe caps must be worn when working in water or very wet conditions.

15.29.6 Clothing

All employees working on a project site must wear high visibility protective clothing with reflective taping. Trousers must be long and shirts must be long-sleeved. Shirts must be buttoned at the neck and wrists.

Protective clothing must preferably be made of natural fibres.
Short pants, short-sleeved shirts, sleeveless shirts, and vests are prohibited as outer garments (with the exception of a high visibility vest worn over a long-sleeved shirt).

Loose clothing may not be worn where it may become caught in moving machinery or equipment. For hot work (e.g. welding, cutting, etc.), work in the vicinity of molten metal, and any work carried out in the vicinity of an open flame, the protective clothing worn (shirt and trousers) must be made of a suitable fire retardant fabric. Underwear and socks must be made of natural fibres (preferably wool) or fire retardant fabric.

No employee may tuck his trousers into his boots when working in the vicinity of molten metal.

15.29.7 Body Protection

Suitable body protection must be provided as required to protect employees against specific hazards. A range of work activities require body protection in one form or another, including but not limited to:

- Working in extremes of temperature, such as firefighting, attending to a heating furnace, working with molten metal, working in refrigerated environments, etc.;
- Hot work (e.g. welding, burning, cutting and grinding);
- Working with hazardous chemical substances (e.g. acids, solvents, pesticides, etc.); and
- Clean up and disposal of hazardous materials and wastes (e.g. asbestos, hydrocarbons, etc.).

A wide variety of protective garments are available, such as firefighting suits, furnace suits, freezer jackets, leather aprons, leather spats, laboratory coats, chemical resistant aprons, chemical resistant (or hazmat) suits, and disposable coveralls. Suitable items must be selected to provide protection against the specific hazard(s) to which an employee is exposed. Hazards must be carefully identified and characterised to ensure that the correct protection is used.

Body protection must be sized properly to prevent tearing, the parting of seams, tripping, or restriction of movement.

15.29.8 Electrical Protective Equipment

To reduce the risk of electric shock, electrical insulating equipment appropriate for the voltage that may be encountered must be worn when working on energised electrical installations and when working within two metres of exposed energised conductors.

All rubber electrical insulating equipment (including gloves, sleeves, matting, covers, blankets, and line hoses) must be inspected for damage prior to and after each use, and immediately following any incident that can reasonably be suspected of having caused damage.

Rubber insulating equipment with any of the following defects and / or damage may not be used:

- A cut, rip, tear, hole, or puncture;
- Ozone cutting or ozone checking (i.e. the cutting action of ozone on rubber under mechanical stress causing a series of interlacing cracks);
- An embedded foreign object;
- Chemical deterioration (texture changes) such as swelling, softening, hardening, or becoming sticky or inelastic; or
- Any other defect that damages the insulating properties.

Rubber insulating gloves must be electrically tested before first issue and every 12 months thereafter as a minimum. Insulating gloves must also be given an air test along with the daily inspection. Essentially, this involves filling a glove with air and checking for any holes or leakage.

Insulating equipment that fails an inspection or electrical test may be repaired only as follows:

- Rubber insulating line hose may be used in shorter lengths with the defective portion(s) cut off;
- A rubber insulating blanket may be repaired using a compatible patch that results in the patched area having electrical and physical properties equal to those of the blanket;
- A rubber insulating blanket may be salvaged by cutting the defective area off the undamaged portion of the blanket;
- Rubber insulating gloves and sleeves with minor physical defects, such as small cuts, tears, or punctures, may be repaired by applying compatible patches. The patched areas must have electrical and physical properties equal to those of the surrounding material.

Repairs to gloves are permitted only in the area between the wrist and the reinforced edge of the opening.

Repaired insulating equipment must be retested before it is put back into use.

Insulating equipment must be cleaned as required to remove foreign substances (using a mild detergent).

Insulating equipment must be stored in such a location and in such a manner so as to protect it from light, temperature extremes, excessive humidity, ozone, and other damaging substances and conditions.

Leather protective gloves must be worn over rubber insulating gloves to provide mechanical protection against cuts, abrasions, and punctures.

Suitable arc flash PPE (e.g. voltage rated gloves, fire retardant clothing, arc rated face shield, arc flash hood, arc flash suit, etc.) must be worn whenever an employee is potentially exposed to an arc flash hazard. The appropriate level of PPE must be worn depending on the task and the potential energy exposure. These PPE requirements must be clearly specified as part of a project-specific arc flash protection programme (refer to the Electrical Safety Standard).

15.29.9 Jewellery

Necklaces, dangling earrings, and bracelets may not be worn on a project site.

No ring or watch may be worn where there is a risk that it may become caught in machinery or equipment.

No jewellery or other conductive apparel (such as a key chain or watch) may be worn when carrying out energised electrical work.

15.29.10 Hair

Scalp hair that is longer than the top of the shoulders must be tied up and restrained within the person's safety helmet or within the collar of his or her overalls, shirt or jacket.

For negative or neutral pressure Respiratory Protection Devices, facial hair must not cause the seal between the respirator and facial skin to be broken (or prevent a seal from being formed in the first place).

15.29.11 Task-Specific PPE

In addition to the standard PPE required for a project site (including a safety helmet, safety glasses, safety boots, and high visibility protective clothing), the following task-specific PPE must be used as a minimum by any person carrying out or assisting with such a task:

- Arc Welding – safety glasses and welding helmet (i.e. double eye protection), respiratory protection against the specific airborne contaminants being generated (fumes, gases, dusts, etc.), leather welding gloves, leather apron, leather spats, leather yoke (for work above shoulder height), and knee pads for welders in kneeling positions;
- Gas Welding, Cutting or Brazing – gas cutting or welding goggles with shade 4 filter lenses and full face shield (i.e. double eye protection), respiratory protection against the specific airborne contaminants being generated (fumes, gases, dusts, etc.), leather gloves (long cuff for welding and cutting, short cuff may be used for brazing), leather apron, leather spats, and leather yoke (for work above shoulder height);
- Grinding – safety glasses or goggles and full face shield (i.e. double eye protection), hearing protection, respiratory protection where dust or fumes may be generated, leather gloves, leather apron, and leather spats;
- Abrasive Blasting – respiratory protection (air-supplied hood), hearing protection, leather gloves, and leather apron;
- Spray Painting – respiratory protection (air-supplied hood for confined spaces), safety goggles (if the respirator design does not provide this protection), hearing protection (where air compressors are used), chemical resistant gloves, and chemical resistant disposable coveralls.

15.30 Sun Protection

The contractor must ensure that all personnel are protected in sunlight through the use of long sleeve shirts, long trousers, brims to safety helmets and UV factored sunscreen. Shade structures must also be made available to all employees.

The contractor must conduct training and awareness sessions with his employees, advising on the risks associated with working in the heat (including dehydration) and the precautions to be taken (e.g. ensuring adequate fluid intake).

15.31 Fuel / Flammable Liquid Storage and Refuelling

No fuel (diesel, petrol, paraffin, etc.) or any other flammable liquid (paints, solvents, etc.) may be stored on site unless approved in writing by the nominated project management representative.

If the on-site storage of a fuel or a flammable liquid is approved, the contractor must ensure the following:

- The quantity of fuel / flammable liquid to be stored on site must be kept to the minimum that is required;
- The storage area must be located in a well ventilated area at least 10 metres away from any building, drain, boundary or any combustible material;
- If more than 200 litres of fuel / flammable liquid is to be stored, the tank must be installed / the containers must be positioned within a bund (see Definitions);
- If the fuel / flammable liquid are to be stored in bulk tanks / vessels, then the minimum capacity of the bund must be 110% of the volume of the largest tank / vessel. If many small containers (e.g. 210 litre drums) are to be stored, the bund must be able to contain 25% of the total volume of the stored products;
- The bund must be impermeable. It must have a solid concrete floor and the walls must be constructed out of brick and must be plastered on the inside;
- The bund must be fitted with a lockable drain valve (for draining away rainwater), which must remain locked in the closed position. The valve may only be opened under supervision and in accordance with a written procedure;
- The fuel / flammable liquid storage area may not be used for the storage of any other materials / equipment, and must be kept completely free of all combustible materials (including rubbish, brush and long grass) at all times;
- Access to the storage area must be controlled (wire mesh fencing and gate);
- Appropriate warning signage (i.e. "Flammable Liquid", "No Smoking" and "No Naked Flames") must be prominently displayed at the storage area. The contents and volume of each tank must be indicated;
- In order to contain spillages, the offloading / refuelling bay at the fuel / flammable liquid storage area must have a solid concrete base surrounded by bund walls, ramps or humps and / or spill trenches (covered with steel grating) that lead into a sump;
- Fuel dispensing pumps must be protected against impact damage;
- All fuel / flammable liquid storage tanks and dispensing equipment must be electrically bonded and properly earthed;
- All electrical installations and fittings must be of an approved intrinsically safe type;
- Two 9kg dry chemical powder fire extinguishers must be mounted in an easily accessible position near the entrance gate to the fuel / flammable liquid storage area. Depending on the size of the storage area, additional fire extinguishers may be required to ensure that an extinguisher is no further than 15 metres away from any point on the perimeter of the storage area;
- A fire extinguisher must be at hand wherever refuelling is carried out;
- Smoking or open flames within 10 metres of a fuel / flammable liquid storage / refuelling area is strictly prohibited;
- No petrol or diesel powered vehicle or equipment may be refuelled while the engine / motor is running;
- Cellular phones must be switched off in fuel / flammable liquid storage / refuelling areas;
- Spill clean-up kits (containing a suitable absorbent fibre product) must be provided;
- Any spillages must be cleaned up immediately and all contaminated cleaning materials must be disposed of in accordance with the applicable legislation;
- If a flammable liquid is spilt or is leaking from a container / vessel, the area must be cordoned off and appropriate warning signage must be displayed to keep unauthorised personnel away from the affected area. Every effort must be made to contain the spillage. All hot work in the vicinity must be stopped immediately. If the spilt product is volatile and the possibility exists that a vapour cloud may form, or if the leak or spillage cannot be contained or stopped, then appropriate emergency response procedures must be activated

(refer to Section 14) including the evacuation of all persons in the vicinity. Suitable firefighting equipment must be positioned ready for use should the spilt product ignite;

- The manual decanting of fuel or a flammable liquid from a large container should only be done using a stirrup pump (or similar) or a purpose-made frame which allows the container / drum to tilt for decanting and then return to the upright position;
- Drip trays must be used wherever required;
- All tanks, drums, cans, etc. containing flammable liquids must be tightly closed and properly sealed except for when a container is being filled or when a product is being decanted;
- The transport or storage of corrosive or flammable liquids in open containers is strictly prohibited
- Daily-use quantities of fuel (up to a maximum of 20 litres) must be handled in an approved safety can with a flash arresting screen, spring closing lid and spout cover that will safely relieve internal pressure if the can is exposed to fire;
- Where safety cans may be impracticable, only approved metal containers with screw caps may be used. Each container must be clearly labelled to indicate its contents;
- Only small quantities of flammable liquids (paints, solvents, etc.) may be stored within a building. Each product must be kept either in its original container or in an approved container which must be properly sealed. Each container must be clearly labelled to indicate its contents. When not in use, all such containers must be stored in a well-ventilated steel cabinet which must be kept locked to prevent unauthorised access;
- Not even small quantities of flammable liquids may be stored or dispensed in buildings or places of public assembly, in general warehouses, or in buildings containing sources of ignition such as space heaters, cooking devices, open electric motors, motor vehicles, or where welding, cutting, or grinding activities are being carried out;
- Safe Work Procedures must be compiled for the transportation (including delivery), offloading, storage, handling and use of any fuel / flammable liquid on site;
- All personnel that will be required to work with or may come into contact with a flammable liquid must be made aware of the hazards associated with the product and must be thoroughly trained in the safe transportation, use, handling and storage thereof.

15.32 Fire Protection and Prevention

The contractor must compile a Fire Protection and Prevention Plan for the work that will be carried out on site.

The contractor must assess / survey his area of responsibility and identify locations where the risk of fire is high. Cognisance must be taken of the fact that certain locations may need to be designated as high risk due to the presence of large quantities of flammable or combustible materials / substances. For all high risk areas, the contractor must ensure that additional precautions are taken to prevent fires and strict control is exercised over any hot work (i.e. welding, cutting, grinding, etc.) that is carried out.

The contractor must supply and maintain all required firefighting equipment. The type, capacity, positioning, and number of firefighting appliances must be to the satisfaction of the nominated project management representative and must meet the requirements of the applicable legislation. Fire mains, hydrants and hose reels will rarely be available on site, so use must primarily be made of portable fire extinguishers.

Firefighting equipment, fixed and portable, must be strategically located with a view to being able to rapidly deploy the equipment in order to bring potentially dangerous and destructive fires under control while still in their infancy.

All fire extinguishers (and any other firefighting equipment) placed on site must be:

- Conspicuously numbered;
- Recorded in a register;
- Visually inspected by a competent person on a monthly basis (the results of each inspection must be recorded in the register and the competent person must sign off on the entries made); and
- Inspected and serviced by an accredited service provider every six months (the nominated project management representative may require that this frequency be increased depending on the environmental conditions (e.g. high dust levels, water, heat, etc.) to which the fire extinguishers are exposed).

Any fire extinguisher that has a broken seal, has depressurised, or shows any sign of damage must be sent to an accredited service provider for repair and / or recharging. Details must be recorded in the register.

Firefighting equipment may not be used for any purpose other than fighting fires. Disciplinary action must be taken against any person who misuses or wilfully damages any firefighting equipment.

Access to firefighting equipment, fixed or portable, must be kept unobstructed at all times.
Approved signage must be in place to clearly indicate the location of each permanently mounted fire extinguisher, fire hose reel, etc.
The contractor must ensure that all persons working in / entering his area of responsibility are made aware of where all firefighting appliances and alarm points are located.
The contractor must ensure that his employees (and those of any appointed sub-contractors) are trained in firefighting procedures and the use of firefighting equipment.

The contractor must compile an emergency response procedure detailing the actions that must be taken in the event of a fire or a fire / evacuation alarm (see Section 14).
All personnel working within the contractor's area of responsibility must be trained, and all visitors must be instructed, on this procedure. Copies of the procedure must be prominently displayed in the workplace in all languages commonly used on the site.

A person discovering a fire must extinguish the fire if he can do so safely, and then immediately report the incident to his supervisor. If the person cannot extinguish the fire, he must raise the nearest alarm and then report the fire as quickly as possible to his supervisor, the person responsible for the area, and / or Security.
On hearing a fire / evacuation alarm, all persons must make any operational plant or equipment safe, and then proceed to the nearest emergency assembly point and await instructions.
All incidents of fire (including the use or misuse of any firefighting equipment) must be reported to the nominated project management representative immediately. Used fire extinguishers must be replaced by the contractor without delay.

No hot work (i.e. welding, cutting, grinding, etc.) or any other activity that could give rise to a fire may be performed outside of a designated workshop without a Permit to Work having been issued. Wherever hot work is being carried out, a fire extinguisher must be at hand. Where the risk assessment determents that it is necessary, a fire watch must be stationed.

Supervisors must carry out workplace inspections regularly to ensure adherence to fire prevention measures and procedures.

At the end of every working period (i.e. before each tea / lunch break and at the end of every shift / day), the workplace must be thoroughly inspected to ensure that no material is left smouldering and no condition / situation exists that could give rise to a fire.

The contractor must ensure that all supervisors and all employees carrying out or assisting with any hot work or any other activity that could give rise to a fire have been trained in firefighting procedures and the use of firefighting equipment. The training must be conducted by an accredited training provider.

When using electrical equipment, all cables must be in good condition and the nearest convenient socket must be used.
No power socket may be loaded beyond its rated capacity through the use of adaptors, etc.
Makeshift electrical connections are not permitted under any circumstances.
Water-based firefighting equipment must not be used on electrical equipment or burning liquids.
Refer to Section 13.16 – Electrical Safety.

Each vehicle used on site for work purposes and each item of mobile equipment with a diesel or petrol engine must be fitted with a permanently mounted fire extinguisher.
Smoking is only permitted in designated smoking areas. Cigarette ends / butts must be properly stubbed out in the ashtrays provided and never thrown into waste bins.

The contractor must ensure that good housekeeping practices are enforced, as this is crucial to the prevention of fires.
All combustible waste materials must be removed from the workplace on a daily basis (at the end of each shift) and placed in waste receptacles located at least 5 metres away from any structure.
The accumulation of waste materials in out-of-the-way places is prohibited.
Offices, desks, cabinets, etc. must always be kept tidy and uncluttered. Waste paper bins must be emptied regularly.

The storage of combustible materials under stairways or in attics is prohibited.
The storage of any materials against the exterior of a building or any other structure is prohibited.
All walkways, passages and stairways must be kept clear (i.e. must be unobstructed) at all times, as they may need to be used as a means of escape.
The areas around and the routes to all exits, fire escape doors, fire hydrants, fire hose reels and fire extinguishers must be kept clear (i.e. must be unobstructed) at all times.
"No Smoking" signs must be conspicuously displayed in and around all storage areas / rooms.
Waste may not be burned under any circumstances.

No flammable liquid (such as petrol, acetone, alcohol, benzene, etc.) may be used for starting fires or as a solvent for cleaning clothes, tools, equipment, etc. Only solvents approved by the nominated project management representative may be used for cleaning purposes.

Whenever any work is carried out involving the use of a flammable substance / material, the area must be cordoned off and appropriate warning signage (i.e. "No Unauthorised Entry", "No Smoking" and "No Naked Flames") must be displayed.
Refer to Section 13.32 – Fuel / Flammable Liquid Storage and Refuelling.

15.33 Smoking

The contractor must not permit smoking on site except within designated smoking areas selected in accordance with the applicable legislation. Such an area must be clearly demarcated and the required signage must be displayed.

Any person found smoking or discarding a cigarette butt outside of a designated smoking area may be removed (temporarily or permanently) from site.
In all designated smoking areas, adequate non-combustible commercial ashtrays and / or cigarette butt receptacles (butt cans) must be provided.

Ashtrays and other receptacles provided for the disposal of smoking materials must not be emptied into rubbish bins or any other container holding combustible materials.
"No Smoking" signs must be strictly observed.

15.34 Housekeeping

The contractor must maintain all work areas in a tidy state, free of debris and rubbish. Unless directed otherwise, the contractor must dispose of all debris, rubbish, spoil and hazardous waste off site in a designated and authorised area or facility. The contractor must familiarise himself with the waste management plan for the site including collection and disposal arrangements, and must align his waste management activities accordingly.

In cases where an inadequate standard of housekeeping has developed and compromised safety and cleanliness, a nominated project management representative may instruct the contractor to cease work until the area has been tidied up and made safe.

Neither additional costs nor contract deadline extensions will be allowed as a result of such a stoppage. Failure to comply will result in a clean-up being arranged through another service provider at the cost of the non-complying contractor.

The contractor must carry out housekeeping inspections on a weekly basis to ensure maintenance of satisfactory standards. The contractor must document the results of each inspection. These records must be maintained and must be made available to the nominated project management representative on request.
The contractor must implement a housekeeping plan for the duration of the contract ensuring that the site housekeeping is maintained. Furthermore, at the end of every shift, the contractor must ensure that all work areas are cleaned, all tools and equipment are properly stored, and construction rubble is removed.

Where the contractor fails to maintain housekeeping standards, the nominated project management representative may instruct the contractor to appoint a dedicated housekeeping team for the duration of the project at the contractor's expense.
Littering is prohibited.

15.35 Waste Management

Waste may not be disposed of unless the disposal of that waste is authorised by law. The contractor must therefore ensure that all waste that is generated is handled, stored, transported and disposed of in accordance with the requirements of the applicable legislation / local authority.

No waste may be removed from the project site to a waste storage or disposal facility unless that facility has been approved for use by the nominated project management representative.
An adequate number of waste bins and skips must be provided by the contractor and suitable arrangements must be made to ensure that these bins and skis are emptied regularly.

Hazardous wastes must be kept separate from general wastes.

Waste disposal service providers must be approved by the nominated project management representative before any waste is removed from site. These service providers must be audited on a two-yearly basis (or more frequently if deemed necessary based on risk) in order to ensure compliance with legislation and to help ensure that no liabilities accrue to the project.

15.36 Stacking and Storage

All irregular shaped items will be stacked at floor / ground level in designated stacking areas on a level, firm base capable of withstanding the weight of the commodities being stacked and stacked in such a manner that the items do not topple over or change position due to subsidence or weight transfer when being moved.

Where these commodities are stacked on shelves or racks, the shelves or racks must be designed to carry the weight of the commodity being stacked.
All racks or shelves where heavy material or commodities are stacked will have a weight carrying limitation clearly marked on the structure and have a safety factor of at least +10% of maximum total carrying capacity.

All materials, commodities or articles, which could be damaged due to inclement weather, must be stored under cover.
Waste material that is combustible must not be allowed to accumulate in sufficient quantities to create a hazard.

No commodities or equipment may be stacked or stored within 500mm of rolling stock tracks or where mobile equipment travels.
The storage of material, small equipment, tools, files and general items in cupboards and on shelves must be neat and controlled at all times. Incompatible substances must not be stored in or on the same cupboard or shelf.

No equipment, tools, files or documents may be stored or stacked on top of cupboards which are higher than 1.5 metres in height.

15.37 Demarcation

No demarcation of floors is required inside offices, training centres and the like.
Where it is impractical to paint floors, yellow lines will be deemed adequate e.g. where heavy traffic necessitates the continual painting of floors.

Temporary demarcation in the form of hazard tape (red and white) may be used to demarcate areas where there is, for relatively simple reasons, restricted access.
Where hazards exist and entry must be specifically excluded for safety or health reasons, hazard tape in any form must not be used in isolation. A robust and substantial barrier of timber, rope or other material must be used in conjunction with barrier tape, to prevent entry to unauthorised persons.

Outside storage areas where it is impractical to use floor demarcation, demarcation may take the form of creosote poles and wire rope or similar. Spans between uprights should be painted yellow.

15.38 Facilities

Sanitary conveniences must be provided and maintained at a rate of at least one shower facility for every 10 workers, at least one toilet facility for every 10 workers. separate male and female toilet facility, changing facilities must be provided and sheltered eating areas.

Where chemical toilets are provided, one toilet for every ten employees must be allocated.
All toilets must be cleaned daily, disinfected and provided with toilet paper.
All employees making use of these facilities have the responsibility to help keep the facilities neat, clean and hygienic.

Washing facilities, including soap and towels, must be made available for use by the contractor's employees.

Drainage from all washing / toilet facilities must be properly designed and constructed to prevent employee exposure to waste water (and the associated biological hazards). Waste water may not accumulate or stand in pools at any location on the project site.
Change rooms must be provided and must be kept clean and free from odours at all times.
No chemicals, except those normally used for domestic cleaning of these facilities, may be stored in the facilities.

No equipment or items (other than those normally associated with hygiene facilities) may be stored in the facilities.

All entrances must be constructed in a way to afford privacy to users.
Drinking water must be provided.
A sheltered (covered) area must be set aside on site to be used as a dining facility (eating area). Adequate seating must be provided for the maximum number of employees. The facility must be kept clean and tidy.

A suitably sized, impervious receptacle (bin) must be provided for the disposal of waste food and other refuse generated at the dining facility. This bin must be emptied and cleaned regularly (i.e. promptly after meal times).

Food may only be consumed in authorised sheltered areas.
Adequate refrigerated storage must be provided to the contractor's employees for the storage of food and drinks. Fridges must not be overstocked and must maintain sufficiently low temperatures.

15.39 Occupational Hygiene

The contractor must ensure that the exposure or potential exposure of his employees to any of the following stressors is assessed and measured (a baseline survey must be carried out by an Approved Inspection Authority - this services to be provided by TPT):

- Noise;
- Thermal stress (heat and cold);
- Particulates (dust);
- Silica (free crystalline silica);
- Asbestos;
- Gases or vapours;
- Lead;
- Chemicals;
- Ionising radiation;
- Non-ionising radiation;

- Vibration (hand / arm vibration and whole body vibration);
- Ergonomics; and
- Illumination.

If it is determined that exposure levels for a particular stressor are unacceptable, then a monitoring and control plan must be implemented to manage any risk of overexposure.

Note: Where chemical substances are to be used as part of the construction process, the contractor must ensure that the chemical composition of each substance is known.

Carcinogenic (cancer-causing) ingredients must be specifically identified with due understanding that no chemical known to cause cancer will be permitted for use on site (an alternative will need to be sourced).

15.40 Lighting

For all work areas and access ways, if the natural lighting available is inadequate it must be supplemented by artificial lighting to meet the minimum levels required.
A lighting survey to determine luminance must be conducted for all work areas, at least once every two years and prior to work commencing for the first time in any area.
Emergency lighting must be provided in all indoor workplaces that do have adequate natural lighting or in which persons work at night. The emergency sources of lighting that are provided must be such that, when activated, an illuminance of not less than 0.3 lux is obtained at floor level, to enable employees to evacuate safely.

Where it is necessary to stop machinery or shut down plant or processes before evacuating the workplace, or where dangerous materials are present or dangerous processes are carried out, the illuminance must be not less than 20 lux.

Windows and translucent sheeting must be kept adequately clean and clear of obstructions as far as reasonably practicable. Light fittings, i.e. lenses and reflectors must be kept clean.
If a light intensity meter is used, a valid calibration certificate must be available.

Neon lights must not be installed in areas where moving parts of machinery or equipment cannot be fully guarded, i.e. lathes, bench grinders, etc. in order to eliminate the stroboscopic effect.
No person may use a portable electrical light where the operating voltage exceeds 50 volts, unless:

- It is fitted with a non-hydroscopic, non-conducting handle;
- All metal parts which may become live are protected against accidental contact;
- The lamp is protected by means of a guard firmly attached to the handle; and
- The cable can withstand rough use.
-

No person may use a portable electric light in damp or wet conditions or in closely confined spaces, inside metal vessels or when in contact with large masses of metal, unless:

- The lamp is connected to a source incorporating an earth leakage; and
- The operating voltage of the lamp does not exceed 50 volts. Hearing Conservation

A hearing conservation program must be implemented and protection against the effects of noise exposure must be provided when the noise exposures equal or exceed an 8-hour time-weighted average sound level of 85 decibels measured on the A-weighted scale of a standard sound level meter at slow response.

For the hearing conservation program to be effective it must include as a minimum:

- Monitoring of the workplace to determine the representative exposure of employees to excessive noise levels;
- An audiometric testing program for employees, which must include:
  - A baseline audiogram for all employees exposed to noise levels equal to or in excess of the standard;
  - Annual audiograms for each overexposed employee;
  - Analysis of audiogram results with retesting and/or referral to an otolaryngologist or qualified physician when a significant threshold shift (STS) occurs; and
  - Written employee notification of the STS.
- A training program for all employees exposed to noise;
- Provision of personal protective equipment to all affected employees when administrative or engineering controls fail to reduce sound levels to within the levels of the standards.

Monitoring of employee exposures to noise shall be conducted by an Approved inspection Authority.

The monitoring requirement may be met by either area monitoring or personal monitoring that is representative of employee exposures. Personal monitoring is preferred, and may be required based on the type(s) of noise sources.

For purposes of the hearing conservation program, employee noise exposures shall be computed in accordance with local legislation.
A person-task specification shall be available for every job category and shall be submitted with an employee for audiometric testing.

Audiometric testing and an annual audiogram shall be provided as part of the regular medical examinations.
Audiometric test results obtained from the pre-employment medical examination for a new employee shall be used as the baseline audiogram.

Testing to establish a baseline audiogram shall be preceded by at least 14 hours without exposure to workplace noise.

Hearing protectors shall not be used as a substitute for the requirement that baseline audiograms be preceded by 14 hours without exposure to workplace noise.
Employees shall be notified of the need to avoid high levels of non-occupational noise exposure during this 14-hour period.

Record-keeping for the audiogram shall include:

- Name and job classification of the employee;
- Date of the audiogram;
- The examiner's name;
- Date of the last acoustic or exhaustive calibration of the audiometer;
- Employee's most recent noise exposure assessment.

Audiometric test results shall be maintained in the employee's medical file.
To control noise exposure, its three basic elements shall be examined, i.e. source of the sound, travel path, and effect on receiver or listener. Solution of a given noise problem might require alteration or modification of any or all of these three basic elements.

2) Controlling noise at the noise source can be achieved by the following:

- Select quiet equipment initially. In selecting quiet equipment the following features shall be considered:
- Low-noise certification;
- Advertisement of "quiet" operation, evidence of noise control design;
- Evidence of "lower" and "slower" operating characteristics;
- Side-by-side noise testing of equipment; and
- "On-site" or "in operation" inspection of mechanical equipment before purchase.
- Reduce operating noise by considering the following control measures:
- Reduce impact or impulse noise by reducing weight, size, or height of fall of impacting mass;
- Reduce speed in machines and flow velocities and pressure in fluid systems;
- Balance rotating parts – to control machinery noise and vibration of fans, fly wheels, pulleys, cams, etc.
- Reduce frictional resistance between rotating, sliding or moving parts in mechanical systems: frequent lubrication, proper alignment of moving parts; static and dynamic balancing of rotating parts; correction of eccentricity or "out-of-roundness" of wheels, gears, rollers, pulley, etc.;
- Reduce resistance in air or fluid systems: use of low flow velocities, smooth boundary surfaces of duct or pipe systems, and long-radius turns and flared sections in pipes, etc., to reduce turbulence noise;
- Isolate vibration elements in machinery; install motors, pumps, etc. on most massive part of machine; use belt or roller drives in place of gear trains; use flexible hoses and wiring instead of rigid piping and stiff wiring, etc.
- Apply vibration damping materials such as liquid mastic; pads of rubber, felt, foam or fibrous blankets; or sheet metal visco-elastic laminates or composites to vibrating machine surfaces; and;
- Reduce noise leakage from the interior of machines such as compressors by sealing or covering all openings or applying acoustical materials to machine interiors.

3) Controlling noise in the transmission path can be achieved by the following:
   - Separate the noise source and receiver as much as possible;
   - Use sound-absorbing materials on ceiling, floor or wall surfaces as close to the machine as possible;
   - Use sound barriers and deflectors in the noise path;
   - Use acoustical lining on inside surfaces of such passageways as ducts, pipe chases, or electrical channels;
   - Use mufflers, silencers or snubbers on all gasoline or diesel engines, regardless of size; and particularly on equipment when large quantities of high-pressure, high-velocity gases, liquids, steam or air are discharged into the open air; and
   - Use vibration isolators and flexible couplers where the noise transmission path is structure borne in character.

4) Protection for the receiver – when engineering controls fail to reduce the levels to within the levels specified in local legislation, the following measures shall be implemented:
   - Personal protective equipment shall be provided and replaced as necessary at no cost to employees;
   - Supervisors shall ensure that hearing protective devices are worn by all employees who are exposed to a time-weighted average of 85 decibels or greater and who have experienced a significant threshold shift;
   - Employees shall be given the opportunity to select their hearing protectors from a variety of suitable protectors; and

Noise zones shall be indicated my means of signs at every entrance to such zones.
When noise levels exceed 100 dB(A), a combination of earplug and earmuff may be required to achieve protection of the worker.
It is important to note that using double protection will add only 5 to 10 dB of extra attenuation above that of a single Hearing Protection Device.
Where an earmuff and earplugs are used together, OSHA recommends using this simple calculation: Take the higher rating of the two devices, and add five.
Hearing Protection Devices should be worn for the full noise exposure period.

Where an audiometry programme is required, it must meet the following standards:

- All testing must be by pure tone audiometry in an audiometry booth or quiet room, with measured noise levels less than 40 dB(A);
- The initial audiogram must be taken prior (minimum of 24 hours) to exposure to significant noise. Further audiograms must be taken periodically; annually where exposures are over 85 dB(A) Leq or where continued deterioration to hearing is occurring;
- Testing must be performed by trained and competent personnel;
- Audiometers must be calibrated according to the manufacturer's guidelines. As a minimum these will be a weekly biological calibration using an employee unexposed to noise, or a bio-acoustic simulator, and an annual quantitative check. All results must be documented; and
- Audiograms must be read by trained persons who will identify any increasing hearing loss and then determine if this is noise induced. Any employee with a significant downward shift in one or both ears (measured as an average non age-adjusted loss from baseline of 10 dB at 2, 3 or 4 kHz) must be retested following removal from noise for a minimum of 24 hours, usually after a days-off period. If the downward shift persists the employee must be reviewed by a physician and improved hearing protection considered.

15.41 Particulate and Gas / Vapour Exposures

Designated areas must be created where:

- It is likely that the 95 per cent upper confidence limit of a Specific Exposure Group's (SEG) mean exposure concentration for agents resulting in chronic effects (such as total inhalable dust, respirable dust, respirable crystalline silica, PAH, fluorides, lead, mercury, asbestos or non-asbestos fibrous materials) exceeds the relevant OEL; and
- Agents with an acute effect, such as particulate hazards, or gases (e.g. CO, SO2, NH3, HF, etc.), or vapours exceed 50 per cent of the relevant OEL.

Designated areas must:

- Be identified and mapped, signposted or otherwise clearly communicated to employees working in the area. Signposting, where necessary, must use appropriate wording or symbols on signs to identify the hazard;
- Have a documented respiratory protection programme based on suitable risk assessment and standards, which is applied to employees, contractors and visitors;
- Have regular monitoring of SEGs working in the area; and
- Have a formal review of the practicality of engineering controls at least every two years, or less where it is a critical control for a significant risk.

Particulate and gas / vapour monitoring must be appropriate to the exposure conditions and toxicants, and based on the use of equipment approved by local regulatory authorities, as per documented methods.
Where risk assessment indicates the possible presence of levels of gas or vapour sufficient to cause health effects in less than one shift (e.g. confined space entry), continuous monitoring is required as long as the potential for harm exists.

Employees and contractors must be covered by a medical surveillance programme when:

- Their Specific Exposure Group TWA mean exposure to respirable crystalline silica, total inhalable dust, respirable dust, lead or asbestos is greater than 50 per cent of the relevant OEL;
- The medical adviser considers that it is advisable; or
- There is a legal requirement for medical monitoring.

Where risk assessment indicates a risk of a respiratory condition, assessment programmes must include chest x-rays and / or lung function tests. The test or tests chosen must enable the earliest detection of adverse effects from the exposure of concern. Where indicated, they must meet the following standards:

- High quality chest x-rays will be taken every five years, unless local legislation requires these to be more frequent;
- All chest x-rays for pneumoconiosis surveillance will be read to International Labour Organisation (ILO) standards by an ILO B reader, wherever possible, and if not, by a competent radiologist using verifiable quality criteria;
- Any progression of more than one step on the ILO extended scheme to a reading above 1/0 will be reviewed by a physician;
- Any reading suggesting active lung disease will be reviewed by a physician; and
- All spirometry will be performed by trained staff following the American Thoracic Society guidelines or equivalent and be offered at a frequency determined by the likely rate of detectable change in lung function.

Controls must be of an adequate standard such that surfaces are adequately cleaned to avoid:

- Dust generation due to material dislodgment (e.g. windblown), where practicable; or
- Fume generation from accumulated dust during welding / heating or cutting operations.

Where risk assessment indicates the need to reduce exposures to toxic substances for employees or their families, good personal hygiene must be enforced. The programme must include:

- No smoking, eating or drinking in designated hazard areas;
- Washing of hands and face prior to drinking, eating or smoking;
- Showering at work post shift or after exposure to 'dirty' conditions; and
- Laundering of contaminated clothing by the contractor.

Abrasive blast cleaning must be conducted so as to protect worker health and minimise dust emissions. Substitutes must be used whenever practicable for abrasives containing crystalline silica. However, if such abrasives are used, workers must be aware of the hazards and exposure monitoring conducted. The hazardous properties of alternative materials must be considered before use.

Where required, training in the recognition of signs and symptoms of hazardous particulate and gas / vapour exposure, emergency procedures and preventative measures must be provided.

15.41.1 Respiratory Protection Devices

The selection of Respiratory Protection Devices (RPD's) must be based on:

- The potential particulate size distribution, gas / vapour types, substance toxicity and likely concentrations;
- Compatibility with the work tasks and other PPE; and
- Comfort (as it affects wear-time) and allowance for adequate communication.

Only RPD's approved by the nominated project management representative may be used. Suitable facilities must be available for cleaning and sanitary storage of RPD's.

Half-mask and full-face air-purifying respirators must NOT be used where:

- The atmosphere is oxygen deficient (< 19.5 per cent);
- The atmosphere is immediately dangerous to life or health (e.g. in areas where CO concentrations are > 1500 ppm, HF > 30 ppm or NH4 > 300 ppm);
- Gases and vapours are more than ten times their OEL or greater than 1000 ppm for half-mask respirators, or more than 100 times their OEL for full-face respirators; or
- Particulates are more than five times their OEL for half-mask respirators, or more than 50 times their OEL for full-face respirators.

For atmospheres that are oxygen deficient, or contain unknown hazards, or have concentrations of gases and vapours that are unknown, or could potentially exceed levels that are immediately dangerous to life or health, an air-supplied type respirator must be worn.

For effective use of negative pressure RPD's (including disposable RPD's), fit testing must be qualitative and documented as a minimum, although quantitative fit testing is preferred. Fit testing must be performed by a competent person when RPD's are first issued and must be repeated periodically according to legal requirements or two-yearly as a minimum frequency. There must be a policy requiring a clean shaven face when using a negative or neutral pressure RPD for routine tasks, or the use of a positive pressure RPD will be required. A pulmonary function test and medical evaluation may be required to determine whether or not an individual is medically fit to wear a respirator.

For air-supplied RPD's, breathing air must be effectively filtered and / or isolated from plant and instrument air, and isolated from sources of potential contaminants. The quality of the breathing air must be checked for conformance with applicable standards.

The respiratory protection programme must include:

- Periodic inspection of RPD's, including before each use;
- Periodic evaluation of cleaning, sanitising, maintenance and storage practices by competent persons;
- Performance of positive and negative fit checks before each use by RPD wearers to ensure that the respirator is functioning properly; and
- Training at first issue of a RPD and regular refresher training thereafter in accordance with regulatory requirements or at least once every two years.

15.41.2 Asbestos and Non-asbestos Fibrous Silicates

This section applies to asbestos and bio-persistent non-asbestos fibrous silicates that may display asbestos-like toxicity, related to fibre diameter and length. Local regulations must be followed as a minimum. The following requirements must be met:

- A management program must be in place and actively pursued;
- No new products containing these materials may be purchased;
- Installed materials of this type must be identified and assessed annually for current safety. Where 'safe in place', it should not be removed, unless there is an opportunity for removal during renovation or construction of buildings or equipment;
- Work areas must be barricaded off and signposted to restrict entry; and
- Contaminated material must be promptly placed in appropriate marked plastic disposal bags or covered containers for disposal to an approved landfill.

All workers exposed to these materials must be on a register. "Exposed" means working on or near such material that has been disturbed, abraded or cut. The register must contain details of their annual medical examination and the results of occupational hygiene monitoring.
Asbestos contractors must be competent, registered and have adequate equipment, procedures and monitoring.

Where required, the asbestos / bio-persistent non-asbestos fibrous silicates management programme must cover work practices, training, monitoring, medical surveillance, and waste handling and disposal.

Maintenance operations must be made aware of potential cristobalite exposure hazards when disturbing non-asbestos fibrous silicates that have undergone high temperature conditions.
The potential for occurrence of naturally occurring asbestiform materials in exploration or mining production activities must be assessed, the risk of exposure determined and appropriate control measures implemented where required.

15.42 Hazardous Chemical Substances

No chemical substance may be brought onto site unless it has been approved for use by the nominated project management representative and it appears on the Approved Chemical Substances Register which will be made available to all contractors.
The register will contain the following information:

- Trade name / product name of substance;
- Manufacturer / supplier of substance;
- Maximum inventory;
- Storage requirements and precautions;
- Inventory of special emergency items held for handling spillages, fires, etc. (e.g. reagents to neutralise spillages, firefighting foam, etc.); and
- Approved disposal methods.

If the contractor wishes to make use of a chemical substance that does not appear on the register, then the contractor must provide the following information to the nominated project management representative for review PRIOR to bringing the substance onto site:

- A detailed 16-point Material Safety Data Sheet (MSDS) issued by the manufacturer / supplier of the substance;
- The reason for wanting to bring the substance onto site (i.e. the intended use of the substance);
- The proposed method of transportation;
- The proposed arrangements for the safe storage of the substance;
- The quantity to be stored on site;
- The proposed methods for handling / using the substance (including PPE);
- The proposed method of disposal of the waste;
- Proof that the contractor is able to readily provide the necessary first aid measures as specified in the MSDS; and
- A risk assessment covering the transportation, use, handling, storage and disposal of the substance with specific reference to the substance's compatibility with other chemicals.

This information must be provided at least five (5) working days prior to the date on which the contractor intends to bring the substance onto site for use.
Any chemical substance brought onto site without adherence to the requirements stipulated above shall be removed from site immediately.

If the nominated project management representative approves the substance for use, the contractor must ensure that all necessary precautions are taken concerning the transportation, use, handling, storage and disposal of the substance, and that all required PPE and first aid materials / equipment (as stipulated in the MSDS) are readily available on site.

The contractor must ensure that a Material Safety Data Sheet (MSDS) is obtained for each chemical substance brought onto site. A file, or files, containing all of the MSDS's must be maintained and must be readily available to all personnel on site (particularly first aiders) as well as other potentially affected parties (e.g. emergency services personnel, persons from the local community, etc.). The MSDS's must be in the language(s) commonly used on site.

The contractor must appoint a trained and competent Hazardous Chemical Substances Coordinator who understands and is able to evaluate the risks associated with a wide variety of substances. This person shall be responsible for:

- Assessing the hazardous properties and risks associated with all chemical substances brought onto site by the contractor and appointed sub-contractors (using the MSDS's);
- Determining precautions and safe practices for transportation, use, handling, storage and disposal (including PPE requirements) (using the MSDS's);
- Determining first aid and emergency response requirements / procedures (using the MSDS's);
- Maintaining the MSDS file;
- Managing and monitoring the consumption of inventory; and
- Providing an "as needed" service to site personnel and suppliers.

The risks associated with the transportation, use, handling, storage and disposal of all hazardous chemical substances brought onto site must be assessed and managed by the contractor through a process that incorporates risk reduction using the hierarchy of controls as described in Section 6. Whenever a task-based risk assessment is carried out, consideration must be given to the use of chemical substances (e.g. greases, solvents, etc.).

The contractor must provide Safe Work Procedures for the transportation, use, handling, storage and disposal of all hazardous chemical substances to be used on site.

The contractor must provide his employees with all of the Personal Protective Equipment that is necessary to prevent exposure / injury while handling / using the hazardous chemical substances that they will be required to work with. Appropriate PPE must be selected with consideration given to the potential hazards, permeability, penetration, resistance to damage and compatibility with the work tasks.

The contractor's employees must be trained in the safe transportation, use, handling, storage and disposal of the hazardous chemical substances that they will be required to work with or may come into contact with. The training must specifically address PPE requirements (including the correct selection, fitment and use thereof).
All personnel must be trained to understand the potential health effects associated with exposure to hazardous chemical substances and therefore the importance of Safe Work Procedures and PPE.
All personnel must be trained on emergency response procedures and first aid measures.
Behaviour-based observations and coaching must include the use / handling of hazardous chemical substances.

An appropriate occupational exposure monitoring and medical surveillance programme must be in place for all personnel potentially exposed to hazardous chemical substances which have the potential to cause immediate or long-term harm.

Emergency showers and eyewash stations must be provided where required by law, or where a risk assessment indicates a need. The emergency showers and eyewash stations must be appropriately located, signposted, and regularly tested and maintained. Employees must receive training on the location and use of the showers / eyewash stations.

An emergency response plan for incidents involving hazardous chemical substances must be in place. Regular and appropriately staged emergency drills (possibly involving external spill response and ambulance support services) must be held and lessons learnt must be incorporated into the emergency response plan.

The contractor must provide appropriate storage facilities for all hazardous chemical substances to be used on site. The storage facilities must be secure and protected from damage. They must also be designed for easy access for firefighting purposes. Where applicable, the storage facility must protect chemical containers from physical damage due to temperature extremes, moisture, corrosive mists or vapours, and vehicles.

The inventory of hazardous chemical substances stored on site must be kept to a minimum. The quantity of each chemical stored must be justifiable.

Storage and segregation requirements for all hazardous chemical substances to be used on site must be based on:

- The quantities of the substances stored;
- The physical state of the substances (solid, liquid or gas);
- The degree of incompatibility; and
- The known behaviour of the substances.

Access to areas where hazardous chemical substances are stored and handled must be limited and controlled.

Every chemical substance container must be adequately and clearly labelled to identify its contents, to indicate precautionary requirements for the substance, and to indicate the date of expiry (if applicable). Pipes used to transfer / convey / distribute chemical substances must be clearly identified (e.g. colour coding). Directional flow must be indicated where practical.
Before any item, equipment or empty container containing a chemical residue is disposed of as general waste, it must be properly decontaminated (where applicable). Before being disposed of, empty chemical containers must also be rendered unusable for carrying water (by puncturing, cutting or crushing them).

Hazardous chemical substance waste (i.e. redundant / expired hazardous chemical substances, containers containing residues, contaminated items / materials, etc.) must be disposed of in accordance with the applicable legislation.

Maintenance, inspection and testing schedules and procedures must be in place for critical equipment associated with hazardous chemical substances.

A system must be in place to ensure that the risks are assessed before any changes are made to equipment and / or processes for the transportation, storage, handling, use or disposal of a hazardous chemical substance.

A programme must be in place to continually investigate possibilities / opportunities for replacing hazardous substances with safer alternatives.

15.43 Radiation

The risks associated with ionising (from naturally occurring radioactive minerals (NORM), radon, and man-made sources), ultra violet (UV) and electromagnetic field (EMF) radiation exposure must be assessed by a competent person.

There must be an inventory of all radiation sources that have the potential to cause adverse health effects. For each radiation source, the type of radiation (e.g. radioisotope, radon, x-ray, EMF, laser, etc.), the strength of the radiation, and the location must be recorded.

Where risk assessment indicates the need, a documented radiation management programme must be developed such that:

- All types of radiation sources are adequately characterised and described;
- Exposures are eliminated or reduced to as low as reasonably practicable (ALARP);
- A clearly defined chain of responsibility (with duties) is provided; and
- Education is provided for employees regarding radiation safety, including the radiation management programme elements.

The ionising radiation management programme must meet all applicable regulatory requirements, and as a minimum must include the following elements (as applicable):

- Surveyed radiation areas and quantification of exposure sources / levels;
- Exposure and medical monitoring programmes based on established investigation levels;
- Transport of radioactive materials in compliance with international radiation transport regulations, when no local regulations are in place;
- Waste monitoring and disposal programmes;
- Feedstock and equipment checks for naturally-occurring ionising radiation;
- Clearance and control procedures for all contaminated materials and equipment leaving or arriving at site (including scrap);
- Leak (wipe) tests on sealed radioactive containment equipment;
- Lock-out procedures for vessels and equipment containing radioactive sources and radon decay product measurement prior to entry;
- Emergency procedures;
- Environmental impact risk assessment (air, water, waste, foods, etc.);
- Product / waste life cycle control; and
- Dose assessment for employees and critical exposure groups, according to documented methods and by a competent person.

Areas with ionising radiation with annual doses greater than 5 milli Sieverts (mSv) must be designated as restricted access or controlled areas. These areas must be identified and mapped, signposted or otherwise clearly communicated to employees working in the area.

Each person whose potential exposure exceeds 5 mSv per annum or who is a designated radiation worker must undergo periodic personal radiation monitoring and medical surveillance designed to show continued fitness for radiation work.

All sources of ionising radiation must be managed in use and when they are either disposed of or securely stored in accordance with local regulations. Each operation where individual worker's exposures could exceed 5 mSv per annum must have a trained radiation protection adviser or ready access to a trained protection consultant.

There must be documented procedures for the inspection, assessment and maintenance of the controls, and emergency procedures to deal with incidents involving ionising radiation sources (including fire and explosions). All controls must be reassessed annually to ensure their continued effectiveness and that operating practices are in accordance with written procedures.

15.44 Thermal Stress

Hot areas or activities where employees have experienced or could experience excessive fatigue, muscle cramp, dehydration, dizziness and other symptoms of heat stress must be identified and described.

Where a risk of thermal stress is determined, a competent person must conduct monitoring surveys on site, in consultation with workers.

For defined extreme thermal conditions and job activities, medical examinations must include information about the operator's physiological and biomedical aspects, and an assessment of fitness for the working conditions.
Cold areas or activities where employees have experienced or could experience pain or loss of feeling in extremities, frostbite, severe shivering, excessive fatigue and other symptoms of cold stress must be identified and described.

Workplace thermal stress levels (temperature, air movement, humidity, etc.), activities (work level, etc.) and conditions (clothing, health, etc.) that have the potential to exacerbate thermal stress effects must be adequately characterised and described. Workplace exposure assessment must be repeated according to regulatory requirements or whenever there is a change in production, work organisation, process or equipment which may impact thermal stress levels.

Detailed heat stress assessment of identified tasks or jobs must be tiered to:

- Commence with the use of a simple heat stress index as a screening tool; then, if necessary;
- Use rational heat stress indices in an iterative manner to determine the 'best' control methods for alleviating potential heat stress; and
- Undertake physiological monitoring when exposure times are calculated to be less than 30 minutes, or where high level PPE that limits heat loss must be worn.

Detailed cold stress assessment of identified tasks or jobs must be conducted according to current appropriate guidelines that incorporate a cold stress index, to determine the 'best' control methods for alleviating potential cold stress.

When a risk of thermal stress is identified, the following exposure controls must be implemented:

- An acclimatisation period for new workers and those returning from extended leave or sickness;
- Training in the recognition of signs and symptoms of heat or cold stress, emergency procedures and preventative measures;
- Protective observation (buddy system or supervision); and
- A requirement for self-paced working.

The following exposure controls must be considered by a competent person:

- Work / rest regimes and job rotation based on measurements conducted;
- Suitable rest areas with a provision of cool drinking water and cool conditions for high temperatures, or provision of warm drinks and warm conditions for cold temperatures;
- Selection of appropriate clothing or other PPE for extreme temperature conditions;
- The use of engineering controls; and
- Undertake hot / cold tasks during a cooler / warmer time of the day.

Where thermal stress is assessed to be a risk, the operation must develop a suitable emergency response plan.

15.45 Fitness for Work

The contractor must develop and implement a programme to manage employee fitness for work. All employees working on site for whom the contractor is responsible (i.e. direct employees of the contractor as well as the employees of any appointed sub-contractors) must be subject to this programme.

All safety critical jobs (i.e. roles where fatigue or other causes of reduced fitness for work could lead to serious injury, illness or death to employees, significant equipment / plant damage, or significant environmental impact) must be identified and the risks associated with reduced fitness for work in these roles must be assessed.

A programme to manage these risks must be implemented, and it must include:

- Mechanisms for managing fatigue, stress and lack of fitness;
- An alcohol and other (including prescription, pharmaceutical or illicit) drugs policy that includes testing;
- An Employee Assistance Programme providing confidential access to resources and counsellors; and
- Training and awareness programmes.

Each employee has an obligation to present himself fit for work at the start of the day / shift, and to remain fit for work throughout the work period. Reporting for work under the influence of alcohol or any other intoxicating substance will not be tolerated. Any transgression concerning the alcohol and other drugs policy applicable to the project may result in the offending employee's access to the project premises being temporarily or permanently withdrawn.

Alcohol and drug testing on the project premises will be carried out randomly (as employees report for duty and during the course of the day / shift), following significant incidents (all persons involved), and whenever there is reasonable suspicion. Alcohol and drug testing may also be carried out as part of a Pre-Employment Medical Examination.

Sleep deprivation during shift work or from excessive working hours is a known cause of fatigue. Fatigued employees are at increased risk of accidents. Shift system design must consider:

- The effect on worker fatigue;
- The effects of activities carried out during scheduled and overtime hours;
- The impact on sleep cycles of activities such as commuting to and from site; and
- The monitoring and control of working hours.

The contractor is responsible for the administration of the working hours of his employees as well as the employees of any appointed sub-contractors. The maximum working hours per day and the

minimum rest times between shifts must be specified in the contractor's Health and Safety Management Plan and must comply with all applicable legislation.

All employees engaged in safety critical jobs must undergo fitness assessments (medical examinations) which must be carried out prior to the commencement of employment on the project, prior to a change in role, periodically based on an employee's individual risk profile, and on termination of employment on the project:

- Pre-Employment Medical Examination – to assess the physical suitability of the person for the role and environment in which he will work (carried out prior to the commencement of employment on the project and prior to induction);
- Periodic (Surveillance) Medical Examination – to assess the ongoing physical condition of an employee to determine if his role is impacting on his health and whether the employee's fitness level is still adequate for the role he holds (these medical examinations are "risk driven" – the specific protocol followed and the frequency of the examinations will depend on the applicable legal requirements and the employee's individual risk profile as determined by his personal fitness, the nature of his role / duties, and the environment in which he works / occupational health hazards to which he is exposed). The periodic medical assessment programme must include:
  - The identification of modifiable risk factors that may impact fitness for work;
  - Education and support to maintain health or address identified risk factors; and
  - Education and support to help employees regain their fitness for work.
- Role Change Medical Examination – to assess an employee's physical suitability for a different role and work environment (carried out prior to a change in role / duties);
- Exit (Post-Employment) Medical Examination – to determine the total physical impact of the work the employee performed (carried out on termination of employment on the project if the employee worked on the project site for more than six months).

Note: The results of an Exit Medical Examination from previous employment will not be accepted as a Pre-Employment Medical Examination.

Note: The medical examinations described above may only be carried out by an occupational medical practitioner (i.e. a medical doctor who holds a qualification in occupational medicine).

A detailed job (role) description and an exposure profile (noise, dust, heat, fumes, vapours, etc.) must be provided for each employee or group of employees. The medical examinations that an employee undergoes must be based on (i.e. the employee's fitness must be assessed against) the information contained in these documents as well as the baseline risk assessment for the work. This information must be made available to the occupational medical practitioner performing the medical examination.

For each role, the medical criteria for fitness must be documented and these must be based on an evaluation of the physical and medical requirements for the role.
Depending on the circumstances, certain vaccinations may need to be provided to employees.
The medical examinations carried out for all drivers and operators must include testing / assessment for medical conditions that could affect the safe operation of vehicles or equipment.

Specific testing / questioning must be carried out to determine if an individual:

- Suffers from epilepsy or any other medical condition deemed to be a risk by the occupational medical practitioner;

- Makes use of chronic medication that could affect performance;
- Is colour-blind; or
- Has poor day or night vision.

The medical examinations carried out for employees that are required to work at height must include testing / questioning to determine if an individual suffers from epilepsy, hypertension (high blood pressure) or any other medical condition deemed to be a risk (with regard to working at height) by the occupational medical practitioner.
Electricians must be tested for colour-blindness.

With regard to the placement of new employees:

- Prospective employees must be referred to a suitable occupational medical practitioner (doctor) for a "Pre-Employment Medical Examination";
- If an individual is found to be medically "unfit for placement", the doctor will indicate which work activities cannot be performed by the person;
- The individual may still be employed on the project if his medical restrictions can be accommodated and provided that no legislation is transgressed.

A process must be established to manage medical restrictions that may be placed on an employee. For every employee with a medical restriction, regular follow up visits with the occupational medical practitioner must be arranged to ensure that each case is proactively managed.

An employee in a safety critical job must report (to his supervisor) any condition that might impair his ability to safely perform the duties associated with his role. A mechanism must be in place for such reports to be referred to an occupational medical practitioner to determine if the employee is fit to continue with his work.
Proof of all medical examinations (i.e. certificates of fitness signed by an occupational medical practitioner) must be kept on site and these records must be readily available for inspection by the nominated project management representative.

An employee's certificates of fitness must be included in his Personal Profile (dossier). If an Employee Personal Profile (dossier) hasn't already been compiled for a particular employee, then this must be done without delay following the employee's Pre-Employment Medical Examination.
No employee in a safety critical role may commence work on site without proof that he has undergone a Pre-Employment Medical Examination.

Occupational medical examinations and data interpretation may only be carried out by medical practitioners that are appropriately qualified and certified to do so.
Occupational medical data contained in reports to management must be grouped and summarised to ensure that the confidentiality rights of each individual employee are maintained.
All occupational medical data and records must be retained for at least 40 years.

15.46 HIV / AIDS

The contractor must assess the risks posed by HIV. Appropriate mitigation strategies must be implemented as required.
Discrimination towards employees on the basis of actual or perceived HIV status is forbidden.
All information on the HIV status and condition of employees and community members, including that relating to counselling, care and treatment and receipt of benefits, must be maintained in medical confidence.

HIV / AIDS screening may not be a requirement for recruitment or a condition of employment.

16. Occupational Hygiene

These services are to be provided by TPT):

- Chemical agents =Gases, vapours, solids, fibres, liquids, dusts, mists, fumes, etc.
- Physical agents =Noise, Vibration, Heat, Cold, Electromagnetic fields, lighting etc.
- Biological agents =Bacteria, fungi, etc.
- Ergonomic factors =Lifting, stretching, and repetitive motion.
- Psychosocial factors =Stress, workload and work organisation

TPT Occupational health must provide the contractor with the health risk assessment in respect of existing Occupational Health Risk on Sites

Additionally an Occupational Health Program for monitoring the existing Occupational health Risk will be given to the Contractor

The contractor must conduct an Occupational Health Risk Assessment in respect of their trade.
The contractor must appoint an Approved Inspection Authority (AIA) for Occupational Hygiene to conduct the identified Occupational hygiene Surveys.

16.1 Lighting

- Should be measured once-off within 6 months of new installations prior to work commencing for the first time in any area
- The installations should be placed on a maintenance/ repair/ replacement schedule by management. Proof of this should be available
- Lighting and ventilation shall comply with the National Building Regulations (SANS 10400-O: Lighting and Ventilation) before occupancy is established
- Measurements do not need to be conducted by an Approved Inspection Authority for Occupational Hygiene

16.2 Particulate and Gas/ Vapour Exposures

The concentration of an HCS in the air is, or maybe, such that the exposure of employees working in that workplace exceeds the recommended limit without the wearing of respiratory protective equipment, is zoned as a respirator zone

16.3 Thermal Stress

Hot areas or activities where employees have experienced or could experience excessive fatigue, muscle cramp, dehydration, dizziness and other symptoms of heat stress must be identified and described.
Where a risk of thermal stress is determined, a competent person must conduct monitoring surveys on site, in consultation with workers.
For defined extreme thermal conditions and job activities, medical examinations must include information about the operator's physiological and biomedical aspects, and an assessment of fitness for the working conditions. Transnet Port Terminals Health and Safety Management Health and Safety Specification 27 May 2015
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Cold areas or activities where employees have experienced or could experience pain or loss of feeling in extremities, frostbite, severe shivering, excessive fatigue and other symptoms of cold stress must be identified and described.
Workplace thermal stress levels (temperature, air movement, humidity, etc.), activities (work level, etc.) and conditions (clothing, health, etc.) that have the potential to exacerbate thermal stress effects must be adequately characterised and described. Workplace exposure assessment must be repeated according to regulatory requirements or whenever there is a change in production, work organisation, process or equipment which may impact thermal stress levels.
Detailed heat stress assessment of identified tasks or jobs must be tiered to:

- Commence with the use of a simple heat stress index as a screening tool; then, if necessary;
- Use rational heat stress indices in an iterative manner to determine the 'best' control methods for alleviating potential heat stress; and
- Undertake physiological monitoring when exposure times are calculated to be less than 30 minutes, or where high level PPE that limits heat loss must be worn.

Detailed cold stress assessment of identified tasks or jobs must be conducted according to current appropriate guidelines that incorporate a cold stress index, to determine the 'best' control methods for alleviating potential cold stress.
When a risk of thermal stress is identified, the following exposure controls must be implemented:

- An acclimatisation period for new workers and those returning from extended leave or sickness;
- Training in the recognition of signs and symptoms of heat or cold stress, emergency procedures and preventative measures;
- Protective observation (buddy system or supervision); and
- A requirement for self-paced working.

The following exposure controls must be considered by a competent person:

- Work / rest regimes and job rotation based on measurements conducted;
- Suitable rest areas with a provision of cool drinking water and cool conditions for high temperatures, or provision of warm drinks and warm conditions for cold temperatures;
- Selection of appropriate clothing or other PPE for extreme temperature conditions;
- The use of engineering controls; and
- Undertake hot / cold tasks during a cooler / warmer time of the day.

Where thermal stress is assessed to be a risk, the operation must develop a suitable emergency response plan.

16.4 Measuring and Monitoring

The workplace exposure (or potential exposure) of persons to occupational health stressors must be measured and monitored to determine the effectiveness of control measures as well as compliance with legal and other requirements, particularly Occupational Exposure Limits.
All such measuring and monitoring must be carried out by an Approved Inspection Authority (i.e. a specialist service provider that is appropriately registered with a governing authority).
A plan for measuring and monitoring occupational exposure must be developed and it must include:

- Detail of what must be measured and monitored, based on a risk assessment and / or identified legal or other requirements;
- The frequency of measurement and monitoring;
- A description of the necessary equipment;

• Data quality requirements and controls (including details on the sample size for statistical validation and any rejection criteria);

• The sampling and analysis method(s) including any laboratory certification requirements; and

• The competency requirements for persons carrying out workplace monitoring.

Each instrument and item of equipment used for occupational exposure measurement and / or monitoring must be:
• Properly maintained to ensure compliance with legislative requirements;

• Controlled and safeguarded from unintentional adjustments;

• Suitably stored and protected from damage; and

• Calibrated or verified against a traceable standard at specific intervals (calibration records must be retained).

Each analytical laboratory service that is used must have implemented a credible quality assurance or quality control programme.
All monitoring results obtained must be analysed on a regular basis to:
• Identify trends and potential exceedances of legal or other requirements (such as Occupational Exposure Limits);

• Identify inconsistent or unusual results;

• Evaluate the effectiveness of existing control measures;

• Measure performance against stated objectives; and Identify continual improvement opportunities.

Each exceedance of a specified requirement or limit must be recorded, investigated and reported. Appropriate corrective actions must be identified and implemented.

17. Temporary works

A contractor must appoint a temporary works designer in writing to design, inspect and approve the erected temporary works on site before use.

A contractor must ensure that all temporary works operations are carried out under the supervision of a competent person who has been appointed in writing for that purpose.
A contractor must ensure that all temporary works structures are adequately erected, supported, braced; and
A contractor must ensure that, all temporary works structures are adequately erected, supported, braced and maintained by a competent person so that they are capable of supporting all anticipated vertical and lateral loads that may be applied to them, and that no loads are imposed onto the structure that the structure is not designed to withstand;

All temporary works structures are done with close reference to the structural design drawings, and where any uncertainty exists the structural designer should be consulted;
detailed activity specific drawings pertaining to the design of temporary works structures are kept on the site and are available on request to an inspector, other contractors, the client, the client's agent or any employee;

All persons required to erect, move or dismantle temporary works structures are provided with adequate training and instruction to perform those operations safely;

all equipment used in temporary works structure are carefully examined and checked for suitability by a competent person, before being used;

All temporary works structures are inspected by a competent person
all temporary works structures are inspected by a competent person immediately before, during and after the placement of concrete, after inclement weather or any other imposed load and at least on a daily basis until the temporary works structure has been removed and the results have been recorded in a register and made available on site;

No person may cast concrete, until authorization in writing has been given by the competent person; if, after erection, any temporary works structure is found to be damaged or weakened to such a degree that its integrity is affected, it is safely removed or reinforced immediately;

- adequate precautionary measures are taken in order to—
- secure any deck panels against displacement; and
- prevent any person from slipping on temporary works due to the application of release agents;
- as far as is reasonably practicable, the health of any person is not affected through the use of solvents or oils or any other similar substances;
- upon casting concrete, the temporary works structure is left in place until the concrete has acquired sufficient strength to safely support its own weight and any imposed load, and is not removed until authorization in writing has been given by the competent person contemplated in paragraph (a);
- The foundation conditions are suitable to withstand the loads caused by the temporary works structure and any imposed load in accordance with the temporary works design.
- provision is made for safe access by means of secured ladders or staircases for
- a temporary works drawing or any other relevant document includes construction sequences and methods statements;
- the temporary works designer has been issued with the latest revision of any relevant structural design drawing;
- a temporary works design and drawing is used only for its intended purpose and for a specific portion of a construction site; and
- The temporary works drawings are approved by the temporary works designer before the erection of any temporary works.

No contractor may use a temporary works design and drawing for any work other than its intended purpose.

18. Structure

A contractor must ensure that,
all reasonably practicable steps are taken to prevent the uncontrolled collapse of any new or existing structure or any part thereof, which may become unstable or is in a temporary state of weakness or instability due to the carrying out of construction work;

No structure or part of a structure is loaded in a manner which would render it unsafe; and
all drawings pertaining to the design of the relevant structure are kept on site and are available on request to an inspector, other contractors, the client and the client's agent or employee.
An owner of a structure must ensure that;
Inspections of that structure are carried out periodically by competent persons in order to render the structure safe for continued use;
That the inspections contemplated in paragraph (a) are carried out at least once every six months for the first two years and thereafter yearly;

The structure is maintained in such a manner that it remains safe for continued use;
The records of inspections and maintenance are kept and made available on request to an inspector.

19. Emergency Preparedness and Response

The contractor must develop, implement, test and maintain an Emergency Response Plan (incorporating emergency evacuation procedures) that focuses specifically on the contractor's team and work activities. The plan must be risk-based and must detail the procedures that must be followed when responding to all potential emergency scenarios such as a medical emergency (including first aid response), a fire, an explosion, a hazardous substance spill, flooding, rescue from height, rescue from a confined space, etc.

The contractor's Emergency Response Plan must be aligned with the Emergency Response Plan developed for the project.
Potential off-site emergency scenarios must be included (e.g. emergency scenarios related to the transport of personnel, the transport of hazardous materials, and personnel performing work in remote locations).

Consideration must be given to neighbours, and to the availability and capability of local emergency services. Details of any arrangements with external emergency response service providers must be included.
The Emergency Response Plan must satisfy and comply with all applicable legal requirements.
The plan must be adequately resourced to ensure effective implementation. These resources must include appropriate personnel, external emergency response service providers, emergency response equipment, and warning devices. All equipment and warning devices must be identified, maintained and tested to ensure availability at all times.

Accountability for the Emergency Response Plan must be clearly defined. An Emergency Response Team (ERT) responsible for the implementation, management and execution of the Emergency Response Plan must be established. The roles and responsibilities of each team member must be clearly defined in the plan. Each team member must receive appropriate training to ensure that each role is performed competently.

The process for managing incident communication, notification, and reporting must be incorporated into the Emergency Response Plan. The responsible person(s) must be clearly identified, and the protocols for communicating with internal and external stakeholders must be defined.
Emergency evacuation procedures must be developed and included in the Emergency Response Plan.
A copy of the plan must be provided to the nominated project management representative for approval prior to site establishment.
The Emergency Response Plan must be formally reviewed (and amended if necessary) on at least an annual basis, and following any emergency situation, to ensure that it remains appropriate and effective.
At each project work site:

- A suitable evacuation alarm (siren) must be provided. If work is to be carried out in proximity to an existing operational plant, the alarm provided by the contractor must be distinctly different (in terms of the sound that it generates) to any alarm installed in the operational plant. All persons working in an area where an evacuation alarm is sounded must respond to it immediately.

- Suitable fire-fighting equipment must be provided and maintained, and personnel must be trained in fire-fighting procedures and the use of fire-fighting equipment.
- Suitable first aid equipment and supplies must be provided and maintained, and an adequate number of appropriately trained First Aiders must be in place (refer to Section 14.2).
- Emergency assembly points positioned in safe locations away from buildings, plant and equipment must be designated (and conspicuously signposted). In the event of an evacuation, all persons (i.e. personnel and visitors) must assemble and be accounted for at these emergency assembly points.
- All personnel must receive awareness training on the applicable emergency response procedures, and all visitors entering the site must be properly instructed in these procedures.
- The emergency response procedures must be displayed on each notice board.
- A diagram (site plan) indicating evacuation routes, emergency assembly point locations, and the positioning of emergency equipment (fire extinguishers, first aid boxes, etc.) must be prominently displayed in all buildings and plants, in all offices, on all notice boards, and in other locations on the site as may be required.
- An up-to-date list of emergency telephone numbers must be compiled and maintained. A copy of this list must be posted at each site entrance, in each office, near each telephone, and on every notice board.
- Emergency response drills must be conducted to test the effectiveness of the emergency procedures and equipment, as well as the knowledge and proficiency of the response personnel. Where appropriate, drills must include liaison with and the involvement of external emergency response service providers. A variety of emergency scenarios must be tested including, but not limited to, medical emergencies, fires, rescues, and hazardous substance spills. A drill must be carried out one month after site establishment and six-monthly thereafter.

Each drill must be monitored and the outcomes (highlights and shortcomings) must be documented. Corrective actions must be identified and implemented to address the shortcomings, and the Emergency Response Plan and associated procedures must be amended as required.
Refer to the Transnet Port Terminals Health and Safety Management Site Emergency Managements HAS-P-0001.

19.1 Fire Fighting

The contractor must ensure that Fire Fighting requirements are met and the fight fighting training must be done through an accredited training institution. The cost of this training shall be for the contractor's account.

19.2 First Aid

The contractor must ensure that First Aiders are trained and appointed as described in (Section 10.5)

19.2.1 First Aid Kits

A suitable first aid kit (i.e. appropriate to the level of training) must be readily available to each First Aider. All kits must be provided and maintained by the contractor.

Taking into account the type of injuries that are likely to occur in the workplace, each first aid kit must contain suitable equipment and supplies. First aid equipment and supplies required by applicable legislation must be provided as a minimum.

The contents of each first aid kit must be kept clean and dry. Each kit must be contained in either a portable weatherproof case / bag or a steel box mounted to a fixed structure. Access to first aid equipment / supplies must be limited to train First Aiders only. Access to portable kit bags must be controlled and steel first aid boxes mounted in the workplace must be kept locked.
Approved signage must be in place to indicate the locations of the first aid boxes / bags.
A record of each treatment administered must be kept in a suitable register.

The first aid kits must, as a minimum, contain the following equipment and supplies:

Table 19-1 Minimum Requirements to be included when equipping first aid boxes

Item 1:	Wound cleaner/ antiseptic – 100ml;
Item 2:	Swabs for cleaning wounds;
Item 3:	Cotton wool for padding – 100g;
Item 4:	Sterile gauze – minimum quantity 10;
Item 5:	1 x Pair of forceps – for splinters;
Item 6:	1 x Pair of scissors – minimum size 100mm
Item 7:	1 x Set of safety pins;
Item 8:	4 x Triangular bandages;
Item 9:	4 x Roller bandages – 75mm x 5m;
Item 10:	4 x Roller bandages – 100mm x 5m;
Item 11:	1 x Roll of elastic adhesive – 25mm x 3m;
Item 12:	1 x Non-allergenic adhesive strip – 25mm x 3m;
Item 13:	1 x Packet of adhesive dressing strips – minimum quantity 10 assorted sizes;
Item 14:	4 x First aid dressings – 75mm x 100mm;
Item 15:	4 x First aid dressings – 150mm x 200mm;
Item 16:	2 x Straight splints;
Item 17:	2 x Pairs large and 2 x pairs medium disposable latex gloves;
Item 18:	2 x CPR mouth pieces or similar devices.

Additional items / supplies may need to be provided depending on the nature of the workplace (specific hazards) and the level of training of the first aider in position of the kit.

20. Management Review

A review of the contractor's Health and Safety Management System must be completed annually to ensure that the system continues to be effective in managing health and safety performance and meeting project requirements.

The review must evaluate if there is any need for change and must identify actions to improve the system.

The review must be led by senior management and the following must be considered:

- The suitability of the policy adopted for the project;
- The impact of changing legislation;
- The management of risk;
- Health and safety objectives and performance indicators;

- Changing expectations and requirements of relevant stakeholders;
- Changes to the contractor's scope, schedule, designs, etc.;
- Changes to the contractor's organisational structure;
- Communication and feedback (particularly from employees, Project representatives, and client representatives);
- The effectiveness of the management of change process;
- Workplace exposure monitoring and medical surveillance;
- The status of corrective actions;
- Performance statistics, including an annual summary of safety statistics, and occupational hygiene monitoring and medical surveillance results;
- Non-conformances (findings) from completed audits;
- Follow up on actions from previous management reviews; and
- Recommendations and opportunities for improving the effectiveness of the management system.

A record of each completed management review must be retained and it must include all decisions and identified actions concerning alterations, modifications or improvements to the management system that demonstrate a commitment to continual improvement.
For occupational hygiene: **Approved Inspection Authority (AIA) for Occupational Hygiene**

21. Management of Change

To ensure that proposed changes do not give rise to unacceptable health or safety risk, the contractor must develop and implement a process for identifying and managing change in the workplace (e.g. changes to scope, schedule, procedures, work methods, site conditions, designs, plans, plant and equipment, materials, processes, etc.) that may impact on health or safety performance.

The management of change process must take into consideration that changes may be planned or unplanned, sudden or gradual, temporary or permanent.

The process must aim to ensure that:

- Changes are identified and assessed before they are implemented;
- Careful consideration is given to managing the risks associated with any change;
- Due diligence can be shown to have taken place;
- The number of unsatisfactory or unnecessary changes is minimised;
- The right people are involved in the change process; and
- All statutory requirements are met.

All risks associated with a proposed change must be evaluated and ranked. The risks that are ranked as moderate or higher must be managed to prevent serious injury or illness.

It must not simply be assumed that a change will not result in significant risks. All proposed changes must be formally evaluated. The evaluation or review must include:

- An appropriate level of technical expertise;
- The involvement of the workforce potentially affected by the proposed change; and
- Approval of the change by a person with at least the same level of authority as those who control the existing process or item being changed.

22. Sub-contractor Alignment

Processes must be in place to ensure that the health and safety risks associated with the procurement of materials, equipment, services and labour are identified, evaluated and effectively managed.

A process for evaluating a sub-contractor's (or supplier's) ability to provide materials, equipment, services and labour that meet defined specifications must be in place. A prospective sub-contractor's health and safety management expertise, experience and capability (including previous health and safety performance) must be formally assessed prior to any contract or purchase order being awarded.

Each appointed sub-contractor must develop and implement a detailed Health and Safety Management Plan based on the requirements of the contractor's Health and Safety Management Plan and the Health and Safety Specification for the project. This plan must be reviewed and approved by the contractor prior to the commencement of any work.

The properties of all materials provided to the project must be adequately understood, documented and integrated into operating procedures where exposure to these materials presents a significant health or safety risk.

Procedures, commensurate with the evaluated risk, must be in place for the receiving, storing, dispatching and transporting of all equipment and materials.

Before work commences on any contract, all sub-contractor personnel must receive comprehensive orientation and induction training (refer to Section 11).
All work carried out by a sub-contractor must be managed (activity supervised) throughout the contract period and performance must be reviewed (audited) on a regular basis (refer to Section 21).

23. Measuring and Monitoring

The workplace exposure (or potential exposure) of persons to hazardous substances or agents must be measured and monitored to determine the effectiveness of control measures as well as compliance with legal and other requirements, particularly Occupational Exposure Limits.
All such measuring and monitoring must be carried out by an Approved Inspection Authority (i.e. a specialist service provider that is appropriately registered with a governing authority).

A plan for measuring and monitoring occupational exposure must be developed and it must include:

- Detail of what must be measured and monitored, based on a risk assessment and / or identified legal or other requirements;
- The frequency of measurement and monitoring;
- A description of the necessary equipment;
- Data quality requirements and controls (including details on the sample size for statistical validation and any rejection criteria);
- The sampling and analysis method(s) including any laboratory certification requirements; and
- The competency requirements for persons carrying out workplace monitoring.

Each instrument and item of equipment used for occupational exposure measurement and / or monitoring must be:

- Properly maintained to ensure compliance with legislative requirements;

- Controlled and safeguarded from unintentional adjustments;
- Suitably stored and protected from damage; and
- Calibrated or verified against a traceable standard at specific intervals (calibration records must be retained).

Each analytical laboratory service that is used must have implemented a credible quality assurance or quality control programme.

All monitoring results obtained must be analysed on a regular basis to:

- Identify trends and potential exceedances of legal or other requirements (such as Occupational Exposure Limits);
- Identify inconsistent or unusual results;
- Evaluate the effectiveness of existing control measures;
- Measure performance against stated objectives; and
- Identify continual improvement opportunities.

Each exceedance of a specified requirement or limit must be recorded, investigated and reported. Appropriate corrective actions must be identified and implemented.

24. Incident Reporting and Investigation

The contractor must establish a procedure for the management of all health and safety incidents. This procedure must define the responsibilities, methodologies and processes that must be followed for:

- Reporting an incident;
- Investigating an incident;
- Analysing an incident to determine the root cause;
- Identifying and implementing corrective actions to prevent a recurrence; and
- Communicating information concerning an incident to relevant persons and / or groups.

Please Note: Arrangements must be in place to ensure that proper medical care is provided to any contractor (or sub-contractor) employee that suffers an occupational injury or illness (refer to Section 15). These arrangements must be described in the contractor's Health and Safety Management Plan.

An incident may have multiple impacts. For each impact, the Actual Consequence and the Maximum Reasonable Outcome must be evaluated. Each impact must be evaluated independently, with the most significant classification forming the primary rating of the incident.

A Near Hit is an incident. All Near Hits must be reported.

Using the defined consequence scales contained in TPT 5x5 qualitative risk matrix, the Actual Consequence of each impact must be categorised as:

- A Near Hit;
- Insignificant (Level 4; as per TPT incident level classification guidance);
- Minor (Level 3; as per TPT incident level classification guidance);
- Moderate (Level 2; as per TPT incident level classification guidance);
- Major (Level 1; as per TPT incident level classification guidance); or
- Catastrophic (Level 1; as per TPT incident level classification guidance).

The Maximum Reasonable Outcome (MRO) is based on a risk evaluation of the maximum reasonable consequence of an impact and the likelihood of the event occurring again given a reasonable failure of existing controls. Using the matrix referred to above, each impact must be evaluated and classified as:

- Low;
- Moderate;
- High; or
- Extreme.

An incident must be reported on the same work day or shift on which it occurs and preliminary details must be recorded and a TPT Incident Flash Report must be completed within 24 hours. Depending on the Actual Consequence and Maximum Reasonable Potential Outcome of the impact(s), the relevant internal and external parties must be notified in accordance with specified protocols and timeframes, and legislative requirements.

In the event of a significant incident (i.e. an incident with an Actual Consequence of Moderate, Major or Catastrophic, or a Maximum Reasonable Potential Outcome of High or Extreme, work must cease and must only resume once the necessary actions (including the re-evaluation of any relevant risk assessments) have been taken to eliminate or reduce the risk of recurrence. Work must only be permitted to recommence once formal authorisation has been granted by the Project Construction Manager. In the case of incidents with an Actual Consequence of Major or Catastrophic, work must not be permitted to recommence until authorisation has been granted by the relevant government authorities (i.e. the South African Police, the Department of Labour or the Department of Mineral Resources).

All significant incidents (i.e. incidents with an Actual Consequence of Moderate, Major or Catastrophic, or a Maximum Reasonable Outcome of High or Extreme must be investigated using the approved Transnet investigation methodology. Such an investigation must be facilitated by a trained project representative within 7 calendar days.

For all other incidents (i.e. incidents with an Actual Consequence of Insignificant or Minor, or a Maximum Reasonable Outcome of Low or Moderate other methodologies approved by the Project Health and Safety Manager must be used.

Each incident (including Near Hits) must be investigated to a level of detail that is appropriate for the Maximum Reasonable Potential Outcome of the incident.

Each incident must be analysed to determine the root cause, and corrective actions must be identified and prioritised for implementation to eliminate or reduce the risk(s) in order to prevent recurrence of the incident.

For each corrective action, a responsible person must be designated and an appropriate timeframe (target date) for completion of the corrective action must be specified. Progress on implementing corrective actions (i.e. closing incidents) must be monitored and reported on. The implementation of corrective actions must be verified during monthly audits by the Project Health and Safety Advisors but also no later than 30 calendar days after the conclusion of the incident investigation. The contractor must document the results of each investigation and a report must be submitted to the nominated project management representative within five working days of the incident occurring.

As a minimum, each incident report must include:

- The date, time and location of the incident;
- A detailed description of the incident, including photographs;
- The names of any injured persons;
- Injury details (if applicable);
- A summary of the first aid and / or medical treatment provided (if applicable);
- The current status of any injured persons;
- The root causes of the incident; and
- Detailed corrective actions, including responsible persons and target dates for implementation.

Each significant incident must be summarised for its lessons learnt following the investigation. This information must be reviewed by the contractor's Project Manager to assure completeness, accuracy and relevance before it is shared with (communicated to) all project personnel.
Refer to the Transnet Port Terminals Health and Safety Management Occurrence Reporting and Investigation HAS-P-0002.

25. Non-conformance and Action Management

The contractor must establish a process for identifying and recording corrective actions arising from:

- Incident investigations;
- Hazard identification and risk assessment;
- Measurement and monitoring;
- Improvement plans and suggestions;
- Managing change;
- Audits and inspections; and
- Safety observations and coaching (safety interactions).

The contractor must establish a procedure for managing actions that addresses:

- Identification, categorisation and prioritisation of actions;
- Formal evaluation and approval of actions (management of change process);
- Assignment of responsibilities, resources and schedules for implementation;
- Implementation of actions;
- Tracking and reporting on implementation status; and
- Monitoring and verifying the effectiveness of the actions.

26. Performance Assessment and Auditing

The contractor must establish and maintain programmes for measuring and monitoring health and safety performance on a regular basis. Metrics must include leading and lagging indicators, and be based on qualitative and quantitative data.

26.1 Reporting on Performance

Reports summarising the contractor's health and safety performance on the project must be compiled on a weekly and a monthly basis.

The contractor must be prepared to discuss the content of these reports at scheduled health and safety meetings.

The reports must contain the following information:

- Number of contractor and sub-contractor employees on site;
- Total hours worked on site by contractor and sub-contractor employees (by company);

- Number of incidents by category (i.e. Near Hit, FAI, MTI and LTI);
- Lost Time Injury Frequency Rate (LTIFR) (project to date and 12-month rolling);
- Details of all new incidents for the reporting period and the corrective actions taken or to be taken;
- Feedback (progress updates) on all open incidents and outstanding corrective actions;
- Status and feedback on any employee that may have been injured and has not yet returned to work;
- Details of all health and safety training carried out during the reporting period;
- Details of all audits, inspections and site visits carried out during the reporting period, and the corrective actions taken (or to be taken) to address all non-conformances;
- Feedback (progress updates) on all open non-conformances and outstanding corrective actions;
- Number of Toolbox Talks conducted during the reporting period (monthly);
- Number of Planned Task Observations (PTO's) carried out during the reporting period (monthly);
- Details of all active risk assessments and Safe Work Procedures highlighting those that are due for review in the coming month (monthly);
- A look ahead (to the coming week, month or quarter) to ensure that appropriate health and safety planning and preparation is done for upcoming work;
- Challenges faced with regard to health and safety; and
- Any other health and safety related information specific to the project that may be required.

Leading indicators (e.g. audit findings, observations, etc.) must be analysed, and any negative trends identified with regard to unsafe behaviour or conditions must be appropriately addressed to prevent incidents.

Lagging indicators (e.g. injuries, illnesses, near hits, etc.) must be investigated in detail to determine the root causes. Corrective actions must be identified, implemented and integrated into Safe Work Procedures to prevent recurrences.

26.2 Audits and Inspections

On a monthly basis, the health and safety management system and workplace activities of the contractor will be audited by a Project Health and Safety Advisor to assess compliance with the project health and safety requirements. Any deviation from these requirements (i.e. non-conformance) that places the health or safety of any person in immediate danger will result in the specific activity being stopped until the non-conformance is corrected.

For each non-conformance determined during any audit, the contractor must identify and implement appropriate corrective actions.

For each corrective action, a responsible person must be designated and an appropriate timeframe (target date) for completion of the corrective action must be specified. Progress on implementing corrective actions (i.e. closing non-conformances) must be monitored and reported on. The implementation of corrective actions will be verified during the monthly audits.

Should it be determined that the contractor's level of compliance is unsatisfactory, all work being performed by the contractor on the project site may be stopped (at the contractor's expense) until an investigation into the reasons for the poor performance has been carried out, a corrective action plan has been developed, and corrective actions have been implemented.

In addition to the audit carried out by the Project Health and Safety Advisor, the contractor must carry out an internal audit done by contractor's Safety Manager who is registered as CHSM (Construction Health and Safety Manager) with SACPCMP on a monthly basis to assess compliance with the project health and safety requirements (including the requirements of this specification and the contractor's Health and Safety Management Plan). Furthermore, the contractor must ensure that each appointed sub-contractor is audited and measured to the same standard. Copies of these audit reports must be submitted to the Project Health and Safety Advisor on a monthly basis.

The Contractor's 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's 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's 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 carry out internal health and safety inspections as follows:

- General site health and safety inspections on a daily basis; and
- Inspections of plant, tools and equipment prior to establishment or use on site, and at least monthly thereafter.

All audits and inspections must be carried out by competent persons who have been appointed in writing.

A schedule of planned audits and inspections must be compiled and maintained ensuring that:

- All work areas and all activities are covered at regular intervals;
- All applicable legal requirements are complied with; and
- Areas or activities with significant associated hazards or risks receive greater attention.

27. Reference Documents

Table 28-1: Reference Documents

Document Identification	Document Title
HAS-P-0001	Transnet Port Terminals Health and Safety Site Emergency Management
HAS-P-0002	Transnet Port Terminals Health and Safety Occurrence Reporting and Investigation
HAS-GN-0001	Transnet Port Terminals Health and Safety Management Guidelines for Managing Common Hazardous Activities and Tasks
Occupational health and safety act, 85 of 1993 and Regulations	Occupational health and safety act, 85 of 1993 and Regulations

Note: If hardcopy, check electronic system for latest revision

Transnet Capital Projects Health and Safety Management

Site Emergency Management

HAS-P-0001

Prepared by:		5 March 2008
	V. Narsai	Date
Reviewed by:		5 March 2008
	N. Steyn	Date
Approved by:		5 March 2008
	G. Bam	Date

Rev No	Date	Revision Details
A	29 October 2007	ISSUED FOR REVIEW
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1. Purpose

This procedure establishes the requirements for the management of emergencies on sites.

2. Scope

This procedure applies to all Transnet Capital Projects controlled sites.

3. References

- Occupational Health and Safety Act No.85 of 1993 and associated Regulations as amended.
- Guidelines for Managing Common Hazardous Activities and Tasks – HAS-GN-0001

4. Responsibilities

The Construction Manager is responsible for the implementation of this procedure.

The Health and Safety Manager shall ensure its effectiveness by regular surveillances and audits.

5. Procedure

5.1 Legal Requirements

As a minimum all applicable regulatory requirements shall be met.

Legislative requirements, hard copy or electronic version, shall be available at the site for review.

A system shall be in place to ensure that changes to applicable regulatory requirements are monitored.

5.2 Planning

The Construction Manager shall ensure that a Site Emergency Management System is planned, implemented and managed, to minimise the consequences of an emergency should it occur. The Site Emergency Management System shall include the following:

- Be in a clear and auditable form
- Be practical

- Be working effectively
- Have clearly defined roles, responsibilities and accountabilities
- Include procedures and work instructions to communicate Emergency Management requirements which should be reviewed periodically and revised as appropriate

5.3 Site Specific Work Instruction

For any work site, existing Operating Division procedures and services must be taken into account when preparing a Site specific Emergency Management Work Instruction.

As a minimum the following situations should be covered following the requirements of the Emergency Management Section in the Guidance Note

HAS-GN-0001:

- Roles and responsibilities
- Fire
- Personal injury
- Bomb threat
- Natural disasters
- Industrial Action

5.3.1 Greenfield

Prior to commencement of work on site, as part of the fact finding exercise of the Construction Manager, meet with local representatives of the Police, Ambulance Services and Fire Departments and establish requirements for:

- Reporting emergency situations
- Response time expected (consideration of distance and availability); and
- Type of response (equipment availability) contact point
- A joint site inspection is to be arranged to identify any access problems that are likely to be encountered on the site. These are to be noted and corrected, if necessary
- Setting up a joint consultative forum to continuously inform interested and affected parties of the situation on the site

5.3.2 Existing Facility

Where work is undertaken, discuss existing emergency procedures with the responsible official of the Division and establish its appropriateness for construction work within the existing facility. Agree if existing procedures are to be applied, modified to suit, or new procedures established, using the framework of the Site Emergency Management in the Guidance Note HAS-GN-0001.

Evaluate existing local and existing Divisional services to determine if they are adequate to cover the requirements of construction work. Based on the evaluation, prepare a recommendation for additional services and/or amendments to existing procedures if required.

Discuss the recommendations with the Division and agree on the use of existing services, amendment to existing procedures or the introduction of additional services.

Prepare the Site Specific Work Instruction referred to in 5.3 for signature by both the Division and Transnet Capital Projects.

5.4 Works Information

The Emergency Management Procedures are to be included in the Works Information of Enquiry/Contract documents involving site work.

5.5 Communication

All incidents requiring use of the Site Emergency Management Plan will be communicated to the project manager via a Job Safety Alert and discussed at the next weekly Toolbox Meeting.

5.6 Supervision

The Construction Manager shall identify a competent person whom shall supervise the Site Emergency Management Plan.

Contractors shall identify a competent person to coordinate their participation in the Site Emergency Management Programme.

5.7 Training

The requirements of the Site Emergency Management Programme shall be communicated to all site staff via the Induction Process for new employees and Contractors.

Construction staff's understanding of the requirements of the Site Emergency Management requirements shall be evaluated by the Transnet Capital Projects Risk officials on an on-going basis.

5.8 Change Management

Transnet Capital Projects shall implement a process to control and communicate changes associated with Site Emergency Management.

6. Records

All documents generated during the life of the Contract will be retained in terms of the Document Management Procedure.

Transnet Capital Projects Health and Safety Management

Occurrence Reporting and Investigation

HAS-P-0002

Prepared by:		19 March 2008
	V. Narsai	Date
Reviewed by:		19 March 2008
	N. Steyn	Date
Approved by:		19 March 2008
	G. Bam	Date

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12 March 2008

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Note: If hardcopy, check electronic system for latest revision
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12 March 2008

1. Purpose

This procedure provides the standardized criteria for the Reporting and Management of all work related occurrences involving Transnet Capital Projects Staff, Transnet Capital Projects Managed Contractors and/or Transnet Capital Projects controlled Work Sites.

The aim of this procedure is also to ensure and facilitate the effective reporting, recording and investigation of all work-related incidents, including those involving contractors and members of the public.

Incident Management leads to the containment of dangerous situations, effective caring for any injured persons, identification of corrective actions, and the recording of learning for the future.

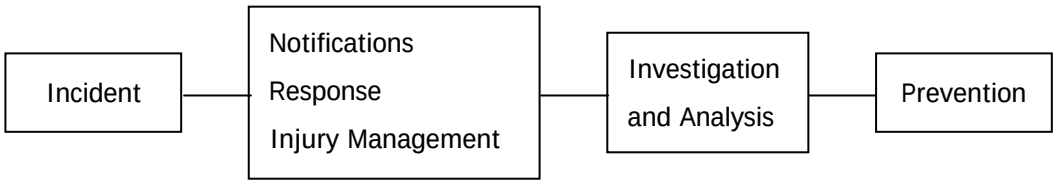
This procedure also assists Transnet Capital Projects fulfil its legal obligation to report certain levels of incidents to the relevant Statutory Authority.

2. Scope

Incident Management involves:

- Response
- Making the area safe
- Caring for any injured person
- Containing any environmental and/or plant damage
- Notification
- Investigation
- Analysis
- Prevention
- Reporting

The overall Incident Management Program in Transnet Capital Projects is illustrated in the diagram below:



A summary of the Transnet Capital Projects Incident Management Process is shown in Figure 1

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Transnet Capital Projects Health and Safety Management
Occurrence Reporting and Investigation
12 March 2008

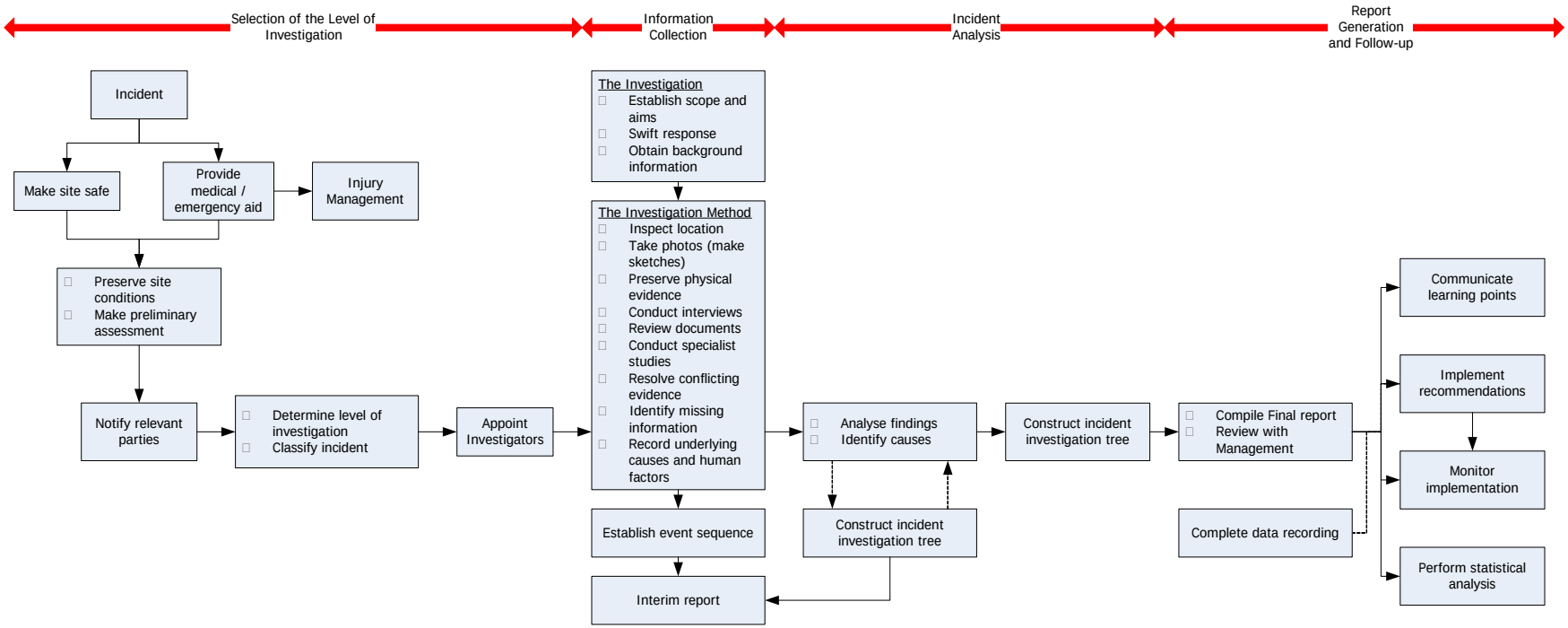

Figure 1 Summary of Incident Management Process

3. References

- ISO 9001
- Occupational Health and Safety Act No.85 of 1993 and associated Regulations as amended.
- GRM/SHEQ/STD 010 – Incident Notification and Investigation Standard

4. Definitions

Actual — An actual incident/event.

Contractor — Any person formally contracted by Transnet Capital Projects for the supply of a product, material or service, for example building a structure. A contractor in terms of construction work refers to an employer, as defined in Section 1 of the Act, who performs construction work, and includes principal contractors. This excludes any construction work performed by Transnet employees (or employees placed by a TES (Temporary Employment Service)).

Employee — A person who has entered into or works under a contract of service, apprenticeship or learnership with an employer, whether the contract is express or implied, oral or in writing, whether the remuneration is calculated by time or work done and paid for in cash or in kind, or tactfully (by tacit agreement) and includes where such a person is under the control, instruction and supervision of Transnet Capital Projects, namely:

a. A casual employee employed for the purpose of the employer's business;
b. A person who has entered into a contract of service or of apprenticeship or learnership with the employer;
c. A person provided to Transnet Capital Projects by a TES (Temporary Employment Service) or a Temporary Employment Service and who works under the control, instruction and supervision of a Transnet Capital Projects employee;
d. A part-time worker;
e. A temporary worker;
f. An occasional employee;
g. An unattached learner;

h. A bursar whilst under the supervision of Transnet Capital Projects;

i. Any contractor, where no written agreement as required in terms of Section 37(3) of the OHS Act is available; and/or

j. Any contractor's employees who perform any work under the instruction and/or supervision of a Transnet Capital Projects employee where the instruction given directly resulted in an injury.

First Aid Injury (FA)

A First Aid Injury is any one time treatment and any follow-up visit for observation of minor scratches, cuts, burns, splinters and the like which do not normally require medical care. Such treatment is considered to be First Aid even if administered or supervised by a Medical Practitioner.

First Aid includes any hands on treatment given by a First Aider (e.g. band-aid, washing, cleansing, pain, relief).

The following procedures are generally considered First Aid treatment:

- Application of antiseptics
- Application of butterfly adhesive dressing or sterile strips for cuts and lacerations
- Treatment for first degree burns
- Application of bandages during any visit to medical personnel
- Removal of foreign bodies not embedded in the eye if only irrigation is required
- Removal of foreign bodies from a wound if procedure is uncomplicated, for example by tweezers or other simple technique
- Use of non-prescription medications and administration of single dose of prescription medication on first visit for any minor injury or discomfort
- Application of ointments to abrasions to prevent drying or cracking
- Negative x-ray diagnosis
- Administration of tetanus shot(s) or booster(s). However, these shots are often given in conjunction with more serious injuries, consequently injuries requiring these

shots may be recordable for other reasons

- Inhalation of toxic or corrosive gas, limited to the removal of the employee to fresh air or the one time administration of oxygen for several minutes

Incident /Occurrence

An undesirable event occurring at work that results in physical harm to a person or death, or damage to environment, plant and/or equipment, and/or loss of production.

An event which causes or could have caused injury, illness, damage to plant, material, or changes in the environment, or public alarm. This definition shall include losses of containment, fire, explosion, non-compliance with environmental regulatory complaints, security breaches, vehicle incidents, off site incidents, and excursions above the accepted occupational hygiene or biological exposure limit

Lost Time Injury (LTI)

Any occurrence that resulted in a permanent disability or time lost from work of one day/shift or more.

If an employee is injured and cannot return to work in the next shift (will ordinarily miss one whole shift), and the department brings the employee in to only receive treatment by the Supervisor/Return to Work Coordinator in that shift, this is still considered an LTI. In any event, an injured employee should be treated with the necessary care and should be registered with the appropriate injury type i.e. Work Injury, Medical Treatment Injury or Lost Time Injury.

Lost Time Injury Frequency Rate (LTIFR)

LTIFR =

The LTIFR is a proportional representation of the occurrence of industrial Lost Time injuries. It is used internationally as an indicator or measure of health and safety performance. The figure 200 000 refers to the average number of hours worked by 100 employees in one year. The LTIFR rate (12 month progressive) reflects a rough estimate of the percentage of the workforce that suffered a lost time in the preceding twelve months.

Medical Treatment Injury (MTI)

A work injury requiring treatment by a Medical Practitioner and which is beyond the scope of normal First Aid including initial treatment given for more serious injuries. The procedure is to be of an invasive nature (e.g. stitches, removal of foreign bodies etc.).

The following procedures are generally considered medical treatment:

- Treatment of infection

- Treatment for second or third degree burns
- Application of sutures (stitches)
- Removal of foreign bodies embedded in the eye
- Removal of foreign bodies from the wound by a Physician due to the depth of embedment, size or shape of object or the location wound
- Use of prescription medications (except a single dose administered on first visit for minor injury or discomfort)
- Cutting away dead skin (surgical debridement)
- Positive x-ray diagnosis (fractures, broken bones etc.)
- Loss of consciousness due to an injury or exposure in the work environment
- Reaction to a preventative shot administered because of an occupational injury
- Sprains and strains - series (more than one) of hot and cold soaks, use of whirlpools, diathermy treatment or other professional treatment

Near Miss Incident

Any unplanned incident that occurred at the workplace, which although not resulting in any injury, disease, damage or contamination, had the potential to do so.

Occupational Disease

Any confirmed disease arising out of and in the course of an employee's employment and which is listed in schedule 3 of the Compensation for Occupational Diseases Act. Confirmation must be done by a medical practitioner or, depending on the disease, a specialist (i.e. Ear Nose & Throat, Audiologist, Pathologist or panel established by the Department of Health, (NIOH)).

Occurrence:

See Incident

Potential

A potential incident/event.

Recordable Injuries (RI)

Equals Lost Time Injury, plus fatality plus occupational diseases plus Medical Treatment Injury with Restricted Duties.

Recordable Injury Freq Rate (RIFR)

RIFR =

The RIFR is a proportional representation of the occurrence of Total injuries. The figure 200 000 refers to the average number of hours worked by 100 employees in one year. The RIFR rate (12 month progressive) reflects a rough estimate of the percentage of the

	workforce that suffered injuries in the preceding twelve months
Restricted Work Day Injuries (RWDI)	Injuries that results in restriction of work or motion for one full shift or more
Restricted Work Case (RWC)	Is an occupational illness or injury which leaves a person, although at work, unable to perform the full duties of his or her regular work on the next calendar day (including weekends and public holidays), after the day of the injury. This may involve the injured employee being assigned to another job or restricted/alternative duties (any duties/activities carried out that accommodate agreed restrictions and limitations) as a result of the injury; or returned to their pre-injury or normal duties where they may not be able to perform all the associated activities with their regular work.
Serious Incident	• Any incident where there was a Lost Time Injury (LTI) or there was a potential for a LTI • An actual or potential for damage to assets of greater than $R100,000.00 • An actual or potential to be out of business or to sustain damage to our business reputation of local area significance or worse • Where there has been or was potential for a transient environmental event that may attract public attention or a statutory fine
Severity	A relative measure of the actual or potential injury or damage that is consequent of an incident.
Severity Index (SI)	The number of days lost per million labour hours.
Work Injury	An occupational injury or disease which arises out of, or in the course of a person's employment and which requires First Aid, medical treatment, lost time injury or involves a fatality. Employment, in this sense, includes the following: • All work or activity performed in carrying out an assignment or request by the Employer, including incidental and related activities not specifically covered by the Assignment or Request • All voluntary work or activity undertaken while on duty

with the intention of benefiting the Employer or with the consent and approval of the Employer

Note: Commuting injuries are not classified as a work injury.

Working days lost due to Lost Time Injury

The number of working days lost through Lost Time Injury/disease refers to the total number of working days, irrespective of the number of hours that would normally have been worked each day. A maximum of 12 months may be recorded for any individual occurrence.

For a fatality the maximum period of lost time (12 months {220 days}) should be ascribed.

5. Responsibilities

1. The Group Executive (Transnet Capital Projects) or his/her designate, is legally responsible for ensuring adherence to this procedure.
2. The Section 16(2) assignee in terms of the Occupational Health and Safety Act, is responsible for ensuring adherence to this procedure in his/her area of responsibility or jurisdiction of control.
3. Management shall be responsible for ensuring that all incidents are reported, recorded, investigated and followed-up in order to determine the root causes of incidents, institute corrective measures and ensure the prevention of similar incidents.
4. The Legal and Risk Department shall support and advise Line Management in ensuring adherence to this procedure.

6. Procedure

6.1 Incident Scene

On notification of an incident or on arrival at an incident scene, first:

- Make the site safe for the injured person, other employees or any emergency services that may be called to the scene
- Implement any Site Emergency Procedures
- Provide First/Emergency Aid if necessary
- Make preliminary assessments and identify any immediate actions required to prevent the incident happening again.

6.2 Investigation Assistance

To assist with any resultant investigation:

- Cordon off, isolate and secure the area to restrict access
- Identify all personnel or third parties directly involved
- If possible, keep witnesses separated
- Await the arrival of any incident investigation team

Some details that may be required are:

- Time, date and nature of the incident
- Persons injured, equipment/environmental damage caused
- Nature of injury/damage and estimate of severity
- Immediate corrective actions taken
- Details of assistance provided
- Operations in progress at the time

6.3 Reporting and Recording of Incidents

a. All incidents/accidents shall be reported internally using the Occurrence Flash Report as indicated in Annexure A. This form is designed to facilitate speedy internal reporting and notification of an incident/accident.

b. All incidents/accidents shall be reported before the end of the shift or day or within 24 hours of the incident/accident occurring or as soon as anyone becomes aware of the fact that an incident/accident has occurred, in which case the same reporting timeframes will apply.

c. Employees involved in incidents/accidents must notify their immediate supervisors or managers immediately.

d. The person completing the Flash Report is required to provide all the relevant information as detailed in Annexure B. One flash report shall be completed per incident/accident.

e. The completed Flash Report must be forwarded to the relevant Line/Project/Departmental Manager and the safety manager within 24 hours from the date of the incident/accident.

f. The safety manager will assess the Flash Report and shall advise management in terms of the type of investigation that is required.

g. For further information regarding the reporting of specific incident/accident types refer to Annexure A, the Reporting Responsibility Matrix.

h. The SHEQ administrator shall be responsible for ensuring that the incident is recorded in the Transnet Occurrence Management System (TOMS)

All information for all stages of Incident Investigation, Analysis, and Corrective Actions etc. shall be entered into the TOMS database by the SHEQ administrator.

6.3.1 Incident / Injury Classification Levels

Consequences of incidents include injury and illness, the environment, plant and equipment, financial, outage/reputation, security, motor vehicle and quality.

The classification level of incidents or occurrences will be as per Annexure B. This is aligned to the Transnet Group classification level for incidents and occurrences.

6.3.2 Occurrence Notification Responsibility Matrix

Capital Projects Occurrence Notification Reporting requirements are shown in Table 1.

Table 1 - Reporting requirements

Incident / Occurrence Level	Reported by who	Reported to whom	How and what	When
Level 1, 2, 3 or 4	Employee or contractor	Supervisor and Safety Officer	• Telephonically	• Immediately
Level 1, 2, 3 or 4	Supervisor	First Line Manager (e.g., Departmental Manager, Project Manager, Project Services Manager, Planning manager, Construction Manager, etc)	• Telephonically	• Immediately
Level 1, 2, 3 or 4	First Line Manager	Health and Safety Manager Senior managers and directors Programme Managers or leads Insurance Manager Department of Labour Compensation Commissioner SAPS	• Telephonically to Safety Manager and flash report to all	• Telephone immediately and flash report before end of shift or day
Level 1 or 2	Health and Safety Manager	Transnet Capital Projects EXCO members	• SMS and flash report	• SMS immediately and flash report within 24 hours
Level 1	Transnet Capital Projects Group Executive or delegated person	Transnet Group SHEQ Manager	• Telephonically and flash report	• Telephone immediately and flash report within 24 hours
Level 1	Transnet Group Chief Risk Officer	Transnet Group Chief Executive	• As determined by Group Risk	• As determined by Group Risk

Prior to the recommencement of any operations the following should be considered:

- Obtaining any Health and Safety Authority Clearances to continue operations/production if required
- Advising other sites if affected by the incident
- Initiating any off-site isolation of similar plant until checked
- Discontinuing operations until all hazards are assessed and control measures put in place
- Correcting any non-conformances
- Temporary repairs to ensure compliance
- Taking equipment out of service
- Deferring any response until after the investigation is completed
- Assessing work alternatives with the Work Group
- Assessing if any Injury-causing Task needs to be completed
- Assess engineering repairs and modification possibilities
- Initiate any immediate Preventative Maintenance Programs
- Upgrade the existing Maintenance Program
- Conduct a total Hazard Assessment of the specific operation

6.3.3 Investigation Level

Determine the level of investigation and appoint Investigator/s. For serious incidents the Investigation Team should always include at least one Transnet Capital Projects Safety Representative or Project Manager.

Complete the Analysis Requirements detailed in Incident Management - Analysis Requirements (Annexure B).

These requirements apply to all work activities managed or performed by Transnet Capital Projects. The minimum standard of all Incident Analysis, shall meet Transnet Group Requirements:

- Generally, for Level 1 and 2 incidents a Brief Report and Summary Analysis is required
- For Level 3 incidents a Detailed Analysis is required
- For Level 4 and 5 incidents a Detailed Analysis and Formal Report are required

6.4 The Investigation

- Establish Scope and Aim of Investigation

- Respond swiftly
- Obtain background information
- Inspect location
- Take photos/make sketches
- Preserve physical evidence
- Gather witness statements;
- Conduct interviews; refer to Witness Interviewing Guidelines - see Annexure C
- Conduct specialist studies where required
- Resolve conflicting evidence
- Identify missing information;
- Establish event sequence. Refer to example - Incident Time Line in Annexure E
- Issue Interim Report

6.5 Analysis of Findings

- Construct an incident investigation tree
- Conduct a Root Cause Analysis

Identify and Group Root Causes into:

- Defences breached and/or failed
- Person/Team errors and/or violations
- Workplace error and/or violations producing conditions
- Organisation Management decisions/Organisational Processes

An example of an Incident Cause Analysis Worksheet and Guide to Identification of Root Cause Analysis for Incidents can be found in Annexure D.

A Basic Incident Tree is shown in Figure 2

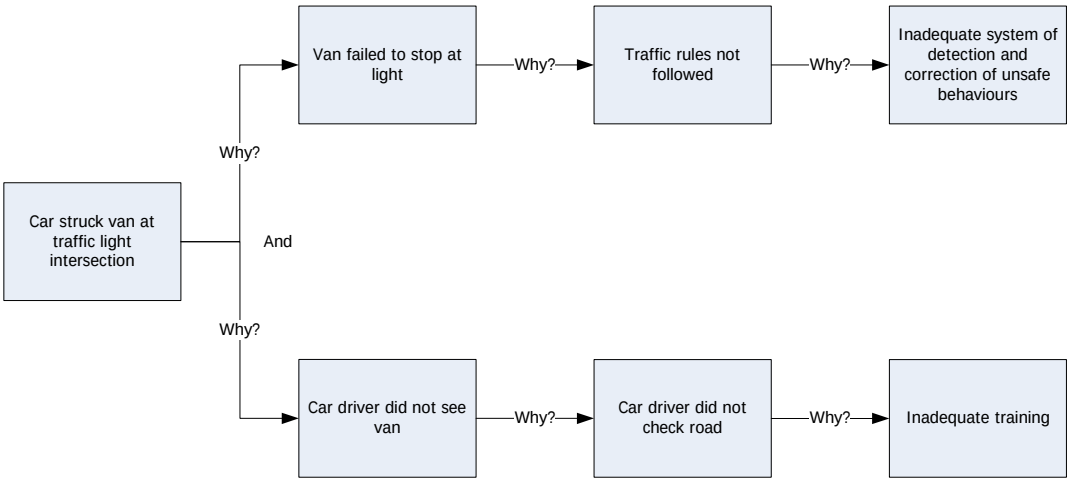

Figure 2 Root Cause Analysis - Event Tree Example

For a **Serious Incident Investigation Tree**, see example in Annexure E.

Refer to the Accident Causation Model Figure 3:

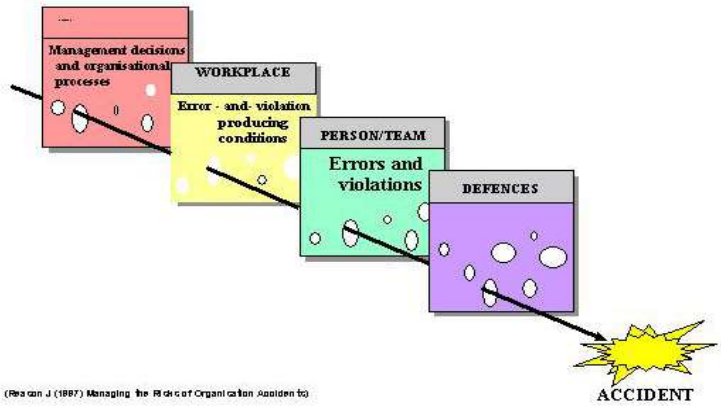

Figure 3 Accident Causation Model

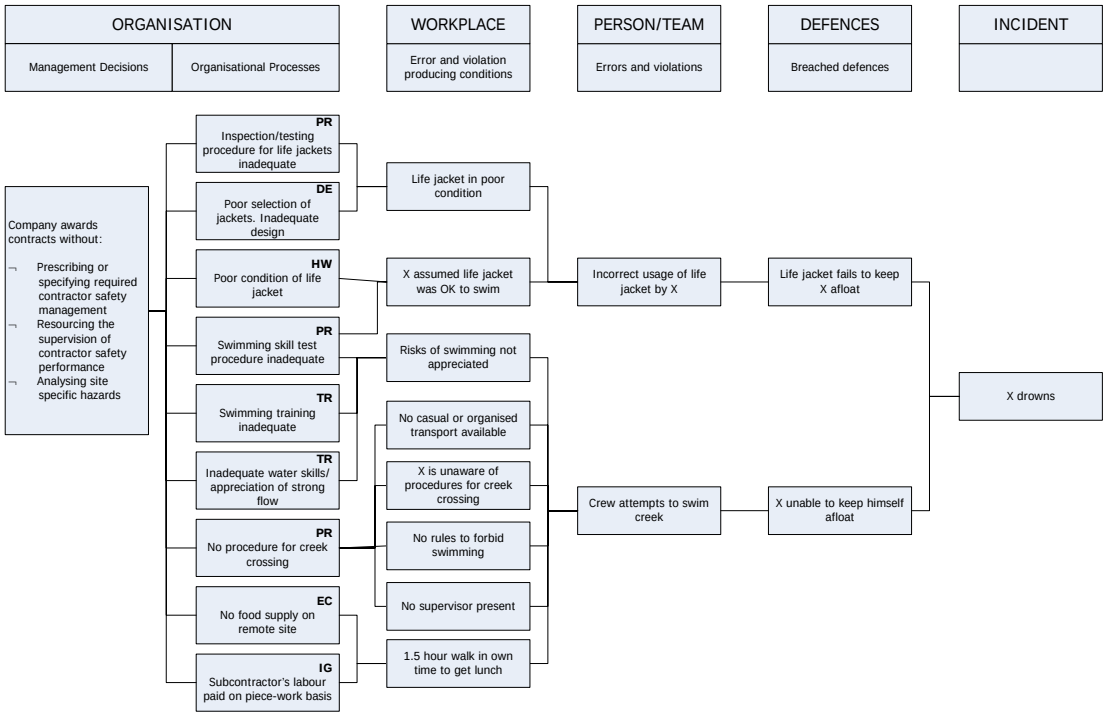

Figure 4 Cause Analysis Example - Drowning Incident

6.5.1 Corrective and Improvement Action Planning

- Identify the most powerful causes
- Generate possible solutions
- Evaluate and select the best
- Develop Action Plan
- Review with Management

6.5.2 Compile Final Report

Sample Incident Report Example may provide guidance (see Annexure E).

On completion of the investigation, a Significant Safety Occurrence (SSO) Report should be generated and distributed for information and learning purposes.

6.6 Implement Action Plan

- Implement corrective and improvement actions
- Communicate learning points
- Monitor implementation
- Review effectiveness

- Audit effectiveness of correct action implementation
- Ensure correct sign-off (see Table 2)
- Close out incident in TOMS

7. Associated Forms

To be advised

8. Records

All documents generated during the life of the contract will be retained in terms of the Document Management Procedure for records retention Archiving of Hard Copy Documentation – DOC-P-0013.

9. Annexures

Annexure A – Sample Occurrence Flash report

Annexure B – Classification Level of incidents

Annexure C – Witness Interviewing Guidelines

Annexure D – Incident Cause Analysis Worksheet and Guide to Identification of Root Causes

Annexure E – Incident Report Example

Annexure A – Sample Occurrence Flash Report

OCCURRENCE DETAILS								
Date			Level	1	2	3	4	
Time			Department					
Location								
OCCURRENCE CLASSIFICATION (Mark appropriate box with an X)								
Fatality		Near Miss		Plant/Equipment		Security		
Injury		Environment		Motor Vehicle				
INJURY CLASSIFICATION (Mark appropriate box with an X)								
First Aid (FA)		Lost Time (LT)		Occupational Disease (OD)		Not Applicable (NA)		
Medical (M)		Fatality (F)		No injuries (NJ)				
CLASS OF PERSONS INVOLVED IN THE OCCURRENCE (Mark appropriate box with an X)								
Employee (E)		HMG JV (JV)		Principal contractor (PC)		Not Applicable (NA)		
Public (P)		Sub contractor (SC)						

	Full Name	Class of Person		Injury Classification		Name of Company
1						
2						
3						

DESCRIPTION OF OCCURRENCE:

REPORTED BY		DATE		TEL. NO.	

Sample

Annexure B – Classification Levels of Occurrences/ Incidents

Level 1

1. An undesirable occurrence/incident that meets one or more of the following criteria:

   1.1. Technical:

      1.1.1. Plant /Asset damage exceeds R2 million in the case of Spoornet and R500 000 in respect of all other Divisions.

      1.1.2. Incident/Occurrence that have caused maximum business interruptions in the opinion of the Divisional Chief Executive Officer.

      1.1.3. An incident impacting on more than one Division.

      1.1.4. Impact on customers, stakeholders or outside parties where costs might exceed R2 million in the case of Spoornet and R500 000 in respect of all other Divisions.

   1.2. Operational:

      1.2.1. The death of an employee, a passenger or a member of the public

      1.2.2. Physical harm to a person(s) or a member of the public requiring hospitalisation.

      1.2.3. Any incident where any person's health or safety was endangered: (this effectively requires most if not all near miss incidents to be formally investigated with a presiding officer and a board of enquiry – may pose a practical challenge)

      1.2.4. Where a dangerous substance was spilled.

      1.2.5. Uncontrolled release of any substance under pressure took place.

      1.2.6. Machinery or any part thereof fractured or failed resulting in flying, falling or uncontrolled moving objects.

      1.2.7. Machinery ran out of control.

      1.2.8. Exposure of any person or group of persons to any workplace where the noise ratings are at or above 120 dB(A) as a single exposure (e.g. explosion) or a continuous exposure (SANS 10083 item 3.13, 8.1.4 and 8.2) without double hearing protection which is properly fitted.

      1.2.9. Exposure to any hazardous chemical substance:

         1.2.9.1. above the occupational exposure limit Control Limit (OEL - CL) listed in table 1 of the Regulations for Hazardous Chemical Substances with or without the required use of respiratory protection unless BA sets

were used as part of rescue situations. This is in terms of Regulation 10 (1)b.

1.2.9.2. Including exposure to uncontrolled regulated asbestos dust and/or PCB oil fumes without the required use of respiratory protection.

1.2.10. An official strike by organised labour;

1.2.11. Major fraud or theft that is likely to be punished by demotion or dismissal.

1.2.12. Incidents of interpersonal conflict that are likely to stop production for more than two days.

1.2.13. Transnet Limited becoming liable to prosecution or other legal action.

1.2.14. Major political or media focus on the image of Transnet Limited.

Level 2

2. An undesirable occurrence/incident that meets one or more of the following criteria:

2.1. Technical:

2.1.1. Plant/asset damage more than R1 000 000 in the case of Spoornet and R200 000 in respect of all other Divisions.

2.1.2. Capacity loss considered significant by the Divisional Chief Executive Officer.

2.1.3. Events that have resulted in serious business interruption and other impact to customers.

2.1.4. An environmental incident as defined by NEMA section 30(1)(a) and the National Water Act (36 of 1998) Section 20 (1).

2.2. Operational:

2.2.1. Physical harm to a person or persons that does not result in hospitalisation.

2.2.2. Threat of strike.

2.2.3. Significant fraud or theft.

2.2.4. Non-routine security responses, including interventions by the SAPS.

2.2.5. Incidents or circumstances that have the potential to generate significant reaction from trade unions and/or customers.

2.2.6. Changes in security risk.

2.2.7. Significant political or media focus on the image of Transnet Limited.

Level 3

3. An undesirable occurrence/accident that meets one or more of the following criteria:

   3.1. Plant/asset damage which exceeds R500 000 in the case of Spoornet and exceeds R100 000 in respect of all other Divisions.

   3.2. Business interruption considered significant by the Executive of the Business Unit concerned.

Level 4

4. An minor incident that could be service disruption, daily incidents or safety occurrence with a lesser significance or an incident that did not necessarily result in damage or injury but that had the potential to cause major plant damage/or loss of production or result in injury or death and/or damage to environment. A Level 4 incident includes the following:

   4.1. An incident with the potential, or have caused, plant/asset damage greater than R50 000.

   4.2. An incident with the potential to cause medical or disabling injury.

   4.3. An incident with the potential to affect a person's health.

   4.4. An incident with the potential to cause severe damage to the environment.

   4.5. Business interruption of a minor nature.

   4.6. First aid injuries or minor spills or impact to the environment.

Annexure C – Witness Interviewing Guidelines

In a Typical Investigation

- About 50% of the information comes from witnesses
- About 50% of fact finding time is spent interviewing

Necessity for Speed

- Memory
- Friendly ➜ unwilling ➜ hostile
- Rationalisation by witness distorts testimony
- Conversation with others distorts testimony
- Physical evidence changes

Interview each person as soon as possible after the event. This will minimise subconscious adjustment of the events to fit what they may perceive the Interviewers wish to hear. Take evidence in a chronological order as soon as possible. Consider if the there should be two Interviewers and if the witness should be accompanied by a friend.

Let witness(s) and personnel involved in the investigation tell their story in their own words. *It is imperative to listen to what they have to say.*

All questions should be "open" structured to *facilitate discussion*, not a yes/no answer.

Interviewed persons should ideally not discuss their observations with others prior to the investigation being completed.

Conduct the interviews with tact, compassion (especially if an injury has occurred) and skill. It is quite likely, especially in serious cases, for the victim and those present, to have long-term psychological problems.

Witnesses must be convinced that the purpose of the investigation is to identify the immediate and then real causes of the accident and not to attribute blame.

Eliminate the apprehension of incriminating either themselves or others - bearing in mind the legal consequences of the various OH&S Acts.

Convince them of the need to disclose all of their observations in order to prevent recurrence of the accident.

Conduct the interview in a quiet place to minimise distractions from others, and follow normal interview good practice. A relaxed manner, non-confrontational

setting (why sit behind a desk?) and no telephone calls/interruptions, are essential to maximise the benefits of this investment in OH&S resources.

Document the responses and evidence obtained.

Note: *Contradictory evidence and statements and attempt to resolve differences. If this is not possible, note the evidence considered, the most reliable Interviews should be conducted individually with each witness.*

Be aware of the following:

- Your key witness may or may not be able to tell you exactly what happened
- The same witness may give a different story when questioned in subsequent interviews
- Don't be surprised if different witnesses come up with different versions of the same event
- Given the above, your witness is not necessarily lying or trying to hide something

Interviewing Witnesses to Incidents - Prompt List

Do's of Witness Interviewing

- Do aid the witness with indices, e.g. "How did the lighting compare to the lighting in this room?" "How did he compare in size to you?"
- Do assist the witness with props (photos, drawings, graphs, manuals etc.)
- Do treat the witness with respect and keep the interview from becoming an interrogation
- Do listen to the answers and ask follow-up and clarifying questions
- Do observe how things are said (voice inflections, gestures, facial expressions etc.)

Don'ts of Witness Interviewing

- Don't ask questions that suggest an answer e.g. "Was the odour like rotten eggs?", "Was the colour the same as your dress?", "Was the victim about your height?"
- Don't use inflammatory words e.g. "violate", "kill", "steal", "lie", "stupid" etc.
- Don't make promises that cannot be kept e.g. "You tell us something and we will keep it confidential"
- Don't threaten or blame the witness
- Don't leave questions out of the interview just because you think you know the answer

Questioning Techniques

Question Type	Example
Overhead question, to open discussion	Where shall we start?
Direct question, to gain information	Were you trained to operate?
Relaxing question, to gain opinion	Would you like to comment?
Reverse question, to encourage thought	Tell me your experiences?
Factual question, to get the facts	When, how, who?
Broadening question, to broaden discussion	What other factors were involved?
Justifying question, to gauge a further perspective	Is that important though?
Hypothetical question, to change discussion	Did we ever consider?
Alternative question, to decide an alternative	What is the best solution?

The factual questions:

WHO? Was involved i.e. injured employee, witnesses, people present at the time, people who worked in the area immediately prior to accident.

WHAT? Happened: what was the apparent cause, what did the people concerned do/not do?

WHERE? Did it happen? i.e. where were the parties concerned at the time of the accident?

WHEN? Did all the contributory events occur? This is not just a matter of the precise timing of the accident but also issues such as maintenance schedules, training sessions, reorganisation of the workplace, hazard surveys. The questions focus on the interrelation between events and actions.

HOW? Did it happen? A subjective view by the individual concerned but it also covers qualitative factors such as training effectiveness (how well?) etc.

WHY? Were procedures not followed? This should give some indication of corrective action as answers will focus on unsafe acts and conditions.

Closing the Interview

Summarise the discussion to ensure that no misunderstanding exists.

A written record should be made of the interview and this should be discussed with the witness to clarify any anomalies. Any conflicting evidence should be clarified.

Ask:

- "What else should we know?"
- "Who else should we talk to?"
- "May we call you back later if we need to?"

Summary

- Don't rush
- Shake hands
- Be friendly
- Ware up with 'non-business' items
- Request permission to record
- Explain your purpose
- Stress witnesses' importance to investigation
- Do not judge, anger, refute, or suggest
- Start with routine matters e.g. job title, experience level, training etc.

Annexure D - Incident Cause Analysis Worksheet and Guide to Identification of Root Causes

Incident Cause Analysis Worksheet

Organisation		Workplace	Person / Team	Defenses	Incident
Management Decisions	Organisational Processes	Error and Violation Producing Conditions	Errors and Violations	Breached Defences	

Sample

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12 March 2008

Guide to Defining Root Causes of Incidents

Examples of Common Organisational Deficiencies		Examples of Error & Violation Producing Conditions
Level	**Definition**	**Error Producing Conditions**
Senior Management	**Incompatible Goals** - Conflicting requirements between safety objectives and individual, group or organisational goals. **Communications** - Information necessary (or some part of it) does not reach correct recipients in a clear, unambiguous and intelligible form. **Organisation** - Deficiencies in the structure or way of doing business which allow safety responsibilities and accountabilities to be ill defined and warning signs to be overlooked.	• Unfamiliarity • Time shortage • Noisy/unclear communication between groups • Poor man-machine interface • Designer-user mismatch • Irreversibility • Information overload • Need to "unlearn" old habits • Need to transfer knowledge • Misperception of risk • Poor feedback • Inexperience • Inadequate checking • Poor instructions • Educational mismatch • Sleep disturbance • Hostile environmental • Monotony and boredom
Front Line Management	**Design** - Poor design, plant and equipment fundamentally inadequate. **Hardware** - Deficiencies in quality and availability of tools, plant and equipment. **Procedures** - Deficiencies in quality, accuracy, relevance, availability and workability of procedures. **Training** - Deficiencies in knowledge and skills due to deficiencies in the training process. **Maintenance Management** - Inadequate Management of maintenance (not execution of maintenance tasks). **Housekeeping** - Poor housekeeping usually present in the workplace.	Violation Producing Conditions • Poor safety culture • Worker Management conflict • Poor morale • Poor supervision • Inappropriate work group norms • Misperception of risk • Perceived managerial indifference • Little pride in work • Belief that "it can't happen to me" • Low self-esteem • Learned helplessness (who gives a damn anyway) • Perceived licence to bend the rules • Unclear or meaningless rules • "Macho" culture • "Can do" culture • Excessive zeal
Task Level	**Error - Producing Conditions** - Conditions that lead to errors and violations. **Defences** - Inadequate or absent protection against consequence of failure once it has occurred.	

Annexure E – Incident Investigation Report Example

Facts Resulting from the Investigation

Basic Situation:

A Contractor Rigger (A) working under 122' floor level on the No.1 System Upgrade at approximately 7:45am on 12th May 2000, moved a sling along a beam under a channel holding an electrical conduit. The sling contacted the conduit causing it to bounce and sparks were noticed. The Rigger was wearing gloves and rubber sole boots.

At about the same time, a Company Electrician (B) was called to fix the lights that were not working on the 90' level. The fuses were found to have blown, were replaced and blew again. Shortly afterwards a cut conduit was found, the cable was pulled back and made safe.

The subsequent investigation found that the conduit and 415v 3 phase cables had been cut immediately east of junction box 1 by another contractor employee (C), using an oxy torch. This employee was wearing gloves and rubber sole boots. The cut was made during night shift on the 11th - 12th May. The cut was made in order to remove junction box 1 and make way for a new column base. Diagram 1 illustrates the empty stub end of conduit and junction box 1. Diagram 2 illustrates the relative location of junction box 1 and the next junction box immediately to the east of junction box 1.

When interviewed, contractor employee (C) said that when he cut the conduit, he had assumed that the power had been disconnected. He had made this assumption based on his belief that when the conduit and cables to the west of the junction box were removed in late January 2000. He believed that the cables had been confirmed as dead by the Company Electricians and he and others in his work crew had been instructed to cut and remove the conduit.

The removal of the conduit west of junction box 1 had been done on a day prior to 2nd February, 2000. This conduit was removed in order to make way for preparation work for the installation of the new saturator. Diagram 3 illustrates.

It has been concluded from the investigation, after interviews with the Company Supervising Area Electrician, that when the cables were cut with the oxy torch, some if not all three of the phase fuses were blown. The sparks observed by contractor employee (A), the following morning, were probably due to either an induced voltage (typically 50 v) in the neutral conductor or one of the phase fuses may not have blown the night before. Contractor employee (C) was therefore at risk of electric shock and contractor employee (A) was at a lower risk of electric shock.

Previous Incident on 2nd February, 2000

Following removal of the conduit in the "saturator hole", a conduit to a light from junction box 2 was found to be partially cut by an angle grinder which cut the insulation on a cable exposing the wire. The exposed conductors were made safe and the light removed.

After the light was removed, it seems that contractor employee working on the preparation work at this time gained a somewhat common, if ill-conceived, belief that the conduit and the cables to the west of junction box 2 were dead.

In interviews with contractor employees on the job on 12th and 13th May, it was found that about 60% believed that the cables in the conduit between junction box 1 and junction box 2 had been removed or were at least dead.

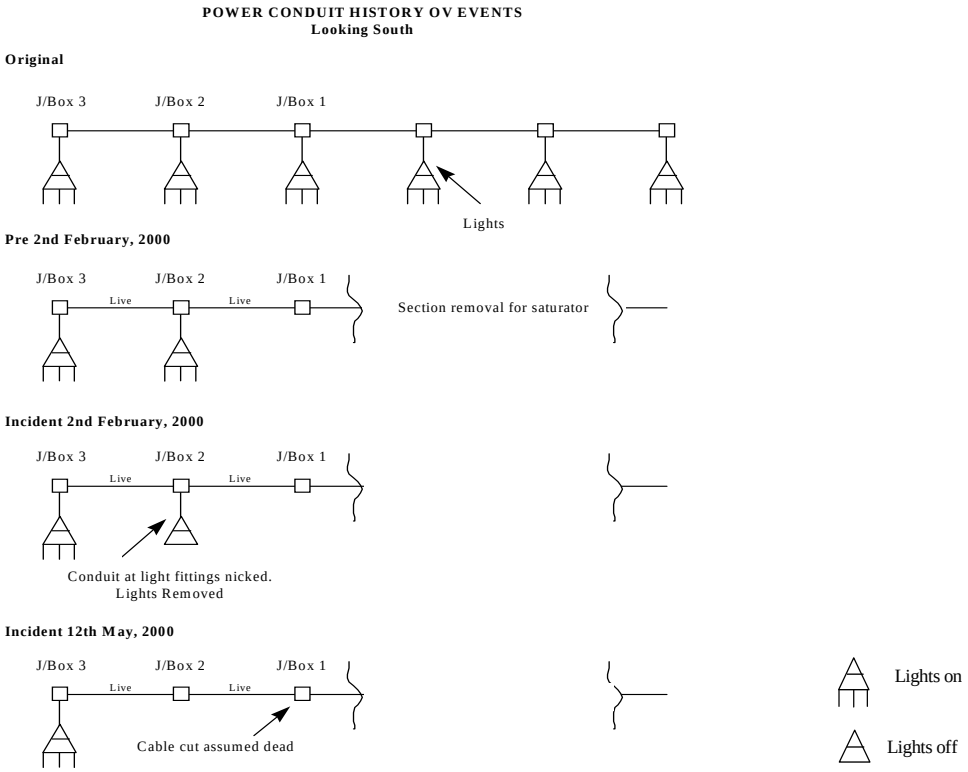
The Incident Report for the incident on 2nd February is attached for reference.

