Transnet National Ports Authority

Electronic Access Control System

Technical Specification

ENG-C&I-SP-0001

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Contents

1 ACRONYMS AND ABBREVIATIONS

The acronyms and abbreviations applicable to this report are summarised in the following table:

Abbreviation	Description
BMS	Building Management System
FoV	Field of View
OEM	Original Equipment Manufacture
OTDR	Optical Time-Domain Reflectometer
PA/ PAS	Public Announcement / Public Announcement System
PC	Personal Computer
PIDS	Perimeter Intruder Detection System
PE	Port Elizabeth
PoE	Power over Ethernet
PON	Port of Ngqura
PSIM	Physical Security Information Management
PTZ	Pan, Tilt and Zoom
CCTV	Circuit Closed Television
ACS	Access Control System
ICT	Information Communications Technologies
PVC	Polyvinyl Chloride
SAT	Site Acceptance Test
SI	International System of Units
STP	Shielded Twisted Pair
CST	Corrugated Steel Tape
TCP/IP	Transmission Control Protocol/ Internet Protocol
TIA	Telecommunications Industry Association
TNPA	Transnet National Port Authority

Abbreviation	Description
UPS	Uninterruptible Power Supply
URS	User Requirements Specification
ORS	Owners Requirements Specification
UTP	Unshielded Twisted Pair
SABS	South African Bureau Standards
VLAN	Virtual Local Area Network
24/7	24 Hours a Day, 7 Days a Week
GUI	Graphical User Interface

2 PURPOSE OF THE SPECIFICATION

The purpose of this technical specification is to set out the minimum technical requirements for functional quality, standardisation and system standards for the detailed design (where required), supply, installation, construction, testing and commissioning of equipment and associated infrastructure for a public address system and electronic security systems to be installed a Port where required by the Port security management.

3 DOCUMENT TERMINOLOGY

This document makes use of the words shall, should, may and will, with regard to requirements and specifications. To avoid any confusion among these terms, their legal and binding meaning, is indicated here. The reader is advised to be familiar with their contextual usage and meaning.
In this document the word:

a. Shall is used to indicate a mandatory requirement.

b. Should is used as a preference.

c. May is used as a permissive (i.e. neither mandatory nor necessarily recommended).

d. Will is used as a declaration on behalf of something/ someone else.

The word should shall be treated as a requirement by the contractor, although it may be negotiated, amended, approved or declined by the employer based on appropriate justification.

4 GUIDELINES, STANDARDS AND SPECIFICATIONS

All equipment and material to be supplied for the project must be designed, assembled and inspected in accordance with the publications shown in tables below. Each publication shall be the latest revision and addendum in effect on the date the specification is issued for construction unless noted otherwise.

Where conflicts occurs the more stringent requirement of the code, standards and project specifications must be met.

The *Contractor* shall adhere to the following further requirements:

a. All installations shall be inspected and witnessed in accordance with this specification, the OEM's instructions and recommendations and the approved quality control plans for each activity.

b. All calibration and test equipment shall hold valid, traceable calibration certificates, which shall be held on site and shall form part of the quality control dossiers.

c. All equipment, instruments and accessories shall, where appropriate, be calibrated and tested at the manufacturer's premises or by a duly authorised representative of the manufacturer.

d. All test and calibration certificates shall be included in the on Site quality control dossiers and the as-constructed data packs.

4.1 Transnet Standards and Specifications

The Transnet standards and specifications listed below, shall take precedence in terms of compliance.

	Document Title	Document No.
[1]	CAD Drawing Standards	ENG-STD-0001
[2]	Specification for plant & equipment Tag numbering	1924701-SP-0006
[3]	Contractor Documentation Submittal Requirements	DOC-STD-0001
[4]	Transnet Group - Integrated Electronic Security and Related Systems Specification: Part 6.17. Auxiliary And Related System	-
[5]	Transnet Group - Integrated Electronic Security and Related Systems Specification: Part 5.2. General Specification	-
[6]	Transnet Group - Integrated Electronic Security and Related Systems Specification: Part 6.21. Security System installation Standards	-
[7]	Specification For The Supply And Installation Of Medium Voltage And Low Voltage Electrical Cables	TPD: 003-CABLESPEC
[8]	Specification For Earthing And The Protection Of Buildings And Structures Against Lightning	TPD: 004-EARTHINGSPEC
[9]	Specification For Electrical Installations To Buildings Other Than Dwellings Houses	TPD-001-EL&PSPEC
[10]	Specification For Corrosion Protection	TNPA-SHEQ-PD-QUAL-SPEC-008

It is the responsibility of the *Contractor* to ensure that he/she obtains all of the *Employer*'s standards (latest amendments apply). The *Employer* shall not be held liable for any losses incurred by the *Contractor* which may arise as a result of non-compliance of the Works by the *Contractor* to the standards.

4.2 National and International Standards

These national and international standards must be adhered to, except where it conflicts with Transnet standards.

Where South African National Standards (SANS) do not cover a specific item, the *Contractor* shall ensure that the item is supplied and installed in compliance with all other relevant/mandatory national and/or international standards, as applicable. Where South African National Standards (SANS) fully cover the item(s) in question, further reference to associated international standards is not required.

The *Contractor* may request approval by the *Employer* for the adoption of a standard not listed in the tables below. Acceptance of such standards will however be at the sole discretion of the *Employer*.

Document Title		Document No.
[11]	(International Code for the Security of Ships And of Port Facilities) ISPS Code – Parts A and B	SOLAS/CONF.5/34
[12]	Degrees of protection provided by enclosures (IP code)	SANS IEC 60529
[13]	Optical fibre cables	SANS IEC 60794
[14]	Splices for optical fibres and cables	SANS 61073-1
[15]	Electrical security installations Part 5-1-2: CCTV installations - CCTV surveillance systems for use in security applications - System design requirements	SANS 10222-5-1-2
[16]	National Fire Protection Association National Fire Codes	NFPA Standards
[17]	EIA/TIA-568 Commercial Building Telecommunications wiring standard	EIA/TIA-568
[18]	EIA/TIA-569 Commercial Building for Telecommunications pathways and Spaces	EIA/TIA-569
[19]	EIA/TIA-606 Administrative Standards for the Telecommunications infrastructure of Commercial Building	EIA/TIA-606
[20]	EIA/TIA-568A premises cabling standard	EIA/TIA-568A
[21]	The application of the National Building Regulations	SANS10400
[22]	Power over Ethernet standard	IEEE 802.3at
[23]	Standard for Ethernet	IEEE/ISO/IEC 802.3
[24]	Design, Installation, Commissioning and Maintenance fire detection and alarm systems	BS EN 5839 Part 1
[25]	Design of Voice Alarm Control and Indicating equipment	BS EN 54 Part 16

In addition to the specifications above, the design shall comply with the following relevant South African Acts, Standards and Regulations and shall apply in the order of precedence as listed below:

a. Occupational Health and Safety Act 85 of 1993
b. South African National Standards and Codes of Practice
c. IEC Standards and Recommendations
d. International Standards and Codes – ISO, DIN, BS, ASME, ASCE, ANSI, ASTM, EU
e. All local, provincial or S.A. Government laws in force at the time.