Diagram 4 shows a pictorial history of events for the electrical conduit.

Photograph 1 shows the empty stub end of conduit prior to oxy cutting.

Photograph 2 shows the continuation of the conduit on the West side of the saturator 'hole'.

Diagram 4



Cause Analysis

An Incident Tree was prepared, see Diagram 6, causes analysed and categorised into:

1. **Defences** - in place/breached.
2. **Person/Team** - errors and/or violations.
3. **Workplace** - error and/or violation producing conditions.
4. **Organisation** - Organisational processes and/or management decisions that may have contributed to the incident.

1. Defences

a) The hazard (the live electrical service) was left in the construction zone and not identified by any of the many scheduled or the informal hazard inspections/observations/audits that were held prior to the shutdown and during the shutdown.

b) Supervision on the job did not predict that this electrical service would need removing in order to complete the construction work at this location.

2. Person/Team

a) The cardinal rule “do not cut any electrical services unless confirmed dead and supervised by the area electrician” was violated. Not deliberately, or maliciously, but under the ill-conceived belief that the electrical service was dead.

3. Workplace

a) The electrical conduit had been cut and appeared to be redundant. The stub end of the conduit to the west of junction box 1 was roughly cut by oxy torch and there were no visible cables, possibly misleading to a non-electrical trades person.

b) The conduit was underneath the working floor level and out of sight.

c) There was a fairly common belief amongst the work crew that the conduit was redundant and dead.

4. Organisation

a) The Electricians in January 2000 isolated the electrical service back to junction box 1. This was still within the future construction zone. They say they were instructed to only isolate the section of conduit immediately within the “saturator hole” and were not aware of the extent of the future works towards the east.

It was a mistake to leave a disused section of electrical service live and within the construction zone. There was also no obvious visual means of identifying the services as still being live. The next functional electrical device on that power circuit was a light at junction box 3.

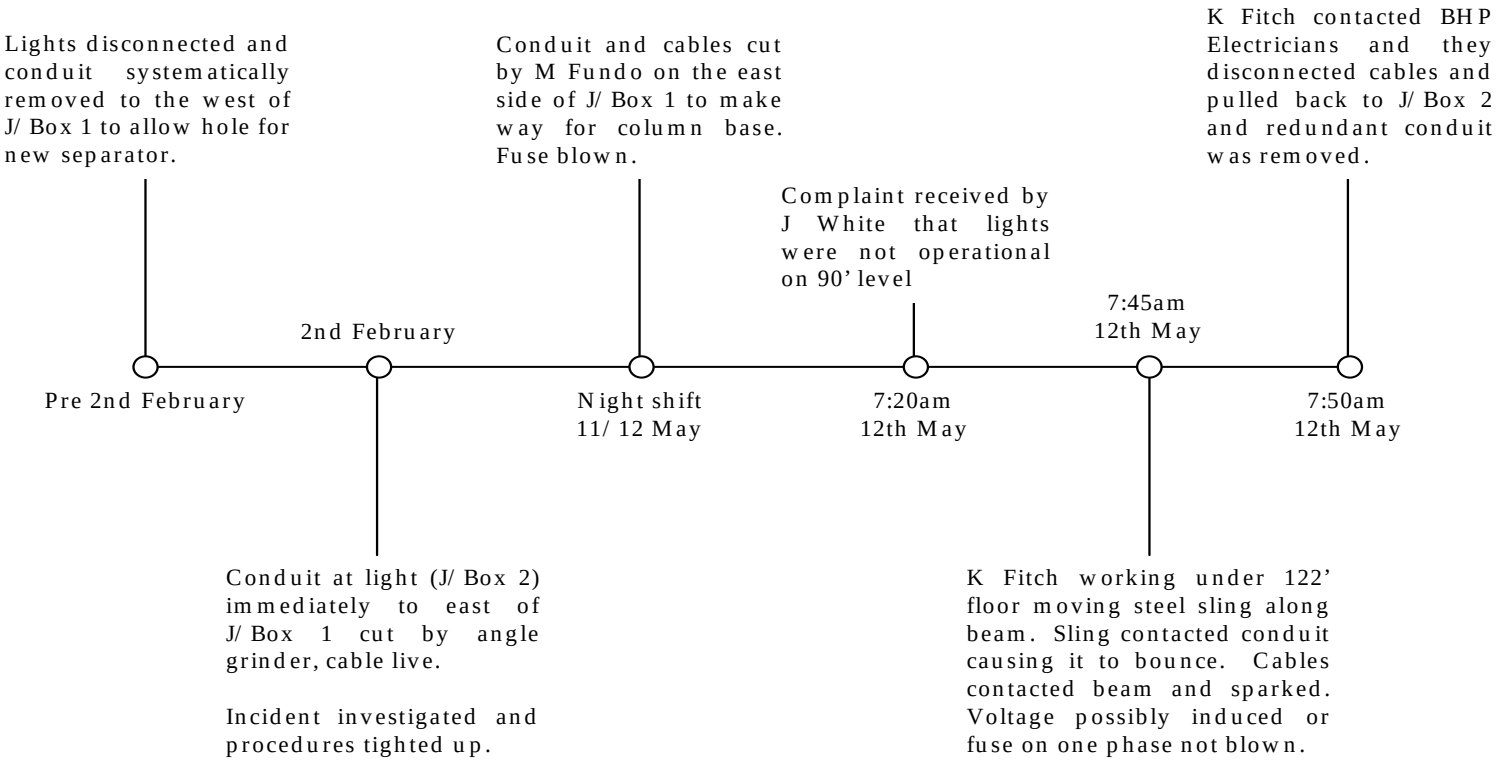
b) The Contractor advised that the cardinal rule “do not cut electrical services …..” was repeated by Crew Supervisors at every Toolbox Meeting daily. The effectiveness of the communication needs to be re-examined.

The Project Induction does not address cardinal safety rules or critical safety procedures. The Contractor advised that these would be discussed at Toolbox Meetings.

c) Interface with operational services was identified in a HAZAN (a Hazard Identification and Analysis Workshop) prior to commencement of the shutdown. A Specific Site Inspection was held to identify services that would require relocation. The service was not identified.

Prior to the start of the current shutdown work, a number of other initiatives were taken with the aim to further reduce the risk of an incident such as this. Unfortunately, this electrical service was overlooked by all.

TIMELINE
Incident 12th May 2000



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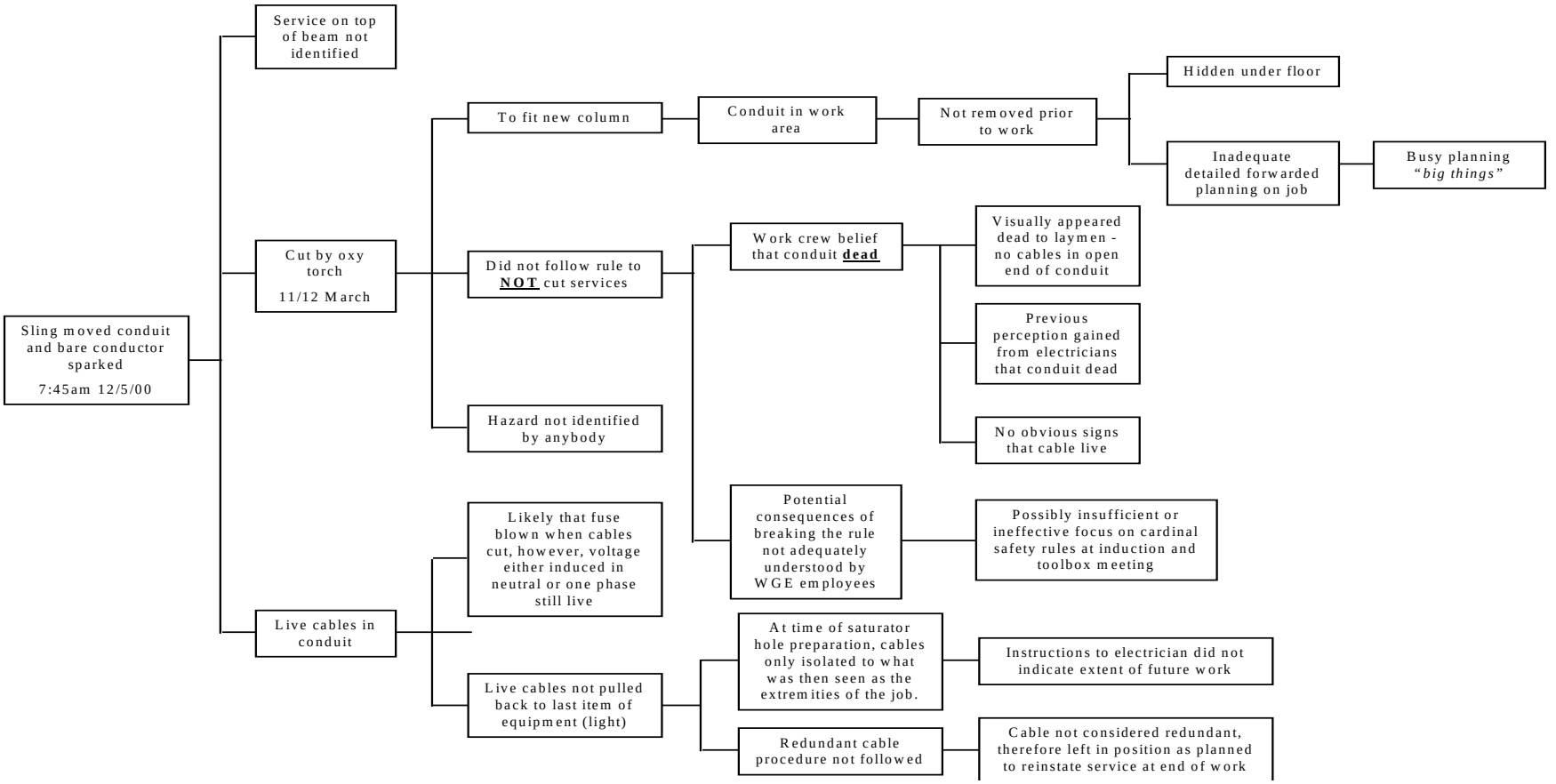
12 March 2008

INCIDENT TREE
Incident 12th May, 2000



5. CORRECTIVE ACTIONS

A number of possible solutions were developed and narrowed down to the following approach.

On all brown field jobs:

1) Clearly identify the extremities of the construction zone and include a safe buffer. Aim to have all services in construction zone isolated, where necessary it is preferable to use temporary power then leave permanent services in a construction zone.

Clearly identify all live services that remain in the construction zone.

Have a written Cardinal Rule such as 'only electrical qualified people are permitted to isolate, disconnect, cut, handle, remove electrical cables, junction boxes, conduits' It is unacceptable to rely on verbal communication alone.

Action Plan

	Corrective Actions	Responsibility	Date	Sign Off
1.	Hatch to implement the above principles immediately.	Transnet Capital Projects		
2.	Contractor to implement the above principles immediately.	Contractor		
3.	Hatch to take to the Company site safety committee to put the issue on the agenda with the proposed solutions	Transnet Capital Projects		

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Transnet Capital Projects Health and Safety Management

Guidelines for Managing Common Hazardous Activities and Tasks

HAS-GN-0001

Prepared by:		5 March 2008
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Reviewed by:		5 March 2008
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Approved by:		5 March 2008
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1. Purpose

This guideline establishes project requirements to ensure that the most common hazardous activities encountered during project work are adequately managed so as to protect and prevent people from exposure to danger.

2. Scope

This guideline applies to all project activities where the use of the requirements listed in Section 6 are necessary to eliminate or reduce the risk to people of exposure to hazards.

3. References

- Occupational Health and Safety Act No.85 of 1993 and associated Regulations as amended
- Explosives Act No

4. Abbreviations and Definitions

4.1 Abbreviations

JSA	Job Safety Analysis
JHA	Job Hazard Assessment

4.2 Definitions

Authorised person	A suitably qualified person who holds a certificate of competency/authorisation issued by a statutory authority or the employer wherever applicable and includes a person deemed competent by local legislation.
Barricade	Used as a physical barrier to prevent personnel from coming in contact with a hazard. Barricades must be of a fixed nature that can restrain personnel when used in situations where crossing the barricade poses an immediate and serious hazard to personnel.
Barriers	Used as a warning to personnel of hazards that exist in work areas. Include rope and flags, rope and bunting,

barrier tapes, para webbing/snow fencing and traffic cones.

Confined space

A vessel or enclosed space, other than the normal workplace, which is, or may become dangerous from:

- The presence of gases, liquids or solids which are flammable, toxic, asphyxiating, radioactive, hot or refrigerative; or
- Oxygen deficiency; or
- Restricted means of entry and exit

Examples include:

- Storage tanks, ore bins, process vessels, boilers, large ventilation ducts, and any other tank like compartments which usually have only a manhole or similar opening for entry purposes
- Open topped spaces of more than 1.5 metres depth, such as pits, ditches and degreasers; and
- Pipes, sewers, drains, tunnels, shafts, ducts and similar structures

Fall Arrest

Where a 'Fall Prevention' solution is not provided where working at height, 'Fall Arrest' apparatus must be used.

Fall Prevention

Is the protection applied to prevent a person or object falling from a height. This is commonly in the form of a physical barrier at or before the edge of a penetration.

Fall Protection

A person has applied fall protection when they are prevented from falling due to physical edge protection barriers or are secured with an approved Personal Fall Protection System.

Work Positioning System

Means an assembly of components capable of restricting a worker's movement on a work surface and preventing the worker from reaching a location from which he or she could fall.

5. Responsibilities

The Project/Contract/Construction Manager is responsible for the implementation of this Health and Safety Guideline and that it is verified by regular Audits. Roles and Responsibilities

6. Requirements

The following requirements will be applicable to all the guidelines in this section:

- Legal Requirements
  - As a minimum all applicable regulatory requirements shall be met
  - Local legislative requirements will take precedence over these (Transnet Capital Projects) Guidelines, except in those cases where the Transnet's Standard calls for a more stringent approach
  - Legislative requirements, hard copy or electronic version, shall be available at the project site for review
  - A system shall be in place to ensure that changes to applicable regulatory requirements are monitored
- Training
  - There shall be a system for ensuring that employees are trained and equipped to carry out their work according to applicable work procedures that minimise exposure to hazards and that their understanding and capability of this has been evaluated. There shall be an Induction Process for new employees and Contractors. Understanding of their awareness shall be evaluated

6.1 Safety Barriers and Barricades

Barriers and barricades are used to protect people from exposure to the dangers of, for example:

- Being struck by falling objects or moving materials
- Falling into open excavations or holes
- Hazardous substances or processes; and
- Falling from elevated positions

6.1.1 Requirements

- Planning

- The use of barriers and barricades shall be properly planned, managed, supervised and carried out to prevent incidents, with a documented Safe System of Work that shall:
  - Be in a clear and auditable form
  - Be practical
  - Be working effectively
  - Have clearly defined roles, responsibilities and accountabilities; and
  - Include procedures for periodic review and revision

- Protection of Public
  - To reduce the risk of injury or harm to people who are likely to be in the vicinity of, but not on the construction site, barriers and barricades appropriate for the hazard must be used for their protection
- Protection in the vicinity of Cranes:
  - People and vehicles must be prevented from entering any area in or adjacent to the site where there is a risk of injury or damage from cranes lifting, lowering or moving material or gear
  - Acceptable prevention measures are barricades with warning signs and flashing lights or Traffic Controller
- Excavations
  - Excavations or holes in areas of high vehicular or pedestrian traffic shall have barricades or barrier fencing, based on the hazard present
- Signs and Tagging
  - All barriers shall have signage that clearly communicates the hazard. An Information Tag shall also be prominently displayed. The information on the Tag must include:
    - Purpose and date of erection; and
    - Name of person who is authorised to place or remove the barrier
- Supervision
  - A competent person shall supervise the installation, alteration or removal of barriers and barricades
- Change Management
  - A process shall be in place to control Change Management associated with barriers and barricades

6.2 Confined Space

The hazards associated with persons working in confined spaces require that there be safe entry, exit and work in such spaces.

6.2.1 Requirements

- Planning
  - Confined Space Entries (CSE) shall be properly planned, managed, supervised and carried out to prevent incidents, with a documented Safe System of Work that shall:
    - Be in a clear and auditable form
    - Be practical
    - Be working effectively
    - Have clearly defined roles, responsibilities and accountabilities; and
    - Include procedures for periodic review and revision
- Permits
  - Prior to all confined space entries a Confined Space Entry Permit will be obtained. The pre-requisite for a Confined Space Entry Permit will be a written procedure detailing the work to be performed
- Cleaning and Purging
  - Where practicable, all solids and liquids, which may present a hazard to persons inside the confined space, shall be removed prior to entry
- Gas Detection
  - Prior to entry into a confined space the atmosphere will be tested and Transnet Capital Projects best practice requires that it is subject to continuous monitoring. A Log will be kept of all readings, hourly that readings are taken
- Ventilation
  - Natural ventilation in confined spaces is usually minimal therefore ventilation by mechanical means shall always be made available
  - Ventilation equipment will be positioned so that contaminated air such as exhaust gases and welding fumes are not drawn into the confined space
- Lighting
  - Explosion-proof lighting will be used where there is a potential for flammable products to be present

- All 110 volt lighting will be protected by ground fault interrupters
- All personnel in confined spaces and the Safety Watch will carry portable lighting in case of power failure

- Safety Watch
  - All confined space entries shall have a Safety Watch posted immediately outside the confined space that will be able to communicate with workers inside and initiate a rescue. Shall not be involved in the rescue
- Isolation
  - All mechanical and electrical equipment within the space shall be positively isolated
  - Blinds shall be placed in piping at the first flange as soon as the piping is connected onto any confined space requiring entry
- Signage
  - Where practicable, signs shall be placed at confined spaces stating a Confined Space Entry Permit must be obtained before entry
- Rescue
  - A Rescue Plan shall be developed, reviewed with all entrants and be posted at the entrance to the confined space. An independent team shall be trained and on continuous standby
- Completion of the Job
  - Before a confined space is closed after entry, the authorised person shall check that no person is inside and all equipment and materials have been removed
- Record Keeping
  - The Permit shall be kept for the duration of the Project or one year; which ever is less
  - The Confined Space Risk Assessment shall be kept for the duration of the Project or one year; which ever is less
  - Training Records shall be kept for the duration of the Project
  - In the event of an incident involving a CSE the documentation will be archived for 25 years
- Supervision
  - A competent person shall supervise all CSE work

- Change Management
  - A process shall be in place to control Change Management associated with CSE

6.3 Cranes and Lifting Equipment

The safe and efficient use of crane and lifting equipment requires that the following minimum requirements to be followed:

6.3.1 Requirements

- Planning
  - The use of cranes and lifting equipment shall be properly planned, managed, supervised and carried out to prevent incidents, with a documented Safe System of Work that shall:
    - Be in a clear and auditable form
    - Be practical
    - Be working effectively
    - Have clearly defined roles, responsibilities and accountabilities; and
    - Include procedures for periodic review and revision
- Lift Studies
  - The use of a Specialist Heavy Lift Engineer to produce a Crane Lift Study to minimise risk to personnel and structures are required when:
    - All loads greater than 20 t or
    - Any load in excess of 70% of crane capacity or
    - Any crane lift involving two or more cranes
    - Loads below 20 t identified as having extra ordinary risks
- Selection of Operators
  - All Crane Operators shall have a certificate of competency for the equipment they are operating. In locations where certification is not available, the Project shall adopt a recognized international standard
  - Crane and industry experience shall be checked prior to commencing on site
  - An On-site Assessment of Operators' competency for specific cranes shall be held. Training in specific project procedures will be given
- Lifting Equipment

- Includes but is not limited to; wire rope, chain, polyester, kevlar and nylon slings as well as come-alongs, chain falls, shackles, hooks, spreader bars and other load bearing hoisting attachments
- When slings are applied to sharp edge loads, the sharp edges must be protected with softeners to prevent damage to the slings
- Slings should be double wrapped when used in choke application
- All hooks shall have functioning safety latches. When beam or plate clamps are used they must be locking or designed so that slackening of the hoist cable does not release the clamp
- Loads shall not be left unsecured or unattended supported from a come-along or chain fall/block

- Pull Testing
  - All lifting equipment shall be pull tested or inspected using an accepted non-destructive method prior to initial use on a project
- Inspection
  - A Daily Log Book must be maintained by the Operator and kept with the crane at all times
  - Prior to starting work, each crane or hoist must receive a complete inspection and certification on the Project. Additional inspection and re-certification is required at least once a year and after every major assembly thereafter
  - Cranes involved in incidents that result in shock loading of the boom or other components shall be removed from service and subjected to a complete inspection and certification prior to resuming work
  - Mobile cranes requiring frequent access/egress from the Project will not be required to be certified at every re-entry. Inspection and certification will be initially performed on the Project and every six months thereafter regardless of the number of re-entries to the Project This provision does not apply to conventional crawler or truck mounted lattice boom cranes, requiring significant assembly or cranes performing lifts requiring engineered lift studies
  - A competent person shall supervise the assembly, alteration and use of all project cranes
  - Lifting equipment shall be given a visual inspection and certification prior to every use on the Project
- Dogging/Rigging

- Slinging and directing of loads shall only be done by or under the direct supervision of doggers or riggers with Certificates of Competency. In locations where certification is not available, the Project shall adopt a recognized international standard

- Tag Lines/Guide Ropes
  - When manual control of a load is required, tag lines shall be used to prevent doggers or riggers from being struck
- Overhead Lifting
  - There shall be no lifting over personnel performing on-going activities
- Work near Electrical Lines
  - All operations shall be performed in full compliance with applicable legislation. Warning signs and/or markers shall be placed in locations where cranes are required to pass under live lines
- Obstructed Vision
  - Whenever the Operator has his vision obstructed, a competent Signal Person will be used. The Signal Person will be identified with unique clothing
- Travelling with a Load
  - The Travelling Procedures will be in accordance with the Manufacturer's recommendations. A Hazard Assessment shall be conducted appropriate to the risk
- Safety Devices
  - Anti two block cut out systems shall be fitted to all cranes
  - Load cut out device shall be fitted to all cranes
  - All cranes must operate in a power down mode
- Change Management
  - A process shall be in place to control Change Management associated with cranes and lifting equipment

6.4 Excavation and Trenching

6.4.1 Requirements

- Planning
  - Excavations and trenching shall be properly planned, managed, supervised and carried out to prevent incidents, with a documented Safe System of Work that shall:

- Be in a clear and auditable form
- Be practical
- Be working effectively
- Have clearly defined roles, responsibilities and accountabilities
- Include procedures for periodic review and revision
- Include Excavation Permit and Underground Facilities Plan records

- Existing Underground Facilities
  - Underground installations, such as sewer, water, fuel, electrical lines or telecommunication lines shall be identified and clearly shown on drawing or sketch prior to any work commencing
  - The underground installations shall be located by hand digging to locate the exact position before any mechanical digging commences. Sonic or other detection techniques can be used to assist only. Hydrovac is suitable for location as approved by the Client
  - The Permit Issuer shall be present during the uncovering of the service
  - No mechanical excavation shall take place within one metre of any parallel services without approval
- Excavation Collapse
  - Prevent the sides and ends from collapsing by battering them to a safe angle or supporting them with timber, sheeting or proprietary support systems. Any excavation where there is a risk of collapse or is at least 1.5 m deep shall be shored, unless the sides have been assessed by a suitably experienced and qualified person to be self-supporting
  - Suitable trench boxes and hydraulic walling shall be in place without requiring people to enter the excavation
- Loading Near Sides
  - Ensure that items of plant, excavated material or any other load is not placed near the excavated area in a position where there is a risk that the sides will collapse or materials may fall into the excavation
- People and Vehicles Falling into Excavations
  - Take steps to prevent people falling into excavations by providing substantial barriers to a minimum height of 900 mm, for example, rails and toe boards, between the person and the likely cause of danger. Timber or earth bumper stops shall be provided where there is a risk of vehicles or plant

driving or backing into excavations. Transit of heavy equipment near the trench should be evaluated by a qualified Civil Engineer as it can be cause of vibration and soil collapse into the trench

- People Being Struck by Plant
  - Keeping people separate from moving plant, such as excavators
- Undermining Nearby Structures or Scaffolds
  - Decide if the structure needs temporary support before digging starts. Building foundations shall be inspected by a Structural Engineer
- Underground Services
  - A Systematic and Penetration Permit Procedure shall be used
- Access
  - Provide ladder access or other safe ways of getting in and out of the excavation at least every 20 m
- Spoil Pile
  - Loose material and soil to be 2 m away from excavation edge
- Fumes
  - Do not allow site petrol or diesel engines in, or near the edge of an excavation unless fumes can be ducted away or the area can be ventilated
- Protecting the Public
  - Fence off excavations in public places. Provide lighting or barricading at night
- Supervision
  - A competent person shall supervise the installation, alteration or removal of excavation supports
- Inspections
  - All excavations shall be inspected by a person experienced and competent in the stability of excavations. Inspections shall be daily; after any event likely to have affected the strength or stability of the excavation; and after any accidental fall of rock, earth or other material. Regular surveillance shall be done. An Inspection Checklist is included in the Code of Practice for Excavation
- Do Not Work in Isolation

- Ensure that if a person works in an excavation that is at least 1.5 m deep, then at least one other person is present in the immediate vicinity

- Training
  - As part of training activities, all personnel working in trench and excavations shall know the Emergency Procedure as flooding, soil collapse and hazardous atmosphere may occur

- Surface Crossing
  - All personnel, vehicle and mobile equipment crossing the trench should be discouraged. Only if necessary, in exceptional circumstances will it be permitted by means of walkways or bridges designed under Engineering and Safety Standards

- Hazardous Atmospheres
  - When necessary an Air Monitor Procedure should be followed if a hazardous atmosphere occurs or could be expected to occur. When applicable a Confined Space Entry Procedure should be applied. No excavation activities with a internal combustion equipment shall be performed as may produce oxygen reduction or hazardous gases may concentrate in the space

- Water Accumulation
  - Prevent water accumulation using diversion, pumping, evacuation or protection means. No activities will be performed in the trench when water accumulation occurs due to weather conditions or "boiling effect" from underground water deposits

- Change Management
  - A process shall be in place to control Change Management associated with excavation and trenching

6.5 Falling Objects

6.5.1 Requirements

- Planning
  - Prevention of falling objects shall be properly planned, managed, supervised and carried out to prevent incidents, with a documented Safe System of Work that shall:
    - Be in a clear and auditable form
    - Be practical
    - Be working effectively

- Have clearly defined roles, responsibilities and accountabilities; and
- Include procedures for periodic review and revision
- Hazards related to falling objects must be identified during the planning of the work activities

- Risk assessment
  - Must be completed in order to determine the potential to do harm and to allow development of appropriate control measures. One factor to be considered at all times is there shall be no work overhead of employees. Effective Risk Control Measures must be determined, implemented and monitored in the following order of priority:
    - Preventing an Object from Falling
      - For example, by using containment sheeting, toe boards, lanyards to secure tools and equipment, lift boxes, brick cages and loads secured to cranes and hoisting equipment
    - Protecting a Person after an Object has Fallen
      - For example, have exclusion zones, overhead gantries, catch platforms, signs, warning devices and traffic controllers
    - Personal Protective Equipment
      - Protective equipment is a last line of defence and must be worn
- Change Management
  - A process shall be in place to control Change Management associated with falling objects

6.6 Isolation from Hazardous Energy

This Guidance Note establishes the project requirements for isolation of plant and equipment from hazardous materials, mechanical, electrical or other energy sources, to protect employees from personal injury. It applies to all project activities with energy sources such as, but not limited to:

electrical, mechanical, hydraulic, pneumatic, chemical, radiation, thermal, compressed air and gas, energy started by pressure, tension or in springs and ropes, and the potential energy from suspended parts (gravity) and equipment due to its position.

6.6.1 Requirements

- Planning

- The isolation of hazardous energy sources shall be properly planned, managed, supervised and carried out to prevent incidents, with a documented Safe System of Work that shall:
  - Be in a clear and auditable form
  - Be practical
  - Be working effectively
  - Have clearly defined roles, responsibilities and accountabilities; and
  - Include procedures for periodic review and revision

- Isolation Program
  - Shall be established for all projects whenever the release of energy during replacement, repair, renovation, or modification of machines or equipment, or during installation of new machines or equipment may cause injury to personnel, create property damage, or release a harmful substance to the environment

- Lock and Tag Requirements
  - The Project shall specify the physical appearance of the Locks and Tags to be used on the Project
  - A Tag alone is not sufficient for isolation, a physical Lock is required
  - All isolations must be tested to ensure all energy sources have been properly de-energized
  - Locks shall be uniquely numbered and have a single key
  - Each person working on the system requires their own Lock
  - Tags shall contain a space to identify the person placing the Tag
  - Locks and Tags shall be sufficiently strong to resist inadvertent removal or casual vandalism, and shall not be significantly affected by the ambient environmental conditions

- Delinquent Lock
  - A procedure shall be developed in the event a person has not removed their Lock and/or Tag and cannot be contacted
  - A person familiar with the status of the equipment shall together carry out the following:

- Carry out an inspection of the area, including interlocking equipment to satisfy themselves that there is no person in a position of potential danger, and no equipment is in an unsafe condition
- The Lock and/or Tag shall only be removed on the authority of the Senior Project Manager. An Incident Report shall be completed after the removal

- Logbook
  - The issuance and application of Locks and Tags must be documented
- Testing
  - Testing may arise which requires plant/equipment to be accessed while not subject to isolation. These situations shall be strictly controlled by an approved Risk Assessment and written procedure
- Blinds
  - Are required for pressure testing, vessel entry purposes, and to provide isolation from live systems
  - The use of valves for isolating confined spaces where leakage from the valve may pose a hazard to workers is prohibited
  - Valves will not be used to isolate sections of pipe for pressure testing
  - A system shall be established to identify blinds installed for safety purposes and a process developed for their removal
- Gas/Pressure Testing
  - All isolated lines shall be gas and pressure tested prior to opening
- Supervision
  - A competent person shall supervise all work involving isolations
- Change Management
  - A process shall be in place to control Change Management associated with isolation

6.7 Mobile Equipment and Light Vehicles

6.7.1 Requirements

- Planning
  - The use of mobile equipment and light vehicles shall be properly planned, managed, supervised and carried out to prevent incidents, with a documented Safe System of Work that shall:

- Be in a clear and auditable form
- Be practical
- Be working effectively
- Have clearly defined roles, responsibilities and accountabilities; and
- Include procedures for periodic review and revision

- Safety Equipment
  - All mobile equipment and vehicles shall have back-up alarms suitable to be heard in the work environment
  - All mobile equipment and vehicles shall be equipped with a ABC fire extinguisher and a First Aid kit
  - All mobile equipment shall be equipped with roll-over protective structures as designed and required in accordance with Statutory Regulations
- Safe Operation
  - All personnel using mobile equipment and vehicles shall be in possession of a valid Drivers License or Certificate
  - All mobile equipment or light vehicle shall be kept with lights on when operating or driving
  - All mobile equipment must be fitted with a rotating light
  - Personnel will not start any mobile equipment and vehicle unless they are thoroughly familiar with its operation and they have been authorized to do so
  - Personnel shall not ride on or in equipment, unless in a seat designed for the purpose and equipped with a safety belt. Seat belts must be used at all times
  - Vehicles must be turned off when refuelling; smoking or hot work is prohibited in the vicinity of refuelling
  - Loads shall not be left suspended while the equipment is unattended
  - Equipment with poor visibility or oversized loads shall be moved or "spotted" with the assistance of a Signal Person. The Signal Person will be identified with unique clothing
  - A walk-around shall be done prior to moving any mobile equipment or light vehicle

- All vehicles left unattended will have the parking brake applied and the motor turned off. When necessary reinforce safe parking on grade (edge) terrain using chock blocks on the wheels
- All personnel surrounding mobile equipment shall be aware of its action radius. If a vehicle, equipment or person approaches or needs to enter equipment working area shall make visual –two way – contact with the Operator prior to entering the area
- Heavy mobile equipment shall be accompanied by a Signal Person when moving
- When Maintenance Procedures are to be carried out, equipment will be suitably locked out and tagged or rendered immobile during the maintenance work. All pinch points will be blocked or locked open
- Although it is discouraged, when transporting material that by length or width exceeds mobile equipment or light vehicle size it shall be mandatory to place light reflective signals or flags to notify its presence. Evaluate the need to have an escort vehicle

- Inspection
  - All equipment and vehicles shall be mechanically inspected prior to mobilizing on the Project
  - All equipment and vehicles shall be maintained and operated in accordance with Manufacturer's specifications
  - Equipment and vehicles shall be inspected at the start of each shift, and shall not be operated if conditions pose a hazard to safe operation
- Supervision
  - A competent person shall supervise the use, repair and maintenance of all mobile equipment and light vehicles
- Training
  - All Operators of personnel hoists and platforms shall be trained in the operation. All Drivers and Operators shall know Emergency Procedures and be aware of use of mobile phone, fatigue, alcohol and medication adverse effects when driving
- Change Management
  - A process shall be in place to control Change Management associated with mobile equipment and light vehicles

6.8 Working at Height

This Guidance Note applies whenever work is performed 2.0 metres or more above a permanent floor level, and/or, the situation exists where tools, equipment or anything else can fall or be dropped and cause injury to personnel or damage to equipment.

6.8.1 Requirements

- Planning
  - All work at heights shall be properly planned, managed, supervised and carried out to prevent incidents, with a documented Safe System of Work that shall:
    - Be in a clear and auditable form
    - Be practical
    - Be working effectively
    - Have clearly defined roles, responsibilities and accountabilities; and
    - Include procedures for periodic review and revision
- Anchor Point
  - Where possible, a safety restraint device should be attached to an anchorage point above the point of anchorage on the harness, or in parallel to the back attachment on the harness
  - Anchorage points shall withstand a force of 22kN or 5000 lbs
- Testing
  - There must be a system for ensuring that Fall Protection equipment is:
    - Inspected by the user before use
    - Personal fall prevention and arrest equipment shall not be used if it is damaged or has been exposed to shock-loading
    - Personal fall prevention and arrest equipment that is damaged or has been exposed to shock-loading shall be tagged "Out of Service" and removed from the workplace
    - Personal fall protection and arrest equipment shall be visually inspected and retagged by a competent person every three months and an Inspection Register maintained
- Rescue
  - A Rescue Plan shall be developed prior to commencing any work at heights

- Securing Equipment and Tools
  - Tools, equipment and personal items shall be secured against falling from heights
  - Wrist restraints, tool lanyards and safety helmet chin straps shall be considered
- Platforms
  - Work at heights shall be carried out from permanent platforms when they are suitable for the work
  - When a suitable permanent platform does not exist, a temporary platform shall be provided to prevent the risk of falling, or an alternative method shall be used
  - The working platform shall be of a size and strength to carry the required loading of personnel, tools and materials
  - The Responsible Engineer shall provide engineering input to design or arrange for the design of temporary work platforms that are not scaffolding, and approve those designs when appropriate
- Ladders
  - Where ladders are approved for work at heights, a safety harness shall be worn and used in accordance with standard personal protective equipment
  - If a ladder and secured safety harness is not suited to the task, the work shall not proceed. A further review shall take place to determine if a safe method for the work can be established
  - Employees shall visually inspect ladders and harnesses before use
- Fall Protection
  - Workers shall be 100% tied-off when working above 2 m in unprotected areas
  - Only use approved full body harness with double lanyard
- Working on roofs
  - Any work on a roof requires a Permit to Work
  - A JHA will be developed for all work on roofs
  - Edge protection shall be provided to the perimeter of all roofs. Where edge protection is not installed a work positioning system shall be provided
- Supervision

- A competent person shall supervise all work at heights

- Training
  - All personnel required to work at heights shall be trained on the hazards and control measures available
- Change Management
  - A process shall be in place to control Change Management associated with work at heights

6.9 Steel Erection

6.9.1 Requirements

- Planning
  - Steel erection shall be properly planned, managed, supervised and carried out to prevent incidents, with a documented Safe System of Work that shall:
    - Be in a clear and auditable form
    - Be practical
    - Be working effectively
    - Have clearly defined roles, responsibilities and accountabilities; and
    - Include procedures for periodic review and revision
- Safety Review Meeting
  - Prior to the start of the erection of structural steel or skeletal structure, a Safety Review Meeting shall be held to plan safe execution of the work, and recorded
  - The Construction Manager, as well as the Superintendent and Engineer involved in the work shall be in attendance
  - Job Safety Analysis shall be used to sequence the execution and identify the hazards. The following issues shall be addressed at the Meeting:
    - Delivery - off-loading
    - Placement and storage in lay down areas - stability of material
    - Cranes and rigging - lift calculation forms
    - Fall protection, types - required approvals, 100% tie-off requirement
    - Falling objects - flagging, barricades, securing of tools/equipment
    - Temporary access - ladders, stairwells, scaffolds

- Temporary decking and hand rail requirements
- Erection sequence - structural members, stairwells, decking
- Bolting and fitting, installation of braces
- Temporary guying
- Rescue Plan

- Shall be developed prior to beginning steel erection

- Fall Arrest
  - Fall arrest shall be provided where there exists a fall hazard over 2m
  - Workers shall maintain 100% tie-off. This may necessitate the use of double lanyards
  - Fall arrest equipment such as lifelines and anchors, that are not part of an approved manufactured system, shall be certified by a professional Engineer
  - Engineer specifications for fall arrest anchors and systems shall be incorporated, as far as reasonable and practical into the design of skeletal structures
  - Climbing columns and braces or walking beams is prohibited unless protected by fall protection specific to the hazard
- Multi Piece Lifting
  - Is prohibited, structural steel members shall be rigged and placed singularly
- Containers
  - Proper canvas tool bags with rope handles shall be provided for storing bolts and drift pins. Containers shall be secured against dislodgement when used at elevations
- Access
  - Ladders, scaffolds and stairwells shall provide safe access and egress from work areas
- Tools
  - Impact wrenches shall be provided with retaining devices for sockets
- Material Delivery
  - Material shall be ordered and received to support the installation of permanent floors and stairwells as the erection of structural members progress

- Secure Work Area
  - The use of barricades, barriers and signage to prevent unauthorized access to erection areas is required. Steel erection must not take place over other trades
- Supervision
  - A competent person shall supervise all steel erection
- Change Management
  - A process shall be in place to control Change Management associated with steel erection

6.10 Designing for Safety

This Guidance Note establishes the requirements to identify and effectively manage safety and health risks during the Engineering Design Process to result in the elimination of any potential injuries to people and damage to plant. This Guidance Note applies to all projects where Transnet Capital Projects has engineering design input or control.

6.10.1 Responsibilities for this Guidance Note

The Project Manager or Engineering Manager is responsible for the implementation of this H&S Guidance Note and that it is verified by regular Audits.

Programme Safety Functional Lead is responsible for auditing and conformance to GN.

Programme Engineering Manager is responsible for implementing and enforcing across all projects.

Project Engineering Manager is responsible for implementing and enforcing across all disciplines per project.

6.10.2 Requirements

- Design Safety Objectives
  - List the safety objectives that are important to the Project as agreed by Transnet Capital Projects and the Client. For example:
    - Meet all the requirements of the Client Requirement Specification
    - Provide an 'item' design that is easy and safe to install and maintain
    - Provide an 'item' that allows safe access for operations and maintenance personnel
- Design Safety

- Criteria using the list of Safety Objectives developed above, list the design criteria that will be used to ensure that the safety objectives are met

- Design Safety
  - The Design Safety Methodology is a description of how the Project will be managed from the point of view of Design for Safety tasks and review points
- The Methodology Statement
  - Can be in the form of written text but it is often easier to summarise as a flowchart
  - The Design Safety Methodology should include the following elements:
    - Preliminary Hazard Identification
    - Risk Assessment
    - Hazard Analysis Studies that may be required (HAZAN)
    - Hazard and Operability Studies that may be required (HAZOP)
    - Safety Review Meetings
    - Safety Data
    - Safety Audits
- Design Safety Organisation
  - Show diagrammatically the Designing for Safety Organisation Structure to be adopted for the Project
  - Specifically identify the following:
    - Key Design Personnel and Qualifications
    - Responsibilities and Authority:
      - Sign off resolution for hazards
      - Formal sign-off of design safety criteria
      - Reporting responsibilities
- Hazard Studies
  - Identify list and schedule the hazard studies (Hazop 1 – Hazop 6) that will be undertaken during the detail design phase of a project e.g. HAZANS or HAZOP's
- Project Schedule and Design Safety Milestones

- Project Schedule should be included to identify when each Safety Task shall be completed
- Designing for Safety Milestones are to be identified and included in the overall Project Schedule. Typical milestones may include:
  - Design Reviews
  - Safety Audits
  - Key Design and/or Calculation Verifications
  - Resolution of Identified Hazards
- Periodic Reviews of the overall Design for Safety Program should be scheduled and included in the Project Schedule where applicable

- Design for Safety and the Environment Checklist and Risk Assessment
  - Checklists and Risk Assessment should be completed at the preliminary stage identifying all hazards, completing a Risk Assessment and verifying that identified controls are adequate to complete the design
- Design Safety Verification
  - Specify the Designing for Safety Verification Tasks that will be undertaken in order to ensure the Design Safety objectives and criteria will be met
  - Designing for Safety Design Verifications should be scheduled, to address the following design interfaces; including Transnet Capital Projects and Contractor designs:
    - Intra discipline
    - Across discipline
    - Across defined plant/equipment
    - Between combined plant/equipment/facility
- Supervision
  - A competent person shall supervise the implementation of this standard
- Change Management
  - A process shall be in place to control Change Management associated with Designing for Safety

6.11 Respiratory Protection

6.11.1 Requirements

Planning

- The use of respiratory protective equipment shall be properly planned, managed, supervised and carried out to prevent incidents, with a documented Safe System of Work that shall:
  - Be in a clear and auditable form
  - Be practical
  - Be working effectively
  - Have clearly defined roles, responsibilities and accountabilities; and
  - Include procedures for periodic review and revision

- Respiratory Selection and Use
  - Specific procedures and requirements for the use of respiratory equipment shall be developed as part of Health and Safety Work Plans. Topics to cover include:
    - Assessment of the employee's medical capacity to wear respiratory protection
    - Respiratory selection
    - Fit testing
    - Employee Training and Instruction
    - Respirator Inspection, Cleaning, Maintenance, and Storage
- Seal
  - There can be no obstruction of contact between the wearer's skin and the mask whatsoever. Affected employees shall be required to be clean shaven each day when assigned to use respiratory protection
- Equipment
  - Only equipment that has been certified to a recognized international standard shall be provided
- Medical Surveillance
  - A medical questionnaire for respirator users shall be completed by all potential candidates, prior to respiratory use and reviewed by a licensed Occupational Physician. A more comprehensive medical evaluation may be required based on the results of the questionnaire, or the details of the work assignment. No employee shall be fit tested, or assigned to a task that requires the use of a respirator unless it has been determined that they are physically able to perform the work while using the required respirator

- Compressed Air Systems
  - Compressed air used for respiration shall be of high purity, and shall meet the requirements of a recognized international standard. The Supplier shall certify compliance with these requirements for each lot of breathing air supplied
- Compressed Air Cylinder Systems (Cascade)
  - Breathing air cylinders shall be legibly identified with the word "Breathing Air" by means of stencilling, stamping, or labelling as near to the valve end as practical
  - Cascade Systems shall be equipped with low pressure warning bells or similar warning devices to indicate air pressure in the manifold below 500 psi
  - When a Cascade System is used to supply breathing air, one employee shall be assigned as safety standby within audible range of the low pressure alarm
- Air Compressors
  - Used to supply breathing air shall be equipped with:
    - A trap and carbon filter to remove oil, water, particulate and odour
    - A pressure reducing valve
    - A carbon monoxide alarm calibrated to alarm at 5 ppm
    - Automatic controls to sound an alarm in the event of overheating or compressor failure
    - The compressor intake shall be located to assure that only respirable (uncontaminated) air is admitted
- Supervision
  - A competent person shall supervise the use of respiratory protection
- Change Management

A process shall be in place to control Change Management associated with the use of respiratory protection

6.12 Site Emergency Management

This Guidance Note applies to all Transnet Capital Projects controlled projects, sites or offices.

6.12.1 Requirements

- Planning

- Emergency Management shall be properly planned, managed, supervised and carried out to prevent incidents, with a documented Safe System of Work that shall:
  - Be in a clear and auditable form
  - Be practical
  - Be working effectively
  - Have clearly defined roles, responsibilities and accountabilities; and
  - Include procedures for periodic review and revision

- Written Procedure
  - Based on the services to be provided, a Site Emergency Procedure document is to be prepared
  - As a minimum the following situations should be covered:
    - Roles and responsibilities
    - Fire
    - Personal injury
    - Bomb threat
    - Natural disasters
    - Industrial Action

- Greenfield
  - Prior to commencement of work on site, meet with local Representative of Police, Ambulance, and Fire Departments, and establish requirements for:
    - Reporting emergency situations
    - Response time expected (consideration of distance and availability); and
    - Type of response (equipment availability) contact point
    - A joint Site Inspection is to be arranged to identify any access problems that are likely to be encountered on the site. These are to be noted and corrected, if necessary

- Existing Facility
  - Where work is to be carried out on an existing plant site, discuss existing Emergency Procedures with the Plant Safety Officer and their adequacy for the new work. Agree if existing procedures are to be applied, modified to suit, or new procedures established

- Based on local services available and, if applicable, existing plant services, determine if they are adequate to cover the new work. A written report of the existing situation is required along with recommendations for additional services if required
- The recommendation is to be discussed with the Customer and agreement reached on the use of existing services or the provision of additional services

- Tender
  - The Emergency Procedures are to be included in all Tender/Contract documents involving site work, either in full or advising the Tenderer/Contractor of their presence and requirement for compliance
- Communication
  - All incidents requiring use of the Site Emergency Management Plan will be communicated to the Project via a Job Safety Alert and discussed at the next weekly Toolbox Meeting
- Supervision
  - A competent person shall supervise the Site Emergency Management Program
- Change Management
  - A process shall be in place to control Change Management associated with Site Emergency Management

6.13 Dangerous Goods and Hazardous Substances

This Guidance Note applies to all Transnet Capital Projects activities where dangerous goods or hazardous materials are stored, handled, transported or used.

6.13.1 Requirements

- Planning
  - Working with dangerous goods or hazardous materials shall be properly planned, managed, supervised and carried out to prevent incidents, with a documented Safe System of Work that shall:
    - Be in a clear and auditable form
    - Be practical
    - Be working effectively
    - Have clearly defined roles, responsibilities and accountabilities; and
    - Include procedures for periodic review and revision

- Labelling
  - All hazardous products must be adequately labelled to inform those in the workplace of the hazards and proper controls. Consideration should be given for the various languages spoken in the workplace
- Material Safety Data Sheets (MSDS)
  - MSDS shall be available to employees at the workplace
  - MSDS shall be centrally filed and controlled
  - MSDS will be updated on a regular basis as per applicable legislation
  - Suppliers will be required to supply current MSDS for all shipments of hazardous products
  - Provide for and adhere to MSDS requirements
- Shipping
  - Ensure local legislative requirements are meet for shipping material off site
  - Ensure consideration for material being shipped to different jurisdictions, such as internationally
- Approval
  - All hazardous products brought into a Transnet Capital Projects controlled area must receive approval prior to being brought onto site
- Supervision
  - A competent person shall supervise the use and control of dangerous goods and hazardous substances
- Training
  - All personnel will receive formal training on the hazardous products, including information on labelling and MSDS
  - First use of controlled products by personnel will involve a review of the MSDS and the precautions to be used when handling the products
- Change Management
  - A process shall be in place to control Change Management associated with dangerous goods and hazardous substances

6.14 Explosive Actuated Hand Tools

6.14.1 Requirements

- Planning

- The use of explosive actuated tools shall be properly planned, managed, supervised and carried out to prevent incidents, with a documented Safe System of Work that shall:
  - Be in a clear and auditable form
  - Be practical
  - Be working effectively
  - Have clearly defined roles, responsibilities and accountabilities; and
  - Include procedures for periodic review and revision

- Competent and Authorised Operator(s)
  - To be deemed competent, a person must be able to provide sufficient evidence of having successfully completed a training course based on the Manufacturer's requirements

- Job Safety Analysis (JSA)
  - Shall be performed for all tasks requiring the use of explosive actuated tools. The JSA shall consider, as a minimum, the following:
    - PPE - eye protection – face shield and safety glasses and hearing protection
    - Safe work area – the area shall be roped off and signposted to restrict entry to authorised personnel only
    - Confined or restricted spaces
    - Hazardous hot work site
    - Flying particles of work surfaces
    - Presence of any explosive or flammable gas, dust, or vapour or an atmosphere which is compressed. Do not use explosive powered tools in these circumstances
    - Presence of excessive heat which may cause the charge to be unintentionally exploded. Do not use the explosive powered tool in these circumstances
    - Where operation of explosive powered tools is required in a confined space, at height or in a hazardous hot work area, additional precautions may be required including the requisitioning of a Work Permit

- Misfiring

- In the event of a misfire, observe the Manufacturer's Misfire Precautions and Procedures. Where the Manufacturer has not provided specific instructions, perform a Risk Assessment and implement the necessary Control Measures

- Barricade/Signage
  - At all times when an actuated power tool is being used, appropriate barricades and signage shall be posted to warn personnel in the area or coming into the area
- Equipment
  - The firing of any tool must require two separate actions i.e. pressure on the nozzle and pulling of trigger
- Inspection
  - An explosive powered tool must be inspected in accordance with the Manufacturer's Instructions immediately prior to use on any particular day to ensure it is fully operational and it is free from defect
- Maintenance
  - Authorised users must ensure the Manufacturer's Instructions are observed to ensure each tool is kept in good working order and to ensure it functions correctly
- Repairs
  - Explosive powered tools must only be serviced and repaired by suitably trained persons. Operators of explosive powered tools shall only carry out simple replacement of worn parts which are specifically listed in the Supplier's 'Instructions for Use'
- Storage of Explosive Powered Tool and Charges
  - Persons in control of the explosive actuated tool and charges shall comply with the following requirements:
    - Before and after using the tool, the Operator shall ensure:
      - The charges and unloaded explosive powered tool are in their box or case
      - The box or case is locked
      - When not in use, shall ensure the equipment and charges are stored in separate and secure places
      - Controlled access to tools

- Supervision
  - A competent person shall supervise all work involving the use explosive actuated tools
- Change Management
  - A process shall be in place to control Change Management associated with explosive actuated tools

6.15 Permit to Work

This Guidance Note establishes the project requirements to control work activities, restrictions and responsibilities in hazardous areas, or involving high-risk procedures. This Guidance Note applies to all project activities where personnel wish to perform maintenance or other works in a process area, or non-process area where control of personnel and activities is essential.

6.15.1 Requirements

- Planning
  - Permitting shall be properly planned, managed, supervised and carried out to prevent incidents, with a documented Safe System of Work that shall:
    - Be in a clear and auditable form
    - Be practical
    - Be working effectively
    - Have clearly defined roles, responsibilities and accountabilities; and
    - Include procedures for periodic review and revision
- Permit to Work System shall:
  - Identify, communicate and manage work hazards
  - Provide authorisation to proceed with work
  - Monitor job progress (issue and closure times)
  - Control access to the work site
  - Identify Work Instructions for the work site; and
  - Establish Job Handover and Completion Procedures
- Permits shall be required for the following:
  - Entry into confined spaces
  - Excavation

- Hot Work
- Movement of radiation sources; and
- Work on high voltage equipment and systems

- Job Hazard Analysis (JHA)
  - The person in control of the job shall complete a JSA and communicate its requirements to all persons on the job
- Recordkeeping
  - Permits and JHA shall be kept for 1 month following the task; if an incident is involved during the Permitted Task the Permit shall be attached to the Incident Report
- Supervision
  - A competent person shall issue and supervise all tasks involving a Work Permit
- Change Management
  - A process shall be in place to control Change Management associated with Permits

6.16 Welding, Cutting and Hot Work

6.16.1 Requirements

- Planning
  - All work involving welding, grinding and burning shall be properly planned, managed, supervised and carried out to prevent incidents, with a documented safe system of work that shall:
    - Be in a clear and auditable form
    - Be practical
    - Be working effectively
    - Have clearly defined roles, responsibilities and accountabilities; and
    - Include procedures for periodic review and revision
- Creating less fume
  - Adopting sensible work practices and following manufacturer's guidelines, to avoid generating unnecessary fume. Explore different methods of welding such as, sub arc welding, induction welding, friction welding resistance and

ultrasonic welding all of which will remove the risk of exposure to fumes and gases

- Apply the hierarchy of control when reviewing strategies on fume reduction

- Fire Prevention
  - Prior to starting work the work area shall be checked for flammable and combustible material. Spark and slag shall be contained as much as possible with fire blankets or similar devices. Where sparks cannot be contained and there is a possibility of contact with combustibles, spark watches shall be used
  - Fire protection must be kept in the immediate vicinity of all hot work, and shall be inspected, and on hand, prior to starting work
- Personal Protective Equipment (PPE)
  - Respiratory protection shall be selected in accordance with the hazard
  - Hard hat/hood combinations are required for welding. Safety glasses shall be worn under the hoods
  - Approved goggles shall be used for all torch burning
  - Polycarbonate face shield or equivalent shall be worn for all grinding activities
  - Craftsmen assisting the welders shall be protected in the same manner as the welder when exposed to similar hazard
  - Double eye protection shall be used by welders
- Welding
  - Welding screens shall be installed to protect personnel from exposure to the arc
  - All welding work shall have a separate and proper ground. The ground shall be located as close as possible to the work. Grounds shall not be attached to rotating equipment, stems of valves, or other equipment where a short could damage the equipment
  - Welding cables and Grinding hoses shall be placed in a manner that does not create a tripping hazard
  - Where welding occurs at elevated heights, welding blanket will be placed underneath area where welding occurs, to protect people and equipment underneath
- Grinding

- All grinding tools/wheels will be equipped with a safety guard
- Tool rests will be set 3 mm (1/8 inch) from the face of the grinder and set below the centreline of the wheel
- Grinding stones, disks and wheels will be inspected frequently to ensure no chips or cracks exist which may cause failure; and
- The rated rotational speed of the wheel or disc exceeds that of the grinder to which it is attached
- All 9" grinders shall be fitted with manufactures additional safety back plates

- Burning
  - An approved flashback device shall be used at the gauge and torch end
  - Workers will prevent sparks, flames, or hot objects from coming into contact with cylinders, regulators or hoses
  - A proper striker will be used to light a torch. Cigarette lighters or matches will not be used
- Supervision
  - A competent person shall supervise all welding, grinding or burning activities
- Training
  - All personnel required to perform welding, grinding or burning duties shall be trained on the hazards and control measures available
- Change Management
  - A process shall be in place to control change management associated with welding, grinding and burning operations

6.17 Electrical Safety

6.17.1 Requirements

- Planning
  - All work involving electrical equipment shall be properly planned, managed, supervised and carried out to prevent incidents, with a documented Safe System of Work that shall:
    - Be in a clear and auditable form
    - Be practical

- Be working effectively
- Have clearly defined roles, responsibilities and accountabilities; and
- Include procedures for periodic review and revision

- Electrical Equipment
  - Shall be designed and manufactured in accordance with the appropriate international standard. The Electrical Distribution System shall permit the interconnection and use of the equipment in a manner which does not cause danger to staff or the public
- Operation and Maintenance of Electrical Equipment
  - Electrical equipment shall be operated and maintained in such a manner as to avoid danger to staff or the public and to permit the continued use of the equipment in service
  - Only persons authorized in writing by the Project Manager or Responsible Electrical Engineer shall enter or operate equipment in high voltage switch rooms or substations
- Static Electricity and Lightning
  - The hazards arising from static electricity and lightning shall to be considered, and appropriate measures taken so as to avoid danger
- Certification of Conformance
  - The design of all new or modified electrical equipment or systems to be installed in those areas in which explosive gas, vapour or dust mixtures with air are likely to cause the area to be classified as hazardous shall conform with internationally recognised concepts and the equipment provided with a Certificate of Conformance
- Written Instructions
  - Safe Working Practices for Operation and Maintenance (including Testing) shall be in place for:
    - High Voltage and Low Voltage Distribution System
    - Isolation, Testing and Live Work
    - External Liaison - A defined system shall exist for liaison with external groups
    - Written Authorisations
    - Electrical Distribution Systems

- Access to Written Rules and Documents
- Competence of Staff
- Electrolytic Plants - The hazards arising from electrolytic plants, which involve the use of high currents, shall be considered, and appropriate measure taken to avoid danger
- Pre-commissioning and Commissioning

- Registration and Inspection
  - The following electrical equipment shall be subject to Site Registration and Quarterly Inspection. Registration will allocate a unique identification and colour code:
    - Equipment and systems for use in potentially explosive atmospheres
    - Electrical power tools, cords, cables, portable generators
    - Equipment known or suspected of deterioration and in such location that failure would give rise to a situation hazardous to the public, people on-site or the environment
- Operator Manual
  - Shall be kept at site for each piece of electrical equipment
- Supervision
  - A competent person shall supervise all work with electrical tool or equipment
- Training
  - All personnel required to perform welding, grinding or burning duties shall be trained on the hazards and control measures available
- Change Management
  - A process shall be in place to control Change Management associated with electrical safety hazards

6.18 Blasting and Use of Explosives

6.18.1 Requirements

- No blasting shall take place without the approval of the PM/CM and Client
- Planning

- Blasting and the use of explosives shall be properly planned, managed, supervised and carried out to prevent incidents, with a documented safe system of work that shall:
  - Be in a clear and auditable form
  - Be practical
  - Be working effectively
  - Have clearly defined roles, responsibilities and accountabilities; and
  - Include procedures for periodic review and revision

- Legislative Requirements
  - Ensure compliance with legal requirements for:
    - Blaster Qualifications
    - Handling of Explosives
    - Storage of Explosives
    - Transportation of Explosives
    - Drilling
    - Loading
    - Wiring
    - Firing of Explosives
    - Electrical firing
    - Transmitter Hazards
    - After Blast
    - Misfire
    - All Clear

- Supervision
  - A competent person shall supervise all work involving blasting and explosives

- Change Management
  - A process shall be in place to control change management associated with blasting and explosives

6.19 Scaffolding and Ladders

6.19.1 Requirements

- Planning
  - The use of scaffolding and ladders shall be properly planned, managed, supervised and carried out to prevent incidents, with a documented Safe System of Work that shall:
    - Be in a clear and auditable form
    - Be practical
    - Be working effectively
    - Have clearly defined roles, responsibilities and accountabilities; and
    - Include procedures for periodic review and revision
- Scaffold
  - Shall be designed for their intended purpose and shall be constructed of materials that will not be adversely affected by process or physical conditions
  - All scaffolds must be erected, used, maintained and dismantled in accordance with the Manufacturer Specifications
  - Scaffolds shall only be erected, altered, maintained or demolished by suitably qualified and authorised personnel
- Material Inspection
  - Suppliers shall inspect material prior to site delivery for defect
- Fall Protection
  - Workers shall be protected from falling at all times during the erection and dismantling of a scaffold using approved Fall Protection Method
- Inspection/Tagging
  - Scaffolding shall be inspected/tagged by an authorised person at weekly intervals or more frequently as directed by the responsible Engineer and results recorded. All Inspections shall be documented
- Tagging
  - Scaffold Supervisor shall be responsible for the Inspection and Tagging of scaffolds. The following colour coded Tags shall be used:
    - RED: Scaffold Incomplete - Danger: Do Not Use -This Tag is placed by the Foreman at the start of erection. Red Tags can be placed by any project personnel at any time the scaffold is deemed unsafe for use

- YELLOW: Caution -This Tag is used to indicate special requirements for safe use. One requirement it could indicate is the requirement for fall arrest, due to decking or handrails removed for equipment installation
- GREEN: Safe for Use

- Access to Scaffolding
  - Shall be via an approved stairway or properly installed ladder. The access to each landing shall be unobstructed and shall be protected by a swinging gate. Where possible the gate shall be self-closing
- Damage to Scaffolding
  - Use of a scaffold shall be prohibited immediately upon the scaffold being damaged in any way. Damaged scaffolding shall be repaired as soon as it is practical to do so
- Dismantle of Scaffolding
  - Scaffolds shall be dismantled progressively with items being carried or lowered to the floor. Under no circumstances shall any item be thrown or dropped from the scaffold
- Tie-in
  - Free standing scaffolds shall not exceed a height of 3 times the smallest dimension of its base
- Scaffold Deck
  - Work platform must be free of holes and have handrails/midrails (knee rail) with toe boards and must be installed per legislative requirements for all scaffold over 2 m
- Rolling Scaffold shall:
  - Not be supported on its pneumatic tires during its erection, dismantling or use
  - Have wheels that are equipped with locking devices that are used whenever personnel are on the scaffold
  - Not have personnel on them when they are being moved
- Barricades/Barriers
  - Shall be erected to prevent entry of unauthorised personnel to areas where scaffolding work is being performed and to prevent entry to areas below scaffolding work
- Ladders

- All portable and fixed ladders shall be designed and used in compliance with applicable legislation
- All fixed ladders shall have protection such as a ladder hoop or ladder cage installed according to applicable legislation
- All portable and fixed ladders shall be inspected by personnel on each occasion before use and actions taken to correct defects immediately
- Under no circumstance shall a ladder that has been damaged or is defective in any way be used for any purpose
- Glass reinforced plastic is the preferred material for all portable ladders. Metal ladders and ladders with metal stiles or reinforcing shall not be used for any electrical work
- Ladders shall be installed so that the side rails or stiles rest on firm, level footing with the top or base of the ladder securely fixed to prevent slippage
- Where it is not practical to securely fix the ladder, a person shall be stationed at the foot of the ladder whenever it is being used
- Stepladders may be used without being lashed or otherwise secured to prevent slipping, provided:
  - The floor is non slip, flat and level; and
  - The work is light duty, such as replacing bulbs and fluorescent tubes
- A person working from a stepladder shall not stand any higher than the second step from the top level
- Portable ladders shall be used to provide a safe means of access to all places where persons have to work:
  - Until such time as temporary or permanent stairways are made available; or
  - Where the work to be carried out is light duty e.g. changing light bulbs, and will be completed in a short period of time
- Personal protective equipment (safety harness) shall be worn where a person may fall from a height of 2.0 metres or more (see HAS-GN-0008)
- A ladder shall extend at least one metre above the platform it services. A clear landing space at the head and base of every ladder and an unobstructed, safe access and egress at each landing shall be provided
- Where possible, every ladder shall be used at such an angle that the horizontal distance from the top support to the foot of the ladder is equal to one quarter of the length of the ladder

- Supervision
  - A competent person shall supervise the implementation of this standard
- Change Management
  - A process shall be in place to control Change Management associated with scaffolding and ladders

7. Records

All documents generated during the life of the contract will be retained in terms of the Document Management Procedure for records retention Archiving of Hard Copy Documentation – DOC-P-0013.

TRANSNET GROUP CAPITAL – ENGINEERING & DESIGN SERVICES

CENTRE OF EXCELLENCE

CAD STANDARDS

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DOCUMENTATION SIGN-OFF SHEET

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I, the undersigned hereby approve this procedure.

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1 PURPOSE

1.1 The purpose of this standard is to ensure that all CAD files and drawings are created in a logical and consistent format, and in a manner reflecting consistent design practice during the execution of the projects within Transnet Group Capital.

2 APPLICABILITY

2.1 This standard applies to all personnel within the Engineering and Design Services department of Transnet Group Capital, as well as external contractors and consultants appointed by Transnet Group Capital (TGC), whom are responsible for developing, creating and issuing drawings.

3 SCOPE

3.1 All engineering staff, contractors and consultants that are involved in the production of drawings for TGC, will be issued with this standard and must ensure compliance. It is noted that where fabrication shop details are required, it is not necessary for the contractor to comply with these standards and their own CAD packages may be used.

3.2 General drawing practice shall comply with current discipline-specific South African Standards.

3.3 In certain cases clients may prescribe standards different from this document.

4 REFERENCE DOCUMENTS

Item	Document Number	Description
[1]	ISO 9001	Quality management systems-Requirements
[2]	SANS 10144	Detailing of steel reinforcement for concrete
[3]	SANS 10143	Building Drawing Practice
[4]	SANS 1044-2	Welding Part II: Symbols

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[5]	SANS 10111	Engineering Drawing Part 1,2 and 3
[6]	SANS 282	Bending dimensions of bars for concrete reinforcement
[7]	SYS-P-0001	Transnet Programme Numbering/Codification Procedure
[8]	BS 3939	Graphical symbols for electrical power, telecommunications and electronic diagrams
[9]	BBB0041	Preparation of Drawings for Transnet Freight Rail
[10]	BBB4354	Preparation of Signal Drawings
[11]	BBD 5371	CAD Standard for technical Documentation
[12]	CSE Z 148	Symbols for Signalling
[13]	ENG-P-0105	Engineering Drawings
[14]	ENG-GL-0103	Revision of Technical Documents
[15]	SANS NRS 1002	Graphical symbols for Electrical Diagrams
[16]	South African Institute of Steel Construction (SAISC) Standard	South African Institute of Steel Construction (SAISC) Standard
[17]	Transnet Bridge Code 1983	Transnet Bridge Code 1983

5 DEFINITIONS

Asset: Refers to physical assets such as structures, production and service plant, power, water and waste treatment facilities, distribution networks, transport systems, buildings and other physical assets that a company owns in order to generate revenue.

Infrastructure: Refers to assets that are developed for public sector, utilities, property and transport systems.

Client: Any Transnet body requesting project services from TGC. Any Operating Division of Transnet including TGC RME Department. Any external commercial interest that interfaces with Transnet.

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Engineering Manager: The Engineering resource responsible for management and coordination of engineering and design activities on a project.

Discipline Engineering Lead: The Engineer appointed to ensure the quality and compliance to regulations and performance within a discipline for any given project.

Project: Is a temporary endeavor undertaken to create a unique product, service or result (Project Management Institute).

Project Lifecycle Process: The Project Lifecycle Process (PLP) is a project development framework and methodology based on a stage-gate approach of delivering projects, which is used worldwide to mitigate risks of project overruns and failures.

Owner Requirement Specification: Verifiable requirements that define what the asset / infra-structure will do but not how the asset will do it. These requirement are viewed from the owner's perspective (in cases where the user is different from the owner).

User Requirements Specification: Verifiable requirements that define what the asset / infra-structure will do but not how the asset will do it. These requirement are viewed from the user's perspective (in cases where the user is different from the owner).

Deliverable: Is a product or service that a project produces for its customer, client, or project sponsor. It can be tangible or intangible.

Deliverable Status Matrix: This is a matrix that assigns different status on a deliverable based on its status on the workflow. Each status is also assigned certain percentage that represent the completeness of the deliverable from the beginning of the workflow.

Milestone: It is any threshold, or defined state during which a project transitions to another phase.

Technical Design Review: An event is a forum in which questions pertaining to the infra-structure or project to be designed can be answered, assumptions clarified and advice sought.

Verification: The evaluation of whether or not a product, service, or system complies with a high-level requirement, specification, or imposed condition, or regulation. It is often an internal process.

Gate Reviews: Are a critical element of the PLP Methodology in that they provide assurance at specific review points that the project under consideration is being

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developed or implemented in accordance with the requirements of the methodology and its viability supports approval to proceed to the ensuing phase.

Validation: The assurance that a product, service, or system meets the needs of the customer and other identified stakeholders. It often involves acceptance testing with external customers.

6 ABBREVIATIONS

TGC:	Transnet Group Capital
SI units:	System International units
CAD:	Computer Aided Design
Eng. CoE:	Engineering Centre of Excellence
E&DS:	Engineering and Design Services
2D:	Two Dimensional
3D:	Three Dimensional
DGN:	MicroStation format graphics files and suffix
DWG:	AutoCAD format graphics files and suffix
NTS:	Not to scale

7 ACCOUNTABILITY, RESPONSIBILITY AND AUTHORITY

7.1 Administrators of the Drawing Standards are responsible for monitoring the implementation of the Standards and ensuring adherence to the Standards.

7.2 Any proposed changes to the Drawing Standards must be reviewed by the Engineering and Design Services Centre of Excellence Committee, as constituted from time to time by the General Manager, Engineering and Design Services.

7.3 Final approval vests with the General Manager E&DS.

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8 PROCEDURE

8.1 This standard should be read together with Engineering Procedure ENG-P-0105: Engineering drawings.

8.2 Drawing Standard

8.2.1 Software - only the most current versions of AutoCad and Microstation are to be used.

8.2.2 Units - all drawings will conform to SI units (Systems International).

8.2.3 Language - all notes, comments and text shall be in the English language (UK Standard). All instructions on a drawing shall be in the imperative tense i.e.: "Pipe to be cut", "connection to be welded".

8.3 Templates

8.3.1 A template with all title blocks, text attributes, layer or level controls must be used when starting a new drawing. Templates are set up for each specific discipline i.e. Civil must use their specific templates, Architects their specific template etc. These discipline specific templates contain the discipline specific layer or level control.

8.3.2 Drawings/models must be done in model space. Viewports must then be created in the paper space at the required scale.

8.3.3 Notes must be done in paper space i.e. on the actual drawing sheet.

8.4 Drawing sizes

8.4.1 Long drawings, where necessary for wiring/circuit diagrams, cable run diagrams, track layouts etc. shall be prepared with widths equal to the widths of "A" series sheets, as required.

Table 1 reflects the different drawings sizes per "A" description.

Table 1: Drawing Sizes

Designation	Trimmed Sizes (mm)
A0	841 x 1189
A1	594 x 841
A2	420 x 594
A3	297 x 420
A4	210 x 297

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8.5 Scales

The requirements of scale settings are as follows:

8.5.1 When using model space, the design must always be full size, i.e. active scale = 1:1.

8.5.2 The title block shall not be scaled.

8.5.3 The viewport will be created on the drawing sheet (in paper space) and scaled to the required scale, rather than trying to scale the drawing sheet to a scale.

8.5.4 In the case of non-dimensional drawings such as diagrammatic drawings, the viewport must be scaled to suit the drawing sheet.

8.5.5 Different vertical and horizontal scales may be chosen in order to exaggerate a profile or to clarify thin layers of a section.

Table 2 reflects the preferred scales.

Table 2: Preferred Scales

1:1	1:2	1:5
1:10	1:25	1:50
1:100	1:20	1:500
1:1000	1:200	1:5000
1:10000	1:2000	1:50000
1:100000	1:20000	

8.6 Text Attributes

8.6.1 All text shall be in Arial font, with a width factor of 0.7mm. Table 3 reflects the different text attributes per layer.

Table 3: Text Attributes

Layer	Colour	Line type	Line weight	Plot style	Use/description
T2	WHITE	CONT	0.25	MONO	General text 2.5mm
T3	YELLOW	CONT	0.35	MONO	General text 3.5mm
T5	RED	CONT	0.50	MONO	General text 5.0mm
T7	GREEN	CONT	0.70	MONO	General text 7.0mm

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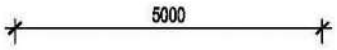
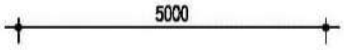
8.7 Dimensioning

8.7.1 All detailed dimensions shall be in millimetres.
8.7.2 All elevations shall be in metres up to 3 decimal places, and clearly indicated, i.e.: EL 23.000 m.
8.7.3 Co-ordinates shall be stated in metres to 3 decimal places.
8.7.4 Dimensioning must be done whilst in paper space, in an active viewport.
8.7.5 This is done so that the dimension size will always be consistent in scale i.e. it will be relative in scale to the scale that the viewport is set at.
8.7.6 Dimensions are not to be exploded.

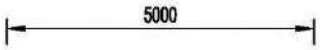
Examples:



Dimension with oblique line



Dimension with dot



Dimension with arrow

Leader

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8.8 Hatching

8.8.1 All hatching to be done in accordance with SANS 10143.

8.9 Layer Control

8.9.1 Standard layers with their own identities will be used in all drawings. The following categories apply:

1. Common layers (without discipline prefix)
2. Architectural layers (A_)
3. Civil layers (C_)
4. Structural layers (S_)
5. Electrical, light and power layers (E_)
6. Mechanical layers (M_)
7. Overhead Track Equipment layers (O_)
8. Signal layers (N_)
9. Telecommunications layers (V_)
10. Bridge layers (B_)
11. Water layers (W_)
12. Perway layers (P_)
13. G.I.S. / Land surveying layers

8.9.2 There are no specific layers set out in this document, save to say that text and all different objects and features must be named in its own layer.

8.9.3 Should further Layers or Levels be required the discipline specific prefix should be used.

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Table 4: Common Layer Category

COMMON LAYERS						
LAYER NAME	**DESCRIPTION**	**COLOUR**	**LINE TYPE**	**LINE WEIGHT**	**PLOT STYLE**	**PLOT**
0	STANDARD LAYER	WHITE	CONT	0.25	MONO	YES
DIMS	DIMENSIONS (PER SCALE)	WHITE	CONT	0.25	MONO	YES
HATCH	GENERAL HATCHING	11	CONT	0.18	MONO	YES
HATCH-252	HATCHING IN COLOUR 252	252	CONT	DEFAULT	COLOUR	YES
HATCH-254	HATCHING IN COLOUR 254	254	CONT	DEFAULT	COLOUR	YES
T2	GENERAL TEXT 2.5mm	WHITE	CONT	0.25	MONO	YES
T3	GENERAL TEXT 3.5mm	YELLOW	CONT	0.35	MONO	YES
T5	GENERAL TEXT 5.0mm	RED	CONT	0.50	MONO	YES
T7	GENERAL TEXT 7.0mm	GREEN	CONT	0.70	MONO	YES
VPORT	VIEWPORTS IN LAYOUTS	254	CONT	DEFAULT	NORMAL	NO
FRAME	TITLE BLOCK FRAME	WHITE	CONT	0.25	MONO	YES
LOGOS	LOGO LAYER	WHITE	CONT	0.25	MONO	YES

Table 5: Architectural Layer Category

ARCHITECTURE						
LAYER NAME	**DESCRIPTION**	**COLOUR**	**LINE TYPE**	**LINE WEIGHT**	**PLOT STYLE**	**PLOT**
A_BR-N	NEW BRICKWALLS	RED	CONT	0.5	MONO	YES
A_BR-X	EXTG BRICKWALLS	YELLOW	CONT	0.35	MONO	YES
A_CONC-N	NEW CONCRETE	GREEN	CONT	0.7	MONO	YES
A_CONC-X	EXTG CONCRETE	YELLOW	CONT	0.35	MONO	YES
A_DOOR	DOORS	MAGENTA	CONT	0.18	MONO	YES
A_FIT	FITTINGS	CYAN	CONT	0.18	MONO	YES
A_FLFIN	FLOOR FINISH	8	CONT	0.13	MONO	YES
A_GRID	GRIDLINES	9	CENTRE	0.18	MONO	YES
A_HIDE	HIDDEN LINES	CYAN	HIDDEN	0.18	MONO	YES
A_PART-N	NEW PARTITIONS	BLUE	CONT	0.7	MONO	YES
A_PART-X	EXTG PARTITIONS	YELLOW	CONT	0.35	MONO	YES
A_REM	DEMOLISH/REMOVE	9	DASHED	0.18	MONO	YES
A_WIN	WINDOWS	MAGENTA	CONT	0.18	MONO	YES
G1	GENERAL 0.18	11	CONT	0.18	MONO	YES
G2	GENERAL 0.25	WHITE	CONT	0.25	MONO	YES
G3	GENERAL 0.35	YELLOW	CONT	0.35	MONO	YES
G5	GENERAL 0.5	RED	CONT	0.5	MONO	YES
G7	GENERAL 0.7	BLUE	CONT	0.7	MONO	YES
H	HATCH	11	CONT	0.18	MONO	YES

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ARCHITECTURE						
LAYER NAME	**DESCRIPTION**	**COLOUR**	**LINE TYPE**	**LINE WEIGHT**	**PLOT STYLE**	**PLOT**
H-252	SOLID HATCH/INFILL	252	CONT	0.25	COLOUR	YES
H-254	SOLID HATCH/INFILL	254	CONT	0.25	COLOUR	YES
A_SITE	SITE AND LOCALITY PLANS	RED	CONT	0.18	MONO	YES
A_DIM	DIMENSIONS	RED	CONT	0.18	MONO	YES
A_BR-N2	CAVITIES	RED	CONT	0.18	MONO	YES
A_SEW	DRAINAGE PLAN	GREEN	CONT	0.40	MONO	YES
A_SW	STORMWATER PLAN &	RED	CONT	0.18	MONO	YES
A_BL	BUILDING LINE	8	HIDDEN	0.13	MONO	YES

Table 6: Civil Layer Category

CIVIL						
NAME	**DESCRIPTION**	**COLOUR**	**LINE TYPE**	**LINE WEIGHT**	**PLOT STYLE**	**PLOT**
C_BENCH	BENCH MARKS	WHITE	CONT	0.25	MONO	YES
C_BLD-N	PROPOSED BUILDINGS	GREEN	CONT	0.35	MONO	YES
C_BLD-X	EXISTING BUILDINGS	RED	CONT	0.18	MONO	YES
C_BRG-N	PROPOSED BRIDGES	GREEN	CONT	0.35	MONO	YES
C_BRG-X	EXISTING BRIDGES	RED	CONT	0.18	MONO	YES
C_CHAIN	CHAINGE	MAGENTA	CONT	0.15	MONO	YES
C_CONC	CONCRETE SURFACING	GREEN	CONT	0.35	MONO	YES
C_CONC-B	CONCRETE BELOW GROUND	YELLOW	DASH	0.25	MONO	YES
C_CRANE	CRANE RAILS & EQUIPMENT	YELLOW	CONT	0.25	MONO	YES
C_CULV-N	PROPOSED CULVERTS	GREEN	CONT	0.35	MONO	YES
C_CULV-X	EXISTING CULVERTS	MAGENTA	CONT	0.15	MONO	YES
C_FNC-PA-X	EXISTING FENCING- PALISADE	MAGENTA	FENCE2	0.15	MONO	YES
C_FNC-PC-X	EXISTING FENCING- PRECAST	MAGENTA	DIVIDE	0.15	MONO	YES
C_FNC-ST-X	EXISTING FENCING-	CYAN	FENCE3	0.25	MONO	YES
C_FNC-PA-N	FENCING-PALISADE	YELLOW	FENCE2	0.25	MONO	YES
C_FNC-PC-N	FENCING-PRECAST CONCRETE	YELLOW	DIVIDE	0.25	MONO	YES
C_FNC-ST-N	FENCING-STEEL/WIRE	YELLOW	FENCE3	0.25	MONO	YES
C_FORM-N	PROPOSED FORMATION	4	CONT	0.70	MONO	YES
C_FORM-X	EXITING FORMATION	41	CONT	0.25	MONO	YES
C_GRID	GRID LINES	251	CONT	0.01	MONO	YES
C_GR-LN	GROUND LINE	MAGENTA	DASH	0.15	MONO	YES
C_KERB-N	PROPOSED KERBING	GREEN	CONT	0.35	MONO	YES
C_KERB-X	EXISTING KERBING	MAGENTA	CONT	0.15	MONO	YES
C_PAV	PAVING	WHITE	CONT	0.25	MONO	YES
C_PREM	PREMIX SURFACING	YELOW	CONT	0.25	MONO	YES
C_RD-M	PROPOSED ROAD MARKINGS	WHITE	CONT	0.25	MONO	YES

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CIVIL						
NAME	**DESCRIPTION**	**COLOUR**	**LINE TYPE**	**LINE WEIGHT**	**PLOT STYLE**	**PLOT**
C_RD-N	EXISTING ROAD MARKINGS	251	CONT	0.01	MONO	YES
C_REM	REMOVED/DEMOLISHED CIVIL	251	HIDDEN	0.01	MONO	YES
C_RES	RESERVOIRS	YELLOW	CONT	0.25	MONO	YES
C_RET	RETAINING STRUCTURES	GREEN	CONT	0.35	MONO	YES
C_SERV	SERVITUDES	93	DASHED2	0.25	MONO	YES
C_SEW-N	PROPOSED SEWER	40	DASH/DOT	0.50	MONO	YES
C_SEW-X	EXISTING SEWER	41	DASH/DOT	0.25	MONO	YES
C_SHORE	SHORE LINE, QUAY WALLS	CYAN	CONT	0.25	MONO	YES
C_SIGN-N	PROPOSED SIGNAGE	WHITE	CONT	0.25	MONO	YES
C_SIGN-X	EXISTING SIGNAGE	251	CONT	0.01	MONO	YES
C_SW-N	PROPOSED STORMWATER	150	DIVIDE	0.50	MONO	YES
C_SW-TXT-	PROPOSED STORMWATER	2	CONT	0.25	MONO	YES
C_SW-X	EXISTING STORMWATER	151	DIVIDE	0.25	MONO	YES
C_SW-TXT-	EXISTING STORMWATER TEXT	MAGENTA	CONT	0.15	MONO	YES
C_STEEL	STEEL STRUCTURES	YELLOW	CONT	0.25	MONO	YES
C_SLEV	SLEEVE PIPES	WHITE	DASH	0.25	MONO	YES
C_TR-CUR	CURVE DATA	WHITE	CONT	0.25	MONO	YES
C_TR-N	PROPOSED RAIL TRACKS	CYAN	CONT	0.5O	MONO	YES
C_TR-X	EXISTING RAIL TRACKS	251	CONT	0.01	MONO	YES
C_TR-T	TEMPORARY RAIL TRACKS	YELLOW	CONT	0.25	MONO	YES
C_TUN-N	PROPOSED TUNNELS	102	DASH	0.70	MONO	YES
C_TUN-X	EXISTING TUNNELS	101	DASH	0.25	MONO	YES
C_WR-N	PROPOSED WATER	80	BORDER	0.50	MONO	YES
C_WR-X	EXISTING WATER	81	BORDER	0.25	MONO	YES
C_BB	BANK BOTTOM EXISTING	35	HIDDEN	0.25	MONO	YES
C_BT	BANK TOP EXISTING	35	DASHED	0.25	MONO	YES
C_BA	BANK BATTER EXISTING	35	CONT	0.25	MONO	YES
C_BB-N	BANK BOTTOM NEW	41	HIDDEN	0.25	MONO	YES
C_BT-N	BANK TOP NEW	41	DASHED	0.25	MONO	YES
C_BA-N	BANK BATTER NEW	41	CONT	0.25	MONO	YES
C_SHORE	SHORE LINE	CYAN	CONT	0.25	MONO	YES
C_QUAY	QUAY WALL	GREEN	CONT	0.25	MONO	YES
C_FIRE-E	FIRE EQUIPMENT	RED	CONT	0.25	MONO	YES
C_FIRE-P	FIRE SUPPLY PIPING	RED	DASHDOT	0.25	MONO	YES

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Table 7: Structures Layer Category

STRUCTURES						
NAME	**DESCRIPTION**	**COLOUR**	**LINE TYPE**	**LINE WEIGHT**	**PLOT STYLE**	**PLOT**
S_STEEL1	DETAIL1:5/1:10	GREEN	CONT	0.7	MONO	YES
S_STEEL2	PLAN/SECT/ELEV	WHITE	CONT	0.5	MONO	YES
S_STEEL3	DET/PLAN/SECT	YELLOW	DASHED	0.25	MONO	YES
S_STEEL4	DETAIL1:2	CYAN	CONT	1.2	MONO	YES
S_STEEL5	PLAN/SECT/ELEV	RED	CONT	0.18	MONO	YES
S_STEEL6	PLAN/SECT/ELEV	RED	DASHED	0.18	MONO	YES
S_STEEL7	PLAN/SECT/ELEV	RED	CENTRE	0.18	MONO	YES
S_STEEL8	DETAILS	YELLOW	DASHED	0.25	MONO	YES
S_STEEL9	EXISTING	RED	DASH/DOT	0.18	MONO	YES
S_STEEL10	EXISTING	YELLOW	DASH/DOT	0.25	MONO	YES
S_STEEL11	PLAN/SECT/ELEV	YELLOW	CONT	0.25	MONO	YES
S_STEEL12	PLAN/SECT/ELEV	YELLOW	CENTRE	0.18	MONO	YES
S_STEEL13	DETAILS	WHITE	DASHED	0.05	MONO	YES
S_CONC1	FOUND/PLAN	GREEN	CONT	0.7	MONO	YES
S_CONC2	REBAR DETAIL	GREEN	CONT	0.7	MONO	YES
S_CONC3	REBAR FOUND	YELLOW	CONT	0.25	MONO	YES
S_CONC4	REBAR FOUND	YELLOW	DASHED	0.25	MONO	YES
S_CONC5	REBAR FOUND	WHITE	CONT	0.5	MONO	YES
S_CONC6	REBAR FOUND	WHITE	DASHED	0.5	MONO	YES
S_CONC7	REBAR FOUND	RED	CENTRE	0.18	MONO	YES
S_CONC8	REBAR FOUND	BLUE	CONT	1.0	MONO	YES
S_WALLS	WALLS	RED	CONT	0.18	MONO	YES
S_HATCH	PROPOSED HATCH	8	CONT	0.01	MONO	YES
S_HATCH EX	EXISTING HATCH	15	Cont	0.065	MONO	YES
S_SLABLINE	SLAB LINE	MAGENTA	Cont	0.18	MOMO	YES
S_REBAR	REBAR	CYAN	CONT	0.50	MONO	YES
S_COLUMN	COLUMN PLAN	GREEN	CONT	0.35	MONO	YES
S_CONC	CONCRETE SECTION	CYAN	CONT	0.5	MONO	YES
S_CONC	CONCRETE SECTION HATCH	8	CONT	0.01	MONO	YES
S_REBAR	REBAR SECTION	RED	CONT	0.18	MONO	YES
S_DIMENSIO	DIMENSION	RED	CONT	0.18	MONO	YES
S_BEAM_DS	BEAM DS	BLUE	CONT	0.7	MONO	YES
S_BEAM_US	BEAM US	BLUE	CONT	0.7	MONO	YES

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Table 8: Electrical, Lighting and Power Layer Category

ELECTRICAL, LIGHTING AND POWER						
NAME	**DESCRIPTION**	**COLOUR**	**LINE TYPE**	**LINE WEIGHT**	**PLOT STYLE**	**PLOT**
E_CABLE	ELECTRICAL CABLES BELOW SURFACE	222	ELEC-1	0.35	MONO	YES
E_CDUCT	DOWN CONDUCTORS	BLUE	CONT	0.70	MONO	YES
E_COND	CONDUITS	WHITE	DASH	0.25	MONO	YES
E_DBOARD	DISTRIBUTION BOARDS	YELLOW	CONT	0.35	MONO	YES
E_EARTH	EARTH SPIKE	RED	CONT	0.50	MONO	YES
E_EX	EXISTING ELECTRICAL	9	CONT	0.18	SCREEN60	YES
E_LUM	LUMINAIRES	RED	CONT	0.50	MONO	YES
E_PSKIRT	POWER SKIRTING	245	DASH	2.00	MONO	YES
E_REM	REMOVED/OBSOLETE ELEC ITEMS	CYAN	DASH	0.25	MONO	YES
E_SW-SOC	LIGHT SWITCHES, SOCKET OUTLETS	WHITE	CONT	0.25	MONO	YES
E_WIRE	ELECTRICAL WIRING	YELLOW	CONT	0.35	MONO	YES
E_ELP	ELECTRICAL LIGHT POLE	RED	CONT	0.25	MONO	YES
E_HLM	HIGH LIGHT MAST	RED	CONT	0.25	MONO	YES

Table 9: Mechanical Layer Category

MECHANICAL						
NAME	**DESCRIPTION**	**COLOUR**	**LINE TYPE**	**LINE WEIGHT**	**PLOT STYLE**	**PLOT**
M_AIRCON	AIRCONDITIONERS	MAGENTA	CONT	0.25	MONO	YES
M_DUCT	AIRCON DUCTING	WHITE	CONT	0.25	MONO	YES
M_FANS	EXTRACTOR & CEILING FANS	CYAN	CONT	0.25	MONO	YES

Table 10: Overhead Track Equipment Layer Category

OVERHEAD TRACK EQUIPMENT						
NAME	**DESCRIPTION**	**COLOUR**	**LINE TYPE**	**LINE WEIGHT**	**PLOT STYLE**	**PLOT**
O_STRC-X	EXISTING STRUCTURES	WHITE	CONT	0.25	MONO	YES
O_STRC-N	PROP. STRUCTURES	RED	CONT	0.50	MONO	YES
O_MOFF-X	EXISTING MAKE OFF WIRES	WHITE	CONT	0.70	MONO	YES
O_MOFF-N	PROP MAKE OFF WIRES	RED	CONT	0. 50	MONO	YES
O-EARTH-X	EXISTING EARTH WIRE	WHITE	CONT	0.18	MONO	YES
O-EARTH-N	PROP EARTH WIRE	BLUE	DASH	0.30	MONO	YES
O-TLINE-X	EXISTING TRANS -MISSION LINE	WHITE	CONT	0.50	MONO	YES
O-TLINE-N	PROP TRANS -MISSION LINE	GREEN	CONT	0.35	MONO	YES
O_NEG RET-	EXISTING NEG. RETURN	WHITE	C-DOT	0.35	MONO	YES
O_NEG RET-	PROP NEG. RETURN	BLUE	C-DOT	0.50	MONO	YES

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Table 11: Signals Layer Category

SIGNALS (Refer to Specification for Preparation of Signal Drawings – BBB4354)

Table 12: Telecommunications Layer Category

TELECOMMUNICATIONS						
NAME	**DESCRIPTION**	**COLOUR**	**LINE TYPE**	**LINE WEIGHT**	**PLOT STYLE**	**PLOT**
V_CBL-N	PROPOSED COMMS CABLES	202	PHANTOM	0.70	MONO	YES
V_CBL-X	EXISTING COMMS CABLES	201	PHANTOM	0.25	MONO	YES
V_NAV	NAVIGATION EQUIPMENT	214	CONT	0.25	MONO	YES
V_OPTIC-N	PROPOSED FIBER OPTIC CABLE	192	PHANT2	0.70	MONO	YES
V_OPTIC-X	EXISTING FIBRE OPTIC CABLE	191	PHANT2	0.25	MONO	YES
V_PNT-N	PROPOSED VOICE/DATA POINT	YELLOW	CONT	0.35	MONO	YES
V_PNT-X	EXISTING VOICE/DATA POINT	9	CONT	0.18	MONO	YES
V_REM	REMOVED/OBSOLETE COMMS ITEMS	CYAN	DASH	0.25	MONO	YES

Table 13: Bridge and Marine Layer Category

BRIDGE/MARINE						
NAME	**DESCRIPTION**	**COLOUR**	**LINE TYPE**	**LINE WEIGHT**	**PLOT STYLE**	**PLOT**
B_ABUT	ABUTMENT	GREEN	CONT	0.5	MONO	YES
B_BOL	BOLLARD	GREEN	CONT	0.5	MONO	YES
B_BORE	BOREHOLES	YELLOW	CONT	0.25	MONO	YES
B_CENT	CENTRE LINE	RED	CENTRE	0.18	MONO	YES
B_CONC	CONCRETE	GREEN	CONT	0.5	MONO	YES
B_CONTH	CONCRETE THIN	RED	CONT	0.18	MONO	YES
B_CONTHK	CONCRETE THIC	GREEN	CONT	0.5	MONO	YES
B_CONMED	CONCRETE MED	YELLOW	CONT	0.25	MONO	YES
B_CONHIDTH	CONC HIDE THIN	RED	DASHED	0.18	MONO	YES
B_CONHIDTH	CONC HIDE THIC	YELLOW	DASHED	0.25	MONO	YES
B_CONCHIDM	CONC HIDE MED	WHITE	DASHED	0.35	MONO	YES
B_CONCHAT	CONC HATCH	RED	CONT	0.18	MONO	YES
B_CONCSHAD	CONC SHADE	11	GREYSCAL		GREY	YES
B_CONCSHAD	CONC SHADE	12	GREYSCAL		GREY	YES
B_CONCSHAD	CONC SHADE	13	GREYSCAL		GREY	YES
B_CONCPIPE	CONC PIPES	WHITE	CONT	0.35	MONO	YES
B_CONTT	CONTOUR INTER	RED	CONT	0.18	MONO	YES
B_CONTMN	CONTOUR MAIN	YELLOW	CONT	0.25	MONO	YES
B_CADAS	CADASTRALS	RED	CONT	0.18	MONO	YES

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BRIDGE/MARINE						
NAME	**DESCRIPTION**	**COLOUR**	**LINE TYPE**	**LINE WEIGHT**	**PLOT STYLE**	**PLOT**
B_CAISS	CAISSONS	WHITE	CONT	0.35	MONO	YES
B_COORD	COORDINATES	YELLOW	CONT	0.25	MONO	YES
B_DECK	DECK SLAB	WHITE	CONT	0.35	MONO	YES
B_EXIST	EXISTING	RED	CONT	0.18	MONO	YES
B-FEND	FENDERS	WHITE	CONT	0.35	MONO	YES
B_FIREHYD	FIRE HYDRANT	WHITE	CONT	0.35	MONO	YES
B_GRID	GRID LINES	RED	CENTRE	0.18	MONO	YES
B_HAND	HANDRAILING	WHITE	CONT	0.35	MONO	YES
B_KEYPL	KEY PLAN	YELLOW	CONT	0.25	MONO	YES
B_LOGRID	LO GRIDLINES	RED	CONT	0.18	MONO	YES
B_MANH	MANHOLES	WHITE	CONT	0.35	MONO	YES
B_MASCAP	MASS CAPPING	WHITE	CONT	0.35	MONO	YES
B_PAVE	PAVING	WHITE	CONT	0.35	MONO	YES
B_PARA	PARAPETS	WHITE	CONT	0.35	MONO	YES
B_PCBEAM	PC BEAMS	WHITE	CONT	0.35	MONO	YES
B_PIER	PIERS	WHITE	CONT	0.35	MONO	YES
B_REINFTHN	REBAR THIN	RED	CONT	0.18	MONO	YES
B_REINFTHC	REBAR THICK	GREEN	CONT	0.5	MONO	YES
B_REINFMED	REBAR MEDIUM	WHITE	CONT	0.35	MONO	YES
B_REINFHIDT	REBAR HIDE THN	RED	DASHED	0.18	MONO	YES
B_REINFHIDM	REBAT HIDE MED	YELLOW	DASHED	0.25	MONO	YES
B_REINFDIM	REBAR DIMENS	RED	CONT	0.18	MONO	YES
B_STEEL	STEEL WORKS	WHITE	CONT	0.35	MONO	YES
B_SLTDRAIN	SLOT DRAIN	WHITE	CONT	0.35	MONO	YES
B_WGS	WGS84 GRID	RED	CONT	0.18	MONO	YES
B_WWALL	WING WALLS	WHITE	CONT	0.35	MONO	YES
B_RETWALL	RETAIN WALL	WHITE	CONT	0.35	MONO	YES
B_GEN1	GENERAL 0.18	RED	CONT	0.18	MONO	YES
B_GEN2	GENARAL 0.25	YELLOW	CONT	0.25	MONO	YES
B_GEN3	GENERAL 0.35	WHITE	CONT	0.35	MONO	YES
B_GEN4	GENERAL 0.5	GREEN	CONT	0.5	MONO	YES
B_GEN5	GENERAL 0.7	CYAN	CONT	0.7	MONO	YES

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Table 14: Water Layer Category

WATER (CIVIL)						
NAME	**DESCRIPTION**	**COLOUR**	**LINE TYPE**	**LINE WEIGHT**	**PLOT STYLE**	**PLOT**
W_PROP1	OIL SEP/BLDGS	GREEN	CONT	0.5	MONO	YES
W_PROP2	STRUCTURES	GREEN	DASHED	0.5	MONO	YES
W_PROP3	PIPES	WHITE	CENTRE	0.5	MONO	YES
W_REBAR1	LAYOUT	WHITE	CONT	0.7	MONO	YES
W_REBAR2	REINFORCING	BLUE	CONT	0.7	MONO	YES
W_REBAR3	REINFORCING	BLUE	DASHED	0.7	MONO	YES
W_REBAR4	LAYOUT	WHITE	DASHED	0.7	MONO	YES

Table 15: Perway Layer Category

PERWAY LAYERS						
NAME	**DESCRIPTION**	**COLOUR**	**LINE TYPE**	**LINE WEIGHT**	**PLOT STYLE**	**PLOT**
P_CAT-G	CATTLE GRID	GREEN	CONT	0.25	MONO	YES
P_GEOT	GEOTECHNICAL DATA	WHITE	CONT	0.25	MONO	YES
P_GR-LAY	LAYERWORKS	35	CONT	0.25	MONO	YES
P_TACHY-T	TACHY TEXT	WHITE	CONT	0.25	MONO	YES
P_TACHY-L	TACHY LEVEL	WHITE	CONT	0.25	MONO	YES
P_TACHY-L	TACHY POINTS	WHITE	CONT	0.25	MONO	YES
P_RD-G	ROAD GRAVEL	41	DASHED	0.25	MONO	YES
P_RD-M	ROAD MAIN	WHITE	CONT	0.25	MONO	YES
P_RD-S	ROAD SIGNS	WHITE	CONT	0.25	MONO	YES
P_TR-DES	TRACK DESIGN	RED	CONT	0.25	MONO	YES
P_TR-CO	TRACK CO-ORDS	WHITE	CONT	0.25	MONO	YES
P_TR-F	TRACK FUTURE	ORANGE	CONT	0.25	MONO	YES
P_TR-C	TRACK CENTRE LINE	WHITE	CENTER	0.25	MONO	YES
P_TR-TO	TRACK TURNOUTS	WHITE	CONT	0.25	MONO	YES
P_TR-UP	TRACK UPLIFT	252	HIDDEN	0.25	MONO	YES
P_TR-S	TRACK SLEEPERS	WHITE	CONT	0.25	MONO	YES
P_TR-R	TRACK RAILS	WHITE	CONT	0.25	MONO	YES
P_TR-EQ	TRACK EQUIPMENT	WHITE	CONT	0.25	MONO	YES
P_TR-SUR	TRACK SURVEYED	WHITE	CONT	0.25	MONO	YES
P_TEL-T	CABLE ROUTE TELCOM	201	PHANTOM	0.25	MONO	YES
P_TEL-N	CABLE ROUTE NEOTEL	201	DIVIDE	0.25	MONO	YES
P_TEL-TR	CABLE ROUTE TRANSNET	201	DASHDOT	0.25	MONO	YES
P_SUBS-D	SUBSOIL DRAIN, GEOFABRIC,	111	CONT	0.25	MONO	YES

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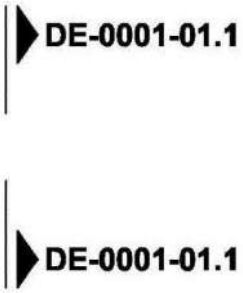
8.10 Section Lines

8.10.1 Section lines are to be as below. They are to be inserted as a block from the symbols library.



8.11 North Point

8.11.1 The North Point below is to be used. It is to be inserted as a block from the symbols library.

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8.12 The Title Block

8.12.1 The Title Block must reflect the following information:

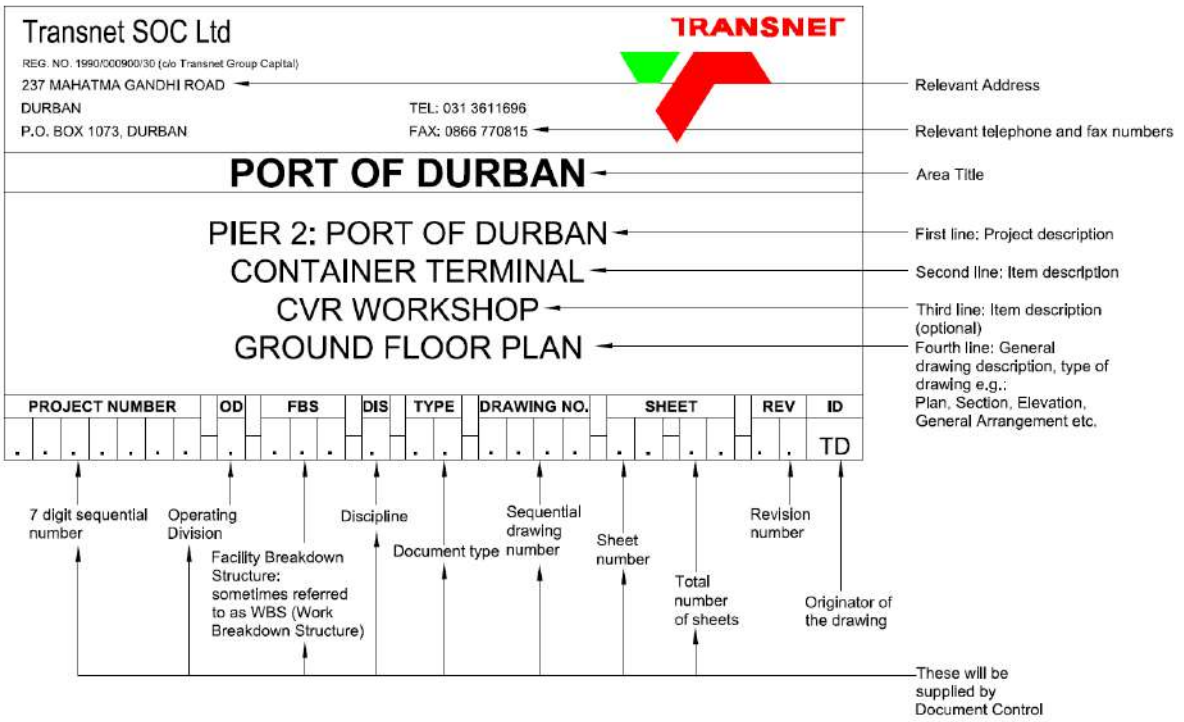

Figure 1: Title Block Format

8.13 Fields in the Signature Block

The Fields in the title block must reflect the following:

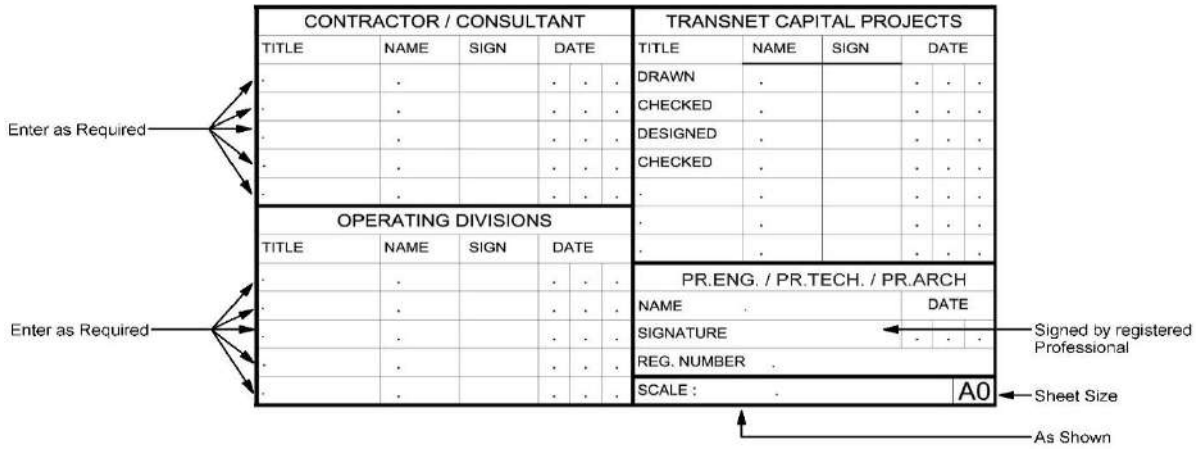

Figure 2: Fields in the Signature Block

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8.14 Revised Drawings

8.14.1 All amendments to drawings must be clearly referenced and indicated on the original drawing together with the draughtperson's name and date.

8.14.2 The amendment block has provision for a checker's signature, an approval signature and a date.

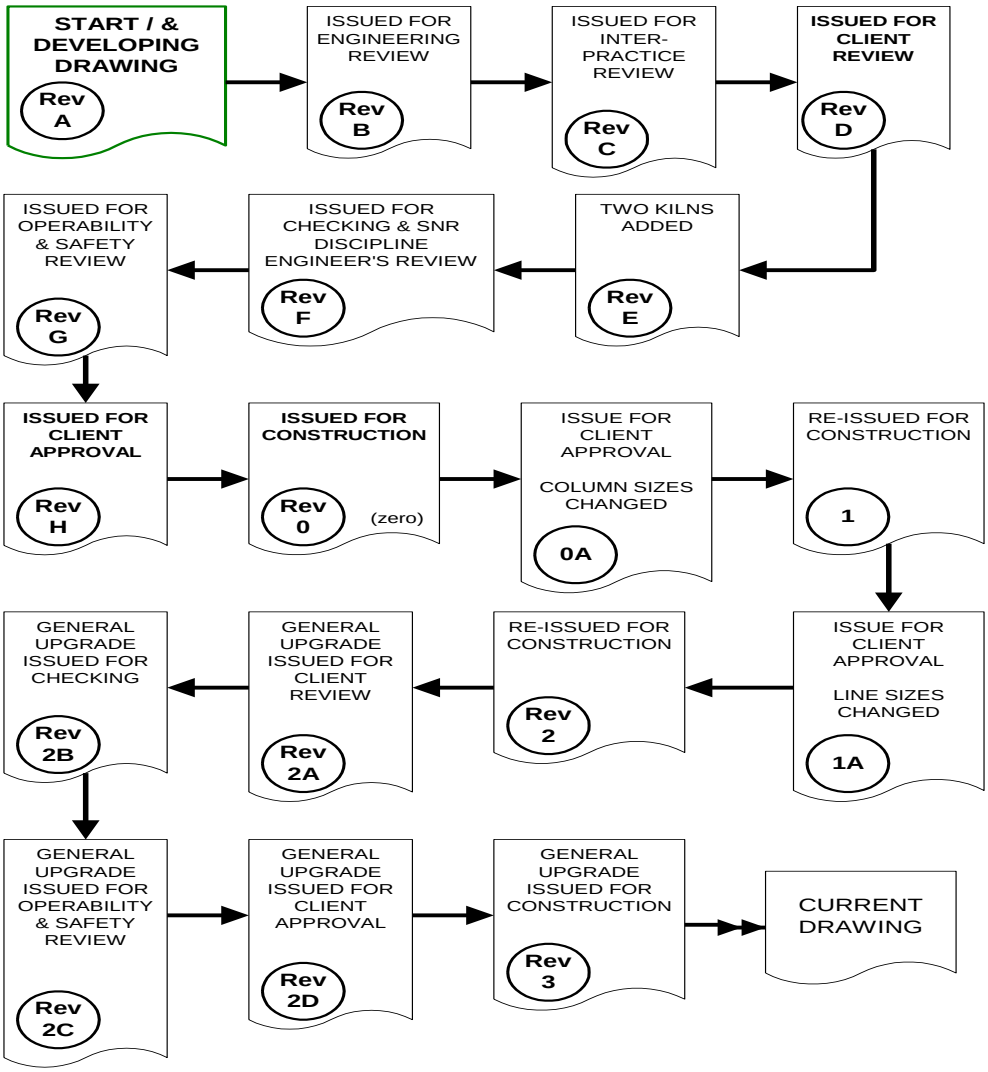

Fig 3: Drawing Numbering Sequence

Drawings and amendments to drawings shall be indexed as follows and as reflected in Fig. 3 above:

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8.14.3 Internal TGC and Client issue (Squad Checks, Client Approval/s, Gate Review) and Issued for Tender shall be in alphabetical sequence marked with the applicable review description.

8.14.4 Construction drawings: No. to be numerical ie.: 0, 1, 2, 3 etc.

8.14.5 As built drawings: ZZ

8.14.6 All drawings shall have the revision raised to the next applicable revision reference (as stated above) which shall be inserted in the revision box of the drawing title block before any drafting is started.

8.14.7 Previously revised drawings to be saved as and re-named to reflect the current revision number. Revisions to be noted from bottom to top and previous revision clouds to be removed from drawings.

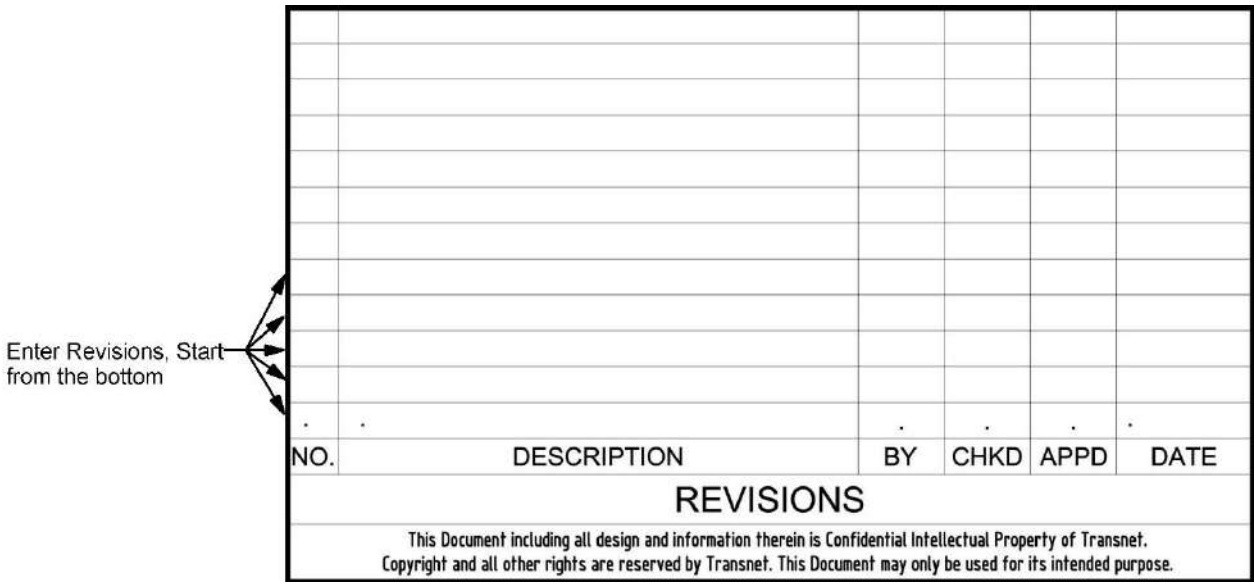

Figure 4: Revisions in the Title Block

8.15 Revision & Hold Clouds

8.15.1 All revised aspects on a drawing must be annotated by means of a "Revision" cloud wherever practical and a triangle with the revision number therein.

8.15.2 "Hold" clouds should be used wherever applicable and practical to indicate hold status within the drawing.

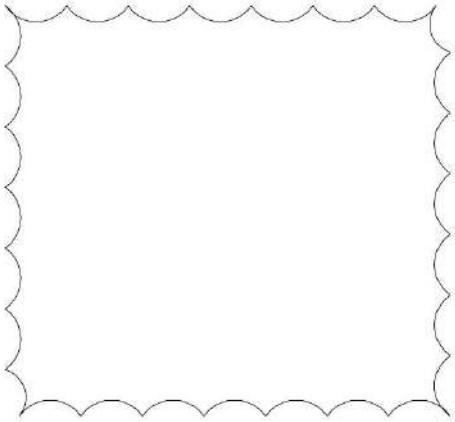

Figure 5: "Hold" Cloud

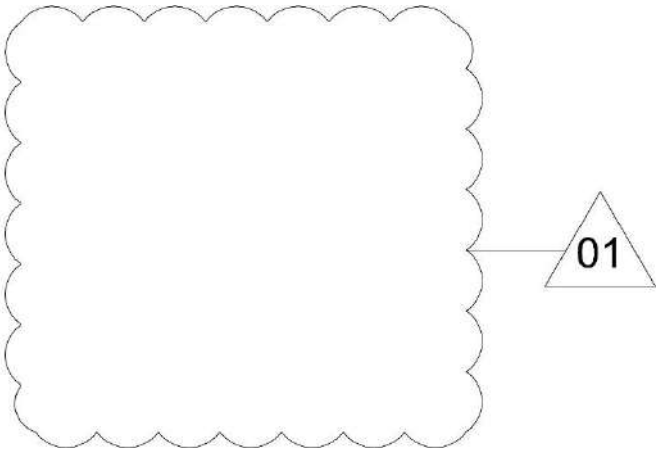

Figure 6: "Revision" Cloud

8.16 Reference Drawings

Drawing number as reflected in drawing title.

Drawing description as per general drawing description in title block.

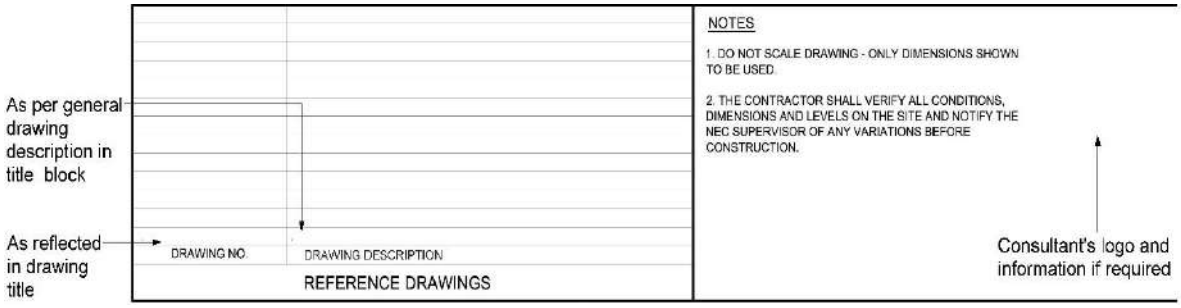

Figure 7: Reference Drawings

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8.17 Key Plan usage

8.17.1 Key plans for different areas in the project are provided and should be referenced in. This approach allows any changes to the key plan to appear immediately on all drawings plotted from that point on.

Note: The drawing subject area is to be hatched on the current drawing.

8.18 Symbols and abbreviations

8.18.1 For Standard symbols Refer to:

- SANS 10143: Building drawing practice
- BBB0041: Preparation of drawings for Transnet Freight Rail
- SANS 1044: Welding Part II: Symbols
- BS 3939: Graphical symbols for electrical power, telecommunications and electronic diagrams
- Z148: Symbols for Signalling

8.18.2 If it is necessary to use symbols which are not standard national symbols, or located on the Transnet template, a new symbol may be created with its description tabled on the applicable drawing.

8.19 Identification of Views

All views shall be identified in the following format:

8.19.1 The two main forms of projection shall be used namely third and first angle projection.

8.19.2 Indicate scale only if scale varies from title block scale.

8.19.3 Reference to a drawing where a section or a detail was taken is required if the view is shown on another drawing.

8.19.4 Letters shall be used for details. Numbers shall be used for elevations and sections. Do not use letters "I" and "O"

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Table 16: Identification of Views

Type	Format	Example
Details	Alpha	DETAIL A
Section	Numeric	SECTION 1
View	Alpha	VIEW X
Items	Alpha	ITEM A – TROLLEY FRAME

9 RECORDS

9.1 All documents generated under this procedure, shall be retained in terms of the Document Management Procedure for Records Retention Archiving of Hard Copy Documents – DOC-P-0013.

10 REVIEW CYCLE

This document to be reviewed within:

6 months	
1 year	
2 years	
3 years	X

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11 ANNEXURES

Not Applicable.

TRANSNET GROUP CAPITAL

ENVIRONMENT & SUSTAINABILITY

CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN (CEMP)

ENV-STD-001 Rev04

Document Control

This document will be managed and controlled in terms of the Transnet Document, Data and Records Management Procedure.

Revision History

Author	Date	Description	Revision
Khathutshelo Tshipala	15 September 2011	Construction Environmental Management Plan (CEMP)	00
Khathutshelo Tshipala	22 January 2013	Construction Environmental Management Plan (CEMP)	01
Biance Schoeman	14 September 2015	Construction Environmental Management Plan (CEMP)	02
Biance Schoeman	01 June 2016	Construction Environmental Management Plan (CEMP)	03
Nonkululeko Hadebe	30 November 2017	Construction Environmental Management Plan (CEMP)	04

This document has been reviewed by:

Reviewer	Date reviewed
Stehan Bouwer	30 November 2017

Document Approvals List

This document has been approved by

Name	Designation	Signature	Date approved
Khathutshelo Tshipala	Executive Manager: Environment and Sustainability		30 November 2017

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1 Purpose

This document describes the main environmental management requirements that the Contractor must comply with during the construction phase to ensure that the environment is considered, negative impacts avoided or minimised, and positive impacts enhanced. This document is critical to the principal Contractor and the Contractor's Environmental Officer (EO) as well as any sub-contractors performing work on the principal Contractor's behalf.

The purpose of this Document is to:

- Describe how project environmental risks will be identified and managed during the construction phase;
- Detail the roles and responsibilities of all parties with respect to environmental management during construction;
- Outline the organisational structure for effective implementation of the CEMP;
- Assist the Contractor in understanding the requirements of complying with the CEMP and any relevant specifications; and
- Provide a set of standards for environmental management during the construction phase.

2 Scope

This standard applies to Contractors that work on site under the control of Transnet Group Capital (TGC).

3 Abbreviations and Definitions

3.1 Abbreviations

Abbreviation	Meaning
CEMP	Construction Environmental Management Plan
CV	Curriculum Vitae
DEA	Department of Environmental Affairs
EA	Environmental Authorisation
ECO	Environmental Control Officer
EO	Environmental Officer

Abbreviation	Meaning
EGF	Environmental Governance Framework
EMP	Environmental Management Plan
EMPr	Environmental Management Programme
NEMA	National Environmental Management Act 107 of 1998 (as amended)
NCR	Non-conformance Report
PES	Project Environmental Specification
SES	Standard Environmental Specification
SHEQ	Safety, Health, Environment and Quality
TGC	Transnet Group Capital
CM	Construction Manager
PEM	Project Environmental Manager
PM	Project Manager

3.2 Definitions

Compliance The action or fact of complying with legislation or regulations.

Conformance The action or fact of conforming to this standard and other internal policies, procedures, guidelines and best practice.

Construction Manager Works together with the Project Manager and the TGC EO to ensure that construction proceeds in accordance with the relevant specifications and agreed schedule.

Contractor The Principal Contractor as engaged by Transnet Group Capital for infrastructure construction operations, including all sub-contractors appointed by the main contractor of his own volition for the execution of parts of the construction operations; and any other contractor from time to time engaged by Transnet Group Capital directly in connection with any part of the construction operations which is not a nominated sub-contractor to the Principal Contractor.

Contractor's Environmental Officer	Contractor's Environmental Officer responsible for ensuring compliance with the CEMP.
Corrective Action	It is generally a reactive process used to address problems after they have occurred. Corrective action may be triggered by a variety of events, e.g. Non-conformance to documented procedures and work instructions, non-conformances raised through internal audits, unacceptable monitoring and measurement results, internal & external SHEQ complaints, etc.
Emergency	Sudden unforeseen event needing immediate or prompt action.
Environment	Surroundings in which the Contractor operates, including air, water, land, natural resources, flora, fauna, humans and their interrelations.
Environmental Aspect	Element of a Contractor's activities, products or services that can interact with the environment and cause an environmental impact (e.g. dust, noise etc.).
Environmental Authorisation	Environmental Authorisation is the authorisation granted by a competent authority of a listed activity or specified activity in terms of National Environmental Management Act 107 of 1998 (as amended).
Environmental Impact	Any change to the environment, whether adverse or beneficial, wholly or partially resulting from a Contractor's activities, products or services.
Environmental Management Plan	A plan generated by the Contractor describing the relevant roles and responsibilities and how potential environmental risks will be assessed and managed including the monitoring and recording thereof.

Environmental Management Programme	A programme that has been approved by the Competent Authority in terms of NEMA, 107 of 1998 stipulating information on any proposed management, mitigation, protection or remedial measures that will be undertaken to address the environmental impacts that have been identified
Environmental Risk	The product of the likelihood and severity of an unforeseen occurrence/incident/aspect and the impact it would have, if realised, on the environment
Incident/Occurrence	An undesired event occurring at work that results in physical harm to a person or death, or damage to the environment, plant and/or equipment, and/or loss of production.
Method Statement	A document that describes how the Contractor will implement environmental management measures associated with a particular environmental aspect during construction.
Non-conformance	An action or situation that does not conform to Transnet/TGC's SHEQ standards, procedures or legislative requirement(s) and that can be, or lead to, an unacceptable SHEQ incident.
Non-compliance	Contravention to environmental legislative requirements.
Project Environmental Manager	Works together with the Project Manager and Construction Manager to ensure that the requirements of the CEMP/SES and applicable PES are met.
Project Manager	A person/s, as appointed by Transnet, responsible for the overall management and implementation of a project.

4 Overview of the CEMP

It is the stated goal of TGC to implement sustainable environmental management practices within the organisation. This will apply to the planning, design, construction, operation, restoration, reuse and decommissioning activities related to all infrastructure development, upgrade and maintenance. The CEMP is the tool used to ensure this goal is achieved during the construction and commissioning phases. Some decommissioning may occur during site clearing in brownfield sites and this CEMP will also apply to those activities.

The CEMP has been developed in line with the requirements of all relevant South African Environmental Legislation and Standards of Best Practice.

The CEMP and associated documents or specifications as well as the EA will be included in the Tender Documents issued to the prospective Contractors. The Contractors will incorporate all requirements set out in the specifications in their submissions to TGC.

There are two types of environmental specifications:

- **Standard Environmental Specification** (SES) describes the minimum standards for environmental management for a range of environmental aspects associated with all construction projects with which the Contractor must comply.
- **Project Environmental Specification** (PES) describes standards specific to a particular project. Variations and additions to the SES are set out in this PES. These would include the EA issued to the project or elements generally drawn from the EA or permits for that project or from specific requirements set by TGC Clients. The PES may also require a more stringent standard to that described in the SES if required by the EA or a particular industry code to which Transnet subscribes including any environmental constraints at a construction site. The PES need not be a separate document; however it can be in a format of an appendix/addendum making reference to environmental authorisation(s), permit(s) or licence(s) applicable to the project. In cases where the project does not trigger any of the NEMA listed activities or any permit(s)/licence(s), the PES may be compiled to prescribe additional environmental management measures over and above the measures stipulated on the SES.

The specifications are configured as performance specifications to ensure that TGC and any entities that enter into formal agreements with TGC achieve the required level of environmental performance.

NOTE: No advice, approval of method statements or any other form of communication from TGC will be construed as an acceptance by TGC of any obligation that indemnifies the Contractor from achieving any required level of performance. Further, there is no acceptance of liability by TGC which may result from the Contractor failing to comply with the specifications, i.e. the Contractor remains responsible for achieving the required performance levels.

5 Implementation of the CEMP

5.1 Roles and Responsibilities

5.1.1 TGC Project Environmental Manager (PEM)

The TGC PEM will be responsible for ensuring that the CEMP and associated specifications or requirements are complied with during construction. The TGC PEM will report functionally to the TGC Senior Manager: Environment and Sustainability, and relevant Project Manager.

Specific tasks during the construction stage will include:

- Liaison with the relevant authorities;
- Preparation of the PES;
- Tender evaluation, development of environmental criteria and adjudication thereof;
- Review all reports from the Environmental Officer/Specialist, including sign off on Method Statements and Monthly Audit reports;
- Conduct any environmental incident enquiries;
- Identify, with support from the TGC Construction Manager; the need for corrective or remedial measures with regard to proposed works;
- Ensure induction material includes project appropriate environmental issues;
- Approve training programmes and other awareness initiatives;
- Coordinate or facilitate internal environmental audits;
- Sign-off on audit reports prepared by ECOs; and
- Prepare environmental monitoring protocols (if monitoring to be done by Environmental Officer and not by an outside consultant).

The TGC PEM may delegate part or all of these responsibilities to the TGC Environmental Officer, based on the merits of the particular project at hand.

5.1.2 TGC Construction Manager

The TGC Construction Manager has overall responsibility for environmental management on site which includes the implementation of the CEMP, SES and PES and reports to the Project Manager. The TGC Construction Manager is supported by the TGC Environmental Officer/Specialist.

The specific environmental tasks for TGC the Construction Manager during the construction phase will include:

- Reviewing the monthly reports compiled by the TGC Environmental Officer/Specialist;
- Communicating directly with the Contractors on environmental issues observed on site; and
- Issuing non-conformance notifications to Contractors in consultation with the TGC Environmental Officer/Specialist

5.1.3 TGC Environmental Officer

The TGC Environmental Officer reports functionally to the TGC Construction Manager and TGC PEM and is responsible for conducting the tasks required to ensure that the CEMP, SES and PES are implemented on the construction site.

The TGC Environmental Officer will conduct the following tasks:

- Ensure that environmental issues receive adequate attention in the site induction training;
- Prepare Risk Reports;
- Prepare and conduct environmental awareness training, as and when required (e.g. posters, tool box talks, signage);
- Generate an inspection checklist prior to the project commencement for sign off by the TGC PEM;
- Review and approve site layout plan;
- Conduct monthly observation & inspection of all work places based on the approved inspection checklist;
- Monitor the Contractor's compliance with the CEMP, SES and PES;

- Develop an Audit Finding and Close out Register that documents all audit findings, close out actions and the time frame allowed for in order to close the finding/s;
- Ensure that all environmental monitoring programmes (sampling, measuring, recording etc. when specified) are carried out according to protocols and schedules;
- Measurement of completed work (e.g. areas top soiled, re-vegetated, stabilised etc.);
- Attendance at scheduled SHE meetings, as and when required, and project coordination meetings;
- Ensure that site documentation (permits, EA, EMPr, CEMP, method statements, audit reports, waste disposal slips etc.) related to environmental management is maintained on the relevant Document Control System;
- Inspect and report on environmental incidents and check corrective action;
- Keep a photographic record of all environmental incidents;
- Completion of Flash Reports for all Level 1 and 2 environmental incidents;
- Implementation of environmental-related actions arising from the minutes of scheduled meetings;
- Management of complaints register;
- Review and Sign off Method Statements prepared by Contractor's EO, as delegated by the TGC PEM;
- Audit conformance to Environmental Method Statements;
- Collate information received, including monitoring results into a monthly report that is supported with photographic records to the TGC Construction Manager showing progress against targets; and
- Report environmental performance of the project on a monthly basis through relevant governance channels.

The key deliverables will include the compilation of:

- Project Start Up Checklist
- Monthly Inspection Checklist
- Monthly Environmental Audit Report
- Monitoring Results, where required
- Flash reports
- Incident investigation Reports
- Environmental Incident Register
- Environmental Non-Conformance Register & Reports
- Complaints Register

- Method Statements Register
- Site Close Out Inspection
- Site Close-Out Reports

5.1.4 Environmental Control Officer

The Environmental Control Officer (ECO) is an independent person legally appointed to monitor compliance of construction related activities with the conditions of the Environmental Authorisation. The ECO fulfils an autonomous role and submits audit reports to the Competent Authority at intervals specified in the EA.

The ECO will conduct the following tasks:

- Monitor compliance to the conditions of the EA, EMPr and can include permits and licenses applicable to a project;
- Attend project meetings as and when required;
- Conduct audits at a frequency stipulated on the EA/EMPr; and
- Compile audit reports and submits them to relevant authorities.

5.1.5 Contractor's Environmental Officer

The Contractor will appoint an Environmental Officer before commencement of any work on site whose role is to ensure implementation of the requirements of the CEMP, SES and PES where applicable. The Contractor will submit the name and CV of the Environmental Officer as well as an Environmental Management Plan detailing roles and responsibilities with their tender submission. The Environmental Officer should have relevant environmental qualifications and experience required for the project. The level of qualifications and experience will depend on the complexity of the project and the sensitivity of the site. This will be for TGC's approval and no work can commence on site if this has not been done.

The Contractor's Environmental Plan will include, but not be limited to:

- Contractor's Environmental Organogram;
- A description of environmental management responsibilities of the Contractor's Project Manager, Contractor's Site Manager and the Contractor's Environmental Officer;
- A signed and dated organisational Environmental Policy;
- Environmental Method Statements; and

- Project-specific Environmental Management Plan;

The Contractor's Environmental Officer will liaise with the TGC Environmental Officer on site. It will be the responsibility of the Contractor's Environmental Officer to ensure that all work is conducted according to the approved Environmental Method Statements and that the roles and responsibilities as set out in this document are fulfilled. The Contractor Environmental Officer's tasks will include:

- Daily and weekly inspections of the work area(s) as per schedule or authorised through written instruction by TGC PEM or Environmental Officer. The Contractor is referred to Section 7 for an example of the items that will need to be inspected and which items will be audited by the TGC Environmental Officer;
- Prepare project-specific activity/aspect based Environmental Method Statements;
- Identify local, provincial and national environmental legislation that applies to the Contractor's activities;
- Ensure conformance/compliance to the CEMP, SES, PES, licenses and permits and approved Environmental Method Statements;
- Conduct ongoing Environmental Awareness Training of the Contractor's site personnel;
- Reporting, investigating and recording of any environmental incidents caused by the Contractor or due to the Contractor's activities, including their sub-contractors;
- Close out of environmental incidents;
- Attendance at all SHE meetings and induction programmes, and toolbox talks where required
- Monitor Waste Management;
- Monitor Water and Energy use;
- Ensure that environmental signage and barriers are correctly placed;
- Taking required corrective action within specified time frame and close out of non-conformances;
- Maintain site documentation related to environmental management (permits, CEMP, method statements, EA, reports, audits, monitoring results, receipts for waste removal etc.). Documentation to be maintained on the relevant site Document Control System;
- The compilation of the Project Environmental Management File
- Hazardous Substances Register; and
- Ensure the environmental file content is scanned monthly or in intervals agreed to by the TGC EO, as per the TGC index and submitted to the TGC document control monthly.

The Contractor's Environmental Officer will be expected to submit daily/weekly checklists as agreed by the TGC Environmental Officer to the TGC Environmental Officer.

When the Contractor's Environmental Officer is replaced after the person has been approved by TGC, the Contractor will submit a CV of a replacement Environmental Officer who has at least the same level of qualification and experience of the previous approved person for approval by the TGC Environmental Officer and TGC Construction Manager. No work can proceed until the replacement Environmental Officer has been approved.

5.1.6 The Contractor

The Contractor shall comply with the requirements of the CEMP and abide by the TGC Project Manager's and TGC Environmental Officer/Specialist's instructions regarding the implementation of the CEMP.

The Declaration of Understanding, as detailed in **Section 6**, must be signed during tender stage, and a signed copy must be submitted to the TGC Environmental Officer prior to the start of construction.

Section 6 details some of the main actions required from the Contractor at various stages during the contract. The TGC Environmental Officer will monitor that all of these actions are undertaken in accordance with the CEMP.

It must be noted, however, that **Section 6** does not list all the requirements of the CEMP, but rather serves as a guide as to where definite actions are required before certain activities can commence. It should be read in conjunction with the SES, and the PES.

Section 7 contains aspects that will be subject to regular inspections and audits by the various parties.

5.2 Organisational structure

The organisational structure identifies and defines the responsibilities and authority of the various entities involved in the project. All instructions and official communications regarding environmental matters will follow the organisational structure shown in **Figure 1**.

All instructions that relate to the CEMP will be given to the Contractor via the TGC Project Manager. In an emergency situation, however, the TGC Environmental Officer may give an instruction directly to the Contractor. Environmental Management of the site will be an item on the agenda of the monthly site meetings, and the TGC Environmental Officer will attend these meetings on request by the Contractor. If at any time the TGC Project Manager is uncertain in any way with respect to an environmentally related issue or specification in the CEMP, he will consult with the TGC PEM.

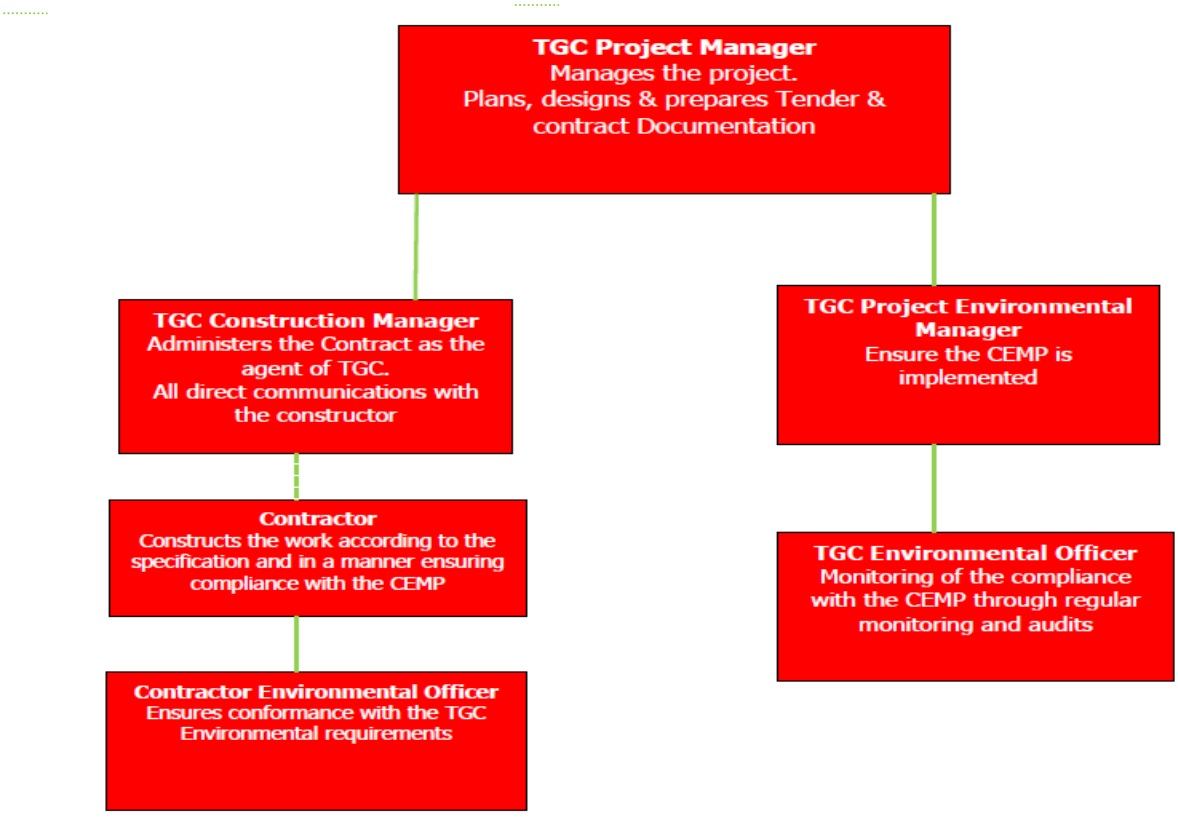

Figure 1: Typical TGC Organogram for Construction

5.3 Availability of the CEMP

Copies of the relevant CEMP documentation (SES, & PES, and any Contractor's Guideline Documents) must be available at the site offices of the Contractor and/or on site.

5.4 Project Environmental Management Plan

The Contractor is required to submit an Environmental Management Plan (EMP) with his Tender Documents. The EMP should describe the relevant roles and responsibilities and how potential environmental risks will be assessed and managed including the monitoring and recording thereof. These will be used to establish a Contractor's competency and experience of preventing and managing potential environmental impacts.

5.5 Environmental Method Statements

Environmental Method Statements are written submissions by the Contractor to the TGC Construction Manager and Environmental Officer describing:

- The proposed activity, setting out the plant, equipment, materials, labour and method the Contractor proposes using to carry out an activity;
- The environmental management of site conditions – waste management, housekeeping, site establishment;
- Transportation of the equipment to and from site;
- How the equipment/ material will be moved while on site;
- How and where material will be stored;
- The containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur;
- Timing and location of activities;
- Description of potential positive and negative environmental impacts and how they will be managed;
- Conformance/ non-conformance with the Standard Environmental Specification and any other statutory and best practice standards;
- Monitoring and reporting requirements;
- Records Management; and
- Any other information deemed necessary by the TGC Construction Manager and TGC EO as well as ECO where applicable.

The Contractor will compile Activity/Aspect-based Environmental Method Statements for all activities proposed. The Environmental Method Statements will enable the potential positive and negative environmental impacts associated with the proposed construction activity to be identified and mitigation measures put in place. All method statements must be signed by both the Contractor and TGC CM and EO, with the addition of the ECO on authorised projects, thereby indicating that the works will be carried out according to the methodology described therein.

Activities may only commence once the Environmental Method Statements have been approved by the TGC PEM, Construction Manager and/or ECO. In some instances local authorities may also need to approve the method statements. This will be highlighted in the Project Environmental Specification, when applicable.

All changes to the original Method Statements must be approved by the TGC PEM/EO and/or TGC Construction Manager prior to implementation. The Contractor, TGC CM, EO and/or ECO will also be required to re-sign the amended Environmental Method Statement.

To enable timely approvals, the environmental method statements will be submitted to the TGC Construction Manager and TGC Environmental Officer for review **two (2) weeks** prior to the intended date of commencement of the activity, or as directed by the TGC Project Manager/Construction Manager.

Where changes to the work methodology are proposed, Environmental Method Statements must be amended accordingly and signed off by all relevant parties as indicated above. These Environmental Method Statements MUST contain sufficient information and detail to enable the TGC Construction Manager and/or Environmental Officer to apply their minds to the potential impacts of the works on the environment. The Contractor will also need to thoroughly understand what is required of him/her in order to undertake the works.

The initial Environmental Method Statements required for submission and approval are listed in the environmental specifications. Others may be requested by the TGC Construction Manager and/or TGC Environmental Officer/ECO during the Contract.

An explanatory example of an environmental method statement on the pro forma method statement sheet to be completed has been included as **Annexure B**.

5.6 Environmental Incidents

Environmental incidents are classified under four levels: 1, 2, 3 and 4. For the purpose of this document; they are defined as follows:

5.6.1 Level 1 Environmental Incident

An incident or sequel of incidents, whether immediate or delayed, that results or has the potential to result in:

- A significant impact on the physical or biological environment (air, ground, water and habitat) with extensive or long term impairment of ecosystem function or surface and ground water resources.
- An inconvenience/ disturbance/disruption/annoyance (including odour, dust, noise, traffic problem, loss of water supply) of a long duration or with a long term impact on interested and affected parties. A release of material (gas, liquid, solid) or energy that will cause chronic illness, permanent lost time injury, fatality or extensive property damage experienced by interested and affected parties.
- Irreparable damage to highly valued structures and sacred locations.
- Public or national / international media outcry.
- Instances where inspections undertaken by or for the regulator to check legal compliance, were found to be outside the permitted limits and have resulted in prosecution.

Where the environmental impact of a Level 2 environmental incident is still present 120 days after occurrence, the incident will be reclassified as a Level 1 incident.

NOTE: A Level 1 environmental incident usually should be reported to the authorities, the incident usually results in significant pollution and may entail risk of public danger. Level 1 environmental incidents usually cause an irreversible impact even with the involvement of long-term external intervention i.e. expertise, best available technology, remedial actions, excessive financial cost etc.

5.6.2 Level 2 Environmental Incident

An incident or sequel of incidents, whether immediate or delayed, that results or has the potential to result in:

- A moderate impact on the physical or biological environment (air, ground, water or habitat) with limited impairment of ecosystem function and/or surface and ground water resources.
- An inconvenience disturbance/ disruption/annoyance (including odour, dust, noise, traffic problems, loss of water supply) of moderate or with medium effect on interested and affected parties.
- A release of material (gas, liquid, solid) or energy that causes severe but reversible illness, non-lost time injury or moderate property damage experienced by interested and affected parties.
- Damage to rare structures of cultural significance or significant infringement of cultural values / sacred locations.
- Attention from local media or widespread complaints.
- Instances where inspections undertaken by or for the regulator to check legal compliance have been outside the permitted limits and an official pre-directive or directive was issued.
- Inability of Contractors to close out corrective actions in an NCR without proper reason.

NOTE: A Level 2 environmental incident may be reported to the authorities, can result in significant pollution or my entail risk of public danger. The impact of Level 2 environmental incidents should be reversible within a short to medium term with or without intervention.

5.6.3 Level 3 Environmental Incident

An incident or sequel of incidents, whether immediate or delayed, that results or has the potential to result in:

- A minor impact on the physical or biological environment (air, ground, water or habitat), with no significant or long-term impairment to the ecosystem function or surface/ground water resources.
- An inconvenience / disturbance / disruption / annoyance (including odour, dust, noise, traffic problems, loss of water supply) of short duration and with no long-term effect on the employees and the community.
- A release of material (gas, liquid, solid) or energy that has the potential to cause illness, or that causes short term discomfort or reversible health effect to interested and affected parties.
- Isolated complaints by interested and affected parties.

- Instances where inspections undertaken taken by or for the regulator to check for legal compliance, have been outside the permitted limits and a non-compliance notice was issued.

NOTE: A Level 3 environmental incident is not reportable to authorities, should not result in pollution and may not have a risk of public danger. The impact of Level 3 environmental incidents should be insignificant immediately after occurrence and/or once-off intervention on the day of occurrence.

5.6.4 Level 4 Environmental Incident

A minor incident with lesser significance that did not necessarily result in damage or injury but that had the potential to cause damage to the environment, including:

- Could result in service disruption with a lesser significance;
- Did not necessarily result in damage; and/or
- Had the potential, under different circumstances, to cause major damage to the environment

In the event of an environmental incident, the Contractor will follow the following procedure:

Step 1:	Immediately take all reasonable measures to contain and minimise the effects of the incident, including its effects on the environment and any risks posed by the incident to the health, safety and property of persons;
Step 2:	Telephonically notify the TGC Environmental Officer and follow up in writing within ***one(1) working day*** including the following information: the nature of the incident and initial classification; substances involved with quantities; initial measures taken to minimise impacts; causes of the incident; measures taken and proposed to avoid the reoccurrence of the incident;
Step 3:	Step 3: Report the incident on all relevant documents and systems - TGC Environmental Incident Register; TGC Environmental Incident Report and TGC Incident Flash Report;
Step 4:	Undertake clean-up procedures;
Step 5:	Remedy the effects of the incident; and

Step 6: Assess the immediate and long-term effects of the incident on the environment and on public health;

In the event of any Level 1 or 2 environmental incidents, the Contractor's Environmental Officer must complete a TGC Incident Flash Report (FAC-FAT-0005); TGC Environmental Incident Report and document the incident on the TGC Environmental Incident Register.

In the event of any Level 1 or 2 environmental incidents, the TGC Environmental Officer will:

- Ensure that an Incident Flash Report (FAC-FAT-0005) has been compiled and that it contains the necessary information; and
- Ensure that Contractor has complied with relevant Transnet protocols on Occurrence Management.

In the event of any Level 3 environmental incident, the Contractor's Environmental Officer must complete a TGC Environmental Incident Report and document the incident on the TGC Environmental Incident Register.

In the event of any Level 4 environmental incidents, the Contractor's Environmental Officer must document the incident on the TGC Environmental Incident Register and/or the Contractor's Incident Register.

In the event of an incident (regardless of level) occurring, the TGC EO shall ensure that the problem statement on the report is clear, the actual or potential consequences are noted, and priority mitigation actions and responsibility for actions are indicated where necessary.

5.7 Public Complaints

Any public complaint received shall be dealt with as depicted in Figure 2.

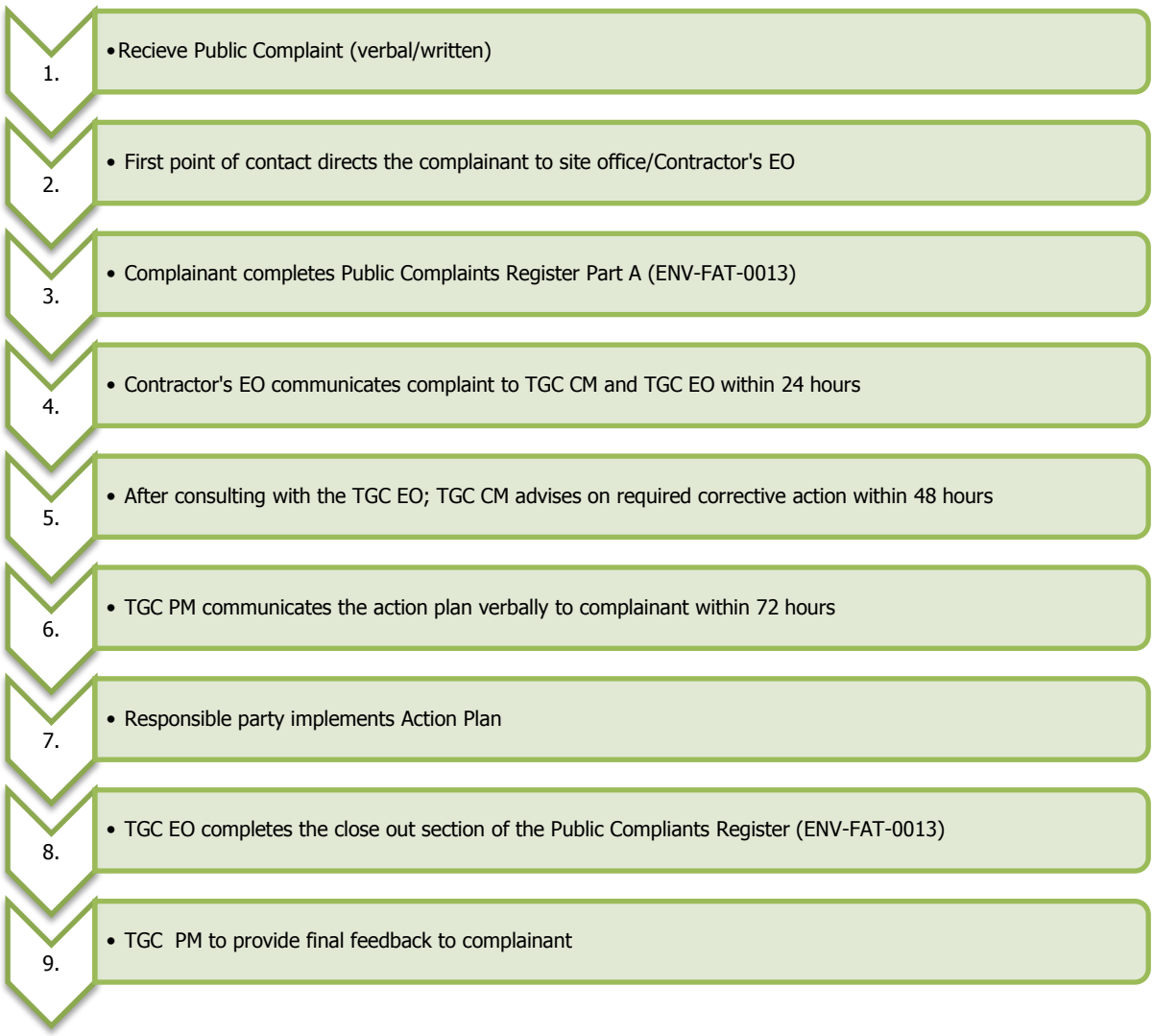

Figure 2: Public Complaints Procedure

5.8 Environmental Non-Conformances

A non-conformance may be issued to the Contractor by the TGC Project Manager/Construction Manager/Environmental Officer where:

- The incident response procedure described in section 5.6 above (including administrative requirements) was not successfully implemented; or
- There are repeated incidents due to inadequate environmental practices on site;
- Documentation required to comply with the CEMP is not prepared or maintained adequately on site; or

- Any non-compliance/non-conformance with the requirements of the Environmental Authorisations, the CEMP, permit(s), licence(s) and Environmental Specifications are identified.

Any environmental non-conformance will be dealt with similarly to a *Defect* as defined in the Contract. A defect is due to non-compliance with the *Works Information* and it is the responsibility of the Contractor to correct the defect in order to ensure that the work takes place in accordance with the *Works Information*. Similarly, non-conformance with the CEMP and SES or with any other permit or licence will be regarded as a non-conformance with the *Works Information*. The Contractor is responsible to rectify any *defect* (non-conformance) as defined above promptly.

The Contractor's EO shall be responsible to search for and identify non-conformances with the environmental specifications at inspection intervals agreed to with the TGC Environmental Officer. The TGC Environmental Officer shall also undertake such inspections on a monthly basis. If such monthly inspections indicate that any part of the Contractor's work is non-conformant with the requirements of the CEMP, permit(s), licence(s), the TGC Environmental Officer shall complete an Environmental Non-Conformance Report and advise the TGC PM to issue a Defects Notification to the Contractor accordingly. The Contractor shall correct the non-conformance (defect) within the timeframes specified in the report and notification and submit proof of such correction to the TGC Environmental Officer by virtue of a completed Non-Conformance Report and up to date Non-Conformance Register.

The Contractor shall be responsible to rectify all environmental non-conformances at the time depicted as per Non-conformances that have not been rectified by the defects in the Contract date, the TGC Environmental Officer shall not issue the Contractor with a Site Closure Certificate. In such an event, the Supervisor may also make use of any reasonable contractual means to rectify the non-conformance(s) as allowed by the Contract (retention moneys etc.).

If the defect (non-conformance) is not corrected within the Defect Correction Period, the TGC Construction Manager can assess the cost of correction by others, and this amount needs to be paid by the Contractor.

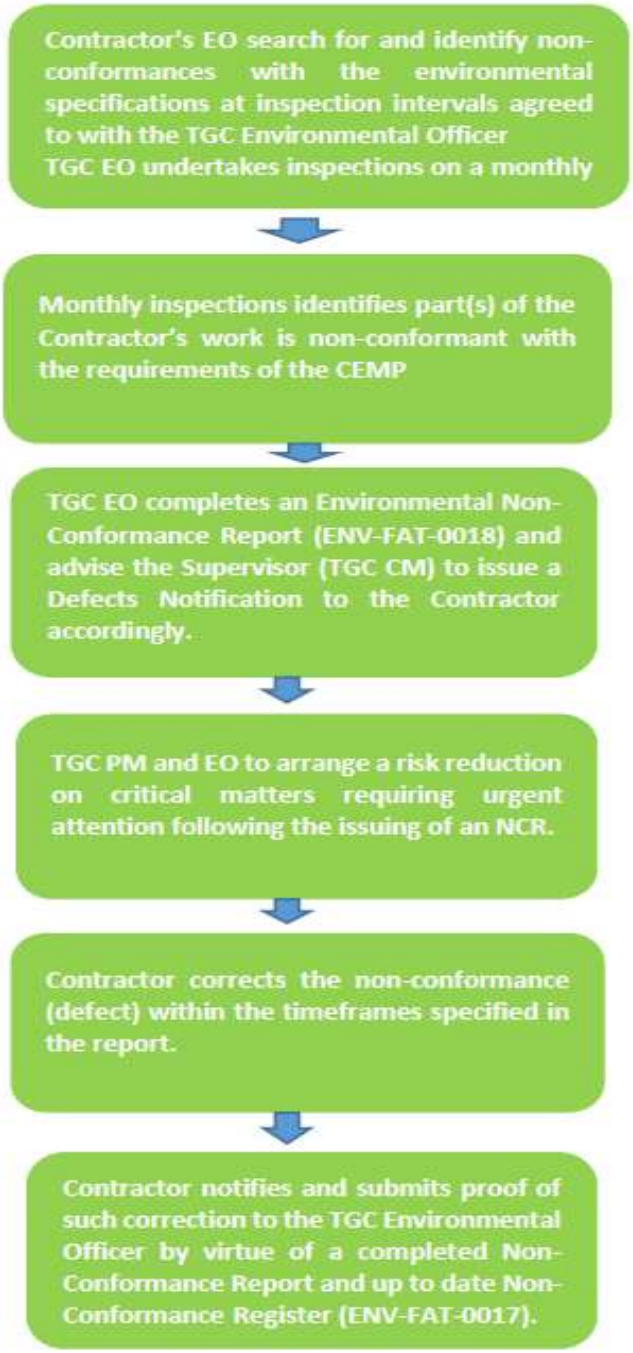

Figure 3: Non-Conformance procedure

NOTE: Each Non-conformance should be listed and numbered separately.

5.9 Documentation and Records

The TGC Document Control will ensure that the Contractor is supplied with all required/applicable documents listed in the TGC Contents for the Contractors Environmental Management File. This Document has been included as **Annexure A.**

The Contractor's Environmental Officer will complete and maintain copies of all documents and records listed in Annexure A and ensure that these documents and records are kept up to date.

The Contractor's Environmental Officer will submit these documents to the TGC Environmental Officer on a frequency as agreed to, except where documents have remained unchanged in which case written notification to this effect must be provided to the TGC Environmental Officer. The Contractor's EO must ensure that electronic copies of these documents are saved on the system.

Once the construction activities have been completed and the TGC Environmental Officer has conducted a site closure inspection and notified the Contractor that site closure will be granted, all documents described above must be handed over to the TGC Environmental Officer after which a Site Closure Certificate will be issued.

NOTE: All documents/records are to be retained, within the TGC Document Control System, for a period of 10 years. In the event of environmental documentation/record being lost before receiving a Site Closure Certificate, the Contractor will be penalised according to the specifications laid down in the relevant project-specific contract.

5.10 Application for Exemption

It is intended that the CEMP and SES be applicable to projects or activities of any size or complexity. For projects with minimal environmental impacts, or where the scope of work is limited; the Contractor may request, in writing to the TGC Project Manager, for exemption from parts of the CEMP. The TGC Project Manager will consult the TGC PEM/TGC Environmental Officer in reaching a decision on whether exemption from some of the CEMP provisions may be granted.

6 Main Actions required by the Contractor to comply

6.1 Prior to Commencement

The TGC Project Manager must ensure that the requirements below are requested of the Contractor in the Project Construction Contract Document, the Letter of Appointment and any other relevant correspondence with the Contractor prior to the start of works, as relevant.

6.1.1 Declaration of Understanding (DoU)

The Declaration of Understanding will be signed, by a person of authority, and provided by the Contractor as part of his Tender Document. The signed DoU is a written confirmation by the Contractor that the requirements of the CEMP, PES, EA, EMPr and other licenses/permits are understood and will be complied with for the duration of their works on site. Post-contract award, a DoU must be signed by the Contractor's EO to confirm that the requirements of the CEMP, SES, PES and other applicable permits and licences will be compiled with. A signed DoU must be kept in the green file at all times.

The pro forma DoU to be signed by the Contractor has been included as **Annexure C.**

6.1.2 Appointment of Contractor's Environmental Officer

The Contractor will appoint an Environmental Officer or depending on the environmental impact of the project, assign a competent person, roles and responsibilities for environmental management during construction. The qualifications and experience of this person shall be stipulated at tender stage taking due regard to the complexity of the project and the sensitivity of the environment. The Contractor will forward details of the appointment to the TGC Construction Manager and TGC PEM for their review and approval. Should the Contractor's Environmental Officer or the person originally assigned with responsibilities for environmental management change from that person identified during either the tender stage, or the construction period, the Contractor will submit the details of such appointment or assignment for the TGC Project Manager's approval. No work will proceed until the new Environmental Officer is assigned or appointed. The Contractor's EO must be employed for the duration of the contract and be 100% allocated to project. Sharing of an EO resource between projects is not allowed unless if it's agreed upon with TGC Environment and Sustainability Department.

The pro forma appointment letter for the Environmental Officer to be appointed by the Contractor has been included as **Annexure D.**

6.1.3 Environmental Management Plans and Method Statements

Where relevant, an Environmental Management Plan and Environmental Method Statements, to meet the requirements of the CEMP, SES and relevant EA, permits/licences (activity based environmental method statements), will be provided by the Contractor as part of their Tender.

Required method statements will be specified in the Quality Criteria of the tender. These include, but are not limited to, the following where applicable:

- Establishment of construction lay down area
- Hazardous and non-hazardous waste management
- Storm water management
- Handling, Storage and Management of Hazardous Substances
- Contaminated water management
- Prevention of marine pollution
- Hydrocarbon spills
- Diesel tanks and refuelling procedures
- Dust control
- Spoil dumping
- Sourcing, excavating, transporting and dumping of fill material
- Noise and vibration control
- Removal of rare, endemic or endangered species
- Removal and stockpiling of topsoil
- Rodent and pest control
- Environmental awareness training
- Site establishment and demarcation
- Emergency procedures for environmental incidents
- Closure of construction laydown area
- Rehabilitation

Emergency construction activity Environmental Method Statements may also be required. The activities requiring Environmental Method Statements cannot commence if they have not been approved by the Construction Manager and PEM, ECO or Environmental Officer.

6.1.4 Environmental Induction

The Contractor will ensure that all management, foremen and the general workforce, as well as all sub-contractors, suppliers and visitors to site have attended the TGC Environmental Induction Programme prior to commencing any work on site. Where new personnel commence work on site during the construction period, the Contractor will ensure that these personnel also undergo the TGC Environmental Induction Programme and are made aware of the environmental specifications on site. The Contractor must ensure that all of their personnel understand the

requirements of the EA, EMPr, CEMP, SES, relevant permits and licences and PES as relevant to their scope of work.

6.2 During Construction

6.2.1 Copy of the CEMP and familiarisation thereof

A copy of the CEMP, SES and where relevant, EA, licenses and permits will be available on site and the Contractor will ensure that all the personnel on Site (including sub-contractors and their staff) as well as suppliers, are familiar with and understand the specifications contained in these documents.

6.2.2 Compliance with the SES and PES and relevant permits and licences

The Contractor will ensure that all sections of the SES and PES (where relevant), relevant EA, permits and licences are complied with during the construction period.

6.2.3 Site clean-up for Closure

Retention moneys will not be paid until a Site Closure Inspection (conducted by the TGC Environmental Officer) has taken place and site closure granted and signed off by the TGC Construction Manager and TGC PEM together with the Site Closure Certificate.

7 Environmental Inspections and Audits

7.1 Environmental Inspections and Audits

Environmental inspections and audits are conducted using five basic techniques:

- Interviews with Contractor's staff including Sub-contractors and suppliers
- Document review
- Observations
- Monitoring
- Measurement and verification

This document sets out the areas and aspects of the construction site that will be inspected or audited, the frequency of such audits, the auditor and auditee.

It should be noted that these lists are not exhaustive and that each site will have specific issues that will need to be audited.

For each construction project, the auditor and auditee are as follows:

Table 1: Relationship between Auditor/Auditee

Place	**Inspector/Auditor**	**Auditee**	**Inspection/audit frequency**
Work places	Contractor's Environmental Officer	Contractor's team	Daily/Weekly Inspection
Construction site (entire area)	TGC Environmental Officer	Contractor's Environmental Officer	Monthly Audit
Construction site (entire area)	Environmental Specialist: Assurance	TGC EO and PEM	As stipulated on the annual audit protocol
Construction site (entire area)	Environmental Control Officer	Construction team (TGC and Contractors)	As stipulated on the EA or TGC Contract

7.1.1 Work Places Inspection

The Contractor's Environmental Officer will be required to conduct daily/weekly inspections of all work places for which the Contractor is responsible, including but not limited to the following:

- Contractor's camp, recreational and canteen facilities
- Material lay down areas
- Liquid and solid waste storage facilities (general, hazardous, recycling and scrap)
- Workshops
- Oil traps
- Wash bays
- Construction work area
- Spray Booths
- Haul roads
- No-go areas
- Storm water drains

- Any other construction area for which the SHE Officer is responsible

At each of these sites, the Contractor's Environmental Officer will be required on a daily basis to check for the following, where relevant:

By observation:

- Litter
- Separation of solid waste as per system
- Hydrocarbon spills
- Effectiveness of dust control measures
- Illegal washing out of containers in drains
- Wash bay drainage systems are working
- Correct usage of drip trays
- Effectiveness of oil separators
- Water use and wastage
- Pollution of rivers and sea
- Provision and use of toilet facilities
- Any other illegal activities

By document check:

- Removal of oil for recycling as per schedule
- Removal of packaging as per agreements with suppliers
- Removal of hazardous waste by specialist Contractors as per schedule
- Correct placement of environmental signage and posters
- Document board listing emergency numbers, hazmat info sheets, etc.

The following records must also be kept up to date (information must include that of sub-contractors where relevant):

- Fuel consumption for entire contract period measured in litres (including plant, generators, other equipment, vehicles etc.)
- Electricity consumption for entire contract period measured in Watt hours
- Quantities of general waste submitted for recycling measured in kilograms
- Quantities of general waste disposed of to landfill measured in kilograms
- Quantities of hazardous waste submitted for recycling measured in kilograms
- Quantities of hazardous waste disposed of to landfill measured in kilograms

- Water consumption, including water used for construction and human consumption measured in litres

7.1.2 Construction Site Audit

The TGC Environmental Officer will be required to conduct monthly inspections of the entire construction site, which may involve more than one Contractor and may include, but not be limited to the following:

- Entire site
- Fencing
- Environmentally sensitive areas
- Contractor's camp, recreational and canteen facilities
- Material lay down areas
- Scrap yard
- Workshops
- Oil traps
- Wash bays
- Sewage plant
- Quarries and borrow pits used for fill and construction material
- Spoil dumping areas
- Solid waste disposal areas
- Liquid waste disposal areas
- Bioremediation site
- Area for the temporary storage of hazardous waste
- Fuel depot and hydrocarbon storage areas
- Construction work area
- Concrete batching plant
- Spray booths
- Haul roads
- No-go areas
- Storm water drains
- And any other construction areas not listed

At each of these sites, the TGC Environmental Officer will be required to check for the following, where relevant:

By observation:

- Litter
- Separation of solid waste as per system
- Hydrocarbon spills
- Use of bunding, hard standing and other protection measures
- Illegal dumping
- Effectiveness of dust control measures
- Illegal washing out of containers in drains
- Wash bay drainage systems are working
- Correct usage of drip trays
- Effectiveness of oil separators
- Illegal use of tracks and off-road driving in no-go areas
- Correct procedures are followed for topsoil removal and stockpiling
- Effectiveness of erosion protection measures
- Excess noise and vibration
- Water use and wastage
- Pollution of rivers and sea
- Provision and use of toilet facilities
- Topsoil removed and stockpiled
- Any other illegal activities

By document check:

- All receipts for the collection of old oil, general recycled waste and hazardous waste
- Correct placement of environmental signage, SHEQ policies and posters
- Document board listing emergency numbers, hazmat info sheets, etc.
- Complete and accurate record of Contractor's Environmental File

By measurement:

- Amount of water used by each Contractor (where practical and/or required by TGC EO)
- Amount of land stabilisation completed
- Area re-vegetated
- Amount of waste recycled, sent to scrap yard or disposed in dump
- Amount of material treated in the bioremediation site

By monitoring:

- Effectiveness of dust control systems
- Effectiveness of pollution control systems
- Effectiveness of rehabilitation and re-vegetation programmes
- Effectiveness of erosion control methods
- Effectiveness of noise control barriers

A site-specific inspection checklist will be provided to the TGC Environmental Officer, by the Contractor's EO, prior to site establishment.

7.2 Environmental Performance Criteria

The Contractor will be required to achieve the minimum requirement for environmental audits. The standard/minimum requirement for all environmental audits, as per the TGC Environmental Governance Framework is 80%. Furthermore, the standard/minimum requirement for all audits conducted by ECO is 90%.

8 Associated Forms

The list of applicable environmental forms and templates will be maintained by TGC's Document Management Department, and these are revised as and when required.

9 Records

All environmental records/documents generated during the construction phase of the project will be managed in terms of the Transnet Document, Data and Records Management Procedure.

10 Annexures

Annexure A: Contents for Contractor's Environmental File
Annexure B: Environmental Method Statement Example
Annexure C: Declaration of Understanding
Annexure D: Appointment of Contractor's Environmental Officer

Annexure A: Contents for Contractor's Environmental File

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CONTENTS FOR CONTRACTOR'S ENVIRONMENTAL FILE

PROJECT NAME:		**DOCUMENT NO:**	
PROJECT NO:		**DATE:**	
CONTRACTOR:		**CONTRACT NO:**	

The following documents must be incorporated into the Contractors Environmental File

No	Item Description	Document No	Tick
1.1	Transnet Safety, Health, Environmental and Quality – Risk Management Policy Statement dated 10 June 2016.		
1.2	TGC Safety, Health, Environmental Management and Quality Policy dated 01 June 2016.		
1.3	Transnet Construction Environmental Management Plan (CEMP) as supplied to Contractor by Transnet Group Capital	**ENV-STD-001 Rev03**	
1.4	Transnet Standard Environmental Specification (SES) as supplied to Contractor by Transnet Group Capital	**ENV-STD-002 Rev03**	
2	Project Environmental Specification (PES) as supplied to Contractor by Transnet Group Capital	**ENV-FAT-0001**	
3	Declaration of Understanding (Signed)	**ENV-FAT-0002**	
4.1	Contractor's Information	**ENV-FAT-0003**	
4.2	Contractor's Environmental Policy		
4.3	Contractor's Organogram		
4.4	Contractor's Environmental Management Plan		
4.5	Appointment of Contractors EO and Declaration of Understanding (Including CV and Job Profile)	**ENV-FAT-0004**	
5	Schedule of Contractor's Construction Plant and Equipment	**ENV-FAT-0005**	
6	Hazardous Substances Register	**ENV-FAT-0006**	
7	Emergency Contacts Register	**ENV-FAT-0007**	
8	Energy Consumption Register	**ENV-FAT-0032**	

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CONTENTS FOR CONTRACTOR'S ENVIRONMENTAL FILE

9	Water Usage Register	ENV-FAT-0033	
10	List of Interested and Affected Parties	ENV-FAT-0008	
11	Induction Attendance Register	Rev 00-01	
12	Project Start-Up Checklist	ENV-FAT-0022	
13	Site Access Certificate	ENV-FAT-0010	
14	Method Statement Register	ENV-FAT-0011	
15	Method Statements	ENV-FAT-0026	
16	Waste Disposal Register	ENV-FAT-0012	
17	Daily Inspection Checklist	ENV-FAT-0023	
18	Weekly Inspection Checklist	ENV-FAT-0024	
19	Monthly Compliance Audits	ENV-FAT-0025	
20	Public Complaints Register	ENV-FAT-0013	
21	Record of Formal External Communications	ENV-FAT-0014	
22	Incident Register	ENV-FAT-0015	
23	Incident Reports	ENV-FAT-0016	
24	Non Conformance Register	ENV-FAT-0017	
25	Non Conformance Reports	ENV-FAT-0018	
26	Awareness/Toolbox Attendance Register (Including Awareness Material)	ENV-FAT-0019	
27	Minutes of Monthly SHE Meetings		
28.1	Environmental Site Rules for Visitors	ENV-GL-0002	
28.2	Environmental Site Rules for Contractors	ENV-GL-0003	
29	Basic Site Procedures	ENV-GL-0001	

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CONTENTS FOR CONTRACTOR'S ENVIRONMENTAL FILE

30	TGC Environmental Induction		
31	Contractor's Environmental Management File Handover	**ENV-FAT-0020**	
32	Site Closure Inspection Form	**ENV-FAT-0021**	
33	Site Closure Certificate	**ENV-FAT-0021**	
34	Application for Exemption	**ENV-FAT-0034**	

Annexure B: Environmental Method Statement Example

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ENVIRONMENTAL METHOD STATEMENT

PROJECT NAME:

PROJECT NO: **DOCUMENT NO:**

CONTRACTOR: **DATE:**

PROPOSED ACTIVITY (give title of method statement and reference number from the CEMP):

WHAT WORK IS TO BE UNDERTAKEN (give a brief description of the works):

WHERE ARE THE WORKS TO BE UNDERTAKEN (where possible, provide an annotated plan and a full description of the extent of the works):

START AND END DATE OF THE WORKS FOR WHICH THE METHOD STATEMENT IS REQUIRED:

Start Date:	End Date:

DESCRIPTION OF HOW POTENTIAL ENVIRONMENTAL IMPACTS WILL BE PREVENTED OR MANAGED (provide as much detail as possible, including annotated sketches and plans where possible):

ENVIRONMENTAL STANDARDS (list the applicable environmental standards to be met):

MONITORING AND RECORD KEEPING (Describe how the activity will be monitored to ensure that the environmental standards are met, as well as the records to be kept):

DECLARATIONS

CONTRACTOR'S ENVIRONMENTAL OFFICER (The work described in this Environmental Method Statement, if carried out according to the methodology described, is satisfactory to prevent or control environmental harm):

Print Name	Signature	Date

PERSON UNDERTAKING THE WORKS I understand the contents of this Environmental Method Statement and the scope of the works required of me. I further understand that this Environmental Method Statement may be amended on application to other signatories and that Transnet Group Capital Environmental Manager and Construction Manager will audit my compliance with the contents of this Environmental Method Statement

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TRANSNET

ENVIRONMENTAL METHOD STATEMENT

Print Name	Signature	Date

TGC ENVIRONMENTAL OFFICER The work described in this Environmental Method Statement, if carried out according to the methodology described, is satisfactory to prevent or control environmental harm:

Print Name	Signature	Date

APPROVING AUTHORITY (i.e. the Employer's Construction Manager)

The works described in this Method Statement are approved.

Print Name	Signature	Date

Annexure C: Declaration of Understanding

TRANSNET

DECLARATION OF UNDERSTANDING

PROJECT NAME:		**DOCUMENT NO:**	
PROJECT NO:		**DATE:**	
CONTRACTOR:		**CONTRACT NO:**	

I,

_____ _____

(Name) *(Designation)*

_____

(Representing)

Declare that I have read and understood the contents of the Construction Environmental Management Plan (ENV-STD-001) and associated documents for the above mentioned Project and Contract.

I also declare that I understand my responsibilities in terms of enforcing and implementing the Environmental Specifications for the aforementioned Contract.

Signed	Signature	Date
Place		
Witness 1:	Signature	Date
Witness 2:		

Annexure D: Appointment of Contractor's Environmental Officer

TRANSNET

APPOINTMENT OF CONTRACTOR ENVIRONMENTAL OFFICER & DECLARATION OF UNDERSTANDING

APPOINTMENT OF CONTRACTOR ENVIRONMENTAL OFFICER AND DECLARATION OF UNDERSTANDING	REFERENCE	

We, _____ *(Contractor)*, hereby confirm that

_____ has been appointed as Environmental Officer for the duration of Contract

_____, the scope of which entails _____

_____

_____ (Description of scope of works)

_____

I, _____ (Appointed Environmental Officer) declare that I have read and understand the contents of:

- The Transnet Group Capital (TGC) Construction Environmental Management Plan (CEMP) and Standard Environmental Specification (SES), documentation issued for Contract _____

I, (Appointed Environmental Officer) also declare that I understand my responsibilities in terms of enforcing and implementing the requirements of the Construction Environmental Management Plan, Standard Environmental Specification (SES) and any Project Environmental Specifications (PES) that may be relevant or required for this project.

Environmental Officer CV attached	Y	N	**Environmental Officer Job Description attached**	Y	N
Signed (Contractors Environmental Officer)	Signature		**Date**		
Received By (TGC Environmental Officer)	Signature		**Date**		

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TRANSNET GROUP CAPITAL

ENVIRONMENT AND SUSTAINABILITY

STANDARD ENVIRONMENTAL SPECIFICATION (SES)

ENV-STD-002 Rev04

Document Control

This document will be managed and controlled in terms of the Transnet Document, Data and Records Management Procedure.

Revision History

Author	Date	Description	Revision
Khathutshelo Tshipala	15 September 2011	Standard Environmental Specification (SES)	00
Khathutshelo Tshipala	6 June 2013	Standard Environmental Specification (SES)	01
Biance Schoeman	15 September 2015	Standard Environmental Specification (SES)	02
Biance Schoeman	01 June 2016	Standard Environmental Specification (SES)	03
Nonkululeko Hadebe	30 November 2017	Standard Environmental Specification (SES)	04

This document has been reviewed by:

Reviewer	Date reviewed
Stehan Bouwer	30 November 2017

Document Approvals List

This document has been approved by

Name	SAP Component	Signature	Date approved
Khathutshelo Tshipala	Executive Manager: Environment and Sustainability		30 November 2017

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1 Purpose

This specification describes the minimum standards for environmental management to which Contractors and Sub-contractors on a construction site must comply. It is a generic standard for use across all construction works executed by Transnet Group Capital (TGC).
There may be project specific environmental standards in addition to the standards in this document that exceed the standards prescribed here. The project specific environmental standards will be described in the Project Environmental Specification (PES) that will be issued separately for each project (where relevant).

This document must be read in conjunction with the TGC Construction Environmental Management Plan (CEMP).

2 Scope

This standard applies to Contractors that work on site under the authority of TGC.

3 Abbreviations and Definitions

3.1 Abbreviations

Abbreviation	Meaning
CEMP	Construction Environmental Management Plan
CM	Construction Manager
DEA	Department of Environmental Affairs
EA	Environmental Authorisation
EO	Environmental Officer
EGF	Environmental Governance Framework
NEMA	National Environmental Management Act 107 of 1998 (as amended)
NEM:BA	National Environmental Management: Biodiversity Act 10 of 2004
NWA	National Water Act 36 of 1998
PEM	Project Environmental Manager

PM	Project Manager
PES	Project Environmental Specification
SES	Standard Environmental Specification
SHEQ	Safety, Health, Environment and Quality
TGC	Transnet Group Capital

3.2 Definitions

Fauna A group of animals specific to a certain region or time period.

Flora A group of plants specific to a certain region or time period.

General waste Waste that does not pose an immediate hazard or threat to health or to the environment; and includes:

(a) domestic waste;
(b) building and demolition waste;
(c) business waste;
(d) inert waste; or
(e) any waste classified as non-hazardous waste in terms of NEMWA, 59 of 2008.

Hazardous waste Any waste that contains organic or inorganic elements or compounds that may, owing to the inherent physical, chemical or toxicological characteristics of that waste, have a detrimental impact on health and the environment and includes hazardous substances, materials or objects within business waste, residue deposits and residue stockpiles.

Indigenous vegetation Plants that naturally occur in an area.

Liquid waste Waste that appear in liquid form such as used oil, grease and/or contaminated water or waste water.

Method statement	A document that describes how the Contractor will implement environmental management measures associated with a particular environmental aspect during construction. It is a written submission by the Contractor to the TGC Environmental Officer/Construction Manager in response to this Specification or a request by the Engineer, an ECO or Authorities setting out the equipment, plant, materials, labour and method the Contractor proposes to use to carry out an activity identified by this Specification or the TGC EO when requesting the Method Statement, in such detail that the TGC EO is able to assess whether the Contractor's proposal is in accordance with this Specification and/ or will produce results in accordance with this Specification.
Natural Vegetation	All existing species, indigenous or otherwise, of trees, shrubs, groundcover, grasses and all other plants found growing on the site.
Rehabilitation	Refers measures that must be put in place to restore the site to its pre-construction or enhanced state, subsequent to construction taking place.
Responsible Authority	A Responsible Authority, according to the National Water Act 36 of 1998, relates to specific power or authority in respect of water uses that is assigned by the Minister to a Catchment Management Agency or to a Regional Office.
Sensitive area	Any area that is denoted as sensitive by this Specification due to its particular attributes, which could include the presence of rare or endangered vegetation, the presence of heritage resources (*e.g.* archaeological artefact or graves), the presence of a unique natural feature, the presence of a watercourse or water body, the presence of steep slopes.

Solid waste	All solid waste, including construction debris, chemical waste, excess cement/ concrete, wrapping materials, timber, tins and cans, drums, wire, nails, food and domestic waste (e.g. plastic packets and wrappers).
Spoil	Excavated material which is unsuitable for re-use as material in the Works or any other use; or is material which is surplus to the requirements of the Works.
Temporary Storage	A once-off storage of waste for a period not exceeding 90 days.
Topsoil	Means a varying depth (up to 300 mm) of the soil profile irrespective of the fertility appearance, structure, agricultural potential, fertility and composition of the soil.
Waste	Any substance, material or object, that is unwanted, rejected, abandoned, discarded or disposed of, or that is intended or required to be discarded or disposed of, by the holder of that substance, material or object, whether or not such substance, material or object can be re-used, recycled or recovered and includes all wastes. Waste or a portion of waste ceases to be a waste only once the waste is, or has been re-used, recycled or recovered.
Watercourse	Means: a) a river or spring; b) a natural channel in which water flows regularly or intermittently; c) a wetland, lake or dam into which, or from which, water flows; and d) any collection of water gazetted by the National Water Act, 36 of 1998 as a watercourse and a reference to a watercourse includes, where relevant, its bed and banks

Wetland	Land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil.

4 Minimum Standards for Environmental Management

The Contractor shall identify the potential environmental aspects and impacts that may occur as a result of his/her 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 this document are achieved. These method statements will be prepared in accordance with the requirements set out in the CEMP.

The Contractor will comply with the standards described below.

4.1 Site Planning and Establishment

The Contractor shall establish his construction camps, offices, workshops, eating areas and any other facilities on the site in a manner that does not adversely affect the environment. These facilities must not be sited in close proximity to sensitive areas. Where required a buffer must be determined by the ecological requirements of the fauna/flora found on-site.

The Contractor shall ensure that a most recent Transnet SHEQ Policy is displayed on the notice-board at all times.

4.1.1 Site plan

Before the onset of construction, the Contractor shall submit to the TGC Construction Manager and TGC Environmental Officer for their approval, plans of the exact location, extent and construction details of the proposed facilities and the impact mitigation measures the Contractor proposes to put in place. Any changes to the location of the facilities and site activities as per the approved site layout plan shall be re-submitted for approval prior to implementation of changes.

The Site Plan must as a minimum include but not necessarily be limited to:

- Detailed layout of the construction works areas including access roads, site offices, material laydown areas, temporary stockpile areas and parking areas;
- Detailed locality and layout of all waste storage and handling facilities for litter, kitchen refuse and workshop-derived liquid waste;
- Proposed areas for the stockpiling of topsoil and excavated spoil material;
- Demarcation of the construction footprint including areas not to be disturbed by the development; and
- Location of sewage and sanitary facilities at the site offices and staff accommodation and at all localities on the site where there will be a concentration of labour. Sanitary arrangements should be to the satisfaction of the TGC Construction Manager and Environmental Officer.

The site offices should not be sited in close proximity to steep areas. It is recommended that the offices, and in particular the ablution facilities, aggregate stockpiles, spoil areas and hazardous material stockpiles be located as far away as possible from any watercourse. Should this not be possible, approval for the location of these facilities must be granted by the TGC Environmental Officer.

4.1.2 Identification and establishment of suitable access routes/roads

Existing access routes to the construction/works areas must be used as far as possible. The building of access roads must be restricted to within the development footprint to prevent unnecessary disturbance of the surrounding environment. However, prior to making a decision about a new access road, the TGC Environmental Officer must assess the proposed access road against the prevailing environmental legislation to confirm/rule out possible EIA triggers. Access tracks must be maintained in a good condition at all times during construction to minimize erosion and dust generation.

4.1.3 Demarcation of site limits

Prior to the commencement of construction, the actual site to be developed must be clearly demarcated through the most effective means. Vegetation within the demarcated zone may be

cleared only upon obtaining approval from the TGC Environmental Officer. Disturbance of vegetation outside of the demarcated development footprint is not permitted.

All plant, material and equipment required for construction must be located within the designated areas. Laydown areas must be clearly demarcated within the site limits. No activities are allowed outside of the demarcated development footprint.

4.1.4 Eating Areas

The Contractor is responsible for providing adequate eating facilities within the works area to ensure that workers do not leave the site to eat during working hours. Refuse bags/bins must be provided at all established eating areas and when full it should be disposed as required by Section 4.3 below.

4.1.5 Liquid waste Management

Liquid waste water from site shall be stored on-site in a properly designed and constructed system, situated so as not to adversely affect water courses (streams, rivers, pans, dams etc.). Only domestic type wastewater, i.e. toilet, shower, basin, kitchen water shall be allowed to enter the designated system.

4.2 Sewage and Sanitation

The Contractor is responsible for providing adequate sanitary facilities including toilets, toilet paper, wash basins etc. to all workers on site and for enforcing the proper use of these facilities. Safe and effective sewage treatment will require one of the following sewage handling methods: dry-composting toilets such as "enviro loos" or the use of chemical toilets which are supplied and maintained by a suitably qualified Sub-contractor. The type of sewage treatment will depend on the location of the site and the surrounding land uses, the duration of the contract and proximity (availability) of providers of chemical toilets.

Toilet facilities shall be serviced regularly and the waste material generated from these facilities shall be disposed of at a registered waste water treatment works/macerator and proof of servicing and disposal shall be made available in the Contractor EO's File.

Toilets and latrines shall be easily accessible and shall be positioned within walking distance from wherever employees are employed on the works. Use of open areas (i.e. the veldt) shall not, under any circumstances, be allowed. For projects of high mobility a mobile toilet facility shall be made available by the Contractor.

Outside toilets shall be provided with locks and doors and shall be secured to prevent them from blowing over. Toilets must not be placed in areas susceptible to flooding or high winds. The Contractor shall arrange for regular emptying of toilets and shall be entirely responsible for enforcing their use and for maintaining such facilities in a clean, orderly and hygienic condition to the satisfaction of the TGC Construction Manager.

4.3 Waste Management

Waste is grouped into "general" or "hazardous", depending on its characteristics. The classification determines handling methods and the ultimate disposal of material.

General waste to be expected during construction includes the following:

- Trash (waste paper, plastics, cardboard, etc.) and food waste from offices, warehouses and construction personnel;
- Uncontaminated construction debris such as used wood and scrap metal; and
- Uncontaminated soil and non-hazardous rubble from excavation or demolition.

The Contractor shall classify all waste expected to be generated during the construction period. Examples of typical construction waste which could be expected on the site and how they should be classified are indicated in the following table:

TABLE 1: EXAMPLE OF CONSTRUCTION WASTE CLASSIFICATION

WASTE	CLASSIFICATION	
	HAZARDOUS	GENERAL
Aerosol containers	X	
Batteries, light bulbs, circuit boards, etc.	X	X
Clean soil		X
Construction debris contaminated by oil or organic compounds	X	

WASTE	CLASSIFICATION	
	HAZARDOUS	GENERAL
Domestic waste		X
Empty drums (depends on prior use)	X	X
Empty paint and coating containers		X
Explosive waste	X	
PCB waste	X	
Rubble (not contaminated by oil or organic compounds)		X
Waste Cable		X
Waste plastic		X
Waste paint and/or solvent	X	
Waste oil	X	
Waste concrete		X
Waste cement powder	X	
Waste empty cement bags (must be thoroughly decanted)		X
Waste containing fibrous asbestos	X	
Waste timber		X
Sewerage sludge	X	
Scrap metal		X
Chemically-derived sanitary waste	X	

A hierarchical control approach to waste management is encouraged. Waste should preferably be managed in the following order of preference:

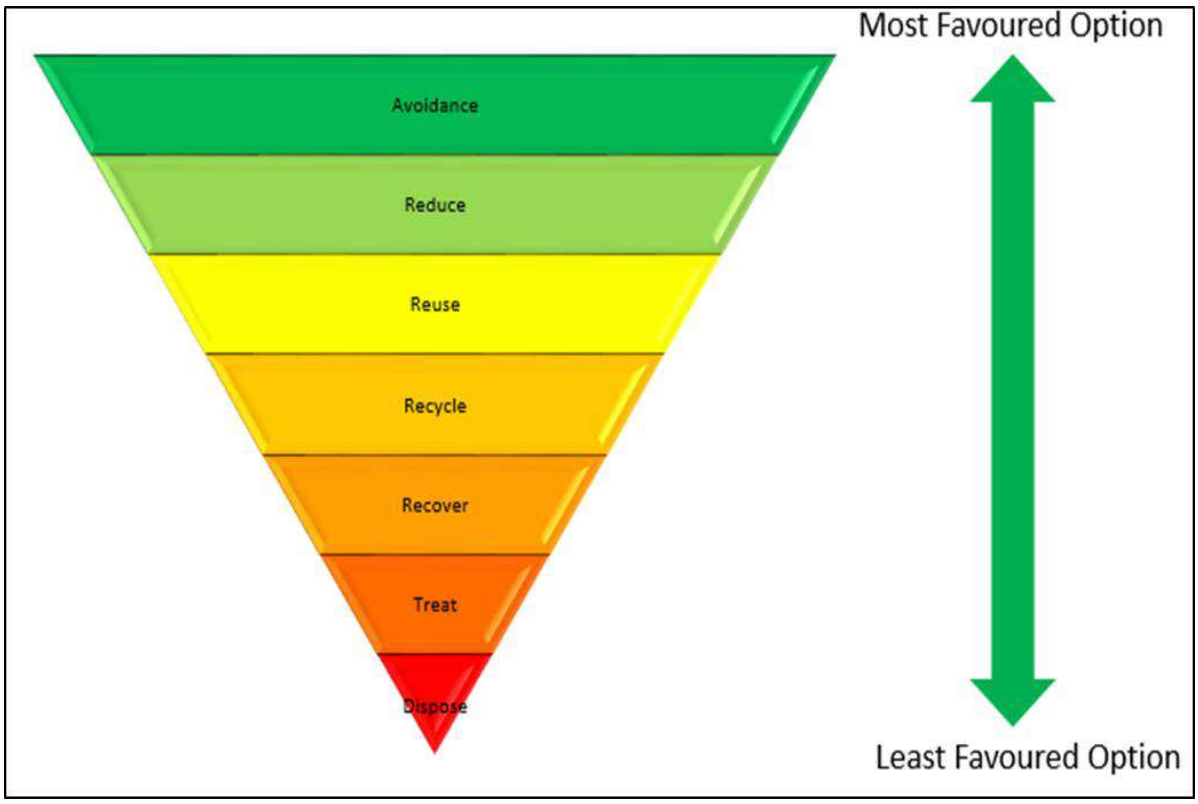

FIGURE 1: THE WASTE MANAGEMENT HIERARCHY

(Transnet Environmental Risk Management Strategy and Framework, 2015:42)

Avoidance/Prevention:	using goods in a manner that minimises their waste components
Reduction/Minimisation:	reduction of the quantity and toxicity of waste generated during construction
Re-use:	removing an article from a waste stream for use in a similar or different purpose without changing its form or properties
Recycling:	separating articles from a waste stream and processing them as products or raw materials
Recovery:	reclaiming particular components or materials, or using the waste as a fuel
Treatment:	processing of waste by changing its form or properties in order to reduce toxicity and quantity
Disposal:	burial, deposit, discharge, abandoning or release of waste

The Contractor is responsible for the removal of all waste from site generated through the construction activities. The Contractor shall ensure that all waste is removed to appropriate licensed waste management facilities. (For the identification of an appropriate facility, the following source may be utilized: **http://sawic.environment.gov.za/**.

The Contractor's Environmental Officer will work in conjunction with the Contractor's Safety and Health personnel to create a Hazardous Materials Management Program. This program will establish the necessary protocol for proper handling and removal of hazardous materials on the site.

The Contractor shall manage **GENERAL WASTE** that is anticipated to be generated by operations as follows:

- Notify waste hauler when container is full so that it can be removed and replaced with an empty container/skip;
- No littering is allowed on site. In the event where staff mobility is high, refuse bags will be made available by the Contractor;
- Provide documented evidence of proper disposal of waste (Waste Disposal Certificate)

The Contractor shall recycle **GENERAL WASTE** (as far as practically possible) that is anticipated to be generated by its operations as follows:

- Obtain and label recycling containers for the following (whichever relevant) and locate them within temporary office building and trailers:
  - Office Waste;
  - Aluminium;
  - Steel;
  - Glass;
  - Ferrous Metals;
  - Non Ferrous Metals; and
  - Waste Timber
- Establish recycled material collection schedule
- Arrange for full bins to be hauled away

Spent batteries, circuit boards, and bulbs, while non-hazardous, require separate storage, special collection and handling.
No burning, burying or dumping of waste of any kind will be permitted.

The Contractor shall manage **HAZARDOUS WASTE** anticipated to be generated by his operations as follows:

- Obtain and provide an acceptable container with correct and visible classification label;
- Place hazardous waste material in allocated container;
- Inspect the container on a regular basis as prescribed by the Contractor's waste management plan;
- Track the accumulation time for the waste, haul the full container to the registered hazardous disposal site;
- Notify the waste hauler when container is full so that it can be removed and replaced with an empty container/skip; and
- Provide documented evidence of proper waste disposal of the waste (Waste Disposal Certificate).

The Contractor shall quantify all waste disposed of, whether general or hazardous (including waste disposed of by any sub-contractors) and keep record of these quantities on site.

4.4 Workshops, equipment maintenance and storage

All vehicles and equipment must be kept in good working order to maximise efficiency and minimise pollution. Maintenance, including washing and refueling of plant on site must be done at designated locations at workshop areas. These designated areas must be agreed with the TGC Construction Manager and TGC Environmental Officer. The Contractor must ensure that no contamination of soil or vegetation occurs around workshops and plant maintenance facilities. All machinery servicing areas must be bunded. Drip trays should be used to collect used oil, lubricants at all times. Drip trays must be provided for all stationary plant. Washing of equipment should be restricted to urgent maintenance requirements only. Adequate wastewater collection facilities must be provided and the wastewater should be disposed of at a registered hazardous waste disposal site.

4.5 Vehicle and Equipment Refueling

4.5.1 Stationary/Designated Refueling

No vehicles or machines shall be serviced or refuelled on site except at designated and approved servicing or refuelling locations. No oil or lubricant changes shall be made except at designate locations, or in case of breakdown or emergency repair.

The Contractor shall store fuel and oil at a secure area, which shall be bunded to contain 110% of the total volume within the bund and designed with an impervious layer or liner or paved surface to prevent spillage from entering the ground.

The Contractor shall provide details of its proposed fuel storage and fuelling facility to the TGC Environmental Officer for approval. The design shall comply with the regulations of the National Water Act, (Act 36 of 1998), the Hazardous Substances Act, (Act 15 of 1973), the Environmental Conservation Act, (Act 73 of 1989), National Environmental Management Act, (Act 107 of 1998), and the Occupational Health and Safety Act, (Act 85 of 1993), mainly the Construction - and Hazardous Chemical Substances Regulations.

4.5.2 Mobile Refueling

In certain circumstances, the refuelling of vehicles or equipment in a designated area is not a viable/practicable option and refuelling has to be done from a tank, truck, bowser or container moved around on site. In such circumstances, the Contractor may request approval from the TGC Construction Manager to conduct mobile refuelling subject to the following control measures:

- Secondary containment equipment shall be in place. This equipment shall be sized to contain the most likely volume of fuel that could be spilt during transfer.
- Absorbent pads or drip trays are to be placed around the fuel inlet prior to dispensing.
- Mobile refuelling units are to be operated by a designated competent person.
- The transfer of fuel must be stopped prior to overflowing. Fuel tanks or refuelling equipment on vehicles may only be filled to 90% carrying capacity.
- Mobile fuelling tanks must be stored in an area where they are not susceptible to collisions. The fuel storage area must be located away from drainage channels.

- Mobile refuelling operations shall not take place within 30 meters of any watercourses or 7.5 meter from other structures, property lines, public ways or combustible storage.
- All mobile refuelling tanks are to be properly labelled and fire extinguishers with valid service dates shall be located near the fuel storage areas. These extinguishers must be of a suitable type and size.

4.6 Spill Response

The Contractor shall have adequate spill response materials/equipment on site which must be aligned with the volumes of hazardous substances used on site and the risk of pollution to sensitive environmental attributes.

The Contractor shall provide details for approval by the TGC Construction Manager and TGC Environmental Officer of its spill response plan in the event of any spills of fuel, oils, solvents, paints or other hazardous materials. The plan will show measures to be taken in removing contaminated material from site and demonstrate complete removal of contamination.

The Contractor shall instruct construction personnel on the following spill prevention and containment responsibilities:

- Immediately repair all leaks of hydrocarbons or chemicals;
- Take all reasonable means to prevent spills or leaks;
- Do not allow sumps receiving oil or oily water to overflow;
- Prevent storm water runoff from contamination by leaking or spilled drums of oil or chemicals; and
- Do not discharge oil or contaminants into storm water or sewer systems.

If a spill occurs on land, the Contractor must:

- Immediately stop or reduce the spill
- Contain the spill
- Recover the spilled product
- Remediate the site
- Implement actions necessary to prevent the spill from contaminating groundwater or off-site surface water
- Dispose of contaminated material at a registered hazardous waste disposal site and provide proof thereof (SDCs)

Any spill to water has the potential to disperse quickly, therefore, the spill must be contained immediately using appropriate containment equipment.
If a spill to water occurs, the Contractor must:

- Take immediate action to stop or reduce the spill and contain it
- Notify the appropriate on-site authorities
- Implement actions necessary to prevent the spread of the contamination by deploying booms and/or absorbent material
- Recover the spilled product
- Dispose of spilled material at a registered hazardous waste disposal site and provide SDCs
- Water samples to be taken downstream from where the spill took place to trace the extent of pollution

4.7 Spray Painting and Sandblasting

Spray painting and sandblasting should be kept to a minimum. All painting should, as far as practicable, be done before equipment and material is brought on site. Touch-up painting is to be done by hand painting or by an approved procedure. A Method Statement shall be submitted to the TGC Environmental Officer for approval.

The relevant Contractor will inform his Environmental Officer of when and where spray painting or sandblasting is to be carried out prior to commencement of work. The Contractor's Environmental Officer will monitor these activities to ensure that adequate measures are taken to prevent contamination of the soil.

If the area is in confined or high (elevated) areas, a protection plan must be issued for approval by the TGC Environmental Officer.

4.8 Dust Management

Contractors are responsible for managing dust generated as a result of their activities. The use of water for dust management must be minimised as far as practically possible. Discretion must be applied on a site-by-site basis in terms of dust control. Dust control measures must be agreed upon by the TGC EO prior to commencement of the Works.

Below are some dust control measures which can be applied during construction:

- Operate vehicles within speed limits, where no speed limit has been specified, the limit shall be 20km/h;
- Minimise haulage distances where possible;
- Environmentally friendly soil stabilisers may be used as additional measures to control dust on gravel roads and construction areas;
- The introduction of hydro-seeding and mulch due to its ability to bind soil particles together and thus reduce fugitive dust on-site;
- Dust suppression measures will also apply to inactive construction areas. (An inactive construction site is one on which construction will not occur for a month or more);
- Minimise disturbance of natural vegetation during right-of-way construction (e.g. transmission lines and erection of fences) to reduce potential erosion, runoff, and air-borne dust;
- Material in transit should be loaded and contained within the load bin of the vehicle in such a way as to prevent any spillage onto the roads and the creation of dust clouds. If necessary, the load bin of the vehicle shall be covered with a tarpaulin to prevent dust;
- Implement a system of reporting excessive dust conditions by construction personnel (as instructed through Environmental Awareness Training);
- In cases where water is to be used for dust control; it shall be ensured that only authorised sources are used; and
- Apply water to gravel roads with a spraying truck when required

4.9 Storm water and Dewatering Management

The Contractor shall be aware that, apart from runoff from overburden emplacements and stock piles, storm water can also be contaminated from batch plants, workshops, vehicle wash-down pads etc., and that contaminants during construction may include hydrocarbons from fuels and lubricants, sewerage from employee ablutions and excess fertiliser from rehabilitated areas, etc.

The Contractor shall take note that discharges to controlled waters such as the sea, rivers, groundwater or to sewerage systems are controlled under the South African Water Legislation. The following specific measures are required:

- Temporary drainage must be established on site during the construction period until permanent drainage is in place. Contractors are responsible for maintaining the temporary

drainage in their areas. Contractors must provide secondary drainage that prevents erosion, where necessary.

- Contractors must employ good housekeeping in their areas to prevent contamination of drainage water.
- The Contractor shall clear stagnant water at all times.
- The Contractor shall ensure that no contaminated surface water flows off-site as a result of Contractor operations. Where necessary, silt traps shall be constructed to ensure retention of silt on site and cut-off ditches shall be constructed to ensure no runoff from the site except at points where silt traps are provided. The Contractor shall be responsible for checking and maintaining all silt traps for the duration of the project.
- The removal from groundwater is defined as a water-use under the National Water Act 36 of 1998. Therefore, it must be ensured that the project has been authorised by the Responsible Authority to remove groundwater prior to dewatering taking place. If applicable, the Contractor shall be responsible for collection, management, and containment within the site boundaries of all dewatering from all general site preparation activities.
- No discharge/dewatering to off-site land or surface water bodies will be allowed
- On-site drainage shall be accomplished through gravity flow. The surface drainage system shall consist of mild overland slopes, ditches, and culverts. The graded areas adjacent to buildings shall be sloped away with a 5% slope. Other areas shall have a minimum slope of 0,2% or as otherwise indicated
- Ditches shall be designed to carry a 25-year storm event with velocities in accordance to minimise erosion. Erosion protection shall consist of suitable stabilising surfaces in all ditches.
- Culverts shall be designed to ensure passage of the 50-year storm peak runoff flow.

4.10 Erosion Control

All structural and non-structural (vegetative) erosion control measures will be designed, implemented, and properly maintained in accordance with best management practices which will include, but not limited to the following:

- Scheduling of activities to minimise the amount of disturbed area at any one time;
- Implementation of re-vegetation as early as feasible;
- Limiting construction traffic and/or avoidance thereof on access roads and areas to be graded to the extent feasible at drainage ditches;

- Compacting loose soil as soon as possible after excavation, grading, or filling;
- Using silt fences, geo-textiles, temporary rip-rap, soil stabilisation with gravel, diversionary berms or swales, small sedimentation basins, and gravelled roads to minimise transport of sediment;
- Implementing the erosion and sedimentation control plan and ensuring that construction personnel are familiar with and adhere to it;
- Managing runoff during construction; and
- The Contractor shall be responsible for checking and maintaining all erosion and sedimentation controls.

4.11 Noise Management

The Contractor must implement the following measures, as a minimum, to manage noise pollution resulting from his/her activities:

- Keep all equipment in good working order;
- Operate equipment within its specification and capacity and don't overload machines;
- Apply regular maintenance, particularly with regards to lubrication;
- Operate equipment with appropriate noise abatement accessories, such as sound hoods;
- Sensitive social receptors shall be notified of any excessive noise-generating activities that could affect them;
- Ensure that the potential noise source will conform to the South African Bureau of Standards recommended code of practice, *SANS 10103:2004* or the latest at the time, so that it will not produce excessive or undesirable noise when released;
- All the Contractor's equipment shall be fitted with effective exhaust silencers and shall comply with the South African Bureau of Standards recommended code of practice, *SANS 10103:2004* or the latest at the time, for construction plant noise generation
- All the Contractor's vehicles shall be fitted with effective exhaust silencers and shall comply with the Road Traffic Act, (Act 29 of 1989) when any such vehicle is operated on a public road
- If on-site noise control is not effective, protect the victims of noise by ensuring that all noise-related occupational health provisions are met. (Occupational Health and Safety Act, (Act 85 of 1993).

4.12 Protection of heritage resources

4.12.1 Archaeological Sites

If an artefact on site is uncovered, work in the immediate vicinity shall be stopped immediately. The Contractor shall take reasonable precautions to prevent any person from removing or damaging any such article and shall immediately upon discovery thereof inform the TGC CM and TGC EO of such a discovery. The South African Heritage Resources Agency (SAHRA) or relevant Authority is to be contacted and will appoint an Archaeologist to investigate the find. Work may only resume once clearance is given in writing by the Archaeologist.

4.12.2 Graves and middens

If a grave or midden is uncovered on site, or discovered before the commencement of work, all work in the immediate vicinity of the graves/middens shall be stopped and the TGC Construction Manager and EO informed of the discovery. The South African Heritage Resources Agency (SAHRA) or relevant Authority should be contacted and in the case of graves, arrangements made for an undertaker to carry out exhumation and reburial. The undertaker will, together with the SAHRA, be responsible for attempts to contact family of the deceased and for the site where the exhumed remains can be re-interred.

4.13 Fire prevention

Fires shall only be allowed in facilities or equipment specially constructed for this purpose.

A firebreak shall be cleared and maintained around the perimeter of the camp and office sites where and when necessary in accordance with relevant legislative requirements.

All conditions incorporated in the requirements of the Occupational Health and Safety Act shall be implemented.

4.14 Water Protection and Management

No water shall be abstracted from any water course (stream, river, or dam) without the expressed permission of the TGC Construction Manager and TGC Environmental Officer. Such permission shall only be granted once it can be shown that the water is safe for use, that there is sufficient water in the resource to meet the demand, and once permission has been obtained from the Department of Water and Sanitation in accordance with the requirements of the National Water Act (Act 36 of 1998).

Water for human consumption shall be available at the site offices and at other convenient locations on site. The generally acceptable standard is that a supply of drinking water shall be available within 200m of any point on the construction site.

Method Statement(s) must be prepared by the Contractor for the various water uses. The Contractor shall keep a record of the quantities of water used during construction (including use by sub-contractors), irrespective of the purpose of use.

4.15 Protection of Fauna and the collection of firewood

On no account shall any hunting or fishing activity of any kind be allowed. This includes the setting of traps, or the killing of any animal caught in construction works.

On no account shall any animal, reptile or bird of any sort be killed. This specifically includes snakes or other creatures considered potentially dangerous discovered on site. If such an animal is discovered on site an appropriately skilled person should be summoned to remove the creature from the site. Consideration should be given to selection and nomination of such a person prior to site establishment. If no-one is available, training should be provided to at least two site staff members.

The Contractor shall provide adequate facilities for all his staff so that they are not encouraged to supplement their comforts on site by accessing what can be taken from the natural surroundings. The Contractor shall ensure that energy sources are available at all times for construction and supervision personnel for heating and cooking purposes.

4.16 Environmental Awareness Training

An Environmental Awareness Program is considered a necessary part of the Construction Environmental Management Plan for the Project. Training of the appropriate construction personnel will help ensure that all environmental regulations and requirements are followed which must be defined in the relevant Method Statement to be prepared by the Contractor.

Objectives of environmental awareness training are:

- Environmental Management – protecting the environment from the effects of construction by making personnel aware of sensitive environmental resources.
- Regulatory compliance – complying with requirements contained in project – specific permit conditions, also complying with requirements in regional and local regulations.
- Problem recognition and communication – training personnel to recognise potential environmental problems, i.e. spills, and communicate the problem to the Contractor's EO for a solution.
- Liability control - non-compliance with regulatory requirements can lead to personal and corporate liability.

All individuals on the Project construction site will need to have a minimum awareness of environmental requirements and responsibilities. However, not all need to have the same degree of awareness. The required degree of knowledge is greatest for personnel in the Safety, Health, and Environmental Sections and the least for the manual personnel.

The Contractor shall present environmental awareness programmes on a weekly/bi-monthly basis (depending on project requirements) and keep record of all the environmental related training of the personnel.

4.17 Handling and Batching of Concrete and Cement

Concrete batching shall only be conducted in demarcated areas which have been approved by the TGC Construction Manager and TGC EO.

Such areas shall be fitted with a containment facility for the collection of cement-laden water. This facility shall be bunded and have an impermeable surface protection so as to prevent soil

and groundwater contamination. Drainage of the collection facility will be separated from any infrastructure that contains clean surface runoff.

The batching facility will not be placed in areas prone to floods or the generation of stagnant water. Access to the facility will be controlled so as to minimise potential environmental impacts. Hand mixing of cement and concrete shall be done on mortarboards and/or within the bunded area with impermeable surface or concrete slab. Bulk and bagged cement and concrete additives will be stored in an appropriate facility at least 10m away from any watercourses, gullies and drains.

Waste water collected in the containment facility shall be left to evaporate. The Contractor shall monitor water levels to prevent overflows from the facility. It is acknowledged that all waste water will evaporate; it must be ensured that the remaining water can be pumped into sealed drums for temporary storage and must be disposed of as liquid hazardous waste.

All concrete washing equipment, such as shovels, mixer drums, concrete chutes, etc. shall be done within the washout facility. Water used for washing shall be restricted as far as practically possible.

Ready-mix concrete trucks are not allowed to wash out anywhere other than in an area designated and approved by the TGC Construction Manager and EO for this purpose.

The Contractor shall periodically clean out hardened concrete from the wash-out facility or concrete mixer, which can either be reused or disposed of as per accepted waste management procedures.

Empty cement and bags, if temporarily stored on site, must be collected and stored in weatherproof containers. Used cement bags may not be used for any other purpose and must be disposed of on a regular basis in accordance with the Contractor's solid waste management system.

Sand and aggregates containing cement will be kept damp to prevent the generation of dust.

Concrete and cement or any solid waste materials containing concrete and cement will be disposed of at a relevant registered disposal facility and SDCs kept on the file. Where disposal

facilities for general waste are utilised, written consent from the relevant municipality must be obtained by the Contractor and proper records kept.

4.18 Stockpiling, Soil Management and Protection of Flora

The Contractor shall measure the extent of all areas cleared for construction purposes and keep this figure updated. Sensitive areas shall be cordoned off and avoided in this regard.

Stockpiling may only take place in designated areas indicated on the approved site layout plan. Any area to be used for stockpiling or material laydown shall be stripped of all topsoil.

Clearance of vegetation shall be restricted to that which is required to facilitate the execution of the works. Vegetation clearance shall occur in a planned manner, and cleared areas shall be stabilised as soon as possible when and where necessary. The detail of vegetation clearing shall be subject to the TGC Construction Manager's approval and shall occur in consultation with the TGC Environmental Officer.

Stockpiles must be positioned in areas sheltered from the wind and rain to prevent erosion and dispersion of loose materials. Stockpiled soil shall be protected by adequate erosion-control measures. Soil stockpiles shall be located away from drainage lines, watercourses and areas of temporary inundation. Stockpiles containing topsoil shall not exceed 2m in height unless otherwise permitted by Transnet.

Topsoil shall be stockpiled separately from other materials and prevented from movement. Excavated subsoil, where not contaminated, must be used for backfilling, if possible, and topsoil for landscaping and rehabilitation of disturbed areas. Where topsoil has become mixed with subsoil or is not up to the original standard, fertiliser or new topsoil shall be provided by the Contractor.

No vegetation located outside the construction site shall be destroyed or damaged. As far as is reasonably practicable, existing roads must be used for access to the site. Before site clearance takes place, vegetation surveys must be conducted and protected species identified.

No protected plant species shall be removed without written consent from the relevant authorities. The development of new embankments or fill areas must be undertaken in consultation with the TGC Environmental Officer.

No dumping of solid waste or refuse shall be allowed within or adjacent to areas of natural vegetation.

The Contractor shall identify and eradicate all declared alien and invasive plant species occurring on site.

4.19 Traffic Management

Vehicles usage is permitted **only** on access roads. Vehicles should only be parked within designated parking areas as demarcated on the site layout plan.

Turning of vehicles should only take place within a clearly demarcated "turn area" located within the approved construction footprint.

The Contractor must co-ordinate the loading and offloading of material during the construction phase so as to ensure that vehicular movement is in one direction only at any one time and that side-tracks are not created on the site.

4.20 Transportation of Materials

The Contractor is responsible for ensuring that all suppliers and delivery drivers are aware of procedures and restrictions (e.g. no-go areas) in terms of the CEMP and this Specification. Material must be appropriately secured to ensure safe passage between destinations during transportation. Loads must have appropriate cover, where ADTs are not utilised, to prevent spillage from the vehicles. The Contractor will be held responsible for any clean-up resulting from the failure to properly secure transported materials.

4.21 Borrow Pits and Quarries

The Contractor shall ensure that suppliers of rock and sand raw materials are in possession of the required permit/license and keep record of the quantity of material supplied.

The Contractor will not make direct use of any borrow pits and quarries unless the borrow pit has a valid permit, he has obtained written approval from the TGC Construction Manager and Method Statement has been submitted and approved. The Method Statement will provide the detailed description of the location of the borrow pits and/or quarries and the procedures that will be followed to adhere to any pertinent national or local legislation (e.g. mineral extraction, rehabilitation, safety and noise levels).

4.22 Social and Labour Issues

The criteria for and selection of labourers, sub-contractors and suppliers for the project shall demonstrate preference for the local community and shall be aligned with the criteria set by TGC in appointing the Contractor. The Contractor shall keep records of the identity of all staff.

Under no circumstances shall the Contractors engage in formal discussions with landowners without prior consent by the TGC Construction Manager.

No activity on private property shall be allowed without written consent by the relevant landowner and TGC Construction Manager/TGC Environmental Officer.

Any damage to private property caused by the Contractor during the construction period, shall be repaired to the satisfaction of the TGC CM and the TGC EO and the land-owner.

The Contractor shall keep record of any complaint raised during the construction period relating to the Contractor's activities.

No job-seekers shall be allowed on site and signs reflecting such shall be displayed on the notice boards.

All public complaints received shall be dealt with as per the CEMP.

4.23 Energy Management

The Contractor shall measure and keep updated records of the following:

- Electricity consumption (to be measured in Kilowatt Hours)
- Fuel consumption (to be measured in liters)

4.24 Handling, Storage and Management of Hazardous Substances

All hazardous materials/substances shall be stored in a secured, designated area that is fenced, bunded and has restricted entry.

All storage shall take place using suitable containers to the approval of the TGC Construction Manager and EO.

All hazardous liquids shall be located in a secure, demarcated area and an adequate bund wall (110% of the total volume stored) shall be provided. The floor and wall of the bund area shall be impervious to prevent infiltration of any spilled/leaked liquids into the soil.

No spillages or accumulated stormwater within this bunded area will be allowed to be flushed from the bund into the surrounding area. All fluids accumulated within the bunded area shall be removed and disposed of in accordance with Section 4.3 above.

Hazard signs indicating the nature and volume of the stored materials shall be displayed on the storage facility or containment structure.

Weighbills of hazardous substances shall be sourced from suppliers and kept on site for inspection by the TGC Environmental Officer.

The Contractor must provide a method statement detailing the hazardous substances that are to be used during construction, as well as the storage, handling and disposal procedures for each substance. Emergency procedures in the event of misuse or spillage that might negatively affect the environment must be specified.

Information on each hazardous substance will be available to all persons on site in the form of Material Safety Data Sheets (MSDS)/Safety Data Sheets (SDS). Training and education about

the proper use, handling, and disposal of the material will be provided to all workers handling the material.

The Contractor's Environmental Officer must be informed of all activities that involve the use of hazardous substances to facilitate prompt response in the event of a spill or release.

4.25 Housekeeping

The Contractor must ensure proper housekeeping of the site for the duration of the project. If practical the contractor shall amongst construction personnel, assign one to be responsible for good housekeeping

Materials shall be stored in a neat and tidy manner in designated areas as per the approved site layout plan.

4.26 Rehabilitation

Contractors shall rehabilitate the entire site upon completion of work. A rehabilitation plan will be submitted to the TGC Construction Manager and EO for approval at least six weeks before project completion. The following, but not limited are critical issues to be included in the rehabilitation plan:

- Details of soil preparation procedures including proposed fertilisers or other chemicals being considered for use;
- A list of the plant species that will be used in the rehabilitation process. Note that these should all be indigenous species, and preferably species that are endemic to the area. The assistance of an appropriately qualified Botanist/Horticulturist should be sought in developing this list;
- Procedures for watering the planted areas (frequency of watering, methodology proposed etc.);
- An indication of the monitoring procedures that will be put in place to ensure the successful establishment of the plants (duration and frequency of monitoring, proposed criteria for declaring rehabilitation as being successful); and
- Procedures for the prevention of the establishment and spread of alien invasive species.

5 Documentation

Refer to the Construction Environmental Management Plan.

6 Records

All documents generated in terms of this procedure will be classed as records and retained for the life of the project for handover by the contractor to TGC (electronic and hard copies).

SCHEDULED TRADES AND OCCUPATIONS

[PROVINCIAL NOTICE NO. 134 OF 1979.]
[DATE OF COMMENCEMENT: 22 MARCH, 1979.]

These By-laws were published in *Provincial Gazette* No. 40991 dated 22 March, 1979.

CITY OF DURBAN

SCHEDULED TRADES AND OCCUPATIONS BY-LAWS

(Editorial Note: The Scheduled Trades and Occupations By-laws have been extended to the whole area of jurisdiction of the eThekwini Municipality by MN 70 of 22 December 2005.)

The Administrator has been pleased, in terms of section 270 of the Local Authorities Ordinance, 1974 (Ordinance No. 25 of 1974), as amended, to approve of the following By-laws made by the City Council of the City of Durban: The City Council of the City of Durban has in terms of section 268 of the Local Authorities Ordinance, 1974 (Ordinance 25 of 1974); made the following By-laws—

1. No person shall erect, extend, alter or add to any building, plant or works used, or for the purpose of using them, in connection with, or shall commence to carryon, or cause or permit to be carried on, in any premises or vehicle or elsewhere in the City any of the trades, businesses, occupations or callings listed in Schedule A of these By-laws, without the written permission of the Medical Officer of Health being first obtained therefor; provided that any permission issued in terms of the Offensive Trade Regulations for the Borough of Durban, promulgated under Government Notice No. 2014 published on 15 December 1921 which permission was in effect at the date of promulgation of these By-laws shall be deemed to have been issued hereunder; and provided further that the requirements of this By-law shall not apply to buildings, plants, or works used for any such purpose and lawfully established before the promulgation of these By-laws or the aforesaid Regulations and which were utilised or carried on as at the time of such promulgations without extension, alteration, or addition.

1A. Nondiscrimination.—(1) Subject to the provision of subsection (2) hereof, no provision of these By-laws shall be applied so as to discriminate between persons on the grounds of race, religion or gender nor shall it be so construed as to have the effect of authorising such discrimination.

(2) Notwithstanding the provisions of subsection (1) hereof, discrimination on the grounds of gender may expressly be authorised in terms of any provision of these By-laws which prescribes the wearing of appropriate apparel in a public place or imposes a restriction upon the entry of persons into public ablution, toilet and changeroom facilities or prescribes different standards for such facilities.

[R. 1A inserted by MN 43 of 1992.]

2. Every person desiring such permission shall apply to the Medical Officer of Health and, unless he otherwise allows, shall submit with such application—

(1) a block plan, drawn to a scale not smaller than 1:1 000 showing the position of the premises, and all dwellings, factories and other premises within 100 metres of the boundary of the proposed premises and the use to which any such premises are put;

(2) a plan and sections to scale of 1:100 of the building proposed to be erected and used;

(3) particulars as to the nature of the trade, business, occupation or calling to be conducted; the raw materials to be dealt with; the processes to be carried on; the products thereof; and the volume, composition, and nature of all production wastes requiring disposal;

(4) particulars of the plant to be installed and the vehicles or other means of transportation to be used, including the transportation of waste materials;

(5) particulars, with any necessary explanatory drawings of the means proposed to be adopted for the disposal of, and to prevent nuisance arising from, atmospheric pollutants, effluent, stormwater, waste material, insect infestation, refuse, abnormal ,working environment, noise or vibrations;

(6) particulars of any circumstance which could cause a hazard to employees or the public;

(7) any further particulars, plans, or drawings which the Medical Officer of Health may require.

3. Except when otherwise permitted by the Medical Office of Health, the applicant shall cause a notice substantially in the form approved by the Medical Officer of Health to be published at least once in each of the official languages in English and Afrikaans language newspapers circulating in Durban; such publication shall be made during the period of 14 days immediately preceding the date on which the application is lodged and the complete page of the newspaper containing the notice shall accompany the application.

4. (1) The Medical Officer of Health after considering any objection lodged and if satisfied that no nuisance or danger to the health of the public or employees is likely to arise and that the storage, composition, transportation and disposal of all waste, either solid or liquid is acceptable to the City Engineer, may give written permission (subject to such conditions or restrictions as he may determine) for the erection or use of the buildings, plant or works and for the conduct of the trade, business, occupation or calling for the purposes set forth in the application; or he may refuse such application; such permission may be granted for an indefinite or specified period and in the latter case may on application be renewed from time to time.

(2) If requested in writing within 14 days from the date notified of the decision of the Medical Officer of Health, by an applicant whose application has been refused or an objector whose objection has been overruled, the Medical Officer of Health shall forward the relevant documents, together with his report thereon, to the Town Clerk for consideration by the Council or any Committee thereof to which this function has been delegated, which body shall have the power to direct that the application be granted or refused.

5. (1) The granting of permission under these By-laws shall in all cases be conditional on the proper construction, maintenance and use of the buildings and works and the plant and apparatus therein and on the effective prevention of any nuisance, or danger to the health of the public or employees.

(2) At any time after the granting of such permission the Medical Officer of Health or City Engineer, if satisfied that any conditions or restrictions are not being properly observed or complied with may, by notice in writing, call upon the owner, occupier or person in charge of the premises upon which the trade, business, occupation or calling is carried on to observe or comply with the aforesaid conditions or restrictions or forthwith remedy any unsatisfactory condition specified in the notice and in the event of his failing to do so or in the event of a recurrence of the nuisance or of other default, the Medical Officer of Health may suspend or withdraw any permission granted in terms of these By-laws.

6. (1) In the case of any trade, business, occupation or calling mentioned in Schedule A and established before the promulgation of these By-laws or the aforesaid Regulations, as the case may be, the Medical Officer of Health if satisfied that any nuisance or any danger to the health of the public or employees is being caused thereby may, by notice in writing, call upon the aforementioned owner, occupier or person in charge forthwith to carry out any repair or alteration, or remedy any unsatisfactory condition for the purpose of preventing a nuisance, or danger to the health of the public or employees.

(2) In the event of failure to comply with a notice, or in the event of a recurrence of the nuisance or danger as aforesaid the Medical Officer of Health may serve notice upon such owner, occupier or person requiring him within the time specified therein to discontinue the trade, business, occupation or calling.

7. If the aforementioned owner, occupier or person in charge, refuses to carry out measures for the abatement of a nuisance or condition dangerous to the health of the public or employees specified in a note under these By-laws or fails to do so within the time specified; the Medical Officer of Health may arrange for such measures to be carried out and the expenses incurred in so doing shall be recoverable by the Council from the person on whom the notice was served.

8. Any person who—

(*a*) contravenes any provision of these By-laws; or

(*b*) contravenes any conditions imposed upon the granting of any application, consent, approval, concussion, relaxation, permit or authority in terms of these By-laws; or

(*c*) fails to compy with the terms of any notice served upon him in terms of these By-laws.

shall be guilty of an offence and liable, on conviction, to the maximum penalty prescribed for the offence by section 266 (7) (*a*) of the Local Authorities Ordinance, No. 25 of 1974.

(2) Failure to comply with the terms of any condition or notice referred to in subsection (1) (*b*) or (*c*) above shall constitute a continuing offence and a person failing to comply with the terms of such condition or notice shall be guilty of a separate offence for each day during which he fails to comply with such terms.

[R. 8 substituted by PN 366 of 1983.]

SCHEDULE A

TRADES, BUSINESSES, OCCUPATIONS OR CALLINGS

Acid works

Alkali works

Ambulance service, and removal of human remains

Ammonia works and bulk transportation

Animal and fish products processing, including the manufacture of meal for animal feeding

Asbestos transportation, handling and storage, and the manufacture and bulk-storage of products containing asbestos

Asphalt plant, permanent and mobile

Battery manufacturing, reconditioning and servicing

Bitumen works, including the transportation and operation of mobile bitumen kettles

Brick and tile works

Building services contractor (as defined in the Licences and Business Hours Ordinance, No. 11 of 1973) in respect of the base premises

Carbon black manufacture

Cement products and pre-mixing works

Ceramic works

Chemical product processing, including any process involving a chemical reaction

Container washing and reconditioning works

Crematoria

Chrome and chromate works

Coal bulk-storage and handling

Distillery

Engineering works

Food manufactory

Fungicide manufacture, and bulk-handling, storage and commercial usage of fungicides

Furniture manufacture and re-conditioning

Gas works

Glass-fibre manufacture, storage, moulding and finishing

Glass works

Hazardous substances (as defined in the Hazardous Substances Act, No. 15 of 1973) manufacture and bulk-blending, transportation and storage

Herbicide manufacture, and bulk-handling, storage and commercial usage of herbicides

Hide and skin processing

Marine food processing

Mattress-maker

Metal products manufacture

Metal buffing, electroplating, enamelling and galvanising

Milling

Offensive trades (as defined in the Licences and Business Hours Ordinance, No. 11 of 1973)

Ore processing works, or handling and storage of ores

Pesticides manufacture, and bulk-handling, storage and commercial usage of pesticides

Pigment works

Plastics products works

Quarrying

Refining

Refuse collection, storage, removal, processing or disposal

Rubber moulding or vulcanising

Sand and shot blasting

Sandwinning (as defined in the Licences and Business Hours Ordinance, No. 11 of 1973)

Sewage treatment, transportation or disposal

Scrap yard

Ship building

Sludge works

Spraypainting

Stone crushing and dressing works

Stone masonry

Tannery

Teasing or shredding works dealing with coir, flock or textiles

Timber yard and works

Upholsterer

Undertaker as defined in the Licences and Business Hours Ordinance, No. 11 of 1973)

Vegetable oil extraction or processing

Waste material salvaging, collecting, sorting, storing, treating, processing or recycling/reclaiming

Welding works

Wood pulping

Yeast manufacture.

Note: If hardcopy, check electronic system for latest revision

Transnet Capital Projects Document Management

Contractor Documentation Submittal Requirements

DOC-STD-0001

Prepared by: R. Herholdt — Date: 21/09/2009

Reviewed by: N Uys, ~~Q Koen, G Whyte~~ — Date: 6/09/2009.

Approved by: C. Lesch / A. Wilson — Date: 13/10/09

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1. Purpose

This standard outlines the documentation requirements that are to be implemented by the *Contractor* for the preparation, submission, receipt, review, and collection of Technical and (or) Deliverable Documentation, as detailed in the Contractor Documentation Schedule (CDS).

Contractor documentation is of the utmost importance for the in-house Engineering activities as the information contained in the *Contractor's* documentation interfaces with several other disciplines for the Engineering, e.g., Mechanical, Structural, Piping, Control and Instrumentation, Electrical, etc.

The supply of high quality documentation within the time required as defined in the '*Works Information*', Contractor Documentation Schedule (CDS), and *Contract* must be considered as one of the main objectives by the *Contractor*.

2. Scope

This scope defines the *Contractor's* responsibilities in terms of the preparation of all the *Contractor* Deliverables required for each *Contract*.

3. References

- ISO 9001:2000 - Quality Management Systems Requirements
- SANS 10111 - Code of Practice for Engineering Drawings
- SANS 10143 - Building Drawing Practice
- DOC-FAT-0001 - Contractor Documentation Schedule (CDS)
- DOC-FAT-0002 - Contractor Documentation Register (CDR)
- DOC-FAT-0003 - Contractor Review Label (CRL)
- DOC-FAT-0004 - Contractor Review Label (CRL) for drawings

4. Definitions / Abbreviations

4.1 Definitions

'As-Built' Document	Is a final record of what was actually installed / constructed according to the Fabrication / Construction *Contractor*, and includes all deviations or changes from the approved AFC document(s). As-Built document(s) are required to reflect the same degree of detail as the original document(s). As-Built document(s) shall be done by all *Contractors*.
Contract	Formal document evidencing agreement between *Employer* and *Contractor* for supply of on site or off site services (generic term used for Purchase Orders, Contracts and Service Orders in this Procedure).
Contractor	The party to a contract that provides services to the *Employer* (generic term used for Vendors, Suppliers, Contractors, Consultants, etc.).
Controlled Document	Any document where its revision and distribution are recorded to ensure that Project Team Members holding a copy of the document have the current revision, and will receive future revisions, subject to a formal review and approval process.
Documentation	Collective term used to describe drawings and documents, e.g., letters, faxes, drawings, specifications, reports, manuals, standards, publications, software, etc.
Document Control	The function that ensures systematic registration, distribution, retrieval, status reporting, and storage of revision controlled documentation, typically Technical and (or) Deliverable documentation.
Document Management	Is the over-arching term used to describe the management of documentation on a Project.
Employer	The party to a Contract or Purchase Order to whom the goods are supplied or for whom the work or services are performed. For this project Transnet Capital Projects is the *Employer.*
Employer's Documentation	Shall mean all documentation issued to *Contractors* by the Project.
Engineering Deliverables	Technical documentation generated by Engineering, i.e. drawings, drawing registers, Engineering Document Registers, calculations, requisitions, equipment lists, design specifications, etc.

'For Record' Document	A set of record drawings / documents conforming to the marked up prints, drawings and other data, handed over to the *Employer* as part of the Project Handover Procedure.
Master Document	The original wet signed (signature) document which is held by Project Office Document Control.
Native/Source Document	Original electronic file format of documentation.
Project Deliverables	Is any document, drawing, report, register, task, etc.
Project Manager	The Project Manager is appointed by the *Employer*, and his role is to manage the Contract for the *Employer*.
Squad Checking	The review of technical documentation by multiple Engineering disciplines in order to ensure co-ordination, communication and interface between the various disciplines; done in an area specifically allocated for the review of documentation; the process / activity is controlled by Document Control but the work is executed by the Engineering Team.
Tender Document	The formal document that expresses the terms, both Commercial and Technical, against which a Tenderer submits its Tender for Contracts.
Transmittal	Is documented evidence of the formal distribution of documentation to recipients which display Transmittal No., Title, Date, Issue Reason, Revision No. etc. It is evidence of distribution and receipt of documentation.
Uncontrolled Document	Any copy of a document where distribution is not required to be recorded, and that does not require revision control or formal review.
Working Document	The main working copy of an original document where proposed changes are recorded for incorporating into subsequent revisions.
'*Works Information*'	Shall refer to the *Works Information* as defined in the Contract

4.2 Abbreviations

AB	As-Built / Recorded Documentation

AFC	Approved For Construction
CDR	Contractor Documentation Register
CDS	Contractor Documentation Schedule
CRL	Contractor Review Label
DC	Document Control
DCIS	Document Control Instruction Sheet
EDMS	Electronic Document Management System
FN	Final
RE	Responsible Engineer

5. Responsibilities

5.1 *Contractor*

The *Contractor* is responsible for submitting all documentation, required by the Contract, via Document Control to the relevant *Project Manager*, to comply with the requirements of this standard.

The *Contractor* is responsible for setting up and maintaining his own internal Document Control Process to ensure traceability and accountability for all information submitted to the *Project Manager*, and all information issued to Sub-Contractors.

5.2 *Sub-Contractors*

The *Contractor* is responsible for providing the *Sub-Contractors* with all the relevant information, and for ensuring that the *Sub-Contractors* applies the Standard, and submit their data via the *Contractor* for formal submission to the *Project Manager*. (If the *Contractor* sub-contracts work, he is responsible for providing the Works as if he had not sub-contracted.)

6. Procedure

6.1 Documentation to be Submitted

6.1.1 Contractor Documentation Schedule (CDS) (DOC-FAT-0001)

The CDS states the Employer's requirements for:

- The document types to be submitted by the *Contractor* at various stages of the Contract
- The timing for documentation to be submitted by the Contractor
- The *Project Manager* completes the Contractor Documentation Schedule (CDS) and includes it with the Enquiry and Contract as an attachment / annexure to the 'Works Information' document. The *Contractor* submits documentation as required by the Contractor Documentation Schedule (CDS), within the time specified in the Contract All documentation shall be submitted according to the dates specified in the Contractor Documentation Schedule (CDS).

6.2 Contractor Documentation Register (CDR) (Annexure B)

The Contractor Documentation Register (CDR) is a list of documentation that the *Contractor* is to submit in accordance with the *Contract*. The *Contractor* is to use the Contractor Documentation Schedule (CDS) as the basis for developing the Contractor Documentation Register (CDR). The CDS is the minimum requirement, and the *Contractor* is still responsible to include all documentation on the CDR required for the successful completion of the contract even if no CDS has been included in the *Contract*.

The title of the documentation shall adequately define and describe the facility and equipment where applicable. The Contractor Documentation Register (CDR) must be submitted within 2 weeks of the *Contract* award date, unless otherwise indicated on the Contractor Documentation Schedule (CDS) or in the Contract. Once the Contractor Documentation Register (CDR) is submitted, the *Project Manager* in conjunction with Document Control assigns document numbers to each document. The Contractor Documentation Register (CDR) is reviewed and returned to the *Contractor* as defined elsewhere in this Standard. The *Contractor* is to use the exact document numbers and titles as provided and listed by the *Project Manager* on the Contractor Documentation Register (CDR), on each of the documents.

The Contractor Documentation Register (CDR) is a 'live' document that shall be updated and re-submitted by the *Contractor* on a regular basis to reflect any changes made, e.g., updated planned / actual submission dates or addition of new documents requiring new numbers. Changes to a row(s) of the register shall be highlighted in colour across the entire row(s).

The Contractor Documentation Register (CDR) shall be submitted in Excel (electronic format) as well as PDF format upon each submission to the Project, and shall also be submitted with the final documentation, unless otherwise agreed as per par 6.3.

The forecast and actual submission dates shall reflect the dates of the next issue of the documentation, and once this submission reaches conclusion the dates are to be updated to reflect the next issue, i.e., the as-built documentation submission dates.

6.3 Format in which Documentation is to be submitted

Although the aim of this Standard is to encourage all documentation to be managed and submitted electronically the *Contractor* can apply to the *Project Manager* to have these requirements changed to accept only paper copies of all documentation

6.4 Documentation Preparation Requirements

6.4.1 Quality

Documentation shall be of the highest quality to allow immediate and accurate use by the Project Manager, i.e., without any need for interpretation due to possible illegibility, or prints / copies of poor quality.

Any illegible or indecipherable drawings will be systematically rejected and returned to the *Contractor*, who shall in no case allege documentation being rejected and returned as a reason for any delay affecting delivery.

All documentation shall have sufficient borders for punching as required for filing purposes.

6.4.2 Standards and Codes

All documentation shall conform to the latest revisions of the following, i.e.,:-

- SANS 10111 - Code of Practice for Engineering Drawings, or
- SANS 10143 - Building Drawing Practice, or
- ISO 9001:2000 - Quality Management Systems Requirements

6.4.3 Language

All drawings and documents shall be in English.

6.4.4 Units and Dimensions

All units and dimensions on the *Contractor's* documentation shall be in SI units, unless otherwise specified.

6.4.5 Sizes of Documentation

6.4.5.1 Drawings

The following standard drawing sizes shall be used:

- A3 - 277 x 420mm
- A2 - 420 x 594mm
- A1 - 594 x 841mm
- A0 - 841 x 1189mm

Note:

- Drawings wider than A0 are not acceptable to the *Project Manager*
- Hard copy drawings shall be printed out at actual size, e.g., shall not print A1 size when drawing size is A0
- A4 drawings are prohibited unless issued as part of a document.

6.4.5.2 Other Documents

All the *Contractor's* documentation other than drawings shall be prepared on standard A3 or A4 size sheets suitable for insertion into an A4 (W71) hard-core binder (file).

All documentation shall have sufficient borders to allow for punching.

6.4.6 Documentation with Multiple Sheets

6.4.6.1 Drawings

If a series of drawings of a particular area is produced by the *Contractor* (e.g., loop diagrams which may have fifty (50) or more sheets) one sequential drawing number shall be used with a series of sheet numbers.

Where more than one sheet is used, the first sheet (numbered 01) shall incorporate an index for all the other sheets in the series, including their current revision status and date.

6.4.6.2 Documents

The *Contractor's* documents with several sheets (e.g., data sheets, reports, etc.) shall be compiled as sets, i.e., a multi sheet document identified as a single document with a single document number. Thus, each sheet is identified individually, e.g., "sheet 10 of 15" and all documents shall be numbered from page 2 onwards.

Each set shall include a Table of Contents and the identification data shall as a minimum contain the following, i.e., the document number, revision number, page number and continuation information shall appear on every page of the multiple page documents. The front sheet of each document shall be page 1; however the number or wording "page 1" is not shown on the first page.

6.4.7 Details Required on Documentation

Each drawing and document shall be identified with the following information, i.e.,:-

- Project Name and Number
- Contract Number or Purchase Order Number
- Equipment Tag Number(s) (if applicable)
- Manufacturer's model / type (if applicable)
- Official Name of *Contractor's* Company
- *Contractor's* Reference Number
- Project Document or Drawing Number
- Electronic File Name (identical to the *Employer's* Document or Drawing Number and not the *Contractor's* Document or Drawing Number)
- Identification and signature of Originator, Checker, Approver, PR Eng, etc.
- Complete Descriptive Title
- Revision

- Date

6.5 Electronic Documentation Requirements

No "Protection" or "password" will be placed on electronic files.

Electronic submissions shall conform to the minimum quality standard as listed below, i.e.,:-

- File Formats to be submitted
- All deliverables submitted by the *Contractor* must be supplied in the formats listed below, and be editable using the software listed in Table 1. Only exceptions that have prior approval from the *Project Manager* will be accepted. Software used shall be the latest generation, and where appropriate, shall be regularly upgraded**.**

Note:

All electronic documents shall be submitted in Adobe Acrobat (PDF) format and the 'Native' file shall be included at the final submission.

6.5.1 Table 1: Acceptable File Formats

Document Type	Description
Drawings	Native: Micro Station 2003 or later
	Published In: Adobe Acrobat (PDF) version 7 or later
Data Sheets (other than instrumentation)	Native: MS Excel 2003 or later
	Published In: Adobe Acrobat (PDF) version 7 or later
Data Sheets (Instrumentation)	Native: As per software used or as otherwise specified in Contract
	Published In: Adobe Acrobat (PDF) version 7 or later
Engineering Data Lists	Native: MS Excel 2003 or later
	Published In: Adobe Acrobat (PDF) version 7 or later
Calculation Outputs / Results	Native: As per software used or as otherwise specified in Contract
	Published In: Adobe Acrobat (PDF) version 7 or later
Document Viewers – Redlining	Adobe Acrobat v7 minimum with "Comments" enabled
All Reports	Native: MS Word 2003 or later
	Published In: Adobe Acrobat (PDF) version 7 or later
Report supporting Data including: Calculations, Charts,	Native: As per software used or as otherwise specified in Contract

Graphs, Indexes, etc.	Published In: Adobe Acrobat (PDF) version 7 or later
Manuals	Native: MS Word 2003 or later
	Published In: Adobe Acrobat (PDF) version 7 or later
General Documents	Native: MS Word 2003 or later
	Published In: Adobe Acrobat (PDF) version 7 or later
Presentations	Native: MS PowerPoint 2003 or later
	Published In: Adobe Acrobat (PDF) version 7 or later
Colour Photographs / Scanned Images	Native File format: JPG Compression level 1%
Graphic Imagery	Published images in: TIF uncompressed or WMF
	Native image format: Corel Draw 7 CDR file
	Adobe Photoshop 7.0 PSD
	PowerPoint 2000 PPT file
Project Schedules	Native: Primavera P6 (preferred)
	Native: MS Project
	Published In: Adobe Acrobat (PDF) version 7 or later
Databases (preferred)	MS SQL Server 2000
Databases (non-preferred)	ODBC compliant
	Microsoft Access 2003
Data Compression	Software: WinZip 8.0
Other General Project Data	Native: Microsoft Office 2003 application or later
	Published In: Adobe Acrobat (PDF) version 7 or later

6.5.1.1 Native File

Native files shall be clean of all extraneous fonts, formats and styles to ensure inadvertent reformatting and format adjustments or difficulties that do not eventuate in downstream handling of documents.

6.5.1.2 Adobe Acrobat (.PDF) Files

PDF files shall be of a high quality and without dark background shading as definition may otherwise become lost.

The quality of Adobe Acrobat (.PDF) files shall be such that a hardcopy of a laser printed A1 Adobe Acrobat (.PDF) drawing can clearly be read in A3 size. Similarly A3 and A4

Adobe Acrobat (.PDF) file quality shall be such that hardcopy of a laser printed A3 or A4 Adobe Acrobat (.PDF) document can clearly be read in A4 size.

The Contractor shall physically test and confirm this prior to transmitting Adobe files.

PDF files shall be saved as "Reader Extent" to make provision for the use of electronic signatures.

PDF files shall be "Optimized" to improve Quality and then "Reduce File Size" through Adobe.

6.5.1.3 Databases

Databases shall be presented in compatible format on CD Rom as specified in Table 1. Multi format documents (created from several files) shall be combined and submitted as a single Adobe Acrobat (.PDF) file.

6.5.1.4 Drawing Files

These shall be submitted in Adobe Acrobat (.PDF) and the 'Native' file format shall be submitted on the final submission unless otherwise specified. 'Native' files shall include reference / border files, etc.

A single file shall be submitted per document, i.e., under no circumstances shall different drawings with different numbers appear on one sheet under one file name, nor shall a drawing with multiple sheets be saved into one electronic file.

All CAD drawings shall be contained in one single merge file, any form of ex Ref or Reference File will not be accepted.

6.5.1.5 Sketches

These shall be A3 or A4 size scanned as Adobe Acrobat (.PDF) file.

6.5.1.6 Text Documents

Each page of a single document shall be collated into one file. (The "wet" signature Contractor Review Label (CRL) coversheet, where required, is inserted at the beginning of the document prior to review).

6.5.1.7 Tables / Diagrams

These shall be A4 and A3 size only.

6.5.1.8 Reports

Reports containing Word, Excel, DGN, DWG, brochures, etc., shall be compiled as one Adobe Acrobat (.PDF) file.

Note:

Original colour hardcopies shall be scanned in colour to ensure all details of paper documents.

6.5.1.9 Photo's / Video's

Prints should be submitted of conventional photographs or prints and digital files of electronic images, or as specified by the Project Manager.

6.5.2 Security

Files shall be clear of known viruses and extraneous (irrelevant) macro's. The *Contractor* shall at all times have the latest generation of virus protection software. The *Contractor* shall ensure appropriate security systems are in place to prevent unauthorized electronic distributions and (or) unauthorized editing or manipulation of electronic files.

6.5.3 Scanning Requirements

Where possible 'native' files shall be converted to PDF rather than scanned from hardcopy.

Where this cannot be done all drawings and documents shall be manually scanned black and white except where colour image and fonts are required or necessary.

The settings below should be adhered to where possible and may vary depending on scanning software used. Where images rendered with these settings are unreadable, operators shall use their discretion, and adjust colour depth and resolution accordingly.

6.5.3.1 Scan Settings

- Resolution:-

  Black and White - 200 dpi

  Colour - 100 dpi

  Fine Line Drawings - 300 dpi

- Image Type:-

  Black and White - 1 Bit

  Colour Line Drawings - 8 Bit (256 colours) minimum

  Colour photos and rendered images - 24 Bit

  Use automatic threshold to determine the white and black points

- Other Criteria to Adhere to:-

  Rotate to correct reading (i.e., viewable at correct orientation)

  De-skew (i.e., straighten if on a slant)

De-speckle (i.e., remove background dirt)

Optimized (i.e., reduce file size)

Note:

When a scanned drawing is printed to be re-scanned, subsequent to, e.g., mark-ups or signatures, then it shall be scanned at a setting of 400 dpi.

6.6 Documentation Numbering

Once the Contractor Documentation Register (CDR) has been submitted by the *Contractor*, Document Control will allocate the *Employer's* documentation numbers on the Contractor Documentation Register (CDR) and return it to the *Contractor*.

A unique sequence number is allocated to each document and remains the same for each submittal of that specific document.

The *Contractor* shall use the *Employer's* document numbers and titles exactly as per the Contractor Documentation Register (CDR) on all documentation submitted.

Electronic file names for all documentation shall be exactly as per the *Employer's* documentation numbers, including the revision number.

7. Revising Documentation

All documentation carries a revision block, which must be completed in full before submitting to the *Project Manager*, and typically denotes the following:-

- NO. - Revision Number, e.g., 00, 01, etc.
- DESCRIPTION - Describes the status, e.g., Issued for Tender and a brief description of the changes made.
- BY - Person responsible for revising the document
- CHK'D - Person responsible for checking the revised document
- APP'D - Person responsible for approving the revised document
- DATE - Date of the revised document

7.1 Revision Notes

The revision block should record each change in revision with a brief but specific description of the changes made.

Terms such as "Minor Revision" or "General Revisions" shall be avoided in favour of a more specific notation.

More than one line may be used but only the revision number and date together with the relevant initials shall appear in the top line.

7.2 Indicating Revisions

Revisions shall be clearly identified by placing a revision triangle with the correct revision number in the right hand column in the case of documents, and is adjacent to the area on the document that has been changed.

All revisions made on drawings shall be enclosed by a cloud except in cases where to add a cloud detracts from the readability of the drawing. At subsequent revisions all clouds and revision triangles from the previous formal revision shall be removed from the drawing.

7.3 As-Built / Final Revisions

Should documentation require changes upon completion of Construction, it shall be revised to an "As-Built" status, as well as bear the wording "Certified As-Built", which is indicated in the revision block of the documentation.

Should documentation not require any changes upon completion of Construction, it shall be revised to a "Final" status, as well as bear the wording "Certified Final", which is indicated in the revision block of the documentation.

8. Documentation Submission

8.1 Documentation Submission Format

All documentation shall be submitted under cover of a *Contractor's* Transmittal Note.

8.2 Electronic Transmission

The Contractor Documentation Schedule (CDS) defines which documentation shall be transmitted electronically. All electronic documentation shall be transmitted on CD ROM unless otherwise agreed as per Par 6.3.

Documentation submitted on CD ROM shall be contained in a zip file with the Transmittal Note enclosed.

Note:

In the event of documentation required urgently and the *Contractor* is not able to submit a CD ROM and (or) hard copy format timeously, then e-mail transmission may take place (but in extreme cases only)

Per e-mail - the file size may not exceed 5 MB and the Transmittal Note shall be attached.

The *Contractor* is still required to submit the relevant CD ROM to Document Control without delay.

When sending an e-mail the *Contractor* shall ensure that the subject field of the e-mail is completed as follows, i.e.,:

- Contract Number – *Contractor's* Transmittal Number and Description of documentation transmitted.

8.3 Hard Copy Transmission

Documentation shall be submitted in printed hard copy format unless otherwise stated on the Contractor Documentation Schedule (CDS).

8.4 Transmittal Notes (Annexure A)

All documentation shall be submitted under cover of the *Contractor's* Transmittal Note indicating all *Contract* references (i.e., Project No, *Contract* No, etc.), Project Documentation Number(s), Revision Number, Title and Chronological listing of transmitted documentation.

The *Contractor's* Transmittal Note shall state the purpose / issue reason of the documentation submission.

Documentation for different purposes must be sent on separate *Contractor* Transmittal Notes. The *Contractor* shall note that documentation will be rejected if this requirement is not met.

The *Contractor* Transmittal shall be signed, date stamped and returned to the *Contractor* by Document Control.

8.5 Formats and Quantities of Documentation

The required number of copies and formats of documents / drawings shall be specified in the Contractor Documentation Schedule (CDS).

A typical example of quantities and formats would be as follows:-

- Pre-Construction – Hard copy and PDF (to be specified in 'CDS')
- Construction – Hard copy and PDF (to be specified in 'CDS')
- As-Built – Red Lined – Hard copies (Normally 3 off) (to be specified in CDS')
- Certified As-Built / Final – Hard copies (full size) and CD ROMs containing PDF and 'Native' file formats (to be specified in 'CDS')

8.6 Address for Submission

The address of submission will be as specified in the *Contract* and all submissions will be identified with the Contract Number, and the responsible *Project Manager*. All deliveries will be made to Document Control who will distribute the documentation to the relevant *Project Manager*.

9. Review and Acceptance of *Contractor* Documentation

The *Contractor* submits documentation as the *Contract* requires to the *Project Manager* via Document Control for review and acceptance.

9.1 Contractor Review Label (CRL)

The purpose of the Contractor Review Label (CRL) is for the *Project Manager* to assign a review code to the reviewed documentation denoting the status of the documentation after consolidation of comments. The Contractor Review Label (CRL) is to be inserted by the *Contractor* as follows:-

9.1.1 First Submission of Documentation

The first revision is revision '0', with subsequent revisions '1', '2', '3', etc.

9.1.2 Review of Documentation

Acceptance of documentation by the Project will in no way relieve the *Contractor* of their responsibility for the correctness of information, or conformance with the requirements. This responsibility rests solely with the *Contractor*.

Once documentation has been reviewed by the Project, all comments are consolidated and a review code is assigned on the Contractor Review Label (CRL) to the original reviewed / marked-up drawing / document by the *Project Manager*.

9.1.2.1 Review Codes for Contractor Documentation

The Review Code resulting from the review is as follows, i.e.,:-

- Code C1 – Accepted

  The *Contractor's* design / submission of documentation is accepted and the *Contractor* only needs re-submit documentation only if major changes have been made. The next submission will be the for Approval of "Redline" and / or "Final " documentation.

- Code C2 – Accepted with Comments. Revise and Resubmit

  In the event that the Project returns documentation with comments noted, the *Contractor* shall, within the '*period of reply'* as defined in the *Contract Data*, make the required changes and submit the revised documentation for further review on the next revision.

- Code C3 – Not Accepted. Revise and Resubmit for Review

  In the event that the Project returns documentation with "Not Accepted, Revise and Re-submit" the *Contractor* , within the '*period of reply'*, make the required changes and re-submit the revised documentation on a new revision for further review. Should these revisions necessitate changes in other related documentation, the *Contractor* shall make the appropriate changes and re-submit all the revised related documentation for further review. The *Contractor* shall not proceed with any activities controlled by the *Contractor's* documentation until it has been re-submitted and acceptance indicated.

  The *Contractor* revises and re-submits documentation but on the next revision until a review code 'C1' is achieved. This review process shall not entitle the *Contractor* to submit any claims due to time loss.

- Code C4 – Review Not Required

  Documentation signed at "Code C4" level is considered to be for information only and does not require further submission, and shall not be returned to the *Contractor*. However, Document Control shall issue a Transmittal only to the *Contractor* in this regard as notification.

9.1.2.2 Return of Reviewed Documentation

The original reviewed / marked-up drawing / document is scanned to PDF format and a copy is returned to the *Contractor* indicating the *Project Manager's* further instructions.

Return of the reviewed documentation is either in hard copy format, in which case the original reviewed / marked-up drawing / document is returned, or on CD.

Contractors will be advised by e-mail or fax (accompanied by a copy of the Project's Transmittal Note) that documentation is available for their collection.

9.1.3 Review Period

The *Contractor* shall allow the *Project Manager* the *'period of reply'* to review and respond to the *Contractor's* submission of documentation, i.e., from time of receipt by the *Project Manager* to the time of dispatch by the *Project Manager*. 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*.

9.1.4 Revised Documentation

On receipt of the reviewed documentation the *Contractor* shall make any modifications requested / marked-up and re-submit the revised documentation within *'the period of reply'* on the Contractor Documentation Schedule (CDS). Queries regarding comments / changes should be addressed with the *Project Manager* prior to re-submittal.

Any re-submittals, which have not included the changes / comments identified, will be marked with the applicable review code and returned to the *Contractor* to be corrected and re-submitted. The *Contractor* shall re-issue the revised documentation incorporating all comments on a new revision and other specified details not included in the previous issue within *'the period of reply'* of receipt of the marked-up documentation.

All revised data shall be submitted in its entirety and shall reflect the revision control numbers, and shall also indicate which documentation the revised documentation supersedes, if applicable.

In the case of drawings every sheet has its own revision number and is revised as an individual document.

In the case of documents all sheets under cover of one document number shall be under the same revision number and be re-submitted, even if the revision is a minor one.

10. As-Built / Final Documentation

This is Certified 'As-Built / Final Accepted' documentation or documentation for which no further review is required. The final documentation shall form part of the final *Contractor* Manual(s) or Data Packs

Contractors shall provide the 'As-Built' documentation that form part of the Operating, Instruction and Maintenance Manuals that were issued and accepted prior to 'As-Built' conditions for inclusion in these types of manuals by the *Project Manager*.

10.1 Definition of Final and As-Built Status of Documentation

10.1.1 "Final" Documentation

This applies to "As Manufactured and Delivered to Site".

Documentation submitted subsequently by the *Contractor* once "Final" status is reached shall be indicated as such in the Revision Notes Block as "Final" and shall also reflect the New Revision Number on the document in the revision block provided.

10.1.2 "As-Built" Documentation

This applies to "As Constructed or As Installed".

The Contractor Documentation Schedule (CDS) shall indicate the documents which are to be brought to "As-Built" status, and must be submitted only after practical completion when the documentation qualifies for "As-Built" status, and the period after completion by which they must be finalized.

10.2 Preparation of As-Built Documents

10.2.1 Transnet Capital Projects Documents

The *Contractor* responsible for completing the construction / installation works shall prepare three (3) marked up hard copies of the applicable documents to represent the As-Built condition(s). The mark-ups shall be in RED pencil or pen and be complete and accurate.

Once prepared the As-Built mark-up documentation is transmitted to Transnet Capital Projects for updating of the original design documentation.

Documents / drawings updated with information known by the *Project Manager* and as provided by *Contractors* at the completion of their *Contracts* is utilized by the *Project Manager* to update Engineering Deliverables / drawings to this status, i.e., "For Record Purposes".

Note:

File naming convention on drawings / documents shall be in accordance with the Project numbers assigned on the Contractor Documentation Register (CDR).

10.2.2 Design, Supply and Install Contractor Documents

Contractors responsible for the design, supply and installation of equipment are responsible for producing As-Builts of their own documentation.

The *Contractor* shall prepare three (3) marked up hard copies of the applicable documents to represent the As-Built condition(s). The mark-ups shall be in RED pencil or pen and be complete and accurate.

Once prepared the As-Built mark-up documentation is transmitted to the *Project Manager* for Approval through the normal process. Once approved C1 the *Contractor* can proceed to update his drawings and submit as part of the final package

The mark-ups are returned to the *Contractor* so that they can produce the As-Built revisions.

11. Installation, Maintenance and Operating Manuals and Data Books

These shall be supplied by the *Contractor* as manuals in an A4 hard covered, red, grease and waterproof binder using two (2) ring type binders.

Drawings and charts larger than A4 shall be folded and those greater than A3 shall be enclosed in an A4 plastic pocket of adequate strength.

Manuals shall be well indexed and user friendly. Manuals shall include a summarized Table of Contents and in manuals comprising a number of files / volumes there should be one summarized Table of Contents in each of the files / volumes. The draft Table of Contents shall be submitted for review to the Project Manager prior to the compilation and official submittal of the manuals. The technical content of manuals shall be specified by the *Project Manager.*

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* shall be 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*.

A typical example of what the binder / file(s) shall be marked with on the spine and the front cover is as follows: -

- Project 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

12. Cancelling and Superseding Documentation

The Document Control Procedure for cancelling and superseding is as follows:-

12.1 Superseding

If the document / drawing has been transmitted anywhere and is to be replaced by a different document number / drawing number, then it is superseded. The superseded item should go up a revision and always have the new drawing or document number written across it, as the normal practice.

The Document Controller is to check that this has been done on the drawing or document, and the revision title block should be preceded with:-

- e.g. "SUPERSEDED by 222057-2-211-M-GA-0030 …."

12.2 Cancelling

If the item is to be cancelled, it means the item has been previously transmitted and it is not being replaced by another drawing number / document number. In this case the Document Controller should check that the revision has gone up, the word “CANCELLED” is written across the drawing / document and the word "CANCELLED" is placed at the beginning of the revision title block

13. Records

All documents generated in terms of this standard are to be retained by Transnet Capital Projects as records in accordance with the requirements of Project Procedure DOC-P-0013.

Note: If hardcopy, check electronic system for latest revision

Annexure A – Typical Transmittal Note

TRANSNET

Document Transmittal Note

TO :		DATE :	
LOCATION :		FROM :	DOCUMENT CONTROL
ATTENTION :		ORIGINATOR :	
		PROJECT No :	
		TRANSMITTAL NO. :	

PURPOSE OF ISSUE *(indicate with an "X" in the appropriate block)*

☐ APPROVED FOR CONSTRUCTION	☐ FOR APPROVAL	☐ AS - BUILT
☐ APPROVED FOR DESIGN	☐ FOR INFORMATION ONLY	☐ FINAL HANDOVER
☐ FOR TENDER PURPOSES / ENQUIRY	☐ FOR REVIEW / COMMENTS	☐ OTHER (please specify)
☐ FOR CONTRACT / PURCHASE / SERVICES	☐ RETURN OF DOCUMENTATION	

ADDITIONAL REMARKS BY ORIGINATOR *(if applicable)*

DOCUMENT NUMBER	REV.	DESCRIPTION	COPY QTY	FORMAT E or H

DISTRIBUTION :

NAME

E = Electronic
H = Hardcopy

Sent by : _____ Received by : _____ Date : _____

Signature : _____ Signature : _____

PLEASE CONFIRM RECEIPT BY SIGNING ONE COPY OF THE TRANSMITTAL AND RETURN TO DOCUMENT CONTROL AS SOON AS POSSIBLE

DOC-TMP-0003 Rev.02

Note: If hardcopy, check electronic system for latest revision

Annexure B – Typical Example of CDR (can be supplied electronically)

TRANSNET CAPITAL PROJECTS

Project Number: _____

Contract Number: _____

Register Document Number: _____

TCP Document Number	Document Title (Description)	Contractor's Document number	Rev	Forcasted Submission date	Actual Submission Date	For-mat	Reason for Issue

DOC-FAT-0002.xls 1

22 April 2016

Note: If hardcopy, check electronic system for latest revision

Transnet Capital Projects

Quality Management

General Quality Requirements for Contractors and Suppliers

QAL-STD-0001

Prepared by: Neel Naidoo — 25-04-2016

Neel Naidoo
Portfolio Manager: Quality

Date

Reviewed by: Sipho Mlaudzi — 25/04/2016

Sipho Mlaudzi
Executive Manager: Health, Safety, Fleet and Facilities

Date

Approved by: Khathutshelo E. Tshipala — 26/04/2016

Khathutshelo E. Tshipala
Acting General Manager: Health, Safety, Environment, Quality, Fleet and Facilities

Date

Rev No.	Date	Revision Details
0	22 April 2016	Issued for Use

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1. Purpose

This Standard outlines the minimum requirements to ensure that products and services supplied to Transnet Capital Projects (TCP) are manufactured, provided, constructed or installed in accordance with all specified requirements as defined in the Contract, all associated specifications, drawings, codes and standards.

2. Definitions / Abbreviations

Term, Abbreviation	Meaning
Contract:	Formal document evidencing agreement between *Employer* and *Contractor* for supply of on site or off site services (generic term used for Purchase Orders, Contracts and Service Orders in this Standard).
Contractor:	The party to a *contract* that provides services to the *Employer* (generic term used for Vendors, Suppliers, Contractors, Consultants, etc.).
Concession:	A request to deviate from the requirements of the *Contract* or specified requirements. The *Concession* request shall clearly identify all elements of the proposed deviation together with any resultant technical, commercial and/or schedule impacts.
Data:	All drawings / documents / data / information / Data Packs and Installation and Operating Manuals required to be supplied under the *Contract*.
Data Pack (DP):	A compilation of manufacturing data, certification, inspection and testing records prepared by the *Contractor* to verify compliance with the Contractual requirements.
Employer:	The party to a *Contract* or Purchase Order to whom the goods are supplied or for whom the work or services are performed. In the context of this document, Transnet Capital Projects is the *Employer*.
Field Inspection Checklist (FIC):	A document that details the checks, requirements and test parameters for each type of equipment to permit field installation and pre-commissioning of the equipment.

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Inspection Release Report (IRR):	A document issued to the *Contractor* by TCP advising release of materials for shipment. This does not relieve the *Contractor* of its obligations in accordance with the Terms and Conditions of the *Contract*.
Inspection Waiver Report (IWR):	A document issued to the *Contractor* by TCP advising that TCP has waived final inspection for the materials listed in this document. The issue of this report does not preclude further inspections by TCP. It is issued without prejudice and does not relieve the *Contractor* from the guarantees and obligations included in the *Contract*.
Installation and Operating Manual (IOM):	A document prepared by the *Contractor* providing relevant information applicable to the installation, operation and maintenance of the specific equipment, including data relating to consumables (eg. oils, etc.)
Non Conformance (NC):	Material, product or workmanship which is not in accordance with the requirements of the *Contract*.
Non-Conformance Report (NCR):	A document initiated by either TCP or the *Contractor* advising that certain materials/products/workmanship provided by the *Contractor* do not conform to the required standards and specifications.
Project Quality Plan (PQP):	A document that outlines the *Contractor's* strategy, methodology, resources allocation, Quality Assurance and Quality Control coordination activities to ensure that Goods and Services supplied meet or exceed the requirements defined in the *Contract* drawings, codes and standards.
Quality Assurance (QA):	A formal methodology designed to assess the quality of products or services provided.
Quality Control (QC):	A set of activities intended to ensure that quality requirements are actually being met.
Quality Control Plan (QCP):	A document outlining specific manufacturing/construction inspection and testing requirements, including responsibilities, test acceptance criteria, nomination of witness and hold points.

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Technical Query Note (TQN):	A document used by the *Contractor* to formally clarify a Technical Query related to the scope of supply. This should not be used where a Non-Conformance Report has already been initiated
TCP:	Transnet Capital Projects – a division of Transnet SOC Limited.
Works Information:	Refers to the *Works Information* as defined in the *Contract (NEC3)*

3. Applicable Documents

3.1 General

All work performed shall comply with the requirements of this Standard, the documentation referenced in the *Contract* and the latest revision/edition of the relevant Codes and Standards referenced herein, except works which are specifically excluded by the TCP Principal Project Manager or higher delegated authority.

3.2 Statutory Regulations

Occupational Health & Safety Act, Act No 85, of 1993 and Regulations as amended.

3.3 Codes and Standards

Document No.	Title
ISO 9001:2015	International Organization for Standardization: Quality Systems

4. Quality System

4.1 General

The *Contractor* / Supplier is responsible for all quality activities necessary to ensure the Work meets the requirements specified in the Contract, and shall manage and coordinate all Quality aspects of the Work in accordance with the requirements of this Standard, together with the *Contractor's* / Supplier's PQP and QCPs once reviewed and accepted by TCP.

4.2 *Contractor* / Supplier Quality System Requirements

The *Contractor* / Supplier shall have and maintain a documented Quality Management System. The *Contractor* / Supplier may be required to demonstrate its use to TCP. The *Contractor's* / Supplier's Quality Management System should be in accordance with the requirements of International Standard ISO 9001.

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The *Contractor* / Supplier submits the following Quality System documentation to TCP at the time of tender and at Contract Phases as detailed below:

- Project Quality Plan (Provisional at tender)
- Typical Quality Control Plan (Provisional at tender)
- Schedule/List of QCP's envisaged for the Works
- Quality Policy
- Copy of ISO 9001 certificate (if certified)
- Quality Manual
- Organogram showing clearly the staffing arrangements for Quality (HO and Site)
- Quality Management personnel CVs
- Schedule/List/Index of Quality Management and Project Procedures to be used for the project/contract/works
- Programme of internal and external audits
- Procedure for the evaluation of Suppliers and Sub-contractors
- Typical Data Pack Indices
- Approved Supplier/Contractor List
- Quality Management System Questionnaire (refer to Annexure 4)

The *Contractor* / Supplier will make formal submission of this Quality Documentation on award of the *Contract* and included in the *Works Information* for the *Contract*.

4.3 *Contractor* / Supplier Documentation Submittal Requirements

The Contractor's / Supplier's responsibilities are defined in terms of *DOC-STD-0001* which outlines the standard requirements for preparation, submission, receipt, review, and collection of Technical and (or) Deliverable Documentation.

The *Contractor* / Supplier develops and maintains a comprehensive Register of Documents that will be generated throughout the project. The Register includes all quality related documents. The Register is a 'live' document and is submitted to TCP for review following each revision by the *Contractor* / Supplier. The Register indicates the dates of issue of the documents taking into account sufficient time to allow for the TCP review/acceptance cycle prior to the document being required for use.

4.4 Project Quality Plan

Where specified, the *Contractor* / Supplier submits a PQP to TCP within the period stated and in any event not later than 28 days after the *Contract* start date. The PQP details

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how the *Contractor's* / Supplier's Quality System will be applied to the Scope of Work specified in the *Contract*, and shall address the following:

- Satisfying the technical and quality requirements of the *Contractor's* / Supplier's Scope of Work, and relevant elements of the applicable ISO 9001 standard,
- Include all quality activities relevant to the Scope of Work, identifying all procedures, reviews, audits, controls and records used to control and verify compliance with the specified Contractual requirements.
- Include a listing of all special processes (eg. welding and non-destructive testing, cube testing, etc.) envisaged for use, including confirmation of personnel certification as required,
- Include all proposed method statements (for site based work activities),
- Include a description of the *Contractor's* / Supplier's project organisation, with key positions and responsibilities identified and individuals named. The organisation structure shall also indicate the resources committed to the management and coordination of QA / QC activities,
- Include a listing of all Quality Control Plans (QCPs), and associated Field Inspection Checklists (FICs), as applicable,
- Identify in the PQP any Sub-Contractor/Sub-Supplier work. Sub-Contractor/Sub-Supplier plans are approved by the *Contractor*, and a copy forwarded to TCP for information,
- Include the proposed Authorised Inspection Authority (where applicable - for pressurised equipment and systems),
- Include a schedule of proposed quality records.

The PQP shall be controlled and re-submitted for approval when required to incorporate any change necessary during the *Contract* duration to ensure that the document is maintained for effective control, change management and records. The change management will be done to an agreed policy or procedure.

Note: Where the *Contractor* / Supplier is required to provide a PQP, no work shall commence until the PQP is accepted by TCP. The *Contractor* / Supplier can consult the sample PQP, Annexure 1, in order to assess the typical requirements that should be addressed.

4.5 Procedures

The *Contractor's* / Supplier's PQP and procedures shall address the system elements and activities appropriate to the Scope of Work, in compliance with the specified Quality Standard.

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Where specified, the *Contractor* / Supplier submits copies of Quality Procedures for review. In addition, the *Contractor* / Supplier ensures that copies of all Procedures relevant to the Scope of Work are available for reference by TCP at each work location.

These will include, as applicable, the following:-

4.5.1 **Document Control**

The *Contractor's* / Supplier's PQP shall provide a description of how documents provided by TCP, Sub-Supplier/Sub-Contractor to the *Contractor* are to be managed. The description shall address as a minimum:

- Management tools and databases
- Receipt, registration and maintenance
- Internal and external distribution to *Employer*, third parties and Sub-Contractors
- Management of Codes, Standards and Specifications
- Internal review and approval routines and authorities
- How it is ensured that the correct revisions of documents are available at the point of use including retention periods for all documentation.

4.5.2 **Design Control**

Where the *Contractor* / Supplier is responsible for any aspect of design related to the Scope of Work, the Quality Plan shall describe the *Contractor's* / Supplier's methods and procedures for the control of these design activities. The Works Information also addresses *Contractor's* / Supplier's Design Responsibilities, etc.

4.5.3 **Procurement**

Where the *Contractor* / Supplier is responsible for any aspect of procurement related to the Scope of Work, the Quality Plan shall describe the *Contractor's* / Supplier's methods and procedures for the control of these activities.

4.6 ***Contractor* / Supplier Audits**

The *Contractor* / Supplier shall:

- Carry out audits in accordance with its Quality System at its own and Sub-Supplier/Sub-Contractor's facilities to ensure project quality requirements are being achieved.
- Include a QA Audit Schedule in the *Contractor's* / Supplier's PQP submitted to TCP prior to commencement of the Scope of Work. The Audit Schedule shall include all audits to be implemented by the *Contractor* / Supplier and Sub-Supplier/Sub-Contractor during the execution of the *Contract*.
- Where stipulated in the *Contract*, perform an audit within three months after the *Contract* start date and thereafter at a minimum frequency of three months. Audit reports are submitted to TCP at the completion of each Audit. Where unsatisfactory

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performance is evident, TCP will direct the *Contractor* / Supplier to perform additional audits.