5 SPECIFICATION

5.1 General Requirements

#1 The installation of the systems (Access control readers, controllers and barriers) shall include any programming/ configuration and testing of all the equipment as required including complete integration of the systems with the respective main electronic monitoring and control systems (through the ICT network), and any other existing or new systems/equipment as applicable and required referenced in the Works Information, this specification, drawings, bill of quantities and any other associated documentation. The procedures governing the detailed design approval, manufacturing, inspections, testing and commissioning of the equipment/ systems, are covered in further sections of this specifications.

#2 The Access Control system equipment to be installed shall be compatible with the existing Babylon XMP system used by TNPA at the Port.

#3 The Access Control System shall be integrated to existing port Access Control system for control, monitoring and management of access, intrusion and time & attendance. The field devices shall be connected to distributed intelligent controllers (K32) capable of operating independently, off line, without the need for a host computer or server. All objects within the access control system (doors, readers, alarms, etc.) shall be viewable from both the access control system and the PSIM system GUIs (where required).

#4 Connection of access control controllers to the servers shall be done through the Transnet enterprise network switches housed in the indoor network cabinets.

#5 Equipment fixing shall comply with the Transnet Group - Integrated Electronic Security and Related Systems Specification: General Specification. Where the specification requirements clashes with other related standards used on the Project, the Contractor shall notify the Project Manager of such developments.

#6 The use of Subscription Software license shall not be/ is not allowed, all software and firmware shall make use of perpetual software Licensing, Contractor to indicate to the Employer all licencing information including type, MSAs, SLAs, software lifecycle and applicable future costs.

#7 It will be the responsibility of the Contractor to ensure that the respective specialist subcontractor/ OEM fully co-operates, co-ordinates, supports and supplies any technical and associated information to the Employer and Others as required, to ensure that the systems are fully integrated, both electrically and electronically.

#8 All equipment supplied to, or by the installation Contractor for installation shall be safely stored and protected from the weather to prevent loss or damage. The Contractor shall be responsible for the replacement of equipment lost or damaged whilst in his/her care.

#9 The Contractor shall be responsible for transporting all equipment from the site project store to the installation site.

#10 The Contractor shall be responsible for providing all storage, scaffolding, ladders and cherry-picker required to effect the installation.

#11 Pre-installation requirements activities

a. Prior to any procurement and installation of equipment, Contractor shall conduct a site survey to assess existing conditions and identify installation requirements.

b. Provide detail designs and datasheets for the equipment as required.

c. Prepare a method statement and risk assessment specific to the installation site.

d. Coordinate with the client regarding power supply requirements and any preparatory civil works (e.g., foundation for barrier mounting, trenching for cabling).

#12 Access control barriers (turnstiles and boom-gates) shall include programming, configuration, and testing with the Babylon XMP access control system.

#13 The access control barriers must have compatible I/O signals to facilitate seamless integration with the K32 controller, allowing proper operation with the Babylon XMP system via access control system peripherals (readers).

#14 Contractor shall further develop the access control drawings into detailed drawings, clearly illustrating all device interconnections and the final mounting positions of each component.

#15 The Access Control system shall accept cards already used (mifare) by TNPA at the ports.

#16 Where required biometric reader firmware and licence shall come with a time and attendance feature.

#17 The site shall be equipped with the following key Access Control system:

a. Hardware: Babylon system hardware controllers and peripherals (controllers and readers).

b. Software: Existing Babylon XMP system (Contractor to provide all required additional licencing/ tags/ templates for the new equipment).

#18 The Contractor shall provide new and latest Babylon XMP access control system infrastructure with hardware, firmware and software that is compatible with existing, robust, immune to failure and of high duty cycle.

#19 The Access Control hardware to be installed in the new buildings and gates shall be of a latest access control system technology and must be seamlessly 100% compatible with the existing access control system and controllers such that any new devices; controllers, card readers or biometric readers, I/O devices supplied can be added, configured, controlled, monitored and managed directly from within the system without the need for 3rd party software or applications.

#20 For new building installations - all outdoor Access Control end-devices shall be mounted on a SS316 grade brushed stainless steel flush-mount tamper and water proof plate with rain-cover/ sun-shield. And for existing building installation where flush mounting is not possible, a surface mount 316 grade stainless steel brushed waterproof/ tamperproof plate/ bracket shall be used subject to Employer's approval.

#21 All indoor Access Control end-devices shall be mounted on a SS304 stainless steel or 3CR12 stainless steel flush-mount tamper proof bracket/ plate. Where flush mount installation is not possible, a surface mounted stainless steel bracket/ plate shall be used subject to Employer's approval.

#22 Equipment installed in a hazardous areas shall comply with ATEX standard.

#23 All Tendered access controllers and readers shall be of the latest versions and still maintain compatibility with existing system.

#24 The Contractor shall supply and install all necessary cable management for both the barrier systems (boom-gates and turnstiles) and the access control peripherals associated with these barriers. This includes the installation of galvanized steel conduits for external and above-ground applications, HDPE pipes for underground installations, and PVC pipes for indoor wiring.

#25 The ACS shall be integrated to the CCTV system for triggering alarm associated cameras live views and playback views during alarm status.

#26 The ACS shall be integrated with the fire and smoke detection systems for monitoring of fire alarms to unlock doors during an emergency and to map on the ACS port layout.

#27 For all fire brigade/ station/ department buildings, the ACS shall come with a push-button (with or biometric where required) installed in the reception/ control-room (or location guided by the fire Chief) to unlock all access control doors and boom-gates/ gate motors when pressed during an emergency situation.