4.7 TCP Audit

TCP reserves the right to perform quality audits or participate as an observer in *Contractor* / Supplier audits to verify compliance with the Contractual requirements. The *Contractor* / Supplier shall within a time frame as agreed upon, correct any adverse audit findings advised by TCP. TCP will use the attached Audit Notification (Annexure 8) and Audit Checklist (Annexure 5) to conduct the audit.

5. Inspection and Testing

5.1 General

TCP may, at its discretion, perform surveillance inspections at the *Contractor's* / Supplier's premises, the premises of any Sub-Supplier/Sub-Contractor or at the location of the Scope of Work.

Dependent on the nature of the Scope of Work and the frequency of inspections, TCP may elect to have inspection personnel resident at the place of manufacture, fabrication, or assembly.

The *Contractor* / Supplier ensures free entry and access is given to TCP, certifying authorities and statutory authorities to inspect the Scope of Work and review procedures and quality records at all parts of the *Contractor's* / Supplier's and Sub-Supplier/Sub-Contractor's premises, or at the location of the Scope of Work while any work or test is in progress.

The *Contractor* / Supplier provides TCP with all necessary tools, calibrated measuring equipment, safety equipment and workspace to verify or witness tests in progress.

While TCP is at the *Contractor's* / Supplier's premises, the *Contractor* / Supplier provides, free of charge, reasonable facilities including office facilities and reasonable access to a telephone, facsimile machine and computer connection point.

The *Contractor* / Supplier provides written notice within a time frame as agreed upon, to allow the attendance of TCP and other representatives at nominated witness and hold points.

5.2 Quality Control Plans

The *Contractor* / Supplier prepares and submits QCPs to TCP for review in accordance with the requirements of the *Contract* and PQP.

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QCPs must clearly identify all inspection, test and verification requirements to meet the Contractual obligations, specifications, drawings and related details including destructive and non-destructive testing, witness and hold points.

The *Contractor* / Supplier shall not commence fabrication or manufacture prior to review and approval of the applicable QCP by TCP.

QCPs shall include reference to all tests specified in the *Works Information*.

A typical format for a QCP is shown in Annexure 2. The *Contractor* / Supplier may use its own format providing all information shown in the sample in Annexure 2 is included.

5.3 Inspection Points

The QCP identifies points in the fabrication, manufacturing and/or installation process that are selected for inspection. These points are denoted by the following inspection codes:

- Hold Point (H) — Inspection points in the manufacturing cycle, beyond which work shall not proceed without the specified activity, work or function being witnessed and signed off. Hold points require written notification to TCP.
- Witness Point (W) — An inspection point in the manufacturing cycle that will be witnessed or verified. If TCP confirms it is unable to attend after being provided with the written notification then manufacture may proceed. Witness points require written notification to TCP.
- Review Point (R) — A point at which products and quality records are verified and endorsed. Review points are not points that require notification to TCP.
- Surveillance (S) — An inspection point in the manufacturing cycle during which any activity, work or function is observed. No formal notification is required.

The *Contractor* / Supplier maintains the status of testing and inspection by progressively having the QCP's signed off.

5.4 Revision to Quality Control Plans

Revision of the QCP is subject to the same submission, review and acceptance routines as described for the original QCP issued.

5.5 Kick Off Meeting

After the *Contract* start date, and prior to manufacture or construction activities, TCP will require a Kick-Off Meeting with the *Contractor* / Supplier to discuss fully the implications of meeting TCP's quality requirements. This meeting may be held as part of the *Contract*

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kick-off meeting for each package or may be a separate meeting, subject to the critical or complex nature of the work. This requirement for a pre-inspection meeting may be repeated when Sub-Suppliers/Sub-Contractors of key equipment are engaged.

5.6 Schedule of Inspection

The *Contractor* / Supplier shall submit a Schedule showing the proposed dates for inspections and tests nominated in the QCP where witness and hold points are required. The Schedule shall be regularly updated with progress and issued to TCP to show the current inspection and test status.

5.7 Field Inspection Checklists

For site installation and construction activities, the *Contractor* / Supplier prepares Field Inspection Checklists (FICs) to permit inspection and testing of installed equipment and constructed facilities in accordance with the respective QCP's.

FIC's are submitted to TCP for initial review. FICs are used to record the results of inspection and testing (where applicable). On completion, FICs are submitted to TCP to confirm satisfactory completion of the tests and inspections at nominated QCP witness and hold points.

5.8 Inspection Notification

The *Contractor* / Supplier notifies TCP in writing at least two calendar weeks prior to the advent of inspections or tests that require witnessing.

For inspections or tests within the country, arrangements are confirmed at least three working days before the event. For inspection and tests outside of the country, arrangements are confirmed at least seven working days before the event.

Inspection notifications include the following essential information:

- Contract Number
- Location of Inspection or Test
- Nature of Inspection or Test
- Date and Time of Inspection or Test
- Name and telephone number of the *Contractor's* / Supplier's Representative

5.9 Inspection and Testing

The *Contractor* is responsible for the conduct of all *Contractor* / Supplier inspections and tests. This responsibility includes:

- Documenting inspection and test results in the QCP's and relevant FICs
- Progressively inspecting the quality of the Scope of Work performed, including that of all Sub-Supplier/Sub-Contractors
- Inspecting to meet all Contractual requirements, in number, type and form

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- Inspecting day to day activities, material receipts, issue of materials for manufacture/installation, in-process inspections, and final inspections.
- The template for an Inspection Report is given in Annexure 9.

Completed original QCP's and FICs are included in the Data Pack that the *Contractor* / Supplier submits to TCP.

5.10 Inspection Release

At completion of the Scope of Work, either in total or in phases, TCP may issue an Inspection Release Report (IRR) or an Inspection Waiver Report (IWR).

The issue of either an inspection release or waiver of inspection does not relieve the *Contractor* / Supplier of its obligations under the *Contract*. The *Contractor* / Supplier ensures that a copy of the release note and final expediting release note for transport, where appropriate, is attached to the delivery docket and accompanies the Work to the designated destination indicated in the *Contract*. Items delivered to TCP without a copy of these documents may not be accepted.

A copy of the inspection release or waiver of inspection is included in the Data Pack.

5.11 Special Processes

It is the *Contractor's* / Supplier's responsibility to ensure that all processes which require pre-qualified procedures and/or work methods are tested and qualified before work begins. This typically covers such activities as welding, non-destructive testing, special fabrication techniques and painting. Unless specified such procedures are the *Contractor's* / Supplier's responsibility and do not require submission to TCP before work begins. When such procedures are requested, no work shall commence until procedures are approved by TCP.

It is the *Contractor's* / Supplier's responsibility to ensure all operators are qualified for the processes in accordance with the procedure and/or applicable standards. Records of qualification of operators shall be maintained by the *Contractor* / Supplier and made available to TCP when requested.

Records of qualification of procedures and processes shall be maintained by the *Contractor* / Supplier in accordance with the applicable procedure or code.

5.12 Welding Procedures

Where the *Contractor's* / Supplier's Scope of Work includes fabricated weldments, Welding Procedure Specifications (WPS) defining the method, preparation and sequences to be adopted to achieve a satisfactory welded joint shall be provided for all weld types required in the execution of the *Contractor's* / Supplier's Scope of Work. The procedure shall only be submitted to TCP when requested in the *Contract*.

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ICT

WPS include all welding essential and non-essential variables for each process used, including appropriate test results. WPS comply fully with the standard or code pertaining to welding required in the execution of the *Contractor's* / Supplier's Scope of Work.

When requested in the *Contract*, a suitably marked "weld map" is completed by the *Contractor* / Supplier for all items to be fabricated. A summary of WPS is prepared and, when used, is identified on the weld map.

Where TCP approval is required, fabrication is not to commence until written approval of WPS and Welding Procedure Qualification Records (WPQR) is received by the *Contractor* / Supplier . No welding fabrication will be accepted that is not covered by a TCP approved WPS/WPQR.

Welding Procedure Qualification (WPQ) tests may be witnessed by TCP and/or an independent inspection authority. Testing of the specimens prepared during the WPQ Tests is carried out by an approved testing laboratory, independent of both TCP and the *Contractor* / Supplier . In certain instances, a certificate to EN 10204 3.1 B may be required, which will be clarified at Tender review and clarification stage.

Where actual weld deposit analysis and weld metal physical properties are required for procedure qualification, the information is taken from the procedure qualification tests. Data listed in the catalogues of the manufacturer of welding consumables is not acceptable.

Welders/welding operators are qualified in accordance with the relevant welding code prior to commencing production fabrication. Specific Welder Qualification (WQ) records will be reviewed by TCP in the *Contractor's* / Supplier's works and should NOT be submitted for review.

A register of welders qualified to work shall be maintained by the *Contractor* / Supplier .

5.13 Material Traceability

Where, and to the extent that material traceability is required, the *Contractor* / Supplier shall provide its procedures for the maintenance of material identification throughout all phases of manufacture. Methods of identification, routines for re-stamping or stencilling as appropriate shall be defined and agreed with TCP.

Adequate records shall be maintained throughout construction enabling traceability of key materials from final product back to original material certificates. The material traceability records shall form part of the Data Pack.

The *Contractor* / Supplier shall prepare a schedule of materials and equipment that are subject to traceability requirements.

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5.14 Material Certification

Where specified in the *Contract* the following certificates shall be provided to TCP and included in the Data Pack:

Type A: A *Contractor's* / Supplier's certificate of compliance with the *Contract*. This certifies that the goods or services are supplied in compliance with the *Contract* without mention of any test results (EN10204 certificate 2.1).

Type B: A certificate issued by a laboratory or test facility independent of the *Contractor's* / Supplier's works. It shall quote test results carried out on the product supplied and state whether compliance with the relevant technical standard, code, etc., has been complied with. (EN10204 certificate 3.1B).

Type C: The same as Type B, the tests are to be witnessed by a third party (EN10204 certificate 3.1C).

6. Non-Conforming Products

6.1 General

The *Contractor* / Supplier shall establish and maintain procedures to control materials or products that do not meet the specified requirements.

All *Contractor's* / Supplier's products and/or materials identified as not conforming to requirements shall be dealt with promptly as follows:

- If the *Contractor* / Supplier discovers materials or products which are not in accordance with the requirements of the *Contract*, i.e. a non-conformance, the *Contractor* / Supplier shall immediately initiate the non-conformance procedure in terms of the Supplier/*Contractor's* Quality Management System, advise TCP promptly, and provide a copy of the non-conformance report (NCR) (Annexure 6) to TCP.
- If TCP or its agent/s identifies a non-conformance, a TCP NCR may be raised.
- The *Contractor* / Supplier shall maintain an updated Non Conformance Register as per Annexure 7.

Originals of all closed out NCRs shall be included in the Data Pack.

6.2 Corrective and Preventative Action

If the *Contractor* / Supplier proposes a disposition of any non-conforming materials or products which varies from the requirements of the Specification or *Contract*, such a proposal shall be submitted in writing to TCP whose decision on the proposal shall be

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obtained in writing before the non-conforming material or product is covered up or incorporated into the Works, or is the subject of any other disposition.

The disposition of non-conformances which do not vary the requirements of the *Contract*, specifications or drawings may be approved by the *Contractor* / Supplier following discussion and agreement with TCP.

7. Concession Requests and Technical Queries

7.1 Concession Requests

Where a *Contractor* / Supplier requests a Concession to deviate from the requirements of the *Contract* or specified requirements, the *Contractor* / Supplier raises the request with TCP using the format as shown in Annexure 3.

The Concession Requests shall clearly identify all elements of the proposed deviation together with any resulting technical, commercial and/or schedule impacts.

Completed original Concession Requests shall be included in the Data Pack.

7.2 Technical Queries

For clarification of technical issues (only), the *Contractor* / Supplier may submit a Field Engineering Query(FEQ) to TCP in accordance with the *Contract*.

The FEQ shall clearly identify all elements of the query, and all supporting documentation and/or drawings shall be attached where appropriate.

Completed original FEQ's shall be included in the Data Pack.

8. Inspection, Measuring and Test Equipment

8.1 Calibration

The *Contractor* / Supplier , including its Sub-Suppliers/Sub-Contractors, shall ensure the calibration of test and measuring equipment is performed and maintained in accordance with the relevant *Contractor* / Supplier procedures and/or the equipment manufacturer's specifications.

Where calibration is required by an external laboratory, the *Contractor* / Supplier shall ensure that the facility selected for calibration possesses current certification. Calibration certificates shall contain a statement that the test equipment is accurate to within specified tolerances.

The *Contractor* / Supplier should establish the frequency of calibration for each item of equipment (including jigs, fixtures or templates) and record the details in a 'Measuring and Test Equipment Register' (or similar).

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8.2 Use of Inspection, Measuring and Test Equipment

The *Contractor* / Supplier shall ensure that authorised equipment users:

- Use the equipment in accordance with manufacturer's instructions, and accepted industry practices
- Ensure the equipment is covered by a current calibration certificate
- Conduct the measurements or tests in accordance with the equipment manufacturer's specifications or other relevant specification
- Prior to commencement of each inspection or test activities:
  - Identify the measurements to be made
  - Determine the accuracy required
  - Select the appropriate inspection, measuring or test equipment for the scope of work.

8.3 Verification of Previous Test Results

Where the calibration status of the equipment is unknown, expired or has doubtful accuracy, the equipment shall immediately be quarantined, and tagged according to *Contractor* / Supplier's Quality System procedures. The *Contractor* / Supplier shall then arrange for either in-house or external calibration, and:

- review all previous test results associated with the suspect equipment;
- identify the inspections, measurements or tests required to re-validate the results;
- ensure that suitable re-testing is performed with calibrated equipment;
- record the results of the re-testing on the respective inspection and test documentation.

9. Quality Personnel Qualifications

It is preferable that *Contractor* / Supplier's personnel engaged in Quality Assurance and Quality Control are members of one or more of the following organisations:

South African Quality Institute

Southern African Society for Quality

It is mandatory that personnel undertaking testing of rail-associated infrastructure are qualified as follows:

For signalling:

- The *Contractor* / Supplier is not allowed to do the commissioning but only a Transnet representative (Transnet employed Test Engineer)

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- The *Contractor* / Supplier should supply a Certificate of Compliance signed by a registered engineer/technologist
- This person should have a minimum of 5 years' experience as a professional
- The CV confirming that his/her experience is in line with the scope of work to be overseen as Quality Assurance or Control Officer

For OHTE and Perway:

- The *Contractor* / Supplier should supply a Certificate of Compliance signed by a registered engineer/technologist
- This person should have a minimum of 5 years' experience as a professional
- The CV confirming that his/her experience is in line with the scope of work to be overseen as Quality Assurance or Control Officer.

10. Quality Records

The *Contractor* / Supplier shall maintain Quality Records necessary to provide objective evidence that demonstrates and verifies achievement of the QA / QC requirements associated with the Scope of Work. All Quality Records, including original source material test certificates and non-destructive test reports, shall be retained by the *Contractor* / Supplier during the project, and be provided to TCP at the times, and in the quantities specified in the *Contract.*

The *Contractor* / Supplier shall collate all quality records in the Data Pack and submit the Data Pack to TCP in accordance with the *Contract* and all referenced standards and specifications. This DP shall be compiled progressively, and shall be available for review at all phases of manufacture or construction activities.

The Scope of Work shall not be complete until the *Contractor's* / Supplier§ Data Pack, including the quality records from Sub-Supplier/Sub-Contractors, has been reviewed and accepted by TCP.

The *Contractor* / Supplier shall retain a copy of all Quality documentation generated during the *Contract,* including a copy of the complete Data Pack, for his own records for a minimum period of five (5) years after the completion of the Scope of Work, including Design Work.

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ANNEXURE 1 – Sample Project Quality Plan

Pages 19 to 23

PROJECT QUALITY PLAN

PROJECT:			**PROJECT CODE:**		**ITEMS DESCRIPTION:**				
ORDER NO.:									
CLIENT:			**CLIENT CONTRACT NO:**		**DRAWING/SPECIFICATION NO.:**				
COST CODE SERIAL NO.:									
GENERAL DESCRIPTION:									

RESPONSIBILITY LEGEND			**APPROVALS**			
H	=	HOLD POINT		**AUTHORITY**	**SIGNATURE**	**DATE**
W	=	WITNESS	1.	Project Quality Manager		
S	=	SURVEILANCE	2.	Project Manager		
V	=	VERIFY	3.	Client Project Manager		
R	=	REVIEW	4.	Project Director		
A	=	APPROVE				

ACT NO.:	**ACTIVITY DESCRIPTION**	**(ACCEPTANCE CRITERIA) REFERENCE DOCS**	**1**			**2**			**3**			**4**		
1.	**MANAGEMENT AND SERVICES**		**R**	**SIGNATURE**	**DATE**	**R**	**SIGNATURE**	**DATE**	**R**	**SIGNATURE**	**DATE**	**R**	**SIGNATURE**	**DATE**
1.1	Contract Agreement and Acceptance.	Signed Contract.	**H**			**H**			**H**					
1.2	Project Schedule and WBS Acceptance.	Accepted Project Schedule and WBS	**H**			**H**			**H**					
1.3	Project PEP.	Signed PEP	**H**			**H**			**H**					
1.4	Quality Policy & Project Procedures.	Signed Approved documents	**H**			**H**			**H**					
1.5	Project Quality Plan.	Accepted Quality Management Plan.	**H**			**V**			**V**					
1.6	Safety & Health Management Plan.	Accepted Safety & Health Management Plan.	**V**			**V**			**V**					
1.7	Environmental Management Plan.	Accepted Environmental Management Plan.	**V**			**V**			**V**					
1.8	Engineering Management Plan.	Accepted Environmental Management Plan.	**V**			**V**			**V**					

PROJECT QUALITY PLAN

1.9	Document Management Plan.	Accepted Documentation Management Plan.	H			V			H					
1.10	Procurement Management Plan	Accepted Procurement Management Plan	H			V			H					
1.11	Project Controls Management Plan	Accepted Project Controls Management Plan	V			V			V					
1.12	Acceptance of Functional Specifications.	Signed Functional Specification.	H			V			H					
1.13	Acceptance Specification.	Signed Acceptance Specification.	H			V			H					
2	**BASIC DESIGN AND DEVELOPMENT**													
2.1	Engineering Planning and Control	Accepted Engineering Management Plan	V			V			V					
2.2	Basic Design reviews completed	Minutes of Design Review	H			V			H					
2.3	Basic Design Documentation completed	Approved Documentation List	H			V			H					
2.4	Finalisation of Detail Design Baseline	Approved Detailed Design Baseline	H			V			H					
3	**DETAIL DESIGN AND DEVELOPMENT**													
3.1	Mechanical Design of Main Systems.	Approved Drawings inc. Code Requirements.	H			V			H					
3.2	Main Facility Pipe design completed.	Approved Drawings inc. Code Requirements.	H			V			H					
3.3	Test Set-up pipe design completed.	Approved Drawings inc. Code Requirements.	H			V			H					
3.4	Civil and Structural design completed.	Approved Drawings inc. Standards Requirements. (SABS 1200)	H			V			H					
3.5	C&I design completed.	Approved C&I Datasheets	H			V			H					
3.6	Electrical design completed.	Approved Drawings and Specifications	H			V			H					
3.7	Conduct Detail Design Reviews.	Design Review Minutes	H			V			H					
3.8	Conduct HAZOP (PFD, P&ID, GA Drawings, Data Sheets, Design	HAZOP Review Minutes and Close Out Report	H			V			H					

PROJECT QUALITY PLAN

	Standards and Codes, etc.)														
3.9	Prepare and Accept O & M Manuals.	Approved O & M Manuals.	H			V			H						
3.10	Detail Design Documentation completed and finalisation of Product Baseline.	Approved Documents	H			V			H						
4	**PROCUREMENT**														
4.1	Detail Procurement Planning and Control.	Accepted Procurement Management Plan.	H			H			H						
4.2	Supplier Selection and Assessments completed and Suppliers Approved.	Supplier Register	H			V			H						
4.3	Critical Items Procurement.	Signed Contracts.	H			V			H						
4.4	Piping and Installation Procurement.	Signed Contracts.	H			V			H						
4.5	Civil and Structural Procurement.	Signed Contracts.	H			V			H						
4.6	C & I Procurement.	Signed Contracts.	H			V			H						
4.7	Procurement Electrical Systems.	Signed Contracts.	H			V			H						
4.8	Procurement of Test set-up Systems.	Signed Contracts.	H			V			H						
4.9	Updating all Procurement and Manufacturing Documentation and finalisation of Manufacturing Baseline.	Approved Manufacturing Baseline.	H			V			H						
5	**MANUFACTURING**														
5.1	Manufacturer QCP's reviewed and accepted.	Applicable Codes, Specifications & Drawings	H			V			H						
5.2	In-process monitoring and control.	Approved QCP's	H			V			H						
5.3	Inspection and FAT of final product.	Approved QCP's	H			V			H						
5.4	Product Acceptance and Release.	Approved QCP's	H			V			H						
5.5	Delivery to Site.	Packaging and Shipping Requirements.	H			V			H						
6	**CONSTRUCTION**														
6.1	Site establishment.	Established Site.	H			H			H						
6.2	Site preparation.	Site Inspection.	H			V			H						
6.3	Civil and Structural work completed.	Civil & Structural Inspections and Records.	H			V			H						

PROJECT QUALITY PLAN

6.4	Main Systems installation work completed.	Installation inspections.	H			V			H							
6.5	Piping installation completed.	Installation inspections.	H			V			H							
6.6	Mechanical Equipment installation completed.	Installation inspections.	H			V			H							
6.7	Electrical installation completed.	Installation inspections.	H			V			H							
6.8	C&I installation completed.	Installation inspections.	H			V			H							
6.9	Installation of Test set-up Systems.	Installation inspections.	H			V			H							
6.10	"As Built" Construction Documentation updates and finalisation of Construction Baseline.	Approved Construction Baseline.	H			H			H							
7	**COLD COMMISSIONING AND HANDOVER FOR HOT COMMISSIONING**															
7.1	Agreement and Acceptance of Commissioning Plan.	Approved Commissioning Plan.	H			V			H							
7.2	Visual Checks and Pressure Testing.	Inspection and pressure Test Results. AIA Release Notes.	H			H			H							
7.3	Cold Commissioning of Components.	Test Results and Reports.	H			V			H							
7.4	C&I and Electrical Commissioning.	Test Results and Reports.	H			V			H							
7.5	Final Update of Plant Configuration to "As Built".	Data Books	H			H			H							
7.6	"As Built" Data Book Verifications.	Project Quality Approval.	H			H			H							
7.7	Plant and System Hand Over.	Customer Acceptance. Customer Release Notes.	H			H			H							

ANNEXURE 2 – Sample Quality Control Plan

Pages 24 to 25

QUALITY CONTROL PLAN

Quality Control Plan No.		Revision:		Date Issued:	
Contract No.		Description:		Item No.	
Contractor		Location:			

Activity No.	Activity Description	Procedure Reference / Code Specification	Specification Acceptance Criteria	Verifying Document / Report / Certificate	Verification/Witness					
					Contractor		**AIA**		**TCP**	
					Action	Sign	Action	Sign	Action	Sign

Rev	Date	Reason for Revision	Drawn	Checked

ACTION

H – Hold. Mandatory Hold Point

R – Review (Verify) only

W - Witness

S - Surveillance

NOTE: H & W points require formal notification to TCP

ANNEXURE 3 – Concession Request

Pages 26 to 29

19

CONCESSION FORM

Request for Concession No:			
Project Name:		Project Number:	
A. SUPPLIER/CONTRACTOR SUPPLIED INFORMATION			
SUPPLIER/CONTRACTOR NAME:		P/O /CONTRACT NO.:	
SUPPLIER/CONTRACTOR CONCESSION NO:		DATE:	
Required concession applicable to: (Item/Material/Equipment/Area)			
Quantity Affected:			
Original Requirements:			
Description of Concession – Revised Requirements:			
Justification:			
Cause :			
Consequence :			
References:			
Original Requirements reference:			

Drawing No.:		Rev.:		Specification No.:		Rev.:	
Drawing No.:		Rev.:		Specification No.:		Rev.:	
Drawing No.:		Rev.:		Specification No:		Rev.:	
Attached applicable documentation:							

CONCESSION FORM

A. SUPPLIER/CONTRACTOR SUPPLIED INFORMATION continued						
(NOTE: This concession will be rejected if the following information is not provided):						
(i) VALUE OF BENEFIT TO CLIENT $/R.....	(ii) AGREE TO AN EXTENSION OF THE WARRANTY	YES ☐	NO ☐	(iii) ANY IMPACT ON SCHEDULE?	NO ☐	YES ☐
	IF "YES" WHAT PERIOD?			IF "YES" WHAT PERIOD?		
Requested by:(Supplier/Contractor)						
Name:		Title:		Signature:		Date:
B. SITE ADMINISTERED CONTRACT?	☐ Yes	☐ No				
Possible QC implications:						
Recommended	☐	**Rejected**	☐			
Recommendations with the following Conditions:						
Area Manager:		Signature:		Date:		
Site Engineer:		Signature:		Date:		
C. RECOMMENDATION BY CONTRACT ADMINISTRATOR:						
Name:		Signature:		Date:		
D. RECOMMENDATION BY ENGINEERING:						
Recommended	☐	**Rejected**	☐	**Conditional**	☐	
Recommendations:						
PR Engineer:		Signature		Date		
Lead Discipline Engineer:		Signature		Date		
Engineering Manager:		Signature		Date		
Comments:						

CONCESSION FORM

E. AREA MANAGER:		**Accepted**	☐	**Rejected**	☐
Name:		Signature		Date	
F. Transnet Capital Projects :		**Accepted**	☐	**Rejected**	☐
Name:		Signature		Date	

ANNEXURE 4 – Tender Returnable Quality Management System

Pages 30 to 36

TENDER RETURNABLE'S REVIEW - QUALITY

Tender Returnable – Quality Management System

Tender Information Required

The following documents shall be attached to this returnable and submitted with the tender. Failure to submit the documents may result in the tender being declared non responsive and subsequently rejected.

Item	Document to be submitted	Attached? (Y/N) (Tenderer to complete)
1	Quality Management Questionnaire	
2	ISO 9001 Certification	
3	Quality Policy	
4	Quality Manual	
5	Schedule / List Quality Management System Procedures	
6	Typical Project Quality Plan	
7	Schedule / List of Quality Control Plans (QCPs)	
8	Typical QCP	
9	Quality Management Representatives C.V.	
10	Quality Staffing (Organogram)	
11	Programme of Internal / External Audits	
12	Procedure for Evaluation of Suppliers / Contractors	
13	Approved Supplier / Contractors List	
14	Typical Data Pack Indices	

TENDER RETURNABLE'S REVIEW - QUALITY

Quality Management System Questionnaire

1. Quality Management System			
Is the tenderer certified to ISO 9001 – Quality Management System Requirements?		☐ Yes	☐ No
If yes	Certificate No.:	Certification Body:	Expiry Date:
Are there any exclusions specified? ☐ Yes ☐ No		If yes provide Details of Exclusions:	
If no, is the tenderer Quality Management System ISO 9001 compliant due to?			
Expired certificate	☐ Yes	☐ No	Comments:
Independent verification	☐ Yes	☐ No	Comments:
Other	☐ Yes	☐ No	Provide Details:
Does the Tenderer have an approved Quality Manual that complies with ISO 9001 requirements? *(If yes, please submit a copy)*	☐ Yes	☐ No	Document No.:
Has your Quality Manual been reviewed?	☐ Yes	☐ No	Has it been reviewed in the last: ☐ 6 months ☐ 12 months ☐ more than 12 months
Does the Tenderer have an approved Quality Policy that complies with ISO 9001 requirements in place? *(If yes, please submit a copy)*	☐ Yes	☐ No	Document No.:
Has your Quality Policy been reviewed in the last:	☐ Yes	☐ No	Has it been reviewed in the last: ☐ 6 months ☐ 12 months ☐ more than 12 months
Does the Tenderer have an Index of Management System Procedures? *(If yes, please submit a copy)*	☐ Yes	☐ No	Document No.:
Does the Procedures cover the full Scope of the Quality Management System	☐ Yes	☐ No	Comments:
Has Project Specific Procedures been compiled and approved	☐ Yes	☐ No	Comments:

TENDER RETURNABLE'S REVIEW - QUALITY

Has your Quality Management System procedures been reviewed in the last:	☐ Yes	☐ No	Has it been reviewed in the last: ☐ 6 months ☐ 12 months ☐ more than 12 months
Typical Project Quality Plan *(If yes, please submit a copy)*	☐ Yes	☐ No	Document No.:

Does the Project Quality Plan specify the Management System arrangements in relation to:

Project Initiation and Planning	☐ Yes	☐ No	Organization, Staff allocation and Teams	☐ Yes	☐ No
Interaction Management	☐ Yes	☐ No	Communication Planning and Control	☐ Yes	☐ No
Change Management	☐ Yes	☐ No	Information Management	☐ Yes	☐ No
Project Handover and Closure	☐ Yes	☐ No	Risk Management	☐ Yes	☐ No
Scope and Activity Control	☐ Yes	☐ No	Purchasing Planning and Control	☐ Yes	☐ No
Schedule Development and Control	☐ Yes	☐ No	Documentation Requirements	☐ Yes	☐ No
Cost Estimation	☐ Yes	☐ No	Record Requirements	☐ Yes	☐ No
Budgeting	☐ Yes	☐ No	Evaluation of Sub Contractors	☐ Yes	☐ No
Cost Control	☐ Yes	☐ No	Subcontractors	☐ Yes	☐ No
Resource Planning and Control	☐ Yes	☐ No	Contract Control and Administration	☐ Yes	☐ No
Engineering Management	☐ Yes	☐ No	Health and Safety Management	☐ Yes	☐ No
Environmental Management	☐ Yes	☐ No	Quality Management (QA & QC)	☐ Yes	☐ No

TENDER RETURNABLE'S REVIEW - QUALITY

Project / Scope Specific Requirements	☐ Yes	☐ No	Provide Details of Project/Scope Specific Requirements:		
Typical Quality Control Plan *(If yes, please submit a copy)*	☐ Yes	☐ No	Document No:		
Does your Quality Control Plans specify the following?					
Document and Revision No.	☐ Yes	☐ No	Legend for Interventions	☐ Yes	☐ No
Project, Contract and PO No.	☐ Yes	☐ No	Hold interventions as applicable	☐ Yes	☐ No
Reviews Required	☐ Yes	☐ No	Standards/Specifications/Procedures applicable to Action Item/s.	☐ Yes	☐ No
Approvals Required	☐ Yes	☐ No	Acceptance Criteria as applicable	☐ Yes	☐ No
Approvals by Responsible Engineer	☐ Yes	☐ No	Record Requirements for Actions	☐ Yes	☐ No
Distribution Requirements	☐ Yes	☐ No	Check Sheets included as Addendums	☐ Yes	☐ No
Logical Flow of Actions and Action no's	☐ Yes	☐ No	Release Criteria as final Action	☐ Yes	☐ No
Interventions Required by Fabricator / Erector, Client	☐ Yes	☐ No	Any other Project or Scope Specific Criteria	☐ Yes	☐ No
Provide details of Project/Scope Specific Criteria:					
Provisional Schedule or list of WCP's *(If yes, please submit a copy)*	☐ Yes	☐ No	Document No.:		
Does the QCP schedule or list cover the full Scope Expected Works?				☐ Yes	☐ No
Do you employ a QCP Register for control of all QCP's?				☐ Yes	☐ No

TENDER RETURNABLE'S REVIEW - QUALITY

2. Quality Management Organization			
Has a Quality Management representative been appointed? *(If yes, please submit a copy of the CV.)*	☐ Yes	☐ No	Document No.:
Does the Quality representative have relevant experience specific to the nature of the Project/Scope of Works/ Technology/Industry?			☐ Yes ☐ No
If yes, how many years of experience?	☐ Less than 5 yrs	☐ 5-10 yrs	☐ More than 10 yrs
What qualifications does he/she have?	☐ M and Industry related qualification	☐ M +3 and Industry related qualification	☐ M +4 and Industry related qualification
Project Organogram *(If yes, please submit a copy)*	☐ Yes	☐ No	Document No.:
Has critical positions for quality Management been identified? (HO/Site/Fabricators/Suppliers)	☐ Yes	☐ No	If yes, please supply details:
Does staff numbers and allocation take into account staff utilization?	☐ Yes	☐ No	What is the expected level of staff utilization? ☐ 70% ☐ 80% ☐ 90% ☐ 100%

3. Supplier and Contractor Quality Assurance			
Is an approved audit schedule covering all suppliers and contractors in place?	☐ Yes	☐ No	Document No.:
Have audits been conducted according to the schedule? *(proof to be supplied on contract award)*	☐ Yes	☐ No	Comments
Are audits conducted by qualified auditors and/or subject matter experts?	☐ Yes	☐ No	Comments
Are audit reports factual and available on request?	☐ Yes	☐ No	Comments
Is the audit programme managed in accordance with requirements of ISO 9001?	☐ Yes	☐ No	Comments
Has a documented procedure for evaluation and selection of supplier and contractors been established? *(If yes, please submit a copy)*	☐ Yes	☐ No	Document No.:
Does this procedure provide for quality / performance criteria and categorization of Suppliers/ Contractors based on ability to meet quality / performance requirements?	☐ Yes	☐ No	Comments
Have Suppliers / Contractors been selected and categorized based on this procedure?	☐ Yes	☐ No	Comments
Are Supplier / Contractors continuously monitored /	☐	☐	Comments

TENDER RETURNABLE'S REVIEW - QUALITY

measured in terms of their quality performance?	Yes	No	
Has an Approved Supplier/ Contractors List been implemented and maintained *(If yes, please submit a copy)*	☐ Yes	☐ No	Comments
Does the list indicate the category of Suppliers/ Contractors and are they ranked for preference in terms of performance?	☐ Yes	☐ No	
Has the Approved Supplier / Contractors List been updated and is it current?	☐ Yes	☐ No	Updated in the last: ☐ 6 months ☐ 12 months ☐ 18 months ☐ 24 or more months
Note: Transnet Capital Projects shall approve the list and reserves the right to remove any Supplier/Contractors from the list. Any additions to the List shall be submitted to Transnet Capital Projects for approval.			
Have Typical Data packs Indices been compiled (Fabrication, Construction)? *(If yes, please submit copies)*	☐ Yes	☐ No	Document No/s:
Does Data Packs indices taking into account Industry Practice and Client Requirements?	☐ Yes	☐ No	Comments
Does indices provide for Discipline/Area Specific deliverables in line with Scope of project/Works?	☐ Yes	☐ No	Comments
Have indices been reviewed against the Contractor Deliverables Schedule (CDS) to ensure compliance with requirements of the Project?	☐ Yes	☐ No	Comments

Tenderer should note that information shall be subjected to verification prior to *contract* award.

ANNEXURE 5 – Generic Quality Management System Compliance Checklist

Pages 37 to 41

GENERIC QUALITY MANAGEMENT SYSTEM COMPLIANCE CHECKLIST

1. Scope and Objectives			
1.1 Owner's requirements Specifications detailing the Project Goals and Objectives	☐ Yes	☐ No	Comments:
1.2 Project Quality Objectives defined?	☐ Yes	☐ No	Comments:
2. Planning			
2.1 Project Execution Plan (PEP)	☐ Yes	☐ No	Comments:
2.2 Project Approval Matrix	☐ Yes	☐ No	Comments:
2.3 Kick off minutes (Client and *Contractor* / Supplier)	☐ Yes	☐ No	Comments:
2.4 Project Quality Plan	☐ Yes	☐ No	Comments:
2.5 Are Project Specific Quality Control Plans (QCPs) in place?	☐ Yes	☐ No	Comments:
3. Quality Organisation and People			
3.1 Is there a Quality Organogram for the Project and have the Quality staff been mobilised in line with the Project Schedule?	☐ Yes	☐ No	Comments:
3.2 Have the QA / QC Roles and Responsibilities and Activities been documented?	☐ Yes	☐ No	Comments:
3.3 Is the Project QA / QC team in place and do the resource capacity and competence match the workload?	☐ Yes	☐ No	Comments:
4. Quality Policy and Procedures			
4.1 Is the SHEQ Policy displayed at the workplace?	☐ Yes	☐ No	Comments:
4.2 Is there a Register of Standards and Procedures for the Project?	☐ Yes	☐ No	Comments:
4.3 Are the Standards and Procedures adequate for the scope of work of the Project?	☐ Yes	☐ No	Comments:
4.4 Are Procedures and Task Instructions available at the place of work? Do employees perform work in accordance with Procedures, Work Instructions and other relevant requirements?	☐ Yes	☐ No	Comments:

GENERIC QUALITY MANAGEMENT SYSTEM COMPLIANCE CHECKLIST

4.5 Has Project Specific Procedures been compiled and approved?	☐ Yes	☐ No	Comments:
5. Execution			
5.1 Are the PQP and QCPs implemented effectively with the necessary sign-offs at Hold Points before proceeding?	☐ Yes	☐ No	Comments:
5.2 Are FATs and SATs being conducted, documented and reported on?	☐ Yes	☐ No	Comments:
5.3 Is the Engineer signing off construction / installation in compliance to the design on completion?	☐ Yes	☐ No	Comments:
5.4 Are punch lists being prepared and punch items classified and closed out accordingly?	☐ Yes	☐ No	Comments:
6. Defects and Non-conformance			
6.1 Is there a Defect and Non-conformance Management procedure and is it being applied to the Project?	☐ Yes	☐ No	Comments:
6.2 Are Non-conformances adequately closed out and the Non-conformance Register updated?	☐ Yes	☐ No	Comments:
6.3 Is there adequate Quality Performance tracking?	☐ Yes	☐ No	Comments:
6.4 Are product on hold and recall / rework procedures and instructions used in the event that the supplier's process parameters are found to be outside of specified requirements?	☐ Yes	☐ No	Comments:
7. Quality Audits			
7.1 Is there an approved quality audit schedule?	☐ Yes	☐ No	Comments:
7.2 Have audits been conducted according to the schedule? *(proof to be supplied on contract award)*	☐ Yes	☐ No	Comments:
7.3 Are audits conducted by qualified auditors and/or subject matter experts?	☐ Yes	☐ No	Comments:
8. Inspections and Tests			
8.1 Are all inspections indicated in sequence (inspection planning done)? Are characteristics to be inspected identified?	☐ Yes	☐ No	Comments:

GENERIC QUALITY MANAGEMENT SYSTEM COMPLIANCE CHECKLIST

8.2 Are inspections and tests performed at defined stages with clear indication of inspection and test status?	☐ Yes	☐ No	Comments:
8.3 Is contract requirements incorporated?	☐ Yes	☐ No	Comments:
8.4 Is there evidence that product conforms to specified requirements and do these documents contain proper authorisations? Verify release notes and certificates.	☐ Yes	☐ No	Comments:
8.5 Is Inspection and Test Equipment stored in acceptable conditions?	☐ Yes	☐ No	Comments:
8.6 Are all equipment calibrated (verify serial number on instrument against certificate)?	☐ Yes	☐ No	Comments:
8.7 Have calibration intervals been identified? Verify compliance against due date.	☐ Yes	☐ No	Comments:
8.8 Have calibration accuracy requirements and environmental acceptance criteria been defined (tolerances)?	☐ Yes	☐ No	Comments:
8.9 Are non-conforming instruments removed from work area?	☐ Yes	☐ No	Comments:
9. Transportation, Receipt, Storage and Release of Goods			
9.1 Have transportation and storage protection for goods been provided for?	☐ Yes	☐ No	Comments:
9.2 Are packing & marking in accordance with client specifications?	☐ Yes	☐ No	Comments:
9.3 Are goods received checked against the specifications on receipt and signed off?	☐ Yes	☐ No	Comments:
9.4 Are there records that all products has passed the inspections and test as defined by the acceptance criteria and is the authority identified who is responsible for the release of the product?	☐ Yes	☐ No	Comments:
9.5 Have rejected items been isolated?	☐ Yes	☐ No	Comments:

GENERIC QUALITY MANAGEMENT SYSTEM COMPLIANCE CHECKLIST

Note: Compliance against relevant standard requirements pertaining to the relevant inspection and testing activity/goods supplied should be assessed. For instance, % NDE to be done in accordance with code, stress testing requirements, load testing to be done, etc.			
10. Change Control			
10.1 Are there Change Control Procedures (Engineering, Scope and Project Changes)?	☐ Yes	☐ No	Comments:
10.2 Are changes managed in line with the Procedures?	☐ Yes	☐ No	Comments:
10.3 Is approval given at the appropriate level for each change?	☐ Yes	☐ No	Comments:
10.4 Are Project Plans regularly updated to reflect agreed changes?	☐ Yes	☐ No	Comments:
11. Concessions and Queries			
11.1 Is there a procedure for concessions and a concession register in place?	☐ Yes	☐ No	Comments:
11.2 Are Technical and Field Engineering Queries being addressed timeously and adequately?	☐ Yes	☐ No	Comments:
12. Documentation			
12.1 Are the issuing of documentation/drawings/ specifications controlled and are there Registers for these?	☐ Yes	☐ No	Comments:
12.2 Do all Documentation including Data Packs, Operating and Maintenance Manuals meet the requirements of the Document Handover Matrix?	☐ Yes	☐ No	Comments:
12.3 Does a procedure exist for As-built documents and is it complied with?	☐ Yes	☐ No	Comments
13. Risks			
13.1 Are Quality risks included in the Risk Register?	☐ Yes	☐ No	Comments:
13.2 Are Quality Risks been allowed for in the Risk Allowance?	☐ Yes	☐ No	Comments

Please note that further Project Specific Quality Checklists may need to be developed in line with the scope of work of the Project.

ANNEXURE 6 – Non Conformance Report

Pages 42 to 43

TRANSNET

NON-CONFORMANCE REPORT

Project Name:		NCR Number:	
Project Number:		Date:	

Section A – Initiating a Non Conformance Report

PO/Contract No:		Sub-Contract No:	*(If applicable)*
Supplier/Contractor:			

Description of Non Conformance:

Non Conformance Classification

☐ Construction ☐ Commissioning ☐ Eng/Design ☐ Documentation ☐ Complaint

☐ HSE ☐ Manufacture ☐ Materials ☐ Systems/Procedure ☐ Other

Originator

Name:	Signature:	Date:

Section B – Supplier/Contractor Proposed Corrective Action

Cause :

Corrective Action :

Action to Prevent Recurrence:

Acknowledgement of Receipt by Supplier/Contractor

Name:		Signature:		Date:	

TRANSNET

NON-CONFORMANCE REPORT

Project Name:		NCR Number:	
Project Number:		Date:	

Section C – Review and Recommendations

Comments/Recommendations/Instructions:

Section D - Verification

Comments (if applicable):

Concession Required ☐ Yes ☐ No

Section E – Close Out

Sign off when NCR is completed :

Name: **Project Quality Manager**	Signature:	Date:

ANNEXURE 7 – Non Conformance Register

Pages 44 to 45

NON-CONFORMANCE REGISTER

Project Name:					Project Number :				
NCR No.	Raised By	Issue Date	Assignee	Non-Conformance	Response Date	CAR Agreed (Y/N)	Close Out Date	Classification	Criticality

ANNEXURE 8 – Audit Notification

Pages 46 to 48

TRANSNET

AUDIT NOTIFICATION

AUDIT DATE: from _____ to _____
Opening meeting: date _____ time _____
Closing meeting: date _____ time _____

Detail Audit Plan Attached: Yes ☐ **No** ☐

TYPE OF AUDIT: System ☐ Process ☐ Product ☐

AUDIT OBJECTIVES:

1. To confirm the effective implementation of planned arrangements
2. To confirm that the management system is capable of achieving policy objectives

---

SCOPE:
Department: _____

Reference Documents:
1. ISO 9001:2015
2. QAL-STD-0001
3. _____

AUDITOR(S): _____
_____
_____

TCP Quality Department
Name *Date*

CONFIRMATION:

Name: _____ Date: _____

Day 1: Day ddmmyyyy **Auditors:**				
Time	**Description**	**Reference**	**Area/Process/Function**	**Auditor**
08:00				
08:30	Opening meeting			
09:00				
09:30				
10:00				
10:30				
11:00				
11:30				
12:00				
12:30	BREAK			
13:00				
13:30				
14:00				
14:30				
15:00				
15:30				
16:00				
16:30	Feedback meeting			Auditors
17:00	**END**			

ANNEXURE 9 – Inspection Report - A

Pages 49 to 50

TRANSNET

INSPECTION REPORT - A

Inspection Report (A) Number :			
Contract Name:		Project No:	
Contractor:		PO No:	
Subcontractor:		Equipment:	
Revision/Drawing No:		Location:	

ACTIVITY

☐ Inspection to QCP	☐ Material/Machinery Inspection	☐ Pressure Test
☐ Inspection to Drawing	☐ Welding Inspection/NDT	☐ Performance Test
☐ Documentation Review	☐ Progress Initial/Final	☐ Site Inspection

Status: ☐ REJECTION ☐ APPROVED/RELEASED

ITEM NO	COMMENTS/ACTION	STATUS

Subcontractor Signature		Date:	
Contractor Signature		Date:	
Transnet Capital Projects Representative		Date:	

ANNEXURE 10 – Punch List

Pages 51 to 52

PUNCH LIST

Punch List ID.	Contract No:	Package No:	Sequential No:	Date:	Page
Area Inspected.	Area No:	System/Area:	Subsystem:	Punch List Originator:	

Item No.	Equip No.	Defects Description	Disc	Cat	Priority	Cause	Due Date	Completion					
								Contractor		TCP		Client	
								Date	Sign	Date	Sign	Date	Sign
1													
2													
3													
4													
5													
6													
7													
8													
9													

Discipline		**Category**		**Priority**		**Cause**	
C	Civil	A	Safety Critical items	1	Complete before Commissioning	H	Design inadequate
M	Mechanical	B	Performance Limiting items	2	Complete before Trial Operation	J	Installation incorrect
E	Electrical	C	General installation None critical items	3	Complete before Operations Handover	K	Work remaining
I	Instrumentation			4	Complete before Performance Acceptance	L	Additional item
P	Piping						

SANKOFA
Insurance Brokers

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To Whom It May Concern,

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

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

INSURED:	Transnet (SOC) Limited
PERIOD:	1 April 2021to 31 March 2022 (Both days inclusive)
DIVISION:	Transnet Freight Rail, Transnet Engineering, Transnet Properties, Transnet Pipelines, Transnet National Ports Authority and Transnet Port Terminals
THE INSURED'S VAT NO:	4720103177
THE INSURED'S COMPANY REGISTRATION NO:	1990/000900/30
POSTAL ADDRESS (Head Office)	P O Box 72501, Parkview, 2122

CONTRACT WORKS INSURANCE

Cover Provided :	Contract Works - Physical loss or damage to the Property Insured which being materials, plant and other things for incorporation into the permanent works.
Insurer :	Mirabilis (Santam Limited)
Policy Number :	MZAR35023-CAR
The Contract Site :	Any location within the Territorial Limits upon which The Insured Contract is to be executed or carried out as more fully defined in The Insured Contract documents together with so much of the surrounding area as may be required or designated for the performance of The Insured Contract.
Territorial Limits :	The Republic of South Africa.
Additional Co-Insureds:	
The Contractor:	All Contractors undertaking work in connection with The Insured Contract including the Employer to the extent that the Employer undertakes work in connection with The Insured Contract;
Sub-Contractors:	All Sub-Contractors employed by the Contractor and all other Sub- Contractors (whether nominated or otherwise) engaged in fulfilment of The Insured Contract; and to the extent required by any contract or agreement; transporters, suppliers, manufacturers, vendors, other persons, persons providing storage facilities, plant

owners and/or operators in respect of liability loss or damage arising out of The Insured Contract; project managers, architects, land surveyors, quantity surveyors, engineers and other advisors or consultants or sub-consultants appointed in the performance of the Insured Contract activities arising at the Contract Site provided always that any such person shall not be insured hereunder in respect of liability loss or damage arising out of such person's error or omission in the performance of the professional services for which he was appointed;

Provincial & Government: any Local Provincial or Government Department with which the Insured enters into any contract or agreement for the performance of The Insured Contract;
all for their respective rights and interests.

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

a) contracts which at award stage have a value in excess of R 1,000,000,000;

b) contracts with an estimated construction period exceeding 48 months but increasing to 60 months in respect of rail maintenance contracts and Transnet Freight and Rail contracts for logistical support for inline inspections and identification of defects over a 5 year period in respect of Transnet's pipeline assets (excluding Defects Liability/Maintenance period);

c) contracts involving construction or erection of petrochemical manufacturing plant(s) but this exclusion shall not apply to pipelines and other associated works undertaken by or on behalf of the Insured;

d) contracts in or on any aircraft;

e) Off-shore contracts;

f) Wet Risk Contracts which at award exceeds R500,000,000;

g) Dam Contracts

h) Tunnel contracts which at award exceeds R50,000,000;

i) Tunnel contracts using tunnel boring machines;

j) Underground Mining Contracts;

k) Horizontal Directional Drilling Contracts which at award exceeds R50,000,000;

l) Horizontal Directional Drilling Contracts where total drilling exceeds 1 km;

m) Horizontal Directional Drilling Contracts for pipe diameters greater than 76 cm.

Definitions

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

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

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

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

5 *Tunnels" means Tunnels (Including declines) involving all of the following;*
- *(a)* Works below ground level; and
- *(b)* Tunnelling machinery below ground level; and
- *(c)* A tunnelling crew operating the machinery below ground level;
- *(d)* But shall not include Horizontal Directional Drilling Contracts

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

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

Testing Period: 120 Days not consecutive.

Maintenance Period : 12 Months

Main Policy Extensions :

- Costs & Expenses - Limited to maximum of R50,000,000.
- Expediting Measures – Limited to a maximum of R50,000,000.
- Professional Fees In Reinstatement Of Property Insured - Limited to a maximum of R50,000,000.
- Costs & Expenses For Removal Of Debris No Damage - Limited to a maximum of R50,000,000.
- Surrounding Property in care custody or control of the contractor – Limited to a maximum of R55,000,000.
- Fire Brigade & Public Authorities - Limited to a maximum of R10,000,000.
- Public Authority Reinstatement Costs - Limited to a maximum of R20,000,000
- Public Relationship Costs - Limited to a maximum of R1,000,000.
- Records - Limited to a maximum of R2,000,000.
- Removal to Gain Access - Limited to a maximum of R20,000,000

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

Main Policy Exclusions :

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

Deductibles: In respect of loss or damage:

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

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

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

R500,000,001 to R1,000,000,000	R150,000	R25,000

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

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

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

PUBLIC LIABILITY

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

Insurer : Stalker Hutchinson (Santam Limited)

Policy Number: 6000/132335

Territorial Limits : The Republic of South Africa.

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

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

Policy Limits:

Contractors Public Liability	R100,000,000 any one occurrence / unlimited during the Period of Insurance
Contractors Negligent Removal or weakening of Support	R100 000 000 any one occurrence and R100,000,000 per site in the aggregate during the Period of Insurance.
Statutory Legal Defence Costs	*R5 000 000 in the aggregate during the Period of Insurance.
Arrest / Assault / Defamation	*R5 000 000 in the aggregate during the Period of Insurance.
Emergency Medical Expenses	R5 000 000 any one occurrence
Prevention of Access	*R5 000 000 in the aggregate during the Period of Insurance.
Trespass / Nuisance	*R5 000 000 in the aggregate during the Period of Insurance.
Claims Preparation Costs	R5 000 000 any one occurrence

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

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

General Policy Exclusions :

The policy does not cover:

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

PROFESSIONAL INDEMNITY

Cover Provided :	Professional Indemnity a) In respect of damages which the Insured shall become legally liable to pay in consequence of neglect, error or omission by or on behalf of the Insured in the conduct or execution of their Professional Activities and Duties as defined. b) Prior To Handover/Rectification - against loss arising out of any defect in the works discovered prior to the issue of any practical completion or take-over certificate provided that any such defects are caused by a negligent breach of a Professional Activity or Duty by the Insured in consequence of neglect, error or omission by or on behalf of the Insured.
Insurer :	Stalker Hutchinson (Santam Limited)
Policy Number:	6000/132337
Jurisdiction :	Worldwide excluding North America
Insured Contracts:	All contracts (including any undertaking awarded or commenced prior to inception of the period of Insurance) involving design, construction, performance testing and commissioning in respect of the works and shall include capital expenditure, upgrade, modification, maintenance or overhaul, refurbishment, renovation, retrofitting or alterations and additions to existing facilities undertaken by the Insured or other Insured Parties acting on their behalf but **Excluding**: a) Contracts which at award stage have a value in excess of R 1,000,000,000. b) Contracts with an estimated construction period at award exceeding 48 months (excluding Defects Liability/Maintenance period). c) Contracts with a Contractual Defects Liability Maintenance Period exceeding 24 months. d) Contracts involving construction or erection of petrochemical manufacturing plant(s) but this exclusion shall not apply to pipelines and other associated works undertaken by or on behalf of the Insured. e) Contracts in or on any aircraft. f) Off-shore contracts - “Off-shore contracts” means all works and installations in the sea or on the seabed and do not constitute normal Wet Risk Contracts like harbours, moles, bridges, wharves or sewage or cooling water intake or outlet facilities, piers, marinas, causeways, breakwaters, jetties, dry docks and offshore pipelines when connected directly to onshore facilities and canal developments. "Off-Shore contracts" shall include oilrigs and oil platforms.
Limit Of Indemnity:	Professional Indemnity - *R100,000,000 in the aggregate during the policy period of insurance.

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

Policy Extension Limits Of Indemnity:	Claims Preparation Costs -	*R7,500,000 in the aggregate during the policy period of insurance.
	Loss of Documents -	*R2,000,000 in the aggregate during the policy period of insurance.
	Statutory Defence Costs -	*R5,000,000 in the aggregate during the policy period of insurance.
	Defamation -	*R5,000,000 in the aggregate during the policy period of insurance. R 10,000 R 5,000,000 R 5,000,000
	Infringement of Copyright -	*R5,000,000 in the aggregate during the policy period of insurance.

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

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

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

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

Policy Main Exclusions:

- Excludes all consequential loss other than cost of re-design, rectification and replacement as a consequence of the defect.
- Excludes Supervision.
- Excludes liability arising out of environmental impairment / pollution
- Excludes the cost of removing, nullifying or cleaning-up the effects of environmental impairment/ pollution.
- Excludes war, invasion, acts of foreign enemies, hostilities or warlike operations (whether war be declared or not), civil war, rebellion, revolution, insurrection, civil commotion assuming the proportions of or amounting to an uprising, military or usurped power, any act of terrorism and nuclear risks.
- Excludes fines, penalties, punitive and exemplary damages, multiplication of compensatory damages and/or any other noncompensating damages of any kind.
- Excludes liability from the hazardous nature of asbestos.
- Excludes medical malpractice.

- Excludes failure to meet contractual requirements relating to efficiency, output or durability.
- Excludes failure to meet completion dates
- Excludes the estimation of probable costs other than cost advice and cost planning services normally provided by a Quantity Surveyor or Project manager.
- Excludes incorrect authorisation of payment.
- Excludes breach of any statutory regulation.
- Excludes liability from the insolvency, liquidation or judicial management of the Insured.
- Excludes the certification of value of work executed by any contractor where the Insured has an equity interest in such contractor;
- Excludes liability due to unlawful competition, unfair practices, abuse of monopoly power, cartel activities or breach of a competitions ac
- Sanctions Exclusion

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

Dennis Govender

Chief Broking Officer

T2.2-XX: Health and Safety Questionnaire

Health, Safety Questionnaire

1. SAFE WORK PERFORMANCE

1A. Injury Experience / Historical Performance - Alberta

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

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

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

1B. Workers' Compensation Experience

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

Industry Code:	Industry Classification:

Year			
Industry Rate			
Contractor Rate			
% Discount or Surcharge			

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

2. CITATIONS

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

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

3. CERTIFICATE OF RECOGNITION

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

4. SAFETY PROGRAM

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

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

Does your safety program contain the following elements:

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

5. TRAINING PROGRAM

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

	YES	NO		YES	NO
GENERAL RULES & REGULATIONS	☐	☐	CONFINED SPACE ENTRY	☐	☐
EMERGENCY REPORTING	☐	☐	TRENCHING & EXCAVATION	☐	☐
INJURY REPORTING	☐	☐	SIGNS & BARRICADES	☐	☐
LEGISLATION	☐	☐	DANGEROUS HOLES & OPENINGS	☐	☐
RIGHT TO REFUSE WORK	☐	☐	RIGGING & CRANES	☐	☐
PERSONAL PROTECTIVE EQUIPMENT	☐	☐	MOBILE VEHICLES	☐	☐
EMERGENCY PROCEDURES	☐	☐	PREVENTATIVE MAINTENANCE	☐	☐
PROJECT SAFETY COMMITTEE	☐	☐	HAND & POWER TOOLS	☐	☐
HOUSEKEEPING	☐	☐	FIRE PREVENTION & PROTECTION	☐	☐
LADDERS & SCAFFOLDS	☐	☐	ELECTRICAL SAFETY	☐	☐
FALL ARREST STANDARDS	☐	☐	COMPRESSED GAS CYLINDERS	☐	☐
AERIAL WORK PLATFORMS	☐	☐	WEATHER EXTREMES	☐	☐

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

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

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

6. SAFETY ACTIVITIES

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

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

Who follows up on inspection action items?

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

Yes ☐ No ☐ Daily ☐ Weekly ☐ Biweekly ☐

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

Yes ☐ No ☐ Weekly ☐ Biweekly ☐ Monthly ☐

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

Is the process documented? ☐ Yes ☐ No

Who leads the discussion?

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

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

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

☐ Yes ☐ No

How does your company measure its H&S success?

- Attach separate sheet to explain

7. SAFETY STEWARDSHIP

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

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

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

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

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

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

7D Does your company track non-injury incidents?

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

8 PERSONNEL

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

Name	Position/Title	Designation

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

Name	Address	Telephone Number

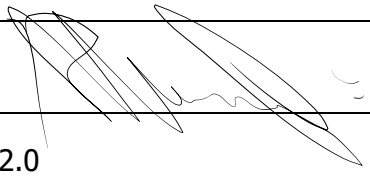
Other responsibilities:

9 REFERENCES

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

Name and Company	Address	Phone Number

POST COVID 19 LOCKDOWN CONSTRUCTION SITE HEALTH AND SAFETY GUIDELINES

Document number	TGC-IMS-HS-SOP-009.001
Business Name	Transnet Group Capital
Process/ Activity Name	COVID 19 Post Lockdown Construction Site Health and Safety Guidelines
Process Owner Name	Sipho Mlaudzi
Process Owner Signature	
Version Number	2.0
Classification	Unclassified
Effective Date	01 June 2020
Review Date	01 May 2021

SUMMARY VERSION CONTROL

VERSION NO.	NATURE OF AMENDMENT	PAGE NO.	DATE REVISED
1.0	New Document		
2.0	Changed Document to Standard Operating Procedure	1	01/05/2020
2.0	Include provision for COVID-19 Isolation Room on Construction Sites	11	01/05/2020
2.0	Include Provision for Health Care Waste Management on Construction Sites	15	01/05/2020
2.0	Extend the Scope to Transnet from TGC	All	01/05/2020

Note: Only latest amendments and/or additions are reflected in italics in the body of the document

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1. PURPOSE

The purpose of these guidelines is to provide guidance on how TGC should manage its construction sites and contractors during or after COVID 19 lockdown period. These guidelines seek to mitigate the general health risks posed by the COVID-19 in Construction Project sites. In addition, to ensure that TGC manages their contractors in accordance with applicable regulations and the contractual obligations, using practices that are fair, transparent, cost effective and of critical importance safe and healthy.

Note: These guidelines should be read in conjunction with the Project Specific Health and Safety (H&S) Specification and Disaster Management Act and its Regulations.

2. APPLICABILITY

These guidelines are applicable to Transnet managed construction sites.

Note: Contractors should review their Project Specific Risk Assessments and H&S Plans in line with these guidelines and submit to TGC for approval.

3. REFERENCE DOCUMENTS

Name	Reference Number	Applicable Section
Disaster Management Act, 2002 and its Regulations	Act No 57 of 2002	
Occupational Health and Safety Act, 1993 and its Regulations	Act No 85 of 1993	
Contractor Management Procedure	TRN-IMS-GRP-PROC 014	
Business Continuity Management Procedure	TRN-IMS-GRP-PROC-016	
Business Continuity Management Systems	ISO 22301:2012	
COVID-19 Health Care Waste Management on Construction Sites	TGC-IMS-ENV-SOP-009.001	
Occurrence and Non-conformance Management Procedure	TRN-IMS-GRP-PROC 013	

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4. DEFINITIONS AND ABBREVIATIONS

4.1 Definitions

Cleaning means physically removing germs, dirt and organic matter from surfaces

Contractor An employer (organization) or a person who performs **ANY** work and has entered into a legal binding business agreement contract to supply a product or provide services to Transnet. This applies to the Suppliers, Vendors, and Consultants, Service providers or Contractors.

Note: A Contractor is an employer in his/her own right.

Disinfecting means using chemicals to kill germs on surfaces. It is important to clean before disinfecting because organic matter and dirt can reduce the ability of disinfectants to kill germs.

Social Distancing means the practice of maintaining a greater than usual physical distance from other people or of avoiding direct contact with people or objects in public places during the outbreak of a contagious disease in order to minimize exposure and reduce the transmission of infection.

4.2 Abbreviations

COVID 19	Novel Coronavirus (2019-nCov)
H&S	Health and Safety
PPE	Personal Protective Equipment
TRANSNET	Transnet SOC Limited *(Operating as any of its Operating Divisions and/or Specialist Units)*

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5. ACCOUNTABILITY, RESPONSIBILITY AND AUTHORITY

Transnet's Executive Manager, Health and Safety (In Construction Projects Execution)	• Sets the H&S guidelines for management of COVID 19 Post-Lockdown on TGC construction sites; • Determine Scope for the COVID 19 Post-Lockdown Construction Site H&S guidelines; • Ensures development, implementation and maintenance of these guidelines; • Sets values and performance standards; and • Demonstrates and drives H&S leadership.
Transnet Project Director / Project Manager	• Drive implementation of COVID 19 Post-Lockdown Construction Site H&S guidelines; • Ensure availability of resources; • Ensure communication of COVID 19 Post-Lockdown Construction Site H&S guidelines directives to teams; • Communicate performance on the guidelines to the respective members of the Top Management Team; • Ensure resolution on issues identified through the COVID 19 Post-Lockdown Construction Site H&S guidelines process and implementation.
Transnet Construction H&S Agents / Managers	• Monitor implementation of COVID 19 Post-Lockdown Construction Site H&S guidelines and plans on projects sites; • Approves contractor's project / site specific COVID 19 Post-Lockdown Construction Site H&S Plan.
Construction Manager (Contractor)	• Customize the guidelines and develop a project / site specific COVID 19 Post-Lockdown Construction Site H&S Plan; • Implement and maintain contractor site specific COVID 19 Post-Lockdown Construction Site H&S Plan.
Employees	• Adhere to COVID 19 Post-Lockdown Construction Site Health and Safety Plan • Take accountability for assigned activities; and • Report any deviations.

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6. STANDARD OPERATING PROCEDURE

6.1 Site Mobilisation

- Employees must be advised to check themselves for COVID-19 symptoms before travelling to site and notify their supervisor and consult their Health practitioner if they feel sick;
- Flu-like symptoms ranging from mild fever, dry cough, runny nose, sneezing to moderate and severe symptoms like productive cough, high fever, and shortness of breath can be experienced.

6.1.1 Training and Awareness

- All employees must be trained on site specific COVID 19 Post-Lockdown construction site H&S plan, updated risk assessments and procedure taking into account new hazards and risks posed by exposure to COVID-19 in the workplace;
- Employees must be provided with up-to-date H&S education and training on COVID-19;
- Employees to be trained on the use and maintenance of PPE;
- Training material should be easy to understand and available in the appropriate language and literacy level for all workers.

6.1.2 Transportation of Employees to Sites

The contractor must provide means of transportation for employees to site. The transport should comply with the following:

- A minibus licensed to carry 10 passengers is limited to carry a maximum of 7 passengers including the driver;
- A minibus licensed to carry 15 passengers is limited to carry a maximum of 10 passengers including the driver;
- A minibus permitted to carry a maximum of 22 passengers, is limited to carry a maximum of 15 passengers including the driver;
- A vehicle licensed to carry a maximum of 5 passengers is limited to carrying 50% of its permissible passenger carrying capacity;
- Transport vehicles shall be sanitised before and after transporting of workers;
- All passengers shall sanitise their hands before getting into the vehicle;
- All passengers shall wear facemask while in transit.

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Use of public transport

Where the use of public transport cannot be avoided, the contractor must inform employees on precautions to take while using public transport as above.

6.1.3 Access Control

- Site access points must be monitored in order to enable social distancing of 1.5 metres – there might be a need to change the number of access points, either increase to reduce congestion or decrease to enable monitoring;
- Entry systems (e.g. biometrics) that require skin contact e.g. fingerprint scanners, should be removed or disabled;
- All personnel must be provided with means to wash or clean their hands before entering or leaving the site;
- Body temperature to be monitored with thermometer upon arrival;

  Alcohol testing on projects site should be managed in such a way that no employee is exposed to the epidemic and contractors must promote personal hygiene.
  - Breathalyzer used shall be equipped with disposable mouthpieces.
  - Breathalyzer shall be cleaned and or disinfected after every use.

Visitors and Suppliers

Note: All non-essential visitors to site are not allowed, only suppliers are allowed

- Suppliers must be advised in advance of the COVID 19 site screening tests and required COVID 19 Personal Protective Equipment (COVID PPE) requirements for the site;
- Suppliers must bring their own PPE and no PPE will be issued to them;
- The site supervisor must ensure that suppliers are accompanied on site.

6.2 Work Arrangements during Construction

- Non-essential physical work that requires close contact between workers should not be carried out;
- Tools and equipment in stores should be sanitised before issued and on return to the stores;
- Every employee to be issued with own tool for use for the duration of the shift;
- Sharing of tools and equipment should be avoided at all costs;
- Work requiring skin to skin contact should not be carried out;
- Plan all activities to minimise contact between workers;

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- Employees to be provided with face masks and should wear them at all times on site;
- Washing hands facilities must be provided on site, and where it is not available, all employees should be provided with hand sanitisers;
- Employees to be always encouraged to wash their hands

6.2.1 Before the Start of the Shift

- Pre-start meeting / DSTI to be held incorporating Covid-19 risk factors and protective behaviours (e.g. cough etiquette, care and use of PPE)

6.2.2 End of the Shift

- At the end of shift, all site personnel must dispose-of all single use PPE;
- Safety gloves, hard hats, face shields / googles (where applicable) and safety shoes should be cleaned with sanitizer and left at lockers provided on site;
- All employees shall clean hands with sanitiser before leaving site;
- Transport provided by the contractor shall be sanitised before boarding.

6.3 Construction Employees' Facilities

In addition to the Facilities Regulations, 2004 and Construction Regulations, 2014, Regulation 30, the contractor must ensure the following with regard to construction employee facilities:

6.3.1 Toilet Facilities

- Restrict the number of people using toilet facilities at any one time;
- Ensure workers wash hands before and after using the facilities. Note: Provide additional handwashing facilities if a large spread out of site or significant numbers of personnel on site;
- Enhance the cleaning regimes for toilet facilities particularly door handles, locks and the toilet flush;
- Portable toilets should be avoided wherever possible, but where in use these should cleaned and emptied more frequently;
- Provide suitable and sufficient rubbish bins for paper hand towels with regular removal and disposal.

6.3.2 Offices and Eating Facilities

- The workforce should also be required to stay on site once they have entered it and not use local shops;

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- Dedicated eating areas should be identified on site to reduce food waste and contamination;
- Break times should be staggered to reduce congestion and contact at all times;
- Hand cleaning facilities or hand sanitiser should be available at the entrance of any room where people eat and should be used by workers when entering and leaving the area;
- The workforce should be encouraged to bring pre-prepared meals and refillable drinking bottles from home;
- Workers should sit 1.5 metres apart from each other whilst eating and avoid all contact;
- Where catering is provided on site, it should provide pre-prepared and wrapped food only:
  - Payments should be taken by contactless card wherever possible or
  - Where only cash can be used, the usual hands washing with soap and water or hand sanitizers will be observed
  - Crockery, eating utensils, cups etc. should not be used
- Drinking water should be provided with enhanced cleaning measures of the tap mechanism introduced;
- Tables should be cleaned between each use;
- All rubbish should be put straight in the bin and not left for someone else to clear up;
- All areas used for eating must be thoroughly cleaned at the end of each break and shift, including chairs, door handles, vending machines and payment devices.

6.3.3 Changing Facilities, Showers and Drying Rooms

- Introduce staggered start and finish times to reduce congestion and contact at all times;
- Introduce enhanced cleaning of all facilities throughout the day and at the end of each day;
- Consider increasing the number or size of facilities available on site if possible;
- Based on the size of each facility, determine how many people can use it at any one time to maintain 1.5 metres spacing for social distancing;
- Provide suitable and sufficient rubbish bins in these areas with regular removal and disposal.

6.3.4. COVID-19 Isolation Room on Site

- *An isolation room should be identified and be secured with a clear signage for Isolation room*
- *Access to the isolation room must be limited to health care workers, hygiene maintenance workers (Cleaners) and health and safety professionals only.*

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- *Adequate PPE mast be maintained in the Isolation room, these will include FFP1 masks, hand sanitizers, latex gloves, bio-bin for waste management, clean drinking water, "there must clean running water, base and soap for washing of hands at close proximity"*
- *There must be adequate chairs for patients and health workers.*
- *A cleaning scheduled must be kept up to date and attached to back of the door.*
- *Deep cleaning and disinfection must be conducted after every isolation of a confirmed positive case.*
- *The isolation room must have adequate ventilation and positive displacement of air must be maintained.*

6.4 Avoiding Close Working (Social Distancing)

- Put up posters around the workplace on keeping at least 1.5 metres distance between everyone at the workplace;
- Erect signs at the entrances to lifts and meeting rooms to ensure the maximum safe capacity is not exceeded;
- Move work stations, desks and tables in staffrooms further apart to comply with social distancing;
- If possible, bring in shift arrangements so less staff are in the workplace at once;
- If possible, provide social distancing markers on the floor in areas where customers line up or where workers perform tasks;
- Nominate a person on the work floor to be responsible for keeping everyone the required 1.5 metres distance apart.

There will be situations where it is not possible or safe for workers to distance themselves from each other by 1.5 metres.

The **General Principles** are:

- Non-essential physical work that requires close contact between workers should not be carried out;
- Work requiring skin to skin contact should not be carried out;
- Plan all other work to minimise contact between workers;
- Where possible, stairs should be used in preference to lifts or hoists;

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- Where lifts or hoists must be used:
  - Always Lower their capacity to reduce congestion and contact ;
  - Regularly clean touchpoints, doors, buttons etc.
- Increase ventilation in enclosed spaces
- Regularly clean and disinfect the inside of construction vehicle / plant cabs and between uses by different operators.

Site Meetings (Also refer Site Meetings Procedure Annexure 8.4)

- Only necessary meeting participants should attend;
- Attendees should be two metres apart from each other;
- Rooms should be well ventilated / windows opened to allow fresh air circulation;
- Consider holding meetings in open areas where possible;

6.5 Personal Protective Equipment (PPE)

- No employee should be allowed on site without adequate and appropriate PPE;
- All employees should be provided with re-usable face masks;
- Re-usable PPE should be thoroughly cleaned after use and not shared between workers;
- Single use PPE should be disposed of properly so that it cannot be reused e.g. provide sufficient bins for this purpose;
- Any job specific respiratory protection should still be worn on site (e.g. FFP2) where required. **Note**: Re-usable face masks should be worn by employees not required to wear specialised respiratory protection.

6.6 Health and Hygiene

6.6.1 Management of Chronic Illnesses

- Self-disclosure may be necessary for the effective management of illness regimes at work;
- **In certain situations**:
  - Management of chronic illness may involve illness specific (measuring blood glucose for diabetes).
  - Some illness may necessitate regular visits to specialists or hospitals for treatment.

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- Self-disclosure may also enable employer to provide tangible support that directly or indirectly facilitates management.
- Please refer to ***Hand Washing Procedure (Annexure 8.3)***

6.7 Cleaning and Management of Communal Areas

Enhanced cleaning procedures should be in place across the site, particularly in communal areas and at touch points including:

- Toilet flush and seats
- Taps and washing facilities
- Door handles and push plates
- Hand rails on staircases and corridors
- Lift and hoist controls
- Machinery and equipment controls
- Food preparation and eating surfaces
- Telephone equipment
- Key boards, photocopiers and other office equipment

Rubbish collection and storage points should be increased and emptied regularly throughout and at the end of each day.

Note: A combination of cleaning and disinfection will be most effective in removing the COVID-19 virus. Cleaning reduces the soil load on the surface, allowing the disinfectant to work and kill the COVID-19 virus. Disinfectant may not kill the virus if the surface has not been cleaned with a detergent first **(Refer to Annexure 8.2: Cleaning and Disinfecting Procedure).**

6.8 Emergency Procedure and Reporting

In case where an employee has symptoms or tests positive for COVID-19, the following process must be followed:

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For TRANSNET:

- Employee must immediately report to his / her Line manager and Project Manager on site and thereafter follow **(Refer Annexure 8.1: Transnet guidelines when an employee tests positive for COVID-19)**

For Contractors:

- Employee must immediately report to his / her Line manager and /or Construction Manager on site;
- Construction Manager to report immediately to the TRANSNET Project Manager;
- TGC Project Manager follow **Transnet guidelines when an employee tests positive for COVID-19 (Annexure 8.1)**

6.9 COVID-19 Health Care Waste Management at Construction Sites

The Contractor must:-

- *Develop the Health Care Waste Management method statement for review and approval by the Transnet Environmental Officer and Construction Health and Safety Agent for the site.*
- *Manage the implementation of the waste management plan and/or method statement.*
- *Provide Training and Awareness to all Contractor site personnel on the management of general health care waste.*
- *Provide and Designate bio-bins or plastic bags for the disposal of health care waste (PPE) for the temporary storage prior to removal and disposal.*
- *Ensure that healthcare storage points are managed in accordance with the stated requirements.*
- *Maintain Waste Manifest (PPE) records relating to the safe disposal of health care waste.*
- *Immediately address and report any non-conformances and incidents noted on site regarding the management of health care waste.*
- *Monitor and coordinate the staff assigned to containerize, collect, store, and transport healthcare waste on site.*
- *Contractor to provide Daily evidence of waste receptacles to the TRANSNET Environmental Officer where health care waste is temporarily kept for remotely situated sites.*

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- *Maintain records of all healthcare waste quantities for disposal by the appointed service provider*
- *Liaise with own and Employer's (Transnet) project team members to minimize any health care waste management anomalies and ensure compliance with the approved site healthcare waste management plan and/or method statement.*

Note: *This section must be read in conjunction with the Standard Operating Procedure COVID-19 Health Care Waste Management on Construction Sites TGC-IMS-ENV-SOP-009.001 attached hereto as* ***Annexure 8.5***

7. RECORDS

7.1 Site Specific H&S Plan

7.2 Training and Awareness Registers (Risk Assessment, Induction, Tool Box Talks)

7.3 Site Meeting Registers

8. ANNEXURES

8.1 Transnet Guidelines when an employee tests positive for COVID-19

8.2 Cleaning and Disinfection Procedure

8.3 Hand Washing Procedure

8.4 Site Meetings Procedure

8.5 Standard Operating Procedure COVID-19 Health Care Waste Management on Construction Sites TGC-IMS-ENV-SOP-009.001

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GUIDELINES WHEN AN EMPLOYEE TESTS POSITIVE FOR COVID-19

Note: Any employee that takes the step to test because of the clinical presentation of having symptoms(cough, fever,) should immediately self-quarantine.

1. Employee tests positive for COVID-19.

2. Employee self -quarantines and does not present to work, but advises line-manager immediately upon getting test results.

3. Line -manager advises OD GM: HR and CE.

4. OD GM: HR with the Wellness manager or OH Doctor immediately invokes the process of contacting the Department of Health . Simultaneously , the CE reports the positive case to the GCE.

5. Department of Health Invokes a process of tracking and tracing close contacts of the employee.

6. Transnet OD reps ensure the team/site , dependant on who the employee has had contact with is shut down immediately.

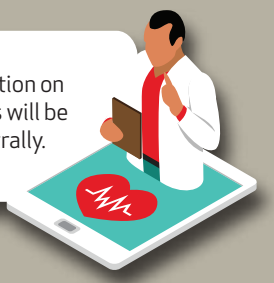
7. The Department of Health will advise on testing close contacts and close contacts should immediately self-quarantine.

8. Transnet ensures site/office is decontaminated.

9. The OD also offers support to the employee who tested positive through the EAP service provider.

10. The Department of Health takes over once the employee has tested positive and Transnet will be advised accordingly.

11. The Communication on all positive cases will be managed centrally.



ANNEXURE 8.2

CLEANING AND DISINFECTING PROCEDURE

Cleaning and disinfecting are two (2) different processes:

Cleaning means physically removing germs, dirt and organic matter from surfaces.

Disinfecting means using chemicals to kill germs on surfaces. It's important to clean before disinfecting because organic matter and dirt can reduce the ability of disinfectants to kill germs.

Note: A combination of cleaning and disinfection will be most effective in removing the COVID-19 virus. Cleaning reduces the soil load on the surface, allowing the disinfectant to work and kill the COVID-19 virus. Disinfectant may not kill the virus if the surface has not been cleaned with a detergent first.

1. Routine cleaning

Workplaces including construction sites should clean surfaces at least daily. Special attention should be given to frequently touched surfaces (e.g. tabletops, door handles, light switches, desks, toilets, taps, kitchen surfaces, cupboard handles, and etc.). Ideally, once clean, surfaces should also be disinfected regularly. Alternatively, you may be able to do a 2-in-1 clean and disinfection by using a combined detergent and disinfectant.

Surfaces and fittings should be cleaned more frequently when:

- Visibly soiled
- Used repeatedly by a number of people, and
- After any spillage.

For routine cleaning, disinfectants are usually only necessary if a surface has been contaminated with potentially infectious material. For this reason, when and how often a workplace should undertake disinfection as part of routine cleaning will depend on the likelihood of contaminated material being present at the workplace. For example, in a busy area such as toilet facilities with many employees entering each day, more frequent disinfection is recommended to prevent the spread of COVID-19.

2. How to clean

Use the following steps to clean an environment:

- Wear gloves when cleaning. Gloves should be discarded after each clean. If it is necessary to use reusable gloves, gloves should only be used for COVID-19 related cleaning and should not be used for other purposes or shared between workers;
- Wash reusable gloves with detergent and water after use and leave to dry;
- Clean hands immediately after removing gloves using soap and water or hand sanitiser;

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- Thoroughly clean surfaces using detergent and water. Always clean from the cleanest surfaces to the dirtiest surfaces. This stops the transfer of germs to cleaner surfaces and allows you to physically remove and dispose of the largest possible amount of germs;
- If you need to use a disinfectant, clean the surface first using detergent then apply a disinfectant or use a combined detergent and disinfectant. A disinfectant will not kill germs if the surface has not been cleaned first;
- Apply disinfectant to surfaces using disposable paper towel or a disposable cloth. If non-disposable cloths are used, ensure they are laundered and dried before reusing;
- Allow the disinfectant to remain on the surface for the period of time required to kill the virus (contact time) as specified by the manufacturer. If no time is specified, leave for 10 minutes;

How should I clean if someone at my workplace is suspected or confirmed to have COVID-19?

- If a person who has been at your workplace is suspected or confirmed to have COVID-19, you must thoroughly clean and disinfect all areas of suspected contamination;
- Clean and disinfect all areas (for example, offices, bathrooms and common areas) that were used by the suspected or confirmed case of COVID-19. Close off the affected area before cleaning and disinfection. Open outside doors and windows if possible to increase air circulation and then commence cleaning and disinfection;
    - **Clean and disinfect hard surfaces using either:** a physical clean using detergent and water followed by a clean with bleach solution (2-step clean), for example, household bleach or hospital-grade bleach solutions that are readily available from retail stores.
    - **A physical clean using a combined detergent and bleach solution (2-in-1 clean) made up daily from a concentrated solution.**
- Once cleaning and disinfection is complete, place disposable cloths, PPE and covers in a plastic rubbish bag, place it inside another rubbish bag (double-bagging) and dispose of the bag in the general waste;
- There is no need to close down an entire workplace, while cleaning and disinfection takes place, particularly if the person infected, or suspected to be infected, has only visited parts of the workplace. However the cleaning and disinfection must occur before any workers return to affected areas;

Note: Whether you need to suspend operations in your workplace will depend on factors such as the size of the workplace, nature of work, number of people, and suspected areas of contamination in your workplace.

- Those cleaning an area of suspected contamination need to be equipped with appropriate PPE. This includes disposable gloves and safety eyewear to protect against chemical splashes;
- If there is visible contamination with respiratory secretions or other body fluids in the area, the cleaning staff should also wear a disposable apron.
- Clean your hands using soap and water for at least 20 seconds, or where this is not possible, hand sanitiser of with at least 60% ethanol or 70% isopropanol as the active ingredient before putting on and after removing PPE;

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- Cleaning equipment including mop heads and cloths should be laundered using hot water and completely dried before re-use;
- Cleaning equipment such as buckets should be emptied and cleaned with a new batch of disinfectant and allowed to dry completely before re-use.

Hard surfaces

- In most circumstances, cleaning with detergent and water is sufficient;
- Disinfectants containing ≥ 70% alcohol, quaternary ammonium compounds, chlorine bleach or oxygen bleach are suitable for use on hard surfaces (that is, surfaces where any spilt liquid pools, and does not soak in). These will be labelled as 'disinfectant' on the packaging;

Soft or porous surfaces

- For soft or porous surfaces like fabric or leather, seek advice from the manufacturer of the item to be cleaned about which products can be safely used;
- Detergent can generally be used to clean fabric surfaces. If more thorough cleaning is needed, fabric surfaces may be steam cleaned. Leather will have special cleaning requirements;

Using disinfectants safely

- Follow all manufacturer's instructions and read the label and the Safety Data Sheet (SDS);
- Do not use different types of disinfectants together;
- Store your disinfectants safely and securely, out of direct sunlight and away from heat sources;
- For spraying or misting products, spray directly into the cleaning cloth to dampen the cloth for use. Take care not to generate a mist.

PPE to use when diluting and using disinfectants includes:

- Gloves, elbow-length if available, and
- Eye protection (safety glasses, not prescription glasses).

Disposal or cleaning of materials and PPE

- Reusable, washable cloths, PPE and covers should be washed in a regular cycle wash using the warmest possible setting with normal washing detergent. Avoid shaking out the items before placing in the washing machine;
- Wear disposable gloves to handle used cloths, PPE and covers. Wash your hands thoroughly with soap and water for at least 20 seconds after removing the gloves;
- Reusable, non-washable PPE such as eye protection, should be wiped clean with a detergent solution first, then wiped over with a disinfectant, and left to air dry.

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ANNEXURE 8.3

HANDWASHING PROCEDURE

Wash hands before you start work and after the following activities:

- Using the rest room;
- Touching your hair, face or body;
- Sneezing, Coughing or using a tissue;
- Smoking, eating, drinking, or chew gum or tobacco;
- Handling chemicals that might affect the safety of the food;
- Clearing tables or bussing dirty dishes;
- Touching anything else, that may contaminate hands such as sanitized equipment.

Hand-care

- Use soap and water for 20-30 seconds regularly and immediately after taking off PPE, where it is not possible;
- Use alcohol based hand sanitiser with at least 60% of ethanol or 70% isopropanol as the active ingredient;
- If hands are soiled, wash hands with soap and water for 40-60 seconds;
- Do not use hot water to rinse your hands;
- Dry hands and arms completely with a single use paper towel or warm air hand dryer;
- Take care of your hands by regular using a protective hand cream /lotion at least daily;
- Use paper towel to turn off the faucet, and open the door

Please remember…

- Do not wear artificial fingernails;
- Keep natural nails short;
- Discard disposable gloves after each task and clean your hands;
- You may use hand sanitizer or chlorinated water, if soap and water are not available.

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ANNEXURE 8.4

SITE MEETINGS PROCEDURE

Key considerations to prevent or reduce COVID-19 risks on construction sites meetings:

Before the meeting

The following should be exhausted:

- Develop and agree on preparedness plan to prevent infection at your meeting;
- Consider whether a face-to-face meeting is needed. Could it be replaced by a teleconference or online meeting;
- Could the meeting be scaled down so that fewer people attend?
- Pre-order sufficient supplies, including tissues and hand sanitizer for participants. Have face masks available to offer anyone who develops respiratory symptoms;
- Actively monitor where COVID-19 is circulating. Advise participants in advance that if they have any symptoms or feel unwell, they should not attend;
- Make sure all organisers and participants at the meeting provide contact details: mobile telephone numbers, email and address where they are staying. State clearly that their details will be shared with local public health authorities if any participant becomes ill with a suspected infectious disease. If they will not agree to this they cannot attend the meeting;
- Develop and agree a response plan in case someone at the meeting becomes ill with symptoms of COVID-19 (dry cough, fever, malaise). This plan should include at least: Identify a room or area on site where someone who is feeling unwell or has symptoms can be safely isolated;
- Develop a plan for how they can be safely transferred from there to a health facility;
- Include what to do in your plan if a meeting participant or project member tests positive for COVID-19 during or just after the meeting.

During the meeting

- All meeting organisers must ensure that health and safety briefing is held where they will provide information or a briefing, preferably both orally, on COVID-19 and the measures that organisers are taking to make the meeting safe for participants;
- Build trust. For example, as an icebreaker, practice ways to say hello without touching;
- Encourage regular hand-washing or use of hand sanitiser by all participants at the meeting;
- Encourage participants to cover their face with the bend of their elbow or a tissue if they cough or sneeze. Supply tissues and closed bins to dispose of them in;
- Provide contact details or a local health hotline contact number that participants can call for advice or to give information;
- Display dispensers of alcohol-based hand rub prominently around the construction site;
- Arrange seats so that participants are at least one (1) meter apart;

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- Open windows and doors whenever possible to make sure the site meeting venue is well ventilated;
- If anyone starts to feel unwell, follow your site emergency preparedness plan and report to the Project Manager or Construction Manager;
- Depending on the situation in your area, or recent travel of the participant, place the person in the isolation room. Offer the person a mask so they can get home safely, if appropriate, or to a designated assessment facility;
- Thank all participants for their cooperation with the provisions in place.

After the meeting

- Retain the names and contact details of all participants in the health and safety file for the project duration. This will also help public health authorities trace people who may have been exposed to COVID-19 if one or more participants become ill shortly after the meeting;
- If someone at the meeting or event was isolated as a suspected COVID-19 case, the organiser should let all participants know this. They should be advised to quarantine and monitor themselves for symptoms for 14 days and take their temperature twice a day;
- If they develop even a mild cough or low-grade fever (i.e. a temperature of 37.3 C or more) they should stay at home and self-isolate. This means avoiding close contact (1 meter or nearer) with other people, including family members. They should also contact their healthcare provider or the local public health department, giving them details of their recent travel and symptoms;
- Meeting organisers must thank all the participants for their cooperation with the provisions in place.

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STANDARD OPERATING PROCEDURE

COVID-19 HEALTH CARE WASTE MANAGEMENT ON CONSTRUCTION SITES

Document number	TGC-IMS-ENV-SOP-009.001
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Process Owner Signature	
Version number	1.0
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SUMMARY VERSION CONTROL

VERSION NO.	NATURE OF AMENDMENT	PAGE NO.	DATE REVISED
1.0	New Procedure		

Note: Only latest amendments and/or additions are reflected in italics in the body of the document.

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   8.3 DEFF: Draft Regulations on Health Care Risk Waste April 2018 published for comment under section 69(1) b, (g), (h), (r), (s), (dd), and (ee) read with sections 72 and 73 of the National Environmental Management: Waste Act, 2008, Act No.59 of 2008. 11
   8.4 Construction Environmental Management Plan (CEMP) ENV-STD-001 11
   8.5 Standard Environmental Specifications (SES) ENV-STD-002 11
   8.6 Project Environmental Specification (PES) 11

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1. PURPOSE

This purpose of this Standard Operating Procedure (SOP) is to provide the framework for handling, storing, transporting and/or disposing of COVID-19 Health Care Waste in an environmentally sound and legally compliant manner.

2. APPLICABILITY

These guidelines are applicable to Transnet managed construction sites.

This document shall be reviewed every three (3) months and/or as and when there are legislative and regulatory changes in relation to the COVID-19 Pandemic.

3. REFERENCE DOCUMENTS

Name	Reference Number	Applicable Section
Department of Health - Guidelines on Management of Coronavirus or COVID-19 Health Care Waste		Sections B and G
Management of Healthcare Waste	SANS 10248-1-2008	Part 1 – Management of Healthcare Risk Waste
Department of Environment Forestry and Fisheries: Draft Regulations on Health Care Risk Waste		Entire Document
COVID 19 Post Lockdown Construction Site Health and Safety Guidelines	TGC-IMS-HS-SOP-009.001	
Occurrence and Non-conformance Management Procedure	TRN-IMS-GRP-PROC 013	

Note: Any reference in this document to legislation or subordinate legislation is to such legislation or subordinate legislation at the date of promulgation thereof and as amended and/or re-enacted from time to time

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4. DEFINITIONS AND ABBREVIATIONS

4.1 Definitions

Infectious Waste	Waste suspected to contain pathogens; and which normally causes or significantly contributes to the cause of increased morbidity of human beings.
Isolation Waste	Waste containing materials contaminated with excretions, exudates, or secretions from humans or animals who are required to be isolated (by the infection control staff, the attending physician or surgeon, the attending veterinarian, or the local health practitioner) in order to protect others from highly communicable or zoonotic diseases.

4.2 Abbreviations

CEMP	Construction Environmental Management Plan
EO	Environmental Officer
HCRW	Health Care Risk Waste
PES	Project Environmental Specification
PPE	Personal Protective Equipment
SES	Standard Environmental Specification
SOP	Standard Operating Procedure
TGC	Transnet Group Capital

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5. ACCOUNTABILITY, RESPONSIBILITY AND AUTHORITY

5.1 Transnet Environmental Officer

Transnet's Environmental Officer's role and responsibilities will include, but not limited to, the following:-

- Review and approve the waste management plan/method statement in accordance with guidelines.
- Provide induction and training on the management of health care waste (PPE) to the Contractor and Transnet employees.
- Keep evidence of daily, weekly and monthly inspection of waste receptacles where the general health care waste is temporarily kept on site.
- Ensure that the Contractor's Environmental File is constantly updated with the quantities of health care waste generated on-site, date of removal, method of transportation and safe disposal certificates.
- Investigate and record any incidents/complaints related to Coronavirus or COVID-19 health care waste management, using the Transnet Occurrence and Non-conformance Management Procedure TRN-IMS-GRP-PROC 013.
- Liaise with the Contractor's Environmental Officer and project team to identify potential health care waste impacts/hazards.
- Maintain records of all non-conformances and incidents relating to the management of health care waste guideline noted on-site.

5.2 Contractor Environmental Officer

The Contractor's Environmental Officer's role and responsibilities will include, but not limited to, the following:-

- Develop the Health Care Waste Management method statement for review and approval by the Transnet Environmental Officer and Construction Health and Safety Agent for the site.
- Manage the implementation of the waste management plan and/or method statement.

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- Provide Training and Awareness to all Contractor site personnel on the management of general health care waste.
- Provide and Designate bio-bins or plastic bags for the disposal of health care waste (PPE) for the temporary storage prior to removal and disposal.
- Ensure that healthcare storage points are managed in accordance with the stated requirements.
- Maintain Waste Manifest (PPE) records relating to the safe disposal of health care waste.
- Immediately address and report any non-conformances and incidents noted on site regarding the management of health care waste.
- Monitor and coordinate the staff assigned to containerize, collect, store, and transport healthcare waste on site.
- Contractor to provide Daily evidence of waste receptacles to the TRANSNET Environmental Officer where health care waste is temporarily kept for remotely situated sites.
- Maintain records of all healthcare waste quantities for disposal by the appointed service provider.
- Liaise with own and Employer's (Transnet) project team members to minimize any health care waste management anomalies and ensure compliance with the approved site healthcare waste management plan and/or method statement.

6. STANDARD OPERATING PROCEDURE

In terms of the National Environmental Management Waste Act, No. 59 of 2008, Transnet is a holder of waste as it generates, stores, accumulates, transports, processes, treats or disposes of waste.

With Covid-19 Pandemic, health care waste resulting from used Personal Protective Equipment (PPE) will be generated at workplaces/offices/construction sites imposing a duty of care on Transnet to handle, store, transport and/or dispose of waste in an environmentally sound and legally compliant manner.

The Guidelines on "Management of Coronavirus or COVID-19 Health Care Waste" published by the Department of Health on 30 March 2020 outlines the minimum

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requirements for the management of health care waste (PPE) and provides for the two types of Health care wastes; namely:-

- Infectious waste – "Waste suspected to contain pathogens; and which normally causes or significantly contributes to the cause of increased morbidity of human beings"; and
- Isolation waste – "Waste containing materials contaminated with excretions, exudates, or secretions from humans or animals who are required to be isolated (by the infection control staff, the attending physician or surgeon, the attending veterinarian, or the local health practitioner) in order to protect others from highly communicable or zoonotic diseases.

6.1 Guidelines Applicable to TRANSNET Workplace/Offices/Construction Sites

The two Sections of the guidelines applicable to TRANSNET Workplace / Offices / Construction Sites include:–

- Section B - Health Care Facilities (Public and Private); and
- Section G – Workplace/Offices and Public Places

6.1.1 Section B of the Guidelines

Section B of the guidelines set out the minimum requirements for management of COVID-19 Health Care Risk Waste (HRCW) in workplaces/offices/construction sites.

These requirements are:-

- The waste stream generated from isolation units/wards during the care of COVID-19 patients shall be treated as isolation waste which is part of Category A infectious substances and handled as health care risk waste (HCRW).

- The waste shall be safely disposed of in doubled bagged (red liners) using designated single use box sets (50L or 142L) and tied when full.

- The designated single use box sets shall be marked "COVID-19" and labelled with the bio- hazard symbol/sign.

- The designated single use box sets including the double bags shall be properly sealed prior to internal collection.

- ¾ full sealed box sets shall be removed and stored at the central storage area prior to collection for treatment and disposal.

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- Health Care Waste Officers/designated representatives shall witness collection at all times of the waste.

- A separate waste manifest document shall be made available to the health care facility indicating the volumes of COVID-19 waste removed.

- The waste shall be collected and transported with other health care risk waste streams/categories provided it is clearly identified and marked "COVID-19".

- The collection, removal and transportation of the waste shall be provided by the appointed or contracted service provider.

- The treatment and disposal of the waste must be conducted at a licensed HCRW treatment and disposal facility.

- However, the use of non-burn technologies must only be at treatment facilities where shredding is either part of an enclosed treatment process or occurs after treatment of the waste to minimize potential release and/or exposure of staff or personnel to COVID-19.

- All who handle health care waste should wear appropriate PPE. Proper hygiene practices to be performed/observed during and after the removal of health care/risk waste.

6.1.2 Section G of the Guidelines

Section G of the guidelines set out the minimum requirements for management of COVID-19 healthcare waste in workplaces/offices/construction sites.

These requirements relate to:-

- All waste generated at workplaces/construction and site offices including, but not limited to – used masks, gloves, and paper towels[1], is classified as general health care waste in terms of SANS 10248-1:2008.

- Such waste is to be placed in plastic bags and tied when full.

- The plastic bags to be placed with normal health care waste generated for collection, removal, transportation and disposal by the relevant municipality.

[1] Excluding contaminated or infectious health care waste

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- In cases where screening[2] is undertaken at workplace/construction site, waste generated is treated as Health Care Risk Waste (HCRW)[3] in terms of SANS 10248-1:2008.

- For HCRW, the requirements under Section B of the Guidelines apply.

6.2 TRANSNET Requirements

TRANSNET requirements for the management of Coronavirus or COVID019 Construction Site Health Care Waste (PPE) are as follows:-

- The contractor must designate a representative or waste management officer (health care waste officer) to oversee waste management[4] on site.

- The Contractor must submit a waste management method statement, taking into account the requirements of the Guidelines issued by the Department of Health dated 30 March 2020 and the Construction Industry (where Applicable), for approval by the TRANSNET Environmental Officer prior to undertaking such activity on-site.

- All approved waste management method statements for existing sites must be revised to accommodate the management of Coronavirus or COVID-19 health care/risk waste.

- Plastic bags or bio-bins **(as per section 7 of SANS 10248-1:2008.)** shall be used for containing general health care waste and health care risk waste across all construction sites.

- Plastic bags and bio-bins shall be clearly labelled and visible with indelible markings.

- The Contractor's Environmental Officer shall ensure that all personnel deposit general health care waste and health care risk waste in appropriate bins/plastic bags.

- The plastic bags or bio-bins shall be managed so that no waste can be blown from the bin and/or bag/s and no bin or bag/s must be overfilled **as per section 7.1.3 of SANS 10248-1:2008.** The plastic bags and bins shall remain closed and only opened to deposit new health care waste.

[2] Testing for COVID-19 either at the Isolation room and/or by undergoing swab tests at the health care facility excluding standard screening at the entry point of workplace.
[3] Any used PPE from workplace/construction site isolation room and or Health care facility.
[4] All activities, administrative and operational, involved in handling, treatment, storage, recovery, and recycling of healthcare general waste and the disposal of waste, including transportation.

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- The removal of health care waste shall only be conducted by a contracted service provider for all construction sites and site offices.

- Records on quantities of general health care waste and or health care risk waste generated on each site must kept in the Environmental File and onsite at all times.

- The Contractor must notify the contracted service provider for the disposal of health care waste, once the plastic bags or bio-bins are full. Under no circumstances will general health care waste be permitted to be stored on-site longer than 90 days.

- Health care risk waste (HCRW) from the isolation room and or health care facility shall not be stored on site for longer than 72 hours and shall be managed as per Section B of the guidelines.

- The contracted service provider shall provide proof of disposal of health care waste (Waste Manifest) indicating method of transportation and waste management facility for treatment and/or disposal.

- Keep all records related to management of health care waste on site.

7. RECORDS

7.1 Waste Management Method Statement – COVID-19 Healthcare Waste Plan
7.2 Training and Awareness Register – COVID-19 Healthcare Waste Management Procedure
7.3 COVID-19 Healthcare Waste Register
7.4 COVID-19 Healthcare Waste Manifest

8. ANNEXURES

8.1 Department of Health - Guidelines on Management of Coronavirus or COVID-19 Health Care Waste
8.2 SANS 10248-1-2008 – Management of Healthcare Waste: Part 1 – Management of Healthcare Risk Waste
8.3 DEFF: Draft Regulations on Health Care Risk Waste April 2018 published for comment under section 69(1) b, (g), (h), (r), (s), (dd), and (ee) read with sections 72 and 73 of the National Environmental Management: Waste Act, 2008, Act No.59 of 2008.
8.4 Construction Environmental Management Plan (CEMP) ENV-STD-001
8.5 Standard Environmental Specifications (SES) ENV-STD-002
8.6 Project Environmental Specification (PES)

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Baseline Risk Assessment

Provision of Offices for Transnet Port Terminals at 202 Anton Lembede Street, Durban.

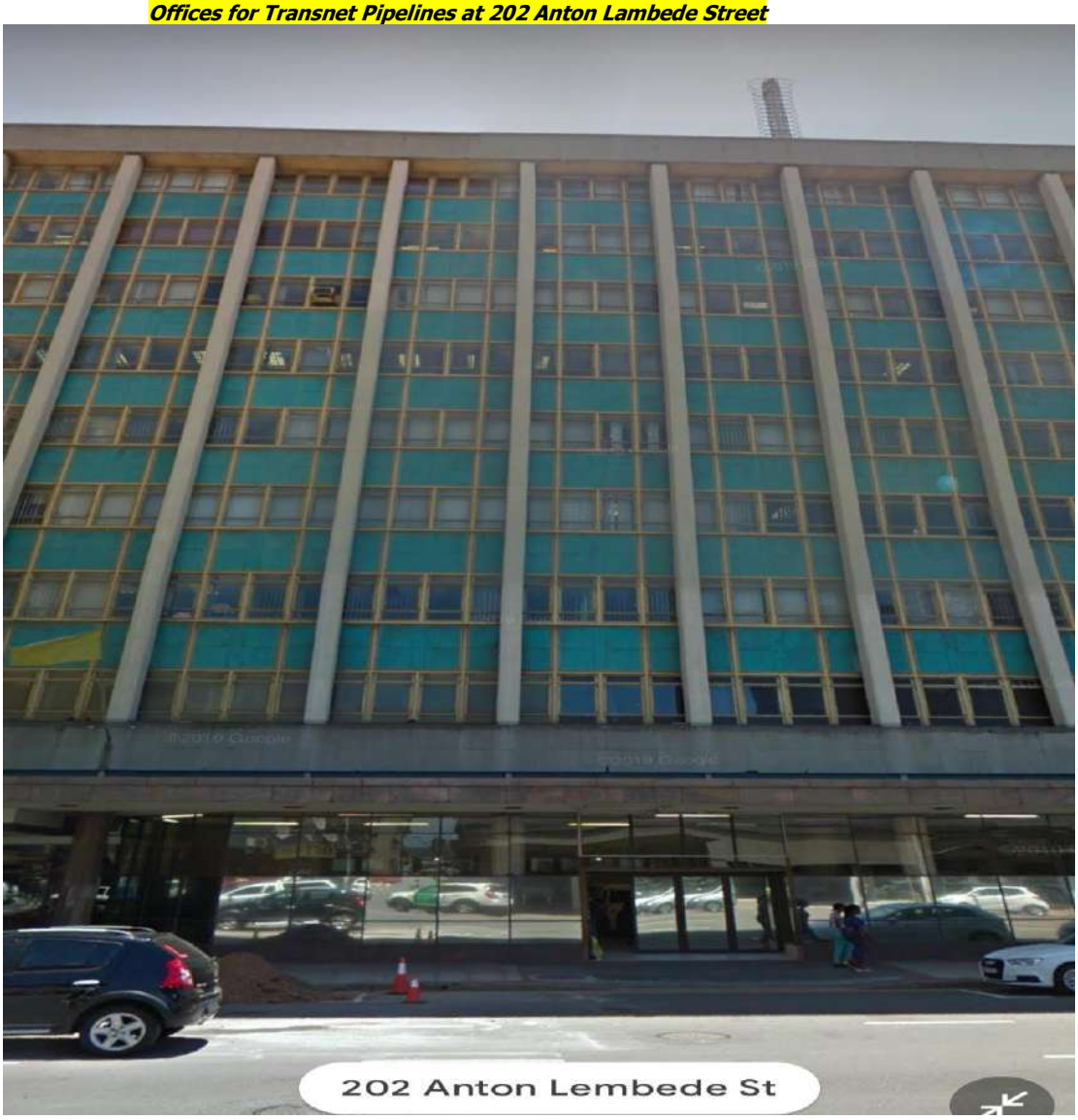
Transnet Port Terminals

Project Number:

Compiled by:	Duma Mahlakazela		10/06/2021
	Health & Safety Practitioner	Signature	Date
Reviewed by:	Bhekani Msebeni		11/06/2021
	Health & Safety Manager	Signature	Date
Approved by:	Ketan Bindapersad		11.06.21
	Project Manager	Signature	Date

Rev No.	Date	Revision Details
01	10/06/2021	ISSUE FOR REVIEW AND APPROVAL

Offices for Transnet Pipelines at 202 Anton Lambede Street



Introduction and Background

The Employer's objective is to provide office accommodation for Transnet Port Terminals staff at 202 Anton Lembede Street on specifically allocated floors within the existing building.

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 operations and the operations and activities of other stakeholders who currently occupy the building.

Risk Assessment Title	Provision of Offices for Transnet Port Terminals at 202 Anton Lembede Street, Durban.

Risk Assessment Team				
	Name	Designation	Contact Number	E-mail
Facilitator	Bhekani Msebeni	Health & Safety Manager	083 389 4183	Bhekani.Msebeni@transnet.net
Team Member 1	Duma Mahlakazela	Health & Safety Practitioner	081 036 7553	Duma.Mahlakazela@transnet.net
Team Member 2	Ketan Bindapersad	Project Manager	083 537 5842	Ketan.Bindapersad@transnet.net
Team Member 3	Onobom Njokwana	Construction Manager	083 571 6651	Onobom.Njokwana@transnet.net
Team Member 4	Ismail Dindar	Engineering Manager	083 786 9974	Ismail.Dindar@transnet.net
Team Member 5	Busisiwe Nthedi	Planner	072 827 1738	Busisiwe.Nthedi@transnet.net
Team Member 6	Siphelele Mweli	Quality Manager	063 251 9077	Siphelele.Mweli@transnet.net
Team Member 7	Derik Maritz	Mechanical Engineer	083 854 2391	Derik.Maritz@transnet.net
Team Member 8	Snegugu Nhlapho	Procurement Officer	031 361 1271	Snegugu.Nhlapho@transnet.net
Team Member 9	Zachia Dicks	Document Controller	060 969 3813	Zachia.Dicks@transnet.net
Team Member 10	Lwandile Poswa	Electrical Engineer	071 858 7734	Lwandile.Poswa@transnet.net
Team Member 11	Pinda Fumba	Cost Engineer	031 361 1168	Pinda.Fumba@transnet.net
Team Member 12	Madoda Sankqela	Quantity Surveyor	083 711 9291	Madoda.Sankqela@transnet.net
Team Member 13	Anand Naidoo	Principal Project Manager	083 781 9890	Anand.Naidoo@transnet.net

Inherent Risk

- Traffic congestion.
- People walking into TPL building.
- Unsafe walking of Employees on the road to the TPL offices
- Insufficient parking allocation to TPT employees

Activities Covered

- The supply, delivery, installation and commissioning of distribution boards, power skirting, plug and lan points for desks.
- Supply new and install or remove and replace light switches and light fittings
- Design of modification of HVAC ductwork, diffusers, air distribution on the 5th, 3rd and 2nd floors to comply with National Building Regulations
- Detail design, supply and installation of suitable standalone HVAC system to service the canteen and boardroom on the Ground floor
- Installation of trunking and access routes for ICT and security installation (to be done by others)
- General building work including demolition, stripping, tiling, painting and carpeting where required.
- Supply and installation of shop fittings/ partitions for new closed offices and boardrooms where required.
- Transportation, delivery and installation of existing furniture in the relevant areas, including installation of power supply/plug points and lan points to desks, offices and boardrooms.

Scope of Risk Assessment
The risks identified are those that will have a direct effect on the contractors during construction but also those that could have a detrimental effect on the project directly or indirectly from a time delay and cost point of view.

Hazards, Associated Risks, and Ratings				
Activity, step or action step	**Hazards**	**Associated risk event**	**Risk controls**	**Risk Rating**
1. COVID19				
• **Transportation of Employees to site**	• **Maximum allowed capacity exceeded;** • **No facilities for sanitising vehicles and passengers;** • **No additional protective measures available, e.g. face masks;**	• **Ill health and COVID 19 infection**	• **Contractor must comply with TGC Covid-19 Post Lockdown Construction site Health and Safety Guidelines – TGC-IMS-HS-GL-009-01** • **Selection and provision of transport services compliant with Government gazetted requirements** • **Policy and procedures and rules for travel** • **Where possible to limit the use of public transport, or to arrange selective methods of transport** • **Supply of cloth masks to be worn when travelling or moving on and off site** • **Vehicle occupancy maintained at 70% capacity or less;** • **Vehicles sanitised between trips** • **Provision of Hand sanitisers**	**EXTREME**

Hazards, Associated Risks, and Ratings				
Activity, step or action step	**Hazards**	**Associated risk event**	**Risk controls**	**Risk Rating**
	• **Contaminated facilities (e.g. door handles, seats, etc.)**	• **Ill health and COVID 19 infection**	• **Wearing of masks at all times to prevent touching of eyes, nose and mouth** • **Covid19 face shields to be worn were required** • **Wearing of gloves at all times** • **Utilisation of sanitizers with at least 70% alcohol** • **Washing of hands frequently with soap and water for at least 20 seconds** • **Cleaning and Disinfecting the vehicle prior to boarding**	**EXTREME**
	• **Visitors visiting site unannounced or non-essential visitors**	• **Ill health and COVID 19 infection**	• **Non-essential visitors are not allowed** • **Visitors to be informed in advanced of site screening tests** • **Required and adequate Covid-19 PPE to be worn prior to entering the site** • **Visitors to bring their own Covid-19 PPE** • **Visitors to be accompanied by the Site Supervisor**	**EXTREME**

Hazards, Associated Risks, and Ratings				
Activity, step or action step	**Hazards**	**Associated risk event**	**Risk controls**	**Risk Rating**
	• **Older workers 60+ workers with underlying auto-immune or chronic diseases (note that workers may be symptom free but infected with Covid-19)** • **Not declaring chronic illness as per Transnet Guidelines for Employees with Chronic Illness**	• **Ill health and COVID 19 infection**	• **Testing using Thermometers prior to going to site** • **Informing line Manager if there are any symptoms** • **Screening and valid certificate of fitness on return to work** • **Daily completion of screening /return to wok questionnaire** • **Symptomatic employees to be isolated and sent for testing** • **Declaration of Chronic illness as per Transnet Guidelines for Employees with Chronic illness**	**EXTREME**
• **Site Preparation**	• **Employees not trained on COVID 19 Post lockdown Construction Health and Safety Guidelines** • **COVID 19 Compliance Officer not appointed**	• **Ill health and COVID 19 infection**	• **Daily COVID 19 topic Tool box talk** • **Covid-19 Induction/Awareness** • **Revised policies and procedures** • **Revised Method Statements and SWPs** • **Revised Risk Assessments** • **Decontaminate the site, in affected areas;** • **Ensure the availability of hand washing facilities and sanitizers, throughout the site, and at entrances.** • **Appointment of the COVID 19 Compliance Officer**	**EXTREME**

Hazards, Associated Risks, and Ratings				
Activity, step or action step	**Hazards**	**Associated risk event**	**Risk controls**	**Risk Rating**
	• **Contaminated facilities and surfaces (e.g. door handles, counters, etc.)**	• **Ill health and COVID 19 infection**	• **Utilisation of sanitizers with at least 70% alcohol** • **Washing of hands frequently with soap and water for at least 20 seconds** • **Ensuring that every room is clean and Disinfected prior to use**	**EXTREME**
	• **Using public sanitary facilities**	• **Ill health and COVID 19 infection**	• **Wearing of masks at all times to prevent touching of eyes, nose and mouth** • **Wearing of gloves at all times** • **Utilisation of sanitizers with at least 70% alcohol** • **Washing of hands frequently with soap and water for at least 20 seconds**	**EXTREME**
	• **Be in contact with someone who is visibly coughing, sneezing, sick person**	• **Ill health and COVID 19 infection**	• **Wearing of masks at all times to prevent touching of eyes, nose and mouth** • **Wearing of gloves at all times** • **Utilisation of sanitizers with at least 70% alcohol** • **Washing of hands frequently with soap and water for at least 20 seconds** • **Keeping a social distance of at least 1.5metres** • **Avoid shaking hands, hugs and kissing**	**EXTREME**
• **Working on site**	• **Sharing of tools and equipment**	• **Ill health and COVID 19 infection**	• **Planning of work to minimise contact and maintain social distance** • **Employees to be issued with own tools and/ or equipment, no sharing is allowed**	**EXTREME**

Hazards, Associated Risks, and Ratings				
Activity, step or action step	**Hazards**	**Associated risk event**	**Risk controls**	**Risk Rating**
			• **Wearing of masks at all times to prevent touching of eyes, nose and mouth** • **Wearing of gloves at all times** • **Utilisation of sanitizers with at least 70% alcohol** • **Washing of hands frequently with soap and water for at least 20 seconds** • **Contractor must comply with TGC Covid-19 Post Lockdown Construction site Health and Safety Guidelines – TGC-IMS-HS-GL-009-01**	
	• **Conducting meetings traditionally**	• **Ill health and COVID 19 infection**	• **Wearing of masks at all times to prevent touching of eyes, nose and mouth** • **Wearing of gloves at all times** • **Utilisation of sanitizers with at least 70% alcohol** • **Washing of hands frequently with soap and water for at least 20 seconds** • **Keeping a social distance of at least 1.5metres** • **Avoid shaking hand, hugs and kissing** • **Cleaning and disinfecting area prior to utilising** • **Use of teleconferencing** • **Holding meetings in an open area (if possible)**	**EXTREME**
	• **Not adhering to social distancing protocol**	• **Ill health and COVID 19 infection**	• **Keeping a social distance of at least 1.5metres, where not possible, Demarcation and spacing of queueing**	**EXTREME**

Hazards, Associated Risks, and Ratings				
Activity, step or action step	**Hazards**	**Associated risk event**	**Risk controls**	**Risk Rating**
			areas; segregation of queueing areas and public outside site perimeters; • Meeting/eating areas to be large, enough to maintain 2m distance at maximum occupancy • Intense monitoring	
• Covid-19 Signage & Posters	• Unauthorised entry to site and work areas). • Acts and behaviour that compromises worker	• compromising workers health (contamination) leading to infection with COVID 19	• Installation of posters and signage with the site rules and protocols that need to be maintained at strategic points. • Intense Supervision and adequate awareness training required. • Disciplinary steps will be taken against transgressors.	EXTREME
• Use, Maintenance and Disposing of Personal Protective Equipment (Covid-19 PPE)	• Training not provided on using or wearing covid-19 PPE; • Non-maintenance of PPE; and Incorrect disposing off covid-19 PPE	• Ill health and COVID 19 infection	• No employees are allowed to come to site without wearing appropriate covid-19 PPE • Covid19 face shields to be worn were required • Issuing of re-usable masks • Cloth masks must be washed after each use • Adequate training must be provided in the correct use and disposal of cloth masks • Masks to be worn for the entire duration on site • Single use must be disposed properly	EXTREME

Hazards, Associated Risks, and Ratings				
Activity, step or action step	**Hazards**	**Associated risk event**	**Risk controls**	**Risk Rating**
			• **Provision of sealable disposal containers/bags through appropriate waste removal company** • **Where possible face shields should be used to protect mouth, nose and eyes. Regular cleaning of face shields required.** • **No sharing of PPE is permitted.** • **Adequate supervision** • **COVID-19 PPE does not replace conventional PPE** • **Contractor must comply with TGC Covid-19 Post Lockdown Construction site Health and Safety Guidelines – TGC-IMS-HS-GL-009-01**	
• **Covid-19 waste Management**	• **Improper discarding of covid-19 waste**	• **Spreading of virus and contact with virus causing infection from handwashing, drying hands, cleaning equipment, disposal of contaminated waste and other related aspects**	• **Covid-19 waste to be properly disposed of, procedure to be developed** • **Adequate awareness training on covid-19 waste management** • **Adequate provision of supplies of material and consumables** • **Provision of sealable disposal containers/bags through appropriate waste removal company** • **Provision of adequate supply of paper towels**	**EXTREME**
	• **Non-compliance with TPL rules**	• **Entry denied.**	• **All Contractor employees including visitors, suppliers and deliveries must**	**MEDIUM**

Hazards, Associated Risks, and Ratings				
Activity, step or action step	**Hazards**	**Associated risk event**	**Risk controls**	**Risk Rating**
2. Access into the TPL Building			**undergo safety induction before working in the building.**	
	• **Driving under the influence of alcohol and drugs.**	• **Injury to persons and property damage.** • **Disruptions to TPL operations.**	• **All employees entering TPL building shall submit to an alcohol Breathalyzer or drug test if requested to do so;** • **The contractor's drivers shall abide by all general road traffic rules found in the National Road Traffic Act (Act 93 of 1996) and Regulations thereto or otherwise.**	**HIGH**
	• **Speeding.**	• **Injury to persons and property damage.**	• **All drivers shall abide by the speed limit of 20km/h inside the parking.** • **The contractor's drivers shall abide by all general road traffic rules found in the National Road Traffic Act (Act 93 of 1996).** • **Adherence to National Road Traffic Act.**	**MEDIUM**
	• **Parking in areas not designated for parking.**	• **Obstruction to the road and lead to injury to persons/ property damage.** • **Disruptions to TPL operations.**	• **Contractor shall ensure that all their drivers' park in designated areas to avoid obstruction on Anton Lambede road.** • **Contractor's employees must ensure that they use designated routes to get to their respective site.**	**MEDIUM**
3. Site Establishment	• **No ablution facilities.**	• **Communicable disease due to lack of hygiene.**	• **Contractor to adhere to OHSACT ACT 85 of 1993 and Facilities Regulations of 1994, and TPT Health and Safety Project specification.**	**LOW**

Hazards, Associated Risks, and Ratings				
Activity, step or action step	**Hazards**	**Associated risk event**	**Risk controls**	**Risk Rating**
	• Using drinking water from un-identified source/connection.	• Sickness of employees resulting from drinking water from unsafe sources.	• Drinking water must only be sourced from a connection identified as safe for drinking.	MEDIUM
	• No designated eating area.	• Employees contracting diseases due to eating at hazardous areas on site.	• Contractor to adhere to OHSACT ACT 85 of 1993 and Facilities Regulations of 1994, and TPT Health and Safety Project specification.	MEDIUM
	• Temporary electrical connection.	• Electrocution and property damage.	• Electrical connection must be done by a MIE (Master Installation Electrician) who has been authorised.	HIGH
• Transportation of office containers and materials to site.	• Overloading and speeding.	• Containers and materials falling off causing injuries and property damages. • Road accidents.	• Contractor to ensure that loads are not overloaded. • The contractor's drivers shall abide by all general road traffic rules found in the National Road Traffic Act (Act 93 of 1996).	HIGH
	• Incompetent driver.	• Property damage and injuries.	• Contractor's driver must be competent and appointed in writing.	HIGH
• Offloading of office containers and materials.	• Substandard rigging and lifting practices.	• Loads falling causing injuries and property damages. • Loads swinging causing injuries and property damages.	• Contractor must develop and implement a rigging study and lift plan.	HIGH
	• Possible mechanical failure of lifting	• Loads falling causing injuries and property damages.	• Valid crane, hook, rope, load and calibration test to be completed.	HIGH

Hazards, Associated Risks, and Ratings				
Activity, step or action step	**Hazards**	**Associated risk event**	**Risk controls**	**Risk Rating**
	equipment (mobile cranes/crane trucks)	• **Loads swinging causing injuries and property damages.**	• **Competent Rigging and lifting equipment inspector appointed (LMI).** • **Pre-use checks to be conducted by the appointed competent person.** • **All lifting and rigging equipment tested and certified, proof to be kept on file.** • **Storage of lifting and rigging equipment to be done in an approved manner.**	
	• **Poor ground stability**	• **Crane tipping over causing injuries to employees and damage to property**	**Contractor to ensure inspection of ground stability before outriggers are extended**	**HIGH**
	• **High wind speeds**	• **Loads falling causing injuries and property damages.** • **Loads swinging causing injuries and property damages.**	• **Contractor to take note of the weather prior to any lifting activities.** • **Contractor to ensure that no lifting must take place when there is inclement weather and or the wind speed is equal or more than 30km/h**	**HIGH**
	• **Incompetent rigger and crane operator.**	• **Loads falling causing injuries and property damages.** • **Loads swinging causing injuries and property damages.**	• **Competent operator and riggers with previous experience and competencies must be appointed.** • **Contractor to comply with Driven Machinery regulations,2015 and 18(11)** • **Guide ropes to be used to control load.**	**MEDIUM**

Hazards, Associated Risks, and Ratings				
Activity, step or action step	**Hazards**	**Associated risk event**	**Risk controls**	**Risk Rating**
	• Employees working under suspended loads	• Loads falling causing injuries and possible fatalities	• Contractor to ensure that no person walks or works under suspended loads at all times.	HIGH
	• Incorrect manual Handling.	• Back injuries. • Pinch points.	• Contractor to ensure employees are trained on correct manual lifting techniques. • Employees to use appropriate gloves when doing manual handling.	LOW
4. The supply, delivery, installation and commissioning of distribution boards, power skirting, plug and lan points for desks.	• Manual handling	• Hand and back injuries	• Contractor to ensure employees are trained on correct manual lifting techniques. • Employees to use appropriate gloves when doing manual handling. • Employees not to lift material heavier than 10kg alone.	LOW
	• Incompetent driver.	• Property damage and injuries.	• Contractor's driver must be competent and appointed in writing.	
	• Overloading and speeding.	• Containers and materials falling off causing injuries and property damages. • Road accidents.	• Contractor to ensure that loads are not overloaded. • The contractor's drivers shall abide by all general road traffic rules found in the National Road Traffic Act (Act 93 of 1996).	MEDIUM

Hazards, Associated Risks, and Ratings				
Activity, step or action step	**Hazards**	**Associated risk event**	**Risk controls**	**Risk Rating**
	• Isolation and lock out procedure not followed during installation	• Electrocution • Possible fatality • Physical damage to structures.	• Adherence to Electrical Installation Regulations, under the Occupational Health & Safety Act, Act 85 of 1993. • Contractor must adhere to SANS 10142 • All drawings will be made available to the contractor for information. • Contractor must comply with Project Health and Safety specification • Contractor to follow Safety lock -out procedure at all times. • Electrical connection must be done by a MIE (Master Installation Electrician)	HIGH
	• Working in awkward positions	• musculoskeletal disorders	• Contractor to ensure that employees do not stay in awkward positions for a long time.	LOW
5. Supply new and install or remove and replace light switches and light fittings	• Manual handling	• Hand and back injuries	• Contractor to ensure employees are trained on correct manual lifting techniques. • Employees to use appropriate gloves when doing manual handling.	LOW
	• Incorrect use of hand tools	• Injuries to employees	• Contractor must ensure that employees are using the correct type of tool for the activity.	LOW

Hazards, Associated Risks, and Ratings				
Activity, step or action step	**Hazards**	**Associated risk event**	**Risk controls**	**Risk Rating**
	• **Defective drill**	• **Injury to operator and nearby employees**	• **Contractor to ensure the inspection of drill machine by operator before use.** • **Drill operator to be competent to use drill.**	**LOW**
	• **Working on a ladder/elevated platform**	• **employee falling from a ladder/elevated platform sustaining injuries**	• **Contractor to ensure ladder inspection is done before use.** • **Contractor to ensure that employees are trained on the safe use of a ladder.** • **All equipment used for working at heights must be inspected before use.** • **All employees working at heights must go for working at heights training.**	**HIGH**
	• **Isolation and lock out procedure not followed during installation**	• **Electrocution** • **Possible fatality** • **Physical damage to structures.**	• **Adherence to Electrical Installation Regulations, under the Occupational Health & Safety Act, Act 85 of 1993.** • **Contractor must adhere to SANS 10142** • **All drawings will be made available to the contractor for information.** • **Contractor must comply with Project Health and Safety specification** • **Contractor to follow Safety lock -out procedure at all times.** • **Electrical connection must be done by a MIE (Master Installation Electrician)**	**HIGH**

Hazards, Associated Risks, and Ratings				
Activity, step or action step	**Hazards**	**Associated risk event**	**Risk controls**	**Risk Rating**
6. Detail design, supply and installation of suitable standalone HVAC system to service the canteen and boardroom on the Ground floor	• **Working on a ladder/elevated platform**	• **employee falling from a ladder/elevated platform sustaining injuries**	• **Contractor to ensure ladder inspection is done before use.** • **Contractor to ensure that employees are trained on the safe use of a ladder.** • **All equipment used for working at heights must be inspected before use.** • **All employees working at heights must go for working at heights training.** • **Contractor to adhere to National Building Regulations and Building Standards.**	**HIGH**
	• **Manual handling**	• **Hand and back injuries**	• **Contractor to ensure employees are trained on correct manual lifting techniques.** • **Employees to use appropriate gloves when doing manual handling.**	**LOW**
	• **Using of hand tools**	• **Injuries to employees**	• **Contractor must ensure that employees are using the correct type of tool for the activity.**	**LOW**
7. Installation of trunking and access routes for ICT and security installation (to be done by others)	• **Manual handling**	• **Hand and back injuries**	• **Contractor to ensure employees are trained on correct manual lifting techniques.** • **Employees to use appropriate gloves when doing manual handling.**	**MEDIUM**

Hazards, Associated Risks, and Ratings				
Activity, step or action step	**Hazards**	**Associated risk event**	**Risk controls**	**Risk Rating**
	• **Working on a ladder/elevated platform**	• **employee falling from a ladder/elevated platform sustaining injuries**	• **Contractor to ensure ladder inspection is done before use.** • **Contractor to ensure that employees are trained on the safe use of a ladder.** • **All equipment used for working at heights must be inspected before use.** • **All employees working at heights must go for working at heights training.** • **Contractor to adhere to National Building Regulations and Building Standards.**	**HIGH**
	• **Using of hand tools**	• **Injuries to employees**	• **Contractor must ensure that employees are using the correct type of tool for the activity.**	**LOW**
	• **Defective drill**	• **Injury to operator and nearby employees**	• **Contractor to ensure the inspection of drill machine by operator before use.** • **Drill operator to be competent to use drill.**	**LOW**
	• **Exposure to noise**	• **Noise induced hearing loss.**	• **The contractor must implement engineering control or personal control by ensuring that all employees wear hearing protection devices to decrease noise exposure levels higher than 85 dB** • **Contractor to comply with Noise induced Hearing Loss regulations,2003**	**MEDIUM**

Hazards, Associated Risks, and Ratings				
Activity, step or action step	**Hazards**	**Associated risk event**	**Risk controls**	**Risk Rating**
	• Exposure to dust	• Respiratory diseases caused by dust inhalation.	• Ensure employees have been trained in safe work practices and appropriate PPE (e.g. dust musk. • Contractor must comply with Hazardous Chemical Substances Regulations	LOW
8. General building work including demolition, stripping, tiling, painting and carpeting where required.				
• Demolition	• Defective equipment	• injury to personnel and property damage	• Contractor to appoint demolition supervisor to supervise all demolition activities. • Contractor to ensure that pre inspections are done on the equipment.	LOW
	• Flying particles.	• Injuries to eyes and body	• Ensure operator and employees have been trained in safe work practices and appropriate PPE (e.g. eye protection.) • No employees must work close to the demolition area.	LOW
	• Exposure to dust	• Respiratory diseases caused by dust inhalation.	• Contractor must comply with Hazardous Chemical Substances Regulations • Contractor to implement dust suppression measures. • Ensure operator and employees have been trained in safe work practices and appropriate PPE (e.g. dust masks.) • No employees must work close to the demolition area.	MEDIUM

Hazards, Associated Risks, and Ratings				
Activity, step or action step	**Hazards**	**Associated risk event**	**Risk controls**	**Risk Rating**
	• **Excessive noise**	• **Noise induced hearing loss**	• **The contractor must implement engineering control or personal control measures by ensuring that all employees wear hearing protection devices to decrease noise exposure levels higher than 85 dB** • **Contractor to comply with Noise induced Hearing Loss regulations,2003**	**MEDIUM**
	• **Manual handling**	• **Injuries to employees**	• **Contractor to ensure employees are trained on correct manual handling techniques.** • **Employees to use appropriate gloves when doing manual handling.** • **Employees doing demolition must be aware of fellow employees.** • **Employees to be aware of sharp objects when handling rubble material.**	**LOW**
	• **Using of hand tools**	• **Injuries to employees**	• **Contractor must ensure that employees are using the correct type of tool for the activity.**	**LOW**
• **Stripping**	• **Flying particles.**	• **Injuries to eyes**	• **Contractor to ensure all employees have been made aware of flying particles including safe work practices and appropriate PPE (e.g. eye protection.)**	**MEDIUM**

Hazards, Associated Risks, and Ratings				
Activity, step or action step	**Hazards**	**Associated risk event**	**Risk controls**	**Risk Rating**
	• Incorrect manual Handling of rubble materials.	• Back injuries caused by manual lifting. • Pinch points due to feet and hands being caught between objects. • Cuts	• Contractor to ensure employees are trained on correct manual lifting techniques. • Employees to use appropriate gloves when doing manual handling. • Contractor to ensure that employees take note of sharp objects.	**MEDIUM**
• Tiling	• Using of hand tools	• Injuries to employees	• Contractor must ensure that employees are using the correct type of tool for the activity.	**LOW**
	• Manual handling	• Hand and back injuries	• Contractor to ensure employees are trained on correct manual lifting techniques. • Employees to use appropriate gloves when doing manual handling.	**LOW**
	• Working in awkward positions	• musculoskeletal disorders	• Contractor to ensure that employees do not stay in awkward positions for a long time.	**LOW**

Hazards, Associated Risks, and Ratings				
Activity, step or action step	**Hazards**	**Associated risk event**	**Risk controls**	**Risk Rating**
• **Painting**	• **Chemical Fumes from paint**	• **Exposure to solvent vapours may result in a number of health effects, e.g. the central nervous system, respiratory system.**	• **Contractor to adhere to the OHSACT and HCS Regulations, when dealing with Hazardous Chemical Substances.** • **MSDS's which contains the necessary information pertaining to a specific hazards or used substance, must be present and communicated to employees for all hazardous material stored on sit** • **Contractor must adhere to Project Health and Safety Specification.**	**LOW**
	• **Working on a ladder/elevated platform**	• **employee falling from a ladder/elevated platform sustaining injuries**	• **Contractor to ensure ladder inspection is done before use.** • **Contractor to ensure that employees are trained on the safe use of a ladder.** • **All platforms used for working at heights must be inspected before use.** • **All employees working at heights must go for working at heights training.** • **Contractor to adhere to National Building Regulations and Building Standards.**	**HIGH**
• **Carpeting**	• **Manual handling**	• **Hand and back injuries**	• **Contractor to ensure employees are trained on correct manual handling techniques.** • **Employees to use appropriate gloves when doing manual handling.**	**LOW**

Hazards, Associated Risks, and Ratings				
Activity, step or action step	**Hazards**	**Associated risk event**	**Risk controls**	**Risk Rating**
	• Using of hand tools	• Injuries to employees	• Contractor must ensure that employees are using the correct type of tool for the activity.	LOW
9. Supply and installation of shop fittings/ partitions for new closed offices and boardrooms where required.	• Manual handling	• Hand and back injuries	• Contractor to ensure employees are trained on correct manual handling techniques. • Employees to use appropriate gloves when doing manual handling.	LOW
	• Working on a ladder/elevated platform	• employee falling from a ladder/elevated platform sustaining injuries	• Contractor to ensure ladder inspection is done before use. • Contractor to ensure that employees are trained on the safe use of a ladder. • All platforms used for working at heights must be inspected before use. • All employees working at heights must go for working at heights training. • Contractor to adhere to National Building Regulations and Building Standards.	HIGH
	• Using of hand tools	• Injuries to employees	• Contractor must ensure that employees are using the correct type of tool for the activity.	LOW

Hazards, Associated Risks, and Ratings				
Activity, step or action step	**Hazards**	**Associated risk event**	**Risk controls**	**Risk Rating**
	• **Exposure to noise**	• **Noise induced hearing loss**	• **The contractor must implement engineering control or personal control measures by ensuring that all employees wear hearing protection devices to decrease noise exposure levels higher than 85 dB** • **Contractor to comply with Noise induced Hearing Loss regulations,2003**	**MEDIUM**
	• **Exposure to dust**	• **Respiratory diseases caused by dust inhalation.** •	• **Ensure employees have been trained in safe work practices and appropriate PPE (e.g. dust musk.** • **Contractor must comply with Hazardous Chemical Substances Regulations**	**MEDIUM**
10. Transportation, delivery and installation of existing furniture in the relevant areas, including installation of power supply/plug points and lan points to desks, offices and boardrooms.	• **Incompetent driver.**	• **Property damage and injuries.**	• **Contractor's driver must be competent and appointed in writing.**	**MEDIUM**
	• **Overloading and speeding.**	• **Containers and materials falling off causing injuries and property damages.** • **Road accidents.**	• **Contractor to ensure that loads are not overloaded.** • **The contractor's drivers shall abide by all general road traffic rules found in the National Road Traffic Act (Act 93 of 1996).**	**MEDIUM**

Hazards, Associated Risks, and Ratings				
Activity, step or action step	**Hazards**	**Associated risk event**	**Risk controls**	**Risk Rating**
	• **Manual handling**	• **Hand and back injuries**	• **Contractor to ensure employees are trained on correct manual lifting techniques.** • **Employees to use appropriate gloves when doing manual handling.** • **Employees not to lift material heavier than 10kg alone.**	**MEDIUM**
11. Working at Night	• **Inadequate lighting**	• **Insufficient light - not enough (too little) light for the need.** • **Glare - too much light for the need.** • **Improper contrast.** • **Poorly distributed light. Flicker.**	• **Contractor must conduct Lighting survey before initiating night work. Contractor to ensure the site is well lit at night as workers should not be allowed to work in the dark.**	**HIGH**
	• **Employees working long hours**	• **Injuries due to fatigue and lack of rest/sleep**	• **Contractor to develop and submit a plan for working at night to TPT for review.** • **Contractor to have two teams for day and night work.** • **Contractor to adhere to Basic Conditions of Employment Act.**	**HIGH**

Annexure 1 – TPT Risk Matrix and Descriptions

Likelihood	Consequence				
	Insignificant	Minor	Moderate	Major	Critical
Almost Certain	Medium	Medium	High	Extreme	Extreme
Likely	Low	Medium	High	High	Extreme
Possible	Low	Medium	High	High	High
Unlikely	Low	Low	Medium	Medium	High
Rare	Low	Low	Low	Low	Medium

Assessed Risk Level	Description of Risk Level	Action Required
Low	If an incident were to occur, there would be little likelihood that an injury would result	Undertake the activity with the existing controls in place
Medium	If an incident were to occur, there would be some chance that an injury requiring First Aid would result	Additional controls may be needed
High	If an incident were to occur, it will be likely that an injury requiring medical treatment would result	Controls will need to be in place before the activity is undertaken
Extreme	If an incident were to occur it, it would be likely that a permanent or death would result	Consider alternatives to doing the activity. Significant control measures will need to be implemented to ensure safety

Likelihood	Desciption of Likelihood		Consequence	Description of Consequence
1. Rare	Will only occur in exceptional circumstances		1. Insignificant	No treatment required
2. Unlikely	Not likely to occur within the foreseeable future, or withing the project lifecycle		2. Minor	Minor injury requiring First Aid treatment (e.g. minor cuts, bruises, bumps)
3. Possible	May occur within the foreseeable future, or within the project lifecycle		3. Moderate	Injury requiring medical treatment or lost time
4. Likely	Likely to occur within the foreseeable future, or within the project lifecycle		4. Major	Serious injury (injuries) requiring specialist medical treatment or hospitalisation
5. Almost Certain	Almost certain to occur within the foreseeavle future or within the project lifecycle		5. Critical	Loss of life, permanent disability or multiple serious injuries

TRANSNET

Transnet Integrated Management System (TIMS)
POLICY COMMITMENT STATEMENT

Transnet is a State-Owned Company that operates as an integrated freight transport company, formed around six core operating division namely Transnet Freight Rail (TFR), Transnet Engineering (TE), Transnet National Ports Authority (TNPA), Transnet Port Terminals (TPT) and Transnet Pipelines (TPL) and Transnet Property (TP) that complement each other.

Transnet has developed and implemented a TIMS that forms an integral part of the core business. We are committed to ***transporting freight, passengers, and provide excellent service*** to our customers along key transport corridors. This is done in order to ***competitively grow our business***, enhance efficiency of South Africa's logistics system and thereby contribute to economic vibrancy.

TIMS is established, implemented and maintained in accordance with recognised best practices that will enable us to:

- Incorporate and comply with applicable ***legislation, regulations, codes, standards, protocols, best practices and customer requirements*** to which we subscribe in order to achieve our business objectives;
- Set and achieve ***objectives and targets*** that address significant enterprise-wide ***strategic, tactical and operational risks, opportunities and mitigate the consequences*** thereof;
- Proactively implement ***waste and pollution prevention strategies*** to prevent ***environmental degradation;***
- Continually promote the prudent and ***sustainable*** use of ***energy and natural resources;***
- Provide ***quality products*** and ***services*** in order to meet our customers' requirements;
- Provide ***safe and secure environment*** for our employees and stakeholder;
- Carry out our business in a manner which ***protects our assets and information*** and ***prevents injuries and ill health*** to our employees and stakeholders;
- Promote ***safe operational principles*** during operations to minimize occurrences of safety incidents;
- Strategically ***source our contractors*** through fair, equitable and transparent processes;
- Provide ***soc-economic development*** as a good corporate citizen;
- Promote ***food safety practices*** in our food preparation and handling environments;
- Ensure ***proficiency and preparedness*** to deal with and ***effectively recover*** from any ***emergency situations;***
- ***Develop, train and manage our employees*** through inspirational leadership, provide the necessary ***organizational information, knowledge and resources*** to achieve the intention of this policy statement;
- ***Communicate, engage*** and ***provide support*** and ***appropriate information*** to relevant stakeholders in order to build relationships based on care, openness, mutual trust and involvement as well as promote a TIMS risks awareness culture;
- Allocate ***responsibilities*** and ***accountabilities*** for meeting the requirements of the TIMS policy statement.
- Drive an ***integrated assurance management programme*** to ensure ***continual improvement*** of TIMS.

The TIMS Policy Commitment Statement shall be ***reviewed every three years*** or ***as circumstances dictate*** to ensure that it remains ***current and relevant.*** Our progress on the achievement of the policy statement commitments shall be reported in the respective Governance Structures. Transnet recognises its accountability for TIMS; all employees including contractors have a role to play in delivering on the commitment set out in this policy statement.

Group Chief Executive

Date: 29/07/2020
Next Review Date: 29/06/2023

Copies of the approved TIMS Policy Commitment Statement can be made available to external Stakeholders on request.

©Transnet SOC Ltd

Brand Guidelines

Signage kit of parts and specifications

freight rail
rail engineering
pipelines
port terminals
national ports authority

TRANSNET

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INTRODUCTION

01

SIGNAGE INTRODUCTION

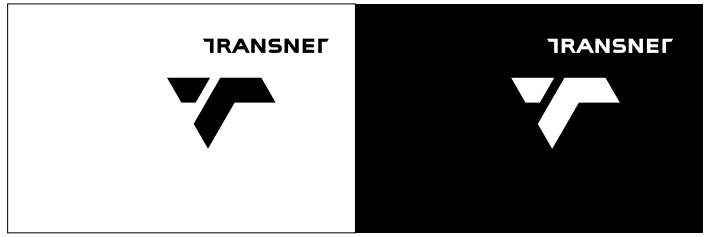
Signage has greatest impact on the "first impression" external and internal stakeholders have with our organization. It is the first visual identiy que that locates our business. It is the common denominator of what unites the people of Transnet Limited. The clarity of directions, ease with which they enter and leave the facility, and overall appearance of the grounds will be motivating factors in their decision to return.

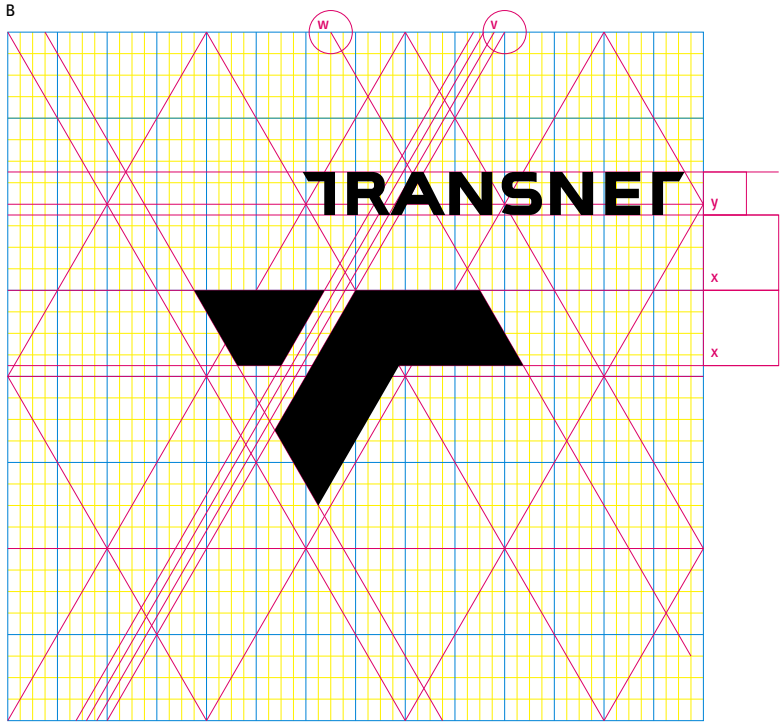
The overall goal of the Transnet signage outlined in this manual is to provide a harmonious and integrated brand identity that reinforces the “one company, one vision” platform and the resultant monolithic brand architecture. The signage guidelines are anchored on the following parameters:

· Communication: Maximize usefulness and effectiveness of message to viewer, achieved through choice messages, format, sign placement and empathy for user
· Graphic design: Overall graphic format/style fulfilling functional and aesthetic needs, including typography/spacing, color, size and relationship of sign to setting
· Technical specifications: Achieve the highest level of durability within economic constraints, including fabrication, installation, maintenance and repair

Signage elements for Transnet separate into four basic categories according to the informational function they provide.

1. Directional signs indicate directions
2. Identification signs identify a place, facility or structure.
3. Informational signs provide a site map
4. Regulative and prohibitive signs communicate regulations and restrictions

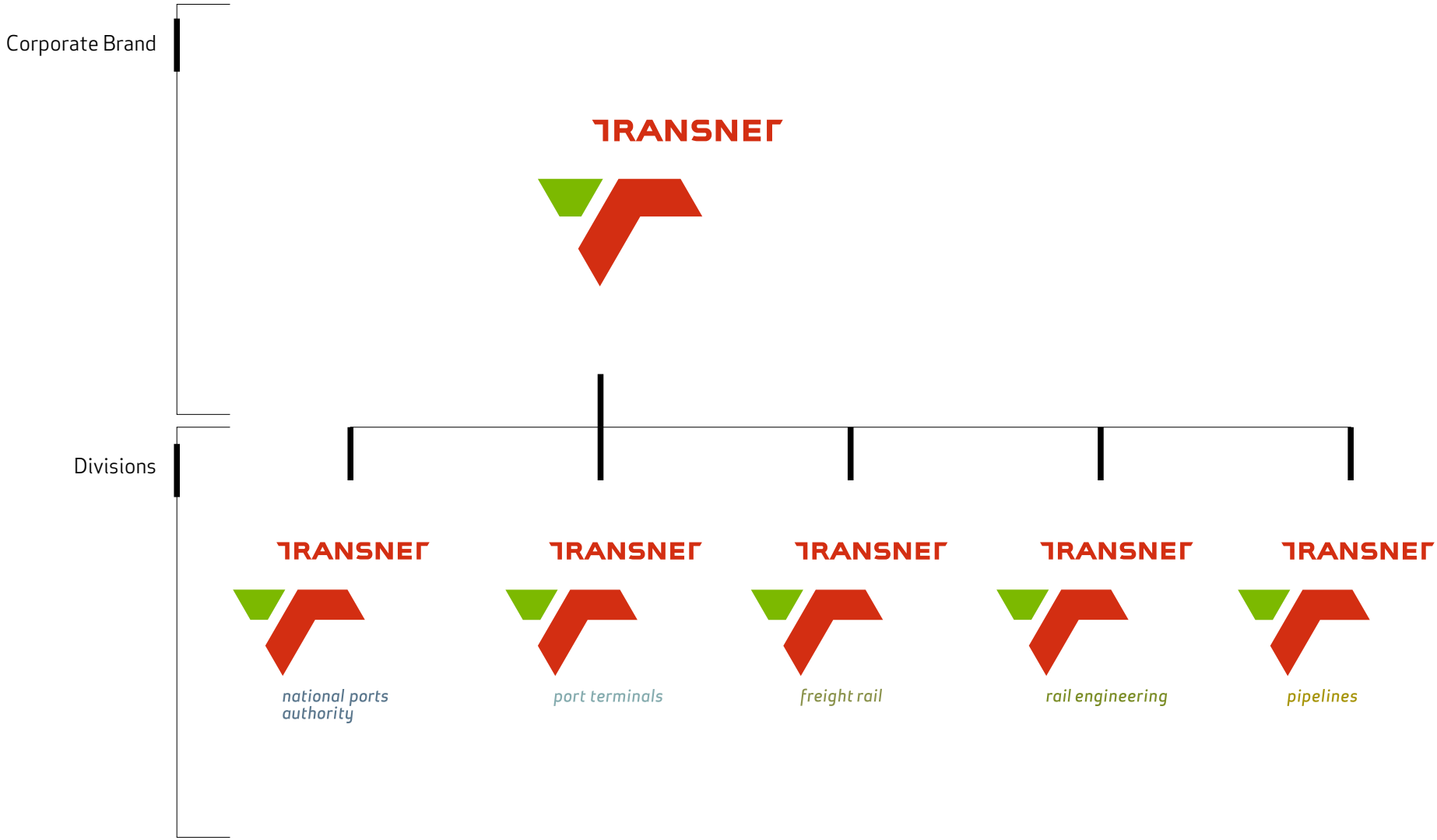




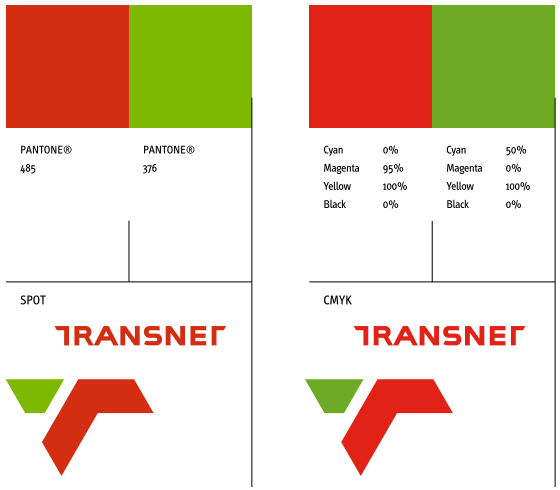
Geometry of the brand signature as illustrated above in A is based on a horizontal and vertical grid, as well as a secondary grid that runs on a 60° angle. This grid forms the back bone of the house style.

The 'A' in the logotype is central to the continuance of the angles created by the chevron (shown in W and V). The is the most common use of the relationship between the logo and logotype.

BRAND ARCHITECTURE



COLOUR



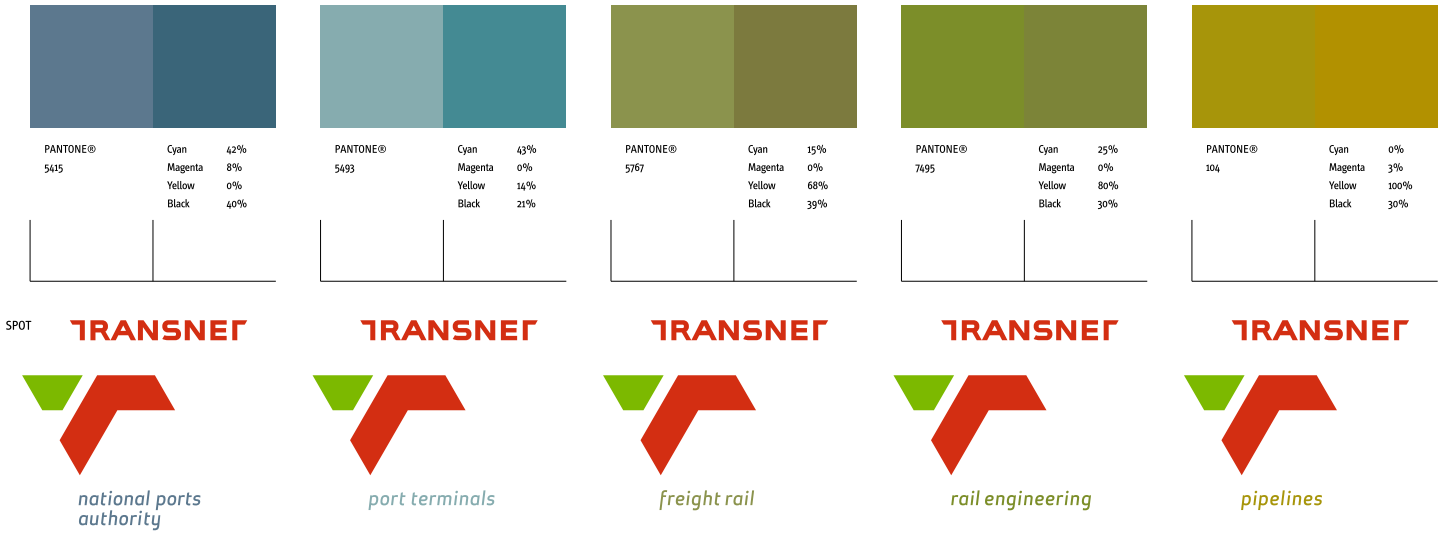
COLOUR - TRANSNET NATIONAL PORTS AUTHORITY

COLOUR - TRANSNET PORT TERMINALS

COLOUR - TRANSNET FREIGHT RAIL

COLOUR - TRANSNET RAIL ENGINEERING

COLOUR - TRANSNET PIPELINES



PRIMARY ALPHANUMERIC TYPEFACE - APEX

aAbBcC 123

Apex Sans Book T

abcdefghijklmnopqrstuvwxyz
ABCDEFGHIJKLMNOPQRSTUVWXYZ
1234567890@#%&{}[](.,;:!?)<>*^

Apex Sans Book Italic T

abcdefghijklmnopqrstuvwxyz
ABCDEFGHIJKLMNOPQRSTUVWXYZ
1234567890@#%&{}[](.,;:!?)<>^*

Apex Sans Medium T

abcdefghijklmnopqrstuvwxyz
ABCDEFGHIJKLMNOPQRSTUVWXYZ
1234567890@#%&{}[](.,;:!?)<>*^

Apex Sans Medium Italic T

abcdefghijklmnopqrstuvwxyz
ABCDEFGHIJKLMNOPQRSTUVWXYZ
1234567890@#%&{}[](.,;:!?)<>^*

Apex Sans Bold T

abcdefghijklmnopqrstuvwxyz
ABCDEFGHIJKLMNOPQRSTUVWXYZ
1234567890@#%&{}[](.,;:!?)<>*^

Apex Sans Bold Italic T

abcdefghijklmnopqrstuvwxyz
ABCDEFGHIJKLMNOPQRSTUVWXYZ
1234567890@#%&{}[](.,;:!?)<>*^

The Transnet brand manifests its visual identity through many different formats of the written and printed word. Typography is an essential element of the identity used to establish Transnet's individual, characteristic and consistent approach.

MATERIAL

02

LIGHTING SPECIFICATIONS

03

Site notes:

1. All building work to comply with SABS 0400
2. No dimensions to be scaled or scanned from drawing
3. All dimensions to be checked on site
4. Where applicable the contractor is to check on site sizes of components to be manufactured prior to manufacture.
5. Contractor is to locate and identify existing services on the site and to protect these from damage throughout the duration of the works.
6. Any errors discrepancies or omissions to be reported immediately.

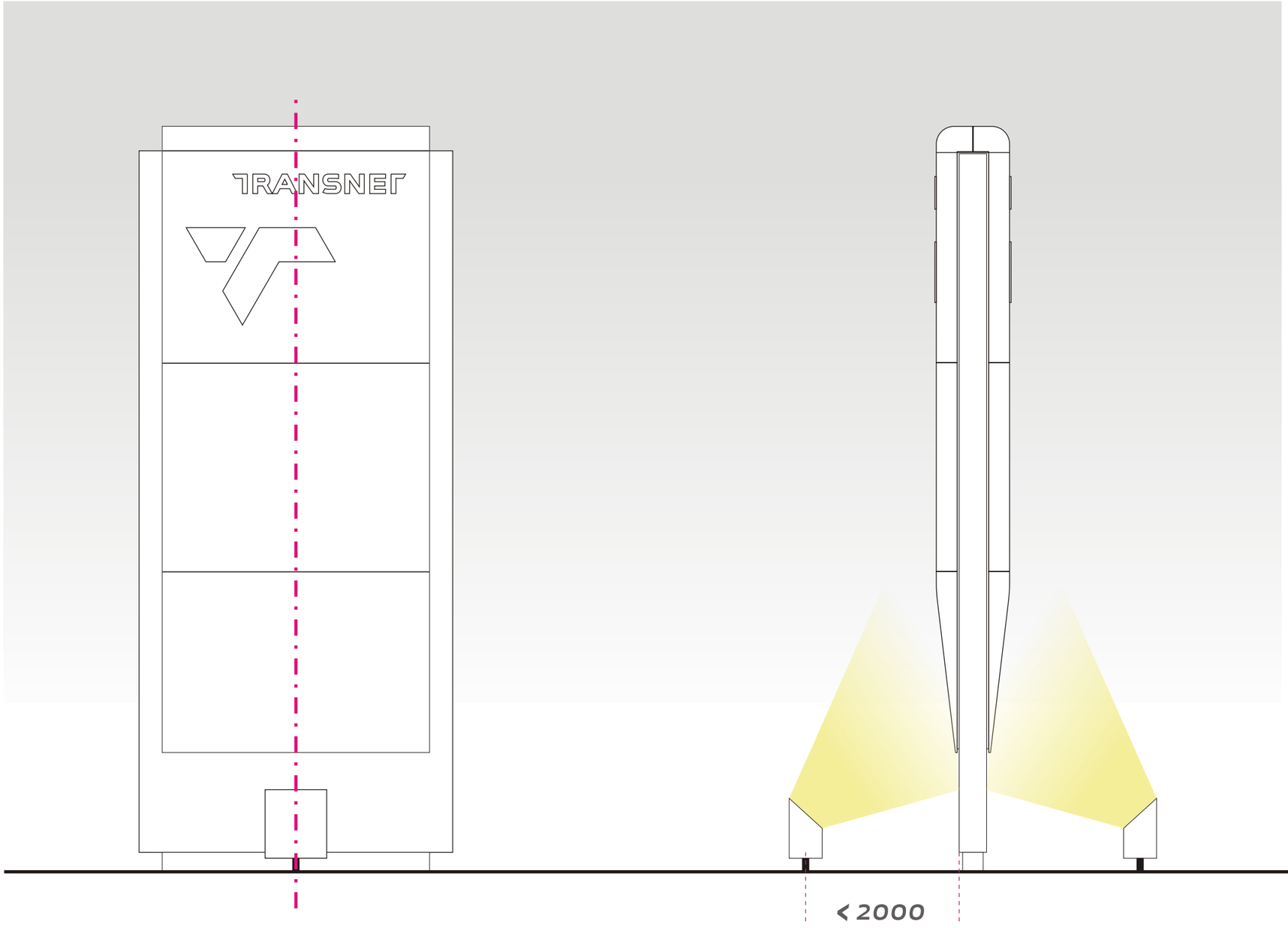
Finishes:

1. All signs need to be level.
2. All rivets, screws, bolts etc. need to be flush with sign surface.
3. All edges, holes, trimmings need to be finished off neatly and be free of burrs.
4. All sprayed elements need to be correctly primered before spray painting to prevent bubbling and rust.
5. All fabricated panels to fit flush, so as to prevent light seepage.

Materials:

1. All materials to be used must be recyclable
2. All metal/steel elements need to be rust proofed for use at coastal areas
3. Any external lighting must be of a low wattage energy efficient type
4. No trees or plants are to be damaged in the installation of the signage, if there is a need to remove any, they must be replanted

Signage Kit of Parts - Primary Signage additional lighting



In all cases where external lighting is necessary for all pylons, both non/illuminated types (especially in rural areas), the use of external uplighters is required. A suitable uplighter is to be used, with a white 'light wash' (CFL Lamps) such as the REEFLITE Rl226.

Light is not to be placed any further than 2m from the sign.

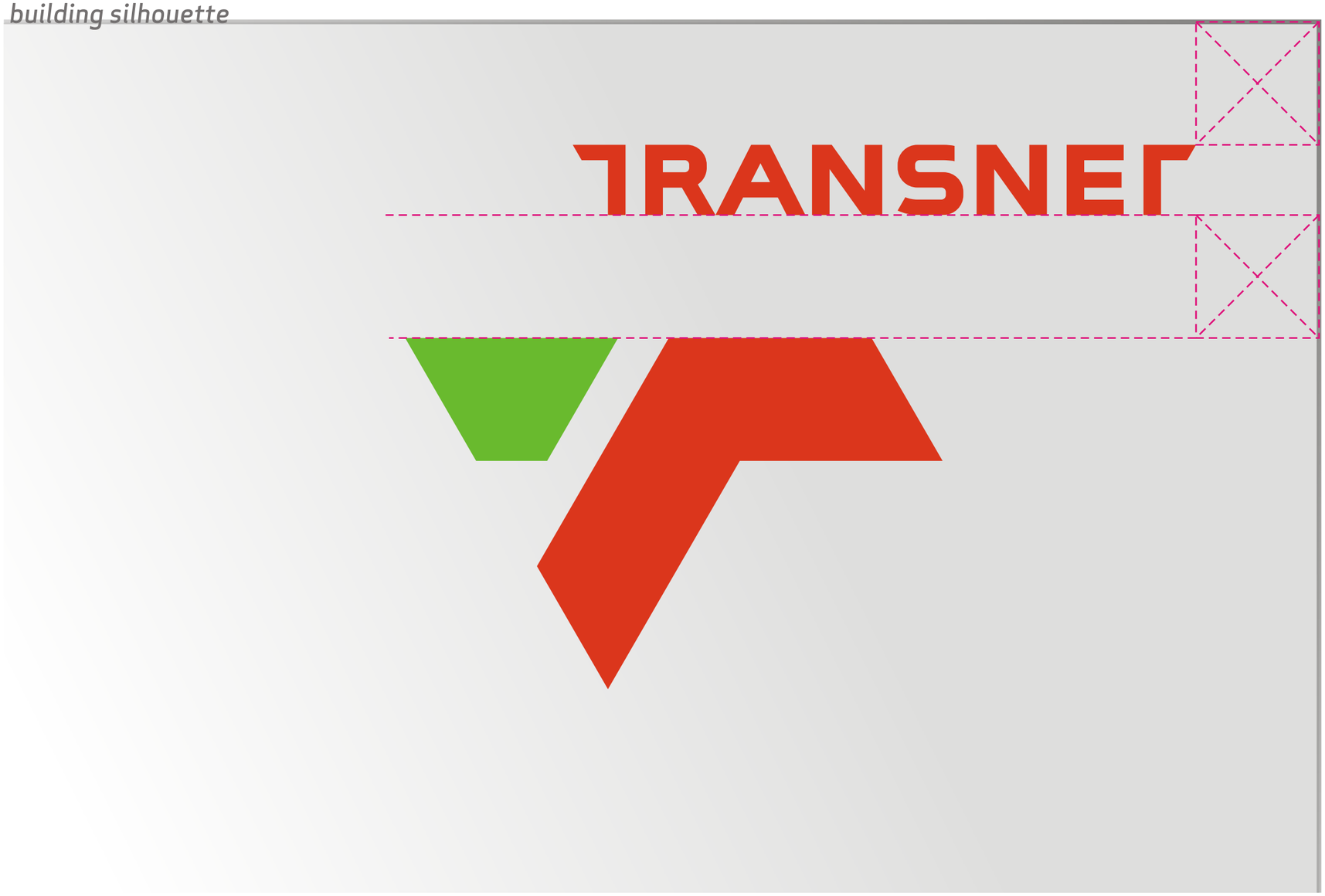
FITS AND FINISHES

04

SIGNAGE SPECIFICATION - FEATURE SIGNAGE

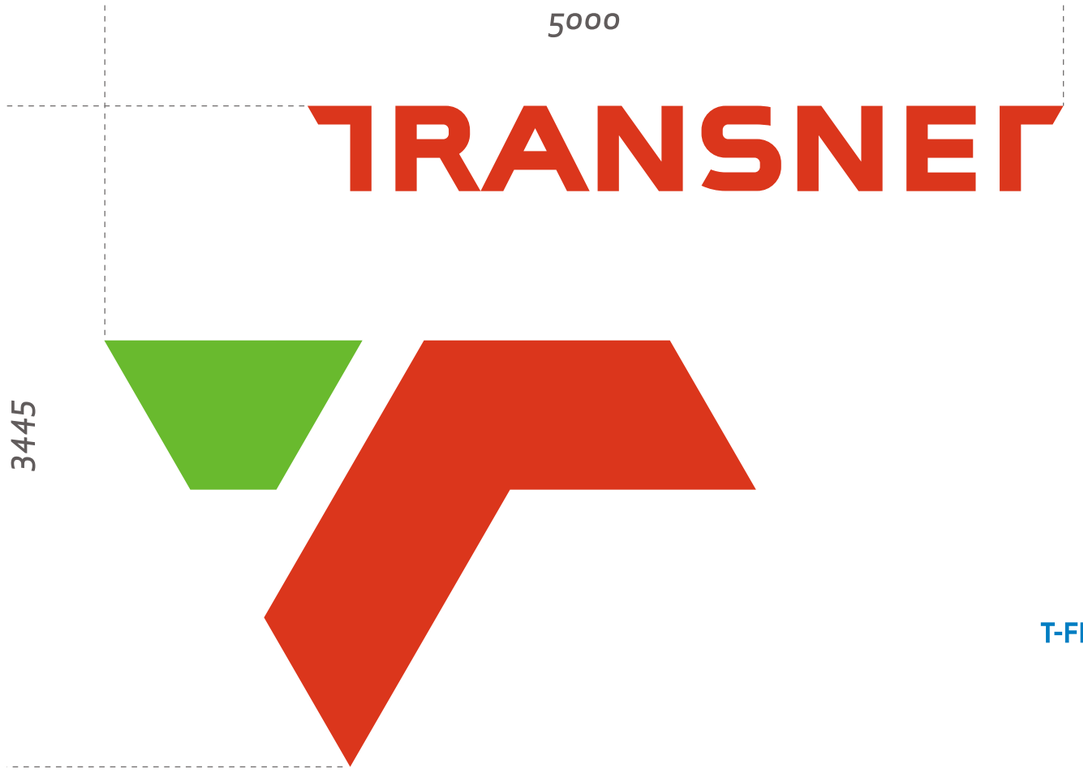
05

Signage Kit of Parts - Feature Head Office Building Sign Constraints

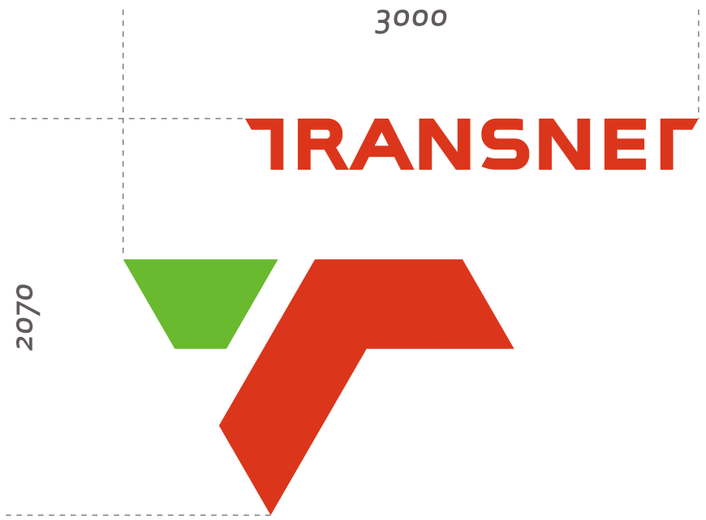


Incorporation of one of the TRANSNET C.I. Logo signs onto a building - the viewable distance (distance from the public eye) needs to be considered. Should the mountable area be any higher than 25m, the 5m sign is to be used.

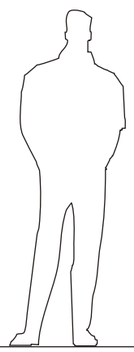
Signage Kit of Parts - Feature Building Sign Library (Corporate)

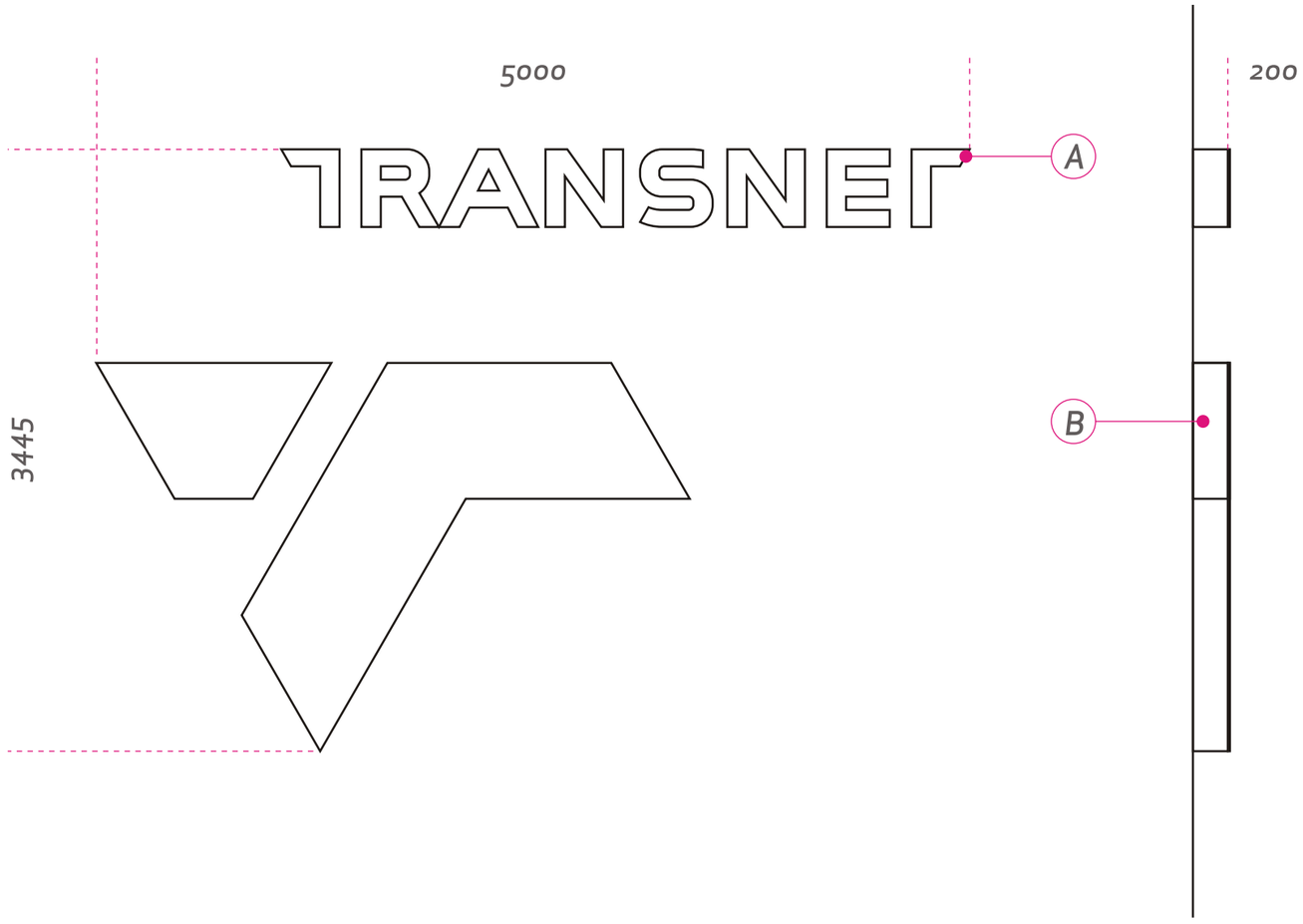


T-FEAT 1



T-FEAT 2





A *TRANSNET C.I. Logo - fabricated Opal perspex lightboxes, with neon tube illumination. Face is coated with translucent vinyl in the offical TRANSNET colours.*

B *Sign returns - returns are left Opal 050 perspex, to allow for light wash onto mounted surface.*

Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

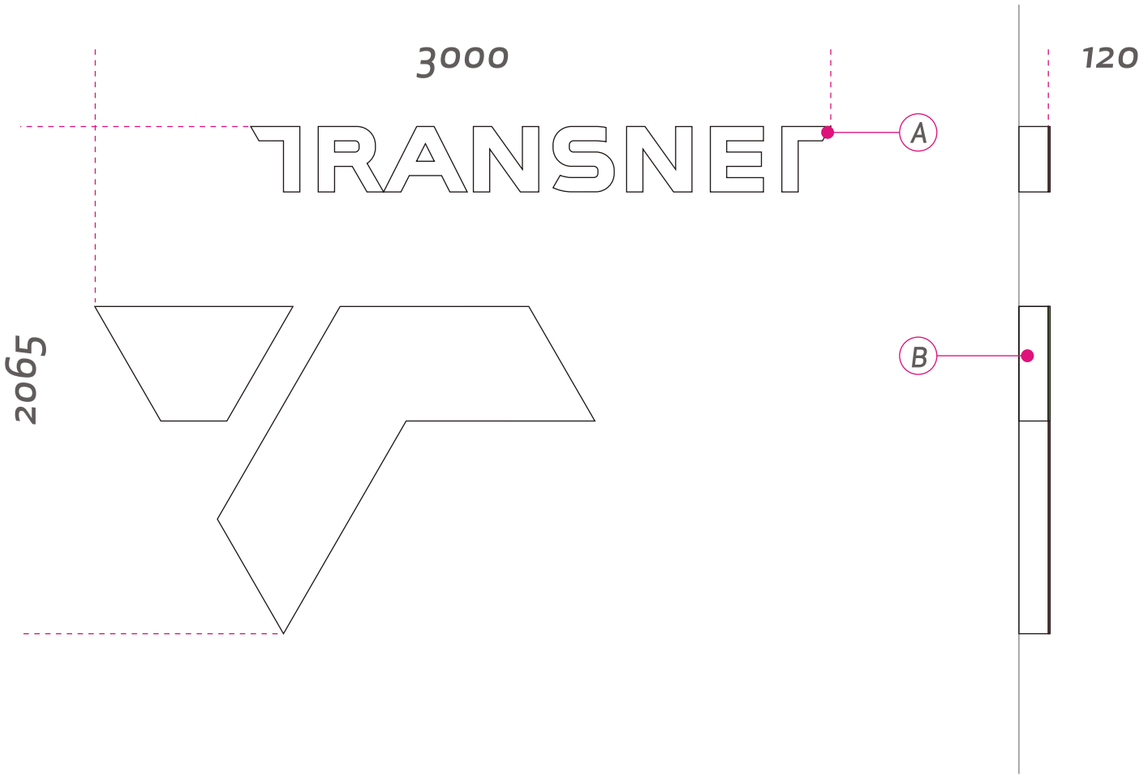
TRANSNET SIGNAGE PROGRAMME

Feature Signage Specification Layouts

Feature building sign - 5m (width)

Sign No.	T-FEAT 1
Scale	Scale 1 : 35
DRAWN	v1• 08•2007

TRANSNET



Ⓐ *TRANSNET C.I. Logo - fabricated Opal perspex lightboxes, with neon tube illumination. Face is coated with translucent vinyl in the offical TRANSNET colours.*

Ⓑ *Sign returns - returns are left Opal 050 perspex, to allow for light wash onto mounted surface.*

Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

TRANSNET SIGNAGE PROGRAMME

Feature Signage Specification Layouts

Feature building sign - 3m (width)

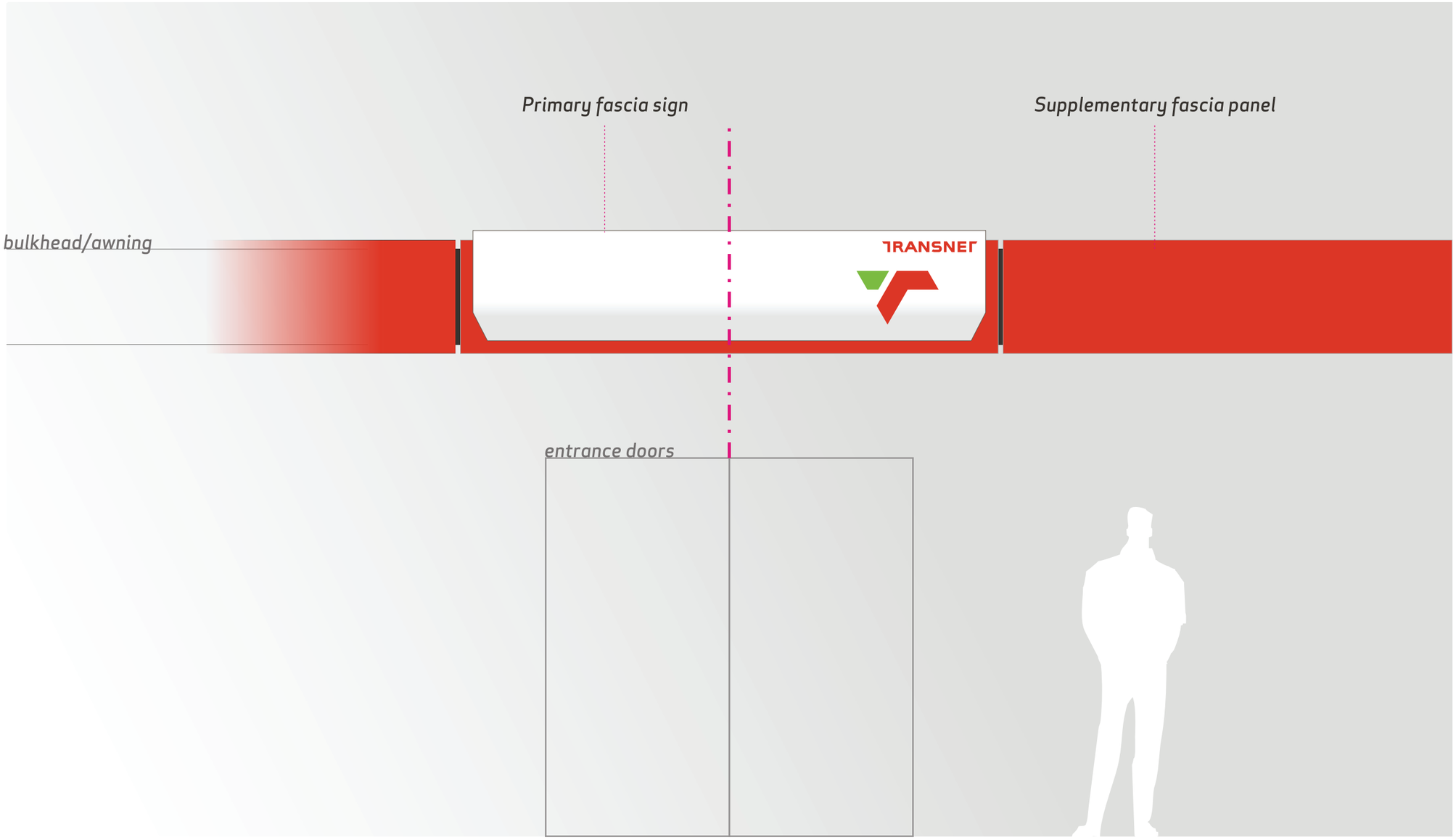
Sign No.	T-FEAT 2
Scale	Scale 1 : 25
DRAWN	v1• 08•2007

TRANSNET

SIGNAGE SPECIFICATION - PRIMARY SIGNAGE

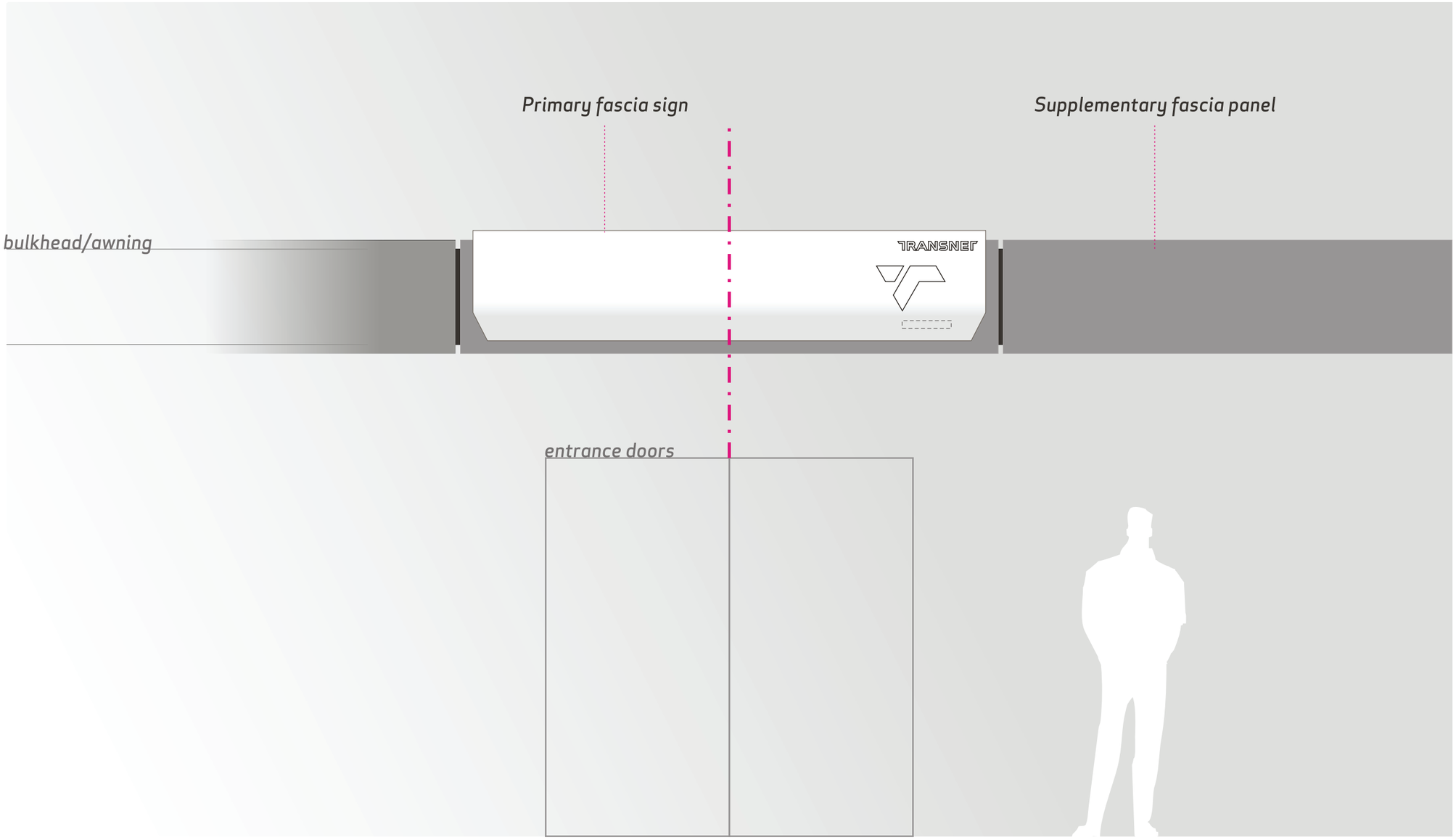
06

Signage Kit of Parts - Fascia Band Sign Constraints (Corporate)



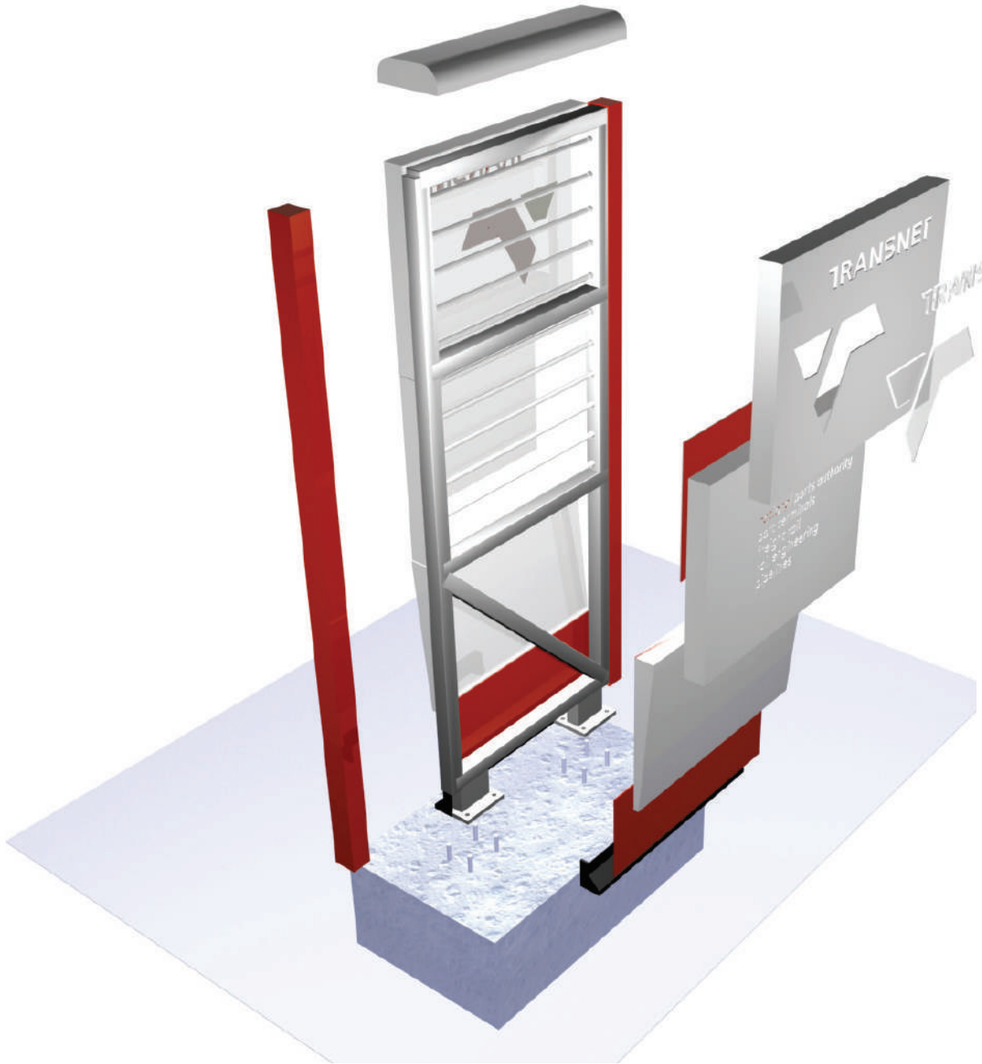
The incorporation of fascia band signage - the fascia band signage should be installed on a bulkhead/awning above a main entrance to a building.
The primary fascia sign is to be installed center to the entrance door/s. Supplementary fascia panels are to be introduced to run the length of the bulkhead/awning.

Signage Kit of Parts - Fascia Band Sign Constraints

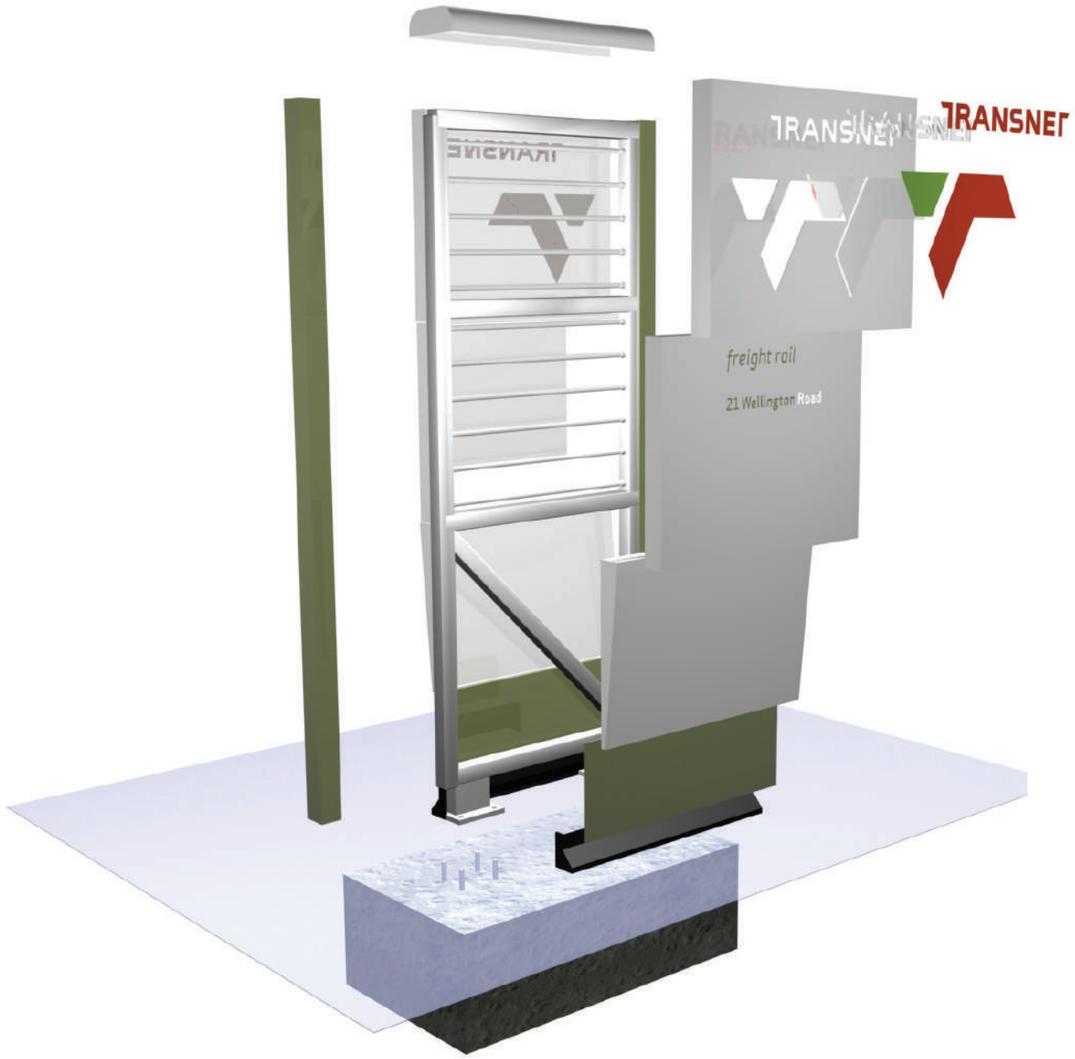


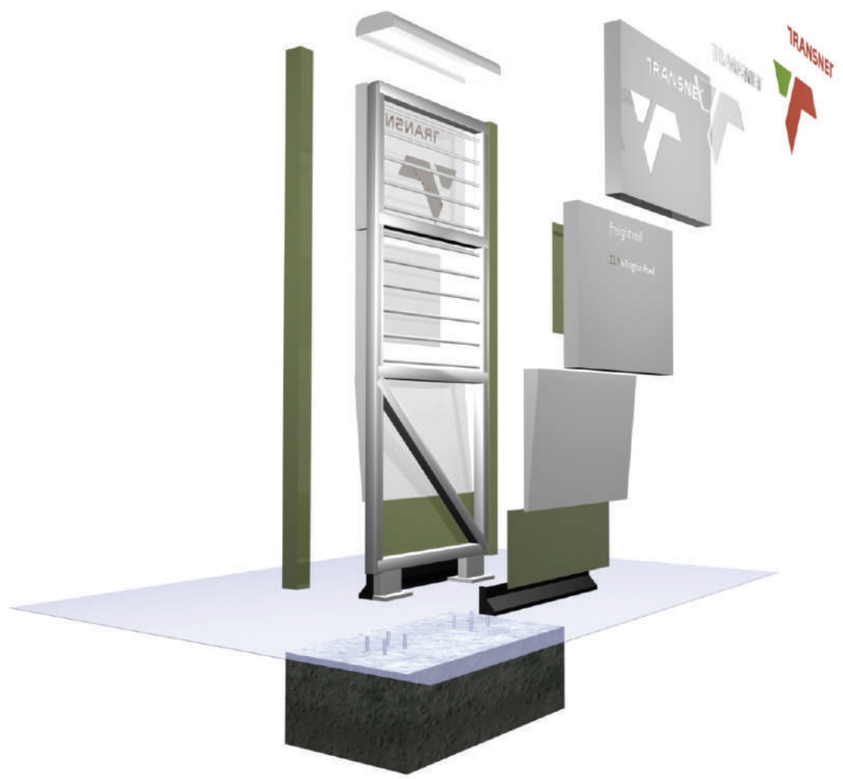
The incorporation of fascia band signage - the fascia band signage should be installed on a bulkhead/awning above a main entrance to a building.
The primary fascia sign is to be installed center to the entrance door/s. Supplementary fascia panels are to be introduced to run the length of the bulkhead/awning.

Signage Kit of Parts - Pylon exploded views (Corporate)

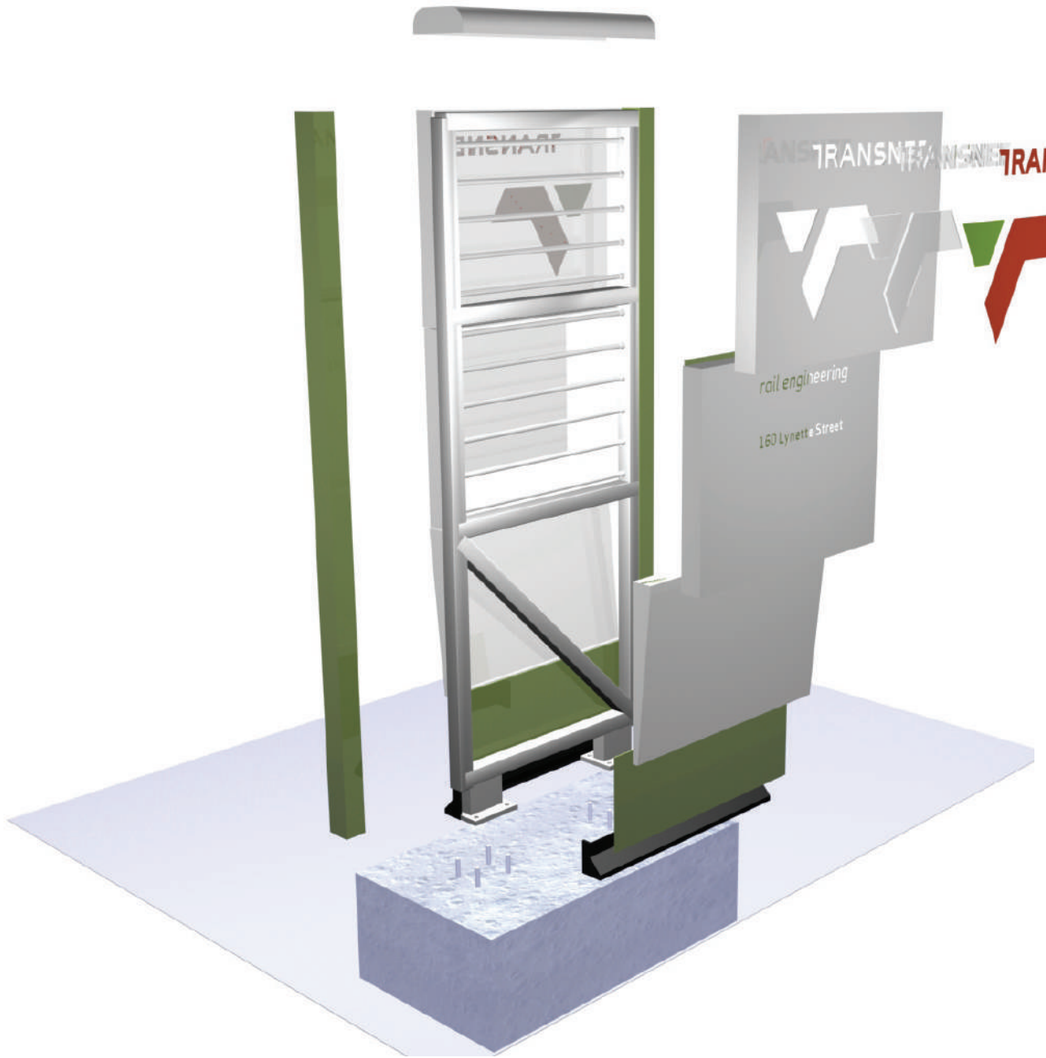


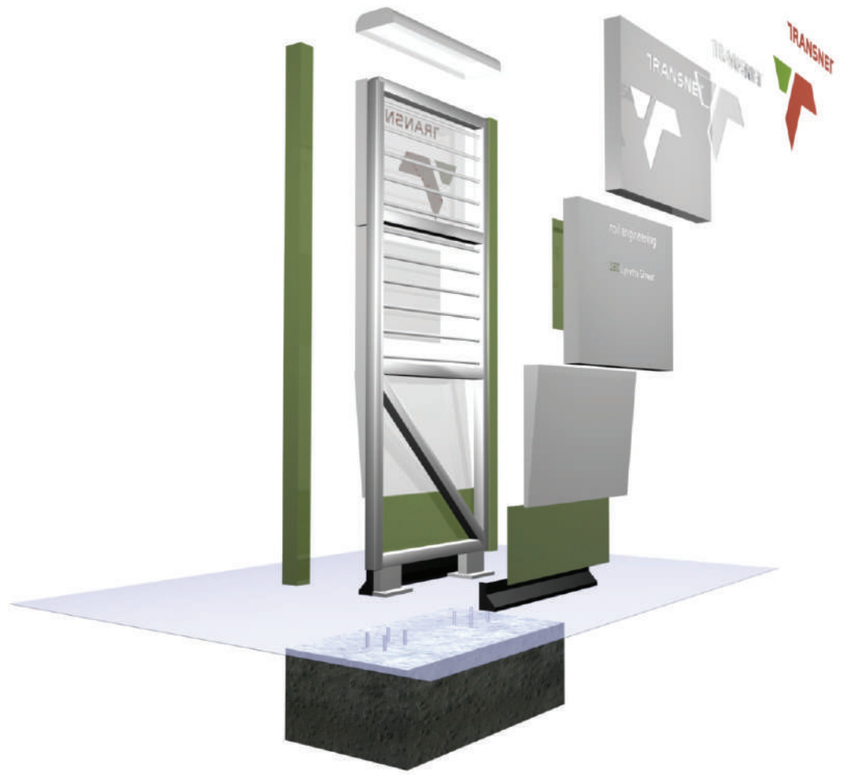
Signage Kit of Parts - Pylon exploded views (Freight Rail)



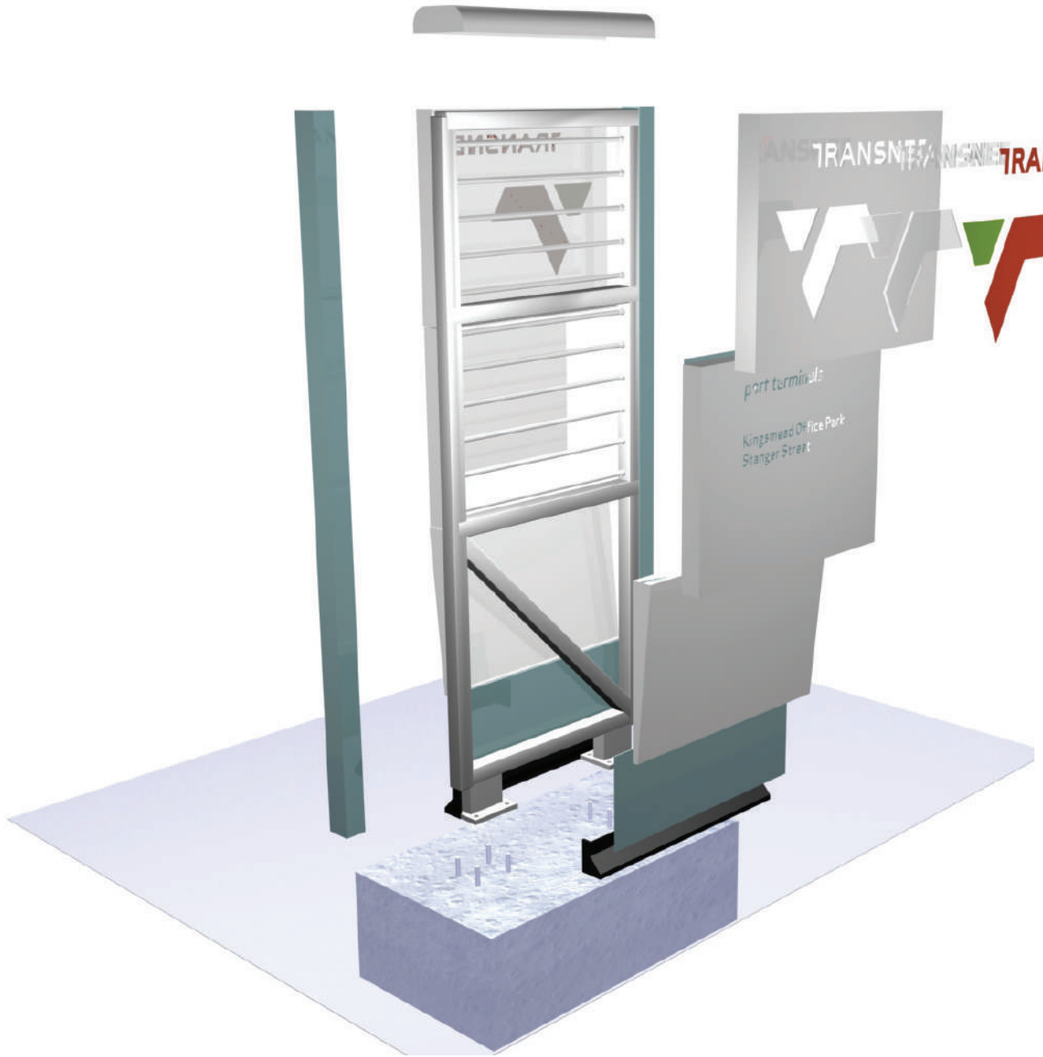


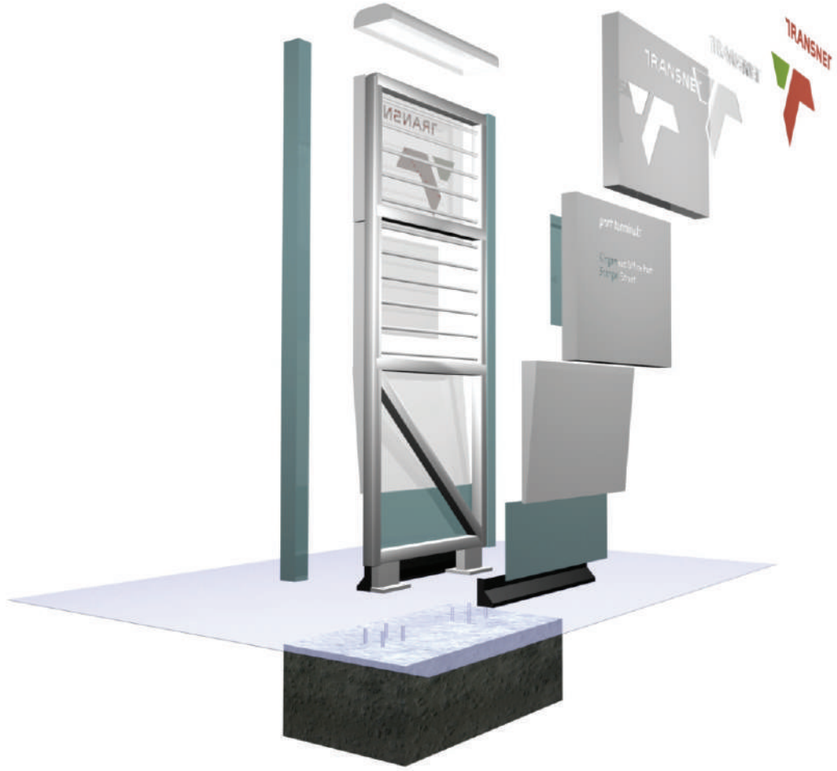
Signage Kit of Parts - Pylon exploded views (Rail Engineering)



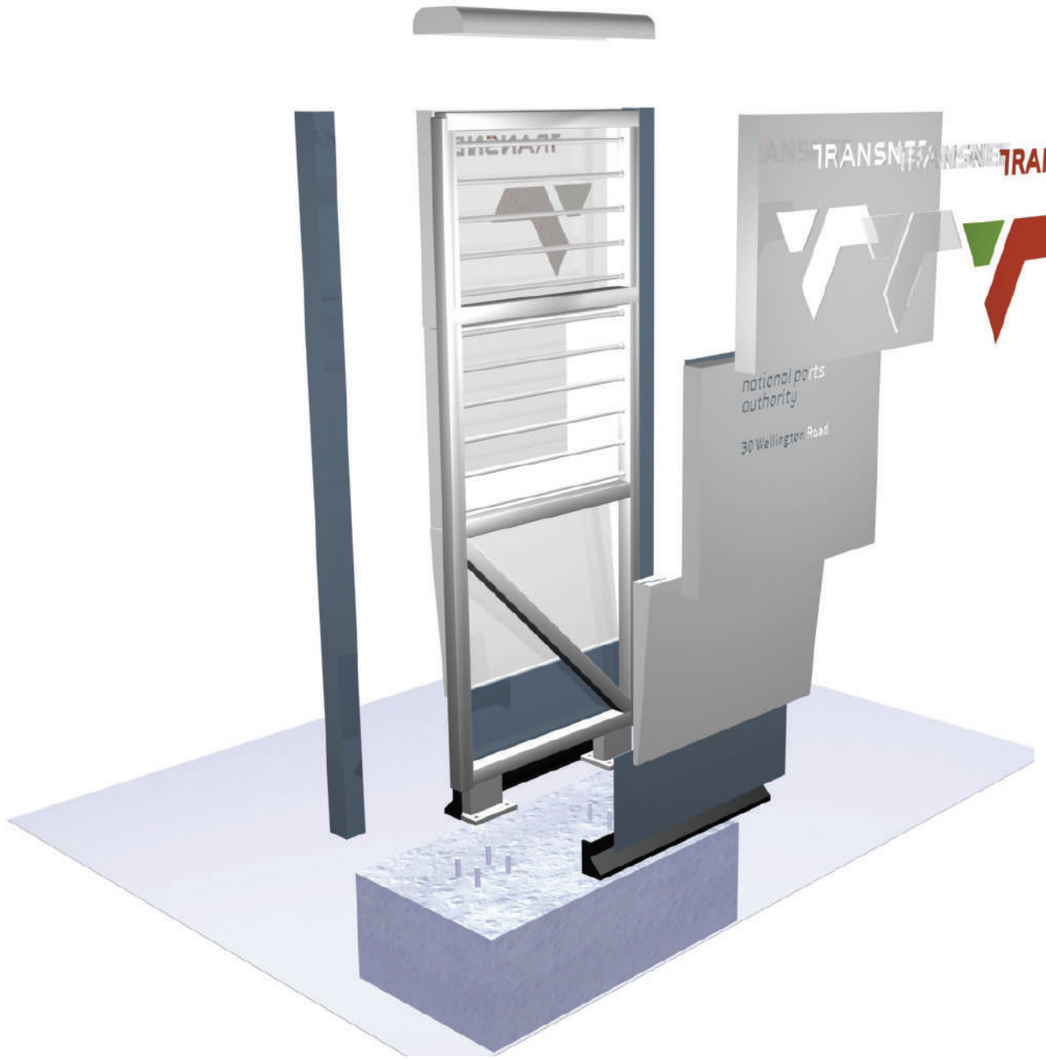


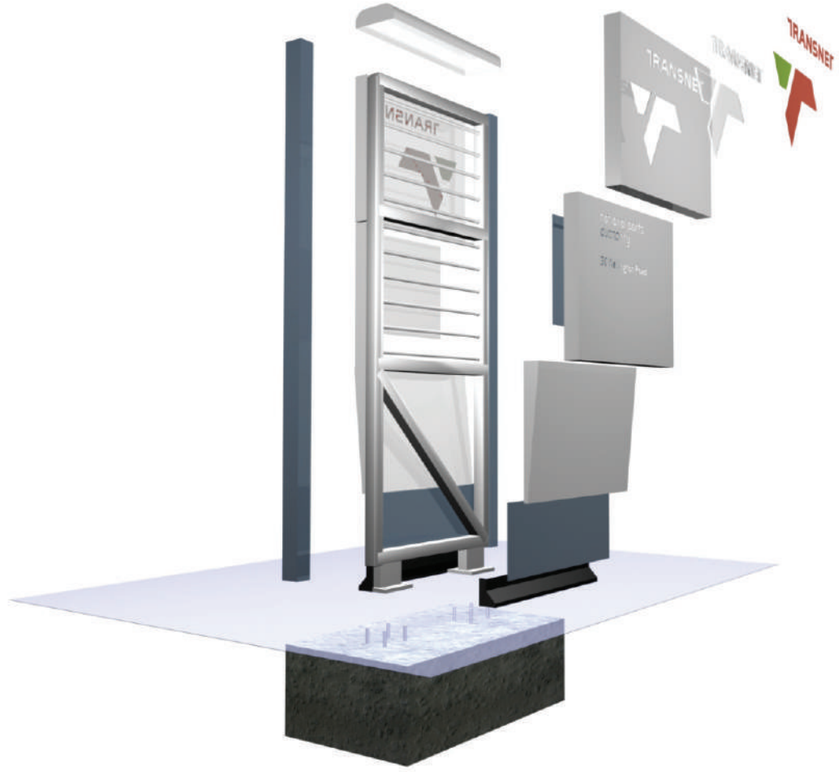
Signage Kit of Parts - Pylon exploded views (Port Terminals)



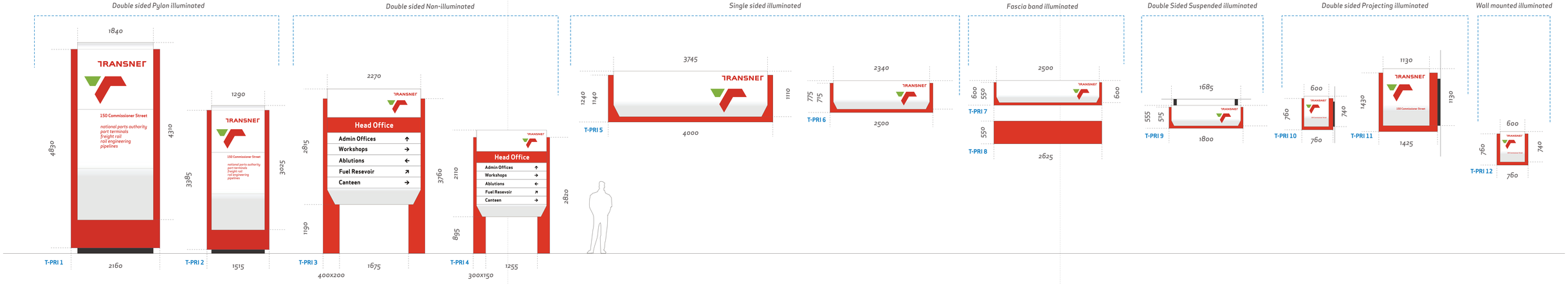


Signage Kit of Parts - Pylon exploded views (National Ports Authority)

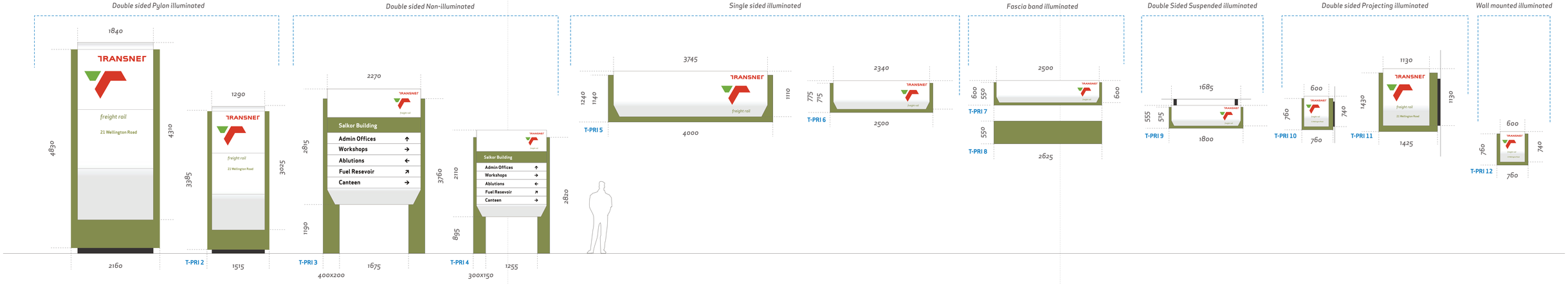




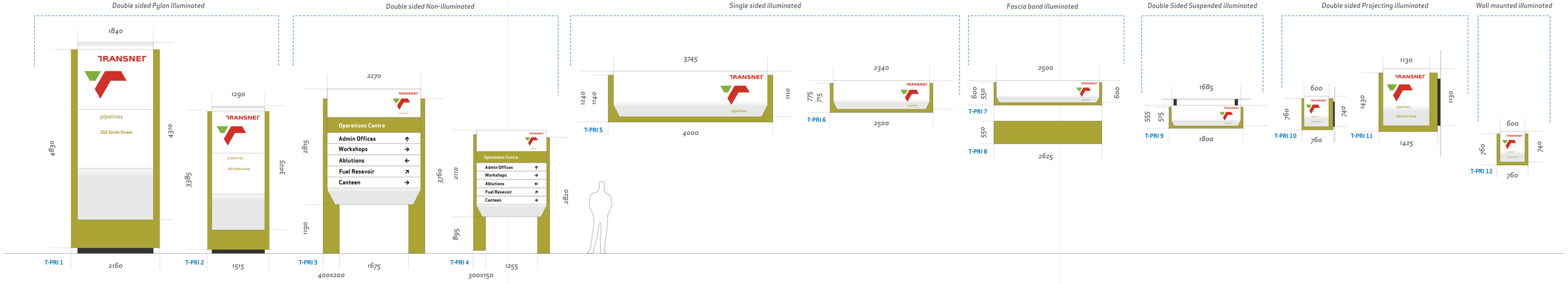
Signage Kit of Parts - Primary External Signage Library (Corporate)



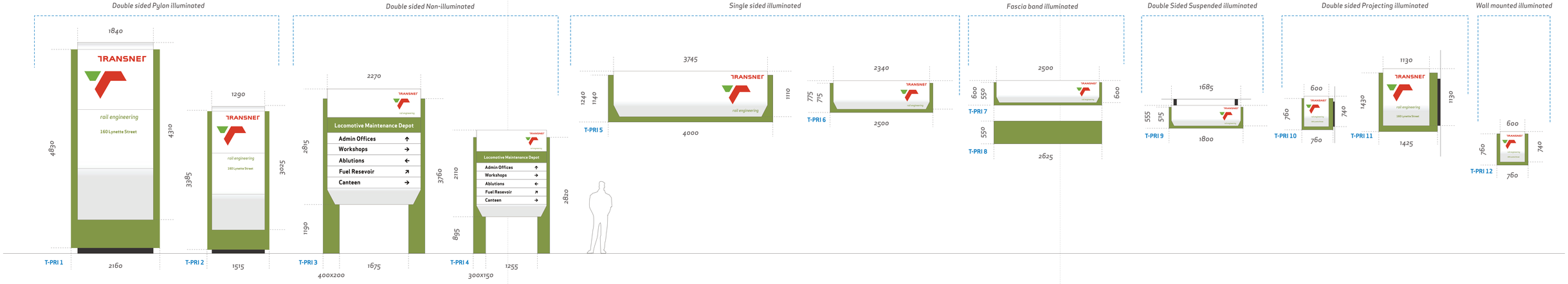
Signage Kit of Parts - Primary External Signage Library (Freight Rail)



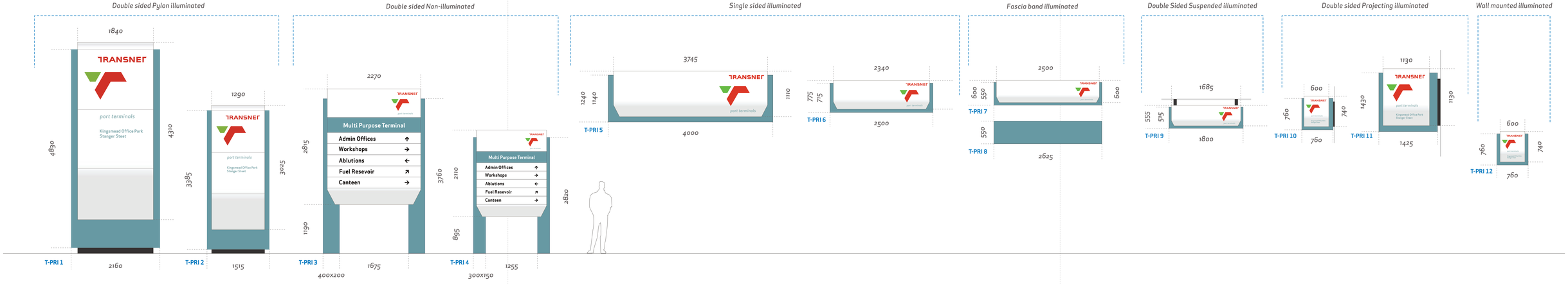
Signage Kit of Parts - Primary External Signage Library (Pipelines)



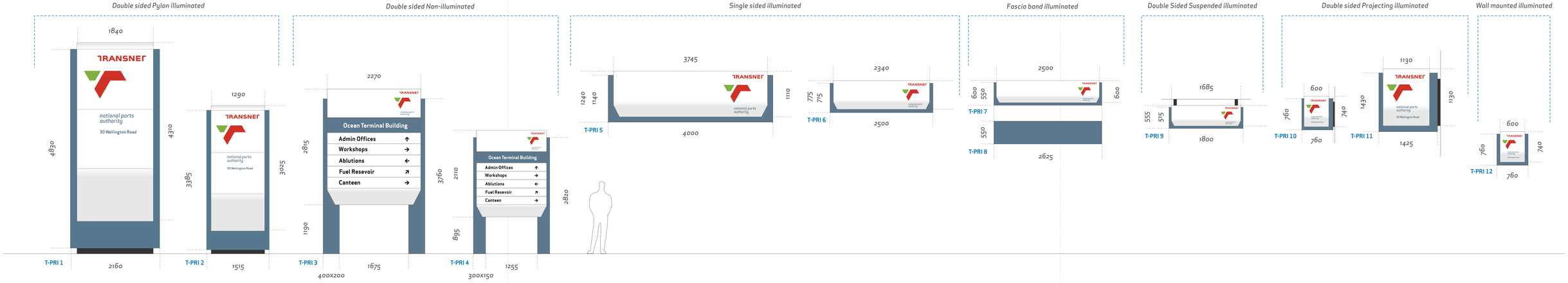
Signage Kit of Parts - Primary External Signage Library (Rail Engineering)



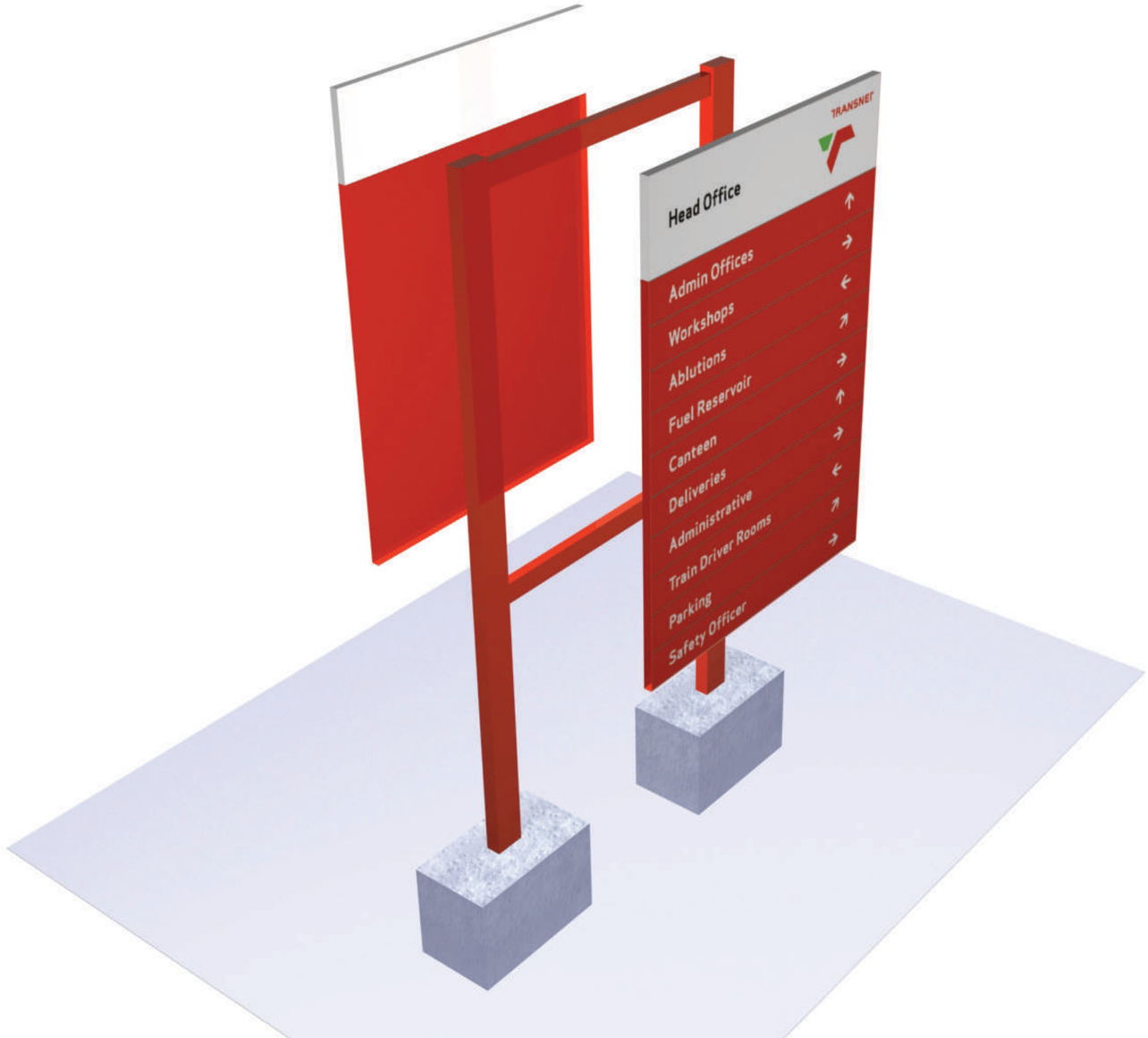
Signage Kit of Parts - Primary External Signage Library (Port Terminals)



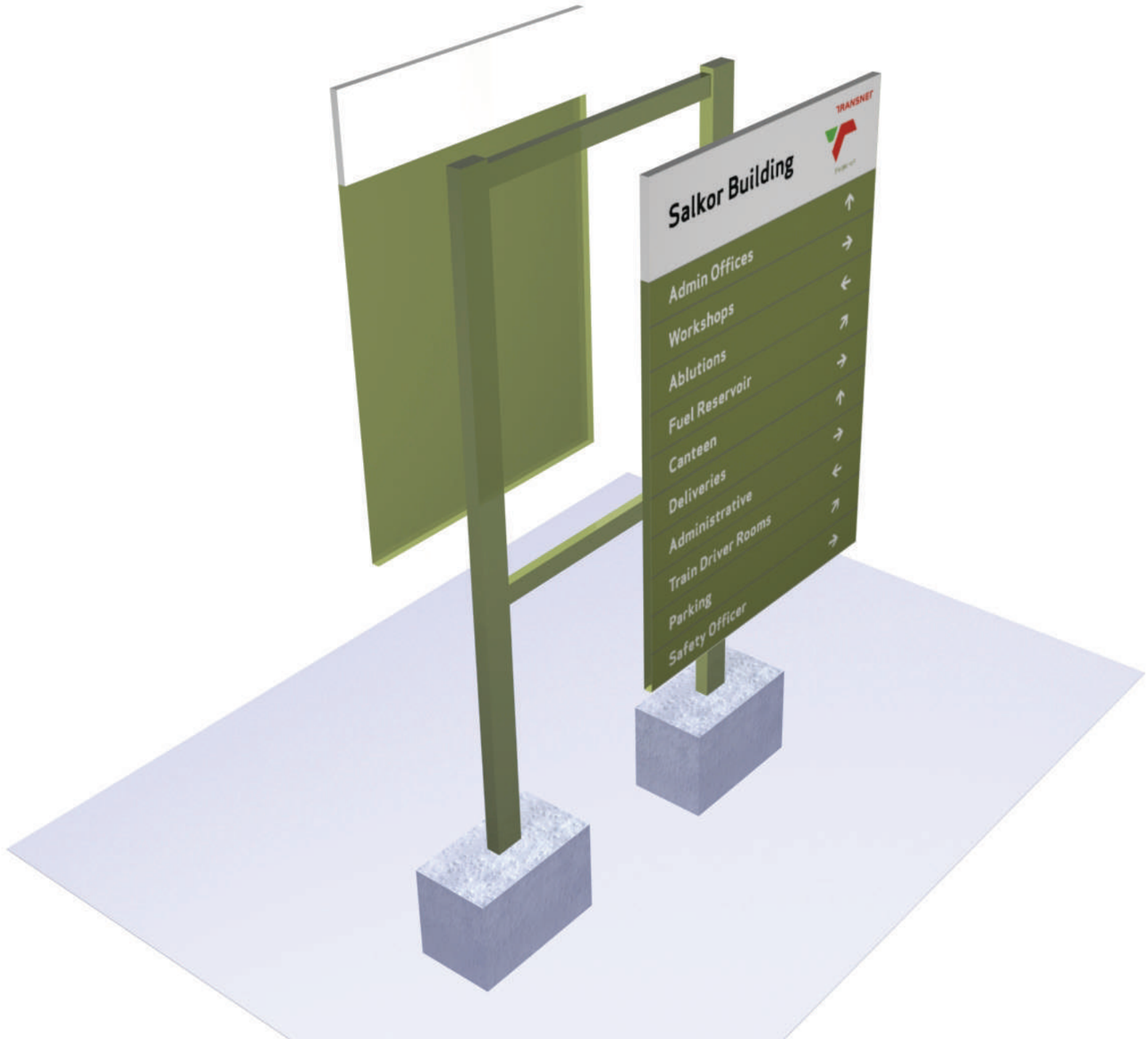
Signage Kit of Parts - Primary External Signage Library (National Ports Authority))



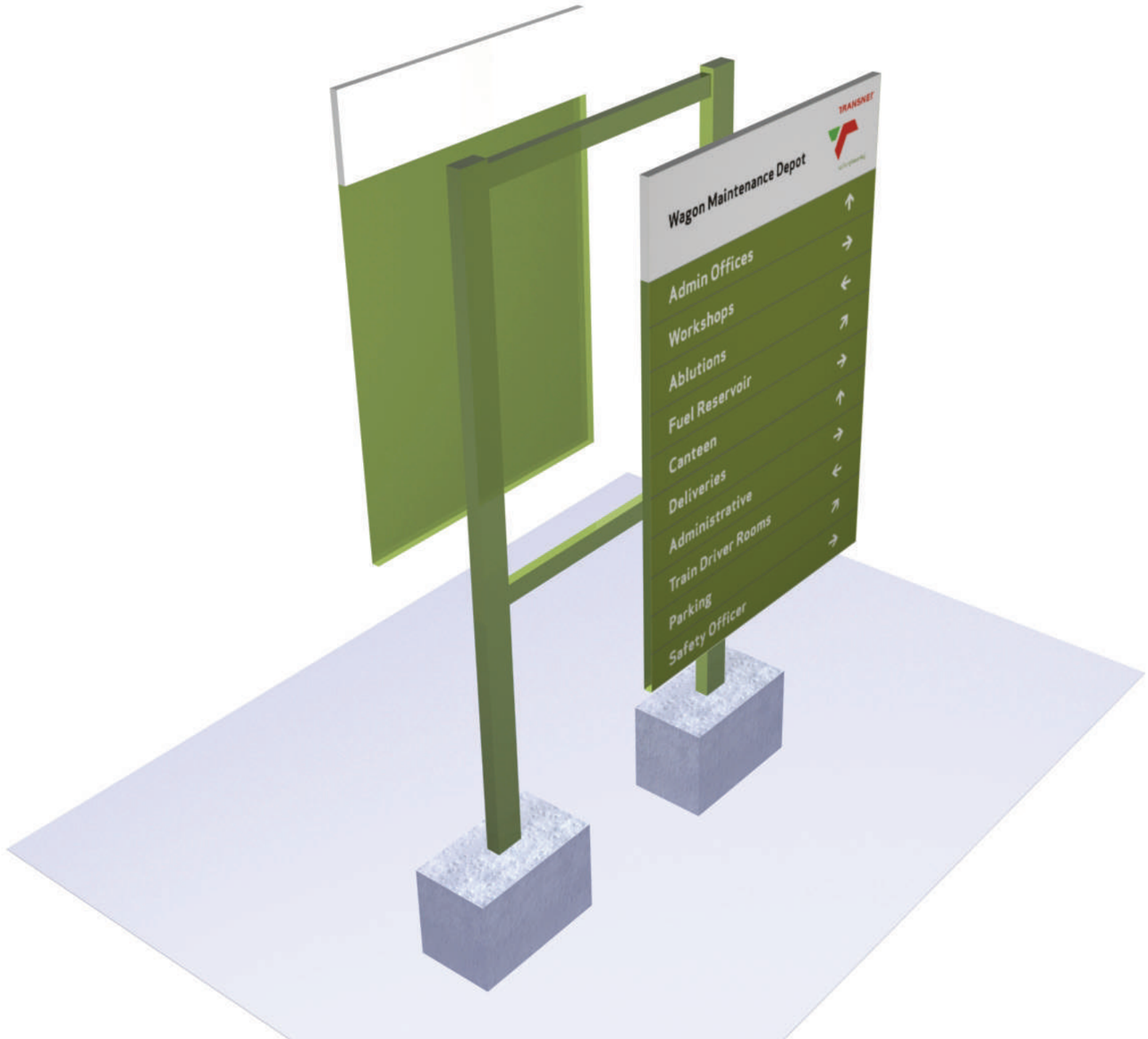
Signage Kit of Parts - Secondary Exterior Signage exploded view (Corporate)



Signage Kit of Parts - Secondary Exterior Signage exploded view (Freight Rail)

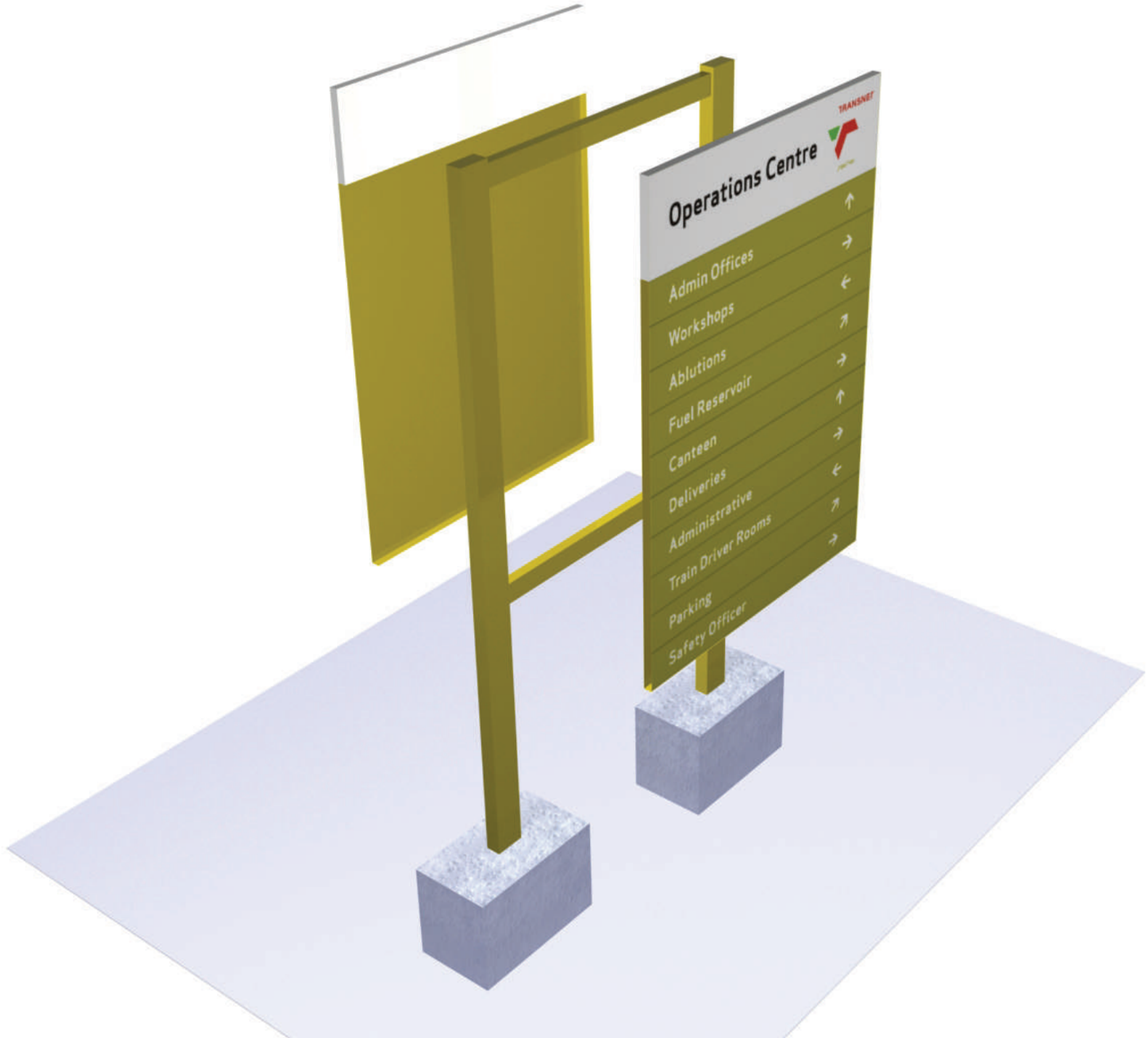


Signage Kit of Parts - Secondary Exterior Signage exploded view (Rail Engineering)

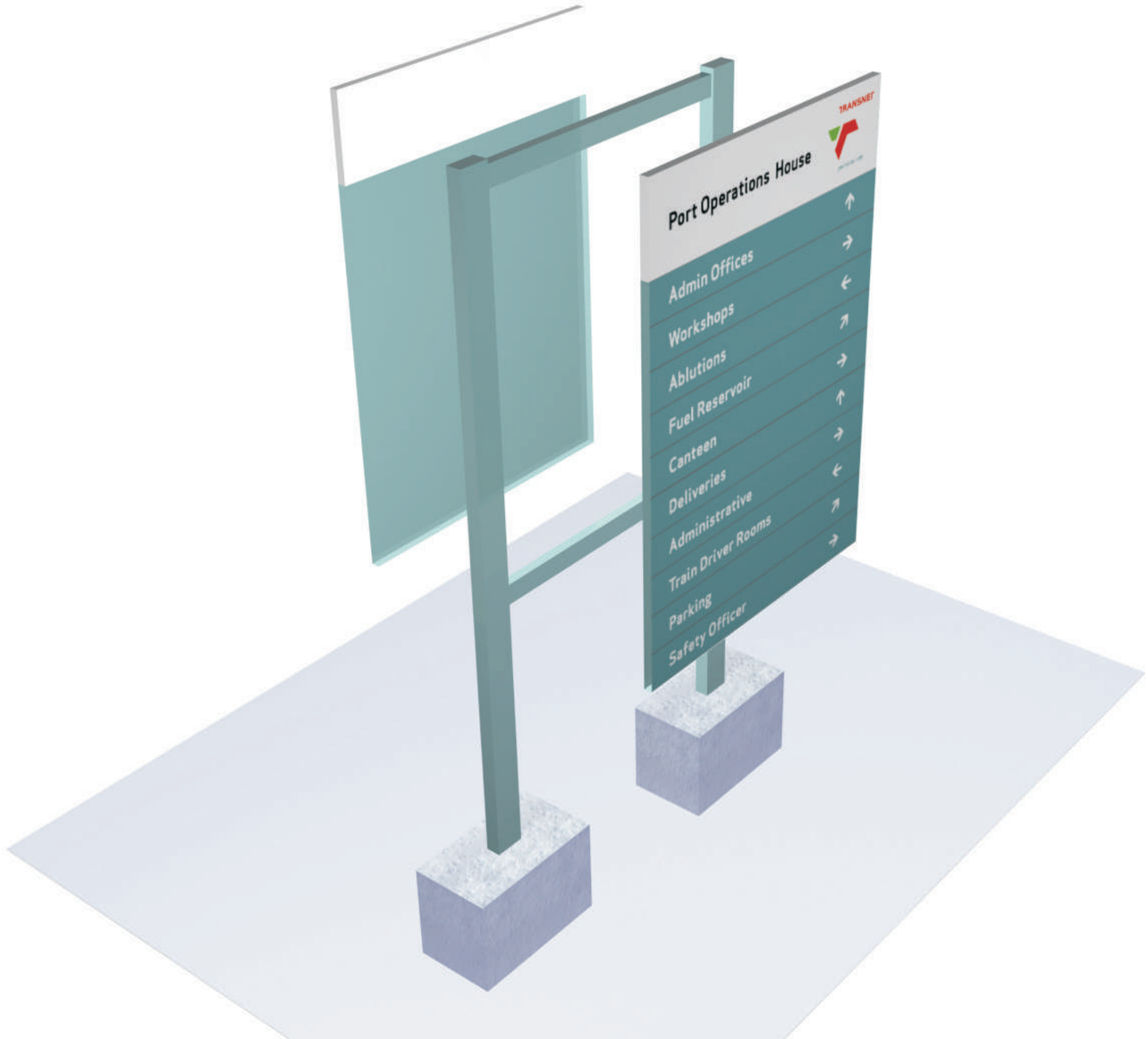


Transnet Limited, Signage Kit of Parts

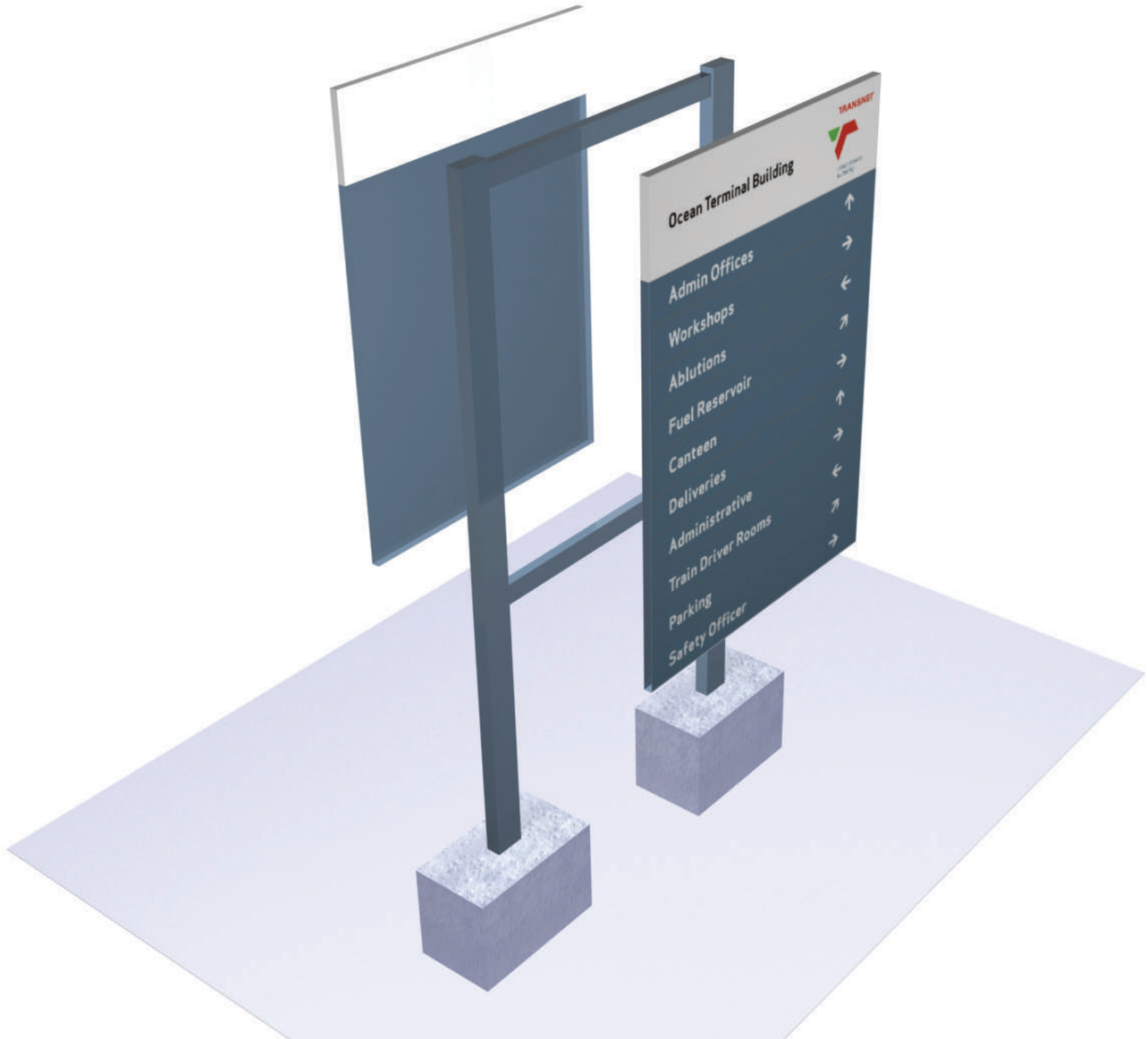
Signage Kit of Parts - Secondary Exterior Signage exploded view (Pipelines)



Signage Kit of Parts - Secondary Exterior Signage exploded view (Port Terminals)

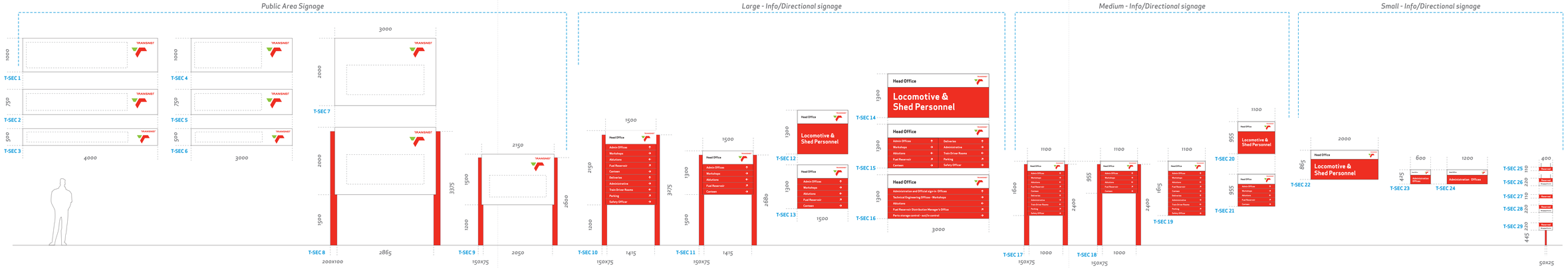


Signage Kit of Parts - Secondary Exterior Signage exploded view (National Ports Authority)

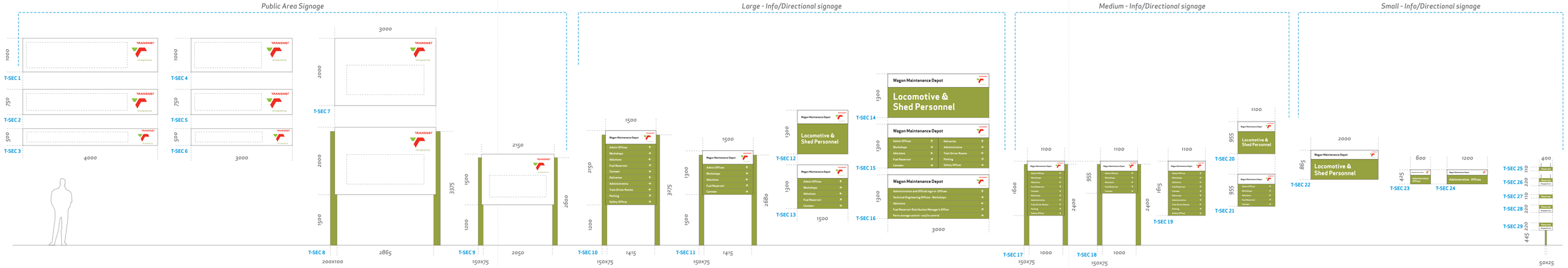


Transnet Limited, Signage Kit of Parts

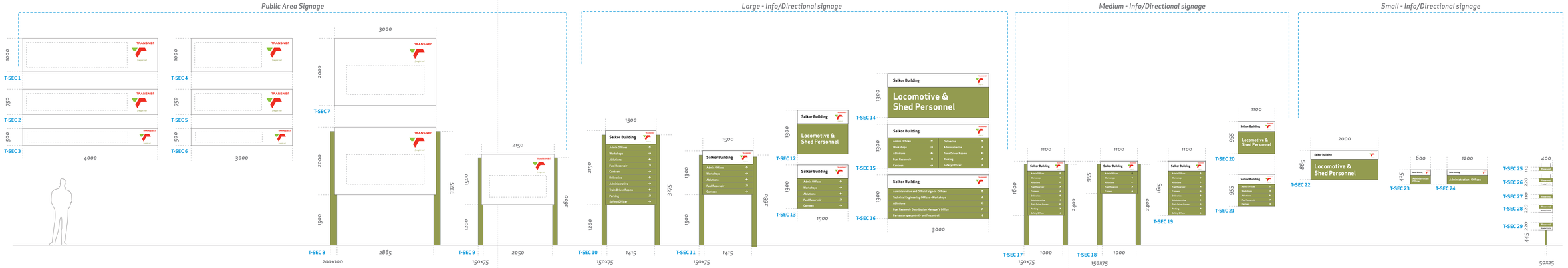
Signage Kit of Parts - Secondary Exterior Signage Library (Corporate)



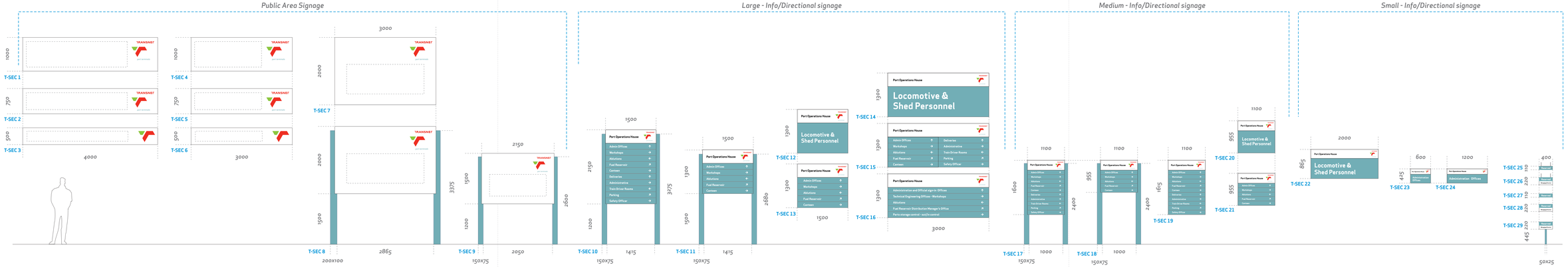
Signage Kit of Parts - Secondary Exterior Signage Library (Rail Engineering)



Signage Kit of Parts - Secondary Exterior Signage Library (Freight Rail)

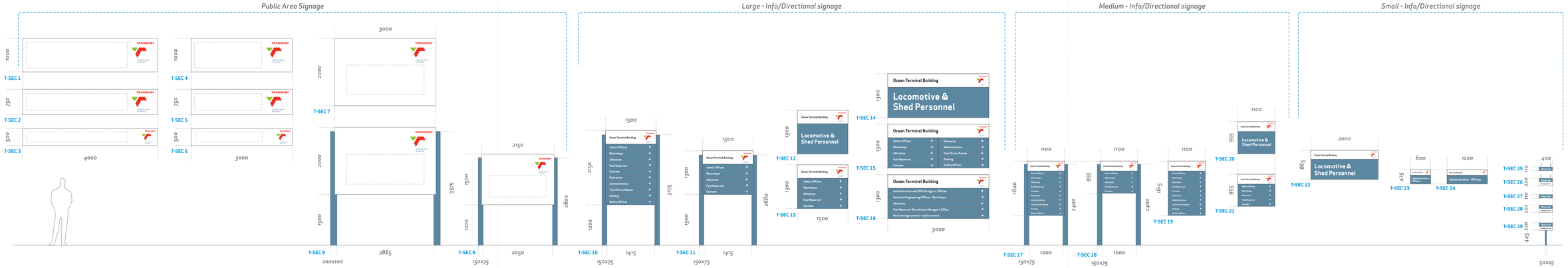


Signage Kit of Parts - Secondary Exterior Signage Library (Port Terminals)

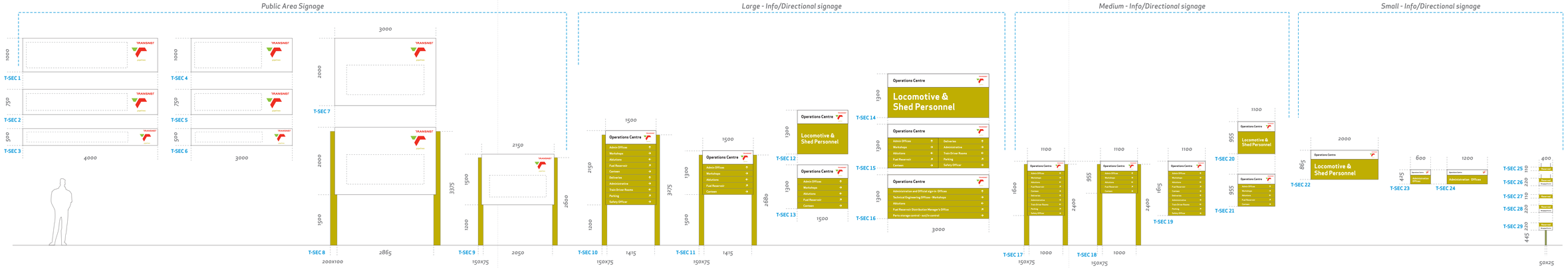


Transnet Limited, Signage Kit of Parts

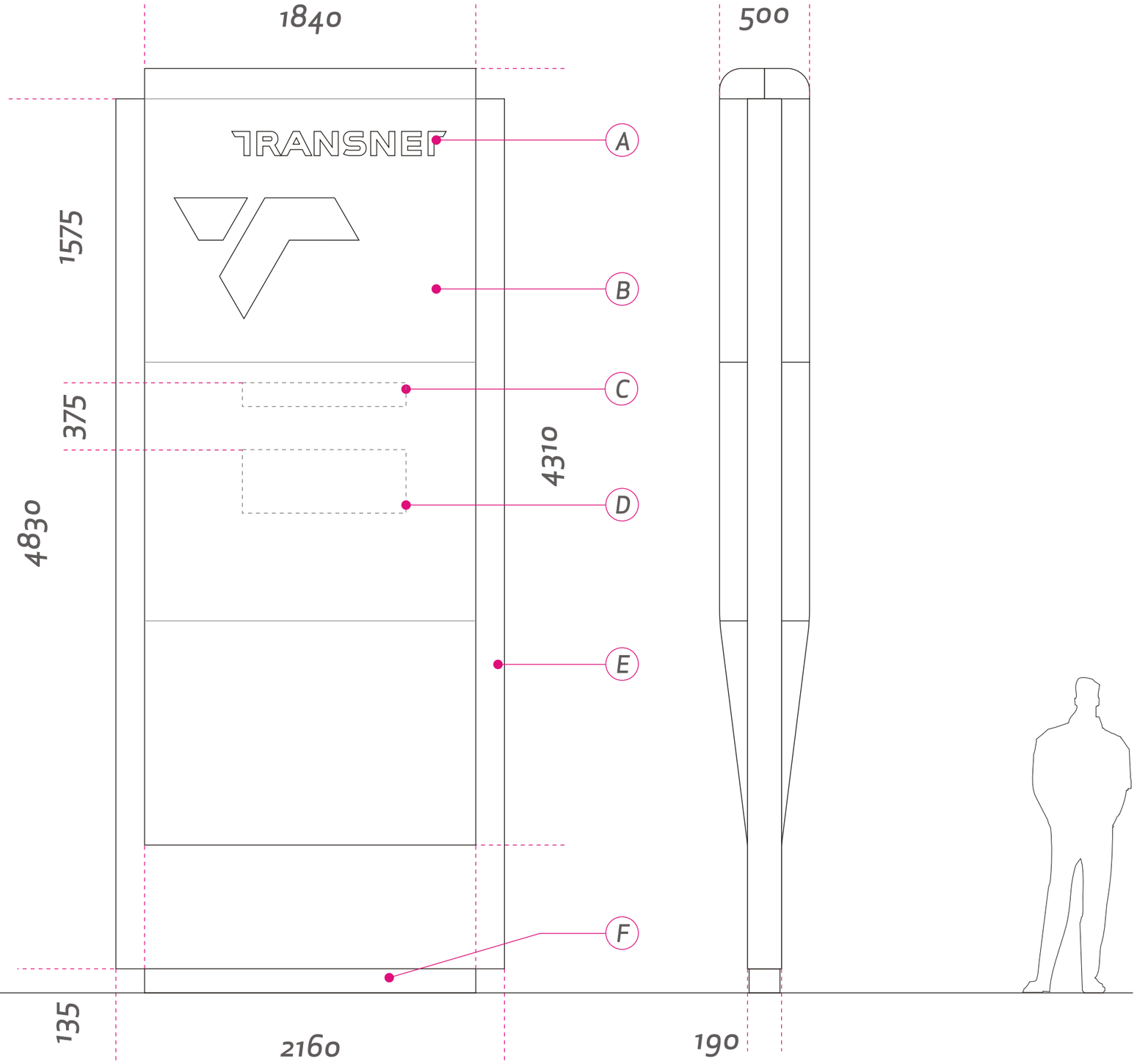
Signage Kit of Parts - Secondary Exterior Signage Library (National Ports Authority)



Signage Kit of Parts - Secondary Exterior Signage Library (Pipelines)



T-PRI 1



- (A) *TRANSNET C.I. - cut-out logo with back placed opal perspex, translucent vinyl applied.*
- (B) *Sign face - fabricated alumnium boxed sign face spray painted Transnet White.*
- (C) *TRANSNET Division descriptor - cut-out with back placed opal perspex, translucent vinyl applied.*
- (D) *Location Address - cut-out with back placed opal perspex, translucent vinyl applied.*
- (E) *Pylon spine - fabricated aluminium boxed spine spray painted to relevant divisional colour.*
- (F) *Base plate - fabricated aluminium 'foot' spray painted black with spark finish.*

Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

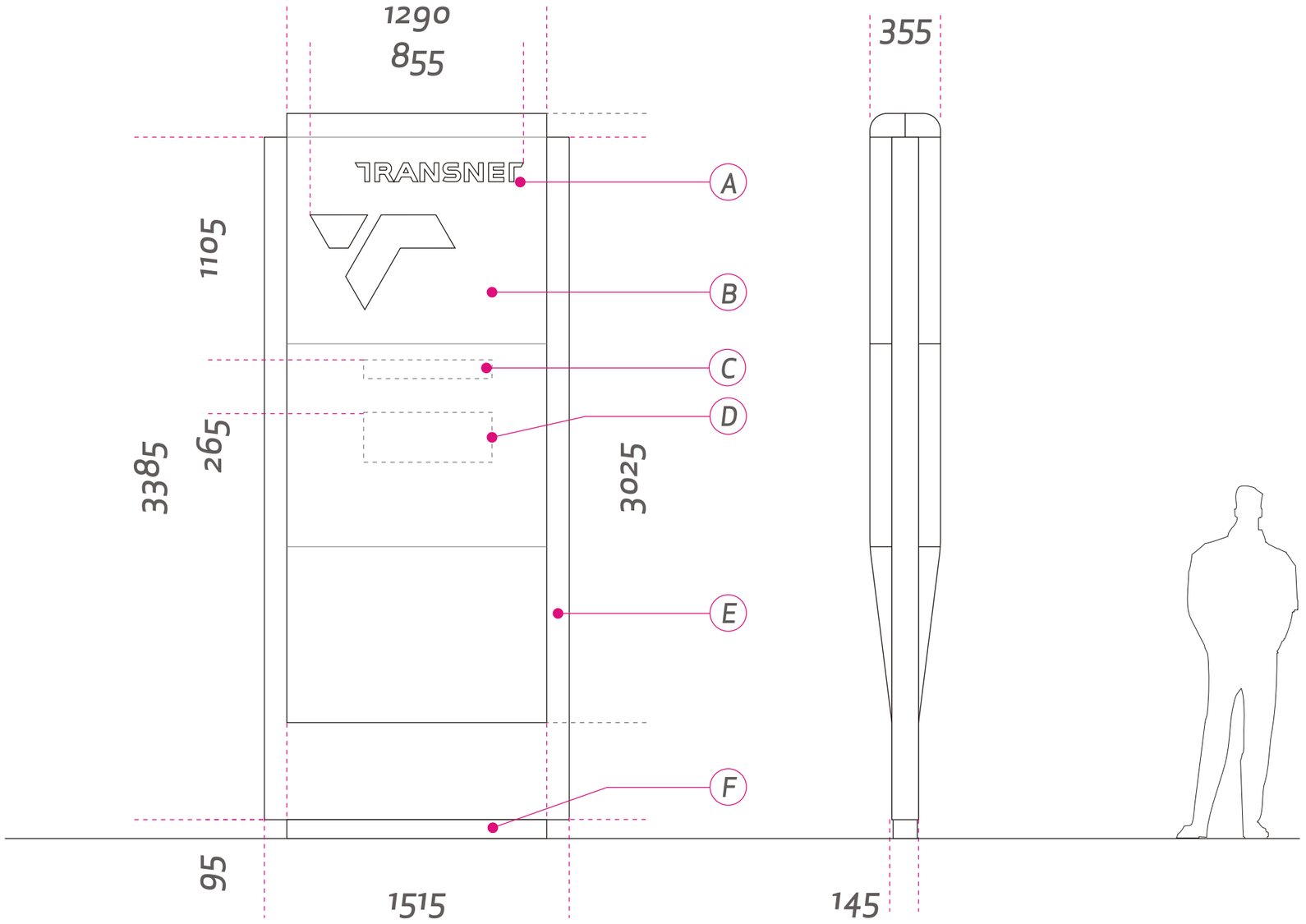
TRANSNET SIGNAGE PROGRAMME

Primary Signage Specification Layouts

Pylon sign - 5m (height)

Sign No.	T-PRI 1
Scale	Scale 1 : 25
DRAWN	v1• 08•2007

TRANSNET



- (A) *TRANSNET C.I. - cut-out logo with back placed opal perspex, translucent vinyl applied.*
- (B) *Sign face - fabricated alumnium boxed sign face spray painted Transnet White.*
- (C) *TRANSNET Division descriptor - cut-out with back placed opal perspex, translucent vinyl applied.*
- (D) *Location Address - cut-out with back placed opal perspex, translucent vinyl applied.*
- (E) *Pylon spine - fabricated aluminium boxed spine spray painted to relevant divisional colour.*
- (F) *Base plate - fabricated aluminium 'foot' spray painted black with spark finish.*

Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

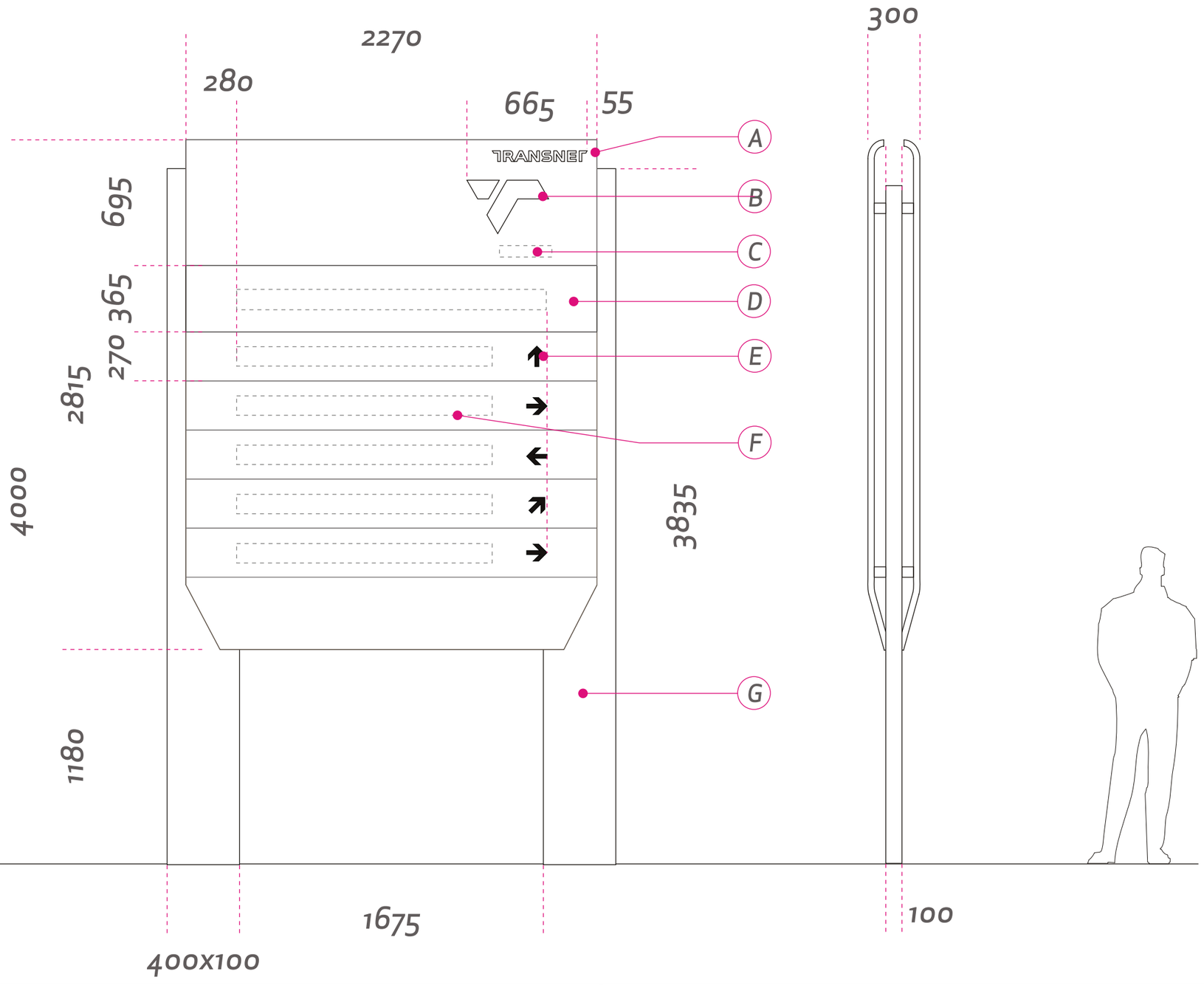
TRANSNET SIGNAGE PROGRAMME

Primary Signage Specification Layouts

Pylon sign - 3.5m (height)

Sign No.	T-PRI 2
Scale	Scale 1 : 25
DRAWN	v1• 08•2007

TRANSNET



- (A) *Sign face - fabricated rolled and folded alumnium sign face spray painted TRANSNET White.*
- (B) *TRANSNET C.I. - opaque vinyl graphic logo applied to sign face.*
- (C) *TRANSNET Division descriptor - vinyl graphic descriptor applied to sign face.*
- (D) *Depot/Department descriptor - white vinyl graphics sticker on relevant coloured panel.*
- (E) *Directional arrows - black vinyl stickers.*
- (F) *Directional type - black vinyl stickers. 105mm font.*
- (G) *Sign poles - rectangular aluminium 'legs' spray painted in the relevant division's colour.*

Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

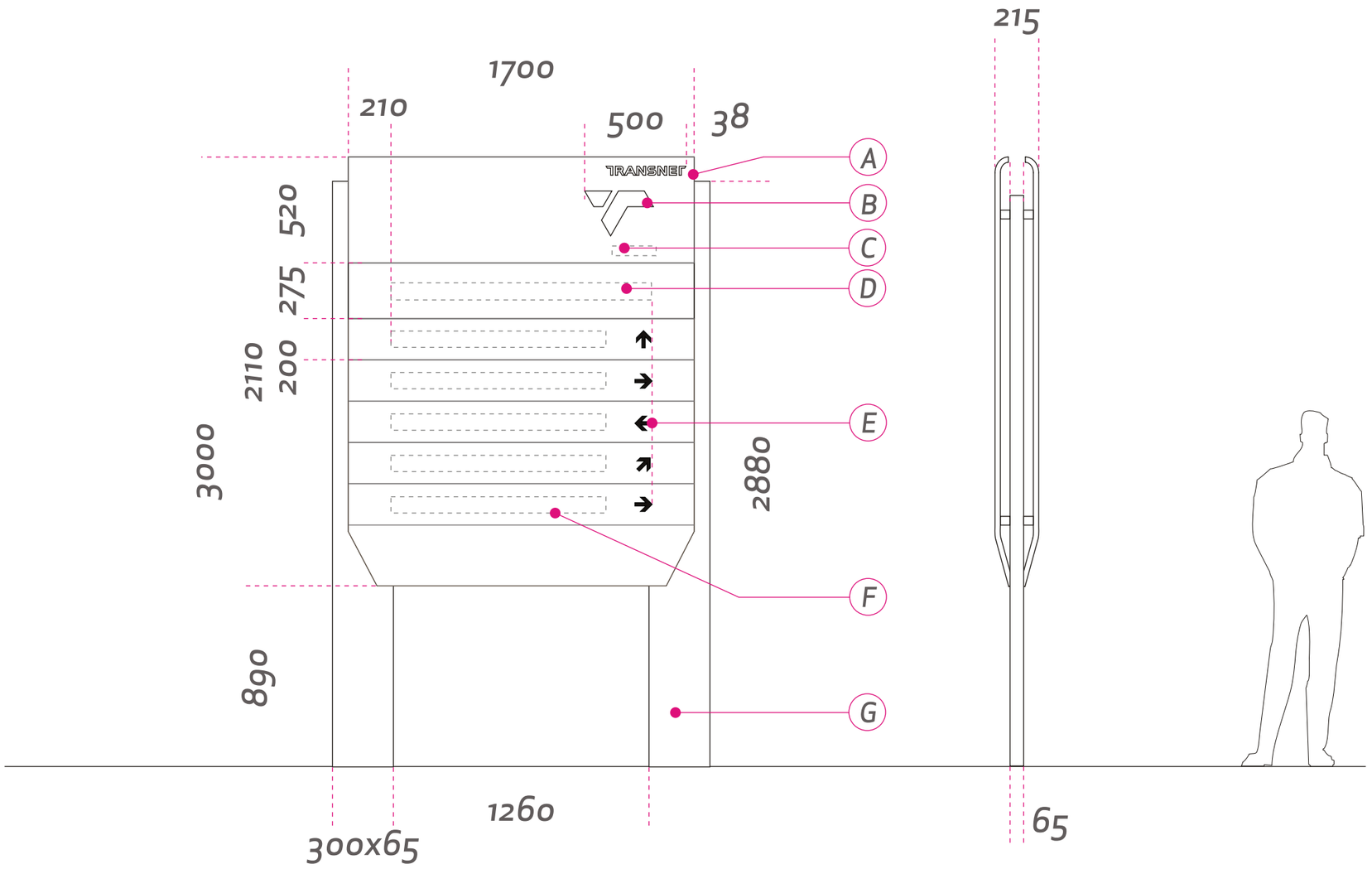
TRANSNET SIGNAGE PROGRAMME

Primary Signage Specification Layouts

Non-illuminated pylon sign - 4m (height)