5.2 Licencing and Software

#28 Additional licences shall be provided by *Contractor* where required. This includes all licences as required such as Babylon License Dongles with Access Control, Guard Patrols, Building Management, Visitor Management, Site Graphic Interface, IBO Concurrent Licenses, PIDS and LPR licences, intercom licences as required.

#29 All Access Control Systems software and firmware shall be of the latest model type of the existing but without any integration issues.

#30 Contractor shall provide all licences, drivers and modules required for integrating the system to the PSIM system.

5.3 Equipment Specification

5.3.1 Electronic operating barrier system (boom-gate)

Equipment	Minimum Parameter
Electronic operating barrier (boom-gate)	<u>Barrier Types & Security Levels</u> • Main Entrance / High Security Level: Scorpion High Security Spike Barrier, or an approved equivalent with comparable performance and quality, subject to approval by the client/engineer. • Secondary Entrance / Medium Security Level: Boomgate Genius / Rapid Traffic Barrier (variants of the same brand), or an approved equivalent with comparable performance and quality, subject to approval by the client/engineer. • Contractor to provide an electronically operated boom gate system integrated with the spike barrier (where required), vehicle detection sensors and safety interlocks. <u>Environmental & Design Requirements</u> • Barriers shall be suitable for coastal environments and industrial high-traffic entrances accommodating cars and trucks. • 100% locally manufactured and designed for high volumes of traffic, equipped with 100% duty cycle torque motors. • All electronic equipment shall comply with ISO standards.

Equipment	Minimum Parameter
	Spike Barrier Specifications • Spike barriers shall be flush-mounted, integrated with the boom gate, and constructed to withstand extreme vehicle loads typical of heavy-duty commercial and industrial applications. • Barrier arm and spikes shall be driven by separate motors. • Spikes lower before the boom arm opens, electrically interlocked to prevent forced tampering. • Spikes remain up if the boom arm is forced open and return to the down position on power failure. • Spike material: hot-dip galvanised (≥100 µm) mild steel frame with yellow powder-coated spikes. • Concrete works and dimensions for the spike housing plinth shall adhere to OEM requirements and Transnet standards, with drawings submitted to the Employer for approval before construction. Boom Gate Specifications • Boom arm lengths shall be selected based on lane size, suitable for cars and trucks. • Boom arms: octagonal aluminium tubing, epoxy powder coated, white with red reflective UV-resistant tape. • Equipped with breakaway mechanisms and built-in sensors to detect obstacles and return the boom arm to the open position. • Left or right boom arms to be selected according to site layout. • Motors shall allow boom arms to be locked in both up and down positions. • Integrated traffic signal lighting: Boom arms shall include LED lighting strips (red/green) along the length of the arm, visible to vehicles from a safe distance. Supplementary pole-mounted lights may also be provided. Vehicle Detection & Safety Systems • Primary detection: Radar-based vehicle detectors mounted per lane, providing reliable detection in all weather and lighting conditions. • Radar sensors shall integrate with the barrier control system to trigger opening/closing and safety interlocks. • Spike and boom interlocks: ensure spikes cannot be bypassed by forcing the boom arm. • Inductive loops (if specified) shall be installed underground to cover at least 60% of the lane width and connected to the barrier control system for automatic closing and safety.

Equipment	Minimum Parameter

	Cabinet & Enclosure
	• Barrier housing panels shall have IP rating suitable for dusty, salty, and rainy coastal environments.
	Option 1 – Stainless Steel (Premium):
	• Material: minimum 2 mm 316 stainless steel.
	• Finish: brushed, providing excellent corrosion resistance in coastal and industrial environments.
	• Optional powder coating may be applied for colour preference, additional UV protection, or scratch resistance.
	• Shall comply with SANS/ISO 3506 (mechanical properties and corrosion resistance of stainless steel fasteners and components).
	Option 2 – Hot-Dip Galvanised Steel (Cost Alternative):
	• Material: minimum 2–3 mm mild steel, hot-dip galvanised with zinc coating ≥100 µm.
	• Optional powder coating (UV-resistant) may be applied for additional corrosion protection and aesthetic finish.
	• Shall comply with SANS 121 ISO 1461 for hot-dip galvanising, including uniformity of coating and adhesion.
	• Housing shall be rigid enough to support boom mechanisms, sensors, and traffic signalling without excessive flexing.
	• All cabinets shall comply with OEM specifications, and fabrication drawings shall be submitted to the Employer for approval prior to construction.
	Integration & Operation
	• Barrier systems shall integrate with the access control system via N/O contacts.
	• Required alarm outputs to access control:
	  ○ Boom arm knocked off adapter – close output
	  ○ Barrier door opened – close output
	  ○ Boom arm forced open
	  ○ Spikes held down
	• Boom speed and other configurations shall be adjustable.
	• Manual/local control: Each boom shall have a mechanism on the boom cabinet itself to operate the boom locally or isolate it without switching off the main power. This ensures safe local operation or maintenance, even if the power is linked to other booms.
	• Manual control shall also be possible via the boom controller when access control is not operational.

Equipment	Minimum Parameter
	• Gooseneck poles with weather covers shall support entry/exit proximity card readers for light vehicles and biometric readers for heavy vehicles, as shown in layout drawings. • Poles shall also support CCTV cameras for facial recognition. • Automatic exit detection shall be provided using radar sensors and induction loops. • Two wireless remote controllers shall be provided to operate the boom gate where required.
General	
Power and Communication Cabling	• The Contractor shall supply, install, and terminate all power and communication cabling required to make the boom-gate and spike barrier system fully operational. • Power Cables: All power cabling shall run from the electrical distribution board (DB)/ Kiosk or Minisub to the boom-gate system, including any necessary connections for auxiliary devices. • All wiring shall be installed in a professional and neat manner, in accordance with SANS 10142 (Wiring Code). • Miniature Circuit Breakers (MCBs) or other protective devices shall be installed where required to protect circuits and equipment. • The Contractor shall ensure all electrical work is tested and certified, and shall provide a valid Certificate of Compliance (CoC) issued by a registered electrician. • Power Cable Management: All power cabling shall be routed through suitable management systems, including underground sleeves, bosal conduit, or flexible steel conduits, leading to the nearest communication manhole or designated underground sleeves. • Communication Cable Management: All communication cabling shall be routed through suitable management systems, including underground sleeves, bosal conduit, or flexible steel conduits, leading to the nearest communication manhole or designated underground sleeves.
Labelling	• All equipment, cables, and components shall be clearly and professionally labelled. • Labels shall be Traffolyte or an approved equivalent, ensuring legibility and durability in outdoor environments.
Civil and Structural Works	• Contractor shall be responsible for all concrete, bolting and sleeves works required for installing the boom-gate barrier system, spikes and induction loop, and ensuring that the floor for installation adheres to OEM requirements, SANS and Transnet specification. • All concrete works and dimensions for the housing plinth and spikes shall comply with the OEM requirements, SANS standards, and Transnet specifications for concrete works (35MPa concrete with reinforcements),

Equipment	Minimum Parameter
	which are available upon request. Prior to commencing with any concrete works, a layout drawing showing the installation details, including dimensions and concrete specifications/ procedures, shall be submitted to the Employer for approval. • Stormwater drainage – The Contractor shall be responsible for the design and construction of an underground stormwater drainage system that efficiently routes stormwater from the turnstile spikes system to the nearest existing stormwater drainage network in the area.
Testing & Commissioning	Testing and Commissioning of the boom-gate and spike barrier system to ensure proper functioning and ready for integration, including but not limited to: • Operation of the boom barrier (raising and lowering the boom). • Retraction and deployment of the spikes. • Synchronization between the boom-gate barrier and spikes. • Functionality of safety features and emergency stops including induction loop and beams. • Calibrate settings on the control unit as required. • Operation of induction loops and radar sensors. • Perform multiple operational tests to ensure the system meets the desired performance standards. • Access control operation tests and commissioning. Contractor shall train the client's designated personnel in the operation, safety, and maintenance of the system.
Handover	• Fully installed and operational boom-gate Barrier with integrated spike system. • Complete documentation, including user manuals, wiring diagrams, and boom system configuration settings. • Commissioning report detailing the tests performed and confirmation of the system's readiness. • Training session for the client's personnel.

5.3.2 Full Height electronic turnstile system

Item	Minimum Parameter
Outdoor Full height Industrial Electronic Turnstile	• Preferred Model: Turnstar Triumph or Titan full height turnstiles or an approved equivalent with comparable performance and quality, subject to approval by the client/engineer. • A single or double turnstiles shall be installed on the location indicated in the layout drawings complete with all required proximity readers and mounting brackets, power, power cabling, communication cabling, galvanised bosal conduits connected to the installed underground sleeve pipes. • Unit type: Free-standing, floor-mount bolted installation. • Shall come with reader mounting brackets complete with a sunshield and cable management provisions, to accommodate one entry and one exit proximity readers for access on the turnstile. • Designed for high-volume access traffic and high-security applications. • Mechanism: Heavy-duty solenoids rated for 100% continuous duty cycle to ensure optimum reliability. • Operation: 4 arm (90°) – Bi-directional, self-centering rotation operation, with U-tube arms ensuring single entry or exit. • Access Control: Arms locked in position by solenoids when access is invalid. • Wiring: Integral wireways with draw wires in place, no exposed wiring. • Finish material – 316 grade brushed stainless steel or colour of Client choosing, and suitable for the marine environment. <u>Finish Material</u> • <u>*Option 1 – Stainless Steel (Premium):*</u> o Material: minimum 2 mm 316 stainless steel. Brushed finishes, providing excellent corrosion resistance in coastal and industrial environments. o Shall comply with SANS/ISO 3506 (mechanical properties and corrosion resistance of stainless steel fasteners and components). • <u>*Option 2 – Hot-Dip Galvanised Steel (Cost Alternative):*</u> o Material: minimum 2–3 mm mild steel, hot-dip galvanised with zinc coating ≥140 µm. o Optional powder coating (UV-resistant) may be applied for additional corrosion protection and aesthetic finish. o Shall comply with SANS 121 ISO 1461 for hot-dip galvanising, including uniformity of coating and adhesion.

Item	Minimum Parameter
	○ All materials shall comply with OEM specifications, and fabrication drawings shall be submitted to the Employer for approval prior to construction. • Shall be compatible with ready I/O for interfacing or integration to the access control system. • Mechanical key override – clockwise/ anticlockwise direction. • Built-in Fail Safe/Fail Secure changeover options. • Durability: Anti-tamper design, maintenance-free, unaffected by dust/dirt/moisture, self-lubricating. • Contractor shall be responsible for providing power to the turnstile as well as power and comms cables and cable management to the turnstile. • Shall come with Programmable logic with user diagnostic features and shall be capable to link to Access Control System for fault reporting. • Unlocking for entry / exit rotation controlled through normally open dry contact • Shall come complete with power supply with battery back-up for power back-up with min. two 12V 7Ah batteries. • Allows for cabling/ wiring side entry point or bottom entry point. • Contractor shall be responsible for the concrete works required to mount the turnstile and ensuring that the floor for installation adheres to OEM requirements and Transnet standards.
General	
Cabling and Cable Containment	• The Contractor shall allow for all wiring to make this system fully functional. • Power Cables - The Contractor shall be responsible for the supply, installation, and termination of power cables from the electrical distribution board (DB) to the turnstile. • Power cable management - The Contractor shall be responsible for the supply and installation of cable management systems for power cables, including underground sleeve pipes, and bosal conduit or flexible steel, leading to the nearest communication manhole or underground sleeves. • Communication Cable Management - The Contractor shall be responsible for the supply and installation of cable management systems for communication cables, including underground sleeve pipes, and bosal conduit or flexible steel, leading to the nearest communication manhole or underground sleeves.
Labelling	All equipment, cables, and components shall be clearly and professionally labelled using Traffolyte or approved equivalent, ensuring durability in outdoor environments.

Item	Minimum Parameter
General	• Contractor shall be responsible for all concrete (30MPa) and bolting works required for installing the turnstile and barrier bars, and ensuring that the floor for installation adheres to OEM requirements and Transnet standards. • Provision and installation of any additional items that are required to render this installation complete and fully functional as required.
Commissioning	Testing and Commissioning of the turnstile system to ensure proper functioning and ready for integration, including: • Operation of the turnstile. • Functionality of safety features and emergency stops. • Calibrate settings on the control unit as required. • Perform multiple operational tests to ensure the system meets the desired performance standards. Train the client's designated personnel on operating and maintaining the boom-gate and spike system.
Handover	• Fully installed and operational turnstile barrier with integrated spike system. • Complete documentation, including user manuals, wiring diagrams, and configurations. • Commissioning report detailing the tests performed and confirmation of the system's readiness. • Training session for the client's personnel.