Sign No.	T-PRI 3
Scale	Scale 1 : 25
DRAWN	v1• 08•2007

TRANSNET



- (A) *Sign face - fabricated rolled and folded alumnium sign face spray painted TRANSNET White.*
- (B) *TRANSNET C.I. - opaque vinyl graphic logo applied to sign face.*
- (C) *TRANSNET Division descriptor - vinyl graphic descriptor applied to sign face.*
- (D) *Depot/Department descriptor - white vinyl graphics sticker on relevant coloured panel.*
- (E) *Directional arrows - black vinyl stickers.*
- (F) *Directional type - black vinyl stickers. 105mm font.*
- (G) *Sign poles - rectangular aluminium 'legs' spray painted in the relevant division's colour.*

Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

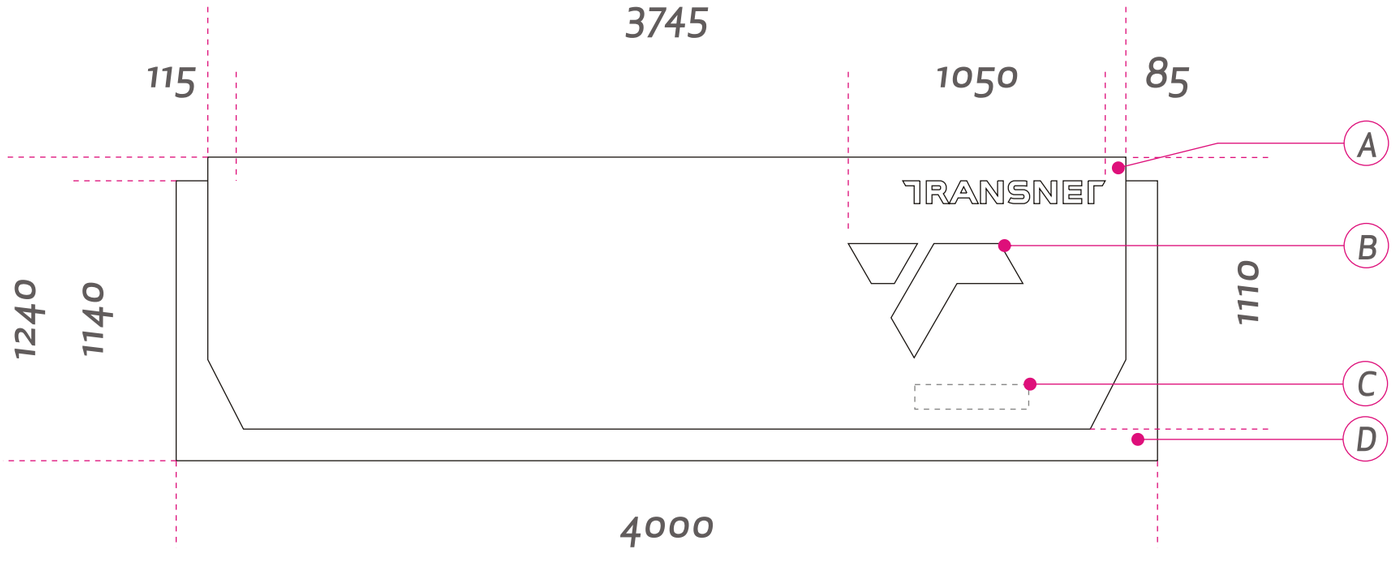
TRANSNET SIGNAGE PROGRAMME

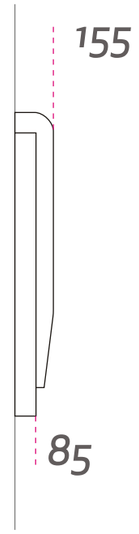
Primary Signage Specification Layouts

Non-illuminated pylon sign - 3m (height)

Sign No.	T-PRI 4
Scale	Scale 1 : 25
DRAWN	v1• 08•2007

TRANSNET





- (A) *Sign face - fabricated/moulded opal 050 perspex sign face and returns. Internally Illuminated.*
- (B) *TRANSNET C.I. - translucent vinyl graphic logo applied to sign face.*
- (C) *TRANSNET Division descriptor - translucent vinyl graphic descriptor applied to sign face.*
- (D) *Sign spine - fabricated boxed aluminium spine spray painted to relevant divisional colour.*

Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

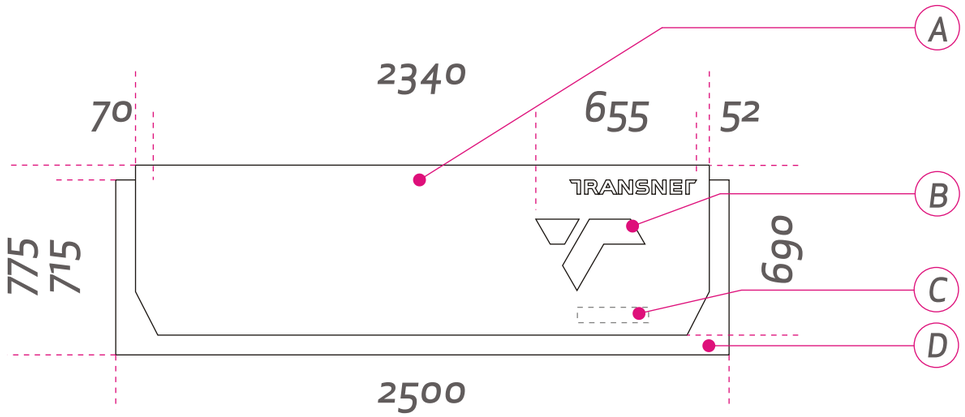
TRANSNET SIGNAGE PROGRAMME

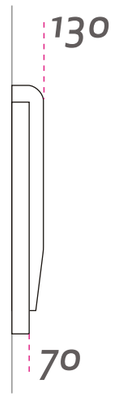
Primary Signage Specification Layouts

Building Wall sign - 4m (width)

Sign No.	T-PRI 5
Scale	Scale 1 : 25
DRAWN	v1• 08•2007

TRANSNET





- (A) *Sign face - fabricated/moulded opal 050 perspex sign face and returns. Internally Illuminated.*
- (B) *TRANSNET C.I. - translucent vinyl graphic logo applied to sign face.*
- (C) *TRANSNET Division descriptor - translucent vinyl graphic descriptor applied to sign face.*
- (D) *Sign spine - fabricated boxed aluminium spine spray painted to relevant divisional colour.*

Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

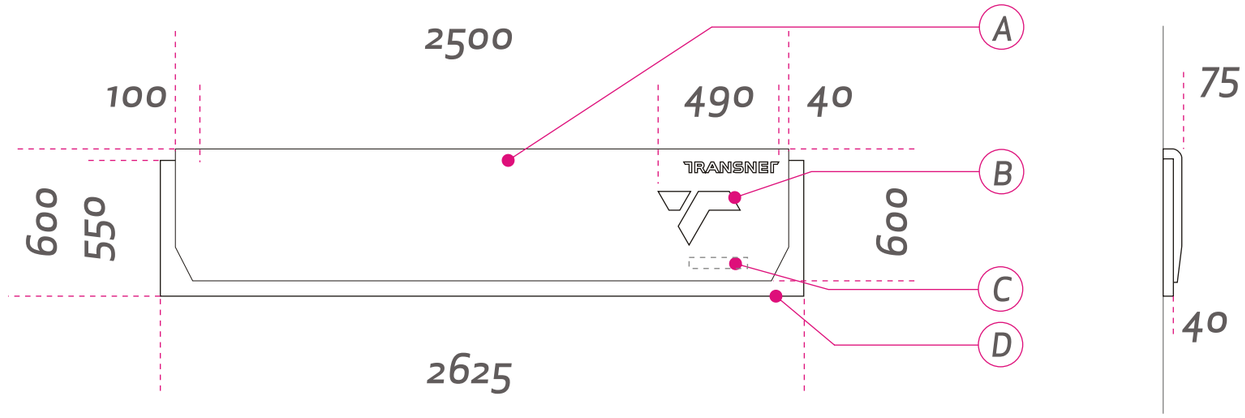
TRANSNET SIGNAGE PROGRAMME

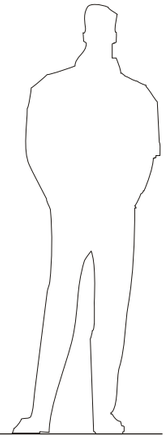
Primary Signage Specification Layouts

Building Wall sign - 2.5m (width)

Sign No.	T-PRI 6
Scale	Scale 1 : 25
DRAWN	v1• 08•2007

TRANSNET





- (A) *Sign face - fabricated/moulded opal 050 perspex sign face and returns. Internally Illuminated.*
- (B) *TRANSNET C.I. - translucent vinyl graphic logo applied to sign face.*
- (C) *TRANSNET Division descriptor - translucent vinyl graphic descriptor applied to sign face.*
- (D) *Sign spine - fabricated boxed aluminium spine spray painted to relevant divisional colour.*

Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

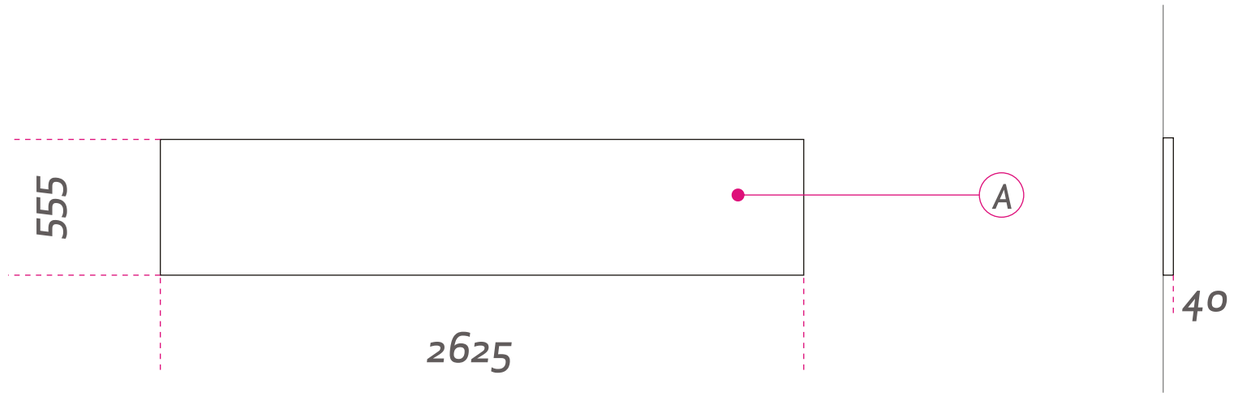
TRANSNET SIGNAGE PROGRAMME

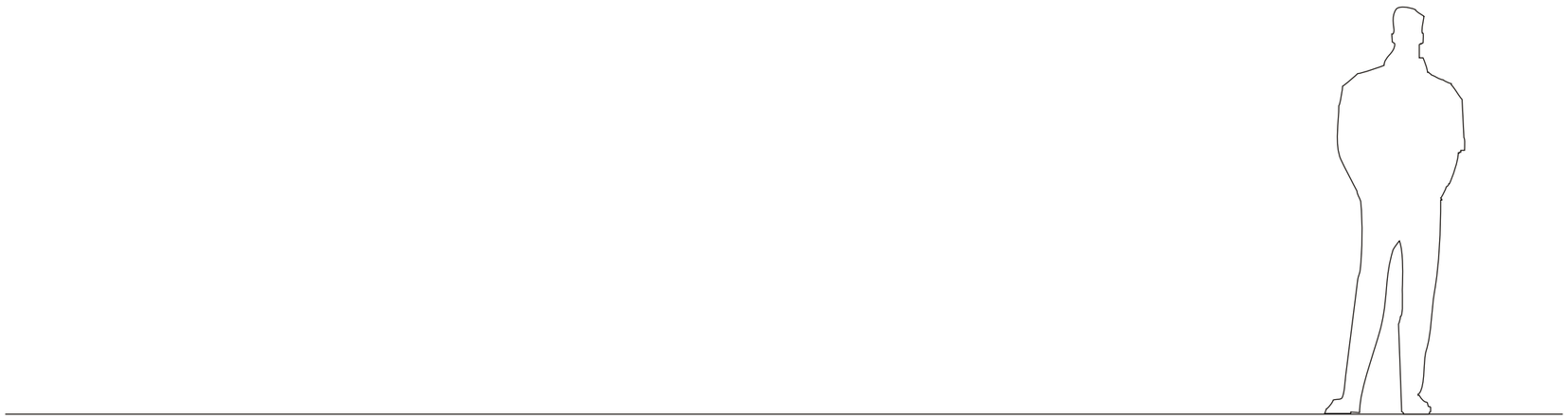
Primary Signage Specification Layouts

Fascia Band sign

Sign No.	T-PRI 7
Scale	Scale 1 : 25
DRAWN	v1• 08•2007

TRANSNET





Ⓐ *Fascia band spine - fabricated boxed aluminium spine spray painted to relevant divisional colour.*

Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

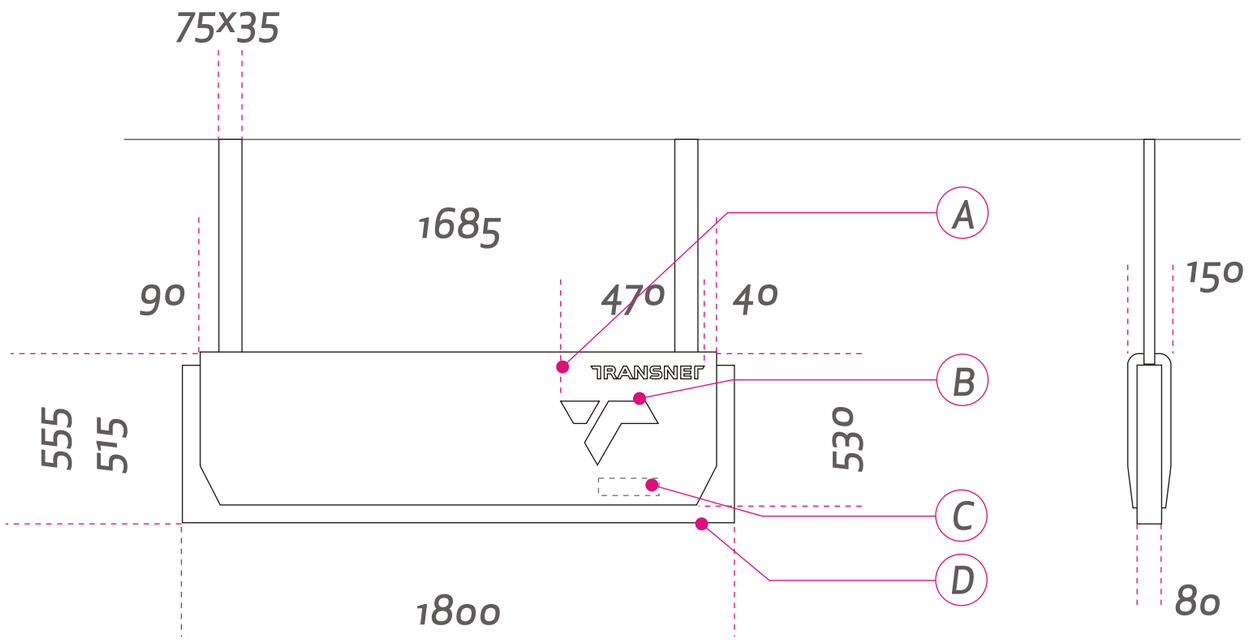
TRANSNET SIGNAGE PROGRAMME

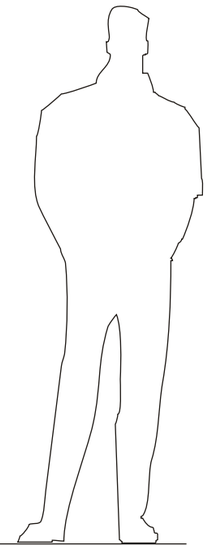
Primary Signage Specification Layouts

Fascia Band - Extension panel

Sign No.	T-PRI 8
Scale	Scale 1 : 25
DRAWN	v1• 08•2007

TRANSNET





- (A) *Sign face - fabricated/moulded opal 050 perspex sign face and returns. Internally Illuminated.*
- (B) *TRANSNET C.I. - translucent vinyl graphic logo applied to sign face.*
- (C) *TRANSNET Division descriptor - translucent vinyl graphic descriptor applied to sign face.*
- (D) *Sign spine - fabricated boxed aluminium spine spray painted to relevant divisional colour.*

Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

TRANSNET SIGNAGE PROGRAMME

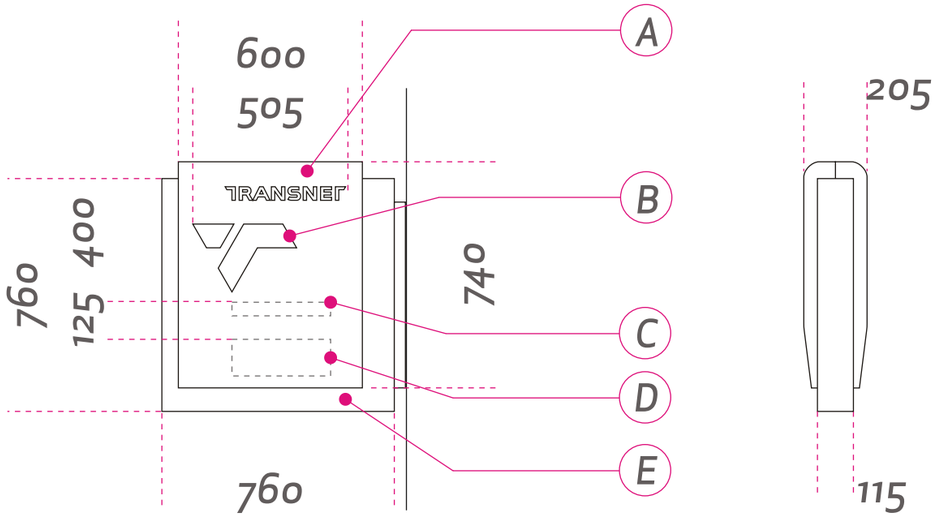
Primary Signage Specification Layouts

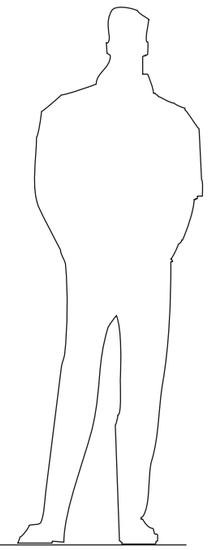
Double Sided Suspended sign

Sign No.	T-PRI 9
Scale	Scale 1 : 20
DRAWN	v1• 08•2007

TRANSNET

T-PRI 10





- (A) *Sign face - fabricated/moulded opal 050 perspex sign face and returns. Internally Illuminated.*
- (B) *TRANSNET C.I. - translucent vinyl graphic logo applied to sign face.*
- (C) *TRANSNET Division descriptor - translucent vinyl graphic descriptor applied to sign face.*
- (D) *Location address - translucent vinyl graphic applied to sign face.*
- (E) *Sign spine - fabricated boxed aluminium spine spray painted to relevant divisional colour.*

Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

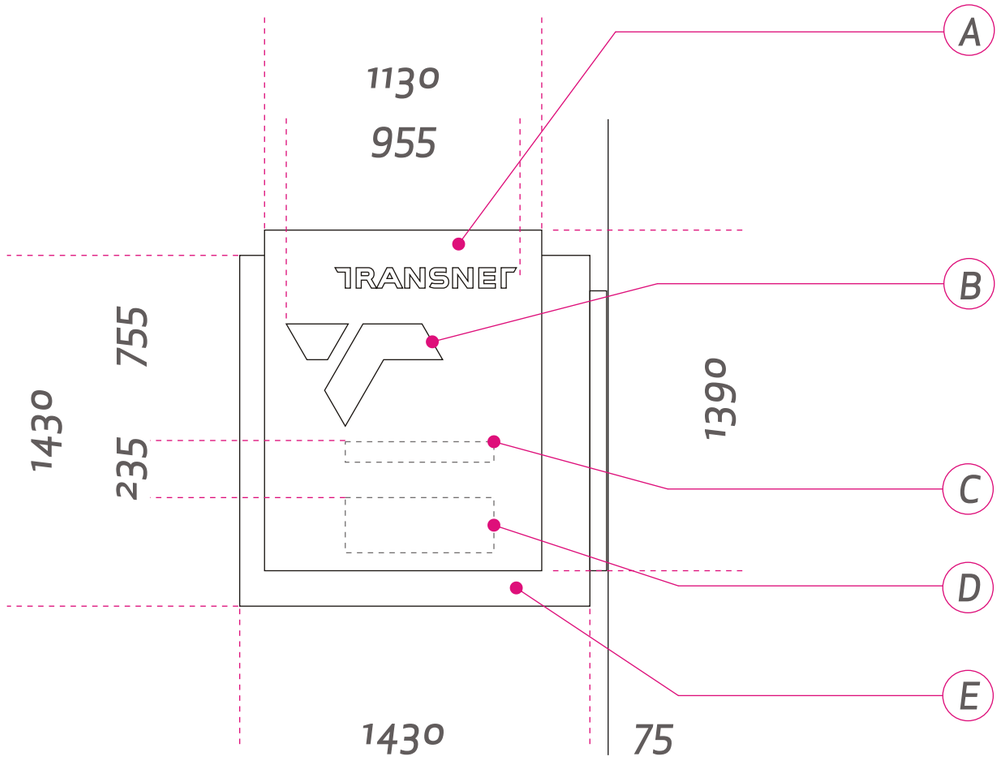
TRANSNET SIGNAGE PROGRAMME

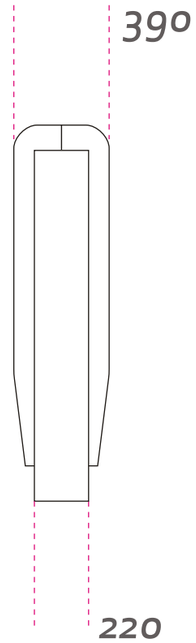
Primary SIGNAGE Specification Layouts

Projecting sign - small

Sign No.	T-PRI 10
Scale	Scale 1 : 20
DRAWN	v1• 08•2007

TRANSNET





- (A) *Sign face - fabricated/moulded opal 050 perspex sign face and returns. Internally Illuminated.*
- (B) *TRANSNET C.I. - translucent vinyl graphic logo applied to sign face.*
- (C) *TRANSNET Division descriptor - translucent vinyl graphic descriptor applied to sign face.*
- (D) *Location address - translucent vinyl graphic applied to sign face.*
- (E) *Sign spine - fabricated boxed aluminium spine spray painted to relevant divisional colour.*

Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

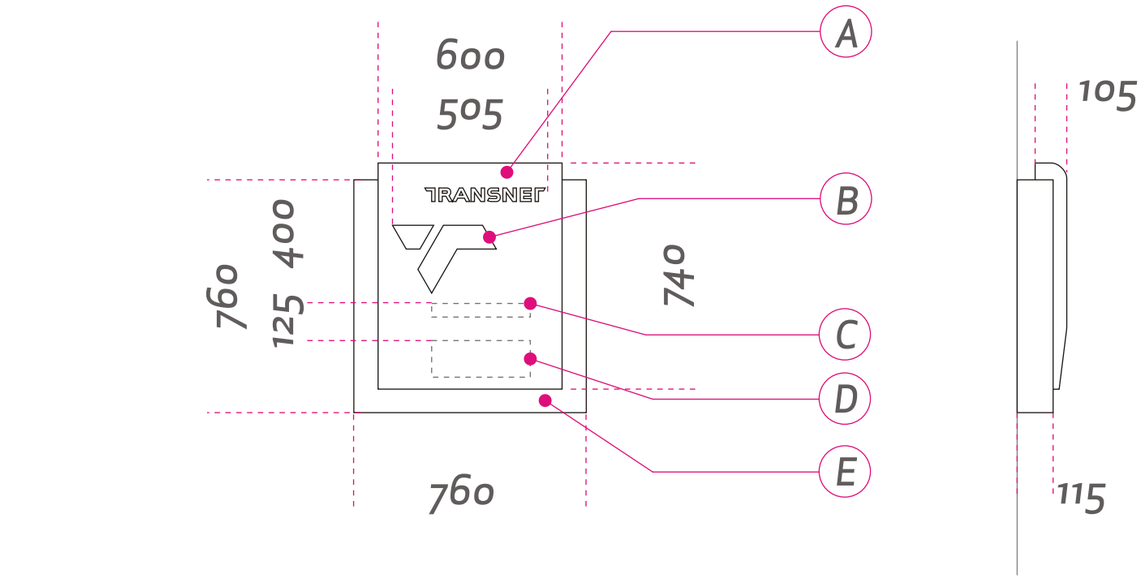
TRANSNET SIGNAGE PROGRAMME

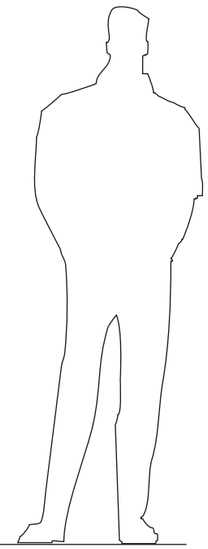
Primary SIGNAGE Specification Layouts

Projecting sign - large

Sign No.	T-PRI 11
Scale	Scale 1 : 25
DRAWN	v1• 08•2007

TRANSNET





(A) *Sign face - fabricated/moulded opal 050 perspex sign face and returns. Internally Illuminated.*

(B) *TRANSNET C.I. - translucent vinyl graphic logo applied to sign face.*

(C) *TRANSNET Division descriptor - translucent vinyl graphic descriptor applied to sign face.*

(D) *Location address - translucent vinyl graphic applied to sign face.*

(E) *Sign spine - fabricated boxed aluminium spine spray painted to relevant divisional colour.*

Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

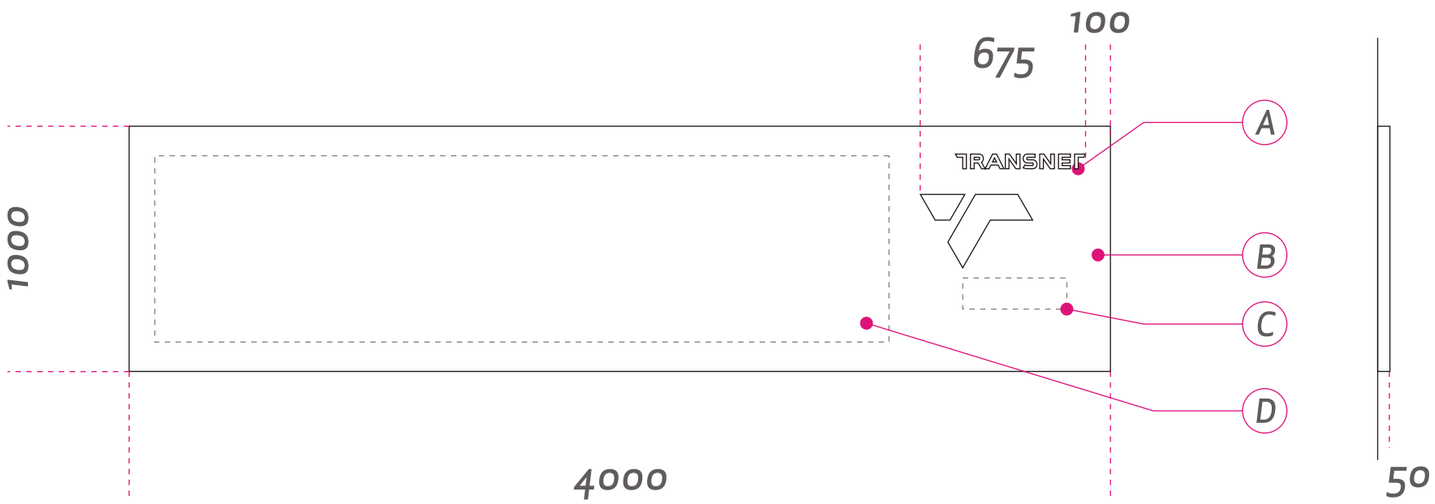
TRANSNET SIGNAGE PROGRAMME

Primary Signage Specification Layouts

Wall sign - small

Sign No.	T-PRI 12
Scale	Scale 1 : 20
DRAWN	v1• 08•2007

TRANSNET



(A) *TRANSNET C.I. - opaque vinyl logo sticker applied to sign face.*

(B) *Sign face - fabricated alumnium boxed sign face spray painted Transnet White.*

(C) *TRANSNET Division descrptor - relevant division vinyl sticker applied to face.*

(D) *Graphic Area - area for informative/confirmative/ directional vinyl graphics.*

Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

TRANSNET SIGNAGE PROGRAMME

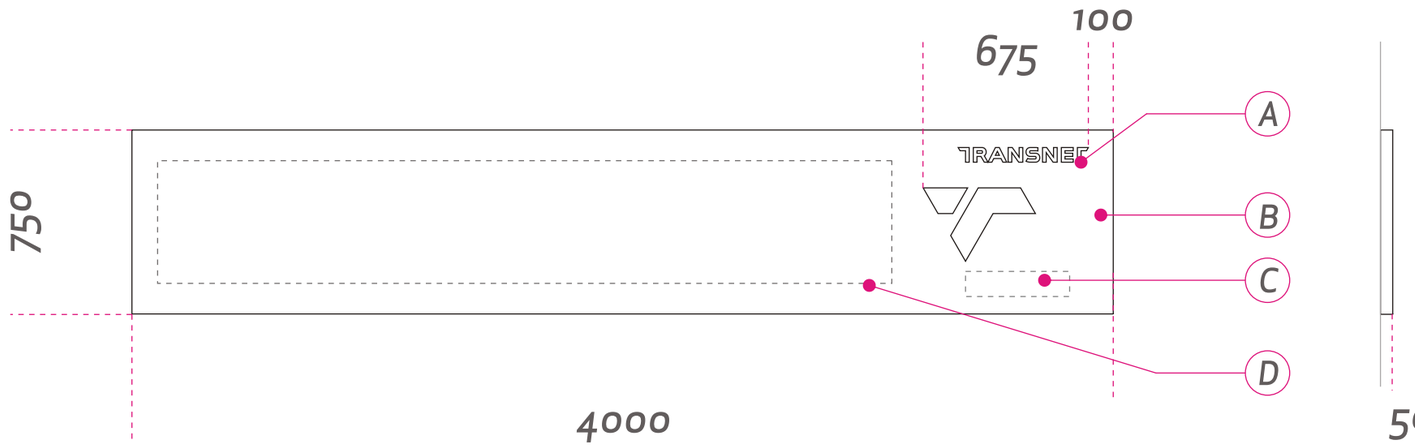
Secondary Exterior Signage - Public Area Signage

Wall sign - 4m (width) - large

Sign No.	T-SEC 1
Scale	Scale 1 : 25
DRAWN	v1• 08•2007

TRANSNET

T-SEC 2



- (A) *TRANSNET C.I. - opaque vinyl logo sticker applied to sign face.*
- (B) *Sign face - fabricated alumnium boxed sign face spray painted Transnet White.*
- (C) *TRANSNET Division descrptor - relevant division vinyl sticker applied to face.*
- (D) *Graphic Area - area for informative/confirmative/ directional vinyl graphics.*

Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

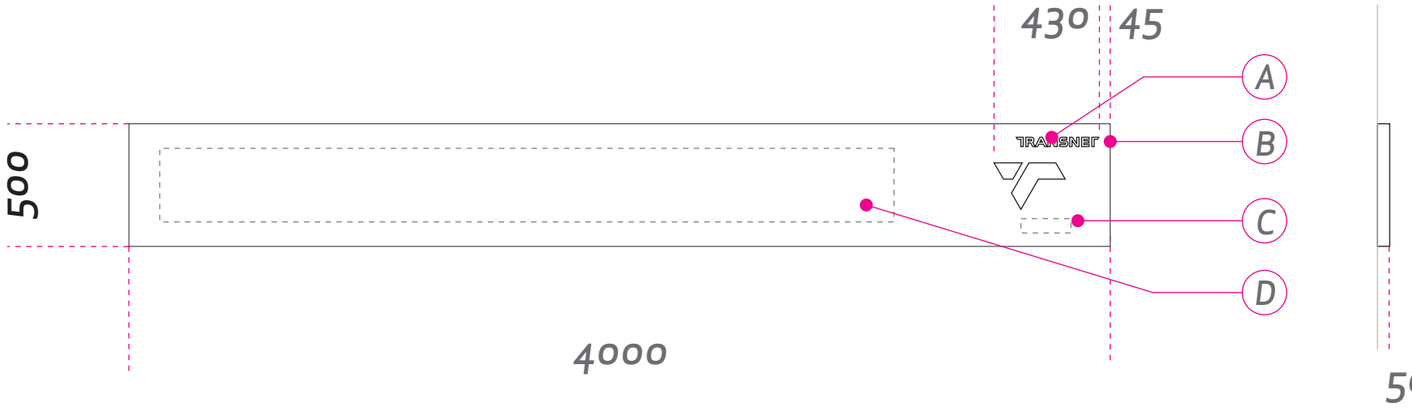
TRANSNET SIGNAGE PROGRAMME

Secondary Exterior Signage - Public Area Signage

Wall sign - 4m (width) - medium

Sign No.	T-SEC 2
Scale	Scale 1 : 25
DRAWN	v1• 08•2007

TRANSNET



(A) *Sign face - fabricated alumnium boxed sign face spray painted Transnet White.*

(B) *TRANSNET C.I. - opaque vinyl logo sticker applied to sign face.*

(C) *TRANSNET Division descrptor - relevant division vinyl sticker applied to face.*

(D) *Graphic Area - area for informative/confirmative/ directional vinyl graphics.*

Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

TRANSNET SIGNAGE PROGRAMME

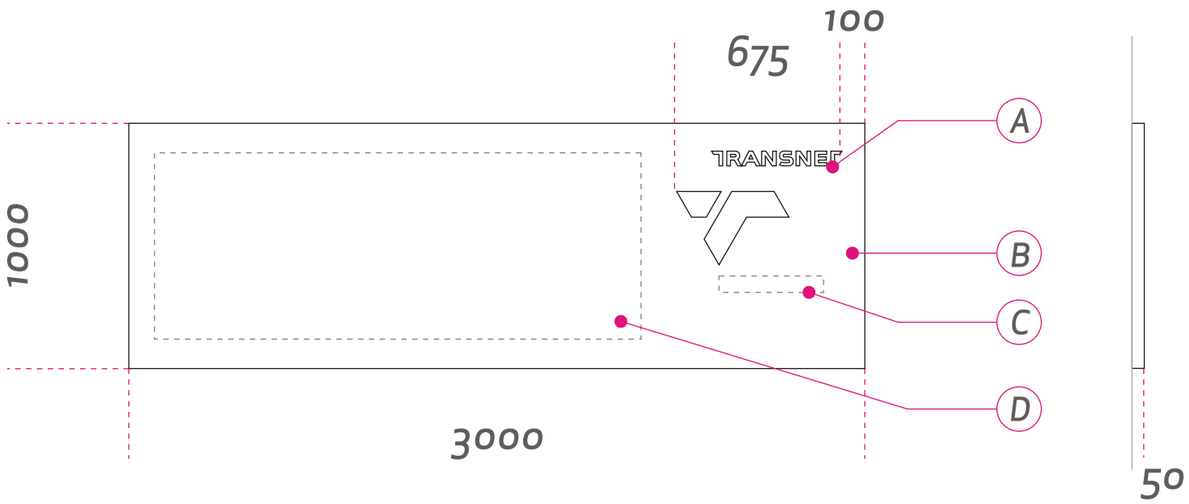
Secondary Exterior Signage - Public Area Signage

Wall sign - 4m (width) - small

Sign No.	T-SEC 3
Scale	Scale 1 : 25
DRAWN	v1• 08•2007

TRANSNET

T-SEC 4



- (A) *TRANSNET C.I. - opaque vinyl logo sticker applied to sign face.*
- (B) *Sign face - fabricated alumnium boxed sign face spray painted Transnet White.*
- (C) *TRANSNET Division descrptor - relevant division vinyl sticker applied to face.*
- (D) *Graphic Area - area for informative/confirmative/ directional vinyl graphics.*

Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

TRANSNET SIGNAGE PROGRAMME

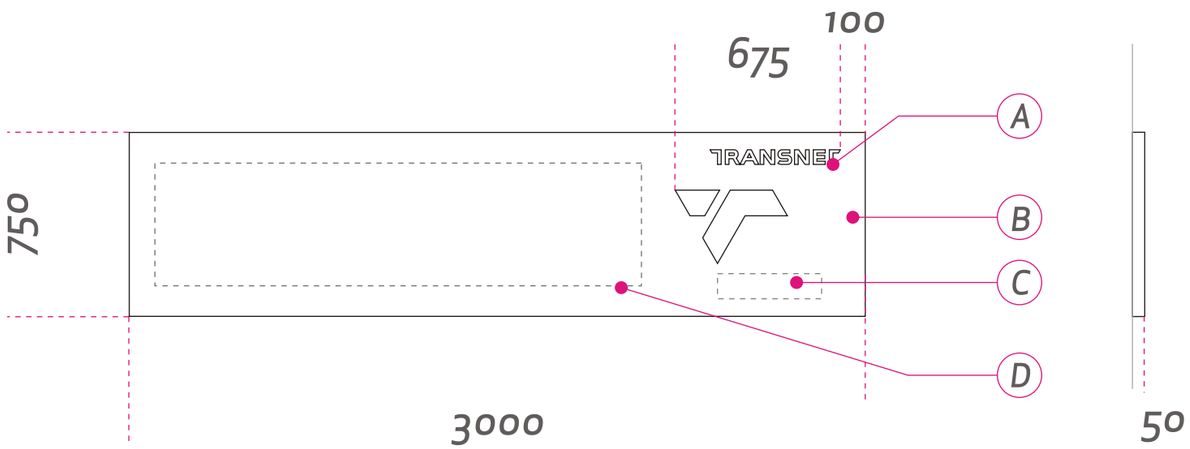
Secondary Exterior Signage - Public Area Signage

Wall sign - 3m (width) - large

Sign No.	T-SEC 4
Scale	Scale 1 : 25
DRAWN	v1• 08•2007

TRANSNET

T-SEC 5



A — *TRANSNET C.I. - opaque vinyl logo sticker applied to sign face.*

B — *Sign face - fabricated alumnium boxed sign face spray painted Transnet White.*

C — *TRANSNET Division descrptor - relevant division vinyl sticker applied to face.*

D — *Graphic Area - area for informative/confirmative/ directional vinyl graphics.*

Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

TRANSNET SIGNAGE PROGRAMME

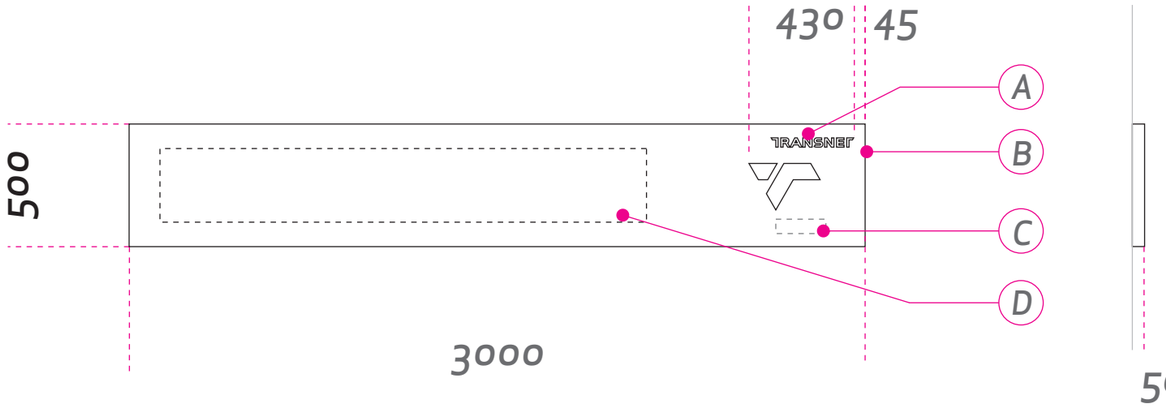
Secondary Exterior Signage - Public Area Signage

Wall sign - 3m (width) - medium

Sign No.	T-SEC 5
Scale	Scale 1 : 25
DRAWN	v1• 08•2007

TRANSNET

T-SEC 6



- (A) *Sign face - fabricated alumnium boxed sign face spray painted Transnet White.*
- (B) *TRANSNET C.I. - opaque vinyl logo sticker applied to sign face.*
- (C) *TRANSNET Division descrptor - relevant division vinyl sticker applied to face.*
- (D) *Graphic Area - area for informative/confirmative/ directional vinyl graphics.*

Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

TRANSNET SIGNAGE PROGRAMME

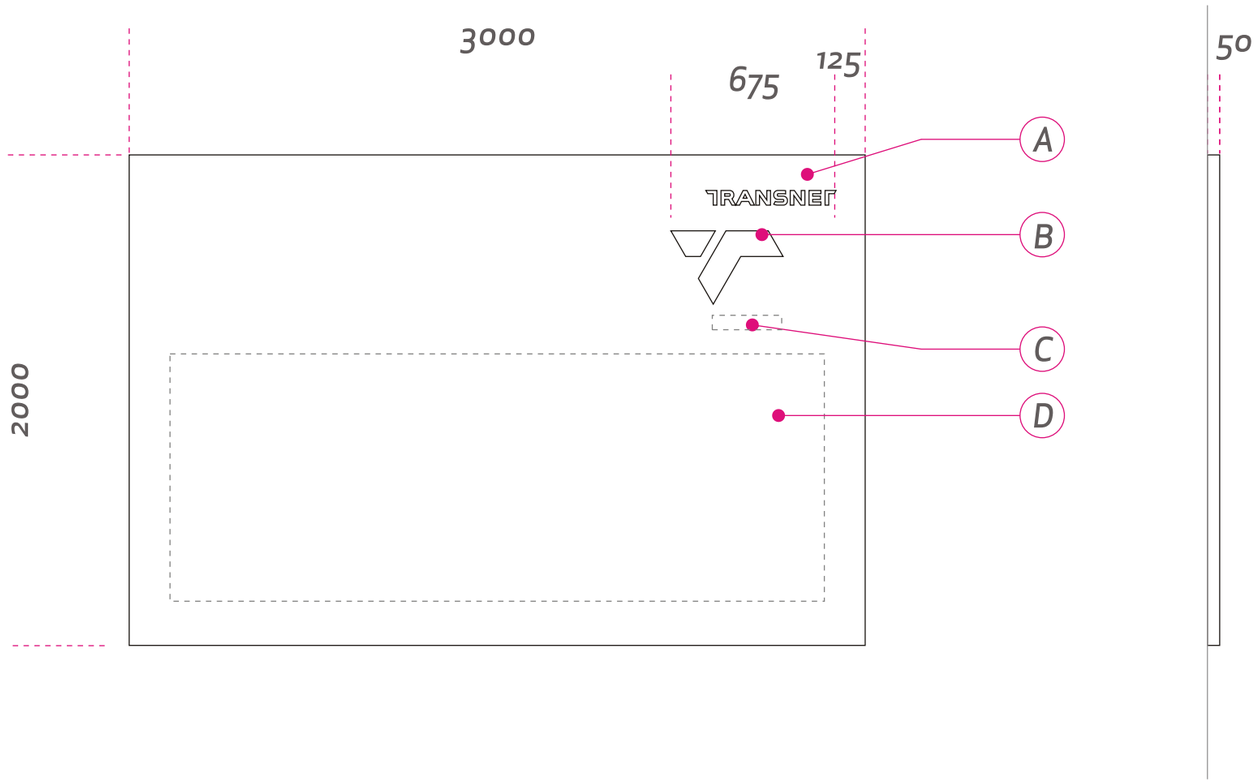
Secondary Exterior Signage - Public Area Signage

Wall sign - 3m (width) - small

Sign No.	T-SEC 6
Scale	Scale 1 : 25
DRAWN	v1• 08•2007

TRANSNET

T-SEC 7



- (A) *Sign face - fabricated alumnium boxed sign face spray painted Transnet White.*
- (B) *TRANSNET C.I. - opaque vinyl logo sticker applied to sign face.*
- (C) *TRANSNET Division descrptor - relevant division vinyl sticker applied to face.*
- (D) *Graphic Area - area for informative/confirmative/ directional vinyl graphics.*

Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

TRANSNET SIGNAGE PROGRAMME

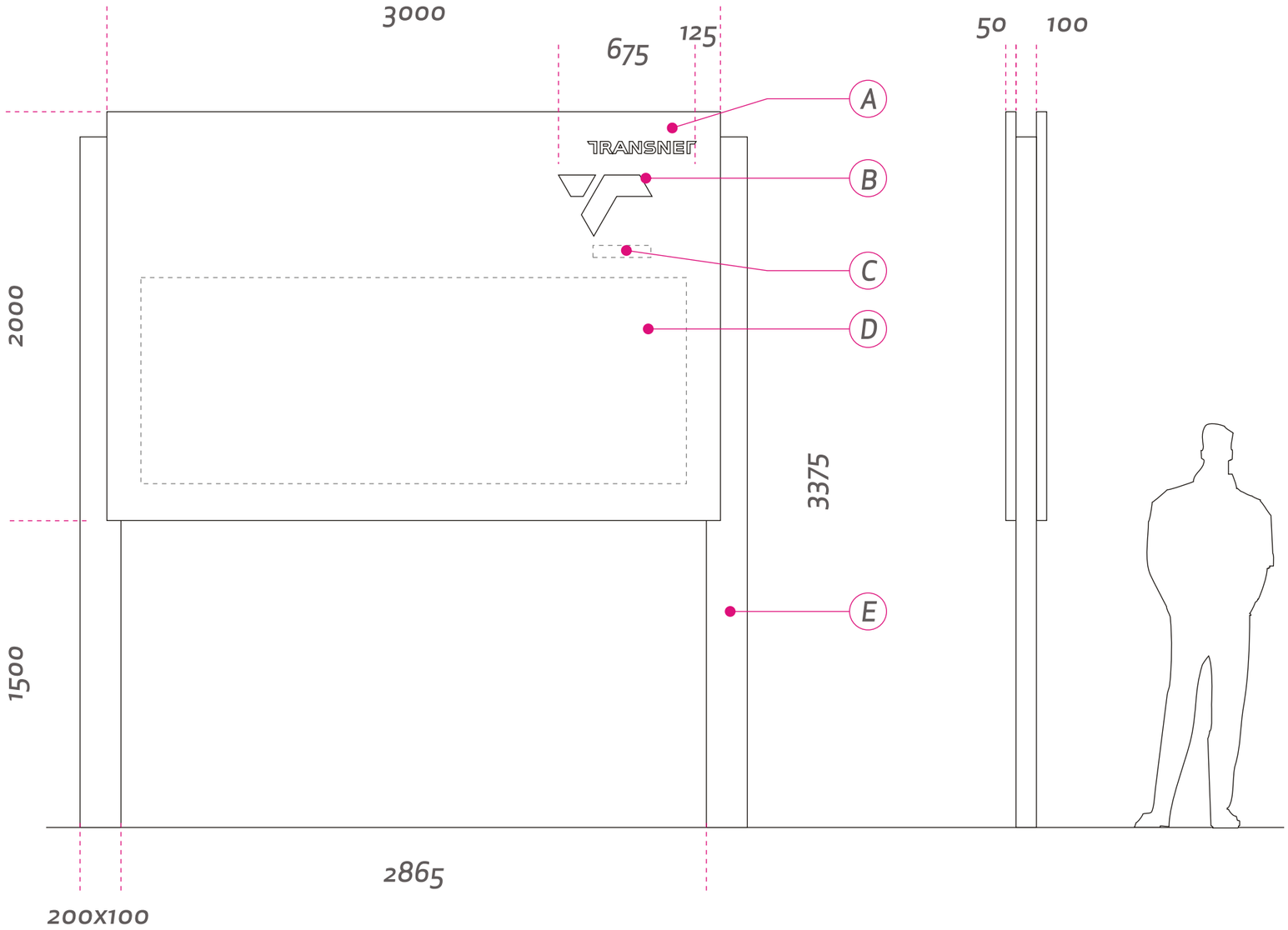
Secondary Exterior Signage - Public Area Signage

Wall mounted sign - Large

Sign No.	T-SEC 7
Scale	Scale 1 : 25
DRAWN	v1• 08•2007

TRANSNET

T-SEC 8



- (A) *Sign face - fabricated alumnium boxed sign face spray painted Transnet White.*
- (B) *TRANSNET C.I. - opaque vinyl logo sticker applied to sign face.*
- (C) *TRANSNET Division descrptor - relevant division vinyl sticker applied to face.*
- (D) *Graphic Area - area for informative/confirmative/ directional vinyl graphics.*
- (E) *Sign poles - rectangular aluminium 'legs' spray painted in the relevant division's colour.*

Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

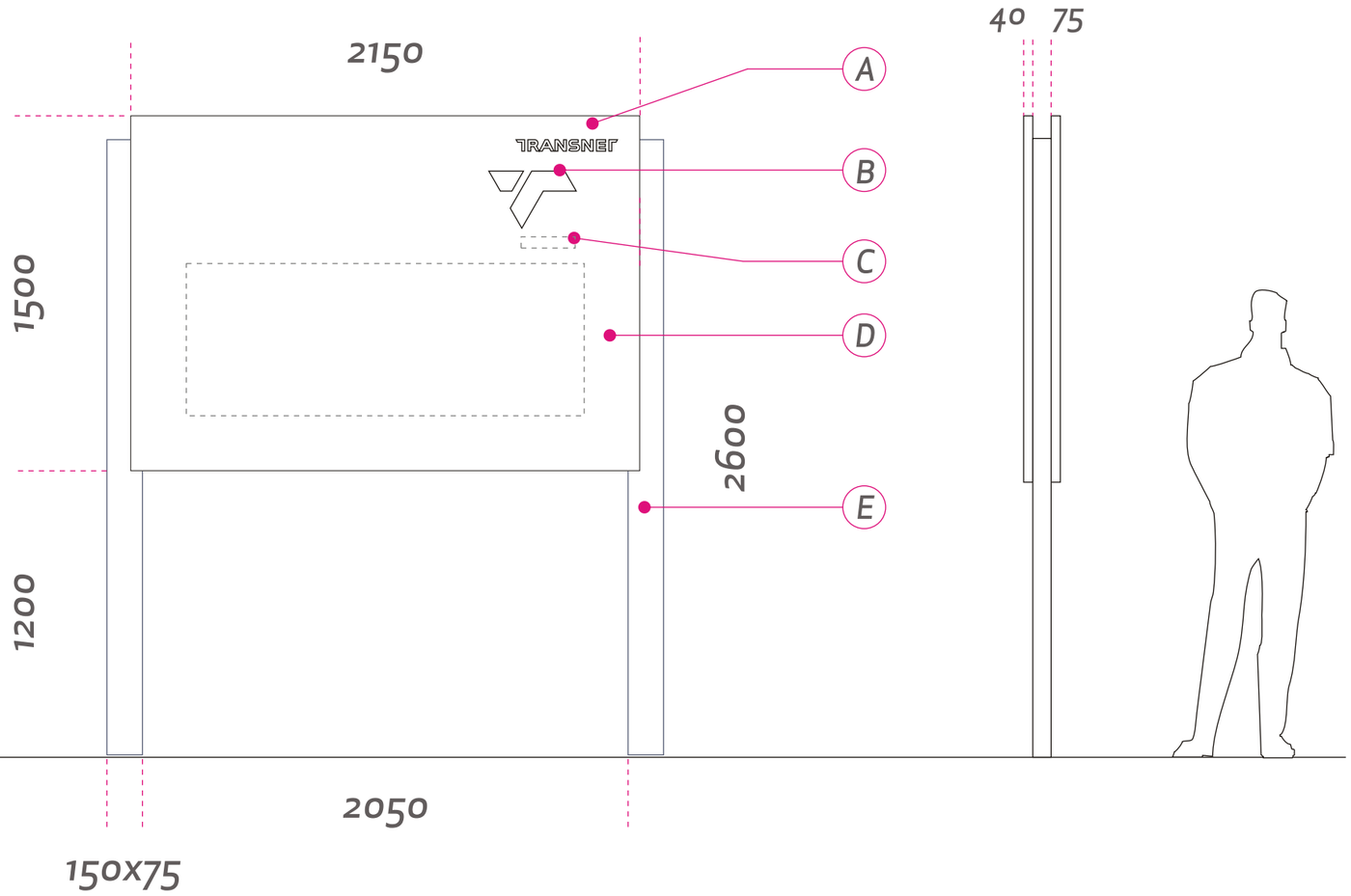
TRANSNET SIGNAGE PROGRAMME

Secondary Exterior Signage - Public Area Signage

Freestanding double sided pole sign - large

Sign No.	T-SEC 8
Scale	Scale 1 : 25
DRAWN	v1• 08•2007

TRANSNET



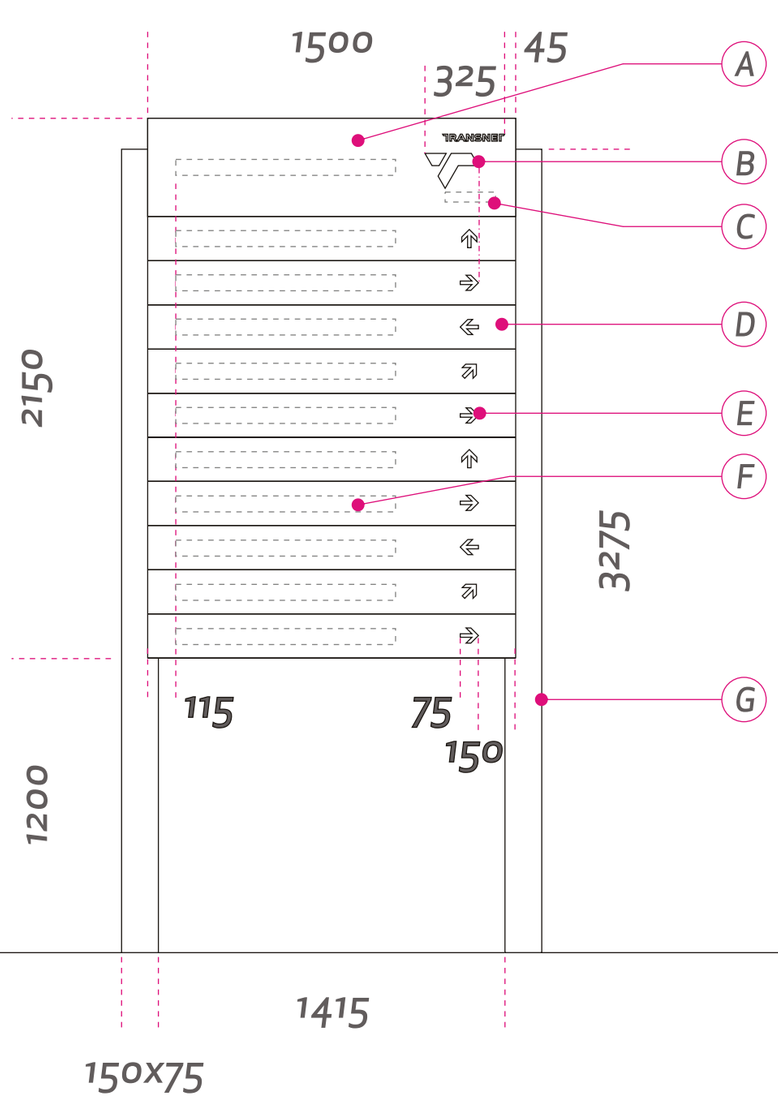
- (A) *Sign face - fabricated alumnium boxed sign face spray painted Transnet White.*
- (B) *TRANSNET C.I. - opaque vinyl logo sticker applied to sign face.*
- (C) *TRANSNET Division descrptor - relevant division vinyl sticker applied to face.*
- (D) *Graphic Area - area for informative/confirmative/ directional vinyl graphics.*
- (E) *Sign poles - rectangular aluminium 'legs' spray painted in the relevant division's colour.*

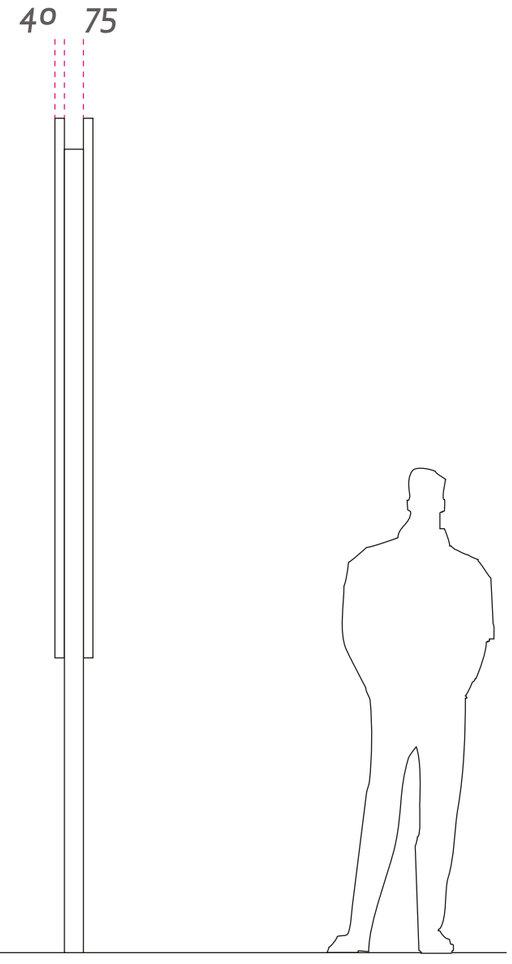
Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

	TRANSNET SIGNAGE PROGRAMME	Sign No. T-SEC 9
	Secondary Exterior Signage - Public Area Signage	Scale Scale 1 : 25
	Freestanding double sided pole sign - medium	DRAWN v1• 08•2007

T-SEC 10





- (A) *Sign face header - fabricated alumnium boxed sign face spray painted white with black depot/department vinyl sticker.*
- (B) *TRANSNET C.I. - opaque vinyl logo sticker applied to sign face.*
- (C) *TRANSNET Division descrptor - relevant division vinyl sticker applied to face.*
- (D) *Directional graphics slats - fabricated alumnium boxed sign face coated in relevant division colour.*
- (E) *Directional arrows - white vinyl stickers.*
- (F) *Directional type - white vinyl stickers. 65mm font.*
- (G) *Sign poles - rectangular aluminium 'legs' spray painted in the relevant division's colour.*

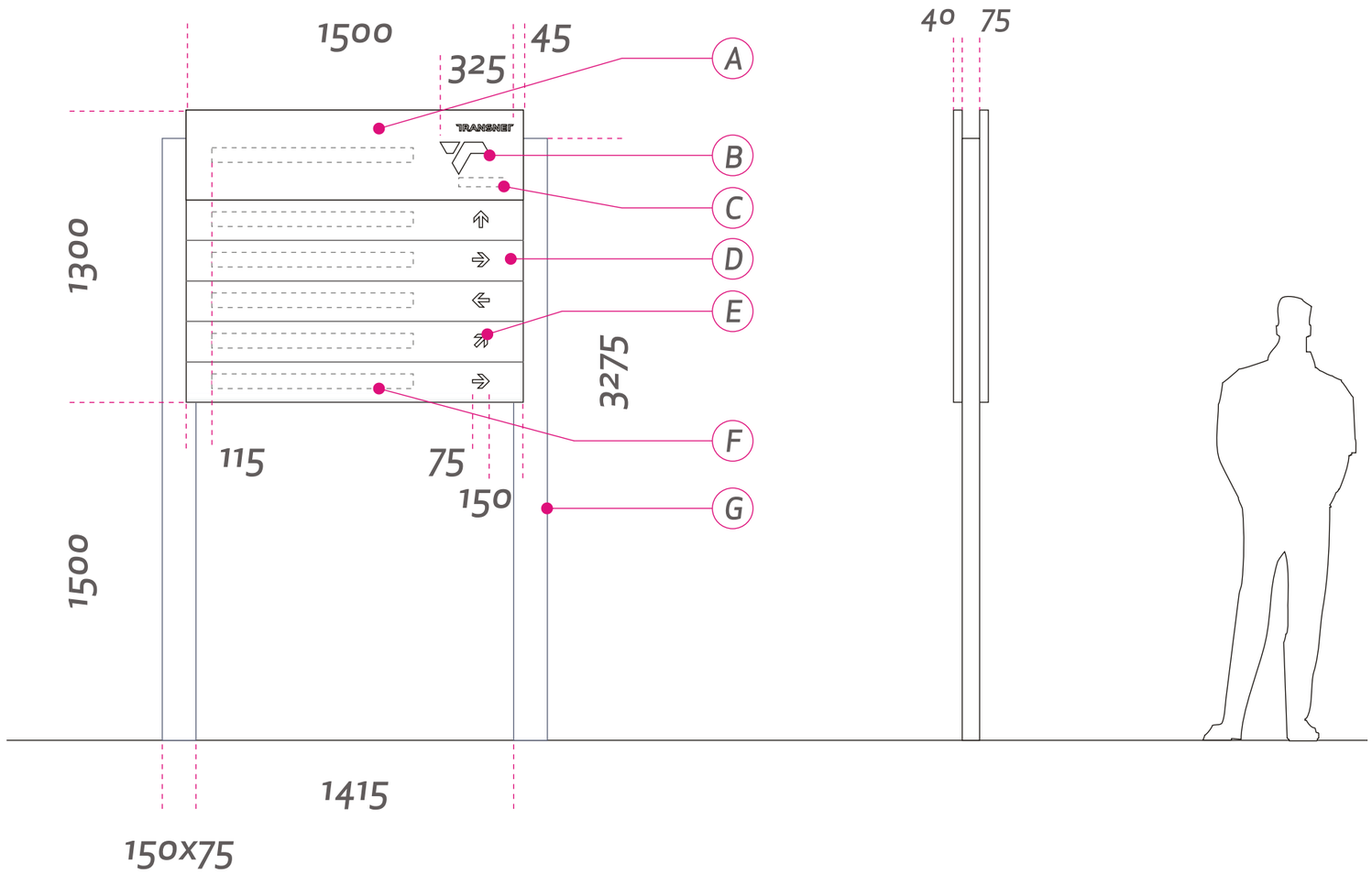
Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

	TRANSNET SIGNAGE PROGRAMME	Sign No. T-SEC 10
	Secondary Exterior Signage - Large Info/Directional signage	Scale Scale 1 : 25
	Freestanding pole sign (10 slat)	DRAWN v1• 08•2007

TRANSNET

T-SEC 11



- (A) *Sign face header - fabricated alumnium boxed sign face spray painted white with black depot/department vinyl sticker.*
- (B) *TRANSNET C.I. - opaque vinyl logo sticker applied to sign face.*
- (C) *TRANSNET Division descrptor - relevant division vinyl sticker applied to face.*
- (D) *Directional graphics slats - fabricated alumnium boxed sign face coated in relevant division colour.*
- (E) *Directional arrows - white vinyl stickers.*
- (F) *Directional type - white vinyl stickers. 65mm font.*
- (G) *Sign poles - rectangular aluminium 'legs' spray painted in the relevant division's colour.*

Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

TRANSNET SIGNAGE PROGRAMME

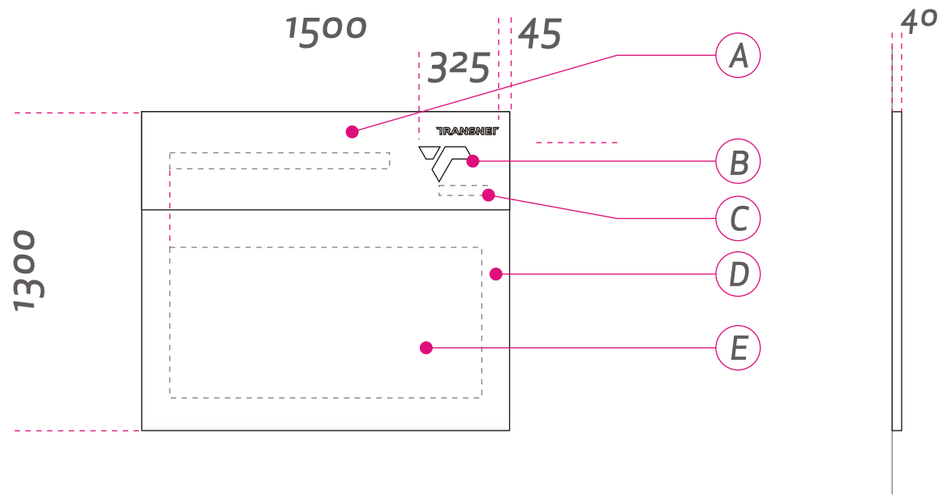
Secondary Exterior Signage - Large Info/Directional signage

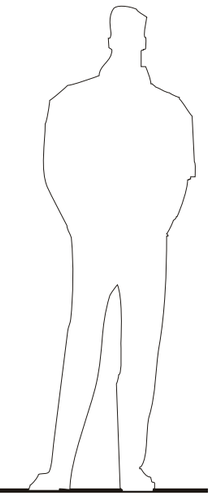
Freestanding pole sign (5 slat)

Sign No.	T-SEC 11
Scale	Scale 1 : 25
DRAWN	v1• 08•2007

TRANSNET

T-SEC 12





- (A) *Sign face header - fabricated alumnium boxed sign face spray painted white with black depot/department vinyl sticker.*
- (B) *TRANSNET C.I. - opaque vinyl logo sticker applied to sign face.*
- (C) *TRANSNET Division descrptor - relevant division vinyl sticker applied to face.*
- (D) *Directional graphics slats - fabricated alumnium boxed sign face coated in relevant division colour.*
- (E) *Directional type - white vinyl stickers.*

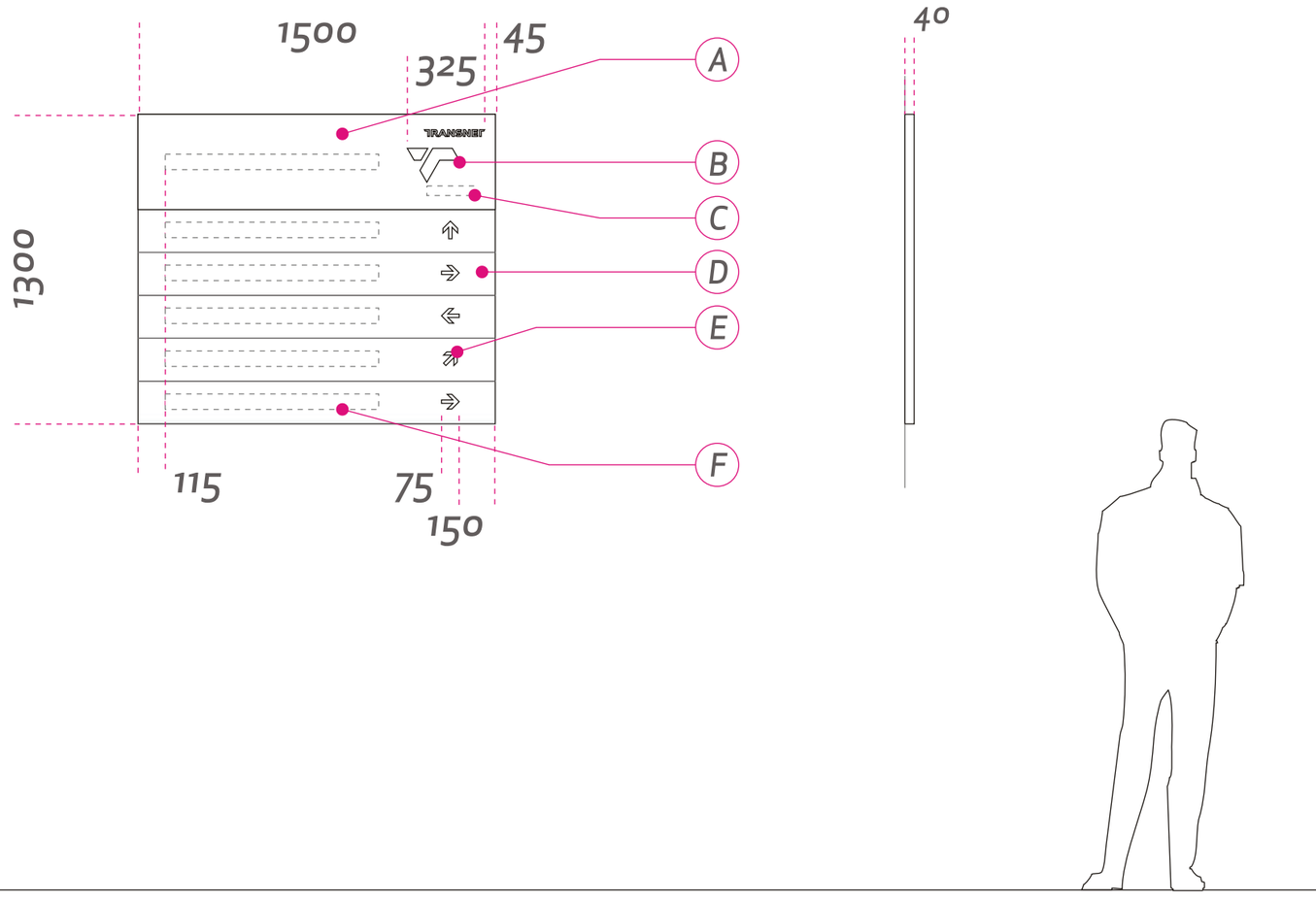
Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

	TRANSNET SIGNAGE PROGRAMME	Sign No. T-SEC 12
	Secondary Exterior Signage - Large Info/Directional signage	Scale Scale 1 : 25
	Wall sign - confirmative	DRAWN v1• 08•2007

TRANSNET

T-SEC 13

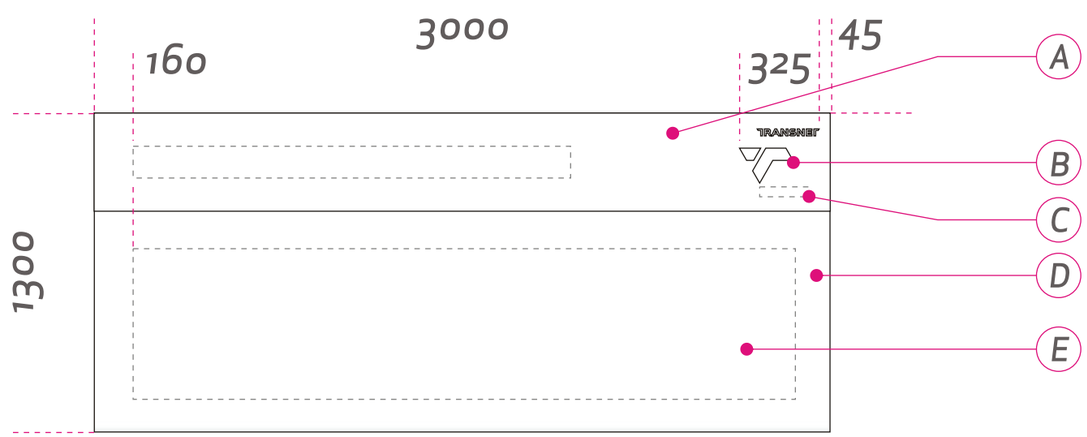


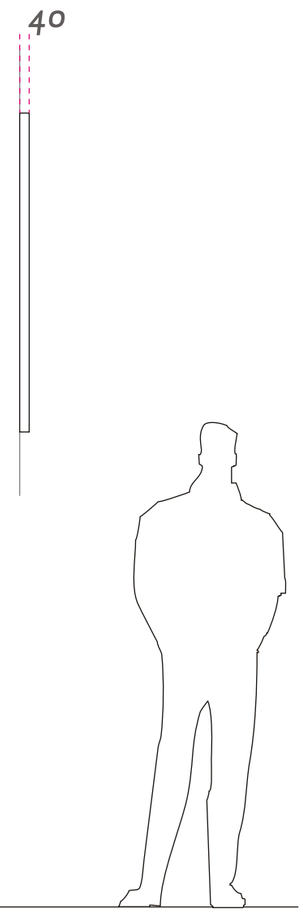
- (A) *Sign face header - fabricated alumnium boxed sign face spray painted white with black depot/department vinyl sticker.*
- (B) *TRANSNET C.I. - opaque vinyl logo sticker applied to sign face.*
- (C) *TRANSNET Division descrptor - relevant division vinyl sticker applied to face.*
- (D) *Directional graphics slats - fabricated alumnium boxed sign face coated in relevant division colour.*
- (E) *Directional arrows - white vinyl stickers.*
- (F) *Directional type - white vinyl stickers. 65mm font.*

Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

	TRANSNET SIGNAGE PROGRAMME	Sign No. T-SEC 13
	Secondary Exterior Signage - Large Info/Directional signage	Scale Scale 1 : 25
	Wall sign - directional	DRAWN v1• 08•2007





- (A) *Sign face header - fabricated alumnium boxed sign face spray painted white with black depot/department vinyl sticker.*
- (B) *TRANSNET C.I. - opaque vinyl logo sticker applied to sign face.*
- (C) *TRANSNET Division descrptor - relevant division vinyl sticker applied to face.*
- (D) *Directional graphics slats - fabricated alumnium boxed sign face coated in relevant division colour.*
- (E) *Directional type - white vinyl stickers.*

Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

TRANSNET SIGNAGE PROGRAMME

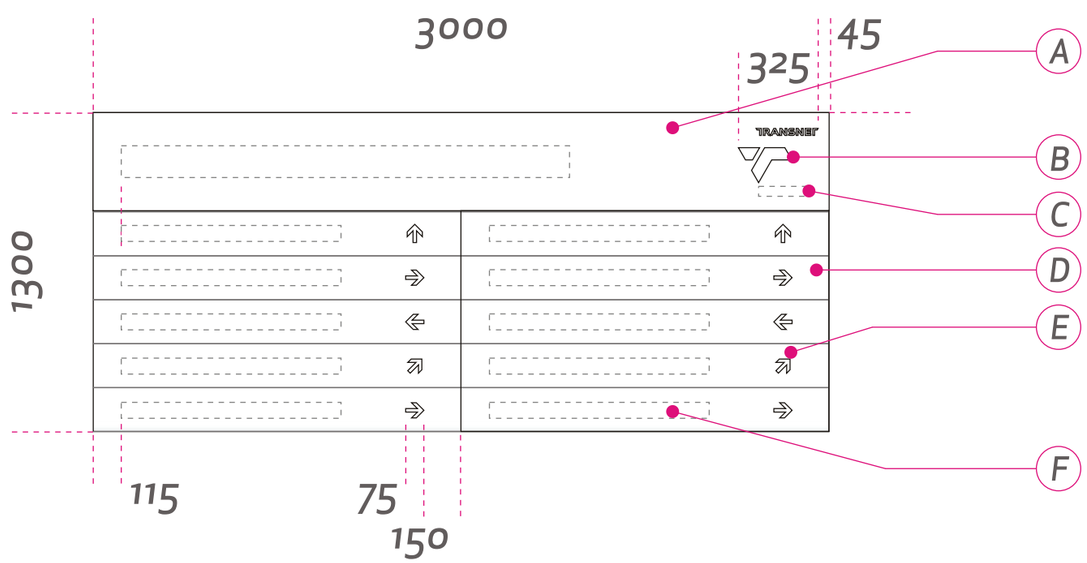
Secondary Exterior Signage - Large Info/Directional signage

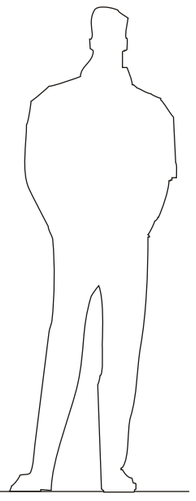
Wall sign - confirmative

Sign No.	T-SEC 14
Scale	Scale 1 : 25
DRAWN	v1• 08•2007

TRANSNET

T-SEC 15





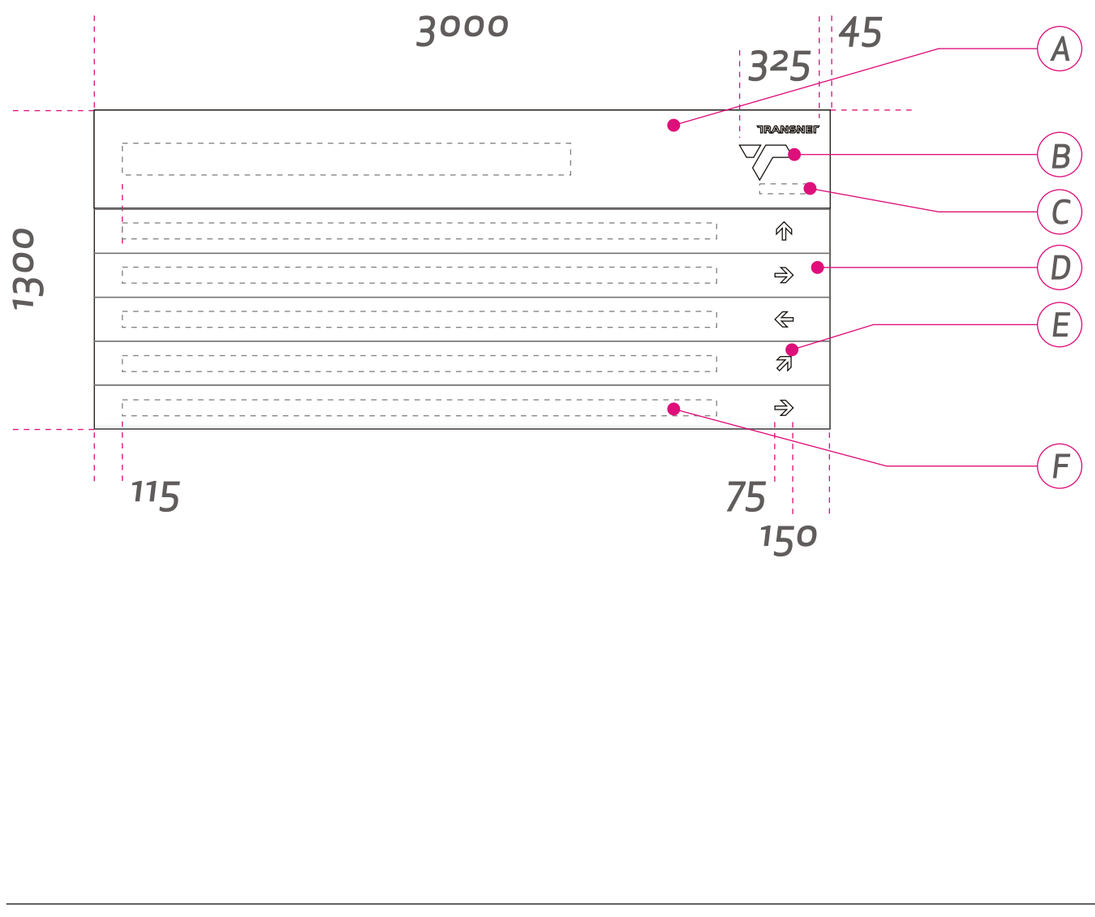
- (A) *Sign face header - fabricated alumnium boxed sign face spray painted white with black depot/department vinyl sticker.*
- (B) *TRANSNET C.I. - opaque vinyl logo sticker applied to sign face.*
- (C) *TRANSNET Division descrptor - relevant division vinyl sticker applied to face.*
- (D) *Directional graphics slats - fabricated alumnium boxed sign face coated in relevant division colour.*
- (E) *Directional arrows - white vinyl stickers.*
- (F) *Directional type - white vinyl stickers. 65mm font.*

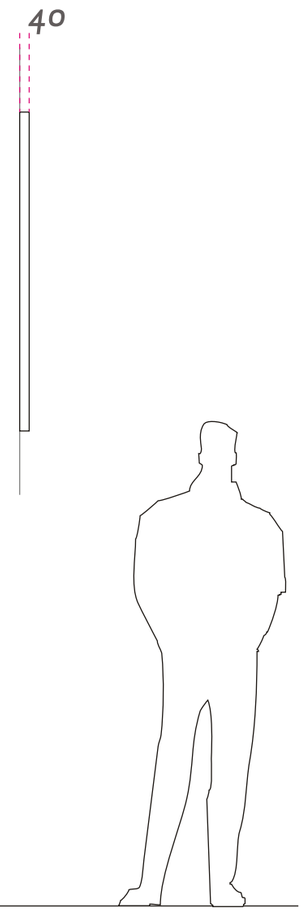
Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

	TRANSNET SIGNAGE PROGRAMME	Sign No. T-SEC 15
	Secondary Exterior Signage - Large Info/Directional signage	Scale Scale 1 : 25
	Wall sign (split) - directional	DRAWN v1• 08•2007

T-SEC 16





(A) *Sign face header - fabricated alumnium boxed sign face spray painted white with black depot/department vinyl sticker.*

(B) *TRANSNET C.I. - opaque vinyl logo sticker applied to sign face.*

(C) *TRANSNET Division descrptor - relevant division vinyl sticker applied to face.*

(D) *Directional graphics slats - fabricated alumnium boxed sign face coated in relevant division colour.*

(E) *Directional arrows - white vinyl stickers.*

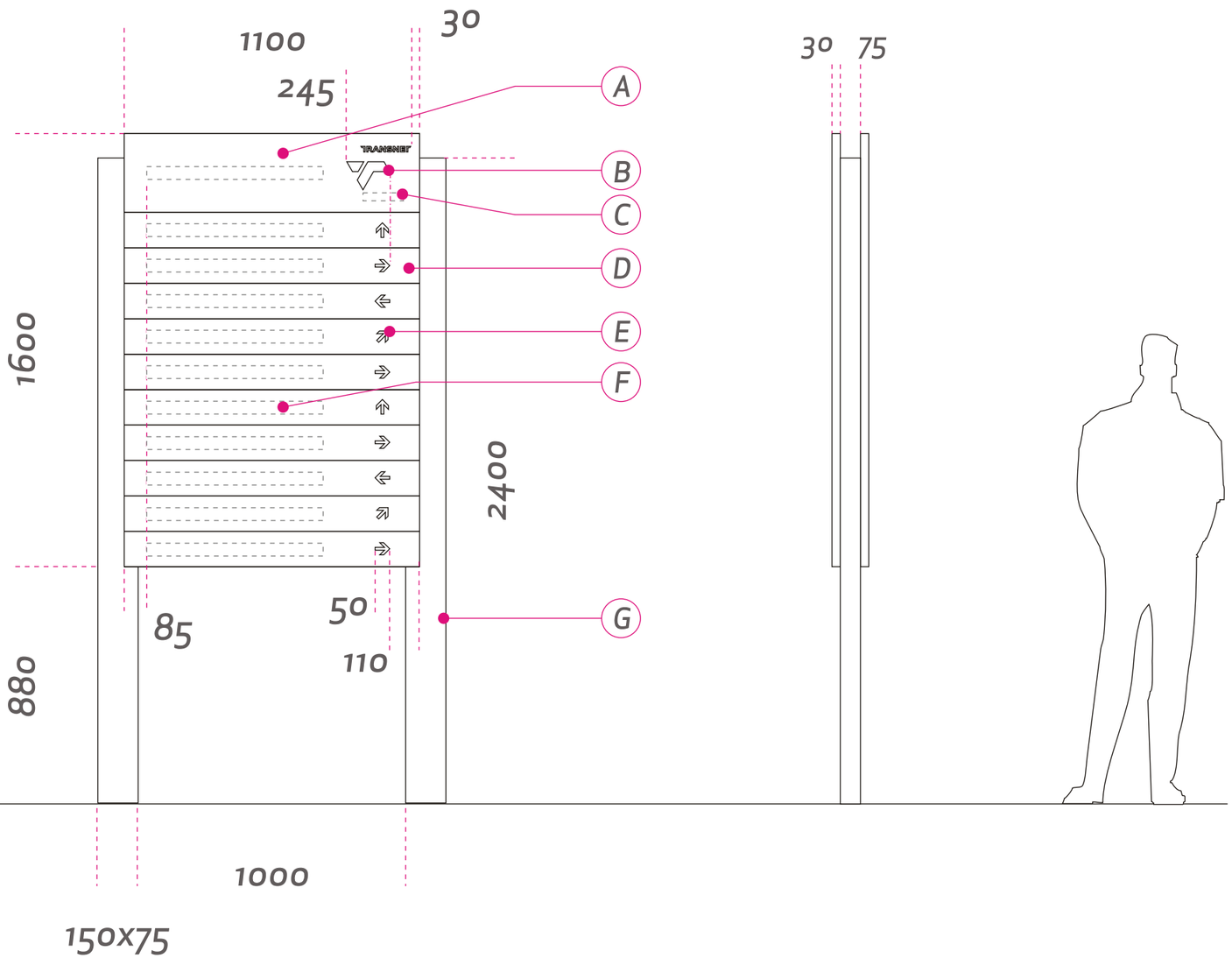
(F) *Directional type - white vinyl stickers. 65mm font.*

Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

	TRANSNET SIGNAGE PROGRAMME	
	Secondary Exterior Signage - Large Info/Directional signage	Sign No. T-SEC 16
	Wall sign (wide) - directional	Scale Scale 1 : 25
		DRAWN v1• 08•2007

T-SEC 17



- A *Sign face header - fabricated alumnium boxed sign face spray painted white with black depot/department vinyl sticker.*
- B *TRANSNET C.I. - opaque vinyl logo sticker applied to sign face.*
- C *TRANSNET Division descrptor - relevant division vinyl sticker applied to face.*
- D *Directional graphics slats - fabricated alumnium boxed sign face coated in relevant division colour.*
- E *Directional arrows - white vinyl stickers.*
- F *Directional type - white vinyl stickers. 48mm font.*
- G *Sign poles - rectangular aluminium 'legs' spray painted in the relevant division's colour.*

Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

TRANSNET SIGNAGE PROGRAMME

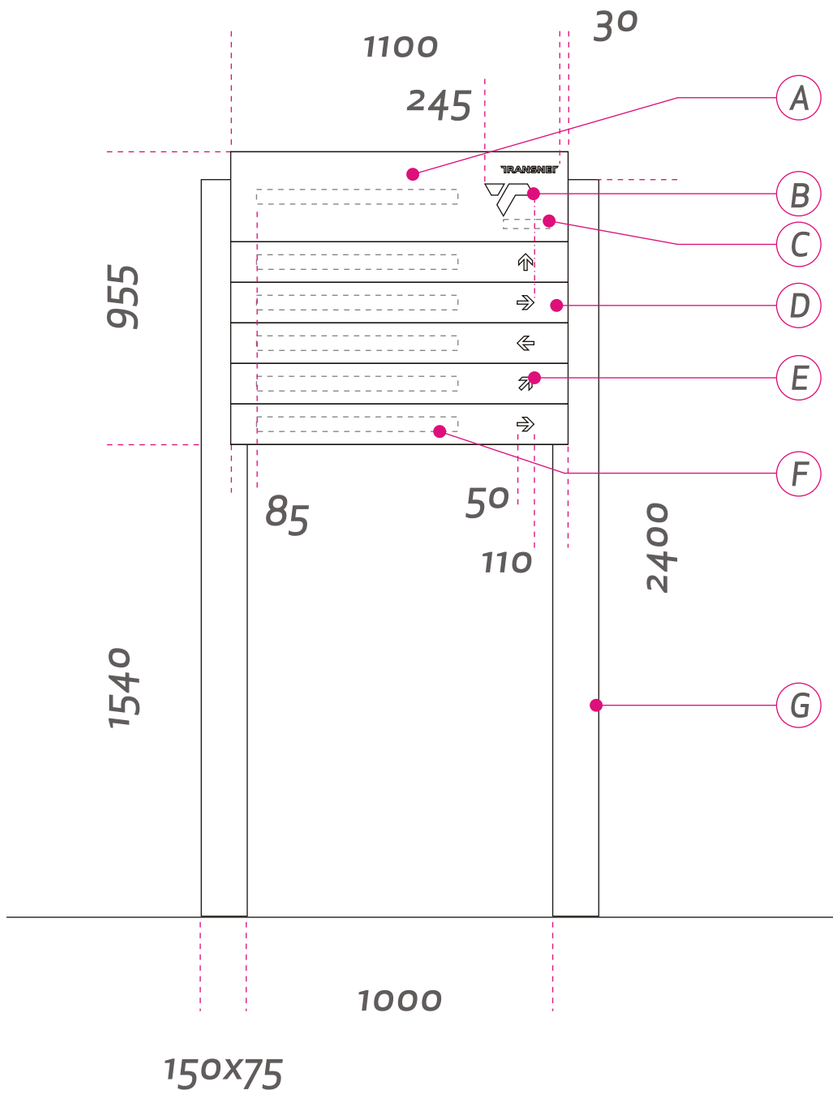
Secondary Exterior Signage - Medium Info/Directional signage

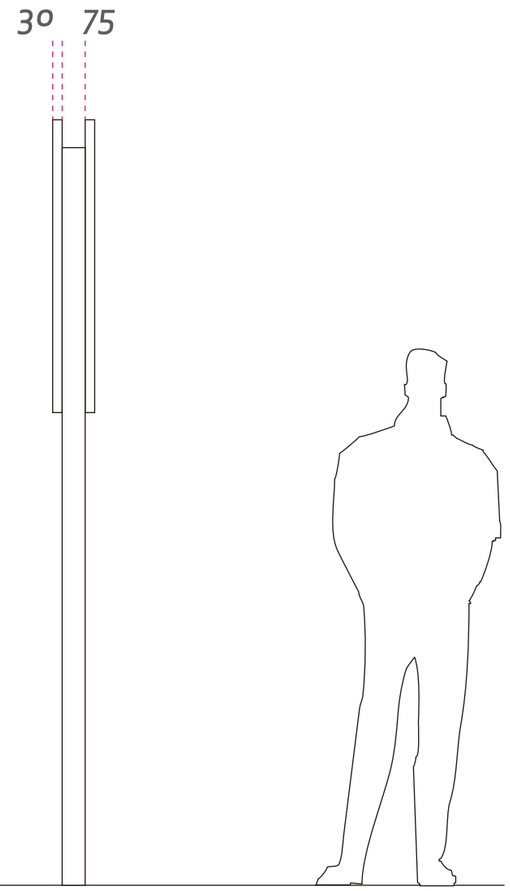
Freestanding directional pole sign (10 slat)

Sign No.	T-SEC 17
Scale	Scale 1 : 25
DRAWN	v1• 08•2007

TRANSNET

T-SEC 18





- (A) *Sign face header - fabricated alumnium boxed sign face spray painted white with black depot/department vinyl sticker.*
- (B) *TRANSNET C.I. - opaque vinyl logo sticker applied to sign face.*
- (C) *TRANSNET Division descrptor - relevant division vinyl sticker applied to face.*
- (D) *Directional graphics slats - fabricated alumnium boxed sign face coated in relevant division colour.*
- (E) *Directional arrows - white vinyl stickers.*
- (F) *Directional type - white vinyl stickers. 48mm font.*
- (G) *Sign poles - rectangular aluminium 'legs' spray painted in the relevant division's colour.*

Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

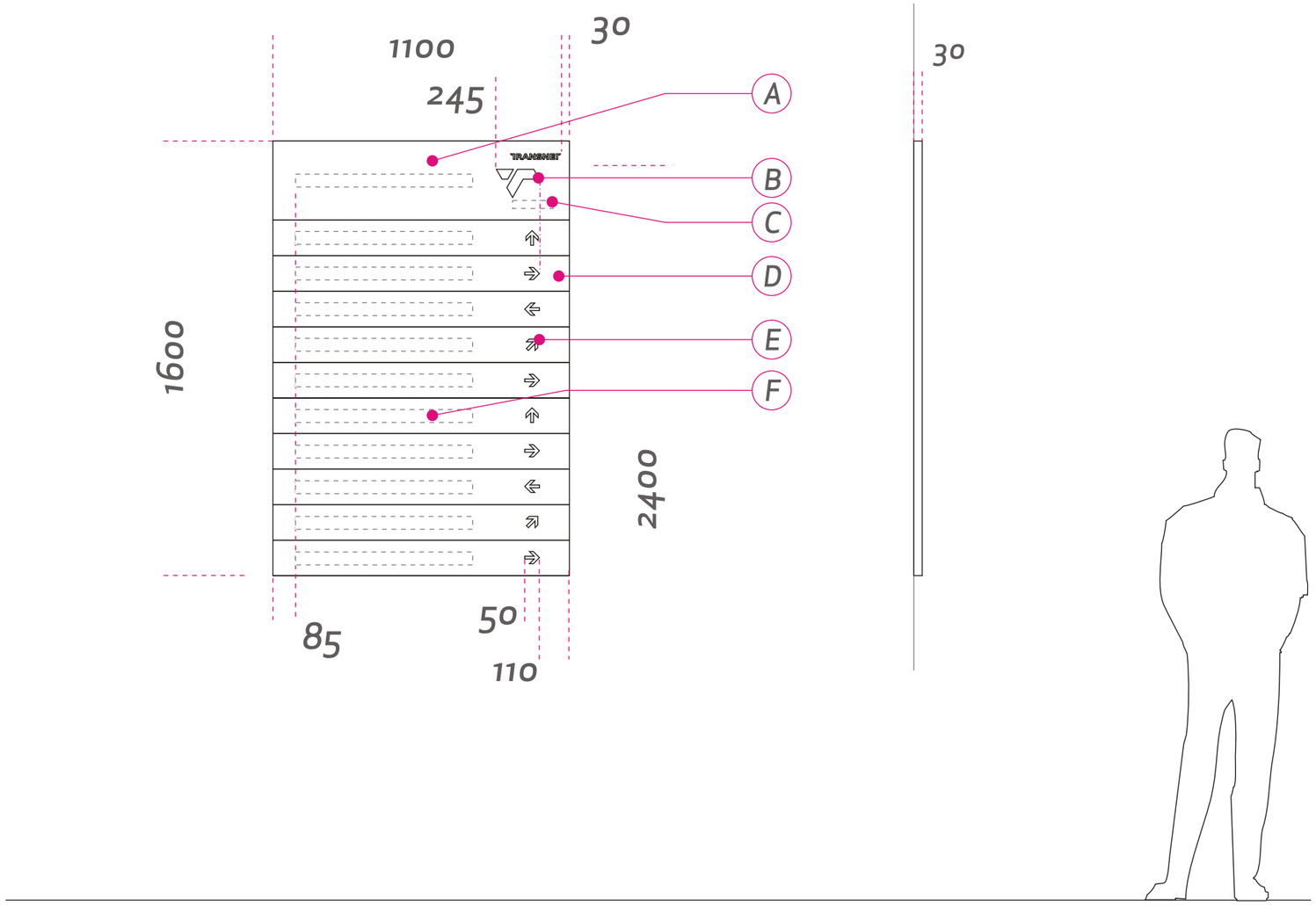
TRANSNET SIGNAGE PROGRAMME

Secondary Exterior Signage - Medium Info/Directional signage

Freestanding directional pole sign (5 slat)

Sign No.	T-SEC 18
Scale	Scale 1 : 20
DRAWN	v1• 08•2007

TRANSNET



- (A) *Sign face header - fabricated alumnium boxed sign face spray painted white with black depot/department vinyl sticker.*
- (B) *TRANSNET C.I. - opaque vinyl logo sticker applied to sign face.*
- (C) *TRANSNET Division descrptor - relevant division vinyl sticker applied to face.*
- (D) *Directional graphics slats - fabricated alumnium boxed sign face coated in relevant division colour.*
- (E) *Directional arrows - white vinyl stickers.*
- (F) *Directional type - white vinyl stickers. 48mm font.*

Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

TRANSNET SIGNAGE PROGRAMME

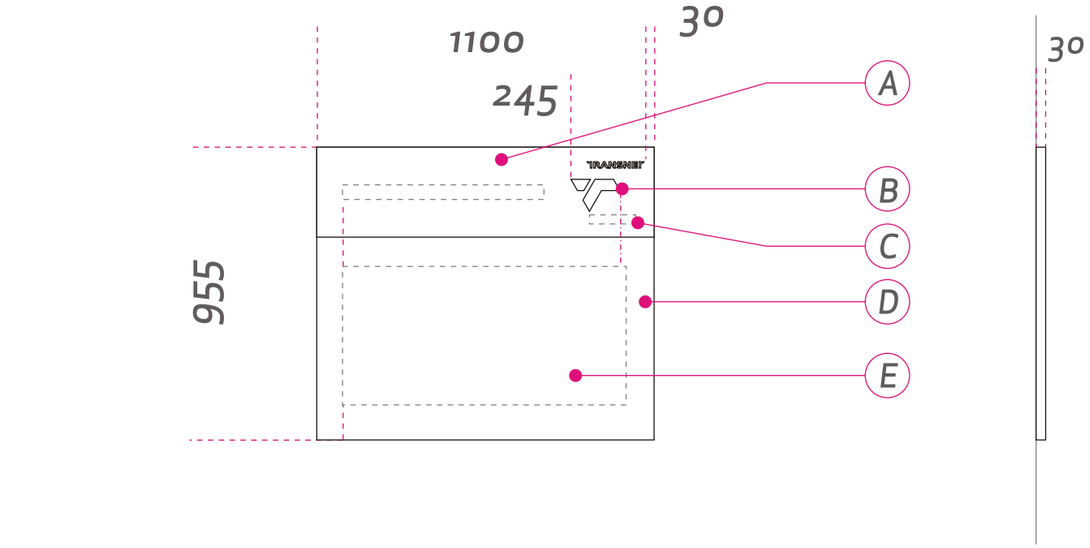
Secondary Exterior Signage - Medium Info/Directional signage

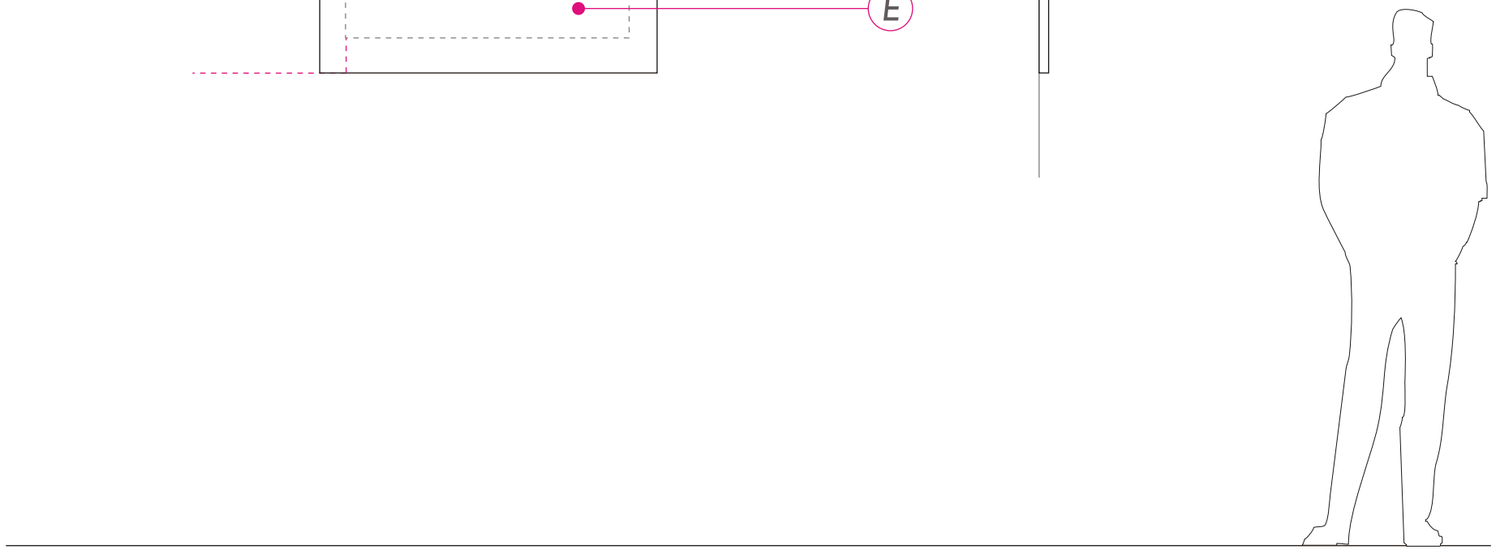
Wall mounted directional sign (10 slat)

Sign No.	T-SEC 19
Scale	Scale 1 : 20
DRAWN	v1• 08•2007

TRANSNET

T-SEC 20





- A *Sign face header - fabricated alumnium boxed sign face spray painted white with black depot/department vinyl sticker.*
- B *TRANSNET C.I. - opaque vinyl logo sticker applied to sign face.*
- C *TRANSNET Division descrptor - relevant division vinyl sticker applied to face.*
- D *Directional graphics slats - fabricated alumnium boxed sign face coated in relevant division colour.*
- E *Directional type - white vinyl stickers.*

Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

TRANSNET SIGNAGE PROGRAMME

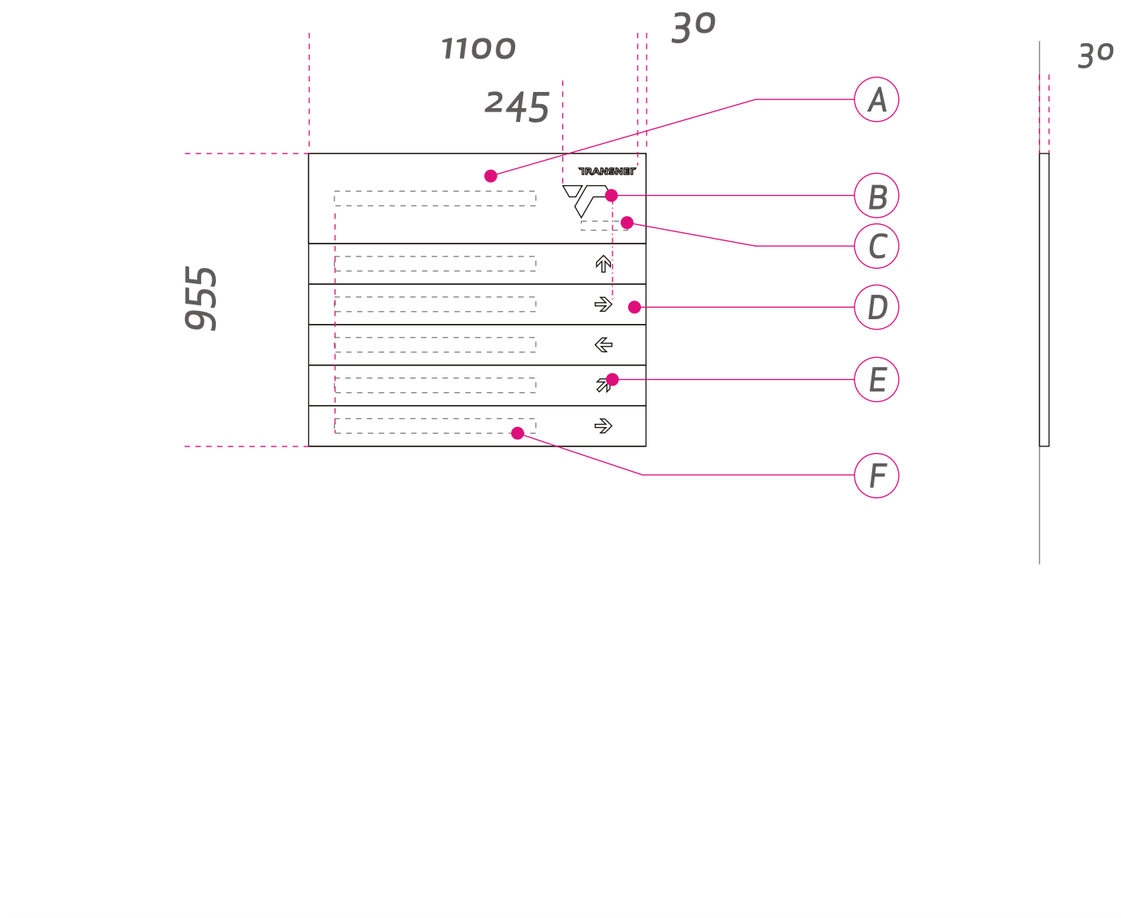
Secondary Exterior Signage - Medium Info/Directional signage

Wall mounted confirmative sign

Sign No.	T-SEC 20
Scale	Scale 1 : 20
DRAWN	v1• 08•2007

TRANSNET

T-SEC 21



- (A) *Sign face header - fabricated alumnium boxed sign face spray painted white with black depot/department vinyl sticker.*
- (B) *TRANSNET C.I. - opaque vinyl logo sticker applied to sign face.*
- (C) *TRANSNET Division descrptor - relevant division vinyl sticker applied to face.*
- (D) *Directional graphics slats - fabricated alumnium boxed sign face coated in relevant division colour.*
- (E) *Directional arrows - white vinyl stickers.*
- (F) *Directional type - white vinyl stickers. 48mm font.*

Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

TRANSNET SIGNAGE PROGRAMME

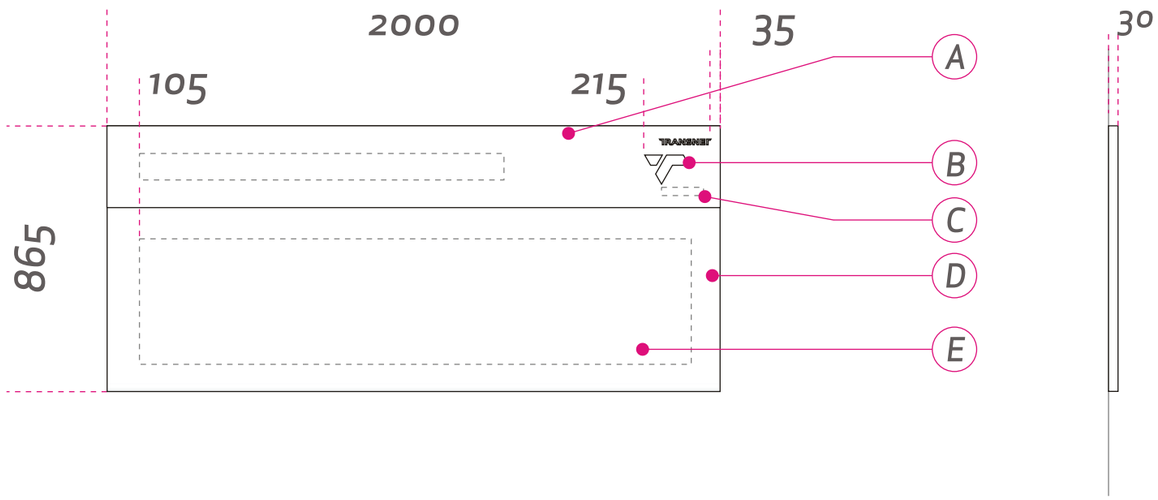
Secondary Exterior Signage - Medium Info/Directional signage

Wall mounted directional sign (5 slat)

Sign No.	T-SEC 21
Scale	Scale 1 : 20
DRAWN	v1• 08•2007

TRANSNET

T-SEC 22



- (A) *Sign face header - fabricated alumnium boxed sign face spray painted white with black depot/department vinyl sticker.*
- (B) *TRANSNET C.I. - opaque vinyl logo sticker applied to sign face.*
- (C) *TRANSNET Division descrptor - relevant division vinyl sticker applied to face.*
- (D) *Directional graphics slats - fabricated alumnium boxed sign face coated in relevant division colour.*
- (E) *Directional type - white vinyl stickers.*

Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

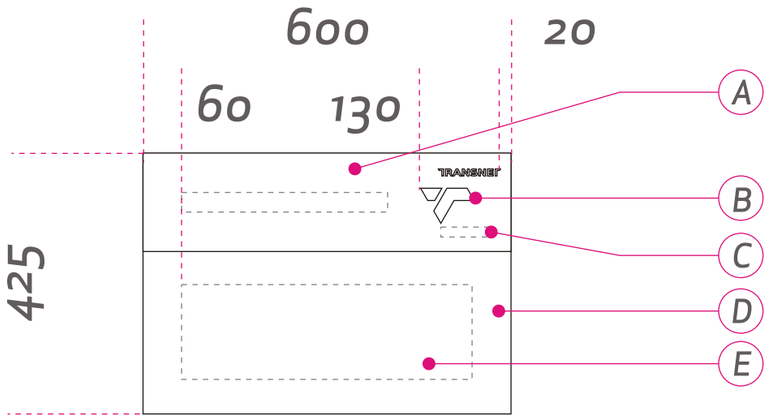
TRANSNET SIGNAGE PROGRAMME

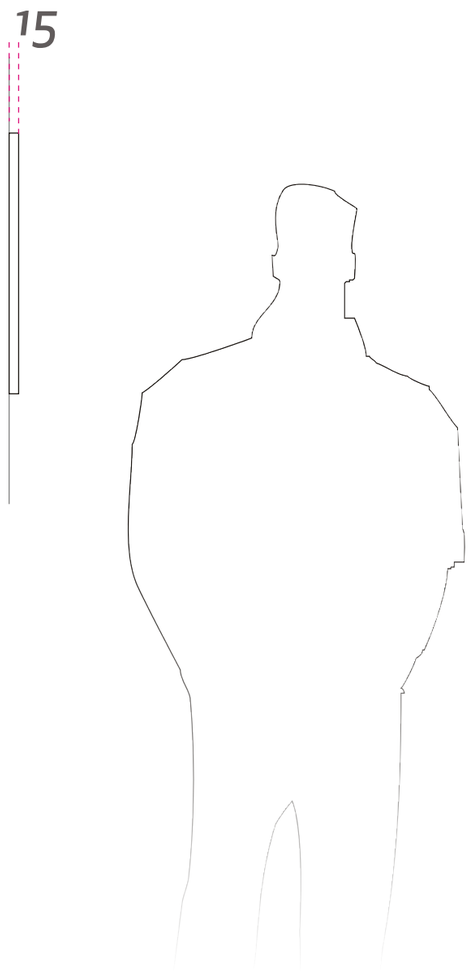
Secondary Exterior Signage - Medium Info/Directional signage

Wall mounted confirmative sign - wide

Sign No.	T-SEC 22
Scale	Scale 1 : 20
DRAWN	v1• 08•2007

TRANSNET



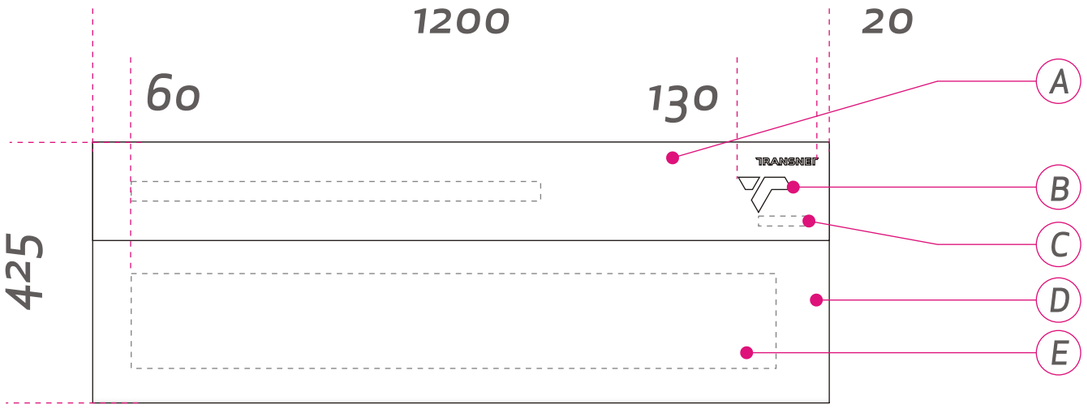


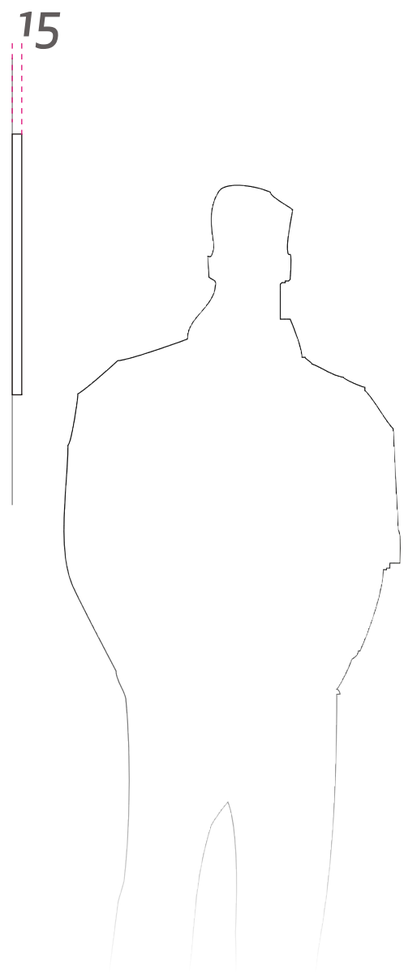
- (A) *Sign face header - fabricated alumnium boxed sign face spray painted white with black depot/department vinyl sticker.*
- (B) *TRANSNET C.I. - opaque vinyl logo sticker applied to sign face.*
- (C) *TRANSNET Division descrptor - relevant division vinyl sticker applied to face.*
- (D) *Directional graphics slats - fabricated alumnium boxed sign face coated in relevant division colour.*
- (E) *Directional type - white vinyl stickers.*

Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

	TRANSNET SIGNAGE PROGRAMME	Sign No. T-SEC 23
	Secondary Exterior Signage - Small Info/Directional signage	Scale Scale 1 : 10
	Wall mounted confirmative sign	DRAWN v1• 08•2007





- (A) *Sign face header - fabricated alumnium boxed sign face spray painted the divisional colour.*
- (B) *TRANSNET C.I. - opaque white vinyl logo sticker applied to sign face.*
- (C) *TRANSNET Division descrptor - relevant white division vinyl sticker applied to face.*
- (D) *Sign face footer - fabricated alumnium boxed sign face spray painted TRANSNET white.*
- (E) *Confirmative type - black vinyl stickers.*

Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

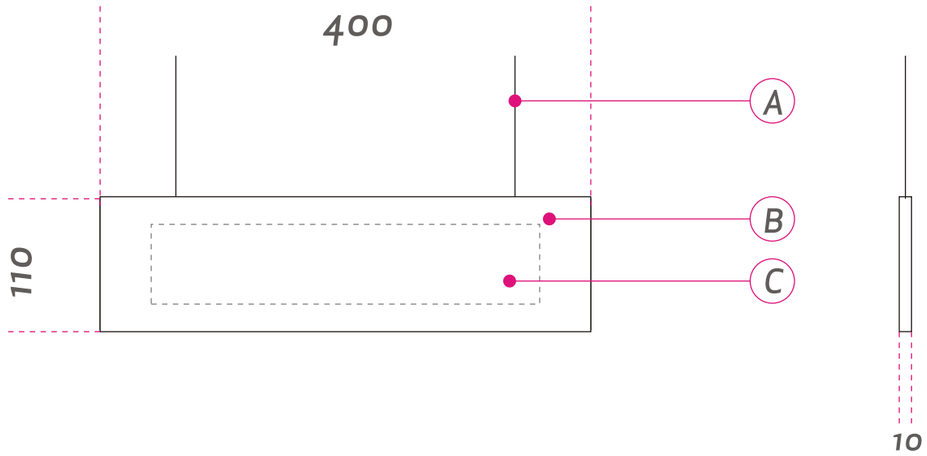
TRANSNET SIGNAGE PROGRAMME

Secondary Exterior Signage - Small Info/Directional signage

Wall mounted confirmative sign - wide

Sign No.	T-SEC 24
Scale	Scale 1 : 10
DRAWN	v1• 08•2007

TRANSNET



A *Suspension cable - clear nylon line.*

B *Sign face - aluminium sign face spray painted to relevant divisional colour.*

C *Confirmative type - white vinyl sticker 65mm font*

Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

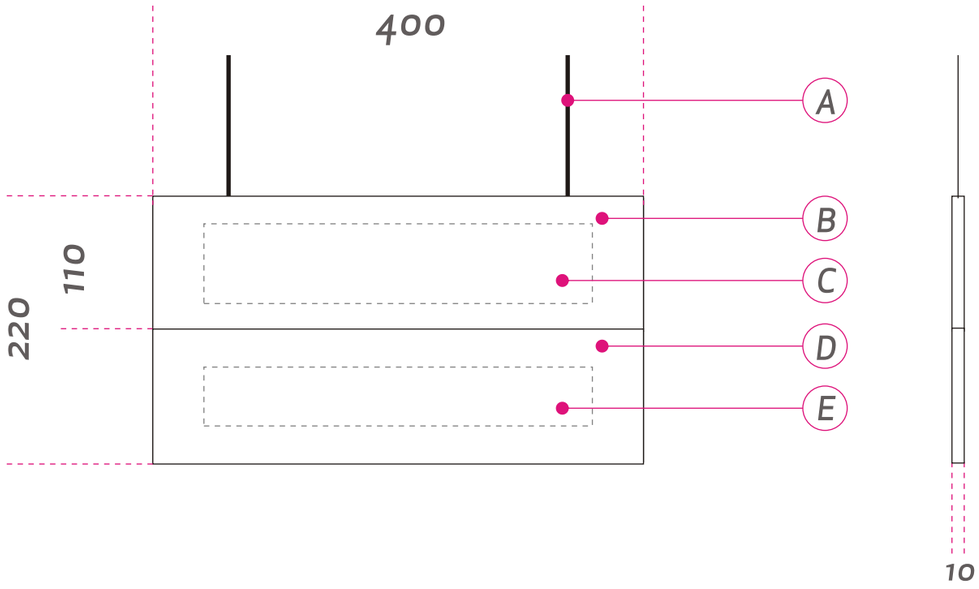
TRANSNET SIGNAGE PROGRAMME

Secondary Exterior Signage - Parking signage

Parking sign - Suspended (small)

Sign No.	T-SEC 25
Scale	Scale 1 : 5
DRAWN	v1• 08•2007

TRANSNET



- (A) *Suspension cable - clear nylon line.*
- (B) *Sign face - aluminium sign face spray painted to relevant divisional colour.*
- (C) *Confirmative type - white vinyl sticker 65mm font*
- (D) *Sign face - aluminium sign face spray painted TRANSNET white.*
- (E) *Confirmative type - black vinyl sticker 48mm font*

Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

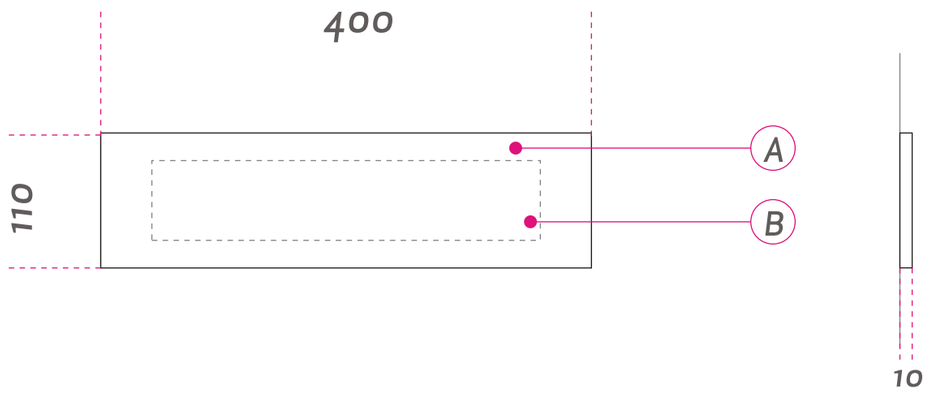
TRANSNET SIGNAGE PROGRAMME

Secondary Exterior Signage - Parking signage

Parking sign - Suspended (large)

Sign No.	T-SEC 26
Scale	Scale 1 : 5
DRAWN	v1• 08•2007

TRANSNET



B Sign face - aluminium sign face spray painted to relevant divisional colour.

C Confirmative type - white vinyl sticker 65mm font

Notes:

1. All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.
2. All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.
3. All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.
4. All lighting, if applicable, must follow the specifications shown in the lighting sheet.

TRANSNET SIGNAGE PROGRAMME

Secondary Exterior Signage - Parking signage

Parking sign - Wall mounted (small)

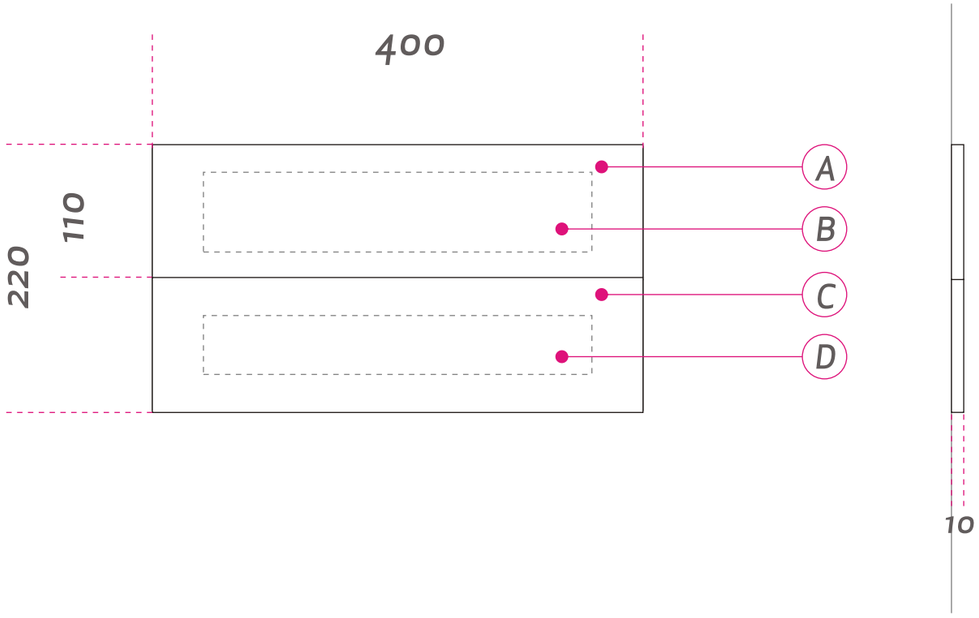
Sign No. T-SEC 27

Scale Scale 1 : 5

DRAWN v1• 08•2007

TRANSNET

T-SEC 28



- (A) *Sign face - aluminium sign face spray painted to relevant divisional colour.*
- (B) *Confirmative type - white vinyl sticker 65mm font*
- (C) *Sign face - aluminium sign face spray painted TRANSNET white.*
- (D) *Confirmative type - black vinyl sticker 48mm font*

Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

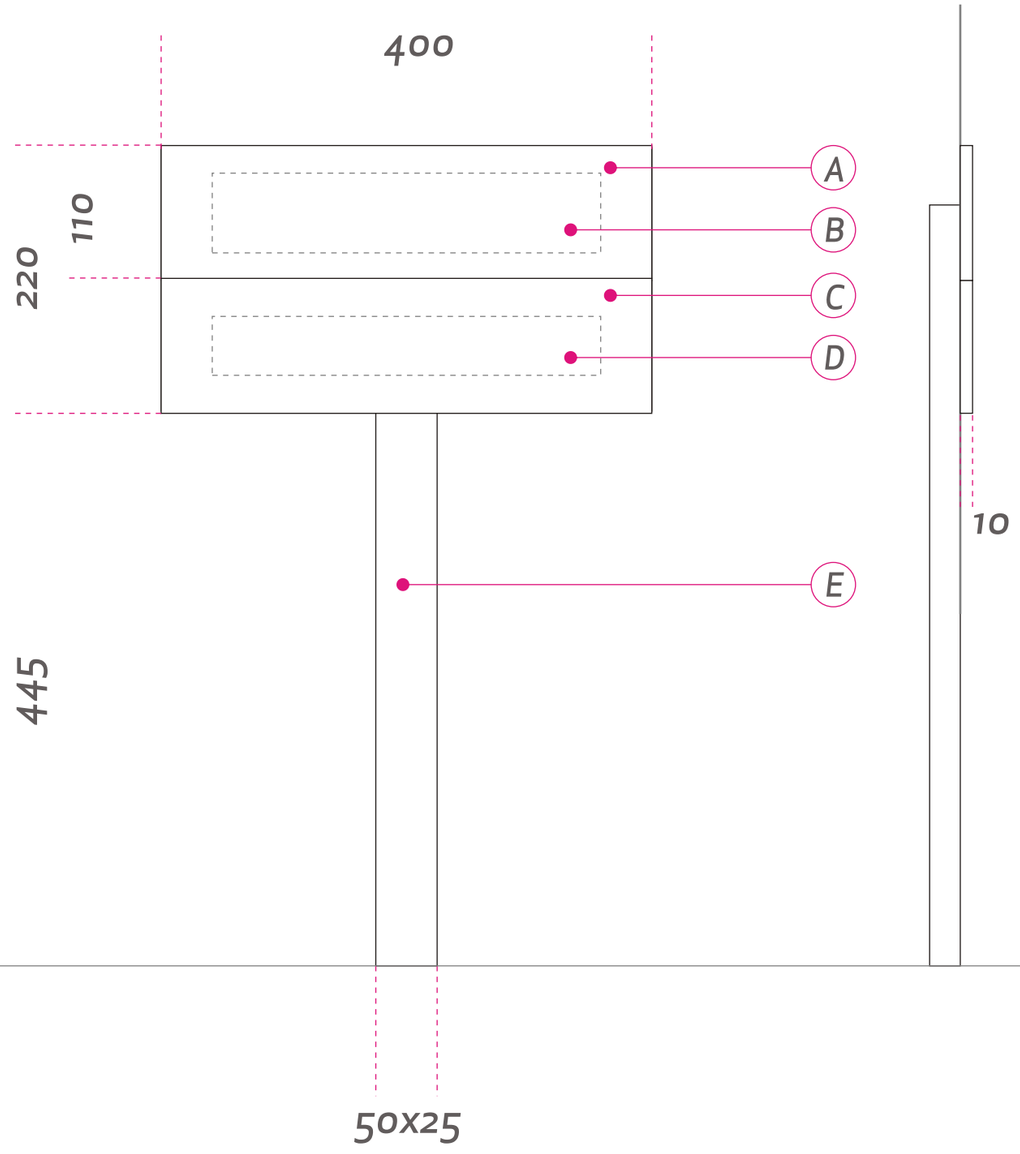
TRANSNET SIGNAGE PROGRAMME

Secondary Exterior Signage - Parking signage

Parking sign - Wall mounted (large)

Sign No.	T-SEC 28
Scale	Scale 1 : 5
DRAWN	v1• 08•2007

TRANSNET



- (A) *Sign face - aluminium sign face spray painted to relevant divisional colour.*
- (B) *Confirmative type - white vinyl sticker 65mm font*
- (C) *Sign face - aluminium sign face spray painted TRANSNET white.*
- (D) *Confirmative type - black vinyl sticker 48mm font*
- (E) *Sign pole - rectangular aluminium 'leg' spray painted the relevant divisional colour.*

Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

TRANSNET SIGNAGE PROGRAMME

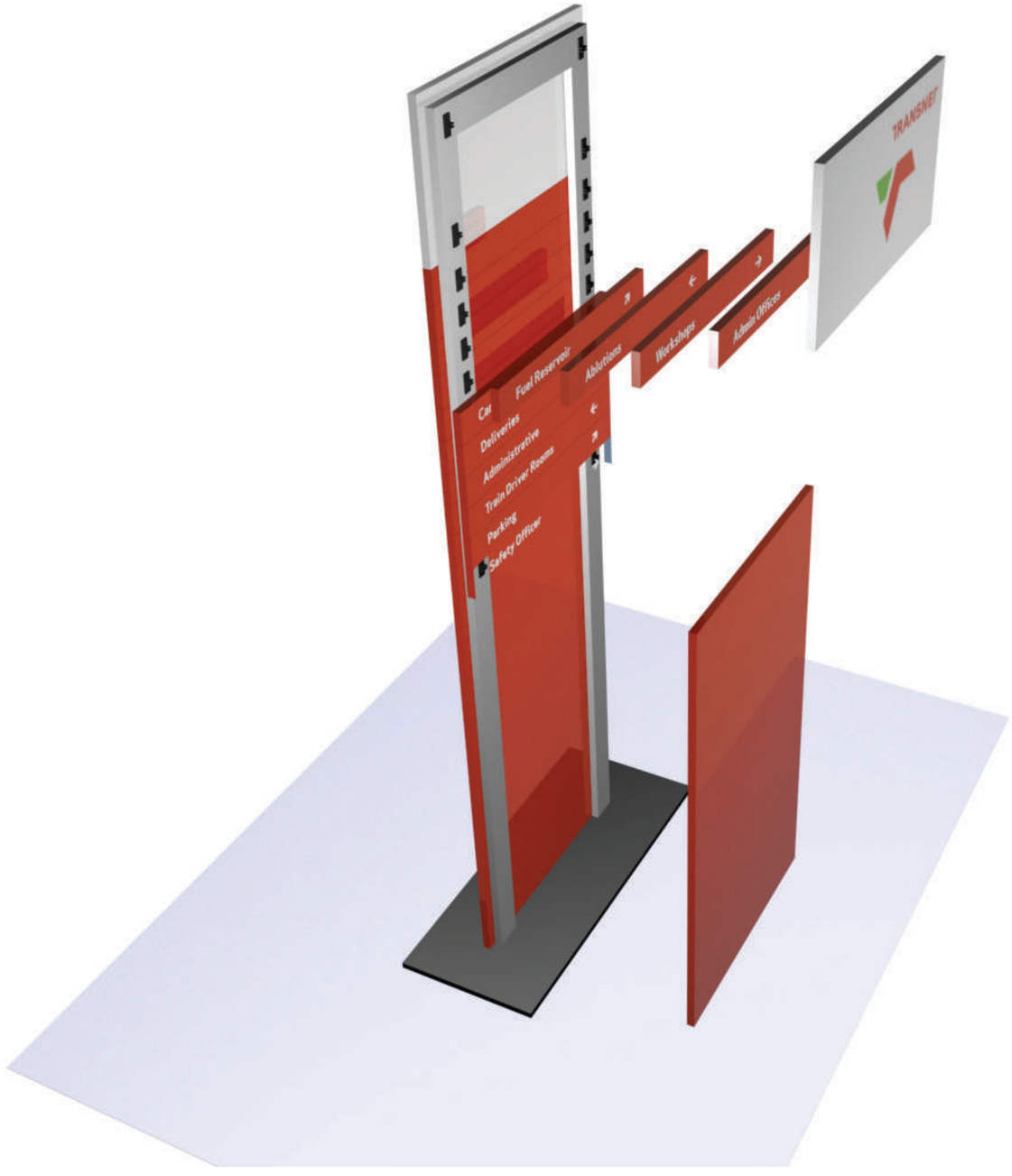
Secondary Exterior Signage - Parking signage

Parking sign - Pole mounted

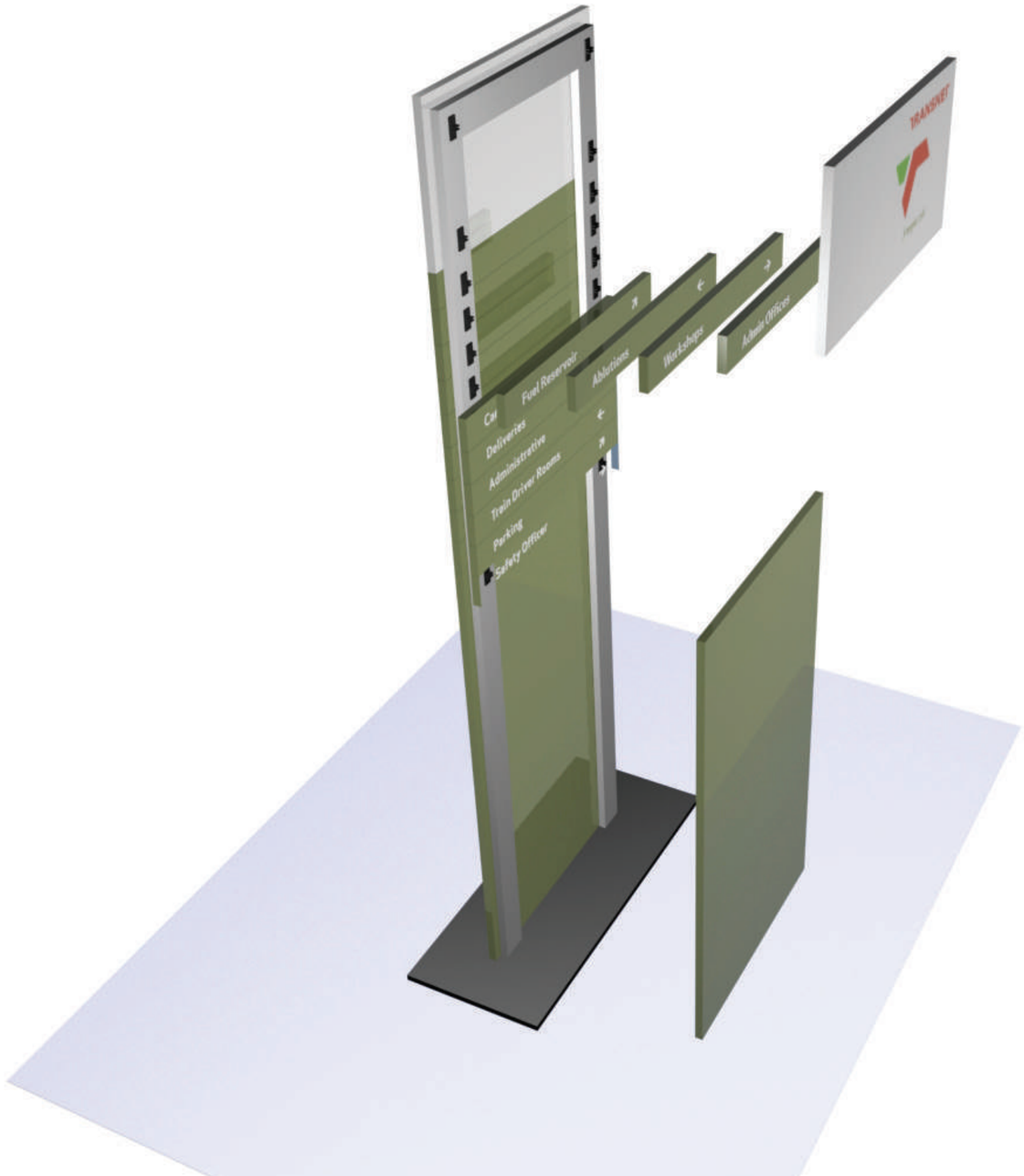
Sign No.	T-SEC 29
Scale	Scale 1 : 5
DRAWN	v1• 08•2007

TRANSNET

Signage Kit of Parts - Internal Signage exploded view (Corporate)

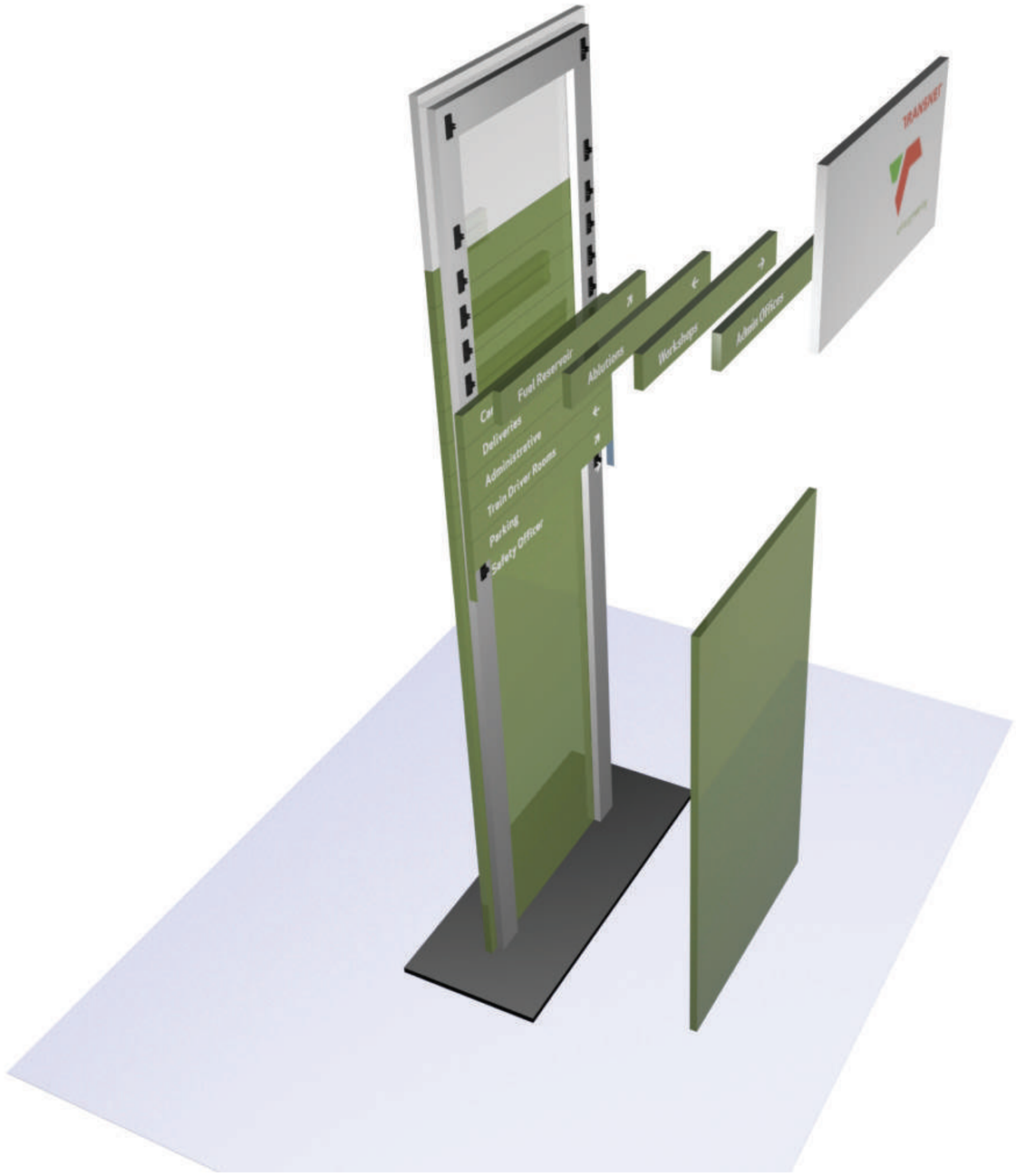


Signage Kit of Parts - Internal Signage exploded view (Freight Rail)



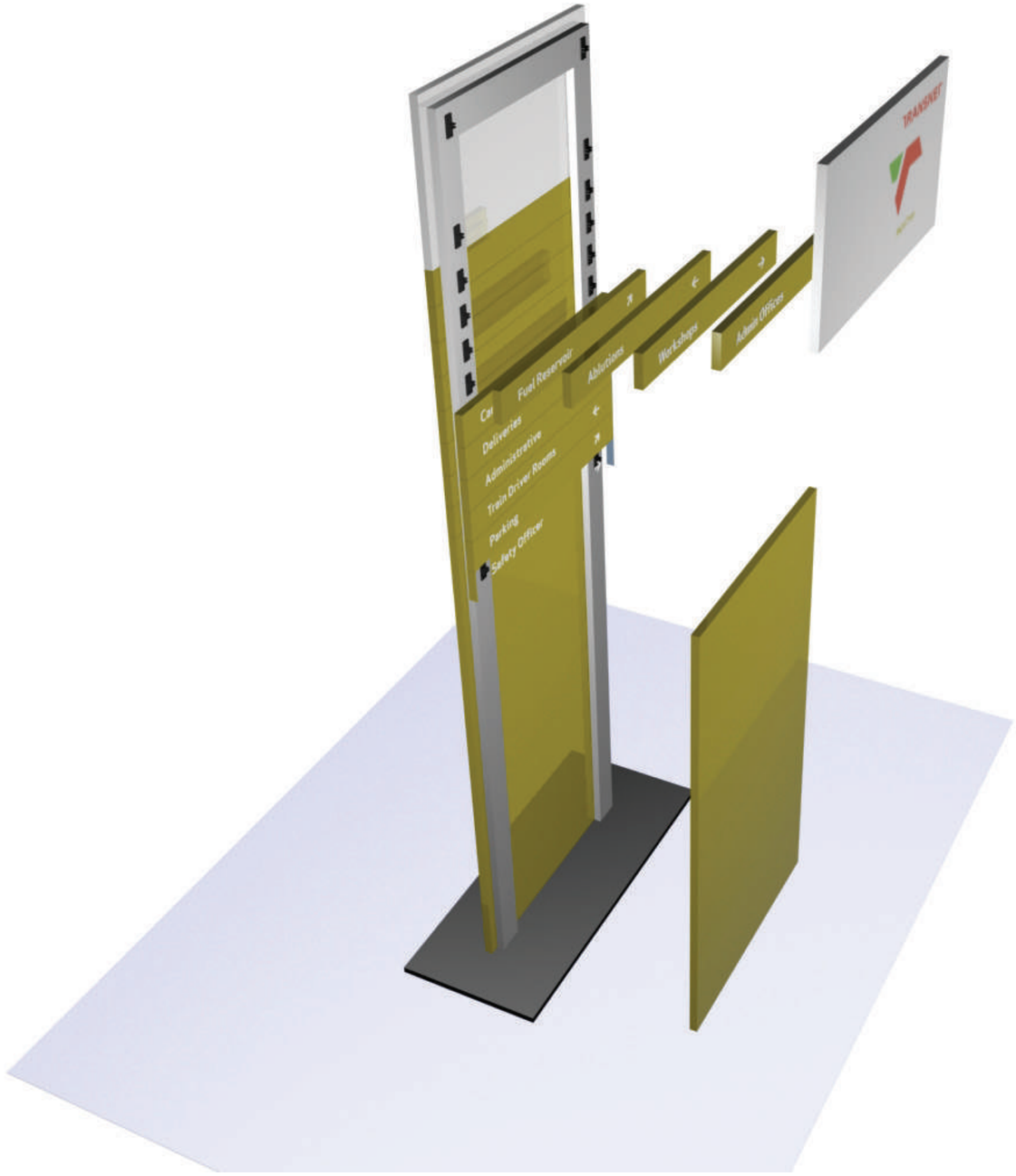
Transnet Limited, Signage Kit of Parts

Signage Kit of Parts - Internal Signage exploded view (Rail Engineering)

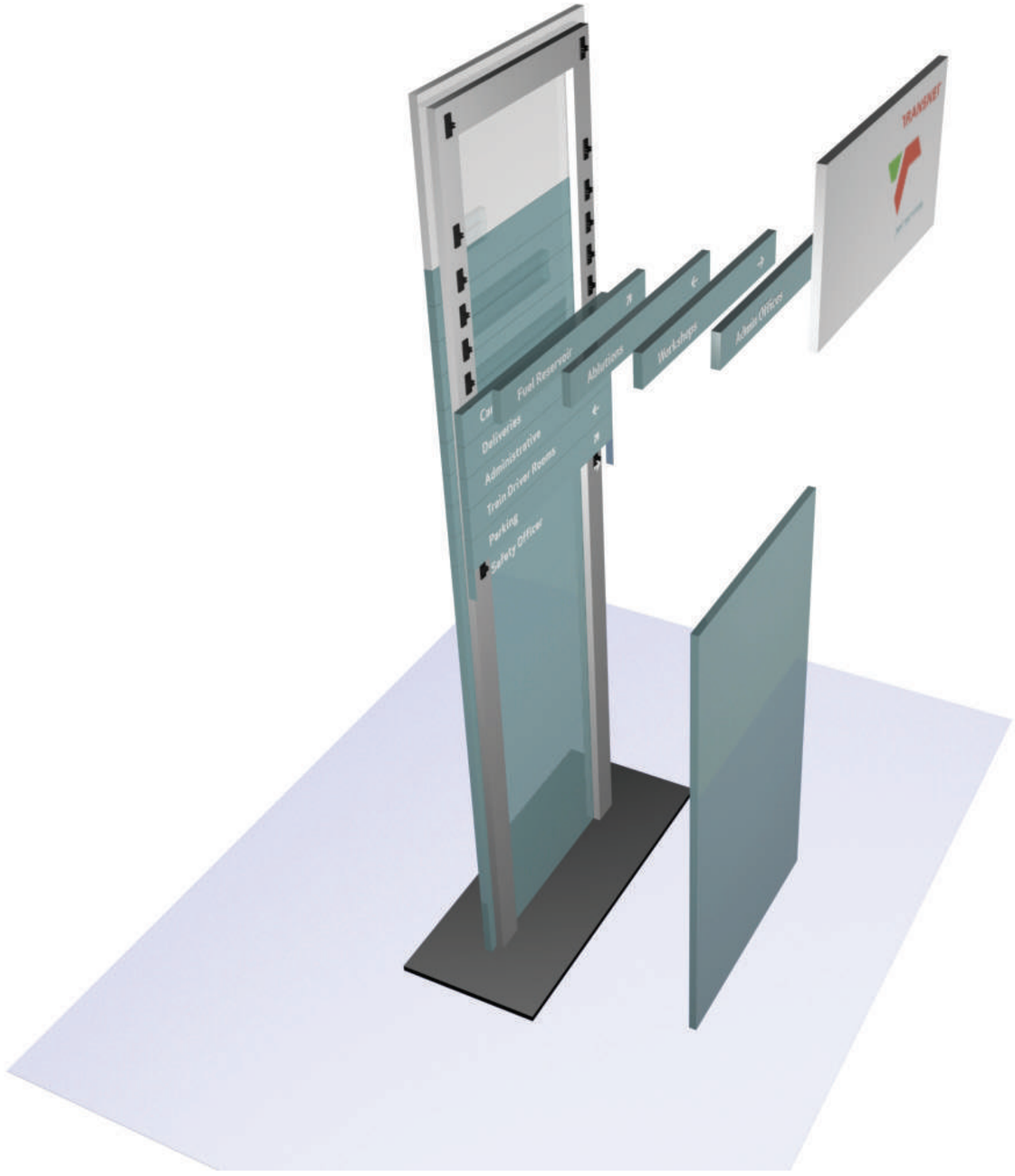


Transnet Limited, Signage Kit of Parts

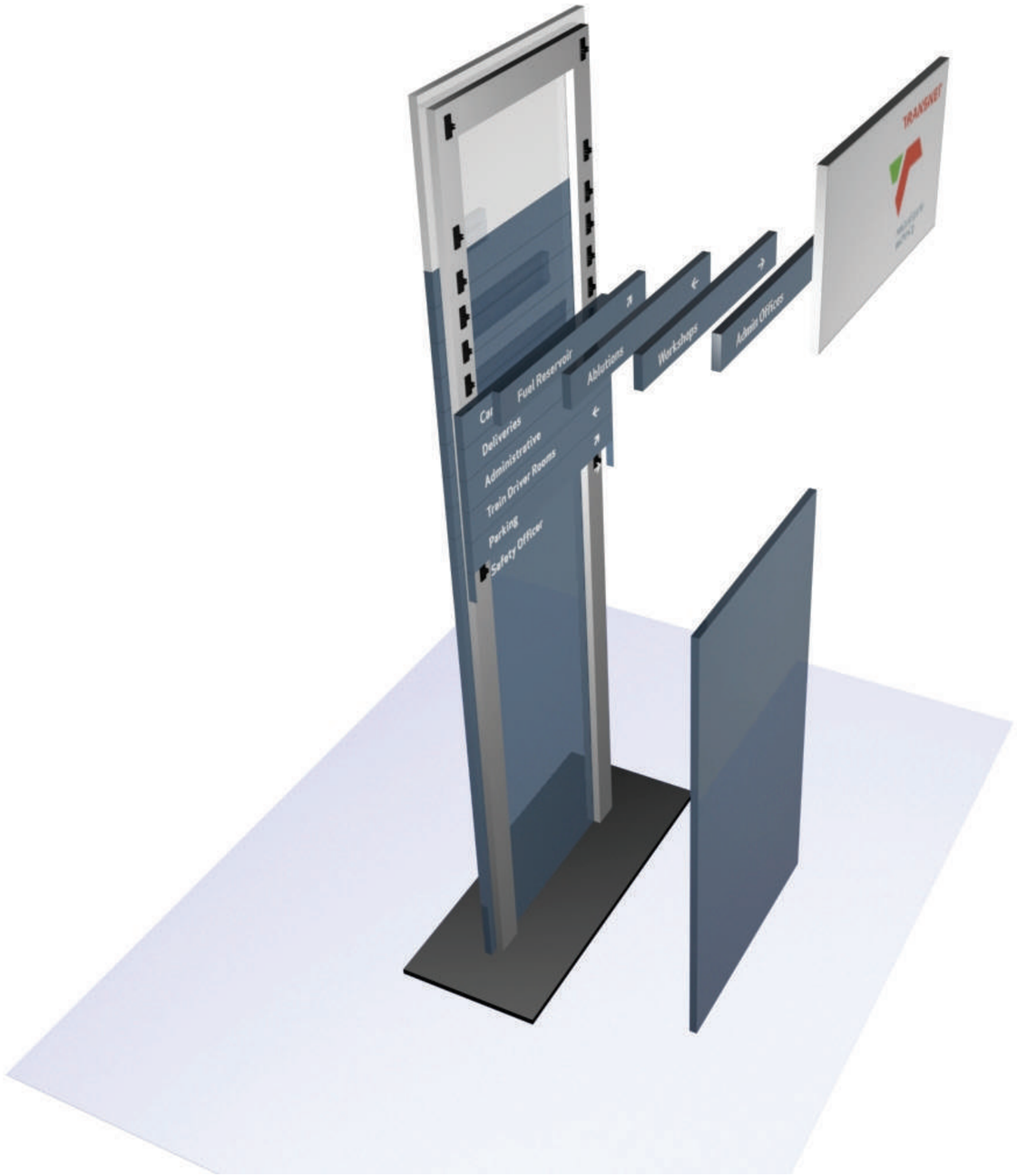
Signage Kit of Parts - Internal Signage exploded view (Pipelines)



Signage Kit of Parts - Internal Signage exploded view (Port Terminals)

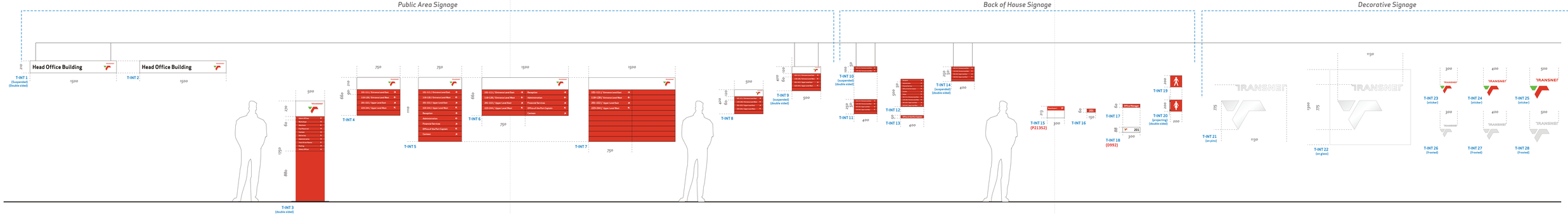


Signage Kit of Parts - Internal Signage exploded view (National Ports Authority)

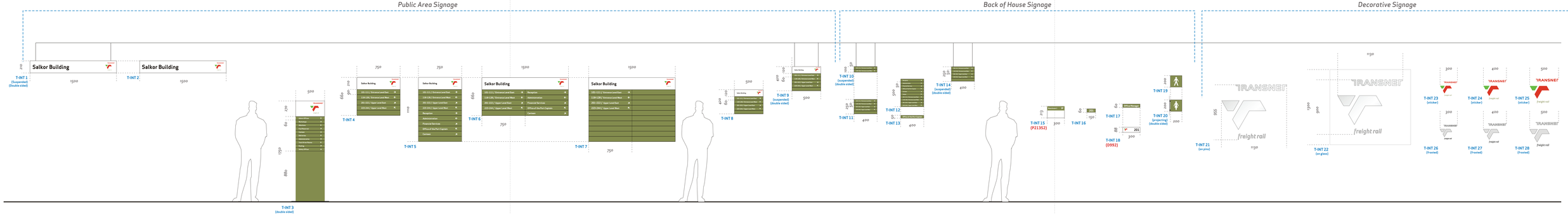


Transnet Limited, Signage Kit of Parts

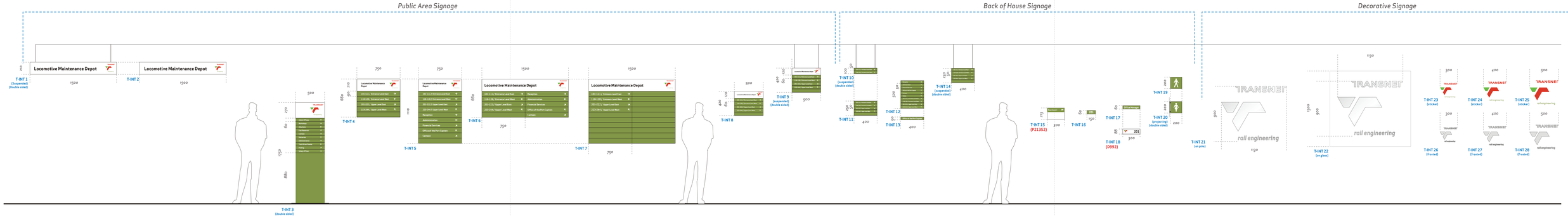
Signage Kit of Parts - Internal Signage Library (Corporate)



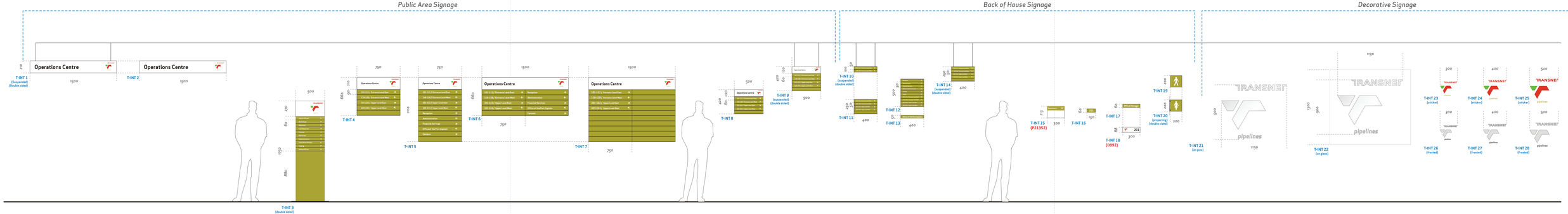
Signage Kit of Parts - Internal Signage Library (Freight Rail)



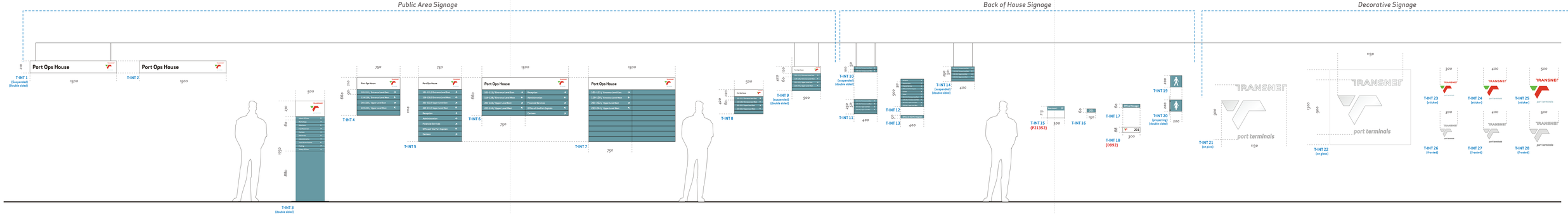
Signage Kit of Parts - Internal Signage Library (Rail Engineering))



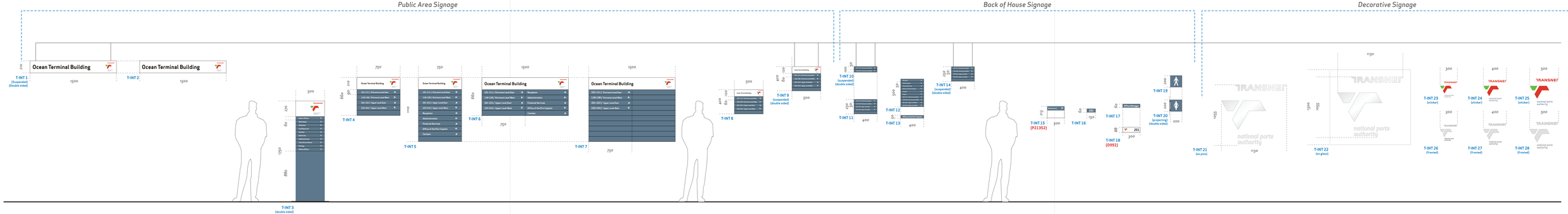
Signage Kit of Parts - Internal Signage Library (Pipelines)

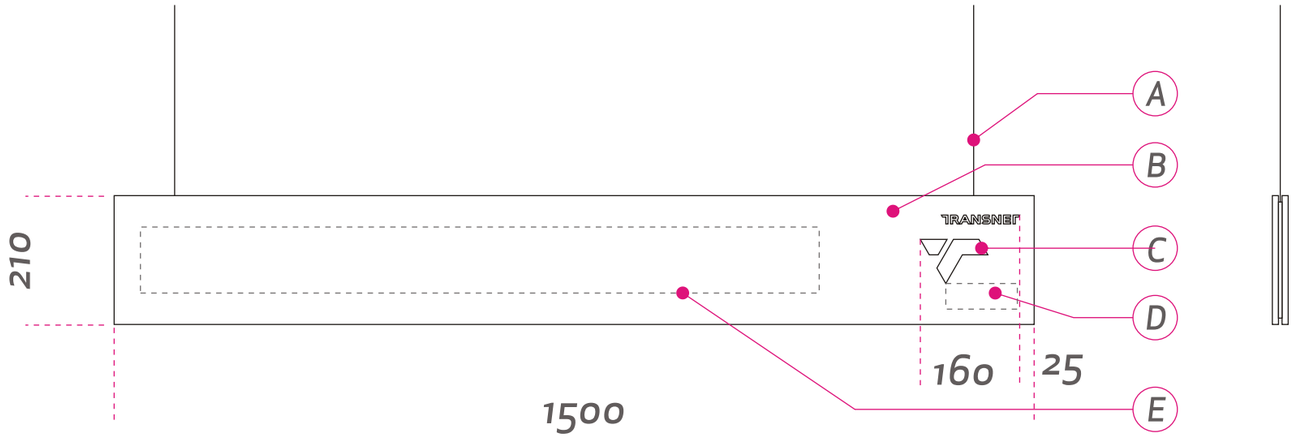


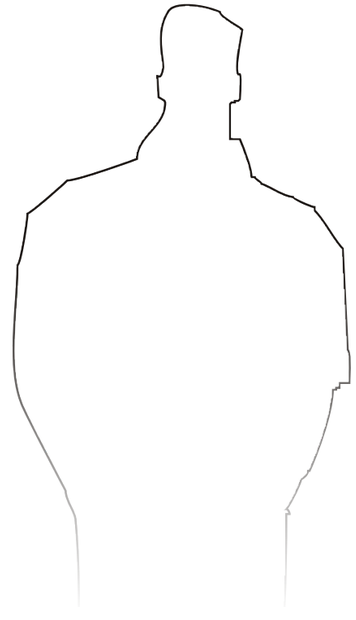
Signage Kit of Parts - Internal Signage Library (Port terminals)



Signage Kit of Parts - Internal Signage Library (National Ports Authority)







- (A) *Suspension cable - clear nylon cable wth ceiling mounting bracket.*
- (B) *Sign face - Extruded aluminium sign face coated with white opaque vinyl.*
- (C) *TRANSNET C.I. - opaque vinyl logo sticker applied to sign face.*
- (D) *TRANSNET Division descriptor - relevant division vinyl sticker applied to face.*
- (E) *Graphic Area - area for informative/confirmative/ directional vinyl graphics.*

Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

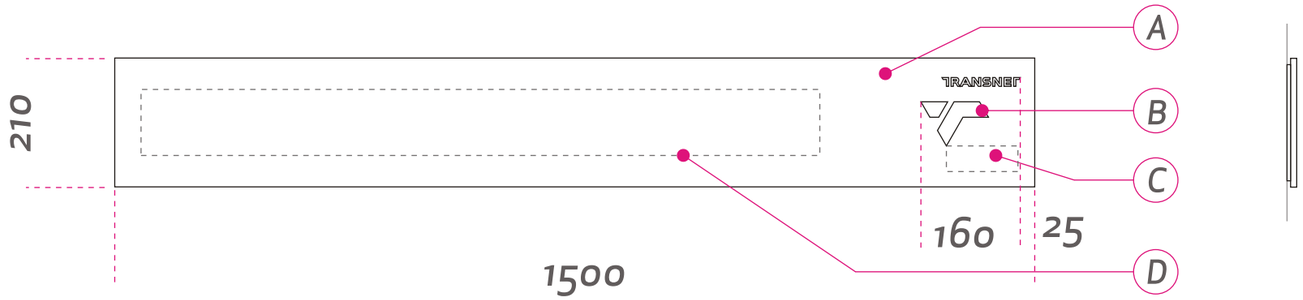
TRANSNET SIGNAGE PROGRAMME

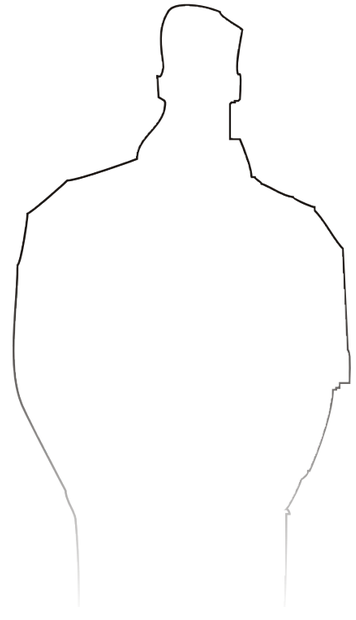
Internal Signage Specification Layouts

Suspended Confirmative sign

Sign No.	T-INT 1
Scale	Scale 1 : 25
DRAWN	v1• 08•2007

TRANSNET





- (A) *Sign face - Extruded aluminium sign face coated with white opaque vinyl.*
- (B) *TRANSNET C.I. - opaque vinyl logo sticker applied to sign face.*
- (C) *TRANSNET Division descriptor - relevant division vinyl sticker applied to face.*
- (D) *Graphic Area - area for informative/confirmative/ directional vinyl graphics.*

Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

TRANSNET SIGNAGE PROGRAMME

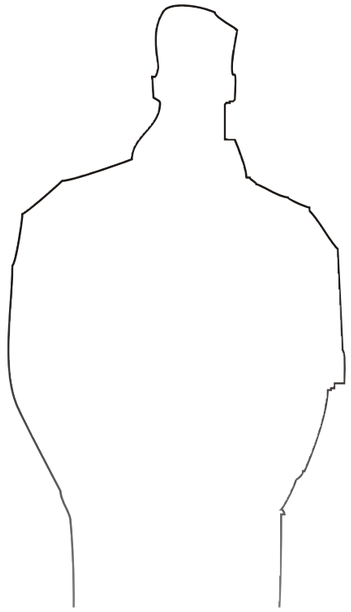
Internal Signage Specification Layouts

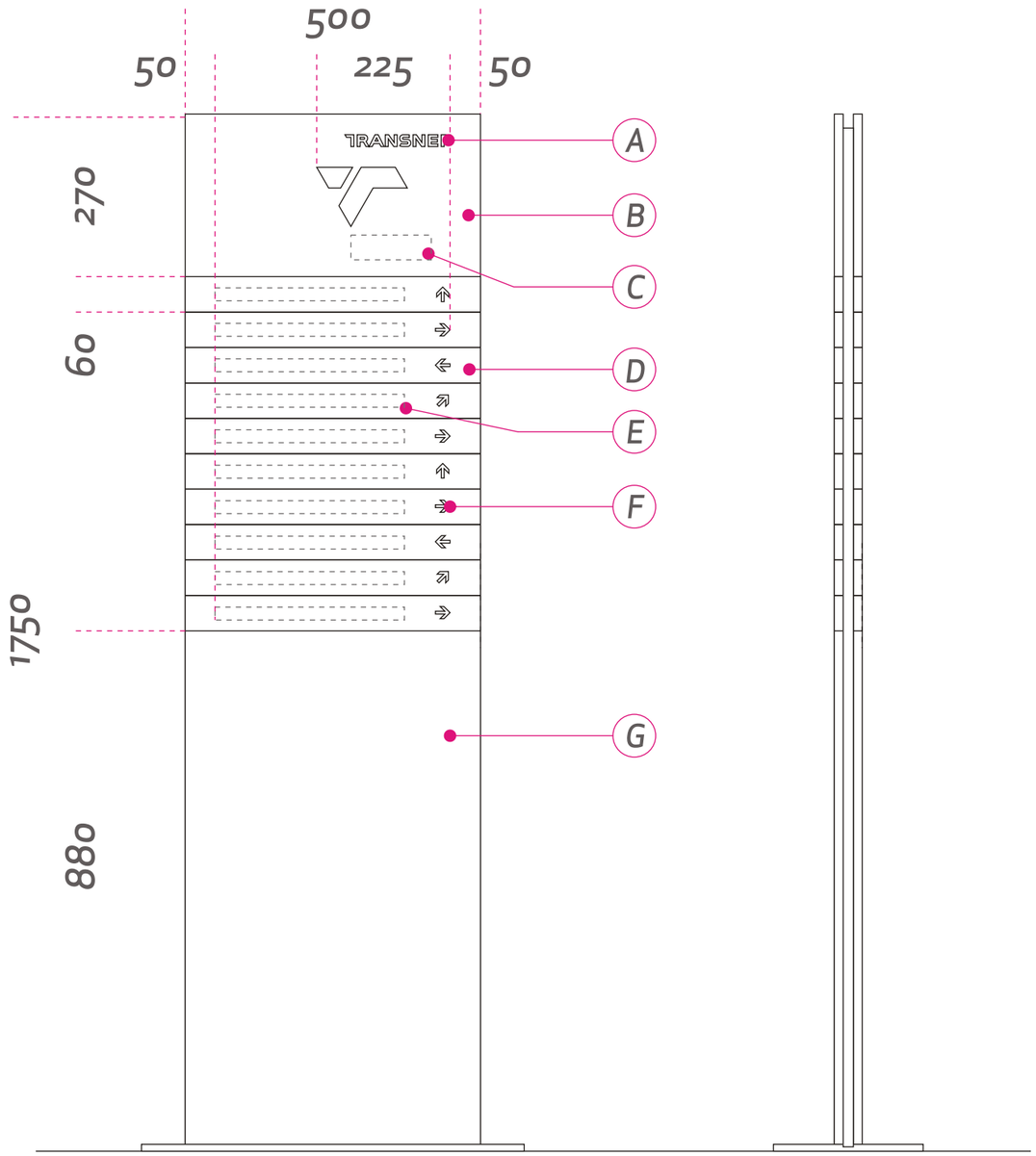
Wall Confirmative/Directional sign

Sign No.	T-INT 2
Scale	Scale 1 : 10
DRAWN	v1• 08•2007

TRANSNET

T-INT 3





- (A) *TRANSNET C.I. - opaque vinyl logo sticker applied to sign face.*
- (B) *Sign face - Extruded aluminium sign face coated with white opaque vinyl.*
- (C) *TRANSNET Division descriptor - relevant division vinyl sticker applied to face.*
- (D) *Slats - Extruded aluminium slats coated with the relevant divisional vinyl colour.*
- (E) *Graphic Area - area for informative/confirmative/ directional vinyl graphics, 22mm font.*
- (F) *Directional arrows - white vinyl arrow graphics.*
- (G) *Lower panel - Extruded aluminium slats coated with the relevant divisional vinyl colour.*

Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

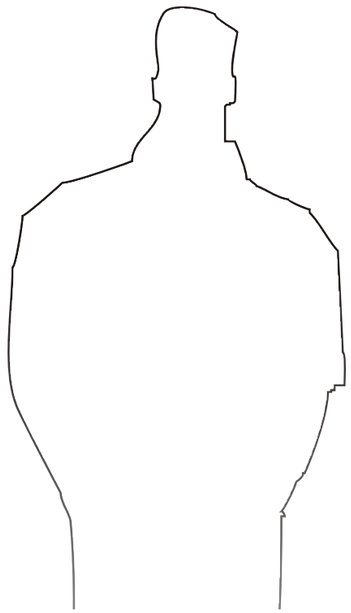
TRANSNET SIGNAGE PROGRAMME

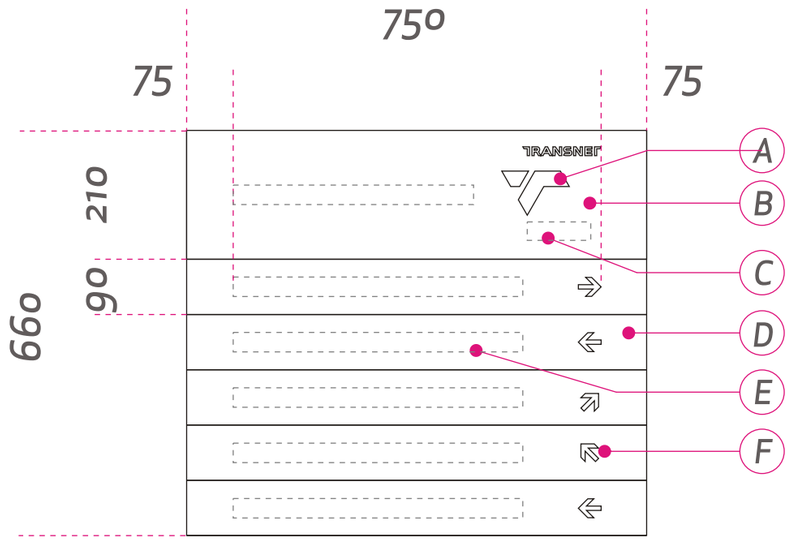
Internal Signage Specification Layouts

Freestanding menu sign

Sign No.	T-INT 3
Scale	Scale 1 : 10
DRAWN	v1• 08•2007

TRANSNET





(A) *TRANSNET C.I. - opaque vinyl logo sticker applied to sign face.*

(B) *Sign face - Extruded aluminium sign face coated with white opaque vinyl.*

(C) *TRANSNET Division descriptor - relevant division vinyl sticker applied to face.*

(D) *Slats - Extruded aluminium slats coated with the relevant divisional vinyl colour.*

(E) *Graphic Area - area for informative/confirmative/ directional vinyl graphics.*

(F) *Directional arrows - white vinyl arrow graphics.*

Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

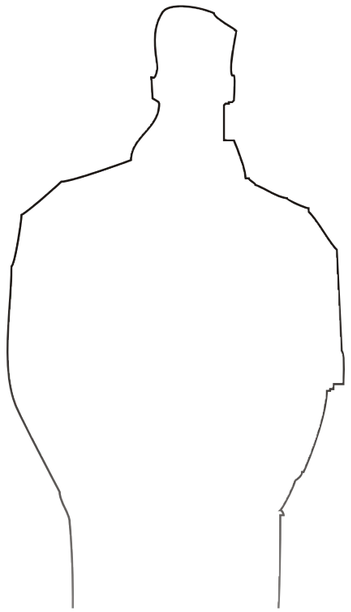
TRANSNET SIGNAGE PROGRAMME

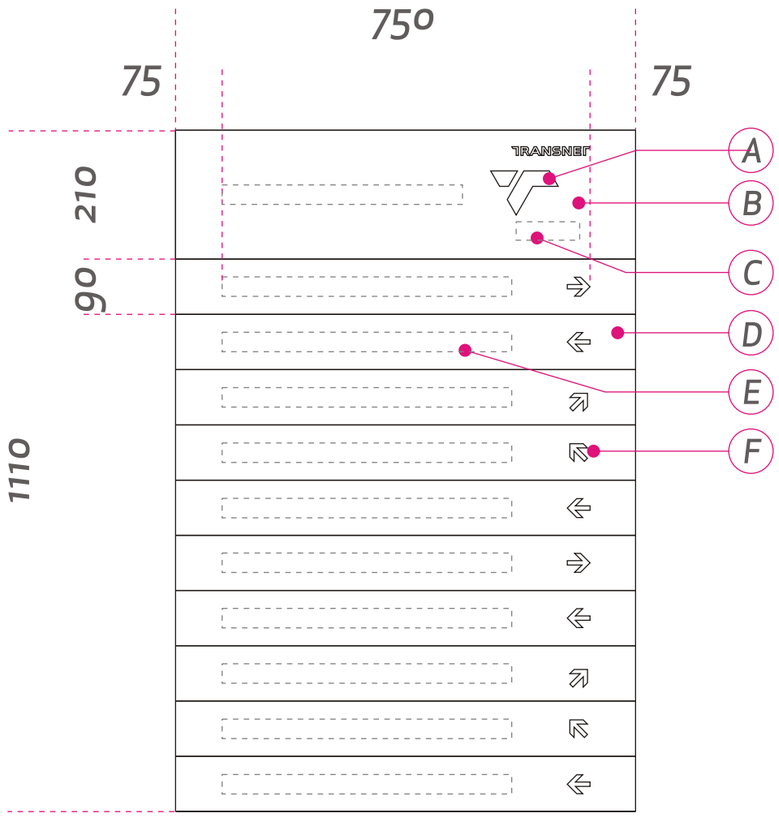
Internal Signage Specification Layouts

Wall mounted menu sign - Large

Sign No.	T-INT 4
Scale	Scale 1 : 10
DRAWN	v1• 08•2007

TRANSNET





- (A) *TRANSNET C.I. - opaque vinyl logo sticker applied to sign face.*
- (B) *Sign face - Extruded aluminium sign face coated with white opaque vinyl.*
- (C) *TRANSNET Division descriptor - relevant division vinyl sticker applied to face.*
- (D) *Slats - Extruded aluminium slats coated with the relevant divisional vinyl colour.*
- (E) *Graphic Area - area for informative/confirmative/ directional vinyl graphics.*
- (F) *Directional arrows - white vinyl arrow graphics.*

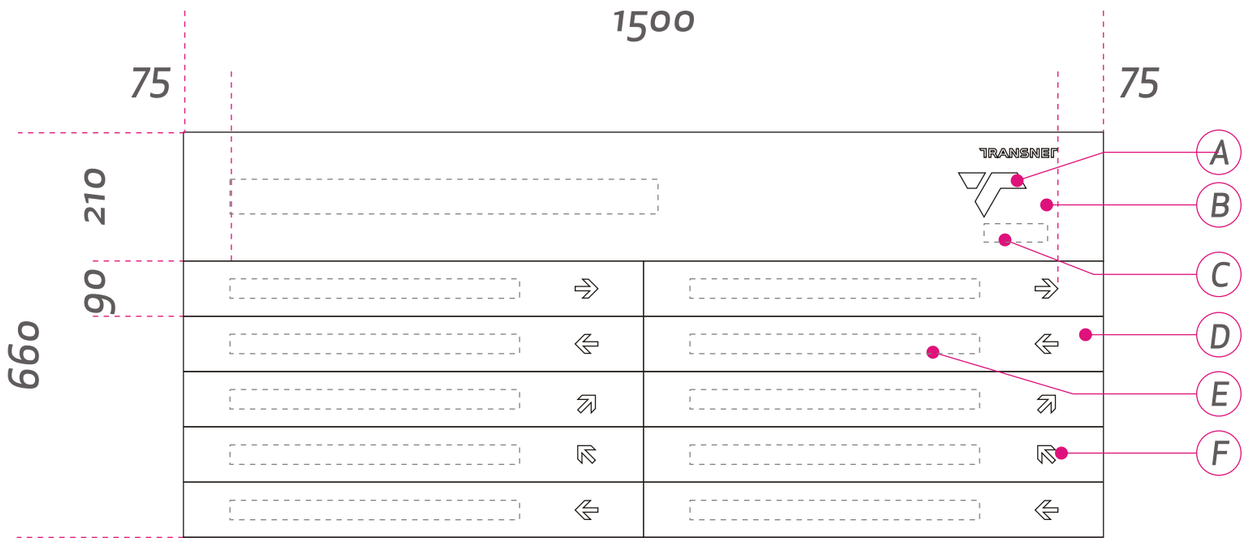
Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

TRANSNET SIGNAGE PROGRAMME	Sign No.	T-INT 5
Internal Signage Specification Layouts	Scale	Scale 1 : 10
Wall mounted menu sign - Large (10 slat)	DRAWN	v1• 08•2007

TRANSNET

T-INT 6

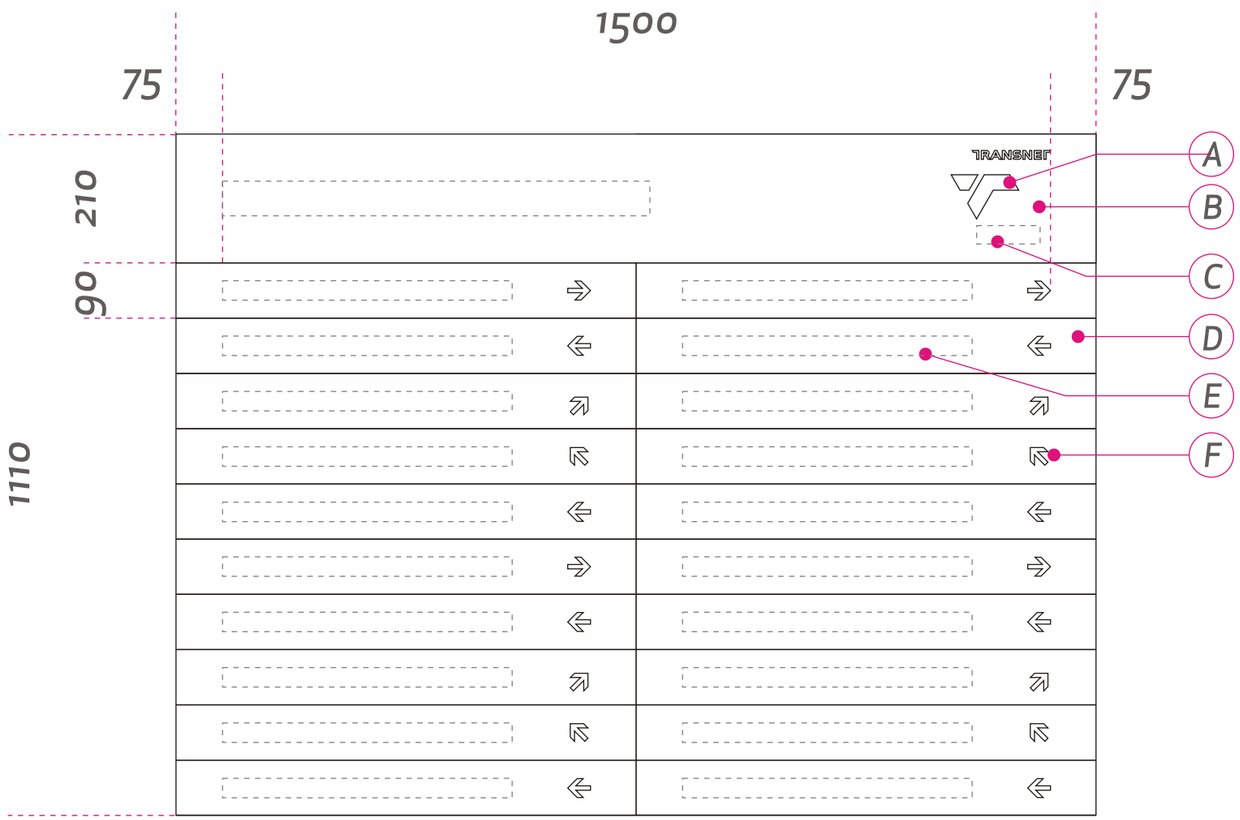


- (A) *TRANSNET C.I. - opaque vinyl logo sticker applied to sign face.*
- (B) *Sign face - Extruded aluminium sign face coated with white opaque vinyl.*
- (C) *TRANSNET Division descriptor - relevant division vinyl sticker applied to face.*
- (D) *Slats - Extruded aluminium slats coated with the relevant divisional vinyl colour.*
- (E) *Graphic Area - area for informative/confirmative/ directional vinyl graphics.*
- (F) *Directional arrows - white vinyl arrow graphics.*

Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

	TRANSNET SIGNAGE PROGRAMME	
	Internal Signage Specification Layouts	
	Wall mounted menu sign - Large wide (10 slat)	Sign No. T-INT 6 Scale Scale 1 : 10 DRAWN v1• 08•2007



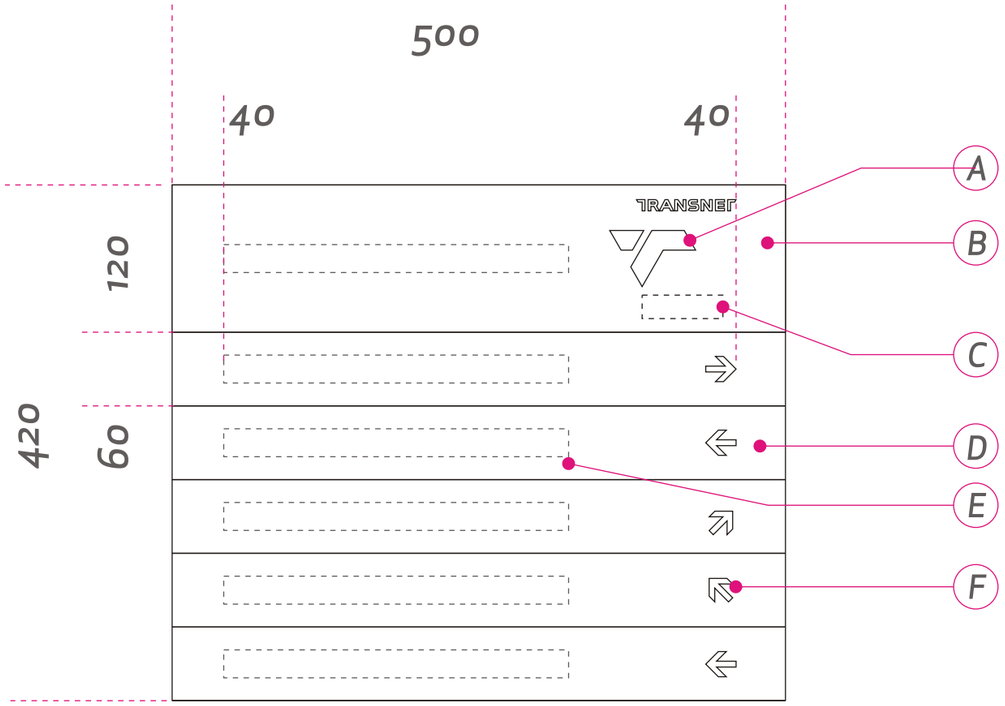
- (A) *TRANSNET C.I. - opaque vinyl logo sticker applied to sign face.*
- (B) *Sign face - Extruded aluminium sign face coated with white opaque vinyl.*
- (C) *TRANSNET Division descriptor - relevant division vinyl sticker applied to face.*
- (D) *Slats - Extruded aluminium slats coated with the relevant divisional vinyl colour.*
- (E) *Graphic Area - area for informative/confirmative/ directional vinyl graphics.*
- (F) *Directional arrows - white vinyl arrow graphics.*

Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

TRANSNET SIGNAGE PROGRAMME	Sign No.	T-INT 7
Internal Signage Specification Layouts	Scale	Scale 1 : 10
Wall mounted menu sign - Large wide (20 slat)	DRAWN	v1• 08•2007

TRANSNET



- (A) *TRANSNET C.I. - opaque vinyl logo sticker applied to sign face.*
- (B) *Sign face - Extruded aluminium sign face coated with white opaque vinyl.*
- (C) *TRANSNET Division descriptor - relevant division vinyl sticker applied to face.*
- (D) *Slats - Extruded aluminium slats coated with the relevant divisional vinyl colour.*
- (E) *Graphic Area - area for informative/confirmative/ directional vinyl graphics.*
- (F) *Directional arrows - white vinyl arrow graphics.*

Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

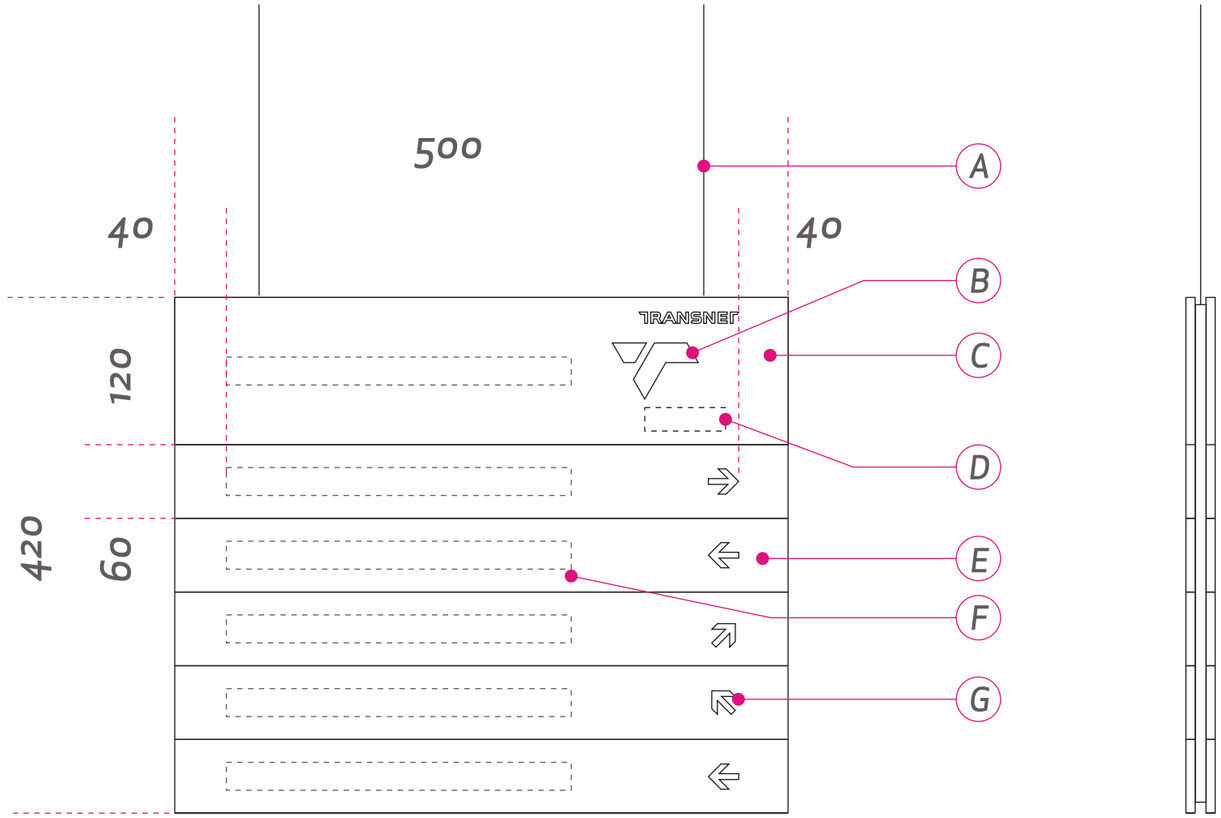
TRANSNET SIGNAGE PROGRAMME

Internal Signage Specification Layouts

Wall mounted menu sign - Medium

Sign No.	T-INT 8
Scale	Scale 1 : 5
DRAWN	v1• 08•2007

TRANSNET



- (A) *Suspension cables - clear nylon cables with ceiling mounting brackets.*
- (B) *TRANSNET C.I. - opaque vinyl logo sticker applied to sign face.*
- (C) *Sign face - Extruded aluminium sign face coated with white opaque vinyl.*
- (D) *TRANSNET Division descriptor - relevant division vinyl sticker applied to face.*
- (E) *Slats - Extruded aluminium slats coated with the relevant divisional vinyl colour.*
- (F) *Graphic Area - area for informative/confirmative/ directional vinyl graphics.*
- (G) *Directional arrows - white vinyl arrow graphics.*

Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

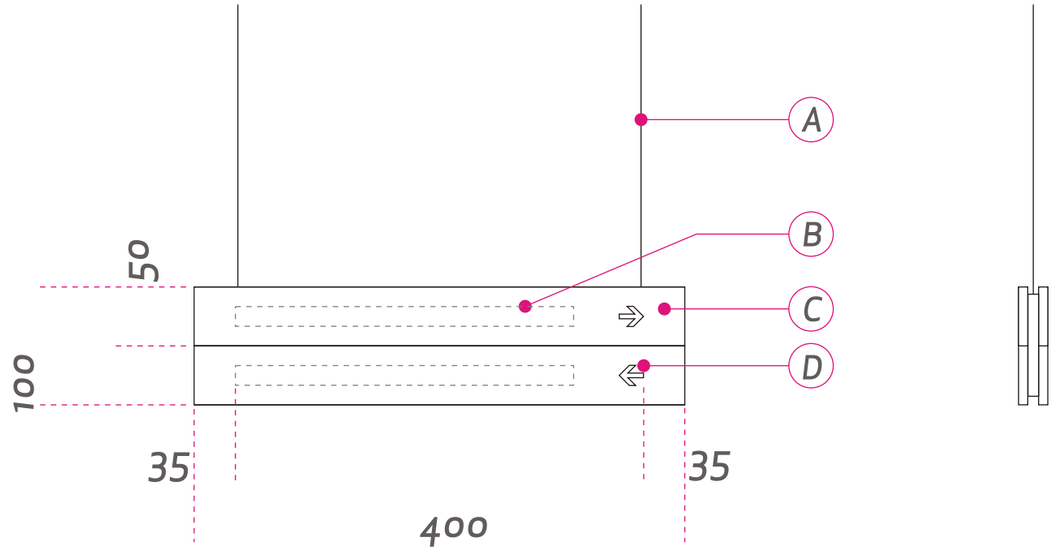
TRANSNET SIGNAGE PROGRAMME

Internal Signage Specification Layouts

Suspended menu sign - Medium

Sign No.	T-INT 9
Scale	Scale 1 : 5
DRAWN	v1• 08•2007

TRANSNET



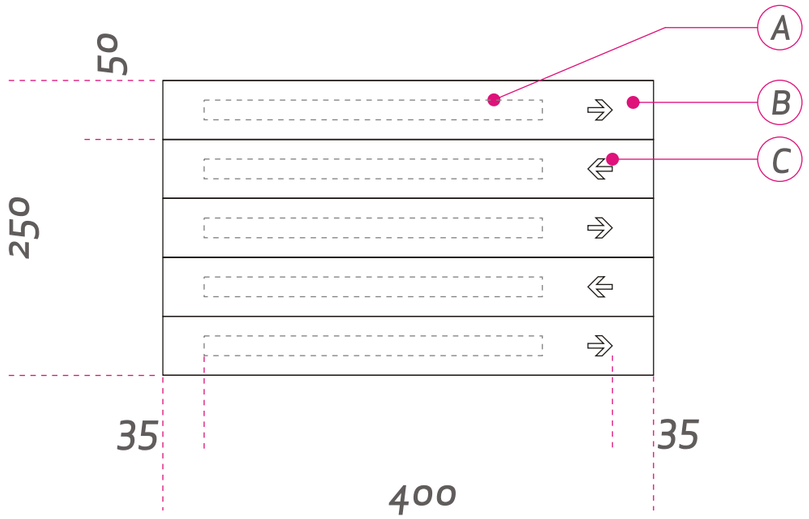
- (A) *Suspension cables - clear nylon cables with ceiling mounting brackets.*
- (B) *Graphic Area - area for informative/confirmative/ directional vinyl graphics. 16mm font.*
- (C) *Slats - Extruded aluminium slats coated with the relevant divisional vinyl colour.*
- (D) *Directional arrows - white vinyl arrow graphics applied to slats.*

Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

	TRANSNET SIGNAGE PROGRAMME	Sign No. T-INT 10
	Internal Signage Specification Layouts	Scale Scale 1 : 5
	Suspended slat sign - small	DRAWN v1• 08•2007

TRANSNET



- (A) *Graphic Area - area for informative/confirmative/ directional vinyl graphics. 16mm font.*
- (B) *Slats - Extruded aluminium slats coated with the relevant divisional vinyl colour.*
- (C) *Directional arrows - white vinyl arrow graphics applied to slats.*

Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

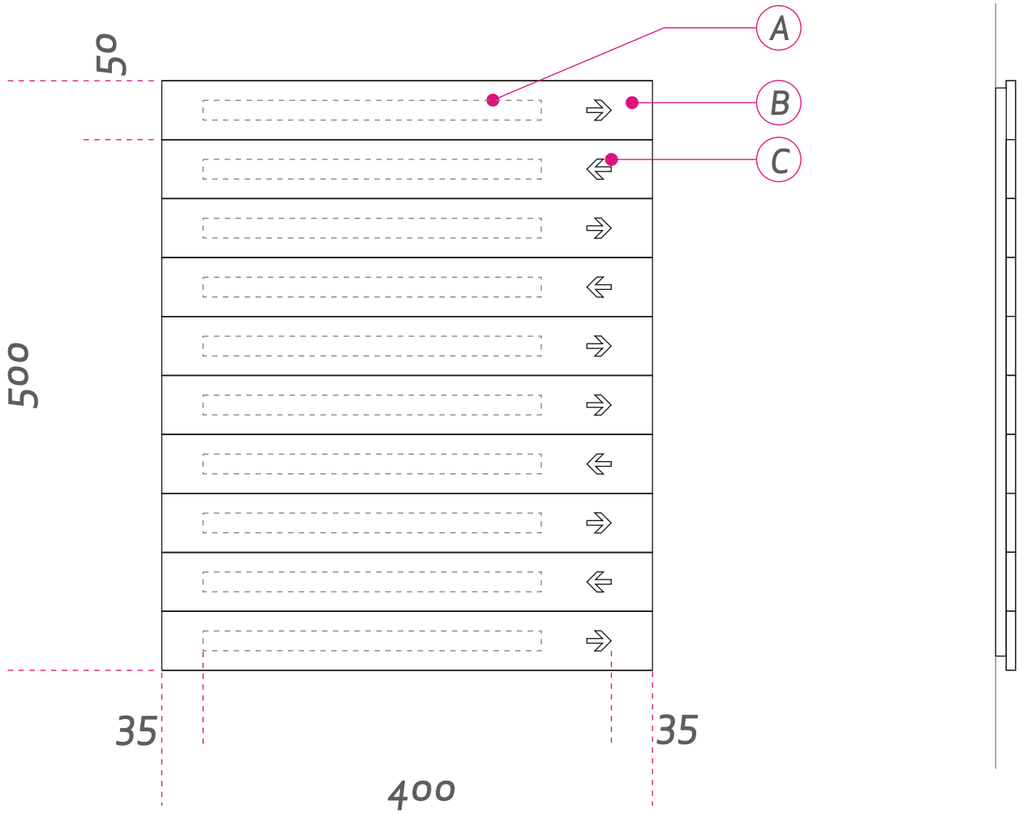
TRANSNET SIGNAGE PROGRAMME

Internal Signage Specification Layouts

Wall slat sign - small (5 slat)

Sign No.	T-INT 11
Scale	Scale 1 : 5
DRAWN	v1• 08•2007

TRANSNET



- (A) *Graphic Area - area for informative/confirmative/ directional vinyl graphics. 16mm font.*
- (B) *Slats - Extruded aluminium slats coated with the relevant divisional vinyl colour.*
- (C) *Directional arrows - white vinyl arrow graphics applied to slats.*

Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

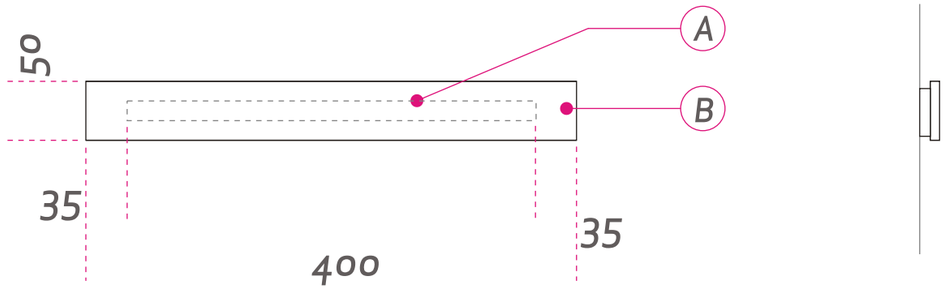
TRANSNET SIGNAGE PROGRAMME

Internal Signage Specification Layouts

Wall slat sign - small (10 slat)

Sign No.	T-INT 12
Scale	Scale 1 : 5
DRAWN	v1• 08•2007

TRANSNET



A Graphic Area - area for informative/confirmative/ directional vinyl graphics. 16mm font.

B Slats - Extruded aluminium slats coated with the relevant divisional vinyl colour.

Notes:

1. All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.
2. All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.
3. All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.
4. All lighting, if applicable, must follow the specifications shown in the lighting sheet.

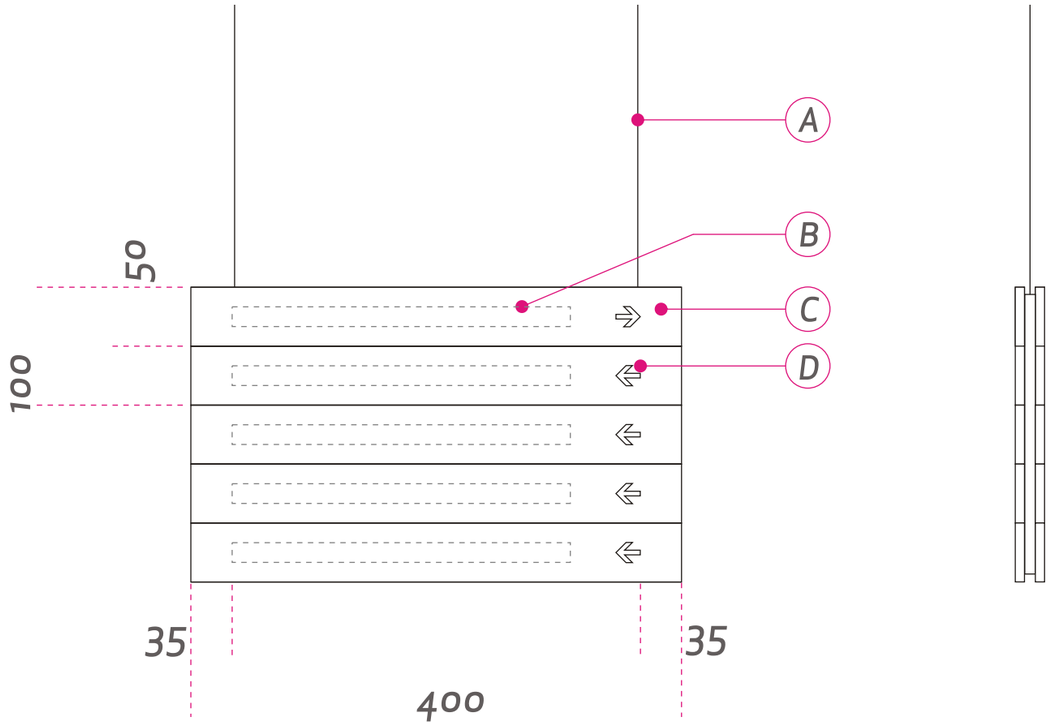
TRANSNET SIGNAGE PROGRAMME

Internal Signage Specification Layouts

Wall slat sign - small (1 slat)

Sign No.	T-INT 13
Scale	Scale 1 : 5
DRAWN	v1• 08•2007

TRANSNET



- (A) *Suspension cables - clear nylon cables with ceiling mounting brackets.*
- (B) *Graphic Area - area for informative/confirmative/ directional vinyl graphics. 16mm font.*
- (C) *Slats - Extruded aluminium slats coated with the relevant divisional vinyl colour.*
- (D) *Directional arrows - white vinyl arrow graphics applied to slats.*

Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

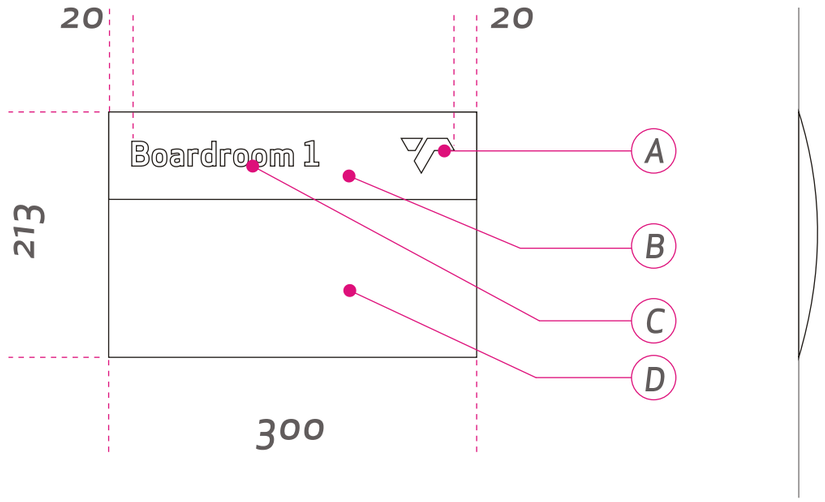
TRANSNET SIGNAGE PROGRAMME

Internal Signage Specification Layouts

Suspended slat sign - small (5 slat)

Sign No.	T-INT 14
Scale	Scale 1 : 5
DRAWN	v1• 08•2007

TRANSNET



- (A) *Watermark - white vinyl graphic of relevant divisional colour*
- (B) *Header colour - vinyl graphic panel of relevant divisional colour*
- (C) *Boardroom name - white vinyl graphic applied to header panel.*
- (D) *Clear removable sheet - acetate A4 sheet on which vinyl graphics are applied.*

Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

TRANSNET SIGNAGE PROGRAMME

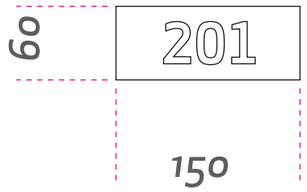
Internal Signage Specification Layouts

Boardroom sign

Sign No.	T-INT 15
Scale	Scale 1 : 5
DRAWN	v1• 08•2007

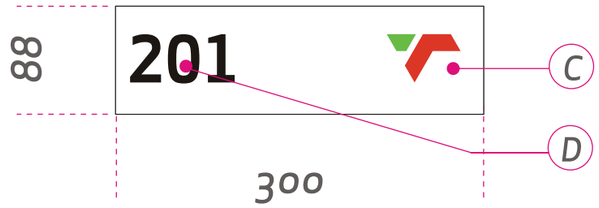
TRANSNET

T-INT 16/17/18



T-INT 16

T-INT 17



T-INT 18

(A) *Graphic Area - area for informative/confirmative/ directional vinyl graphics. 35mm font.*

(B) *Slats - Extruded aluminium slats coated with the relevant divisional vinyl colour.*

(C) *TRANSNET CI logo - vinyl logo applied to clear plastic sheet sign face*

(D) *Graphic Area - office number printed onto white paper positioned behind clear plastic sign face. (Easily changeable number)*

Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

TRANSNET SIGNAGE PROGRAMME

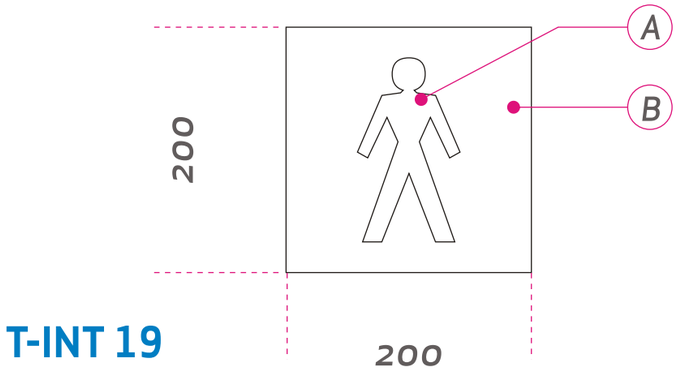
Internal Signage Specification Layouts

Nameplate slats signs - small/med/large

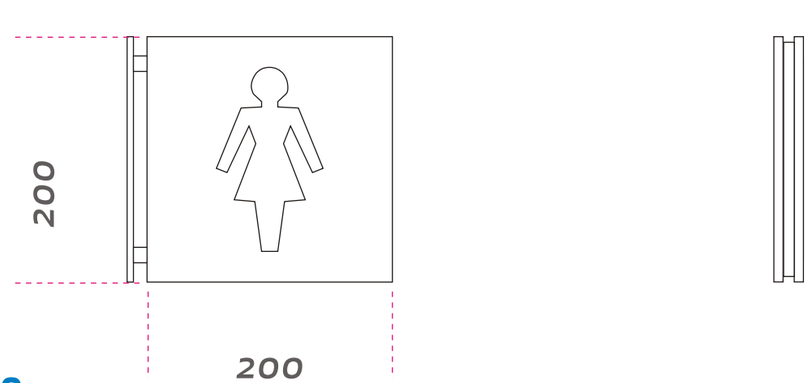
Sign No.	T-INT 16/17/18
Scale	Scale 1 : 5
DRAWN	v1• 08•2007

TRANSNET

T-INT 19/20



T-INT 19



T-INT 20

(A) *Graphic Area - area for informative/confirmative/ directional vinyl graphics. 16mm font.*

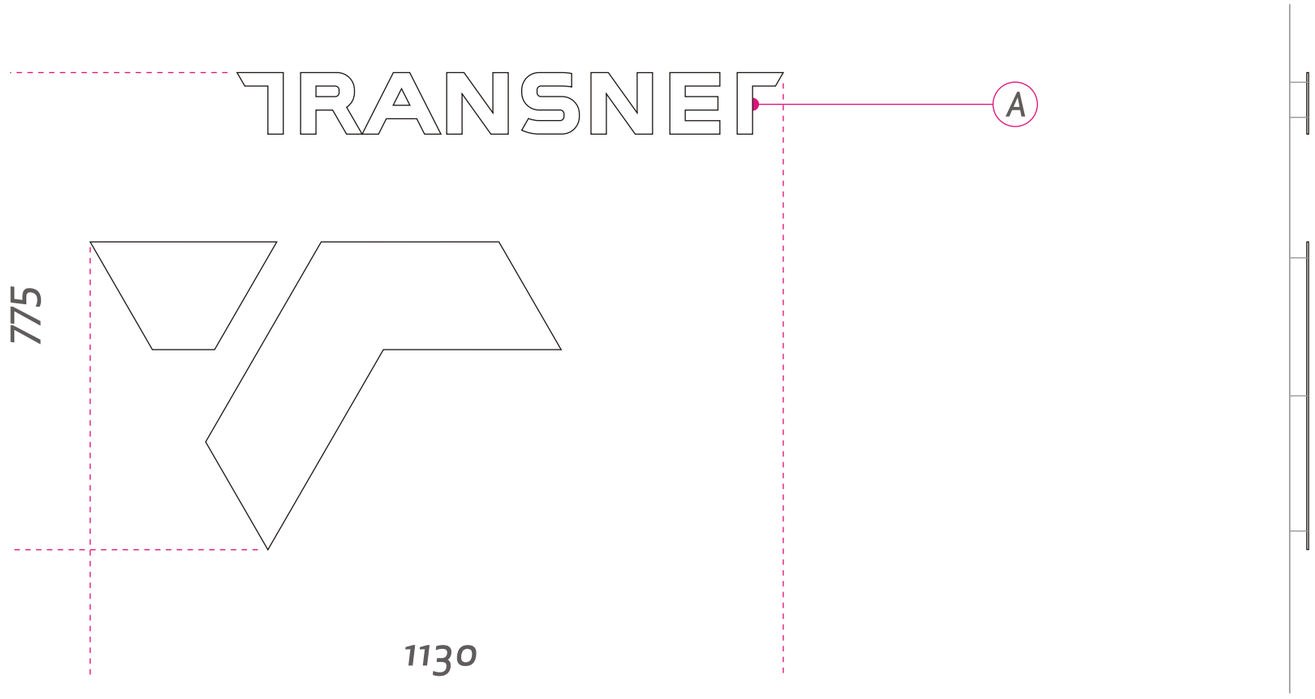
(B) *Slats - Extruded aluminium slats coated with the relevant divisional vinyl colour.*

Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

	TRANSNET SIGNAGE PROGRAMME	Sign No. T-INT 19/20
	Internal Signage Specification Layouts	Scale Scale 1 : 5
	Toilet signs	DRAWN v1• 08•2007

TRANSNET



A *Brushed Aluminium TRANSNET logo - routered aluminium logo mounted on pins 25mm off of wall surface.*

Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

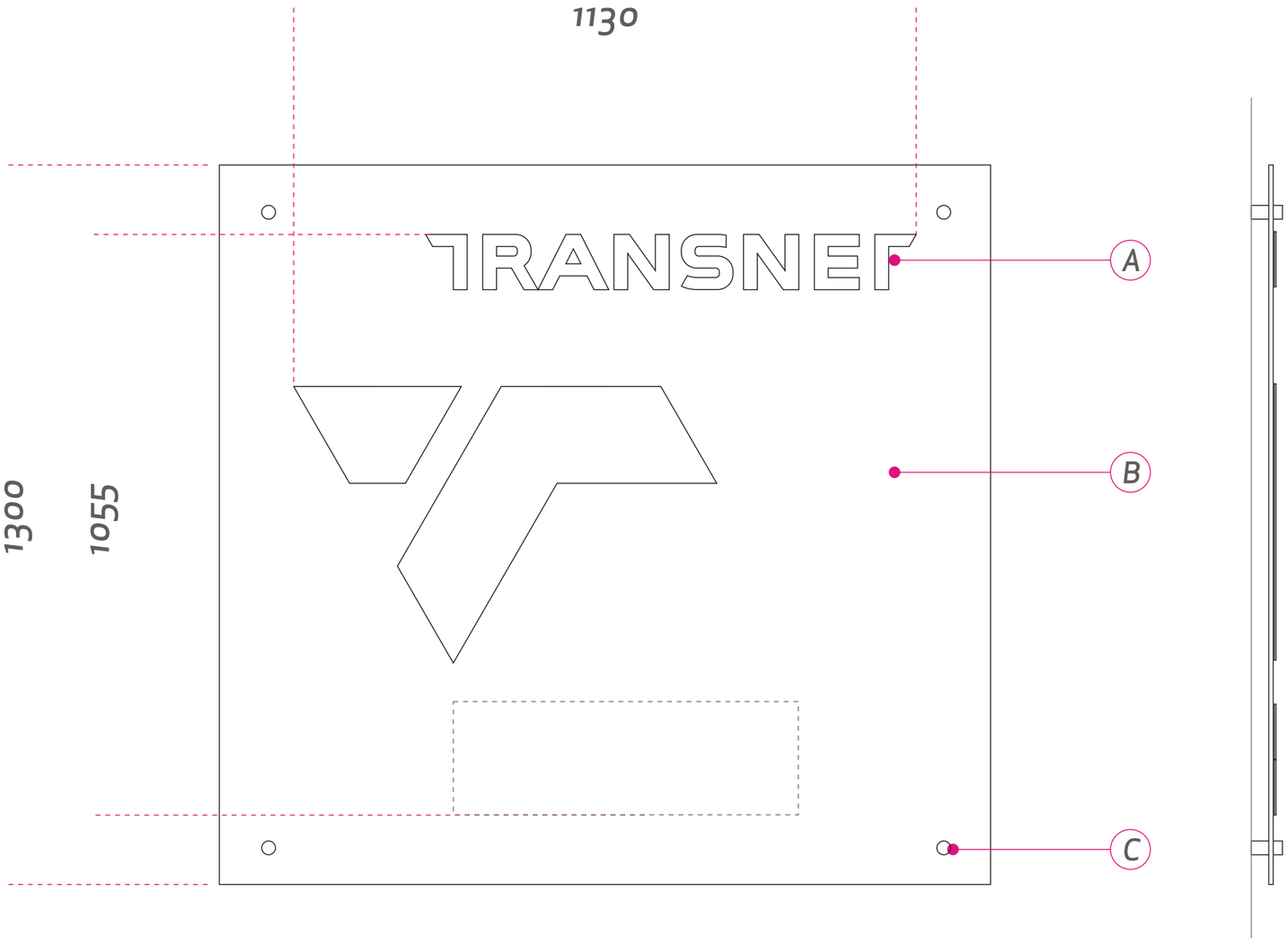
TRANSNET SIGNAGE PROGRAMME

Internal Signage Specification Layouts

Reception sign - on pins

Sign No.	T-INT 21
Scale	Scale 1 : 10
DRAWN	v1• 08•2007

TRANSNET



- (A) *Brushed Aluminium TRANSNET logo - routered aluminium logo mounted on pins 25mm off of wall surface.*
- (B) *Glass panel - 8mm glass panel with polished edges*
- (B) *Aluminium pins - ø 25mmx50mm turned aluminium mounting pins with dome head nuts.*

Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

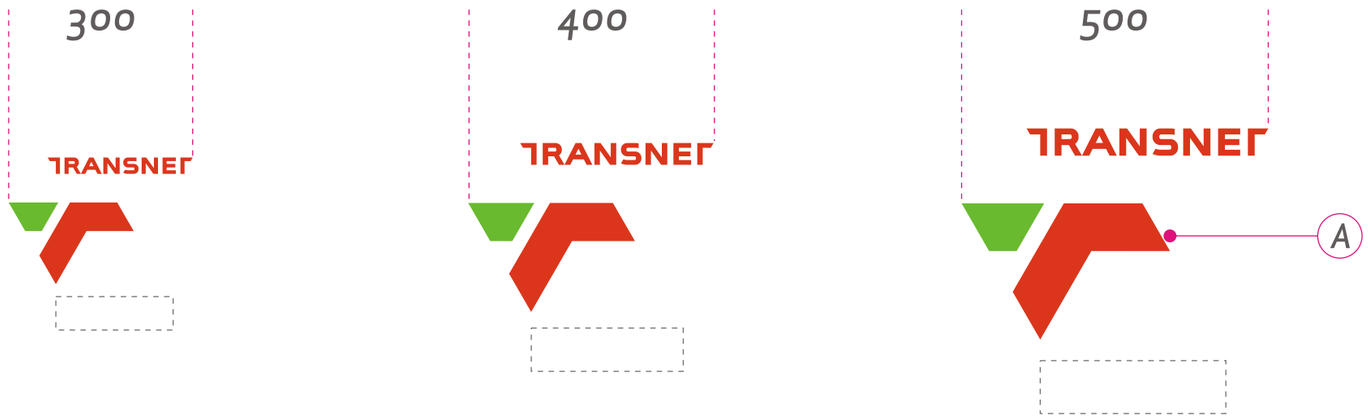
TRANSNET SIGNAGE PROGRAMME

Internal Signage Specification Layouts

Reception sign - on glass

Sign No.	T-INT 22
Scale	Scale 1 : 10
DRAWN	v1• 08•2007

TRANSNET



A *Full colour vinyl stickers - Digitally printed graphics on white vinyl, weeded onto backing tape. (to be used on vehicles)*

Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

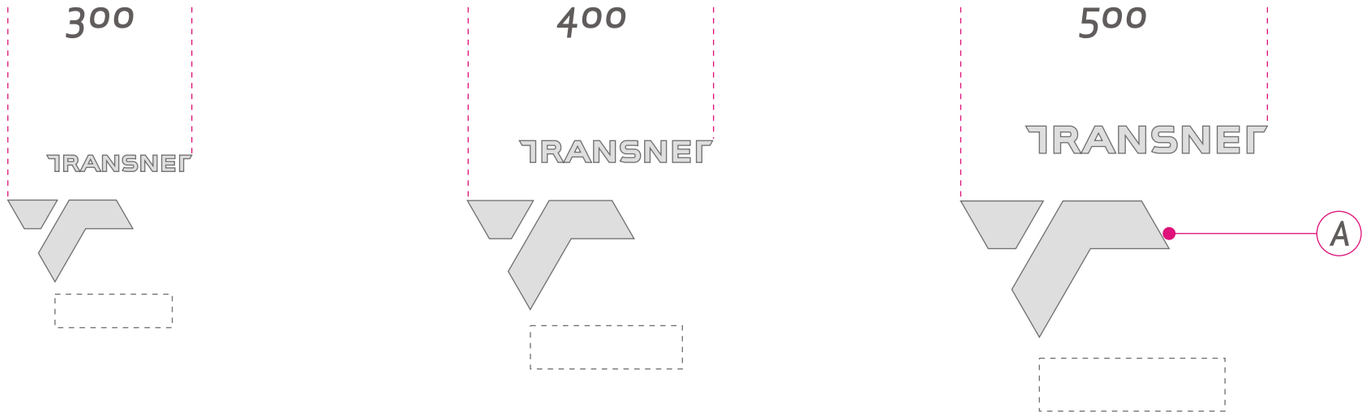
TRANSNET SIGNAGE PROGRAMME

Internal Signage Specification Layouts

Full colour vinyl stickers

Sign No.	T-INT 23/24/25
Scale	Scale 1 : 10
DRAWN	v1• 08•2007

TRANSNET



A *Frosted vinyl stickers - cut-out stickers weeded onto backing tape.*
(to be used on glass doors)

Notes:

1. *All TRANSNET C.I. Logo graphics are to follow the constraints described in the logo data sheet.*
2. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
3. *All vinyl, perspex and paints specs are to be adhered to, as shown in the specification table.*
4. *All lighting, if applicable, must follow the specifications shown in the lighting sheet.*

TRANSNET SIGNAGE PROGRAMME

Internal Signage Specification Layouts

Frosted vinyl stickers

Sign No.	T-INT 26/27/28
Scale	Scale 1 : 10
DRAWN	v1• 08•2007

TRANSNET

GLOSSARY

09

Brand architecture - the organising structure of the relationships of entities that go into making up the brand.

Brand Management – The management of intangible and tangible aspects of a brand.

Branding signatures – The composition and placement of the brands's logo and symbols on various elements of communication.

Body copy - the main body of any printed material that is indistinct from the introduction, index, illustrations and headings.

CMYK – cyan, magenta, yellow and black ink used in four colour process printing to achieve full colour images or graphics

Column width - the unit measurement by which space is sold in print media.

Copyright – the exclusive right, granted by law for a certain term of years, to make and dispose of copies of, and otherwise to control, a literary, musical, dramatic or artistic work.

Corporate identity – the term given to a set of logos that represent a brand in its entirety.

Co-branding – the use of two or more brand names in a communication usually to signify a partnership, joint venture or an endorsement of an initiative

Control Grid – The definition of the space and sizing rules between the various elements of the identity such as name, logo/symbol and descriptors.

Deboss – to decorate with a moulding or carving so that the background protrudes from the foreground shapes.

Dome – to cover with or encapsulate with a design.

Emboss – to decorate with a moulding or carving so that the foreground protrudes from the surrounding background

Foil – a branding process that involves a thin layer of polished metal or metallic ink placed onto an item or page to lend it luminance.

Font – a full set of type for printing or screening where all the characters are of the same design and size.

Headline - a caption printed at the top of a page or article in any printed material, usually in large letters and often summarizing the content that follows it.

Holding Shape – a shape, usually an extension of a symbol or part thereof, used in graphic layout to contain a picture or a section of type.

Identity Guide – summary document used to provide a basic visual reference on the correct use of an identity

Layout – the way component parts or individual elements are arranged in a design, stationery or literature.

Litho – a printing process in which the image to be printed is rendered on a flat surface – eg as on sheet zinc or aluminium – and treated to retain ink whilst the non-image areas are treated to repel ink.

Logo – a design, usually comprised of a graphic symbol and wordmark that is utilised by an organisation on its letterheads, advertising and environmental signs as an emblem by which the organisation can be easily recognised.

Media applications – specifications for application of the national Coat of arms in various media platforms

Monolithic brand – a singular overarching identity that spans or identifies the various offerings of products and services in a portfolio.

Merchandise – Goods, products, stock or commodities.

Naming structure – Guidelines specifying the display and placement of the brand name or sub-brand name relation to the mother brand/or logo/symbol.

Pay-off line – a short distinctive phrase used to identify a company, organisation or its goals.

Pantone – international standards for colour specification and referencing

Pictogram – a pictorial symbol that replaces a word, facility or action. The subject must be singular in meaning and simple in form. Usually associated with signage systems and designed in matching suites, where the shape and spatial design in similar cases.

Point – Unit of measurement of the size of typography.

RGB – the values of the colours of Red, Green, Blue used to make colours on screen i.e web, television etc

Sandblast – to blast air or steam carrying sand, at high velocity to etch glass, stone or metal surfaces.

Scale – a term used for changing the size or weighting of elements, either graphic or text, in a balanced way within the layout.

Sub-brand – a product or service within a portfolio of brands with a distinct identity from the mother brand.

Stock – Specification of paper in terms of its weight in grammage (gsm) and type (bond or laid).

Symbol – the graphic component of a logo that can be made up of one or several icons, each with significant meaning used to communicate the values of the brand.

Trademark – the name, symbol, figure, letter, work or mark adopted and used by a manufacturers or merchant in order to designate the goods he or she manufactures or sells and to distinguish them from those manufactured or sold by others including, but not limited to, any mark entitled to registration under the provisions of a statue is a trademark.

Typeface – a particular style of printed character – such as Apex, used on all literature. Also referred to as a font.

Typography – the arrangement of printed characters on the page.

UV Varnish – Creating a transparent glossy surface in a selected area.

Vinyl – a plastic material, made from vinyl polymer.

Visual identity – a term used to describe a complete visual look, it includes the style of typography, relationships pf typography and photography and palette that is maintained through all printed material relating to the brand.

Visual Standards manual – comprehensive instruction on the correct use of the graphic elements which make up a visual identity.

Wordmark – any letters, words or descriptors constructing a logo.

X-Height – the height of a type character

REVISION	REFERENCE	
Ver. 17	EEAM-Q-008	TRANSNET port terminals

DOCUMENT TYPE: SPECIFICATION	AUTHORISATION DATE: Date signed by CEO
TITLE: SPECIFICATION FOR CORROSION PROTECTION	PAGE 0 of 13

COMPILED BY:	REVIEWED BY:	REVIEWED BY:
EQUIPMENT ENGINEERING AND ASSET MANAGEMENT (GENERAL MANAGER)	SENIOR MANAGER (PROJECT MANAGER)	SENIOR MANAGER (ASSET MANAGER)

ACCEPTED BY:	AUTHORIZED BY:
CHIEF FINANCIAL OFFICER	CEO

FUTURE REVISION RECORD NUMBER	DESCRIPTION OF REVISION	APPROVAL	DATE
-1-			18/06/2008

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KEYWORDS	DATE OF LAST REVIEW: N/A
SPECIFICATION	DATE OF NEXT REVIEW: 18/06/2008

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1. SCOPE

1.1. This specification covers Transnet Port Terminals requirements for protective coating of iron and steel structures, electrical motors, gear boxes etc. against corrosion and must be read in conjunction with the main specification as well as the following (latest editions):-

SABS 064 "Preparation of steel surfaces for coating"

SABS 763 "Hot-dip (galvanized) zinc coatings"

SABS 1091 "National colour standards for paint"

BS 5493 "Code of practice for protective coating of iron and steel structures against corrosion"

2. TYPES OF CORROSION PROTECTION TO BE USED

2.1. The coatings specified in this specification are chosen according to BS 5439, Table 3, part 9, to ensure that the condition of the surface will be at least RE2 on the European scale of degree of rust, after 10 years in a environment of frequent salt spray, chemicals and polluted coastal atmosphere. During the 10 years, the normal maintenance painting will be done.

2.2. The paint manufacturer shall guarantee the paint for at least 10 years.

2.3. Should a tenderer wish to offer coating systems other than those specified, as an alternative, he shall submit full technical details and a list comparing all appropriate details of the alternatives proposed, with the original specified.

2.4. Tenderers must ensure that the different coats they offer in their tenders are compatible with each other.

2.5. The coating of proprietary items must be done according to Clause 3.

2.6. All galvanized components including bolts and nuts but excluding walkway gratings, must be painted with the specified system, unless otherwise approved.

The following coating systems must be used unless otherwise specified in the main specification:-

Substrate	Coat No	Generic Description	Approved Brand Products	Dry Film Thickness (μm)
3CR12 steel	1	Surface tolerant epoxy primer	DULUX /SIGMA Sigmacover primer INTERNATIONAL (PLASCON) Intergard 269 STONCOR (CHEMRITE COATINGS) Carboline 193 Primer	65-75
	2	Two component recoatable, polyurethane finish (Gloss)	DULUX / SIGMA Sigmadur gloss INTERNATIONAL (PLASCON) Interthane 990 STONCOR (CHEMRITE COATINGS) Carboline 134	65-75
Galvanized Steel	1	Surface tolerant epoxy primer	DULUX /SIGMA- Sigmacover primer INTERNATIONAL (PLASCON) Intergard 269 STONCOR (CHEMRITE COATINGS) Carboline 193 Primer	65-75
	2	Two component recoatable, polyurethane finish (Gloss)	DULUX /SIGMA- Sigmadur gloss INTERNATIONAL (PLASCON) Interthane 990 STONCOR (CHEMRITE COATINGS) Carboline 134	65-75

Substrate	Coat No	Generic Description	Approved Brand Products	Dry Film Thickness (μm)
Mild steel	1	Two component self curing inorganic zinc ethyl silicate OR two component zinc rich polyamide cured	DULUX /SIGMA- Sigma MC60 OR Sigma-cover primer	65-75

		epoxy primer	INTERNATIONAL (PLASCON) Interzinc 233 OR Interzinc 52 or 53 STONCOR (CHEMRITE COATINGS) Carbo Zinc 11 OR Carbo-line 658 Primer	
	2	Flexible recoatable high build polyamide cured MIO epoxy	DULUX/SIGMA – Sigmacover CM MIO INTERNATIONAL (PLASCON) Interseal 010 MIO STONCOR (CHEMRITE COATINGS) Carboline 190 HB M.I.O. or Carboline 193 M.I.O.	125-150
	3	Two component recoatable, polyurethane finish (Gloss)	DULUX/SIGMA Sigmadur gloss INTERNATIONAL (PLASCON) Interthane 990 STONCOR (CHEMRITE COATINGS) Carboline 134	65-75

2.7. The paint manufacturer's recommendations for the application of the different coating systems, curing time before handling or application of subsequent coats, health and safety recommendations etc. must be carefully adhered to.

2.8. Paint contractors must have a quality management system which must be submitted to the Engineer for approval before commencement of the work.

2.9. Galvanizing shall be done to SABS 763 heavy duty hot dip galvanizing to a thickness of at least 85μm. Electroplated components in zinc or cadmium are not acceptable.

2.10. All mounting bolts, nuts, washers and brackets as well as all fixing bolts, studs nuts and washers shall be of stainless steel. Fixing rivets shall be of either stainless steel or brass.

2.11. High tensile bolts for friction grip joints must not be galvanised and must be primed and painted after installation. High tensile bolts must be certified.

2.12. The full paint system shall be applied to all surfaces which are to be covered with wear pads, linings etc.

2.13. For steelwork which will be transported over long distances and erected on site the two pack epoxy primers is preferred.

3. PROPRIETARY ITEMS

3.1. Proprietary items such as gearboxes, motors, brakes etc. must either be painted according to this specification or where the coating system is equal to or exceeds this specification sufficient proof of the coating system applied must be provided. Items which are nearly equal to this specification shall be given a finishing coat according to this specification's thicknesses and final colours and to the following procedure:-

3.1.1. A cross cut test must be done to SABS SM159 to determine if the original coating adheres correctly to the substrate;

3.1.2. The original coating shall be rubbed down to remove any smooth finishing to form a suitable key for the finish coat and any damaged areas prepared and patch primed with a suitable primer;

3.1.3. The item must then be detergent washed to remove any foreign matter, taking care that no dust, solvent etc. contaminates any working part of the item;

3.1.4. A test shall be done on the existing coat to ensure that the finish coat will not react with and cause undue dissolving and lifting of the existing coat. This can be done by applying a small quantity of the finishing coat thinners.

3.1.4.1. Should any undue dissolving or lifting occur, a suitable intermediate or barrier coat must be applied before the finishing coat is applied.

3.1.5. Proprietary items which failed the cross cut test and which generally have inadequate protection shall be dismantled and the full corrosion protection specification applied.

4. SURFACE PREPARATION

4.1. All steel surfaces shall be detergent washed and fresh water rinsed to remove all oil, grease and surface contaminates before shot blasting.

4.2. Sharp edges shall be radiused and major roughness of welds shall be removed by grinding. Welding spatter and flux shall be removed.

4.3. Components manufactured from hot rolled steel sections and steel plate shall be blast cleaned to base metal in accordance with SABS 064 grade SA2½ - very thorough blast cleaning, to remove all mill scale, rust, weld spatter etc.

4.3.1. "Sharp" chilled iron shot, chilled iron grit, or granular abrasive slag is to be used to produce a proper degree of surface roughness.

4.3.2. Blast profile shall be determined by micrometer profile gauge, Keane-Tator surface profile comparator or Testex press-o-film.

4.3.3. The profile height shall be between 40 and 50μm at any point.

4.4. Good quality blast cleaning and spray painting equipment shall be used. Air used for spraying and blast cleaning shall be free from all traces of oil, water and salinity. Water and oil traps must be fitted to all equipment.

4.5. Wheel abrading equipment shall not be used unless an angular profile the same as clause 4.3.3 is achieved.

4.6. When wet blasting is done the primer shall be applied before oxidization starts or surface contamination occurs.

4.7. Components manufactured from 3CR12 steel shall be lightly abraded. The components shall then be passivated by using a mixture of 10 - 15% nitric acid in water which is rinsed off after 10 - 15 minutes. The surface shall be neutralized to pH 7 before it is coated.

4.8. Hot-dip galvanized components, galvanized bolts and nuts etc. shall be lightly abraded with a galvanizing pre-cleaner. The components shall then be washed with detergent and water and washed down with clean water until a water break free surface is achieved. Allow to dry thoroughly.

5. JOINTS AND MATING SURFACES OF MEMBERS

5.1. Mating (faying) surfaces of members which have to be joined by high tensile steel bolts in friction grip shall be cleaned according to Clause 4 and painted with primer only.

5.1.1. After being assembled joints so formed shall be seal welded and painted or after the intermediate coat was applied the edges shall be sealed with an approved brand of paintable flexible sealant or mastic (e.g. Butyl rubber, polyurethane sealer or two component epoxy), by means of a suitable caulking gun.

5.2. All rivets, bolts, welds, sharp edges etc. must be covered with a "stripe coat" of the primer or intermediate coat specified to ensure the correct dry film thickness on sharp edges, as well as sealing of bolt threads to head etc.

5.3. All other mating surfaces must be sealed with an approved brand of flexible Butyl rubber, paintable Silicone, polyurethane sealer or two component epoxy sealer, and joined while still wet. All excess compounds must be completely removed.

6. PAINTING PROCEDURES

6.1. Directly before the application of paint, the area to be painted shall be degreased with a suitable degreaser and left to dry.

6.2. Paint shall only be applied under the following conditions:-

6.2.1. There is adequate light.

6.2.2. The steel temperature is between 5 and 50°C and at least 3°C above the dew point of the air.

6.2.3. The relative humidity of the air is between the limits specified by the paint supplier.

6.2.4. Wind does not interfere with the method used and sand and dust cannot be blown onto wet paint.

6.3. Steelwork shall be supported on trestles, at least 900 mm off the ground for painting purposes.

6.4. An adequate number of test readings shall be taken per square meter in order to determine the dry film thickness.

6.4.1. The paintwork shall be acceptable if the average of the test readings taken falls within or exceeds the ranges given.

6.4.2. Paintwork shall not be acceptable if any single test reading is less than the specified minimum thickness.

6.5. An ultrasonic or electronic magnetic flux thickness measurement gauge shall be used, but in case of dispute, destructive testing shall be applied. He painted steelwork shall present a clean, neat appearance of uniform colour and gloss as applicable to the paint used. Each coat of paint shall be applied as a continuous, even film of uniform thickness. More than one application of paint may be required to achieve the dry film thicknesses specified or to obliterate the colour of the previous coating.

6.6. The use of thinners or solvents at any stage of the work is prohibited, unless specified by the paint manufacturer.

6.7. Precautions shall be taken to prevent coatings from being applied to equipment nameplates, instrument glasses, signs etc.

7. COLOUR CODES

Machinery and equipment shall be painted in the following final colours:-

	Area	Colour	Code No. [SABS 1091 and International No's]
7.1.1	Mobile equipment (cranes, loaders etc.)		
	a) Structure, machinery and electrical houses, operator's cabins, chutes, hoppers etc.	Transnet Red	RAL 3020
	b) Undercarriage, travel bogies, rubber tyred rims	Transnet Red	RAL 3020
7.1.2	Industrial buildings, conveyor structures		
	a) Roofs and canopies	Pantone cool grey 10	RAL 7037 (Staubgrau)
	b) Painted walls	Pantone cool grey 3	RAL 7035 (Lightgrau) or SABS 1091 G62 (Pale grey)
	c) Steel columns, rafters, trusses	Pantone cool grey 5	RAL 7004 (Signalgrau)
7.1.3	General		
	a) Guards	Golden yellow	SABS 1091-B49 RAL 1003
	b) Sheaves	Orange	RAL 2008
	c) Cable reels (Stainless steel	Orange	RAL 2008
	Machine buffers and parts of machine which could constitute a serious hazard	Golden Yellow (High Gloss) with Luminous green stripes in chevron pattern	SABS B49 and Luminous green

Area	Colour	Code No. [SABS 1091 and International No's]
e) Any exposed rotating part of machinery, electrical Switch-gear (other than starting and stopping devices and emergency stop control), electrical services e.g. conduit and allied fittings	Light Orange (High Gloss)	SABS 1091 B26 BS 381C-557
f) Low voltage switchgear panels where orange is not aesthetically acceptable	Light grey	SABS 1091-G29 BS 381C-631
g) Medium voltage cable trays, switchgear and motors (3,3 kV and up)	Oxford Blue	SABS FO2 BS 381C-105 RAL5003
h) Starting devices, low voltage cable trays and switchgear	Mid brunswick green (high gloss)	BS 381C-228 SABS1091-EO4 RAL6005
i) Portnet Logo	Transnet White	RAL 3012
j) Parts of stationary machinery (Electrical, motors, gearboxes, brakes, transformers, etc.])	Light Grey	SABS G29 BS 381C-631
k) Hand levers, hand wheels, oiling points, handrails on walkways, ladders	Golden Yellow (High Gloss)	SABS 1091 B49 BS 381C-356
l) Stopping devices, grease points, motor fan covers and danger signs (not symbolic safety signs for which see SABS 1186)	Signal red (High Gloss)	SABS 1091 A11 BS 381C-537 RAL3001
m) Walkways (non slip surfaces) (galvanized gratings not to be painted)	Shop floor green	
n) Informatory signs and notices (not symbolic safety signs for which see SABS 1186)	White on Emerald Green (High Gloss)	White on SABS 1091 E14 BS 381C- 228

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

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

8. FIELD TOUCH-UP PAINTING

8.1. Damaged and unpainted areas, fasteners, welds, etc. shall be cleaned by wire brushing with hand tool or power tool in a manner which will minimize damage to sound paint. Grinding will not be allowed. Rust spots shall be cleaned to bright metal. Thick edges of old paint abutting on bare metal surfaces shall be feathered by scraping and sanding.

8.1.1. Where welding is required on areas already coated with the coating system, the coat should be stepped back for ± 30mm around the weld area.

8.2. The paint shall be applied to match the original coats in accordance with the manufacturer's recommendations for the specific paint system.

Note: Inorganic zinc primers shall not be re-covered with an inorganic primer, but only with an organic zinc primer.

8.3. Areas of damaged galvanizing shall be repaired with an approved cold galvanizing product or metal sprayed by the wire spraying process with Zinc, and then touched up with the specific paint system.

9. GENERAL

9.1. All walkways, floors, maintenance platforms etc. must be painted with a durable, non skid coating of the appropriate colour.

9.2. Exposed machined surfaces must be coated with a strippable corrosion inhibitor (e.g. Tectyl).

9.3. Where different materials will be in contact with each other and galvanic corrosion can occur the contact areas of the materials must be isolated from each other or the joints made water proof to prevent ingress of moisture.

9.4. All components must be designed with corrosion prevention in mind and specifically the following:-

9.4.1. No entrapment of dirt, product, moisture etc.

9.4.2. No areas must be inaccessible for maintenance such as too narrow gaps etc.

9.4.3. Large flat areas rather than complicated shapes and profiles.

9.4.4. No sharp corners and discontinuous welds.

9.5. Parts of equipment which are exposed to high temperatures must be coated with the following system:-

Coat No	Generic Description	Approved Brand Products	Dry Film Thickness (μm)
1	Two component self curing inorganic zinc ethyl silicate	DULUX /SIGMA-Sigma MC60 INTERNATIONAL (PLASCON) Interzinc 233 STONCOR (CHEMRITE COATINGS) Carbo Zinc 11	65-75
2	Single component high temperature moisture curing silicone with aluminuim flakes	DULUX/SIGMA – Sigmatherm Silicate INTERNATIONAL (PLASCON) Intertherm 50 STONCOR (CHEMRITE COATINGS) Carboline 1248	40

10. MAINTENANCE PAINTING OF STRUCTURES

10.1. Areas which are only lightly corroded must be cleaned by means of high pressure water blasting or wire brushing by power tool and the following system applied:-

Coat No	Generic Description	Approved Brand Products	Dry Film Thickness (μm)
1	Surface tolerant two pack epoxy primer with aluminuim pigments	Dulux/SIGMA Aluprimer STONCOR (CHEMRITE COATINGS) Carbomastic 15 INTERNATIONAL (PLASCON) Intergard 468,	125-150
2	Same as first coat OR micaceous iron oxide (MIO) epoxy	DULUX/SIGMA – Sigmacover CM MIO	125-150

		INTERNATIONAL (PLASCON) Interseal 010 MIO STONCOR (CHEMRITE COATINGS) Carboline 190 HB M.I.O. or Carboline 193 M.I.O.	
3	Two component recoatable, polyurethane finish (Gloss)	DULUX/SIGMA Sigmadur gloss INTERNATIONAL (PLASCON) Interthane 990 STONCOR (CHEMRITE COATINGS) Carboline 134	65-75

10.1.1. Alternatively, the Noxyde paint system can be used, consisting of two to three coats of water based Noxyde paint to achieve a DFT of 350 to 400 microns. Where the Noxyde system is used on areas other than slightly corroded structural areas, the following additional requirements must be observed:

10.1.1.1. Very smooth surfaces (e.g. 3CR12, stainless steel or hot-dip galvanized components, bolts, nuts and fittings, and HT bolts): Parts must be thoroughly degreased using OptiDegreaser, washed down with potable water, and immediately when dry, a single coat of OptiPrimeAqua applied.

10.1.1.2. Paintable flexible sealant/mastic: Only sealant approved by the paint manufacturer may be used, and an initial coat of OptiPrimeAqua applied over it before the further coats of Noxyde are applied.

10.1.1.3. Bolted/rivited connections: After blasting or and/or cleaning as required, apply a coat of OptiPrimeAqua and an additional stripe coat of Noxyde, in contrasting colour, to all bolt/nut and plate edges and crevices.

10.2. The adhesion of old coatings must be verified by doing a cross cut adhesion test on selected areas.

10.3. The compatibility of the new paint system on the old coating must be tested and guaranteed in writing by the paint supplier.

10.4. The work and coating system must be guaranteed for a minimum of 12 months.

10.5. All heavily corroded areas must be shot blasted to minimum SA2 and the three coat system indicated in clause 2.6 applied.

10.6. Areas where the old coating is still sound need only be high pressure cleaned with a suitable solvent and coated with one of the primers suggested in clause 10.2 (as tie coat) and then with one of the top coats suggested in clause 2.6 to get the appropriate colour and finish. The minimum dry film thickness of this tie coat must be 75 microns and top coat must be 50 microns, but the previous coating colour shall be completely obliterated to present a uniform colour.

Note: Inorganic zinc primers shall not be re-covered with an inorganic primer, but only with an organic zinc primer.

10.7. Repairs to the insides of all the enclosed sections of the booms as well as the insides of the crane legs, sill beams, cross beams, pylon cross bracing members etc. shall be done as above but the top coat need not be applied.

****** END OF SPECIFICATION HE 9/2/8 [Version 17] ******

INTEGRATED MANAGEMENT SYSTEM

ASBESTOS MANAGEMENT PROCEDURE

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SUMMARY VERSION CONTROL

VERSION NO.	NATURE OF AMENDMENT	PAGE NO.	DATE REVISED
1.0	New Procedure		

Note: Only latest amendments and/or additions are reflected in italics in the body of the document.

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DOCUMENTATION SIGN-OFF SHEET

I, the undersigned hereby approve this procedure.

ROLE	CAPACITY/ FUNCTION	SIGNATURE	DATE
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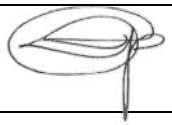
Accepts document for adequacy and practicability. Comments:			
ROLE	**CAPACITY/FUNCTION**	**SIGNATURE**	**DATE**
Process Owner:	**Executive Manager: Health and Safety (Human Factors)**		11/06/2021
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TRANSNET

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1. PURPOSE

The purpose of this procedure is to provide guidelines and a process for the identification, recording, reporting, effective investigation, monitoring and management of asbestos-contaminated material and products. The procedure seeks to clarify roles, responsibilities and accountabilities of all role players for Transnet SOC Ltd (hereafter referred to as "Transnet") to ensure proper and timeous implementation of corrective and preventive actions for asbestos exposures by our employees, contractor, and visitors.

2. APPLICABILITY

This Asbestos Management Procedure (AMP) applies to all Transnet employees, contractors, and visitors who may be in contact with or disturb asbestos-containing materials–on Transnet premises.

3. REFERENCE DOCUMENTS

NAME	REFERENCE	APPLICABLE SECTIONS
Asbestos Abatement Regulations	Published under Government Notice R1196 in GG 43893 of 10 November 2020	All Sections
Competence, Awareness, and Training Procedure	TRN-IMS-GRP-PROC-08	Clause 6.2.6
Construction Regulations	2014	All Sections
Contractor Management Procedure	TRN-IMS-GRP-PROC-014	All clauses of the procedure
Document Data and Record Management	TRN-IMS-PRP-PROC-10	6.11.7, 6.11.8 and 7
Norms and Standards for Disposal of Waste by Landfill site	Published on 23 August 2013	Regulation 4
Occurrence and Non-Conformance Management Procedure	TRN-IMS-GRP-PROC-013	All clauses of the procedure
Operational Planning and Control Procedure	TRN-IMS-GRP-PROC-09	All clauses of the procedure

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4. DEFINITIONS AND ABBREVIATIONS

4.1 Definitions

Asbestos refers to the following fibrous silicates:

- asbestos actinolite, CAS No. 77536 -66 -4;
- asbestos grunerite (amosite), CAS No. 12172 -73 -5;
- asbestos anthophyllite, CAS No. 77536 -67 -5;
- chrysotile, CAS No. 12001 -29 -5 or CAS No. 132207 -32 -0;
- crocidolite, CAS No. 12001 -28 -4;
- asbestos tremolite, CAS No. 77536 -68 -6; and
- any mixture containing these fibrous silicates.

Asbestos - Containing Material: Means asbestos as well as any material that contains asbestos and includes asbestos cement products, asbestos coating, asbestos insulation board, asbestos insulation, asbestos textured decorative coatings, asbestos-contaminated soil, and other asbestos-containing materials.

Asbestos cement products: refers to a range of building materials that were manufactured using moulding and compression techniques, consisting of a hardened mixture of asbestos fibres, cement and water.

Asbestos clearance certificate: A written document verifying that the regulated asbestos fibre concentration in the air meets the clearance indicator.

Asbestos client: Any person for whom asbestos work is performed; "asbestos coating" means a surface coating which contains asbestos for fire protection, heat insulation or sound insulation, but does not include textured decorative coatings.

Asbestos-containing material: Means asbestos as well as any material that contains asbestos and includes asbestos cement products, asbestos coating, asbestos insulation board, asbestos insulation, asbestos textured decorative coatings, asbestos contaminated soil and other asbestos-containing materials.

Asbestos disposal site: A site specifically designated for the purpose of asbestos disposal in terms of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008).

Asbestos dust: Airborne or settled dust, which contains or is likely to contain regulated asbestos fibres.

Asbestos in place: Includes any asbestos, asbestos cement products, asbestos coatings, asbestos-containing material, asbestos dust, asbestos insulation, asbestos insulation board and asbestos waste at the workplace.

Asbestos insulation: Any asbestos-containing material, which is used for thermal, acoustic or other insulation purposes, including fire protection, except:

- Asbestos cement, asbestos coating or asbestos insulating board; and

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- An article of bitumen, plastic, resin or rubber, which contains asbestos and which thermal and acoustic properties are incidental to its main purpose.

Asbestos insulating board: Means any flat sheet, tile or building board consisting of a mixture of asbestos and cement or any other material, but which is not:
- Asbestos coating; and
- An article of bitumen, plastic, resin or rubber, which contains asbestos and which thermal and acoustic properties are incidental to its main purpose.

Asbestos removal site: Means a workplace where asbestos removal work is performed.

Asbestos removal supervisor: A competent person responsible for supervision of physical asbestos work processes and coordination of asbestos removal on an asbestos removal site.

Asbestos risk assessment: Means a risk assessment and risk categorisation of potential exposure to asbestos dust.

Asbestos waste: Refers to undesirable or superfluous asbestos or asbestos containing product or by-product or the undesirable or superfluous asbestos or asbestos-containing emission or residue of any process or activity, which has been:
- discarded by any person; and
- Accumulated and stored temporarily with the purpose of discarding it, with or without prior treatment connected with the discarding thereof.

Asbestos work: Means work that exposes or is likely to expose an employee to asbestos dust, including transporting, storing, removing, handling, treating, repairing and disposing of asbestos.

Contaminated Land: This means any Transnet owned or leased land or buildings that have the presence of asbestos fibre or pollution or may affect the quality of the soil or environment adversely.

Chief Director: Provincial Operations: Means the provincial director as defined in regulation 1 of the General Administrative Regulations, 2003, published as Government Notice R.929 in Gazette No. 25129 of 25 June 2003.

Clearance indicator: Means the measured airborne concentration of regulated asbestos fibres is less than 0, 01 fibres per millilitre (f/ml), as measured in accordance with HSG 248 or an equivalent method.

Competent person: A person who-
- has, in respect of the work or task to be performed, the required knowledge, training and experience and, where applicable, qualifications specific to asbestos work or related tasks: Provided that, where appropriate qualifications and training are registered in terms of the National Qualifications Framework Act, 2008 (Act No. 67 of 2008), those qualifications and that training must be regarded as the required qualifications and training; and

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- Is familiar with the Act and the applicable regulations made under the Act.

Demolition work: A method to dismantle, wreck, break, pull down or knock down a structure or part thereof by way of manual labour, machinery or the use of explosives.

Environmental air monitoring: Includes static air monitoring for regulated fibres conducted downwind from outdoor type 2 asbestos work or outside asbestos enclosures where type 3 asbestos work is performed or in any area where there is the potential for asbestos contamination.

Environment: Means surrounding within which humans exists and that are made up of:
(i) The land, water, atmosphere of the earth;
(ii) Microorganisms, plant, and animal life;
Any part or combination of (i) and (ii) and the interrelationships among and between them; and,
(iii) The physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.

Exposed to asbestos: Means exposed or likely to be exposed to asbestos dust while at the workplace.

Exposure: Has a corresponding meaning.

Incidental asbestos exposure: Means unintentional exposure to airborne asbestos at a workplace where asbestos is present.

Non-asbestos-related work: Includes work performed in the vicinity of asbestos containing materials or asbestos cement products, but excludes work performed on or with asbestos-containing materials or asbestos cement products.

OEL: Means the occupational exposure limit, the value of which is set by the Minister, for a stress factor in the workplace.

OEL for asbestos: Means an occupational exposure limit of 0, 1 regulated asbestos fibres per millilitre of air measured in accordance with HSG 248.

Asbestos contractor: Means either a contractor, a mandatory or an employer who conducts type 2 asbestos work or type 3 asbestos work or asbestos removal work, who is registered with the chief inspector.

Regulated asbestos area: Means an area demarcated and controlled as contemplated in regulation 18 of the Asbestos Abatement Regulations, 2020.

Regulated asbestos fibre: Means a particle of asbestos with a length-to-diameter ratio greater than 3 to 1, a length greater than 5 micrometres and a diameter less than 3 micrometres.

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Remediation: The management of a contaminated site to prevent, minimise, or mitigate damage to human health or the environment. Remediation may include both direct physical actions (e.g. removal, destruction, and containment of contaminants) and institutional controls.

Remediation objective: A numerical limit or narrative statement that has been established to protect and maintain a specified use of soil at a particular site by taking into account site-specific conditions.

Removal of asbestos: Means all tasks included in the process of removing asbestos from the location specified in the inventory of asbestos in place to the final disposal site.

Repair of asbestos-containing materials: Means restoring asbestos-containing materials to a safe condition, after damage, using non-destructive methods in a manner that does not cause the release of asbestos fibres.

Respiratory protective equipment: Means a device, which is worn over at least the mouth and nose to control the inhalation of air that is not safe.

Risk assessment: A process designed to determine the qualitative aspects of hazard identification and usually a quantitative determination of the level of risk based on deterministic or probabilistic techniques.

Risk categorisation: Means the grouping and ordering of potential asbestos exposure risks as contemplated in regulation 5(3) 18 of the Asbestos Abatement Regulations, 2020.
Short-term exposure limit: Means a short-term exposure limit of 0, 6 regulated asbestos fibres per millilitre of air, measured over a continuous 10-minute period.

Type 1 asbestos work:

- painting of asbestos cement products in a manner that does not require surface preparation and does not cause the release of asbestos fibres; or
- the removal of less than 10 square metres of asbestos cement products or equivalent gutters and piping or asbestos insulating board, where removal work may not be repeated on the same site within a period of six months; and, does not require registration as a registered asbestos contractor with the chief inspector.

Type 2 asbestos work:

- the repair or encapsulation of asbestos cement products in a manner that does not require surface preparation; or
- the removal of asbestos cement products or asbestos insulating board; and, requires registration as a type 2 registered asbestos contractor with the chief inspector.

Type 3 asbestos work: The removal, repair or encapsulation of any asbestos and asbestos-containing material; and, requires registration as a type 3 registered asbestos contractor with the chief inspector.

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UN Transport of Dangerous Goods: Means the UN Recommendations on the Transport of Dangerous Goods – Model Regulations, Volumes 1 and 2, which are guidance documents developed by the United Nations to harmonise dangerous goods transport regulations, may be updated from time to time, and are commonly known as the UN Orange Book.

Waste classification- Means establishing:

- whether a waste is hazardous based on the nature of its physical, health and environmental hazardous properties (hazard classes); and
- the degree or severity of hazard posed (hazard categories).

4.2 Abbreviations

ACM	Asbestos-Containing Material
ACW	Asbestos-Containing Waste
AIA	Asbestos Inspection Authority
AMP	Asbestos Management Procedure
CCP	Compliance Control Plan
DFFE	Department of Forestry, Fisheries and Environment
DoEL	Department of Employment and Labour
DWS	Department of Water and Sanitation
IMS	Integrated Management System
MEC	Member of Executive Committee
NEW: WA	National Environmental Management: Waste Act, Act 59 of 2008
ODs	Operating Divisions
OEL	Occupational Exposure Limit
OEP	Occupational Exposure profile
OHM/N	Occupational Health Manager/Nurse
OHS Act	Occupational Health and Safety Act, Act 85 of 1993
PPE	Personal Protective Equipment
RMC	Risk Management Committee
SABS	South African Bureau of Standards
SAR	Site Assessment Report
SANS	South African National Standards
TREM	Transport Emergency Control
UN	United Nations

5. ACCOUNTABILITY, RESPONSIBILITY AND AUTHORITY

Top Management	▪ Overall accountability of this procedure; ▪ Guide the overall occurrence and non-conformance management; ▪ Demonstrate commitment to the development and implementation of occurrence and non-conformance management procedure;

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	▪ Ensure availability of financial, human, and organisational resources; ▪ Communicate to all employees regarding occurrence trends; and • Monitor implementation procedure.
Chief Legal Officer (CLO)	▪ Ensure compliance with this procedure.
Senior Management	▪ Communicate requirements of the procedures and ensure adherence; ▪ Ensure adequacy and integrity of data and information; ▪ Analysis of the occurrence trends, initiate and communicate action plans; ▪ Ensure corrective and preventative actions are implemented to address the root cause(s); ▪ Provide required training and awareness, and maintain records for all personnel; ▪ Ensure effective communication on how measurements and targets will be met; and ▪ Monitor and review implementation of the procedure.
Line Management	▪ Communicate requirements of the procedures and ensure adherence; ▪ Ensure adequacy and integrity of data and information; ▪ Analysis of the occurrence trends, initiate and communicate action plans; ▪ Implement this procedure; ▪ Notify, report, and record occurrences; ▪ Conduct occurrence investigations; ▪ Ensure relevant competencies are in place to implement this procedure; and ▪ Implement recommendations, corrective and preventative actions.
Safety Manager/Specialists	▪ Take a lead in providing necessary guidance for the management of asbestos located in Transnet buildings; ▪ Ensure that a written safe work is developed and followed; ▪ Provide adequate information, instruction, and training ▪ Provide an up to date inventory of asbestos in place to the registered contractor and approved inspection authority; ▪ Review and update asbestos inventory; ▪ Ensure that risk assessments are carried out before asbestos work ▪ Appoint, in writing the Approved Inspection Authority;

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	▪ Ensure that appropriately registered asbestos contractor performs type 2 or 3 as per asbestos plan of work; ▪ Ensure that notification of asbestos work is given within seven days to the Department of Labour and Employment Chief Director: Provincial Operations as per Annexure 4; ▪ Stop any registered contractor asbestos from executing any asbestos work which poses health or safety risks to persons until such time the risk has been appropriately mitigated; ▪ Ensure that before asbestos work commences, the registered asbestos contractor is registered and in Good Standing with the Compensation for Occupational Injuries and Diseases Act, 1993 (Act No 130 of 1993); and ▪ Where a fatality or permanent disability occurs during asbestos work, report such fatality or injury to the Chief Director: Provincial Operations as contemplated in section 24 of the Act and in accordance with section 8 and 9 of the General Administrative Regulations, 2003.
Environment Manager/Specialists	▪ Notify the Minister of Forestry, Fisheries and Environment (DFFE) or MEC of Provincial Environment Department as per the requirements of Part 8 of the National Environment Management: Waste Act, 58 of 2008 using the template included as Annexure 5 of the contaminated land, or plan to undertake the activity that may or has caused contamination of land: ▪ Undertake site assessment to determine the level of contamination on the land; ▪ Conduct risk assessment, to determine the impact of contamination on health and the environment including pathway/source of contamination and receptors; ▪ Develop Remedial Action Plans for risks/contamination that has been identified on sites; ▪ Submit Site Assessment Report (SAR) to DFFE; ▪ Receive a decision and implement remediation orders from DEFF; ▪ Report on the progress on the asbestos remediation and phasing out to OD EXCOs; and ▪ Ensure that asbestos is disposed of in a designated hazardous landfill site if disposal is the preferred option.

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Employees	▪ Adhere to this procedure and cooperate with management; ▪ Carry out instructions issued in the interest of this procedure; ▪ Attend training and awareness; ▪ Report all occurrences in line with the requirements of this procedure; ▪ Participate in the successful implementation of corrective action plans. ▪ Comply with the instructions issued by Transnet concerning asbestos management requirements as per applicable legislation; ▪ Familiarise and adhere to the contents of the Asbestos Management Standard Operating Procedure; ▪ Familiarise themselves with hazards associated with working with asbestos; ▪ Use appropriate PPE, equipment, and materials provided for handling and working with asbestos; ▪ Attend required training provided by the organisation; ▪ Report suspected asbestos-containing material or contaminated sites to Supervisors, Safety or Environment Department; ▪ Ensure that no asbestos or asbestos-contaminated material is disposed in waste bins for general waste; and ▪ No cleaning, damaging, disturbing, or removing asbestos-containing materials unless they are trained and authorised to do so.
Approved Inspection Authority	▪ An approved inspection authority involved in type 2 or type 3 asbestos work shall: o ensure that the appropriately registered asbestos contractor performs only type 2 or type 3 asbestos work, as the case may be; o obtain a copy of an up-to-date inventory of asbestos in place from the asbestos client prior to asbestos work taking place; o in consultation with the registered asbestos contractor, compile a plan of work in accordance with regulation 15; o approve and submit the plan of work at least seven days prior to commencement of asbestos work to the Chief Director: Provincial Operations for acknowledgement; o receive acknowledgement from the Chief Director: Provincial Operations within the seven-day period;

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	○ confirm the employee medical certificate of fitness and asbestos training records for that asbestos work; ○ provide guidance and site-specific instructions to the registered asbestos contractor on the approved plan of work; ○ inspect adherence to the approved plan of work and requirements of the Regulations; ○ stop any registered asbestos contractor from executing any asbestos work which poses a health or safety risk to persons until such time that the risk has been appropriately mitigated; ○ perform planned asbestos air monitoring in accordance with regulation 16 of the Asbestos Abatement Regulations, 2020 and provide, as soon as is reasonably practicable, air monitoring results to the registered asbestos contractor and asbestos client; ○ issue a written report, which includes findings and, where necessary, recommendations; and ○ ensure that, upon completion of type 2 or type 3 asbestos work, clearance is performed as required in regulation 22 of the Asbestos Abatement Regulations, 2020.
Asbestos contractor for asbestos work	▪ In the case of type 2 and type 3 asbestos work, the registered asbestos contractor shall: ○ undertake only the type of asbestos work for which they are registered by the chief inspector; ○ appoint an occupational health and safety representative as contemplated in section 17 of the Asbestos Abatement Regulations, 2020; ○ obtain a copy of an up-to-date inventory of asbestos in place from the asbestos client, prior to asbestos work taking place. ▪ Before commencement of any asbestos work and during such work, the registered asbestos contractor shall ensure that a risk assessment is performed which includes: ○ identification of the hazards to which persons may be exposed; ○ an assessment of the risks related to the hazards based on a documented method; and ○ documented control measures to mitigate the risk; ○ the risk assessment contemplated in sub-regulation (a) is reviewed: ○ at regular documented intervals;

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	○ when an incident has occurred; and ○ when the scope of work changes; and ○ an up-to-date copy of the risk assessment is made available at the relevant asbestos work site. ▪ The registered asbestos contractor shall: ○ ensure that the approved plan of work is submitted to the Chief Director: Provincial Operations at least seven days prior to commencement of asbestos work; ○ appoint in writing an asbestos removal supervisor for each asbestos work site, who shall ensure: ○ occupational health and safety compliance on the asbestos removal site; ○ compliance with safe asbestos removal or repair procedures; ○ the correct use of personal protective equipment; and ○ proper decontamination and waste disposal. ○ adhere to the repair or removal methodology and associated control measures provided in the plan of work approved for that specific asbestos work; ○ ensure that the employee medical and training records are available on site for inspection and validation; ○ ensure that at least the following information for every employee is recorded and kept for a minimum period of 50 years: ○ Physical address of every asbestos work project; and ○ names and identification numbers of employees potentially exposed; ▪ before commencement of asbestos work, ensure that: ○ an approved inspection authority has been appointed in writing by the asbestos client; and ○ the registered asbestos contractor is registered and in good standing with the Compensation Fund or with a licensed compensation insurer as contemplated in the Compensation for Occupational Injuries and Diseases Act, 1993; and ▪ where a fatality or permanent disabling injury occurs during asbestos work, ensure that a report about the

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	fatality or injury is provided to the Chief Director: Provincial Operations as contemplated in section 24 of the Act, and in accordance with regulations 8 and 9 of the General Administrative Regulations, 2003, and that the report includes the measures that the contractor intends to implement to ensure safe asbestos work.

6. PROCEDURE

6.1. Types of asbestos found in Transnet premises

The following types of asbestos are found within Transnet operational area:

- Asbestos-containing material (ACM);
- Asbestos cladding on outside buildings, pipes, and roof sheeting
- Asbestos cement sheeting (can be found inside old coaches);
- Asbestos cladding inside buildings
- Asbestos blankets, buried stockpiles, and asbestos-contaminated railway sleepers and raw asbestos.

6.2. Classification of Waste

- Asbestos waste is classified as hazardous waste in terms of the National Environmental Management: Waste Act, 2008 (Act 59 of 2008): National Norms and Standards for disposal of waste to landfill dated 13 August 2013; and
- Disposal for asbestos waste is only allowed at a Class A landfill designed in accordance with Section 3 (1) and (2) of the Norms and Standards or subject to 3(4) of the Norms and Standards, at a landfill site designed in accordance with the requirements for Hh/HH landfill as specified by the Minimum Requirements for Waste Disposal by Landfill (2nd Ed, DWAF, 1998).

6.3. Identification of asbestos

6.3.1. Identification of asbestos on buildings

- Employees, contractors, visitors, or any other stakeholder may visually identify the following common types of asbestos in Transnet:

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Blue Asbestos – Crocidolite	White Asbestos – Chrysotile	Brown Asbestos – Amosite

- These types of asbestos may be found buried on the ground, on land, or in parts of existing infrastructure used as asbestos cladding on outside buildings, asbestos cement sheeting, asbestos insulation blankets, pipe networks, roof sheeting, etc. as shown below:

Asbestos roof sheeting	Asbestos pipe	Asbestos on the ground

- An asbestos assessment shall be conducted to determine the presence of asbestos on the premises by AIA;
- Visual inspection of locations where asbestos-containing material is present or suspected must be conducted regularly to ensure that damaged or degraded material is properly managed;
- The Safety Manager/Specialist shall maintain written records of the inspections; and
- Damaged asbestos-containing material identified by employees and contractors during the course of their normal day-to-day activities shall be reported to the Safety Manager/Specialist who will ensure that appropriate remediation steps are taken.

6.3.2. Identification of asbestos on land

- Identifying the type and nature of the asbestos in the soil is critical to assessing the risk and forming appropriate control measurements and management plans;
- The history of the site in terms of the previous activities that were undertaken shall be considered;
- Desktop studies for contaminated land shall be conducted by a qualified Geo-Hydrologists;
- Initial site assessments for contaminated land must be undertaken to determine the presence of asbestos on-site;
- A preliminary risk assessment for contaminated land shall be undertaken; and

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- Asbestos soil testing shall be conducted to confirm if asbestos is present in the soil, however, the sampling technique is critical, as asbestos in soil is not homogenous.

6.4. Asbestos inventory and contaminated land register

- The requirement for asbestos inventory and contaminated land register are requirements of both Asbestos Abatement Regulations and Part 8 of the Waste Act with differing requirements as dictated by each Act and Regulation.

6.4.1. Asbestos Inventory for asbestos on buildings

- A register of known and suspected locations of asbestos-containing materials shall be maintained as part of the Asbestos Management Plan as per Annexure 1 of the SOP;
- Transnet must obtain the services of a competent person to ensure that all materials identified as, or assumed to be, asbestos-containing material, are captured into an inventory of asbestos in place, which is kept at the workplace or premises;
- Where there is disagreement as to whether any substance is, in fact, asbestos, the health and safety representative, health and safety committee, or a person nominated by the employees may require that a sample of that substance be taken and definitive identification of the substance be determined by an Approved Inspection Authority; However, the cost of the identification will be borne by Transnet;
- The inventory of asbestos in place shall contain the prescribed information (i.e. the date on which the material was identified; a description of the material, quantity, and extent of deterioration, etc.);
- Transnet must ensure that a competent person reviews and, if necessary, revise the inventory of asbestos in place for the workplace at intervals not exceeding 24 months;
- However, the inventory of asbestos shall be revised frequently if further asbestos-containing material is identified and the asbestos-containing material has deteriorated significantly or is removed, damaged, sealed, coated, or encapsulated; and
- Where the removal of asbestos or repair of asbestos-containing material is planned, the information in the inventory of asbestos in place shall be adequately detailed with respect to the work to be carried out.
- Safety Manager/Specialist/Environment Manager/Specialist shall ensure that a copy of the inventory of asbestos in place, or relevant parts, is:
  - given to the mandatory before any asbestos removal or repair work commences;
  - given to the registered asbestos contractor and Approved Asbestos Inspector Authority before asbestos removal or repair work commences;
  - readily accessible to employees and health and safety representatives at the workplace; and
  - In the case of transfer of ownership, provided to the new owner of the premises.
- The responsible person who carries out the removal of asbestos or the repair of asbestos-containing material at a workplace shall:
  - obtain a copy of the inventory of asbestos in place from Safety Manager/Specialist or asbestos client; and
  - if suspected asbestos-containing materials are located on the structure, plant, or machinery, inform Safety Manager/Specialist, who will ensure that a competent person determines whether the substance in question is asbestos-containing material.