5.3.3 Electronic Waist Height Turnstile system

Item	Minimum Parameter
Outdoor Waist height Industrial Electronic Turnstile	• Preferred Model: Turnstar Triumph or Titan full height turnstiles or an approved equivalent with comparable performance and quality, subject to approval by the client/engineer. • The waist-height turnstile shall be installed in each lane as a barrier to facilitate pedestrian access for passengers in vehicles. • Shall handle high volumes of traffic & is 100% duty rated. • Suitable for industrial coastal heavy duty environment installation and designed for high speed ultra quiet operation. • 3 wing (120°) 316 grade stainless steel rotor arms. • Electrically controlled bi-directional rotation and Mechanically controlled uni-directional rotation by means of key override.

Item	Minimum Parameter
	• Self-centering rotation system - rotor returns to starting position after every rotation and no mid-rotation locking or trapping in the event of a power failure. • Anti-reverse system. • Programmable logic with user diagnostic features. • Mechanical key override - clockwise and anti-clockwise directions (fail-secure). • Integral wireways with draw wires in place - no exposed wires. • Shall be compatible and linked with the Port entrance Access Control System • Shall come with reader mounting brackets complete with a sunshield and cable management provisions, to accommodate one proximity card reader • Built-in Fail Safe/Fail Secure changeover options. • Anti-tamper design and maintenance free. • Cabinet finish - 316 grade brushed stainless steel. • Wiring bottom entry and floor bolting installation. • Contractor shall be responsible for all concrete and bolting works required for installing the turnstile and handrails. • Contractor shall be responsible for power and comms cables as well as cable management to the turnstile. • Shall come with Programmable logic with user diagnostic features and shall be capable to link to Access Control System for fault reporting. • Outdoor hand-rails (304 brushed stainless steel with concealed Nut and Bolt Design (Tamper-Proof)). • Option (where required by Project) - Battery backup with two 7Ah batteries.
Indoor waist height Industrial Electronic Turnstile with wheelchair access (office buildings)	• Turnstar Dynamic drop arm barrier or an approved equivalent with comparable performance and quality, subject to approval by the client/engineer. • The waist-height turnstile shall be installed indoor at reception where required by Project/ guided by design drawings. • Shall handle high volumes of traffic & is 100% duty rated. • Suitable for industrial installation and designed for high speed ultra quiet operation. • High speed, safe and convenient access that allows for special needs access. • Fitted with safety sensors – optical sensors or better.

Item	Minimum Parameter
	• Motor embedded collision detection sensors. • Programmable PLC logic with user diagnostic features. • Integral wireways with draw wires in place - no exposed wires • Shall be compatible and linked with the Port entrance Access Control System • Shall have one-entry (and one-exit where required) biometric reader mounted on the required side of the turnstile. • Anti-tamper design and maintenance free. • Finish - 304 grade brushed stainless steel (indoor). • Finish – 316 grade brushed stainless steel (indoor harsh environment). • Wiring bottom entry and floor bolting installation • Contractor shall be responsible for all bolting works required for installing the turnstile. • Contractor shall be responsible for comms, power cables and bosal conduit/ flexible s to the turnstile. • Shall come with Programmable logic with user diagnostic features and shall be capable to link to Access Control System for fault reporting. • Shall be Integrated to building Fire detection system and PA to force trigger arm to stay down on emergency (fire alarm). • Outdoor hand-rails (304 brushed stainless steel with concealed Nut and Bolt Design (Tamper-Proof)), shall be bolted on the floor. • Come with Battery backup with min. two 12V 7Ah batteries.
Indoor waist height Industrial Electronic Turnstile (Industrial buildings/ Guardhouse)	• Turnstar Streamline or Trident waist height turnstile or an approved equivalent with comparable performance and quality, subject to approval by the client/engineer. • The waist-height turnstile shall be installed at reception areas with high volumes of traffic & is 100% duty rated. • Suitable for industrial installation and designed for high speed ultra quiet operation. • 3 wing (120°) 316 grade stainless steel rotor arms. • Electrically controlled bi-directional rotation and Mechanically controlled uni-directional rotation by means of key override • Ultra quiet, buffered solenoids and pawls • Case hardened locking disk and pawls - eliminating any wear • Self-centering rotation system - rotor returns to starting position after every rotation and no mid-rotation locking or trapping in the event of a power failure

Item	Minimum Parameter
	• Extra secure 60º anti-reverse system • Programmable PLC logic with user diagnostic features • Mechanical key override - clockwise and anti-clockwise directions (fail-secure) • Integral wireways with draw wires in place - no exposed wires • Shall be compatible and linked with the Port entrance Access Control System • Shall have one entry/exit biometric reader mounted on the entry side of the turnstile (single direction access) • Built-in Fail Safe/Fail Secure changeover options • Anti-tamper design and maintenance free • Finish - 304 grade brushed stainless steel (indoor). • Finish – 316 grade brushed stainless steel (indoor harsh environment). • Wiring bottom entry and floor bolting installation • Contractor shall be responsible for all concrete and bolting works required for installing the turnstile and handrails. • Contractor shall be responsible for comms, power cables and bosal conduit/ flexible s to the turnstile • Shall come with Programmable logic with user diagnostic features and shall be capable to link to Access Control System for fault reporting. • Outdoor hand-rails (304 brushed stainless steel with concealed Nut and Bolt Design (Tamper-Proof)), shall be bolted on the floor. • Min. 10 year mechanical guarantee. • Option (where required by Project) - Battery backup with two 7Ah batteries. • Integration to Fire detection system - Free rotation when triggered indefinitely.
Indoor waist height semi-automatic access control special needs gate for trolleys (office premises at reception)	• Turnstar special needs gate semiautomatic or an approved equivalent with comparable performance and quality, subject to approval by the client/engineer. • Should be provided and installed in areas where there is a requirement for controlled access and unassisted closing for any need, be it a trolley or wheelchair . • Gate wing 180° opening and framed stainless steel tubes configuration finish. • 316 grade stainless steel. • Open/ close LED indicator lights. • All electronics mounted inside gate post.

Item	Minimum Parameter

	• Fire alarm integration – Gate shall be integrated to the fire detection system to unlock when there is a fire alarm.
	• Minimum operation
	  ○ Gate is triggered either by means of a pushbutton or access control system reader.
	  ○ LED red cross changes to a green signal - the gate is now unlocked.
	  ○ Gate can either be pushed or pulled open.
	  ○ Gate closes automatically and re-locks or is pushed to close position and re-locks.
	  ○ LED red signal is reinstated.
	  ○ Door closer capability – when held open stays open, floor spring door closer (holds gate open in the 90° position) - factory standard.
	• Integral wireways with draw wires in place - no exposed wires.
	• Shall be compatible and linked with the Port entrance Access Control System.
	• Shall have 1-entry and 1-exit biometric reader mounted on the post of the gate.
	• Anti-tamper design and maintenance free.
	• Wiring bottom entry and floor bolting installation.
	• Contractor shall be responsible for all concrete and bolting works required for installing the turnstile and handrails.
	• Contractor shall be responsible for comms, power cables and cable management to the gate.
	• Option (where required by Project) - Battery backup with two 7Ah batteries.

Indoor waist height Industrial Electronic Turnstile with wheelchair access (office buildings)	• Turnstar Dynamic drop arm barrier or an approved equivalent with comparable performance and quality, subject to approval by the client/engineer. • The waist-height turnstile shall be installed indoor at reception where required by Project/ guided by design drawings. • Shall handle high volumes of traffic & is 100% duty rated. • Suitable for industrial installation and designed for high speed ultra quiet operation. • High speed, safe and convenient access that allows for special needs access. • Fitted with safety sensors – optical sensors or better. • Motor embedded collision detection sensors.

Item	Minimum Parameter
	• Programmable PLC logic with user diagnostic features. • Integral wireways with draw wires in place - no exposed wires • Shall be compatible and linked with the Port entrance Access Control System • Shall have one-entry (and one-exit where required) biometric reader mounted on the required side of the turnstile. • Anti-tamper design and maintenance free. • Finish - 304 grade brushed stainless steel (indoor). • Finish – 316 grade brushed stainless steel (indoor harsh environment). • Wiring bottom entry and floor bolting installation • Contractor shall be responsible for all bolting works required for installing the turnstile. • Contractor shall be responsible for comms, power cables and bosal conduit/ flexible s to the turnstile. • Shall come with Programmable logic with user diagnostic features and shall be capable to link to Access Control System for fault reporting. • Shall be Integrated to building Fire detection system and PA to force trigger arm to stay down on emergency (fire alarm). • Outdoor hand-rails (304 brushed stainless steel with concealed Nut and Bolt Design (Tamper-Proof)), shall be bolted on the floor. • Come with Battery backup with min. two 12V 7Ah batteries.

Indoor waist height semi-automatic access control special needs gate for trolleys (office premises at reception)	• Turnstar special needs gate semiautomatic or an approved equivalent with comparable performance and quality, subject to approval by the client/engineer.
	• Should be provided and installed in areas where there is a requirement for controlled access and unassisted closing for any need, be it a trolley or wheelchair .
	• Gate wing 180° opening and framed stainless steel tubes configuration finish.
	• 316 grade stainless steel.
	• Open/ close LED indicator lights.
	• All electronics mounted inside gate post.
	• Fire alarm integration – Gate shall be integrated to the fire detection system to unlock when there is a fire alarm.
	• Minimum operation
	  ○ Gate is triggered either by means of a pushbutton or access control system reader.
	  ○ LED red cross changes to a green signal - the gate is now unlocked.

Item	Minimum Parameter
	○ Gate can either be pushed or pulled open. ○ Gate closes automatically and re-locks or is pushed to close position and re-locks. ○ LED red signal is reinstated. ○ Door closer capability – when held open stays open, floor spring door closer (holds gate open in the 90° position) - factory standard. • Integral wireways with draw wires in place - no exposed wires. • Shall be compatible and linked with the Port entrance Access Control System. • Shall have 1-entry and 1-exit biometric reader mounted on the post of the gate. • Anti-tamper design and maintenance free. • Wiring bottom entry and floor bolting installation. • Contractor shall be responsible for all concrete and bolting works required for installing the turnstile and handrails. • Contractor shall be responsible for comms, power cables and cable management to the gate. • Option (where required by Project) - Battery backup with two 7Ah batteries.
General	
Cabling and Cable Containment	• The Contractor shall allow for all wiring to make this system fully functional. • Power Cables -The Contractor shall be responsible for the supply, installation, and termination of power cables from the electrical distribution board (DB) to the turnstile. • Power cable management - The Contractor shall be responsible for the supply and installation of cable management systems for power cables, including underground sleeve pipes, and bosal conduit or flexible steel, leading to the nearest communication manhole or underground sleeves. • Communication Cable Management - The Contractor shall be responsible for the supply and installation of cable management systems for communication cables, including underground sleeve pipes, and bosal conduit or flexible steel, leading to the nearest communication manhole or underground sleeves.
Labelling	All equipment shall be neatly and professionally labelled using Traffolyte or approved equivalent labelling.
General	• Contractor shall be responsible for all concrete and bolting works required for installing the turnstile and handrails.

Item	Minimum Parameter
	Provision and installation of any additional items that are required to render this installation complete and fully functional as required.
Commissioning	Testing and Commissioning of the turnstile system to ensure proper functioning and ready for integration, including: • Operation of the turnstile. • Functionality of safety features and emergency stops. • Calibrate settings on the control unit as required. • Perform multiple operational tests to ensure the system meets the desired performance standards. Train the client's designated personnel on operating and maintaining the boom-gate and spike system.
Handover	• Fully installed and operational turnstile barrier with integrated spike system. • Complete documentation, including user manuals, wiring diagrams, and boom system configurations. • Commissioning report detailing the tests performed and confirmation of the system's readiness. • Training session for the client's personnel.

5.3.4 Pedestrian handrails

Equipment	Minimum Parameter
Pedestrian Handrails	• Contractor to supply and install handrails next to the outdoor half height turnstiles on the traffic island for safety and guidance. • Outdoor hand-rails – shall be constructed from 316 stainless steel, brushed finish, with concealed Nut and Bolt Design (tamper-proof). • The Contractor shall determine the dimensions of the handrails based on industry standards and seek approval from the Employer before proceeding with installation. • Complies to SANS10400 building standards including SANS10400-M.
General	
General	Contractor shall be responsible for all concrete and bolting works required for installing the handrails. Provision and installation of any additional items that are required to render this installation complete and fully functional as required.