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- In the event of work carried out at a workplace and potential exposure to airborne asbestos:
  - Transnet must ensure that the person authorising such work is given a copy of the inventory of asbestos in place;
  - the person authorising the work shall determine what future task and incident-related potential exposure scenarios are applicable to the work, including identifying recommended controls; and
  - Safety Manager/Specialist shall ensure that the recommended controls are implemented with regard to the work.
  - all asbestos-containing material listed in the inventory of asbestos in place, shall be clearly labelled or provided with a signage prescribed by the Regulations.

6.4.2. Contaminated land register

- All the ODs must keep a national contaminated land register of investigation and remediated areas as per **Annexure 2**, which includes information on:
  - the owners and any users of contaminated areas;
  - the location of contaminated areas;
  - the nature and origin of the contamination;
  - whether an investigation area:
    - ✓ is contaminated, presents a risk to health or the environment, and shall be remediated urgently;
    - ✓ is contaminated, presents a risk to health or the environment, and shall be remediated within a specific period;
    - ✓ is contaminated and does not present an immediate risk, but measures are required to address the monitoring and management of that risk; or
    - ✓ is not contaminated;
    - ✓ the status of any remediation activities on investigation areas; and
    - ✓ restrictions of use that have been imposed on investigation areas.
- This information shall be kept by the Environment Manager at all times and be reported to Corporate Sustainability in order to maintain and update the Transnet-wide asbestos register.
- The inventory of asbestos in place should be revised more frequently if:
  - Further asbestos-containing material is identified; and
  - The asbestos-containing material has significantly deteriorated, is removed from or damaged, sealed, coated, or encapsulated.
- Where contaminated material work is planned, the information in the inventory of asbestos shall be detailed concerning the work to be carried out.
- The Safety Manager/Specialists and Environment Manager/ Specialist shall ensure that a copy of the asbestos inventory or relevant part thereof, is:
  - Given to the mandatory before any asbestos removal or repair work commences;
  - Given to the registered asbestos contractor before asbestos removal or repair commences
  - Readily accessible to the employees and health and safety representatives at the workplace; and
  - In the case of transfer of ownership, information shall be provided to the new owner of the premises.

6.5. Notification of the authorities of asbestos presence and asbestos work

- All asbestos work to be undertaken shall comply with requirements of the Regulators and/or Authorities such as the Department of Employment and Labour (DEL) and Department of Forestry, Fisheries and Environment, (DFFE);
- Contractors undertaking such work shall be registered with DEL and certified to transport asbestos waste to the licensed waste treatment facility or hazardous landfill site where disposal has been chosen as an option; and
- The contaminated land process that must be followed within Transnet is as per Annexure 3 of this procedure.

6.5.1. Notification of asbestos to Department of Employment and Labour

- Before any asbestos work is undertaken within Transnet premises, the Safety Manager/Specialist shall ensure that a written and signed notification of the asbestos work is submitted to the Chief Director: Provincial Operations of Department of Employment and Labour within seven (7) working days before work commence.
- The written notification shall:
  - Include details of the Transnet site location, venue, and contact details of where asbestos working is taking place;
  - No type 2 and 3 asbestos work will take place within Transnet premises without notifying the Provincial Director in writing, at least within seven (days) before the commencement of the work;
  - In the event of an emergency, a shorter period is allowed to notify the Chief Director: Provincial Operations;
  - Notification to Department of Employment and Labour Chief Director: Provincial Operations shall be in the format provided in Annexure 4 of the Procedure;
  - Acknowledgment of receipt of notification shall be received from the Chief Director: Provincial Operations before any work can commence; and
  - Records of notification and acknowledgment from Department of Employment and Labour shall be kept within the official Transnet record management tools and/or system in line with **TIMS Document Data and Management Procedure (TRN-IMS-GRP-PROC 010).**

6.5.2. Notification of Department of Forestry, Fisheries and Environment (DFFE)

- According to Section 36 (5) of the National Environmental Management: Waste Act 58 of 2008, an owner of land that is significantly contaminated, or a person who undertakes an activity that caused the land to be significantly contaminated, shall notify the Minister and MEC of that contamination as soon as that person becomes aware, of that contamination;
- The Environmental Manager/Specialists must notify the Department of Forestry, Fisheries and Environment, of asbestos contamination using the template attached here as **Annexure 5;** and
- The contaminated land process that shall be followed within Transnet is as per **Annexure 3** of this procedure.

6.6. Asbestos assessment

6.6.1. Asbestos risk assessment on buildings

- If asbestos is identified, then the Safety Manager/Specialist shall ensure that an asbestos risk assessment is carried out, as far as is reasonably practicable, immediately by a competent person and thereafter at intervals not exceeding 24 months.
- The Safety Manager/Specialist) shall, before undertaking a asbestos risk assessment, consult with the relevant health and safety representative or relevant health and safety committee and inform them in writing of the arrangements made for the asbestos risk assessment, give them reasonable time to comment thereon, and ensure that the results of the asbestos risk assessment are made available to them for comment.
- The asbestos risk assessment shall, as an outcome, have a risk categorisation based on the potential for exposure to asbestos for each item of asbestos-containing material, which must be derived from the following:
  - the health impacts of asbestos;
  - the number of persons potentially exposed at the workplace;
  - the potential for damage or disturbance of asbestos-containing materials at the workplace, also by maintenance activities, potential incidents and normal occupant activities; and
  - the condition of asbestos-containing material, including state of deterioration.

6.6.2. Assessment of contaminated land

- A Qualified Practitioner shall be appointed by the Environment Manager/Specialist to undertake a preliminary risk assessment, initial investigations, and preliminary risk assessment in order to obtain a thorough understanding of the site history, setting, and potential impact of asbestos contamination;
- The risk assessment comprises desk study research, site reconnaissance, and the development of a conceptual site model. If the desk study indicates there is a potential for contamination, an intrusive site investigation and refined risk assessment will be required; and
- The investigation is to determine whether there are any unacceptable risks to people, property, or the environment.
- A preliminary site assessment shall cover the following:
  - site location in relation to location and size;
  - nature and extent of contamination, contaminants of concern, or historical activities that might be a source of contamination. List all the past and present activities at the site that involve the storage, production, use, treatment, or disposal of hazardous material that could contaminate the site;
  - describe the current condition of the site and the contents and results of any previous assessment reports;
  - local topography and geology, drainage surface cover, vegetation;
  - status of groundwater, approximate depth to water table;
  - proximity to surface water;
  - proximity to drinking water supply;

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- annual rainfall and flood potential;
- land and water use for the site and nearby areas;
- any other requirements are as regulated by the Minister.

- A preliminary Site Assessment Report must make clear statements with respect to the status of contamination of the site and satisfy the following requirements of the Waste Act (2008):
- State whether the area should be investigated further or remediated immediately or whether any other measures should be taken to manage or neutralise the risk;
- Alternatively, if all the information available in conformance with the checklist for Phase 1 reporting leads to the conclusion that the site poses no risk to human health or the environment; and
- Transnet shall motivate in writing that the site is not a contaminated site and obtain approval and confirmation on the contaminated status of the site from the DFFE; and
- The Site Assessment Report (SAR) investigations shall include the sampling and analysis of soil, sediment, groundwater, and surface water.
- The Site Assessment reporting shall give information on:
  - the type, extent, and level of contamination anticipated on-site and the issues raised in previous reports;
  - the nature of samples collected, the sampling procedures followed, including field sampling quality assurance and quality control requirements;
  - the analyses undertaken, methodologies used and laboratory quality assurance/quality control procedures, including laboratory certificates and appropriate accreditation listed;
  - the actual extent and concentrations of contaminants in all appropriate environmental media on-site based on verified test data;
  - any likely dispersal in air, surface water, groundwater, soil, and dust from the detected contaminants;
  - any potential effects of contaminants on human health, the environment, or building structures and property.
- A Site Assessment Report shall list the results of chemical analyses of soils obtained against the Soil Screening Values and clearly demonstrate that the selection of guideline values is consistent with the principles of the Framework, together with all assumptions and limitations of Soil Screening Values used.
- The report shall make a clear statement regarding the adequacy and completeness of all information used in the assessment and list any further studies or investigations that may be required to verify the status of the site and the risks posed.
- The findings of the report shall satisfy the requirements of Section 37 of the Waste Act (2008) as well as any other regulations in terms of Site Assessment Report, determine, and state whether the following triggering clauses have been breached.
- Where the findings of the site assessment report are that the investigation area is contaminated, the site assessment report shall at least contain information on whether:
  - the contamination has impacted on the environment;
  - the substances present in or on the land are toxic, persistent or bio-accumulative or are in large quantities or high concentrations or occur in combinations;
  - there are exposure pathways available to the substances;
  - the uses of the land and land adjoining increases or is likely to increase the risk to
  - health or the environment;
  - the substances have migrated or are likely to migrate from the land; and

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- the acceptable exposure for human and environmental receptors in that environment has been exceeded, any applicable standards have been exceeded and the area should be remediated or any other measures should be taken to manage or neutralise the risk.

- Report on recommendations shall be compiled to inform the regulatory status of contamination including:
  - the investigation area is contaminated, presents a risk to health or the environment, and must be remediated urgently;
  - the investigation area is contaminated, presents a risk to health or the environment and must be remediated within a specified period;
  - the investigation area is contaminated and does not present an immediate risk, but that;
  - measures are required to address the monitoring and management of that risk; and
  - or the investigation area is not contaminated.
- Alternatively, if all the information available in conformance with the checklist for Phase 2 Reporting and Soil Screening Values arrived at by either comparison with the Soil Screening Values, or contaminant concentrations calculated based on site-specific acceptable risk, leads to the conclusion that the site poses no risk to human health or the environment; and
- Transnet shall motivate in writing that the site is not contaminated and obtain approval and confirmation on the contaminated status of the site from the DFFE.

6.7. Contaminated land management plans

6.7.1. Asbestos management plan

- If asbestos-containing materials are identified, Safety Manager/Specialist shall ensure that a written Asbestos Management Plan for the workplace is prepared by a competent person.
- The asbestos management plan shall include at least the following-
  - a procedure that contains measures related to:
  - the repair, removal, and management of asbestos-containing materials;
  - the implementation of the Regulations for Prohibition of the Use, Manufacturing, Import and Export of Asbestos and Asbestos-containing materials, 341 of 2008; and
  - where asbestos-containing material has been identified in the inventory of asbestos in place a specific procedure which will, as far as is reasonably practicable, reduce the risk of exposure of employees as well as incidental asbestos exposure for the following scenarios:
    - ✓ incidents;
    - ✓ emergencies
    - ✓ removal work; and
    - ✓ repair work.
- A policy procedure and implementation plan for phasing out existing asbestos-containing materials at the workplace which, considers the following:
  - the principle of reasonably practicable; and
- Safety Manager/Specialist and Environment Manager/Specialist shall review, and if necessary, revise the asbestos management plan at intervals not exceeding eight years or if any information is contemplated in the plan.

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6.7.2. Contaminated Site Remediation Plans

- The Environmental Manager/Specialist shall establish the final soil remediation objective for site clean-up taking into consideration technical feasibility, and overall risk management strategies throughout the remediation process and not simply at the end of the remediation process. All risk-based management decisions shall be fully documented and justified.
- The site remediation plan shall be prepared as follows:
  - setting remediation or management objectives (including numerical soil and groundwater targets);
  - ensure the site will be suitable for its current or future proposed land-use and will pose no unacceptable risk to human health or the environment, either on-site or off-site;
  - document in detail all procedures to be adopted to achieve the remediation objective;
  - establish safeguards and contingency measures for safe implementation of all remediation activities;
  - develop a quality assurance monitoring plan that establishes a record of activities that must be carried out to ensure compliance with the approved action plan; and
  - obtain the relevant approvals, permits, or licenses required by regulatory authorities (DFFE) to undertake the proposed remediation activities in terms of Section 20(b) of the Waste Act (2008).
- For large projects with complex remediation activities, a detailed Remediation Plan shall be submitted by the Environment Manager/Specialists as a stand-alone document with a dedicated Operational Controls and Monitoring Plan. The reporting to include the following:
  - remediation objectives (including numerical soil and groundwater targets where relevant)
  - Discussion of the remedial options available, assessment of alternatives including the status quo, identifying the means of risk reduction proposed in each option;
  - rationale for selection of the recommended remedial option;
  - discussion of the remediation required to achieve the remedial objectives
  - risk assessment of proposed remediation activities and mitigatory measures required to minimize environmental hazards and impacts during remediation;
  - identification of regulatory requirements such as permits, licenses, and approvals
  - proposed monitoring and testing to validate the site during, and on completion of the remedial activities;
  - contingency plan if the remedial strategy fails to reach the remediation objectives; and
  - remediation plans require approval under Section 20(b) of the Waste Act (2008) before any activities other than emergency activities can be instigated.

6.8. Information, instruction and training

- The Safety Manager/Specialist and Environmental Manager/Specialist shall:
  - provide, to persons who may have incidental asbestos exposure, information, instruction through induction training upon employment and when the inventory of asbestos is reviewed; and
  - ensure that the information, instruction, and training content complies with the requirements of the Asbestos Abatement Regulations of 2020.
- Where Transnet undertakes non-asbestos related work, where there is a potential for asbestos exposure, Safety Manager/Specialist shall ensure that the employees are adequately

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and comprehensively informed, instructed, and trained both in practical and theoretical knowledge concerning potential health-related risks associated with asbestos exposure.

- For the removal of asbestos or repair of asbestos-containing materials, Safety Manager/Specialist and Environment Manager/Specialist shall ensure that all supervisors and employees are adequately and comprehensively informed, instructed, and trained with regard to amongst others, safe disposal of asbestos waste.
- Training shall:
  - be provided by a person deemed competent by the Chief Inspector of the Department of Employment and Labour;
  - have a minimum contact duration of eight hours; and
  - as an outcome, provide employees with asbestos training certificates.
- Refresher training with a minimum contact duration of two hours shall be provided at least annually or more / intervals following the requirements of the Regulations.
- The Safety Manager/Specialist must ensure that up-to-date records of employee training are made available at the workplace that has asbestos. The Safety Manager/Specialist shall ensure that current employee's asbestos training certificates are provided to employees upon termination of employment.

6.9. Air monitoring

- The Safety Manager/Specialist shall ensure that asbestos air quality monitoring is undertaken across all areas where there is high risk of asbestos exposure or the asbestos contractor undertakes asbestos work.
- This monitoring shall be conducted in line with legislative requirements. The following requirements shall be adhered to:
  - in the case of type 2 and type 3 asbestos work, an asbestos client shall ensure that air monitoring of the concentration of airborne regulated fibres to which an employee may be exposed, is:
    - ✓ performed by an approved inspection authority;
    - ✓ carried out in terms of HSG 248;
    - ✓ representative of employee exposure; and
    - ✓ carried out at a frequency determined by the approved inspection authority based on the site-specific asbestos risk assessment.
- The results of air monitoring obtained must be compared with the OEL or the OEL short-term exposure limit to ensure that no employee is exposed to asbestos in excess of the prescribed OELs.
- An approved inspection authority shall perform environmental air monitoring during type 2 and type 3 asbestos work.
- Air monitoring referred to in sub regulations (1) and (3) of the Asbestos Abatement Regulations of 2020, shall be carried out only after the relevant health and safety representative or relevant health and safety committee has been consulted and given a reasonable opportunity, as mutually agreed, to comment thereon.

6.10. Medical Surveillance

- The Safety Manager/Specialist and Occupational Manager/Nurse shall establish and maintain a system of medical surveillance of employees if:

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- the employer is registered as an asbestos contractor;
- in the opinion of an occupational medicine practitioner, after consideration of the results of the asbestos risk assessment carried out in terms of regulation 5(5)(d) of the Asbestos Abatement Regulations of 2020, it is reasonably likely that an asbestos-related disease may occur under the particular conditions of an employee's work; or
- an occupational medicine practitioner recommends that the relevant employee should be under medical surveillance.

- The Safety Manager/Specialist shall appoint an occupational medicine practitioner to document the system of medical surveillance of employees, including:
  - consideration of:
    - ✓ the risk of developing occupational asbestos-related diseases; and
    - ✓ medical fitness to work requirements, including fitness to wearing a respirator.
- An initial health evaluation before commencement of asbestos work, which comprises:
  - an evaluation of the employee's medical, occupational, exposure and social history;
  - an appropriate physical examination;
  - a chest radiograph; and
  - any other additional medical examination, such as pulmonary function testing, which, in the opinion of the occupational medicine practitioner, is necessary to enable such practitioner to perform an appropriate health evaluation.
- Periodic health evaluations conducted, considering medical tests;
- The duties of an occupational health practitioner, conducted under the direction of the appointed occupational medicine practitioner; and
- Making the documented system of medical surveillance available to the health and safety representative or health and safety committee, who is entitled to further clarification, if they so request.
- The appointed occupational medicine practitioner must notify the Safety Manager/Specialists/ Occupational Manager in writing of the outcomes of the health evaluation by issuing the certificate of medical surveillance, subject to the following:
  - the information provided to the employer is limited to the presence of an occupational disease and the fitness of the employee to perform the inherent requirements of the job, and may not include confidential medical information;
  - the employee is informed of the outcome of the health evaluation; and
  - an employee is assessed to be temporarily medically unfit to perform work if there is a reasonable expectation that the employee's health will improve, and that such employee will be able to return to work.
- The Occupational Manager/Specialist may not permit an employee who was certified by an occupational medicine practitioner as medically unfit to work in a regulated asbestos area, provided that the employee may return to perform that work after being certified fit by an occupational medical practitioner, and after:
  - being informed of the results of the exposure assessments; and
  - being prescribed medical tests in the frequency they should be repeated based on the risks.
- The certificate of medical surveillance:
  - shall be provided by the Occupational Manager/Specialist to the employee upon termination of employment; and
  - may be used for subsequent asbestos work for the full duration of its validity period.

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- the Occupational Manager/Specialist shall record, investigate and report the occupational disease; and
- the Occupational Manager/Specialist shall ensure that the employee provides written informed consent for inclusion in the medical surveillance programme, which forms part of the medical surveillance record.

6.11. Regulated asbestos area

- The Safety Manager/Specialist when undertaking type 1, type 2 or type 3 asbestos work shall:
  - clearly demarcate and identify the relevant area as a regulated asbestos area; and
  - ensure that no person enters or remains in a regulated asbestos area unless he or she wears the appropriate type and correctly fitting respiratory protective equipment and protective clothing.

6.12. Personal protective equipment and facilities

- The Safety Manager/Specialist shall:
  - provide respiratory protective equipment and protective clothing suitable for protection against regulated asbestos fibres to all persons who may be exposed to asbestos;
  - ensure that the respiratory protective equipment provides the appropriate level of protection for the type of asbestos work to be undertaken; and
  - ensure that a person's exposure is adequately controlled.
- Where respiratory protective equipment is provided, the employer or self-employed person shall ensure that:
  - the relevant equipment is capable of keeping the exposure level below the OEL for asbestos;
  - the relevant equipment is correctly and properly used, stored and maintained;
  - information, instruction, training and supervision that are necessary with regard to the use of the equipment are provided to the persons; and
  - the equipment is kept in good condition and efficient working order.
- Safety Manager/Specialist shall, as far as is reasonably practicable:
  - issue no personal protective equipment to a person unless such equipment is cleaned, decontaminated and, where appropriate, sterilised;
  - provide separate containers or storage facilities for personal protective equipment not in use; and
  - ensure that all personal protective equipment not in use is stored only in the place provided.
- Safety Manager/Specialist shall, as far as is reasonably practicable, ensure that all personal protective equipment contaminated with asbestos dust is thoroughly cleaned and handled in accordance with the following procedures:
  - where personal protective equipment is cleaned on the premises of the asbestos client, care must be taken to prevent contamination during handling, transport and cleaning; and
  - water that is used for decontamination or cleaning of equipment must be filtered before being released into any water system.

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- Safety Manager/Specialist shall ensure that no person removes dirty or contaminated personal protective equipment from the workplace, provided that where personal protective equipment contaminated with asbestos dust has to be disposed of, it must be treated as asbestos waste.
- The Safety Manager/Specialist shall:
  - provide employees involved in type 1 and type 2 asbestos work with adequate washing facilities, which are readily accessible and located in an area where the facilities will not become contaminated, to enable employees to meet a standard of personal hygiene consistent with the adequate control of exposure, and to avoid the spread of asbestos dust;
  - provide employees involved in type 3 asbestos work with a decontamination facility, which facility is readily accessible and located in an area where it will not become contaminated to enable employees to meet a standard of personal hygiene consistent with the adequate control of exposure, and to avoid the spread of asbestos dust.

6.13. Removal and remediation of Asbestos

6.13.1. Removal of asbestos on buildings and equipment

- Where old equipment with asbestos insulation is received for scraping/disposal at the Transnet operations, the asbestos material shall be clearly marked, set aside, and removed by asbestos contractor.
- All products containing asbestos material shall be treated in a similar manner;
- Where old equipment and assets containing asbestos are sold for recycling, an inspection shall take place to assess if there is asbestos material;
- A Transnet appointed contractor shall not undertake any work on asbestos-contaminated site unless they hold an appropriate license and approval from a competent authority;
- Registered asbestos contractor shall take the necessary measures to reduce the exposure to asbestos of his employees, Transnet employees, and another person that may be exposed to the lowest level reasonably practicable by measures other than the use of suitable respiratory protection and disposal /personal protective equipment (PPE);
- Registered asbestos contractor shall design and use appropriate work processes, systems and engineering controls and provide suitable work equipment and materials in order to avoid and/or minimize the release of asbestos;
- An AIA shall be appointed by the Safety Manager/Specialist to assess/monitor airborne asbestos fibres from the work area;
- Asbestos contaminated land shall be clearly demarcated and identified by notices indicating:
  - that the area is asbestos-contaminated; and
  - A specific/appropriate protective equipment must be worn at all times.
- Registered asbestos contractor shall not permit any employee, other than an employee who because of his work is required to be in an area designated as an asbestos-contaminated area, to enter or remain in any such area and only employees who are so permitted shall enter or remain in any such area;
- No asbestos containing material shall be sold or reused without being treated to remove asbestos contaminants.
- No person shall use compressed air to remove asbestos dust from any surface or person; and
- The Safety Manager/Specialist and registered asbestos contractors shall ensure that:

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- no employees or visitors will eat, drink or smoke in an area designated as an asbestos-contaminated area;
- arrangements are made for such employees and visitors to eat, smoke or drink in an alternative safe place;
- arrangements to be made for appropriate wash and shower facility with proper drainage and catchment of used water; and
- to follow the AIA work plan and all other applicable legislation regarding asbestos work.

6.13.2. Remediation of asbestos on contaminated land

- Sites contaminated with asbestos shall be identified and demarcated accordingly. The sites d be clearly marked by erecting proper signage indicating the hazardous nature of the site as per Asbestos Regulations;
- These identified asbestos-contaminated sites shall be registered with Transnet Environment Manager/Specialist and Safety Manager/ Safety Manager/Specialist and Environment Manager/Specialist for management and control;
- Should there be a need to dig up the site for any purpose, the Environment Manager/Specialist and Safety Manager/Specialist should immediately be informed for guidance;
- Periodic monitoring/air monitoring shall be conducted by the Environment Manager/Specialist and AIA on these sites to ensure that there are no airborne asbestos fibres that may affect employees and the public at large as per Asbestos Regulations: AR8 register;
- **The Occurrence and Non-conformance Management Procedure (TRN-IMS-GRP-PROC 013)** shall be activated;
- A procurement process must be activated by the Environment Manager/Specialist for a service provider to be procured to manage the discovered asbestos;
- The asbestos shall be safely disposed of at a hazardous landfill site or remediated depending on the remediation option chosen and approved by DFFE; and
- A copy of the disposal certificate shall be kept by the Environment Manager/Specialist as a record of safe disposal at a landfill site, should disposal be the preferred option.

6.14. Undertaking of asbestos work by registered asbestos contractor

- All asbestos work to be undertaken shall comply with requirements of the DoEL and DFFE.
- Contractors undertaking such work shall be registered with DoEL and certified to transport asbestos waste to the licensed landfill site if the type of asbestos remediation/work requires or involves the disposal of asbestos.
- The appointment of the registered asbestos contractor shall be in line with the requirements of the **Contractor Management Procedure (TRN-IMS-GRP-PROC 014).**

6.14.1. Registered Asbestos Contractor work and other requirements

- Where the registered asbestos contractor maintains, renovates, dismantles asbestos-cement roof sheeting, wall paneling, gutters, fascia boards, and related products to a building and or removed asbestos contamination from land on behalf of Transnet, registered asbestos contractor, shall ensure that:
  - all legislative requirements and applicable timeframes for submission of the DoEL documents are met;

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- a plan of work is developed, reviewed, and approved by AIA and submitted to DoEL before work is undertaken;
- suitable roof ladders or duckboards or crawling boards are used in accordance with regulation 12 of the General Safety Regulations;
- written work procedures are laid down and followed to prevent the release of asbestos dust into the environment;
- that the work procedures referred above must be made available for perusal by Transnet Personnel responsible for compliance as well as any Transnet member of the Safety Committee and authorities;
- that asbestos waste of any form, is collected and disposed of in accordance with the applicable legislation;
- that where reasonably practicable and required by law, the relevant items are painted or otherwise sealed with a protective coating to limit the release of asbestos dust, combat weathering, and inhibit growth of lichen or moss;
- any cleaning is done under controlled conditions ensuring that:
  - ✓ dry-brushing, scraping, sanding or abrasion techniques are not used;
  - ✓ where feasible, high-pressure water jetting is not used unless in conjunction with a suitable profiled hood that limits dispersal of contaminated water and, if the said jetting is used, that suitable control methods are used; and
  - ✓ when a fungicidal solution or moss killer is applied, a standing time of 24 hours or any other period specified by the manufacturer is allowed, and a low-pressure hose is used after such period to keep the sheets wet whilst employing a stiff broom or any similar means to remove any moss or lichens.
- all relevant asbestos signage and cordoning of the contaminated area is done to prevent and caution any stakeholder closer to where asbestos work is undertaken;
- a site-specific risk assessment shall be conducted and the Health and Safety Plan be developed and approved by the Safety Manager/Specialist and Environment Manager/Specialist and the AIA.
- a base camp and decontamination facility shall be established in compliance with all legal requirements;
- clean-up of asbestos contamination material shall be done in consultation with Safety Manager/Specialist and Environment Manager/Specialist; and
- all asbestos contaminated soils and other asbestos waste shall be managed appropriately, labeled, and disposed of as per Asbestos Abatement Regulations and the NEM: Waste Management Act.
- the waste shall include all consumables used on site e.g. PPE, vacuum bags, etc.

6.15. Emergency Procedure

6.15.1. Unexpected Discovery of Potential Asbestos-Containing Material

- In the event that potentially asbestos-containing material is discovered in an unexpected area, the Safety Manager/Specialist or Environment Manager/Specialist must be informed; and
- The Safety Manager/Specialist or Environment Manager/Specialist will initiate an inspection of the area to determine if the material does contain asbestos and if so, cordon off the area,

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ensure the location is added to the inventory of asbestos-containing materials, and initiate remediation work as required.

6.15.2. Unintentional Disturbance of Asbestos-containing Material

- In the event that material believed to contain asbestos is unintentionally disturbed, the procedure detailed below shall be followed:
  - the Safety Manager/Specialist or Environment Manager/Specialist shall immediately stop all work activity in the area to avoid further disturbance of the material;
  - the employee shall notify his or her supervisor and the Maintenance Control Centre of the incident;
  - the Infrastructure and/or Real Estate/Property Departments shall shut down the ventilation system in the area in case where contamination is found on the building; and
  - the Safety Manager/Specialist and Environment Manager/Specialist shall undertake an incident investigation to determine the root cause of the disturbance and what corrective action must be initiated to prevent reoccurrence.
- The employees/contractor shall ensure that any clothing and/or tools contaminated with asbestos fibers are decontaminated via damping wiping or vacuum cleaning equipment with a filtration efficiency of at least 99 per cent for particles one micrometre in size before leaving the area.

6.15.3. Emergency preparedness and response to asbestos exposure

- All Transnet operations shall display up to date list of all numbers and names shall be posted at visible locations at each depot or business; and
- The nearest emergency service provider shall be identified as well as its capacity and the magnitude of accidents it will be able to handle. The contact details of the following, but not limited to these emergency centres shall be kept up to date and be available at prominent locations:
  - Approved Inspection Authority (AIA);
  - Department of Forestry, Fisheries and Environment (DFFE);
  - Department of Employment and Labour; and
  - Department of Water and Sanitation (DWS).

6.15.4. Transportation and accidental spillage of Asbestos Waste Material

- The transportation of any asbestos waste material shall be outsourced to registered asbestos contractor;
- The transportation of asbestos off-site shall comply with SANS 10229-1:2010 standards set out in the Code of Practice for packaging of dangerous goods for Road and Rail transportation of South Africa;
- Tightly sealed containers shall be used during transportation to prevent asbestos spillages on public roads;
- Asbestos waste shall be disposed of at the landfill sites specifically approved for asbestos waste (hazardous landfill site) in terms of the National Environmental Management: Waste Act, 1998 (Act No. 59 of 2008), National Norms and Standards for disposal of waste to landfill 2013, should disposal be the preferred method of rehabilitation and remediation;

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- All employees who are involved in the transportation and dumping of asbestos waste shall be provided with required respiratory protection and protective clothing and be properly trained in the procedure to be followed in the event of spillage or similar emergency or situation that could arise by accident;
- All premises and plant shall be cleaned as per regulation 19 and 21 of the Asbestos Abatement Regulations, 2020. This also includes vehicles and protective clothing;
- All incidental spillages of asbestos waste shall be cleaned up immediately. The driver of the vehicle carrying asbestos waste shall have the necessary training and be conversant with the instructions to handle such cases;
- Drivers of these vehicles shall also be in possession of Transport Emergency Control cards (TREM), which describes the handling of specific commodity transported.
- All other asbestos-containing waste shall be collected and stored in a dedicated enclosed and lockable/ secure area. The need to handle or move such items must be kept at a minimum;
- To prevent pollution, asbestos fragments remaining on-site or in scrap heaps shall be dampened with an environmentally friendly bonding agent/wetted before being transported for disposal;
- All asbestos that is removed shall be double contained and then disposed of into appropriate receptacles and be taken off-site for safe disposal; and
- Fragmented asbestos shall be contained to ensure that there is no risk of exposure to Transnet employees, the public, and service provider employees.

6.16. Labelling and signage

- All asbestos in place listed in the inventory of asbestos shall be clearly and legibly identified using the pictogram as specified in the Asbestos Abatement Regulations by the Safety Manager/Specialist or Environment Manager/Specialist.
- All Transnet premises where asbestos has been identified, assessed, and confirmed to be of high risk shall have approved asbestos signage erected.
- The signage to be erected on an asbestos site shall be in line with Transnet Corporate Identity Guidelines and must be approved by the Corporate Affairs Department.
- The installed signage shall also meet the Department of Employment and Labour branding requirements for erecting asbestos signage.
- All installed asbestos signage shall be registered in the Transnet asset register for each OD or Specialist Unit it belongs.

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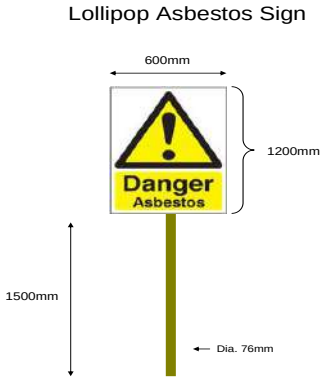
Example of signage to be installed:

- Example 1: Signage Board

NB: *Length of all poles must be 2 200 mm long (i.e. 1 500mm above the ground + 800mm underground)*

- **Example 2: Lollipop Design**



NB: *Length of all poles must be 2 200 mm long (i.e. 1 500mm above the ground + 800mm underground)*

6.17. Disposal of asbestos

Transnet and its contractors shall as far as is reasonably practicable ensure that:

- all asbestos waste is placed in containers that will prevent the likelihood of exposure during handling;
- all vehicles, re-usable containers, or any other similar articles which have been in contact with asbestos waste are cleaned and decontaminated after use, in such a way that such vehicles,

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containers, or similar articles do not cause a hazard inside or outside the workplace concerned;
- all asbestos waste which can cause exposure, is disposed of only on sites specifically designated for this purpose in terms of the National Environmental Management Act,1998 (Act No. 107 of 1998) National Norms and Standards for Disposal of Waste to Landfill 2013, and in such a manner that it does not cause a hazard inside or outside the site concerned;
- all persons involved in the collection, transport, and disposal of asbestos waste, who may be exposed to that waste, are provided with suitable personal protective equipment;
- where the services of a contractor for the disposal of asbestos waste are used, a provision is incorporated into the contract stating that the contractor shall also comply with the provisions of these Regulations; and
- Safe disposal certificates shall be submitted to Transnet ODs Safety and Environment Departments and be kept on record as per the records procedure (TIMS 010).

6.18. Completion of asbestos work

6.18.1. Site clearance certificate for asbestos on buildings

- Following the completion of type 2 or type 3 asbestos work, an approved inspection authority must:
  - conduct a thorough visual inspection of the relevant work area;
  - conduct air sampling to ensure compliance with the clearance indicator;
  - ensure that all asbestos waste has been removed in accordance with the requirements of regulation 21; and
  - issue a written declaration for the purpose of clearance certification.

6.18.2. Monitoring and closure of asbestos remediated sites

- The Environment Manager/Specialist shall appoint a Qualified Practitioner who must ensure that ongoing management and monitoring of the remediation site is carried out until the site is fully remediated to the satisfaction of the authorities.
- A Monitoring report shall be complied by a Qualified Practitioner and submitted to DFFE to obtain a closure letter.
- The Minister will issue a closure letter to the landowner to declare that the remediation objectives have been achieved and the site may be used for the intended purpose as indicated in the remediation plan.

6.19. Record Keeping

- All records shall be kept by the contracting department in line with **TIMS Document, Data and Records Management Procedure (010);**
- Transnet shall also:
  - keep records of all inventories of asbestos in place, asbestos risk assessments, air monitoring results, medical surveillance reports, disposal certificates and clearance certificates as required by regulations 4, 5, 16, 17, 21(d) and 22(d) of the Asbestos Abatement Regulations 2020, respectively: Provided that personal medical records may be made available to only an occupational health practitioner;

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- subject to sub-regulation (c) of the Asbestos Abatement Regulations 2020, make the records contemplated in sub-regulation (a), excluding personal medical records, available for inspection by an inspector;
- allow any person, subject to formal written consent by an employee, to peruse the records with respect to that particular employee;
- Make the records of all assessments, surveys and air monitoring results, and the asbestos inventory, available for perusal
- Keep all records contemplated in sub-regulation (a) of the Asbestos Abatement Regulations 2020 for a minimum period of 50 years;
- Hand over or forward by registered post all records contemplated in sub-regulation (a) to the relevant Chief Director: Provincial Operations, if the employer ceases activities relating to asbestos work;
- Keep a record of training given to an employee in terms of regulation 7 of the Asbestos Abatement Regulations 2020, for as long as the employee remains employed at the workplace where the employee is potentially exposed to asbestos.

6.20. Prohibition

- No Transnet employee or contractor shall:
  - sell, donate, reuse, reinstall or recycle any asbestos or asbestos - containing materials;
  - clean or prepare surfaces of asbestos cement materials;
  - temporarily store any asbestos or asbestos -containing materials for longer than three months after completion of asbestos removal work, before final disposal;
  - temporarily store asbestos -containing materials destined for disposal, which are uncovered or unprotected or stored in a manner that may contaminate ground or water systems or may cause the release of asbestos dust;
  - use compressed air or permit the use of compressed air to remove asbestos dust from any surface or person;
  - use electrical power tools, such as angle grinders, or any other fast - moving equipment to cut, grind or drill asbestos -containing material;
  - smoke, eat, drink or keep food or beverages in a regulated asbestos area or require or permit any other person to smoke, eat, drink or keep food or beverages in such area;
  - vacuum asbestos dust using vacuum cleaning equipment other than vacuum cleaning equipment with a filtration efficiency of at least 99 per cent for particles one micrometre in size; or
  - carry out any demolition work before all asbestos and asbestos containing building material has been identified in the inventory of asbestos in place, safely removed or otherwise controlled, as far as is reasonably practicable, so as to eliminate the uncontrolled release of asbestos and asbestos dust.

6.21. Internal and External Reporting

- Progress on asbestos removal within Transnet operations shall be tracked and reported at the RISKCO and Environmental Forum;
- Each OD is required to designate a representative at the Forum and Committee who shall report on behalf of the OD; and

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- The GM: Sustainability shall report progress of asbestos rehabilitated sites at the Group Risk Management Committee, Executive Committee, and the authorities while EM: Safety will report progress of asbestos removal from buildings.

7. Review of the Asbestos Procedure

- The Asbestos Standard Operating Procedure shall be reviewed regularly and updated to reflect regulatory or best practice changes. As a minimum, the SOP shall be reviewed every five (5) years.

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8. ANNEXURES

8.1. Annexure 1. Asbestos Inventory

No	Location / Station	Asset No	S/M storey	No stories	Const. area m²	In use	Floor m² Asbestos Roof	Ceiling m²	Facias / Barge boards m²	Walls / Cladding m²	Partition-ing m²	Gutters / Downpipes m	Water / Sewer pipes m	Water tanks m³	Building damaged	Asbestos intact

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8.2. Annexure 2: Contaminated Land Register

Province	Site Erf Number (location)	Site Coordinates for contaminated area(e.g. Plume) and the site	Current Land Use Zoning	DEA Reference Number/ permit number	DWA Reference Number/ permit number	DWA Contact person responsible for managing the project (where available)	Details of the Landowner, including contact numbers, physical and postal address	Details of Polluter (if not the same person as the Landowner) including contact numbers, physical and postal address	Current users of contaminated site	Brief description of the activity leading to contamination (what caused contamination)	Details of contaminant(Type and Quantity)	size of the contaminated land requiring remediation (in hectares or m²)	Possible impact to either the environment or human health	Brief description of remediation activities (What has been done, what is being done and what still needs to be done.)	Estimated completion date.

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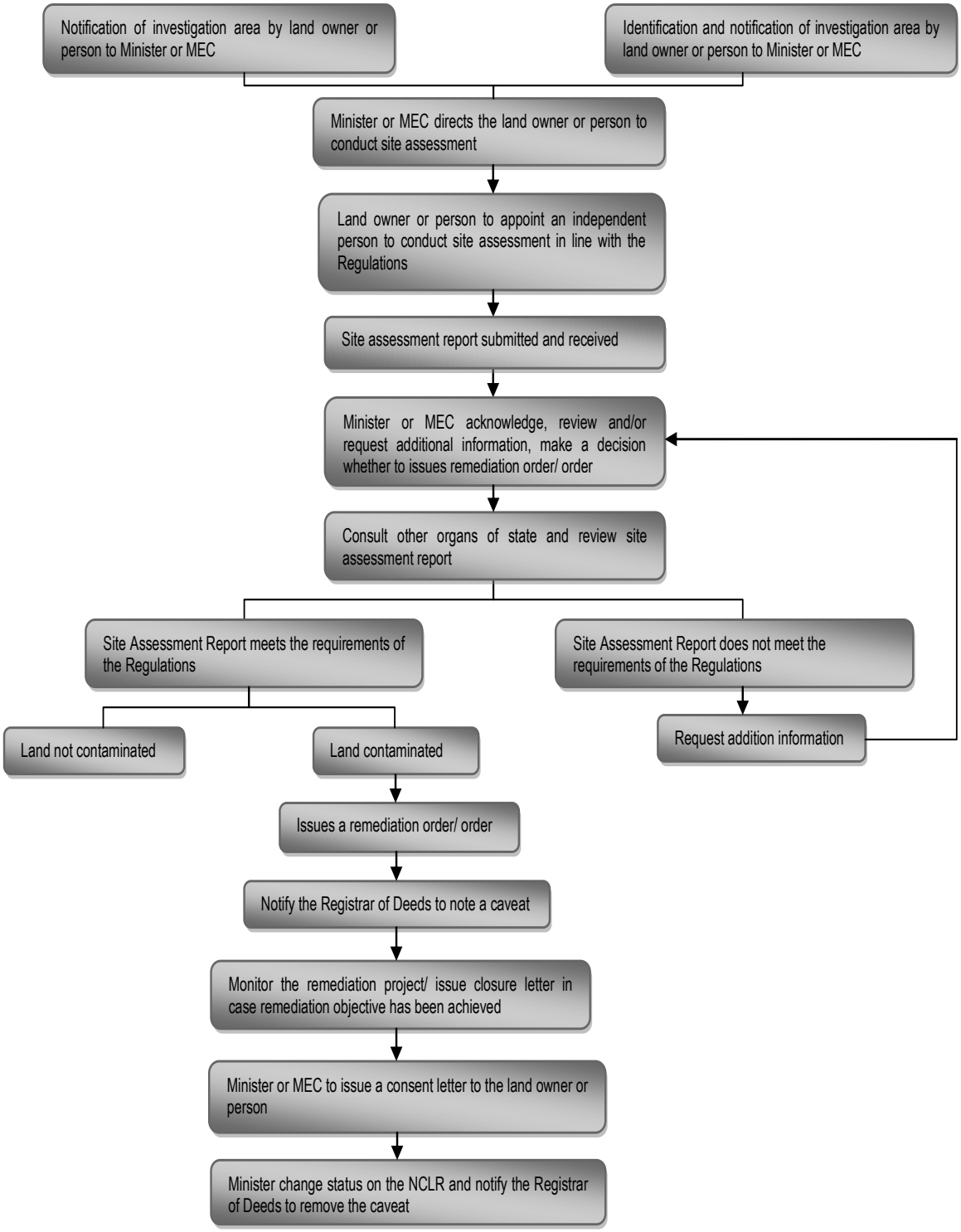
8.3. Annexure 3: Contaminated Land Process Flow



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8.4. Annexure 4: Notification for Asbestos Work

NOTIFICATION OF ASBESTOS WORK

Occupational Health and Safety Act, 1993 (Act No. 85 of 1993) (Regulation 10 of the Asbestos Abatement Regulations, 2020) 1 (a) Name and registration number of the registered asbestos contractor**:

_____

_____

(b) Physical address of the registered asbestos contractor:

_____

_____

(c) Name and phone number of the contact person of the registered asbestos contractor:

_____

_____

2.

(a) Name of asbestos client: _____

_____

(b) Name and phone number of the contact person of the asbestos client:

_____

_____

3.

(a) Name of approved asbestos inspection authority (AIA)** and its Department of Employment and Labour AIA registration number: _____

_____

(b) Name and phone number of the contact person of the approved inspection authority:

_____

_____

4. Exact location/address of where the asbestos work will be done: _____

_____

GPS coordinates S_____ E_____

5. Type and volume of asbestos to be removed/repaired (as applicable):

_____

6. Expected commencement date: _____

7. Expected completion date: _____

_____ _____

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Registered Asbestos Contractor** Date _____ _____

Asbestos Client Date

The completed document must be sent to the Chief Director: Provincial Operations of the Province where asbestos work is to take place, seven days prior to commencement of asbestos work.

** Not applicable in the case of type 1 asbestos work.

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8.5. Annexure 5: Notification of contaminated land

Notification of contaminated land

The following information should be supplied to the Minister or MEC by the owner of the contaminated land, or person who undertakes the activity that caused contamination of land:

- Information required should be typed in the space provided
- Name and Signature of delegated person
- The following should be attached:
  - (i) Current site plan - with scale bar showing north direction, local water drainage and other locally significant features on-site and immediate off-site. The plan should also show the historical location of structures that may have affected the distribution of contamination (e.g. building, underground storage tanks, treatment baths, etc.);
  - (ii) Locality map

1. Details of the Land owner			
Name/ Company:			
Identity number/ Company Reg.:			
Physical Address:			
Postal code:			
Tel:		Fax:	
2. Details of the Land user			
Name of contact person:			
Company name:			
Registration number:			
Physical address:			
Postal code:			
Tel:		Cell:	
Fax:		Email:	
3. Details of the site			
Site Physical Address:			
Erf number:			

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Province:			
District Municipality			
Local Municipality			
Four (4) or more corner coordinates of the portion of land that is contaminated **(in degrees, minutes and seconds)**			
Size of the area contaminated			
4. Details of the Site Assessment Practitioner			
Name and Surname			
Company name			
Physical Address			
		Code	
Postal Address			
		Code	
Telephone/Cell		Fax	
Email Address			
5. Is there any Environmental Compliance Monitoring or Enforcement action against you on that site?			
If yes, provide details (reference number & contact details amongst others) below:			
If no, proceed to Section 6			
6. Department of Water and Sanitation: Water Management Area/ Quaternary Drainage			
Responsible Officer (DWS)			
Physical Address			
		Code	
Postal Address			
		Code	
Telephone			
Email Address			

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7. Description of the Nature of contamination

I declare that the information contained in this form is true

Name of responsible person

Signature of responsible person

Designation

Date

Submission of this form should be directed to:

The Director: Land Remediation-Dr Mpho Tshitangoni
Environment House, 473 Steve Biko Road, Arcadia, Pretoria, 0083
Private Bag X447, Pretoria, 0001

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INTEGRATED MANAGEMENT SYSTEM

POLICY COMMITMENT STATEMENT PROCEDURE

Document Number	TRN-IMS-GRP-PROC-002
Version Number	2.0
Classification	Unclassified
Effective Date	01 October 2019
Review Date	01 August 2022

SUMMARY VERSION CONTROL

VERSION NO.	NATURE OF AMENDMENT	PAGE NO.	DATE REVISED
1.0	New Document		01/12/2017
2.0	Changed the name of the procedure to that of IMS Policy Commitment Statement Procedure	1	01/07/2019
2.0	IMS Compliance policy statement replaced with TIMS Policy Commitment Statement	All	01/07/2019
2.0.	OHSAS 18001 changed to ISO 45001	6	01/07/2019
2.0	AAR Compliance Quality Standard 5000 referenced	6	01/07/2019
2.0	Reworded the Purpose to read "The purpose of this procedure is to define the process for establishing, implementing and maintaining TIMS Policy Commitment Statement at Transnet SOC (Ltd) (hereafter referred to as "Transnet")".	6	01/07/2019
2.0	Definition OHSAS deleted	7	01/07/2019
2.0	Added RMC and TIMS definition	7-8	01/07/2019
2.0	Incorporated Group Chief Executive (GCE) and Group Chief Operating Officer (GCOO) role and responsibilities under Top Management.	8	01/07/2019
2.0	Heading 6.1: The whole paragraph 2 was removed, There is no OD/SU policy statement required.	9	01/07/2019
2.0	Defined TIMS Policy Commitment Statement	9	01/07/2019
2.0	Heading 6.1: paragraph 5, bullet point 5 is removed. The safety philosophy does not need to be singularly expressed.	10	01/07/2019
2.0	Revised sentence to read "a commitment to review and revise the TIMS Policy Commitment Statement every 5 years or as and when required.	10	01/07/2019
2.0	Heading 6.2: First and second sentences replaced to use the inclusive general term 'stakeholders'. Heading 6.2: Third sentence rephrased Heading 6.2: Last sentence, rephrased to include 'the change request process'	10	01/07/2019

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2.0	Heading 6.3: second sentence, word 'approved' corrected to 'approval'.	10	01/07/2019
2.0	Numbering from paragraph 6.3 corrected	All	01/07/2019
2.0	IMS replaced with TIMS	All	01/07/2019
2.0	Heading 6.4: first sentence reconstructed. 'Applicable governance structures' replaced by 'leadership'	11	01/07/2019
2.0	Heading 6.4: second sentence removed, There is no OD/SU policy statement required	11	01/07/2019
2.0	Changes made to 6.4 Approval of the TIMS Policy Commitment Statement by presenting to the RMC, version control it and to be approved by the GCE.	11	01/07/2019
2.0	Heading 6.5: OD/SU removed, and amendments made to the paragraph e.g. visible	12	01/07/2019

Note: Only latest amendments and/or additions are reflected in italics in the body of the document.

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DOCUMENTATION SIGN-OFF SHEET

I, the undersigned hereby approve this procedure.

ROLE	CAPACITY/ FUNCTION	SIGNATURE	DATE
Process Owner:	**General Manager: Risk & Compliance**		14/10/19
Accepts document for adequacy and practicability. Comments:			
Approval committee:	**Risk Management Committee Chairperson**		23.01.2020
Approves document for use. Comments:			

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TRANSNET

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1. PURPOSE

The purpose of this procedure is to define the process for establishing, implementing and maintaining *TIMS Policy Commitment Statement* at Transnet SOC (Ltd) (hereafter referred to as "Transnet").

2. APPLICABILITY

This procedure is applicable to Transnet.

3. REFERENCE DOCUMENTS

NAME	REFERENCE	APPLICABLE SECTION
Association of American Railroads	*AAR-5000:2015*	*Clauses 2.4.1.1 & 2.4.1.2*
Asset management	ISO 55001:2015	Clauses 4.3; 5.2; 6.2.1; 6.2.2; 7.3
Business Continuity Management System	ISO 22301:2012	Clauses 4.1, 4.2, 4.3, 5.1, 5.2, 5.5, 9.4 & 9.5.
Contractor Management	TRN-IMS-GRP-PRO-014	
Continual Improvement	TRN-IMS-GRP-PRO-018	
Determination RSR SMS determination	May 2018	Clause: 8.1.2; 8.1.3;
Energy Management System	SANS 50001:2011	Clauses 4.2.1, 4.2.2, 4.3, 4.4.1, 4.4.6, 4.5.2, 4.5.3, 4.5.4.1, 4.5.5, 4.7.2 & 4.7.3.
Environmental Management System	ISO 14001:2015	Clauses 5.1, 5.2, 7.5
Food Safety Management System	SANS 10049:2012	Clauses 6.1, 6.5, 7.5, 2.6
General Requirements for Competence of Testing and Calibration Laboratory	ISO17025:2018	Clause 4.2.2
Information Technology Service Management	ISO 20000-1	Clauses 4.1.1, 4.1.2, 4.1.4, 4.5.2, 4.5.4.3, 4.5.5.1, 4.5.5.2 & 6.6.1.
Integrated Risk Management Policy	TG/TGR12/1/1/1P	All
Leadership Procedure	TRN-IMS-GRP-PRO-002	
Occupational Health and Safety Management System	*ISO 45001:2018*	*Clauses 5.1, 5.2, 5.4, 6.2.1, 7.3, 9.2.1 & 9.3*
Quality Management System	ISO 9001:2015	Clauses 5.2.1, 5.2.2,7.5.2
Railway Safety Management System	SANS 3001: 2016	Clauses 4.2.1
Risk Management Guidelines	ISO 31000:2018	Clauses 5.2 & 5.4 .2
Societal Security – Business Continuity Management System	ISO 22301: 2012	Clauses 5.3

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Specification for security management systems for the supply chain	SANS 28000:2010	Clauses 4.2, 4.3.3, 4.3.4 & 4.4.3

4. DEFINITIONS AND ABBREVIATIONS

4.1. Definitions

Employee

Any person who is on an indefinite (permanent) contract of employment or on a fix term contract or any person who works for Transnet and who receives, or who is entitled to receive any remuneration, and other person who in any manner assist in carrying on or conducting the business of Transnet excluding independent contractors.

Policy

A Statement of guidance, principles and intentions outlining a framework and / or a general, high level, plan of action regarding specific business component.

Policy Statement

An organisation-level document that prescribes acceptable methods or behaviours in specific circumstances.

Stakeholder

A person or organisation that can affect, be affected, or perceive itself to be affected by Transnet's decisions or activities (Internal and external stakeholders).

4.2. Abbreviations

EMS Environmental Management System

CCRO Chief Corporate Risk Officer

IMS Integrated Management System

ISO International Organisation for Standardisation

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OD Operating Division

QMS Quality Management System

RMC *Risk Management Committee*

SANS South African National Standard

TIMS *Transnet Integrated Management System*

5. ACCOUNTABILITY, RESPONSIBILITY AND AUTHORITY

Top Management	• *Approve the TIMS Policy Commitment Statement;* • *Ensure sustained implementation of the TIMS Policy Commitment Statement*; • Review the Corporate TIMS Policy Commitment Statement; • Take overall responsibility for the implementation of the TIMS Policy Commitment Statement within the Operations; • Ensure that TIMS Policy Commitment Statement commitments are considered during strategic business planning; • Promote integration of the TIMS Policy Commitment Statement in other relevant company Policies; and • Ensure that appropriate processes are in place to monitor the implementation of the TIMS Policy Commitment Statement throughout the organization.
Chief Corporate Risk Officer (CCRO)	• Lead the development, establishment and maintenance of the TIMS Policy Commitment Statement with inputs from Group Executives; • Communicate and consult stakeholders on the TIMS Policy Commitment Statement; • Set standards and strategic direction on issues pertaining to TIMS Policy Commitment Statement; • Ensures integration of the IMS Policy Statement commitments in all relevant elements of the management system and other Transnet Policies; • Promote the TIMS Policy Commitment Statement to internal and external stakeholders; and • Report on the TIMS Policy Commitment Statement performance.
Senior Management	• Ensure dissemination and implementation of the approved TIMS Policy Commitment Statement commitments within the organization;

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	• Communicate performance against the TIMS Policy Commitment Statement to Transnet employees, interested parties and stakeholders; • Ensure the availability of resources essential to support the establishment, implementation, maintenance of the TIMS Policy Commitment Statement; and • Ensures that employees receive the necessary information, training and support to promote the TIMS Policy Commitment Statement.
Line Management	• Ensure dissemination and implementation of the approved TIMS Policy Commitment Statement commitments within the organization; • Communicate performance against the TIMS Policy Commitment Statement to Transnet employees, interested parties and stakeholders; • Ensure the availability of resources essential to support the establishment, implementation, maintenance of the TIMS Policy Commitment Statement and • Ensures that employees receive the necessary information, training and support to promote this TIMS Policy Commitment Statement.
All Employees	• Understand and implement the relevant aspects of the TIMS Policy Commitment Statement within their areas of responsibility; • Relevant employees are involved in the development and review of the TIMS Policy Commitment Statement; • Promote, uphold and comply with the provisions of the TIMS Policy Commitment Statement. • Take accountability for assigned activities and report deviations; and • Inform management of any deviations impacting on the TIMS Policy Commitment Statement such as working condition that poses a risk to the safety or health of a person or the environment.

6. PROCEDURE

6.1. Defining and Development of *TIMS Policy Commitment Statement*

The **Integrated Risk Management Policy TG/TGR12/1/1/1P** shall be developed, defined, maintained and reviewed as per the Transnet Company Policy Framework.

The *TIMS Policy Commitment Statement* is a concise statement of the Integrated Risk Management policy. *The TIMS Policy Commitment Statement* sets out an organization's approach to Risk

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Management, and that guides the establishment of goals and objectives, policies, procedures and programmes, ***Annexure 8.1 TIMS Policy Commitment Statement***

It is a message shared with the organisation and stakeholders on the organisation's commitment and intentions with regard to improving performance within our operations.

When establishing the *TIMS Policy Commitment Statement*, leadership must ensure it considers:

- the organization's commitment to principles and practices as described in the Integrated Risk Management Policy and any other relevant Policy;
- a demonstration of Top Management commitment to compliance, and of where the responsibilities and accountabilities lie;
- a commitment to comply with applicable legislation and other requirements;
- a commitment to make resources available in order to achieve the objectives of the *TIMS Policy Commitment Statement*;
- a directive that all employees shall be involved in achieving the set objectives; and
- a commitment to review and revise the *TIMS Policy Commitment Statement every 5 years or as and when required.*

6.2. Communication and Consultation on the draft *TIMS Policy Commitment Statement*

The draft TIMS Policy Commitment Statement shall be communicated and made available to all stakeholders for inputs using the necessary communication medium as defined under the ***Stakeholder Engagement and Management Procedure TRN-IMS-GRP-PROC-007.***

Consultation with employee representatives on the draft *TIMS Policy Commitment Statement* shall be done where deemed necessary.

The inputs shall be recorded in the 'change request form' in accordance with the change request process as described in the **Document, Data and Records Management Procedure TRN-IMS-GRP-PROC-010.**

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6.3. Management of Inputs from the Draft TIMS Policy Commitment Statement

All received inputs shall be taken into consideration when finalising the *TIMS Policy Commitment Statement*.

If there are no inputs the draft *TIMS Policy Commitment Statement* shall be considered applicable and undergo necessary *approval.*

6.4. Approval of the TIMS Policy Commitment Statement

The *TIMS Policy Commitment Statement* shall be presented at the *Risk Management Committee* (RMC) for *final inputs and approval* by Leadership where applicable.

The effective date of the *TIMS Policy Commitment Statement* as well as the next date of revision shall be stated on the statement to facilitate an effective control of the process.

The GCE shall sign off on the approved *TIMS Policy Commitment Statement.*

6.5. Communication of the *TIMS Policy Commitment Statement*

The approved *TIMS Policy Commitment Statement* shall be communicated and made available to all *stakeholders* using the necessary communication *medium* as defined under the **Stakeholder Engagement and Management Procedure TRN-IMS-GRP-PROC-007.**

The approved *TIMS Policy Commitment Statement* shall be posted in *visible* places in the workplace or at an area where employees normally sign on for duty for visibility.

Copies of the approved *TIMS Policy Commitment Statement* can be made available to the external stakeholders on request as per the **Stakeholder Engagement and Management Procedure TRN-IMS-GRP-PROC-007 and Contractor Management Procedure TRN-IMS-GRP-PROC-014.**

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The stakeholder request of the TIMS Policy Commitment Statement shall be recorded accordingly for tracking purpose as per **Annexure 8.2 Stakeholder *TIMS Policy Commitment Statement* Request Register.**

Implementation of the *TIMS Policy Commitment Statement*

All levels of management, supervisors, and employees shall implement and embody the spirit of the *TIMS Policy Commitment Statement*.

All levels of management must ensure that all divisions, departments and employees are involved in and own the interventions in line with the requirements of **Leadership Procedure TRN-IMS-GRP-PROC-001.**

6.6. Periodic Review of the *TIMS Policy Commitment Statement*

The TIMS Policy Commitment Statement shall be reviewed every 5 years or as dictated to by the changing organisational imperatives.

In cases where the review is pending the last signed statement shall be in force.

7. RECORDS

Records are kept for a period of at least three years or as required by statutory and regulatory requirements.

7.1. TIMS Policy Commitment Statement
7.2. Proof of Communication of the TIMS Policy Commitment Statement
7.3. Stakeholder Policy Statement Request Register

8. ANNEXURES

8.1. TRN-IMS-GRP-GDL-002.1 TIMS Policy Commitment Statement Guideline
8.2. TRN-IMS-GRP-REG- 002.2 Stakeholder *TIMS Policy Commitment Statement* Request Register

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Annexure 8.1

Transnet Integrated Management System (TIMS)
POLICY COMMITMENT STATEMENT

Transnet is a State Owned Company that operates as an integrated freight transport company, formed around a core five operating division namely Transnet Freight Rail (TFR), Transnet Engineering (TE), Transnet National Ports Authority (TNPA), Transnet Port Terminals (TPT) and Transnet Pipelines (TPL) that complement each other. These are supported by a number of company-wide specialist units namely Transnet Property (TP), Transnet Group Capital (TGC) and Transnet Foundation which underpins our company.

Transnet has developed and implemented a TIMS that forms an integral part of our core business. We are committed to ***transporting freight and passengers, and provide excellent service*** to our customers. This is done in order to ***competitively grow our business***, enhance customer satisfaction and ensure sustainable business development.

TIMS is established, implemented and maintained in accordance with recognised best practices that will enable us to:

- Incorporate and comply with applicable ***legislation, regulations, codes, standards, protocols, best practices and customer requirements*** to which we subscribe in order to achieve our business objectives;
- Set and achieve ***objectives and targets*** that address significant enterprise-wide ***strategic, tactical and operational risks, opportunities and mitigate the consequences*** thereof;
- Proactively implement ***waste and pollution prevention strategies*** to prevent ***environmental degradation;***
- Continually promote the prudent and ***sustainable*** use of ***energy and natural resources***;
- Provide ***quality products*** and ***services*** in order to meet our customers' requirements;
- Provide ***safe and secure environment*** for our employees and stakeholder;
- Carry out our business in a manner which ***protects our assets and information*** and ***prevents injuries and ill health*** to our employees and stakeholders;
- Promote ***safe operational principles*** during operations to minimize occurrences;
- Strategically ***source our contractors*** through fair, equitable and transparent processes;
- Provide ***social development*** as a good corporate citizen;
- Promote ***food safety practices*** in our food preparation and handling environments;
- Ensure ***proficiency and preparedness*** to deal with and ***effectively recover*** from any ***emergency situations***;
- ***Develop, train and manage our employees*** through inspirational leadership, provide the necessary ***organizational information, knowledge and resources*** to achieve the intention of this policy statement;
- ***Communicate***, ***engage*** and ***provide support*** and ***appropriate information*** to relevant stakeholders in order to build relationships based on care, openness, mutual trust and involvement as well as promote TIMS risks awareness culture;
- Allocate ***responsibilities*** and ***accountabilities*** for meeting the requirements of the TIMS Policy Commitment Statement.
- Drive an ***integrated assurance management programme*** to ensure ***continual improvement*** of TIMS.

The TIMS Policy Commitment Statement shall be ***reviewed every five years*** or ***as circumstances dictate*** to ensure that it remains ***current and relevant***. Our progress on the achievement of the policy statement commitments shall be reported in the respective Governance Structures. Transnet recognises its accountability for TIMS; all employees including contractors have a role to play in delivering on the commitment set out in this policy statement.

_____ Date: _____
Group Chief Executive Next Review Date:

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Annexure 8.2

Stakeholder TIMS Policy *Commitment* Statement Request Register

TRN-IMS-GRP-REG-002.2

Stakeholder TIMS Policy *Commitment* Statement Request Register				
Date of Issue	**Name of Stakeholder**	**Reason for Requesting the Policy *Commitment* Statement**	**Issued By**	**In what Format**

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Note: If hardcopy, check electronic system for latest revision

ENVIRONMENTAL BASELINE REPORT

Project Name: Transnet Port Terminals Head Quarters move - 202 Anton Lembede Street, Durban

Transnet Project Number: TBC

Author: Nokhuthala Hlongwane

Owner: Transnet

Client: Transnet Port Terminals

Project Sponsor: TBC

Project Manager: Ketan Bindapersad

Revision Number: 0A

Approved by: Ketan Bindapersad

Document No: TBC

Revision History:		
0A	17-Aug-21	1st Draft for review & comments
Revision:	**Date:**	**Description:**

Environmental Baseline / Status Quo Report

Project Name: Transnet Port Terminals Head Quarters move - 202 Anton Lembede Street, Durban

Project Number: TBC

Compiled by:	Nokhuthala Hlongwane		
	TPT Environmental Specialist	Signed	Date
Reviewed by:	Onobom Njokwana		
	TPT Construction Manager	Signed	Date
Approved by:	Ketan Bindapersad		
	TPT Project Manager	Signed	Date
Approved by:	Raymond van Rooyen		
	TPT Executive Manager: SHEQ & Sustainability	Signed	Date

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1. Introduction and Background

The purpose of this report is to identify and characterize the existing status quo of the proposed development site, provide input on the requirements to comply with environmental legislation and make recommendations on initiatives or controls that will ensure environmental protection.

Transnet Port Terminals, Head Office currently leases (one) 1 office building in Kingsmead Office Park, Durban. The extended lease will end on 31 March 2022. A decision has been approved by the Transnet GCE and Executives to move the TPT Head Office into a Transnet owned office building, located at 202 Anton Lembede St. Durban. The 202 Anton Lembede Street building is currently occupied by Transnet Pipelines and Transnet Properties and there is limited space available for TPT Head Office staff. However, due to the current work from home strategy that Transnet has adopted based on the Covid-19 pandemic, less workspace is required. Permanent workspaces are to be allocated to staff that are required to be at work daily, whilst hot desks will be booked by all other staff requiring a desk space for a specific period.

The primary objective of the project is to provide office accommodation for Transnet Port Terminals Head Quarters staff at 202 Anton Lembede Street on specifically allocated floors within the existing building and at the same time save costs on the rental by moving our staff back to Transnet owned facilities. Permanent desks and hot desks will be created to accommodate all TPT Head Office staff requirements. Hot desks will be booked by staff deemed able to work from home, whilst those required to be at the offices will work from permanent desks.

The site inspection for the TPT HQ move Project, Durban was conducted on 18 June 2021 by Nokhuthala Hlongwane (TPT Environmental Specialist).

The site locality plan and typical floor layouts of the building are shown on Figures 1.1, 1.2 1.3 and 1.4 respectively below.

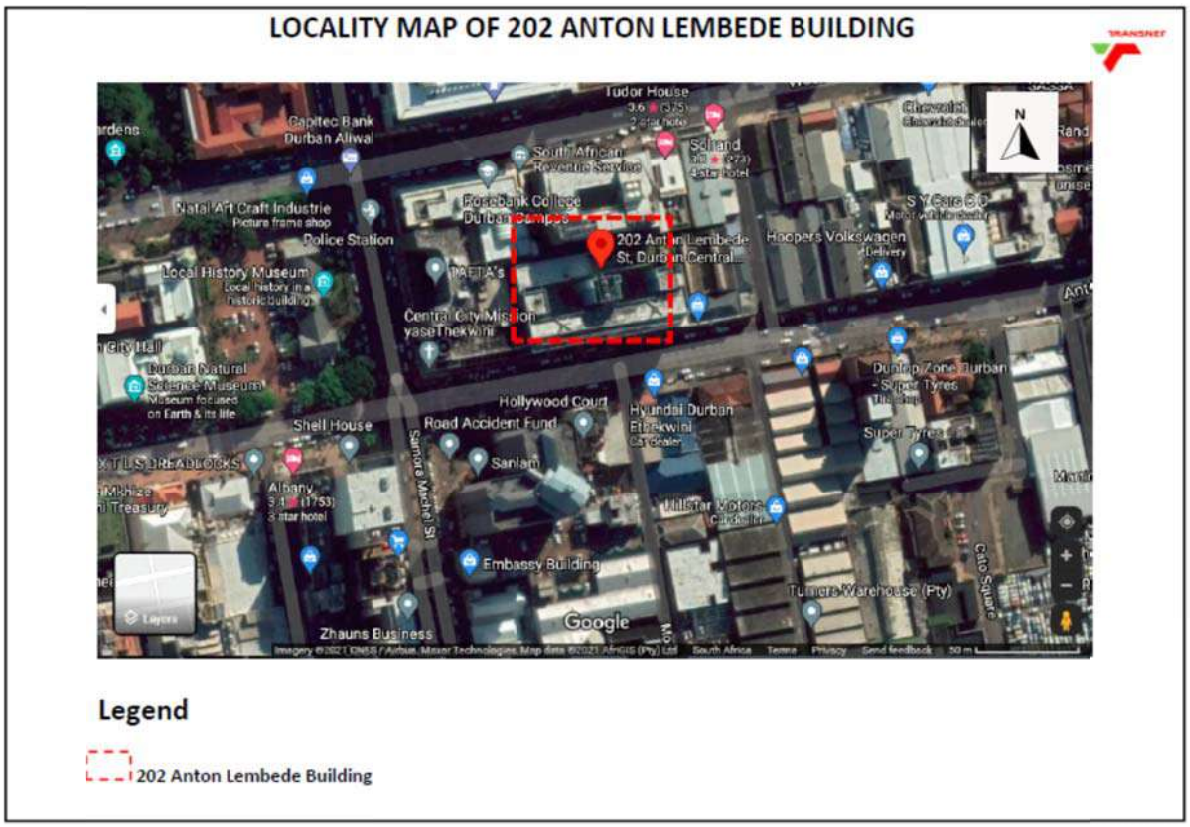

Figure 1.1: Aerial photograph / map (Source: Google Earth) of the site

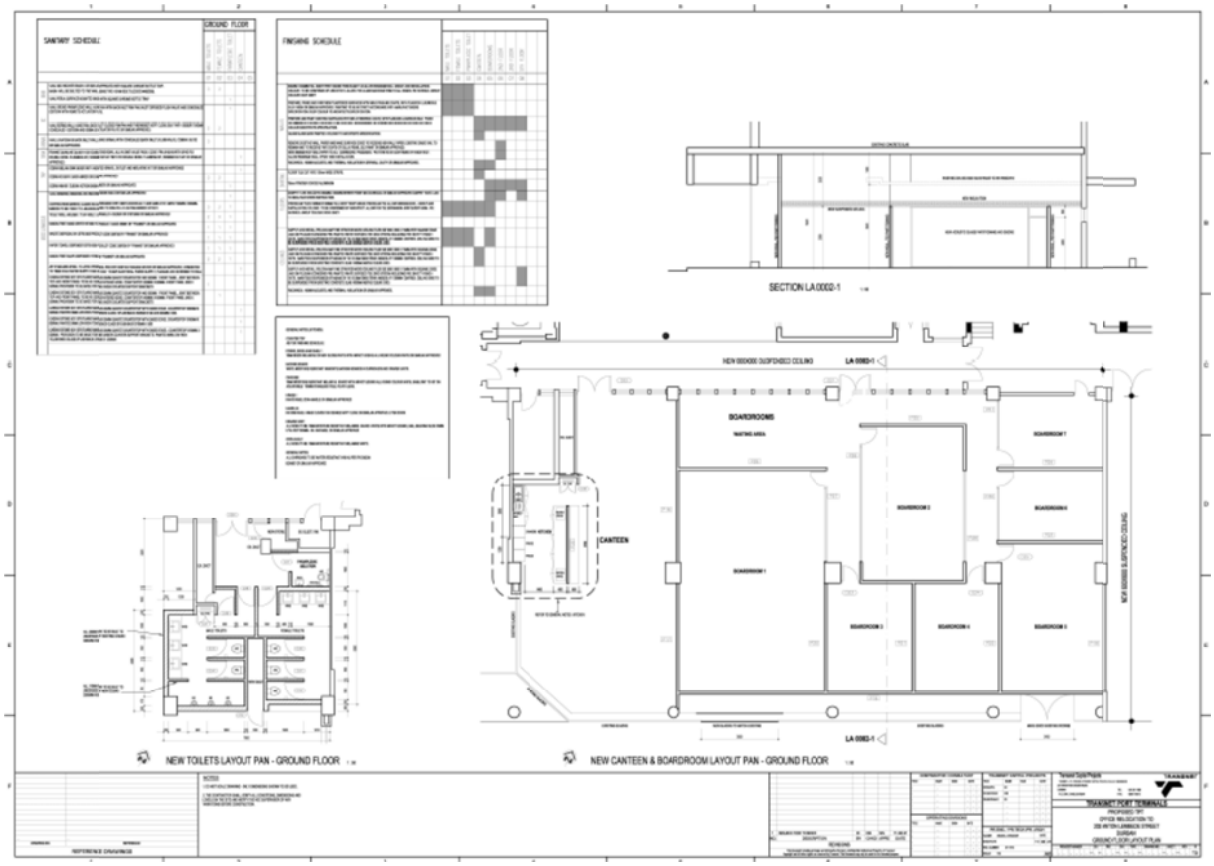

Figure 1.2: Ground floor layout

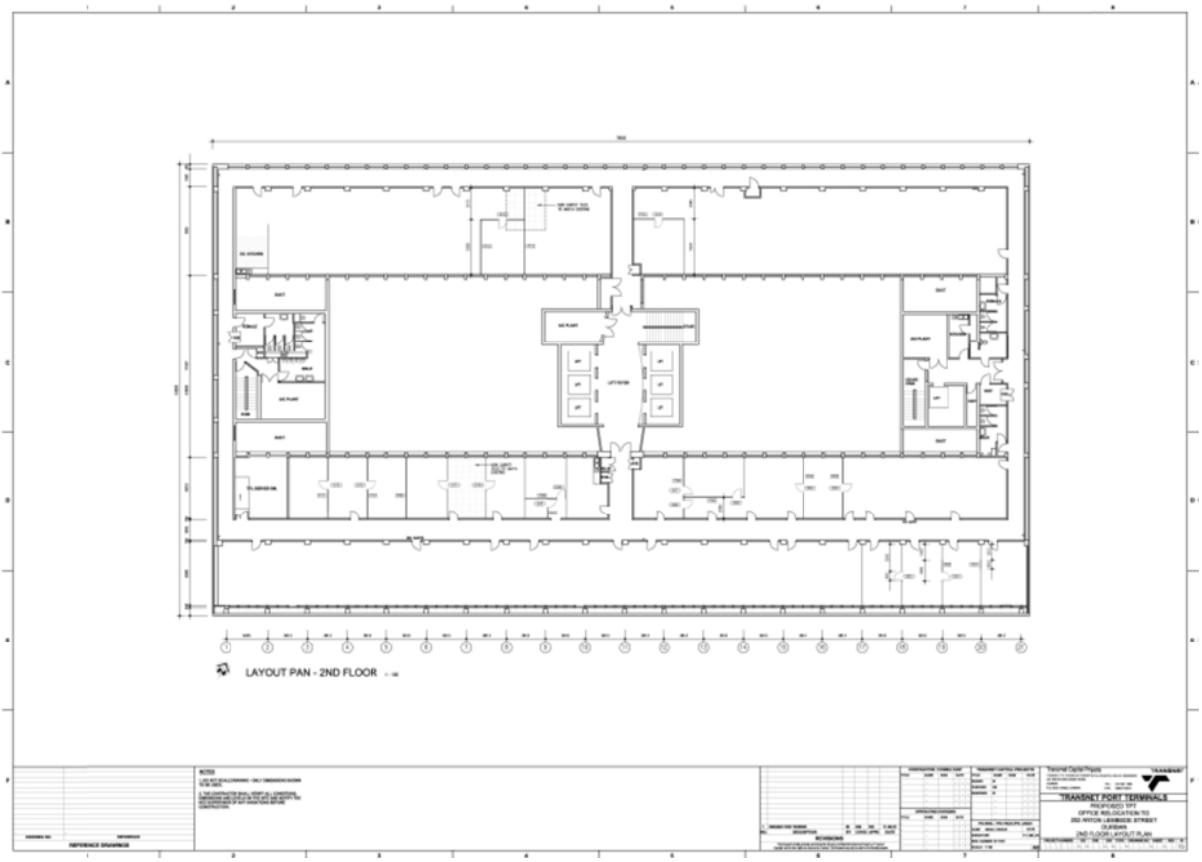

Figure 1.3: Second floor layout

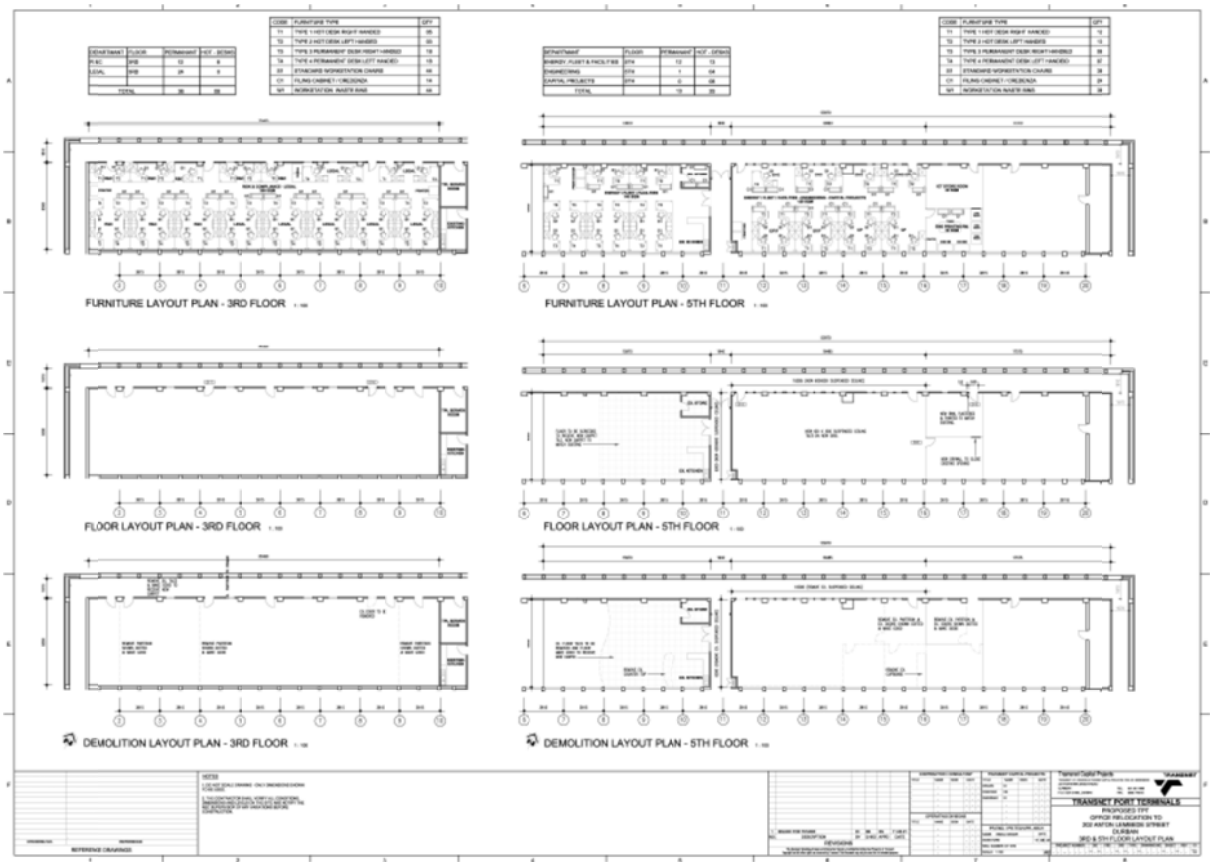

Figure 1.4: Third and fifth floors layout

2. Project Scope

The *Works* that the *Contractor* is to perform involve electrical, mechanical, ICT, security, civil and general building works for the Provision of Offices for Transnet Port Terminals at 202 Anton Lembede Street, Durban.

The offices will be located on the following floors at 202 Anton Lembede Street and the works is limited to these particular floors:

- A portion of the Ground Floor
- The 2nd Floor
- A portion of the 3rd Floor
- A portion of the 5th Floor

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

- The supply, delivery, installation and commissioning of distribution boards, power skirting, plug and lan points for desks.
- Supply new and install or remove and replace light switches and light fittings
- Design of modification of HVAC ductwork, diffusers, air distribution on the 5th, 3rd and 2nd floors to comply with National Building Regulations
- Detail design, supply and installation of suitable standalone HVAC system to service the canteen and boardroom on the Ground floor
- Installation of trunking and access routes for ICT and security installation (to be done by others)
- General building work including demolition, stripping, tiling, painting and carpeting where required.
- Supply and installation of shop fittings/ partitions for new closed offices and boardrooms where required.
- Removal, transportation, delivery and installation of existing furniture in the relevant areas, including installation of power supply/plug points and lan points to desks, offices and boardrooms.

3. Baseline Inspection Criteria

The baseline assessment was carried out against the flora, fauna, water, regional climate, heritage resources and social and community aspects in the area. The inspection criteria was derived from South African Environmental legislation such as the National Environmental Management Act, Act no 107 of 1998, three NEMA Listing Notifications, National Environmental Management Integrated Coastal Management Act 24 of 2008, National Environmental Management Waste Act 59 of 2008, National Water Act 36 of 1998 section 21, National Forest Act 84 of 1998, National Environmental Management Biodiversity Act 10 of 2004, National Environmental Management Air Quality Act 39 of 2004, National Heritage Resources Act 25 of 1999, Mineral and Petroleum Resources Development Act 28 of 202, as well as the eThekwini Municipality By-laws.

Site condition was assessed and the following observations and recommendations were made:

3.1 Flora

The site is situated on the Transnet property within the existing Transnet Building on 202 Anton Lembede Street in the Durban central business district (CBD). There was/is no affected flora near or around the proposed project site.

Plate 1: Floor/Ground/Surface of the study area

3.2 Fauna

The site is within the Transnet building and therefore, no fauna is/will be affected. However, there are pigeons that nest outside the building. However, should any animal or bird species be identified it should not be killed. If an animal or bird species that could be threatened by the development is discovered on site, the TPT Environmental Officer and site supervisor

should be informed immediately. If no-one is available, an appropriately skilled person should be contacted to remove the creature off site.

3.3 Water

The proposed project is located in an existing building and most of the work will be dry work that will not require water use. The appointed Contractor shall either provide drinking water for his construction personnel including construction water or Transnet to allow the Contractor to use the water allocated to the building. Should the Contractor bring water from the outside source, proof of a registered water use/valid permit from the relevant authorities will be required. Should the Contractor use water from Transnet, a level agreement in writing will need to be in place.

On the other hand, the proposed scope of work will have no significant impact on ground water resources as construction entails the refurbishment of an existing building with limited shallow excavations.

However, should the underground water be encountered during excavation, work (excavation) should cease and the Department of water and Sanitation (DWS) must be contacted in order to ascertain whether a General Authorisation (GA) application or a Water Use Licence application (WULA) must be lodged with the department, depending on the amount of groundwater to be removed and also, where and how that water will be disposed.

3.4 Waste management

One of the project's requirements is to refurbish the building (selected floors) and with this in mind, there will be some form of waste generated during the refurbishment phase. All the relevant activities including temporal classification, storage, disposal, etc. will need to comply with the relevant sections of the Waste Act, Act 59 of 2008 as amended as well as the COVID-19 Healthcare Waste Management on Construction sites TGC-IMS-ENV-SOP-009.001.

According to the National Waste Act, (Act 59 of 2008) as amended, Government Notice No. 921 29 Nov 2013 (as amended by GNR 332 of 2 May 2014), Category A, the following listed

activity might be applicable and will require a basic assessment process to be undertaken: Activities 9 (*The disposal of inert waste to land in excess of 25 tons but not exceeding 25 000 tons, excluding the disposal of such waste for the purposes of levelling and building which has been authorised by or under other legislation*) and 10 (*The disposal of general waste to land covering an area of more than 50m^2 but less than 200m^2 and with a total capacity not exceeding 25 000 tons*) of the Waste Act listed activities might also be triggered, depending on the activities that will materialise during construction.

Through refurbishment, the project might further trigger Category B listed activities that require full scoping and environmental impact assessment, which are:
Activity (8) *The disposal of general waste to land covering an area in excess of 200m2 and with a total capacity exceeding 25 000 tons.*
Activity (9) *The disposal of inert waste to land in excess of 25 000 tons, excluding the disposal of such waste for the purposes of levelling and building which has been authorised by or under other legislation*.

Hazardous waste listed activities especially asbestos are not triggered as no asbestos is found in the building. On the other hand, waste management will need to comply with the eThekwini Municipality: Waste removal by law of 2016.

3.5 Storage and handling of dangerous goods

Storage of any hazardous materials/substances during construction should be on adequately bunded floors and the walls on bund areas must be impervious to prevent infiltration of any spills/leaks into the sub-surface soil and ground water. The project further will have to comply with the Durban Metropolitan Unicity Municipality Interim code relating to fire prevention and flammable liquids and substances (23 March 2000). All chapters of this by-law are applicable, except chapters IX and X which might not be relevant.

The eThekwini Municipality Air Quality Management by-law (27 February 2020) will also need to be complied with. This by-law governs air quality management within the Municipality; reasonable measures to prevent air pollution; local emission standards and air pollution control zones; smoke emissions from premises, vehicles and dwellings; the use and operation of fuel burning equipment; the installation and operation of obscuration measuring equipment; the

prohibition of emissions that cause a nuisance; offences and penalties and to provide for matters incidental thereto.

3.6 Excavations and spoil material from excavations

The refurbishment of certain floors at the 202 Anton Lembede Street will involve minor excavations. The excess spoil material from the excavations that might need to be stored for future use might trigger Category A, Activity 1 of the National Environmental Management: Waste Act (Act 59 of 2008) which states:

A person who wishes to commence, undertake or conduct a waste management activity listed under this Category, must conduct a basic assessment process set out in the Environmental Impact Assessment Regulations made under section 24(5) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) as part of a waste management licence application contemplated in section 45 read with section 20(b) of this Act.

(1) The storage, including the temporary storage of general waste at a facility that has the capacity to store in excess of 100m^3 of general waste at any one time, excluding the storage of waste in lagoons.

Whereas Category B, Activity 7 states:

A person who wishes to commence, undertake or conduct a waste management activity listed under this Category, must conduct a scoping and environmental impact reporting process set out in the Environmental Impact Assessment Regulations made under section 24(5) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) as part of a waste management licence application contemplated in section 45 read with section 20(b) of this Act.

7) The treatment of effluent, wastewater or sewage with an annual throughput capacity of 15 000m^3 or more.

Fortunately, there is no need to apply for a waste storage site as the excess spoil material from the excavations is estimated not to reach 100m^3.

3.7 Heritage Resources

According to Section 34(1) of the National Heritage Resources Act, 25 of 1999, *"no person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority".* Section 38(1) states that "*any person who intends to undertake a development categorised as—*

> *(a) the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;*
>
> *(c) any development or other activity which will change the character of a site—*
>
> *(i) exceeding 5 000 m² in extent, must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.*

The 202 Anton Lembede Street building is 62 years old and refurbishment might change the character of the building, therefore, might require the permit from the KwaZulu-Natal Amafa and Research Institute. However, no graves were identified on the project sites. Chances are very slim that artefacts, fossils and middens can be discovered during excavation activities because excavations will be shallow and the excavations will take place in areas that have already been disturbed. However, should any artefacts, fossils, middens and graves be found on site, work should seize immediately, the site should be barricaded and the TPT Environmental Officer and the Construction Manager should be informed immediately. Work may only resume once clearance is given in writing to the Contractor on site.

3.8 Social and Community

Social attributes constitute part of the environment and may as such not be neglected during environmental investigations. The project is located within an existing Transnet

building in the Durban CBC and as such, the project site is secured from uncontrolled access. The controlled access into the building ensures that minimal social impacts will occur. However, the project will need to comply with the eThekwini Municipality: Scheduled Activities by-law of 2019 which provide measures for the prevention, minimisation and management of environmental and human health impacts likely to arise from premises from which certain trades, occupations, businesses, activities or processes are undertaken; to prohibit certain activities or conduct in order to ensure and promote a healthy environment; to provide for the repeal of laws and savings; and to provide for matters incidental thereto.

Furthermore, since the project is located in the CBD where there might be contact with the public, it will have to comply with the eThekwini Municipality: Nuisances and behaviour in public places by-law of 2015 which governs measures for preventing, minimising or managing public nuisances; to prohibit certain activities or conduct in public places; to provide for the repeal of laws and savings; and to provide for matters incidental thereto. On the other hand, the project will be provided with a Public Complaints Register on site that provides an opportunity for the public/visitors/employees/service providers should they want to report and record any complaints.

3.9 Climate Conditions

Durban has a humid subtropical climate (Köppen climate classification Cfa), with hot and humid summers from November to March and pleasantly warm and dry winters from June to September which are snow and frost-free. The average annual temperature is 20.9°C in Durban. The average temperature in summer ranges around 28°C, while in winter the average temperature is 12°C. It has an annual rainfall of 1,009 millimetres (39.7 in). Durban receives lowest rainfall of 20mm in June and the highest rainfall of 130mm in January.

4. Environmental authorisation and permit requirements

The following pieces of legislation were perused to determine the requirements:

National Environmental Management Act (107 of 1998) as amended:

- Environmental Impact Regulations of 2017 (Listing Notice 1, 2 and 3);

National Environmental Management Waste Act (59 of 2008)

- List of Waste Management Activities: GN 921 of 2013 (as amended by GN 633 of 2015);

National Environmental Management: Integrated Coastal Management Act (24 of 2008)

- Section 63, 69 and 71;

National Environmental Management Air Quality Act (39 of 2004)

- Listed Activities and associated minimum emission standards identified in terms of Section 21 of the National Environmental Management: Air Quality Act, 2004: GN 893 of 2013(as amended by GN 551 of 2015);
- National Dust Control Regulations: GNR 827 of 2013;

National Water Act (36 of 1998)

- Water uses as defined in section 21;
- General Authorisation in terms of Section 39 of the National Water Act (36 of 1998) for Water Uses as defined in Section 21 (C) or Section 21 (I), Department of Water and Sanitation GN 509 of 2016;
- Revision of General Authorisations in terms of Section 39 of the National Water Act (36 of 1998) in relation to Section 21 (j), 21 (g), 21 (e), 21 (f) and 21 (h), Department of Water and Sanitation GN 665 of 6 September 2013;

Mineral and Petroleum Resource Development Act (28 of 2002):

- Section 27;

National Forest Act (84 of 1998):

- Section 15 & Section 23(2);

National Environmental Management: Biodiversity Act (10 of 2004)

- Section 87 (a);
- List of critically endangered, endangered, vulnerable and protected species, GNR 1002 of 2011;
- Alien and Invasive species list: GN 599 of 2014;

National Heritage Resources Act (25 of 1999)

- Section 34, 36 and 38;

eThekwini Municipality By-laws

- Air Quality Management By-Law, adopted by the Council on 27 February 2020.
- Interim Code Relating to Fire Prevention and Flammable Liquids and Substances, Municipal Notice No. 27 of 2000, published in the Provincial Gazette No. 5417 and dated 23 March 2000.
- Nuisances and Behaviour in Public Places By-Law, adopted by the Council on 24 June 2015.
- Scheduled Activities By-Law, adopted by the Council on 27 February 2020.
- Waste Removal By-Law, published in the Provincial Gazette No. 1722 and dated 25 August 2016

5. Conclusion

After thorough investigation of the site and scope of work, it seems we are triggering sections 34(1) and 38(1) of the National Heritage Resources Act, 25 of 1999 and this needs to be verified with the KZN Amafa and Research Institute. Social and community activities will mostly trigger the relevant eThekwini Municipality by-laws. However, there is potential that the project may necessitate the need for Water Use Licence (WUL) and/or General Authorisation (GA), should water seeps through excavations, requiring de-watering as triggered by the National Water Act (Act 36 of 1998). The disposal of inert and general waste does not seem to trigger the National Waste Act, (Act 59 of 2008) listed activities as quantities of these waste type might not reach the thresholds as per the listed activities.

On the other hand, the development needs to comply with the eThekwini Municipality By-Laws as reflected on various sections above.

This report might need to be amended if there is a change in the scope of work and or project scope, prior to the commencement of work on site.

Annexure A

Permission Type	Relevant Statutory Document	Document Perused	Applicable	Not Applicable	Required Process
Environmental Authorisation	EIA Regulations of 2014 (Listing Notice 1,2 & 3)	√		√	Basic Assessment/EIA
Waste License	National Environmental Waste Act 59 of 2008 – List of Waste Management Activities: GN 921 of 2013 (as amended by GN 633 of 2015);	√		√	Application for Waste License as stipulated in Chapter 5 of the Act
Atmospheric Emission license	National Environmental Management Air Quality Act 39 of 2004 – List of Activities: GN 893 of 2013	√		√	Application for Air Emission License as stipulated in Chapter 5 of the Act
Water use License	National Water Act 36 of 1998 – Section 21	√		√	Application for Water use License
Mining Permit	Mineral and Petroleum Resource Development Act 28 of 2002 – Section 27	√		√	Application for mining permit in terms of Section 27 of the Act and Regulations 52
Tree Removal Permit	National Forest Act 84 of 1998 – Section 15	√		√	Application for license as stipulated in Section 15 of the Act
Heritage Permit	National Heritage Resources Act 25 of 1999	√	√		Application for permit as stipulated in

Permission Type	Relevant Statutory Document	Document Perused	Applicable	Not Applicable	Required Process
					sections 34-38 of the Act
Permit for removal of protected species	National Environmental Management: Biodiversity Act 10 of 2004	√		√	Application in terms of Section 57(1) of the Act
Permit required for restricted activities as defined in Act (Category 2 Invasive species)	National Environmental Management: Biodiversity Act 10 of 2004	√		√	Application in terms Chapter 7 of the Act Alien and Invasive species list: GN 599 of 2014;
Coastal Authorisation	National Environmental Management Integrated Coastal Management Act 24 of 2008	√		√	Coastal Water Discharge permit – Section 69 General discharge authorisation – Section 69 A dumping permit - Section 71
Air Quality Management By-Law, adopted by the Council on 27	eThekwini Air Quality Management By-Law	√	√		Compliance with the relevant By-Law conditions

Permission Type	Relevant Statutory Document	Document Perused	Applicable	Not Applicable	Required Process
February 2020.					
Interim Code Relating to Fire Prevention and Flammable Liquids and Substances, Municipal Notice No. 27 of 2000, published in the Provincial Gazette No. 5417 and dated 23 March 2000.	eThekwini Interim Code Relating to Fire Prevention and Flammable Liquids and Substances	√	√		Compliance with the relevant By-Law conditions
Nuisances and Behaviour in Public Places By-Law, adopted by the	eThekwini Nuisances and Behaviour in Public Places By-Law	√	√		Compliance with the relevant By-Law conditions

Permission Type	Relevant Statutory Document	Document Perused	Applicable	Not Applicable	Required Process
Council on 24 June 2015.					
Scheduled Activities By-Law, adopted by the Council on 27 February 2020.	eThekwini Scheduled Activities By-Law	√	√		Compliance with the relevant By-Law conditions
Waste Removal By-Law, published in the Provincial Gazette No. 1722 and dated 25 August 2016.	eThekwini Municipality Waste Removal By-Law	√	√		Compliance with the relevant By-Law conditions

Annexure B

Work Packages/ Activities (Description)	EA Requirements Review - All legislation	Activities that may apply to Project	Applicable to Project		Motivation	Process to be followed
			YES	NO		
Transnet Port Terminals Head Quarters move - 202 Anton Lembede Street, Durban	**National Environmental Management Act (107 of 1998) as amended:**					
	• ***Listing Notice 1 (GN R327)***	None		x		
	• ***Listing Notice 2 (GN R325)***	None		x		
	• ***Listing Notice 3 (GN R324)***	None		x		
	• ***eThekwini Municipal By-Laws***					
	• **Durban Metropolitan Unicity Municipality Interim code relating to fire prevention and**	Relevant sections of the By-Law during construction and operation.	x		Compliance with the relevant By-Law conditions	Induction prior to construction, tool box talks, compliance audits to be undertaken

Work Packages/ Activities (Description)	EA Requirements Review - All legislation	Activities that may apply to Project	Applicable to Project		Motivation	Process to be followed
			YES	NO		
	flammable liquids and substances , Municipal Notice No. 27 of 2000, published in the Provincial Gazette No. 5417 and dated 23 March 2000					during construction
	National Environmental Management Air Quality Act (39 of 2004): *List of Activities (GN 893/2013)*					
	• ***List of Activities (GN 893/2013)***	None		**x**		
	• ***eThekwini Municipal By-Laws***					
	• ***Air Quality Management By-Law, adopted by the Council on 27 February 2020***	Relevant sections of the By-Law during construction and operation.	**x**		Compliance with the relevant By-Law conditions	Induction prior to construction, tool box talks, compliance audits to be undertaken during construction

Work Packages/ Activities (Description)	EA Requirements Review - All legislation	Activities that may apply to Project	Applicable to Project		Motivation	Process to be followed
			YES	NO		
	National Environmental Management Waste Act (59 of 2008):					
	• ***List of Activities (GN 921/2013)*** • ***Category A***	1. The storage, including the temporary storage of general waste at a facility that has the capacity to store in excess of 100m3 of general waste at any one time, excluding the storage of waste in lagoons.		**x**	All waste will be disposed of at a registered relevant waste disposal site.	Spoil management is to be followed up.

Work Packages/ Activities (Description)	EA Requirements Review - All legislation	Activities that may apply to Project	Applicable to Project		Motivation	Process to be followed
			YES	NO		
		9. The disposal of inert waste to land in excess of 25 tons but not exceeding 25 000 tons, excluding the disposal of such waste for the purposes of levelling and building which has been authorised by or under other legislation		x	Not much inert waste will be produced.	Inert waste management is to be followed up.

Work Packages/ Activities (Description)	EA Requirements Review - All legislation	Activities that may apply to Project	Applicable to Project		Motivation	Process to be followed
			YES	NO		
		10. The disposal of general waste to land covering an area of more than 50m² but less than 200m² and with the total capacity not exceeding 25 000 tons.		x	All general waste that will be generated on site will be disposed of at the registered general waste landfill site.	Disposal of general waste.

Work Packages/ Activities (Description)	EA Requirements Review - All legislation	Activities that may apply to Project	Applicable to Project		Motivation	Process to be followed
			YES	NO		
				x		
	Category B					
		8. The disposal of general waste to land covering an area in excess of 200m^2 and with a total capacity exceeding 25 000 tons.		x	Not much general waste will be produced.	Disposal of general waste.

Work Packages/ Activities (Description)	EA Requirements Review - All legislation	Activities that may apply to Project	Applicable to Project		Motivation	Process to be followed
			YES	NO		
		9. The disposal of inert waste to land in excess of 25 000 tons, excluding the disposal of such waste for the purposes of levelling and building which has been authorised by or under other legislation.		x	Not much inert waste will be produced.	Inert waste management is to be followed up.
	Category C	1) The storage of general waste at a facility that has the capacity to store excess of 100m³ of general waste at any time, excluding the storage of waste in lagoons or temporary storage of such waste.		x	The general waste that will be produced on site is expected to be less than 100m³. Furthermore, waste will be stored temporarily on site in the waste receptacles and then disposed of at the permitted general waste landfill site.	Storage of general waste.
	eThekwini Municipal By-Laws					

Work Packages/ Activities (Description)	EA Requirements Review - All legislation	Activities that may apply to Project	Applicable to Project		Motivation	Process to be followed
			YES	NO		
	Waste Removal By-Law, published in the Provincial Gazette No. 1722 and dated 25 August 2016	Relevant sections of the By-Law during construction	x		Compliance with the relevant By-Law conditions	Induction prior to construction, tool box talks, compliance audits to be undertaken during construction
	National Water Act (36 of 1998)					
	Sections (f), (g) and (h)	(f) discharging waste or water containing waste into a water resource through a pipe, canal sewer sea outfall or other conduit; (g) disposing of waste in a manner which may detrimentally impact on a water resource; (h) disposing in any manner of water which contains waste from or which has been heated in any industrial or power generation		x	It is not anticipated to discharge waste or water into a water resource, or dispose waste in a manner that may detrimentally impact the water course, nor dispose water containing waste which has been heated in any industrial or power generation process in any manner	Follow up on discharge and disposal of waste water.

Work Packages/ Activities (Description)	EA Requirements Review - All legislation	Activities that may apply to Project	Applicable to Project		Motivation	Process to be followed
			YES	NO		
		process				
	Revision of General Authorisations in Terms of Section 39 of the National Water Act, 1998 (Act No. 36 Of 1998) – GN 665/2013	21(j) Removing, discharging or disposing of (100m^3 a day) water found underground if it is necessary for the efficient continuation of an activity or for the safety of people		**X**	Discharging, removing or disposing groundwater will not take place	Should water seeps through the excavations, an application for a GA/WUL should be applied for with the DWS
	National Environmental Management Biodiversity Act (10 of 2004):					
	Section 1 (Restricted Activities)	87. (a) A permit is required in order to carry out a restricted activity involving specimens of listed threatened or protected species.		**x**	Refurbishment will be inside the building.	N/A
	National Heritage Resources Act (25 of 1999):					

Work Packages/ Activities (Description)	EA Requirements Review - All legislation	Activities that may apply to Project	Applicable to Project		Motivation	Process to be followed
			YES	NO		
		34.(1) No person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority.	x		The building is older than 60 years and some refurbishment will include civil works.	The KZN Amafa and Research Institute must be consulted before any alteration of the building.
		38. (1) any person who intends to undertake a development categorised as— (a) the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length; (c) any development or other activity which will change the	x		Refurbishment might change the character of a site.	The KZN Amafa and Research Institute must be consulted before any alteration of the building.

Work Packages/ Activities (Description)	EA Requirements Review - All legislation	Activities that may apply to Project	Applicable to Project		Motivation	Process to be followed
			YES	NO		
		character of a site— (i) exceeding 5 000 m² in extent, must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.				
	National Environmental Management: Integrated Coastal Management Act (24 of 2008)					
	Section 69	None		**x**		
	Section 71	None		**x**		
	Mineral and Petroleum Resources Development Act (28 of 2002)					

Work Packages/ Activities (Description)	EA Requirements Review - All legislation	Activities that may apply to Project	Applicable to Project		Motivation	Process to be followed
			YES	NO		
	Section 69 (1)	None		x		
	Other relevant eThekwini Municipality By-Laws					
	• ***Nuisances and Behaviour in Public Places By-Law, adopted by the Council on 24 June 2015.***	It governs measures for preventing, minimising or managing public nuisances; to prohibit certain activities or conduct in public places; to provide for the repeal of laws and savings; and to provide for matters incidental thereto.	x		Construction activities can sometimes cause nuisance to the public.	
	• ***Scheduled Activities By-Law, adopted by the Council on 27 February 2020.***	It provides measures for the prevention, minimisation and management of environmental and human health impacts likely to arise from premises from which certain trades, occupations, businesses, activities or processes are	x		Construction activities can sometimes contribute to environmental and human health impacts.	

Work Packages/ Activities (Description)	EA Requirements Review - All legislation	Activities that may apply to Project	Applicable to Project		Motivation	Process to be followed
			YES	NO		
		undertaken; to prohibit certain activities or conduct in order to ensure and promote a healthy environment; to provide for the repeal of laws and savings; and to provide for matters incidental thereto.				

Transnet Port Terminals
Project Environmental Risk Report

Project Name: Transnet Port Terminals Head Quarters move - 202 Anton Lembede Street, Durban

Compiled by:	Nokhuthala Hlongwane		
	TPT Environmental Specialist	Signed	Date
Reviewed by:	Loren Shirley		
	TPT Environmental Officer	Signed	Date
Reviewed by:	Onobom Njokwana		
	TPT Construction Manager	Signed	Date
Approved by:	Ketan Bindapersad		
	TPT Project Manager	Signed	Date
Approved by:	Raymond van Rooyen		
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Document No: ???

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0A	17-Aug-21	1st Draft for review & comments
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1. Introduction

Transnet Port Terminals, Head Office currently leases (one) 1 office building in Kingsmead Office Park, Durban. The extended lease will end on 31 March 2022. A decision has been approved by the Transnet GCE and Executives to move the TPT Head Office into a Transnet owned office building, located at 202 Anton Lembede St. Durban. The 202 Anton Lembede Street building is currently occupied by Transnet Pipelines and Transnet Properties and there is limited space available for TPT Head Office staff. However, due to the current work from home strategy that Transnet has adopted based on the Covid-19 pandemic, less workspace is required. Permanent workspaces are to be allocated to staff that are required to be at work daily, whilst hot desks will be booked by all other staff requiring a desk space for a specific period.

The primary objective of the project is to provide office accommodation for Transnet Port Terminals Head Quarters staff at 202 Anton Lembede Street on specifically allocated floors within the existing building and at the same time save costs on the rental by moving our staff back to Transnet owned facilities. Permanent desks and hot desks will be created to accommodate all TPT Head Office staff requirements. Hot desks will be booked by staff deemed able to work from home, whilst those required to be at the offices will work from permanent desks.

The site inspection for the TPT HQ move Project, Durban was conducted on 18 June 2021 by Nokhuthala Hlongwane (TPT Environmental Specialist). The Google Image of the building is shown on figure 1 below.

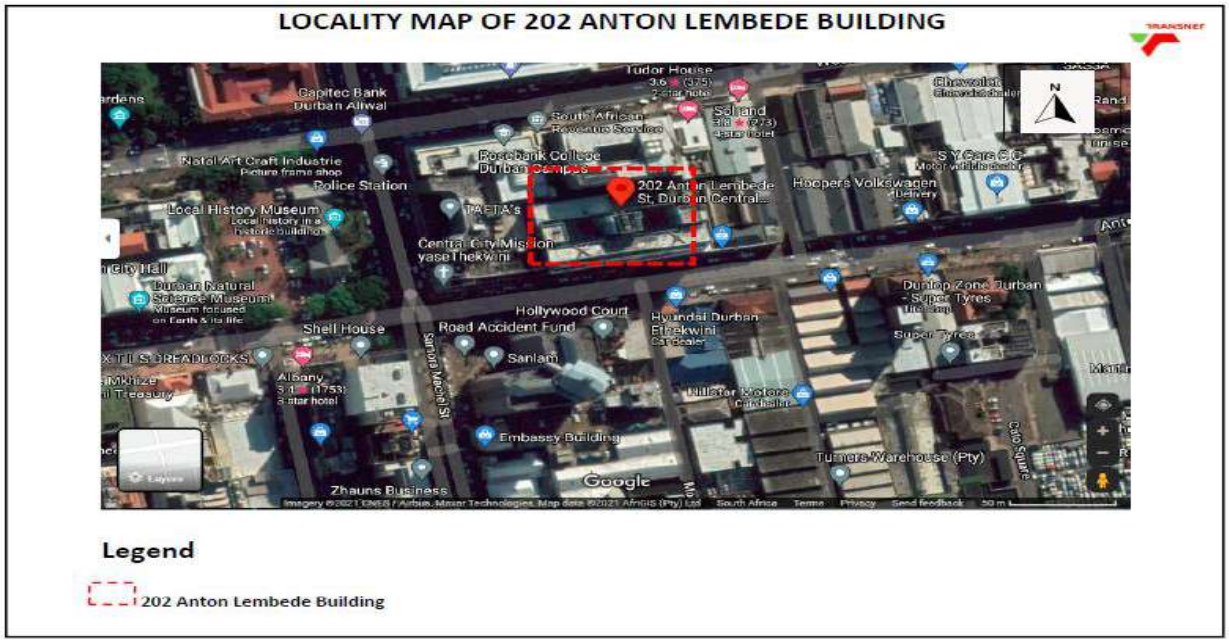


Figure 1: Aerial photograph/map (Source: Google Earth) of the site

2. Methodology

Risk is a function of the likelihood of an event occurring and the level of damage (consequence) that would result should the event be realised.

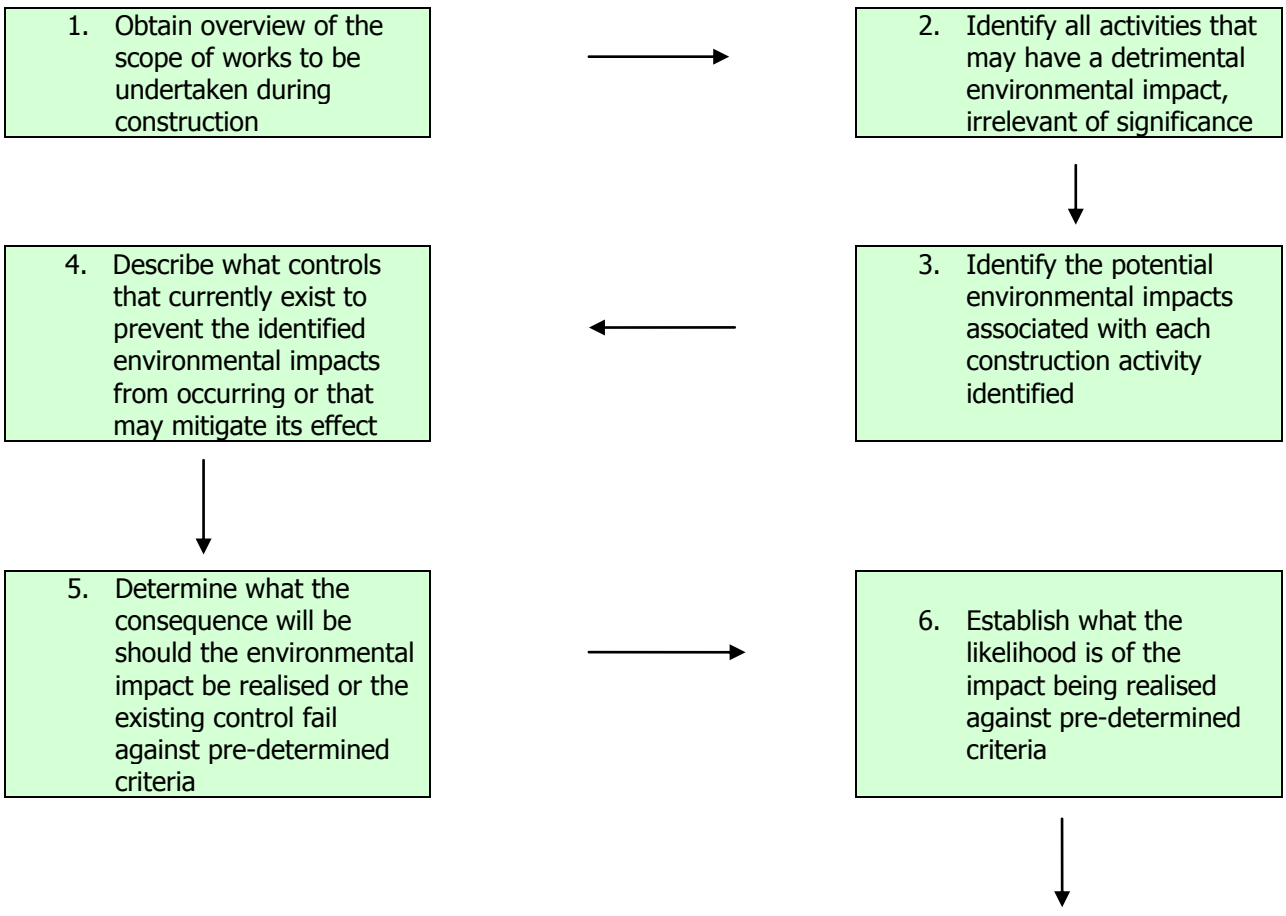
A detailed methodology has been developed to identify and assess TPT's risks at an enterprise wide level known as Enterprise Risk Management (ERM). The criteria contained in ERM is, however, not adequate to address risk at a project level and therefore had to be manipulated for the purposes of this assessment.

This assessment will allow for significant environmental risks to be identified so that they can be targeted for action and the necessary controls can be put in place to manage them.

Applying a structured project risk assessment process (refer to figure 2) will result in a systematic way to identify environmental risks, and determine appropriate remedial measures.

Risks will be assessed and ranked as follows: **Significance** = **Consequence x Likelihood**

2.1 Schematic view of the project risk assessment process



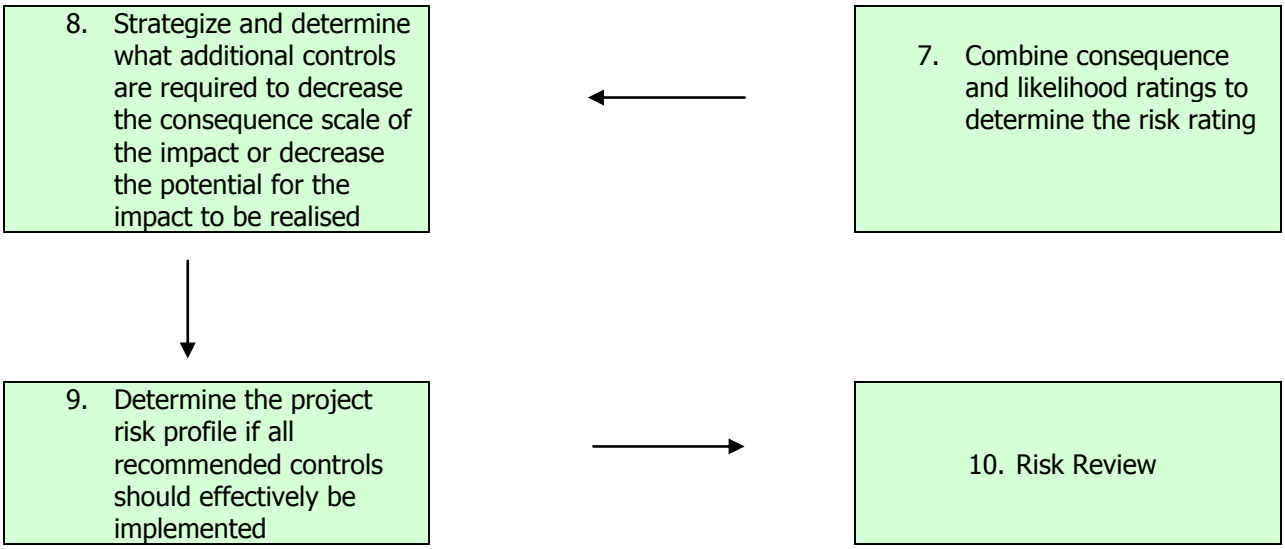


Figure 2: Schematic view of the project risk assessment process

2.2 Determining the Consequence (Co) Score

Consequence will be calculated as follows: Co = Extent + Intensity + Duration

2.2.1 Table 1: Determining the Consequence Score

Rating	Definition of Rating	Score
A: Extent – the area in which the impact will be experienced		
Local	Confined to project or study area or part thereof	**1**
Regional	The region, which can be defined according to cadastral, catchment, topography etc.	**2**
(Inter)national	Nationally or beyond	**3**
B: Intensity – the magnitude or size of the impact		
Low	Minor impact contained within site area	**1**
Medium	Effect leading to off-site impact, prolonged environmental impact	**2**
High	Irreversible long term environmental impact	**3**
C: Duration – the time frame for which the impact will be experienced		
Short term	0 – 2 years	**1**
Medium term	2 – 15 years	**2**

Long term	More than 15 years	**3**

Criteria used to determine the consequence score:

2.2.2 Table 2: Consequence score

Combined Score (A+B+C)	1 - 3	4	5	6	7	8 - 9
Consequence Rating	**6** or **7** *(Discretion required)*	**5**	**4**	**3**	**2**	**1**
Description	Minor/Moderate	Significant	Severe	Serious	Very Serious	Cato-strophic

Consequence Score Classification

2.2.3 Table 3: Consequence Score Classification

Consequence Rating	Classification/Category
1	- Irreversible long term environmental damage to a protected or endangered species/ecosystem - Detrimental impact on the health or livelihoods of one or more community members
2	- Irreversible long term environmental damage to indigenous natural/cultural heritage - High potential for complaints from external parties - Prosecution from competent authorities
3	- Prolonged environmental impact - Significant remediation and management attention required - Hazardous spill/release leading to offsite impact
4	- Medium term effect on the environment or community - Medium term recovery - Major spill affecting natural environment within the project area
5	- Small, unconfined spill or release - Short term transient environmental/community impact with remediation required
6	- Small spill or release contained within the project area - No significant detrimental environmental impact expected
7	- No change to the environment expected

2.3 Determining the Likelihood Score

Likelihood Classification

2.3.1 Table 4: Likelihood Classification

Likelihood of Impact occurring	
E (Definite)	>90% chance of occurring
D (Probable)	70-90% chance of occurring
C (Possible)	40-70% chance of occurring
B (Improbable)	1-40% chance of occurring
A (Highly Unlikely)	<1% chance of occurring

2.4 Determining the Risk Rating

Impact significance/Risk rating = Co x Li

2.4.1 Table 5: Impact significance/Risk rating

Risk Rating	Consequence		Likelihood
I *(Very High)*	1	&	E,D or C
	2	&	E or D
	3	&	E
II *(High)*	1	&	B or A
	2	&	C or B
	3	&	D or C
	4	&	E or D
	5	&	E
III *(Medium)*	2	&	A
	3	&	B or A
	4	&	C or B
	5	&	D or C
	6	&	E or D
	7	&	E
IV *(Low)*	4	&	A
	5	&	B or A
	6	&	C or B
	7	&	D or C
V *(Insignificant)*	6	&	A
	7	&	B or A

2.5 TPT Project Risk Assessment Matrix

The figure below was used to determine the relative ranking of risks

Likelihood rating								
	E	III	III	II	II	I	I	I
	D	IV	III	III	II	II	I	I
	C	IV	IV	III	III	II	II	I
	B	V	IV	IV	III	III	II	II
	A	V	V	IV	IV	III	III	II
		7	6	5	4	3	2	1
						Consequences		

Figure 3: Risk Ranking

3. Identified Hazard Sources

The following activities were identified as those with the potential to cause damage to the environment:

1. Alteration of the building - Possible a need to undertake a Heritage Impact Assessment and/or a permit
2. Spills of hazardous chemicals to soil/water during site establishment/construction
3. Unexpected underground water condition during excavations (i.e. High water table which might necessitate dewatering that requires GA/WUL from DWS or a coastal waters discharge permit from DFFE)
4. Spoil material from excavations
5. Non-compliance with authorised activities
6. Complaints of noise impact due to construction activities done in an operational area
7. Inappropriate disposal of hazardous waste, prosecution, fines or both by authorities
8. Inappropriate disposal of general waste, prosecution, fines or both by authorities
9. Inappropriate storage of waste on site
10. Non-adherence to environmental specifications, permits and licenses because of inadequate knowledge

3.1 Risk Toleration and Accountability

With reference to the risk matrix used during the assessment, the proposed project considered construction related activities as listed on the Scope of Works and other sources of potential environmental harm. All risk with a MEDIUM, HIGH or VERY HIGH rating, requires mitigation/control measures.

Toleration of any risk without the required controls will sit with the relevant authority as described. If no controls are put in place and the impact is to be realized, the toleration authority will be accountable.

Risk Rating	Controls Required	Authority for Continued Toleration of Residual Risk without required control
I	Environmental Authorisation, Permits and Licences, regular engagement with the public and competent authorities (acquisition and compliance with conditions/agreements)	TPT Project Director
II	Method Statement, and other controls e.g. measurement of energy and water usage, letters of consent, disposal certificates, servicing invoices etc.(compilation, acquisition and compliance with conditions)	TPT Construction Manager
III	Method Statement (development and compliance with conditions)	Contractor, TPT Environmental Officer and Construction Manager
IV	Compliance with the CEMP and SES will suffice	Contractor, TPT Environmental Officer and Construction Manager
V	Compliance with the CEMP and SES will suffice	Contractor, TPT Environmental Officer and Construction Manager

3.2 Project Risk Profile

The results obtained from the assessment revealed that the project has a relatively medium to low raw risk (risk without any controls) profile as indicated in Figure 4 below, with 70% of the identified risks requiring control or remediation. If the recommended controls are successfully implemented, 30% of the residual risks will remain (refer to Figure 5 below).

Raw Risk Profile								
Likelihood		**Consequence/Severity**						
		Minor	Moderate	Significant	Severe	Serious	Very Serious	Cata-strophic
		7	6	5	4	3	2	1
Definite	E	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Probable	D	**0**	**0**	**0**	**1**	**0**	**2**	**0**
Possible	C	**0**	**1**	**1**	**3**	**0**	**0**	
Improbable	B	**0**	**0**	**2**	**0**	**0**	**0**	**0**
Highly Unlikely	A	**0**	**0**	**0**	**0**	**0**	**0**	**0**

2	Very High Risk
1	High Risk
4	Medium Risk
3	Low Risk
0	Insignificant Risk

Figure 4: Raw Risks

Residual Risk Profile								
Likelihood		**Consequence/Severity**						
		Minor	Moderate	Significant	Severe	Serious	Very Serious	Cata-strophic
		7	6	5	4	3	2	1
Definite	E	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Probable	D	**0**	**2**	**0**	**0**	**0**	**0**	**0**
Possible	C	**1**	**3**	**1**	**0**	**0**	**0**	**0**
Improbable	B	**0**	**3**	**0**	**0**	**0**	**0**	**0**
Highly Unlikely	A	**0**	**0**	**0**	**0**	**0**	**0**	**0**

0	Very High Risk
0	High Risk
3	Medium Risk
7	Low Risk
0	Insignificant Risk

Figure 5: Residual Risks

Appendix A

Summary of Proposed Mitigation Actions

	Proposed Mitigation Actions			
Risk No	**Risk Description**	**Action No**	**Actions**	**Action Responsibility**
1	Alteration of the building - Possible a need to undertake a Heritage Impact Assessment and/or a permit.	1	Apply for applicable environmental authorisation/s and permits and licences for activities that may require authorisation.	TPT PM and Environmental Specialist
2	Spills of hazardous chemicals to soil/water during site establishment/construction.	2 3 4	Spill response plan and equipment on site. Clear any spills immediately. Place drip trays under parked equipment and vehicles.	Contractor
3	Unexpected underground water condition during excavations (i.e. High water table which might necessitate dewatering that requires GA/WUL from DWS or a coastal waters discharge permit from DFFE).	5	If underground water is encountered during excavation, cease work (excavation) and apply with the DWS and/or DFFE.	Contractor/TPT CM/PM/Environmental Specialist
4	Spoil material from excavations.	6	Compliance with Waste Act Regulations	Contractor/TPT CM/EO
5	Non-compliance with authorised activities.	7 8	Weekly awareness training and environmental method statements to be compiled to ensure adherence to the environmental permits and licenses. TPT EO monthly audit and Contractor EO routine inspections highest.	Contractor/TPT CM/EO
6	Complaints of noise impact due to construction activities done in an operational area.	9 10	Weekly awareness training and environmental method statements to be compiled to ensure adherence to the TGC SES and CEMP. TPT EO monthly audit and Contractor EO routine inspections highest.	Contractor/TPT CM/EO
7	Inappropriate disposal of hazardous waste, prosecution, fines or both by authorities.	11 12 13 14	Method statements to be compiled to ensure adherence to the TGC SES and CEMP. Only registered hazardous waste disposal facilities may be utilized. Waste disposal certificates must be obtained. TPT EO monthly audit and Contractor EO routine inspections highest.	Contractor/TPT CM/EO
8	Inappropriate disposal of general waste, prosecution,	15	Method statements to be compiled to ensure adherence to the TGC SES and CEMP.	Contractor/TPT CM/EO

	fines or both by authorities.	16 17 18	Only registered general waste disposal facilities may be utilized. Waste disposal certificates must be obtained . TPT EO monthly audit and Contractor EO routine inspections highest.	
9	Inappropriate storage of waste on site.	19 20 21	Method statement for waste management to be compiled. Regular awareness on waste management via toolbox talk to be done regularly. TPT EO monthly audit and Contractor EO routine inspections highest.	Contractor/TPT CM/EO
10	Non-adherence to environmental specifications, permits and licenses because of inadequate knowledge	22 23	Awareness topics must be related to environmental issues on site. Environmental information must be included in daily/weekly toolbox talks where method statements are also shared/discussed.	Contractor/TPT CM/EO

Appendix B

Environmental Risk Register

Risk No.	Activity / Hazard source *(e.g. Dust)*	**Description of Risk** *(e.g. Excessive dust generation because of the movement of construction vehicles on gravel roads)*	**Existing Controls** *(e.g. Dust mitigation controls in Environmental Management Plan)*	**Consequence** *(As per standard risk assessment criteria)*	**Consequence Category** *(As per standard risk assessment criteria as well as project-specific description)*	**Likelihood** *(As per standard risk assessment criteria)*	**Risk Category** *(As per standard risk assessment criteria)*	**Risk Rating** *(As per standard risk assessment criteria, make use of correct colouring)*	**Mitigation Strategies** *(e.g. Method Statement for dust management, daily spraying of gravel roads on site, enforcement of speed limit 20km/h etc.)*	**Consequence** (As per standard risk assessment criteria)	**Likelihood** (As per standard risk assessment criteria)	**Impact Significance/Risk Rating (With Mitigation)** *(As per standard risk assessment criteria, make use of correct colouring)*
1	Alteration of the building	Possible a need to undertake a Heritage Impact Assessment and/or a permit.	Environmental baseline inspection/report to be conducted to establish if authorisation/s and permits and licences that are required	2	Irreversible long term environmental damage to indigenous natural/cultural heritage High potential for complaints from external parties Prosecution from competent authorities	D	I	Very High	Apply for applicable environmental authorisation/s and permits and licences for activities that may require authorisation	6	D	III
2	Site camp establishment/construction	Spills of hazardous chemicals to soil/water	Spill response equipment to be on site Drip Trays to be available on site MSDS to be available on site	6	Small spill or release contained within the project area No significant detrimental environmental impact expected	C	IV	Low	Spill response plan and equipment on site Clear any spills immediately Place drip trays under parked equipment and vehicles	7	C	IV
3	Excavations	Unexpected underground water condition (i.e. High water table which might necessitate dewatering that requires GA/WUL from DWS or a coastal waters discharge permit from DFFE)	Geotechnical survey to be conducted to measure the water table	4	Prosecution by Competent Authority (DWS and/or DFFE) Project delay Time and cost increase	C	III	Medium	If underground water is encountered during excavation, cease work (excavation) and apply with the DWS and/or DFFE If opting to continue with excavation, undertake underground water quality and quantity monitoring as per DWS's specification GN 665 of September 2013 (note: fine might be applicable for this option)	5	C	III
4	Excavations	Spoil material from excavations	TPT Environmental Induction TGC Standard Environmental Specification	5	Non-compliance with Waste Act Regulations	B	IV	Low	Compliance with Waste Act Regulations	6	B	IV

Risk No.	Activity / Hazard source *(e.g. Dust)*	Description of Risk *(e.g. Excessive dust generation because of the movement of construction vehicles on gravel roads)*	Existing Controls *(e.g. Dust mitigation controls in Environmental Management Plan)*	Consequence *(As per standard risk assessment criteria)*	Consequence Category *(As per standard risk assessment criteria as well as project-specific description)*	Likelihood *(As per standard risk assessment criteria)*	Risk Category *(As per standard risk assessment criteria)*	Risk Rating *(As per standard risk assessment criteria, make use of correct colouring)*	Mitigation Strategies *(e.g. Method Statement for dust management, daily spraying of gravel roads on site, enforcement of speed limit 20km/h etc.)*	Consequence (As per standard risk assessment criteria)	Likelihood (As per standard risk assessment criteria)	Impact Significance/Risk Rating (With Mitigation) *(As per standard risk assessment criteria, make use of correct colouring)*
			(ENV-STD-002 Rev 04) and Construction Environmental Management Plan (ENV-FAT-001, Rev 04)									
5	Construction/operation activities	Non-compliance with authorised activities	TPT Environmental Induction TGC Standard Environmental Specification (ENV-STD-002 Rev 04) and Construction Environmental Management Plan (ENV-FAT-001, Rev 04)	2	High potential for complaints from external parties Legal contravention with the Environmental Authorisation (EA), permits and licenses conditions which might lead to fines, imprisonment, work stoppage, etc.	D	I	Very High	Weekly awareness training and environmental method statements to be compiled to ensure adherence to the environmental permits and licenses. TPT EO monthly audit and Contractor EO routine inspections highest.	6	D	III
6	Construction activities	Complaints due to noise impact due to construction activities done in an operational area	TGC Standard Environmental Specification (ENV-STD-002 Rev 4) and Construction Environmental Management Plan (ENV-FAT-001 Rev 4)	5	Small, unconfined spill or release Short term transient environmental/ community impact with remediation required	B	IV	Low	Weekly awareness training and environmental method statements to be compiled to ensure adherence to the TGC SES and CEMP. TPT EO monthly audit and Contractor EO routine inspections highest.	6	B	IV
7	Waste handling during construction	Inappropriate disposal of hazardous waste - prosecution, fines or both by authorities	TGC Standard Environmental Specification (ENV-STD-002 Rev 4) and Construction Environmental Management Plan (ENV-FAT-001 Rev 4)	4	Medium term effect on the environment or community Medium term recovery Major spill affecting natural environment within the project area Prosecution	C	III	Medium	Method statements to be compiled to ensure adherence to the TGC SES and CEMP. Only registered hazardous waste disposal facilities may be utilized Waste disposal certificates must be obtained TPT EO monthly audit and Contractor EO routine inspections highest.	6	C	IV

Risk No.	Activity / Hazard source *(e.g. Dust)*	Description of Risk *(e.g. Excessive dust generation because of the movement of construction vehicles on gravel roads)*	Existing Controls *(e.g. Dust mitigation controls in Environmental Management Plan)*	Consequence *(As per standard risk assessment criteria)*	Consequence Category *(As per standard risk assessment criteria as well as project-specific description)*	Likelihood *(As per standard risk assessment criteria)*	Risk Category *(As per standard risk assessment criteria)*	Risk Rating *(As per standard risk assessment criteria, make use of correct colouring)*	Mitigation Strategies *(e.g. Method Statement for dust management, daily spraying of gravel roads on site, enforcement of speed limit 20km/h etc.)*	Consequence (As per standard risk assessment criteria)	Likelihood (As per standard risk assessment criteria)	Impact Significance/Risk Rating (With Mitigation) *(As per standard risk assessment criteria, make use of correct colouring)*
					from competent authorities							
8	Waste handling during construction	Inappropriate disposal of general waste - prosecution, fines or both by authorities	TGC Standard Environmental Specification (ENV-STD-002 Rev 4) and Construction Environmental Management Plan (ENV-FAT-001 Rev 4)	4	Medium term effect on the environment or community Medium term recovery Major spill affecting natural environment within the project area Prosecution from competent authorities	C	III	Medium	Method statements to be compiled to ensure adherence to the TGC SES and CEMP. Only registered general waste disposal facilities may be utilized Waste disposal certificates must be obtained TPT EO monthly audit and Contractor EO routine inspections highest.	6	C	IV
9	Waste handling during construction	Inappropriate storage of waste on site	TGC Standard Environmental Specification (ENV-STD-002 Rev 4) and Construction Environmental Management Plan (ENV-FAT-001 Rev 4)	5	Small, unconfined spill or release Short term transient environmental/ community impact with remediation required Legal contravention with the Environmental Authorisation (EA), permits and licenses conditions which might lead to fines, imprisonment, work stoppage, etc.	C	III	Medium	Method statement for waste management to be compiled. Regular awareness on waste management via toolbox talk to be done regularly. TPT EO monthly audit and Contractor EO routine inspections highest.	6	C	IV
10	Training of construction personnel	Non-adherence to environmental specifications, permits and licenses because of inadequate knowledge	TGC Standard Environmental Specification (ENV-STD-002 Rev 4) and Construction Environmental Management Plan	4	Medium term effect on the environment or community Medium term recovery Major spill	D	II	High	Awareness topics must be related to environmental issues on site Environmental information must be included in daily/weekly toolbox talks where method statements are also shared/discussed.	6	B	IV

Risk No.	Activity / Hazard source *(e.g. Dust)*	Description of Risk *(e.g. Excessive dust generation because of the movement of construction vehicles on gravel roads)*	Existing Controls *(e.g. Dust mitigation controls in Environmental Management Plan)*	Consequence *(As per standard risk assessment criteria)*	Consequence Category *(As per standard risk assessment criteria as well as project-specific description)*	Likelihood *(As per standard risk assessment criteria)*	Risk Category *(As per standard risk assessment criteria)*	Risk Rating *(As per standard risk assessment criteria, make use of correct colouring)*	Mitigation Strategies *(e.g. Method Statement for dust management, daily spraying of gravel roads on site, enforcement of speed limit 20km/h etc.)*	Consequence (As per standard risk assessment criteria)	Likelihood (As per standard risk assessment criteria)	Impact Significance/Risk Rating (With Mitigation) *(As per standard risk assessment criteria, make use of correct colouring)*
			(ENV-FAT-001 Rev 4)		affecting natural environment within the project area Legal contravention with the Environmental Authorisation (EA), permits and licenses conditions which might lead to fines, imprisonment, work stoppage, etc.							