5.3.5 Mesh-wire fence

Equipment	Minimum Parameter
Mesh-wire fence (boom-gate)	• Mesh-wire fence (clear-view or equivalent) (SANS 10244-2) complete with posts and accessories. • Further fence requirements shall be as per specified by the Employer. • Contractor shall be responsible for all concrete works of installing the fence. • Fence finishing shall be of corrosion resistance material suitable for coastal environments (PVC coated or better) and painted green or as specified by the Employer.
General	
General	Provision and installation of any additional items that are required to render this installation complete and fully functional as required.

5.3.6 Door Controller: Babylon XMP K32EX-

Equipment	Minimum Parameter
Door Controller XMP K32EX in housing	• If the site or building is using the Babylon access control system, then every new installation shall conform to the following requirements. • The controller shall be the latest model Babylon XMP K32-EX-002 (Tenderer to provide latest model recommended and supported by OEM) complete with lockable tamper-proof housing, PSU and back-up battery. • Shall make use of ethernet (TCP/IP) to communicate with the central control system via the network infrastructure. • Shall be able to operate independently of the server. • For gate entrance traffic lanes with boom-gate barrier system – No door controller shall control more than lane equipment. (to minimise common point of failure). Therefore on a lane, the controller with connect with the boom barrier entry reader/s, the barrier, the pedestrian turnstile (should there be any) and the reader of the turnstile. • For buildings - the controller shall be housed in a enclosure box which shall be installed in the building on a secure side of the door inside the ceiling or on the wall above a specific door. • Power supply battery back-up with Min. 2.9Ah UPS • Readers per controller: 4 OR 8 Reader configuration as required • Enclosure / Housing: 3CR12 powder coated stainless steel with IP54, tamper-proof & monitored, lockable (key) • Where additional input/ output modules are required for the installation in extension to the K32 controller, the I/O devices shall conform to the OEM

Equipment	Minimum Parameter
	requirements and shall be housed in a tamper proof housing with no wires exposed.
General	
Wiring	The Contractor shall allow for all wiring to make this system fully functional.
Labelling	All equipment shall be neatly and professionally labelled using Traffolyte or approved equivalent labelling.
General	Contractor shall be responsible for the supply, installation, termination of comms, power cables, PVC and bosal conduit/ flexible steel to the door controller, readers and peripherals. Provision and installation of any additional items that are required to render this installation complete and fully functional as required.

5.3.7 Biometric and Proxy card readers

Equipment	Minimum Parameter
Fingerprint, Proximity biometric card reader	• If the site/ building is using the Babylon access control system, then every new installation shall conform to the following requirements. • Readers shall have fingerprint scanner and mifare reader head as minimum. (i.e. XMP-TMC-2851-FP-MIF), Should Contractor propose an alternative, it must be the latest Autec Babylon OEM product then proposal accompanied by a datasheet and shall be sent for Employer's approval. • Where required, readers for time and attendance on certain doors shall have fingerprint scanner, VFD display and keypad. (i.e. XMP-TMC3260-S-FP-MIF), Should Contractor propose an alternative, it must be a latest Autec Babylon OEM product then proposal shall be accompanied by a datasheet and shall be sent for Employer's approval. • Biometric reader shall be connected to the Access Control System via K32 controller. • Case finish: Minimum ABS material (impact-proofed housing) and tamper proof. • Protection type: Min. IP65 Outdoor and IP54 Indoor. • Outdoor readers shall be installed with a rain cover mounting bracket. • Signalling: minimum 3 LED statuses, buzzer. • Finish: Silver or RAL 9006. • All indoor Access Control biometric readers shall be flush-mounted with a tamper proof bracket. Where flush mount installation is not possible, a surface mount 304 grade brushed stainless steel bracket shall be used subject to Employer's approval.

Equipment	Minimum Parameter
	• All outdoor Access Control biometric readers shall be flush-mounted with a tamper proof bracket. Where flush mount installation is not possible, a surface mount 316 grade brushed stainless steel bracket shall be used subject to Employer's approval.
Proximity Card Reader	• If the site is using the Babylon access control system, then every new installation shall conform to the following requirements. • XMP-TMC2150-S-IP65 (MIF) (latest series Babylon product subject to Client approval), Should Contractor propose an alternative, it must be the latest Autec Babylon OEM product then proposal accompanied by a datasheet and shall be sent for Client approval. • Shall be able to read cards already used on the port (both card types if possible). • The reader shall be connected to the Access Control System via a door controller. • The reader shall be connected to the Access Control System via a K32 door controller. • The card readers support infield firmware upgrade and feature Zero Down-time firmware upgrades. • Card readers shall be approved by the Client (datasheet) and Engineer regarding appearance, final finish, and mounting detail. Card readers shall be adaptable for surface and/or flush mounting. • Shall have the following properties; • Case: min. ABS material (impact-proofed housing) and tamper proof • Protection type: Min. IP 65 All • Signalling: minimum 3 LED statuses, buzzer • Outdoor readers shall be installed with a rain cover mounting bracket • Finish: Silver (similar to RAL 9006) • All indoor Access Control readers shall be flush-mounted with a tamper proof bracket. Where flush mount installation is not possible, a surface mount 304 grade brushed stainless steel bracket shall be used subject to Employer's approval. • All outdoor Access Control readers shall be flush-mounted with a tamper proof bracket. Where flush mount installation is not possible, a surface mount 316 grade brushed stainless steel bracket shall be used subject to Employer's approval.
General	
Wiring	The Contractor shall allow for all wiring to make this system fully functional.
Labelling	All equipment shall be neatly and professionally labelled using Traffolyte or approved equivalent labelling.

Equipment	Minimum Parameter
General	Contractor shall be responsible for the supply, installation, termination of comms, power cables, PVC and bosal conduit/ flexible steel to the door controller, readers and peripherals. Provision and installation of any additional items that are required to render this installation complete and fully functional as required.

5.3.8 Break glass unit

Equipment	Minimum Parameter
Break glass Unit	• If the site is using the Babylon access control system, then every new installation shall conform to the following requirements. • Break glass unit and magnetic locks shall be connected to the controller for the specific door. • Shall have Manual key resettable actuator with resettable element. • Legend & logo: BG cover "EMERGENCY DOOR RELEASE" , BG window "Emergency Break Glass" including "PRESS HERE" logo • Shall be flush mounted. • With hinged clear plastic protective cover. • All indoor installations shall be flush-mounted with a tamper proof bracket. Where flush mount installation is not possible, a surface mount 304 grade brushed stainless steel bracket shall be used subject to Employer's approval. • All outdoor installations shall be flush-mounted with a tamper proof bracket. Where flush mount installation is not possible, a surface mount 316 grade brushed stainless steel bracket shall be used subject to Employer's approval.
General	
Wiring	The Contractor shall allow for all wiring to make this system fully functional.
Labelling	All equipment shall be neatly and professionally labelled using Traffolyte or approved equivalent labelling.
General	Contractor shall be responsible for the supply, installation, termination of comms, power cables, PVC and bosal conduit/ flexible steel to the door controller, readers and peripherals. Provision and installation of any additional items that are required to render this installation complete and fully functional as required.

5.3.9 Magnetic Lock

Equipment	Minimum Parameter

Magnetic Lock	• Electromagnetic lock complete with armature plate and all required mounting brackets (ZL / L / U) suitable for the specific door type and opening configuration.
	• Magnetic lock shall be mounted on the secure side (door frame) unless otherwise approved.
	• Maglock shall be fail-safe (unlocked on loss of power).
	• Maglock shall be monitored and provide:
	  ○ Lock Status Monitoring (LSM)
	  ○ Door Status Monitoring (DSM)
	  ○ LED indication
	  ○ NO/NC volt-free relay outputs for integration into the access control system.
	• Maglock shall be selected with a holding force appropriate to the door type, usage, and security classification, and shall comply with the following minimum ratings:
	  ○ Internal low-risk / administrative doors: minimum 400 kg holding force
	  ○ Controlled-access internal doors and perimeter doors: minimum 600 kg holding force
	• Locks installed on external or perimeter doors shall not be less than 600 kg holding force.
	• Holding force rating shall be manufacturer certified.
	• Dual voltage 12/24VDC selectable.
	• Built-in MOV (Metal Oxide Varistor) surge protection.
	• Housing shall be corrosion-resistant anodized aluminium suitable for coastal environments.
	• External installations shall have a minimum IP65 rating.
	• Doors shall be assessed prior to installation to verify correct bracket selection, structural suitability, and full armature contact.
	• There shall be no exposed wiring in the installation. All wiring shall be concealed:
	  ○ Flush installations: wiring routed within concealed PVC conduit.
	  ○ Surface installations: wiring routed within galvanised conduit or PVC-coated flexible metallic conduit of appropriate size.
	• Installation shall comply with applicable requirements of SANS and relevant building fire regulations.
	• Maglocks installed on escape routes shall release upon fire alarm activation and upon loss of power.

General	

Equipment	Minimum Parameter
Wiring	The Contractor shall allow for all wiring to make this system fully functional.
Labelling	All equipment shall be neatly and professionally labelled using Traffolyte or approved equivalent labelling.
General	Contractor shall be responsible for the supply, installation, termination of all cabling, PVC and bosal conduit/ flexible steel to the door controller, readers and peripherals.

5.3.10 Door Monitor/Contact

Equipment	Minimum Parameter
Door Monitor/ Contact	Normal Doors • Industrial Surface Mount Magnetic Contact • Wider break distance helps prevent false alarms caused by loose fitting doors • Rugged Design for Industrial Applications • Concealed Terminals • Closed-loop • ~25mm Take and ~55mm break or better • Shock Proof Function • Waterproof • Durable aluminium casting enclosure with armour protection around cable (roller shutter installation). • Use on roller shutter doors, emergency exit doors and any other doors as requested by the Employer on the design. • Shall be compatible with the access control system.
General	
Wiring	The Contractor shall allow for all wiring to make this system fully functional. No wires shall be exposed.
Labelling	All equipment shall be neatly and professionally labelled using Traffolyte or approved equivalent labelling.
General	Contractor shall be responsible for the supply, installation, termination of comms, power cables, PVC and bosal conduit/ flexible steel to the door controller and peripherals. Provision and installation of any additional items that are required to render this installation complete and fully functional as required.

5.3.11 Intercom

#31 Where required and indicated on the design drawings, door intercom systems shall be installed on access gates or guardhouse and building main doors to enable communication between the gate/ main door and the reception desk or control room.

#32 The Contractor shall supply, install, configure and commission an IP-based two-way intercom system which consist of a door station with physical buttons installed at the gate and a master station phone located in the control room. This system will facilitate efficient communication between the control room and visitors at the gate.

#33 The intercom system shall be IP based and powered via PoE.

#34 Master station shall be press-to-talk communication through the handset, with hands free response from the called station.

#35 Contractor shall provide all software and licences as required. No subscription licences allowed.

5.3.11.1 Desk-phone Master/Sub-Master station requirements

Item	Minimum Parameter
Indoor Master station	• Hikvision DS-KH8500 or similar • Table-top or wall surface mount unit. • IP based and PoE power supply. • Shall have chime tone volume control. • Hands free communication. • Shall come with touch screen (min. 7") for viewing door camera during a call. • Two-way audio with echo cancellation • Support for multiple intercom stations • User-friendly interface for call management • Built-in speaker and microphone • Ethernet port for network connectivity
Door Station	• Hikvision DS-KD8003-IME1 or similar equivalent • Type: Surface-mounted or flush-mounted option at the entrance gate Minimum features • HD video camera with infrared night vision • Physical buttons for call initiation and access control • Two-way audio communication with built-in speaker and microphone • IP65 weatherproof rating for outdoor installation • Remote unlocking capabilities for controlled access • Min. 2 MP resolution for clear video capture • Rust-free material housing or 316 grade stainless steel finish housing.
General	
Wiring	The device shall make use of CAT6 FTP ethernet cable connected to the ICT network switch provided by the ICT Contractor.

Item	Minimum Parameter
Labelling	All equipment shall be neatly and professionally labelled using Traffolyte or approved equivalent labelling.
General	• Communication Cable Management - The Contractor shall be responsible for the supply and installation of cable management systems for communication cables including PVC conduit (indoor) and bosal conduit or flexible steel pipe (outdoor), leading to the nearest communication panel, manhole or underground sleeves. • Provision and installation of any additional items that are required to render this installation complete and fully functional as required.
Commissioning	Testing and Commissioning of the turnstile system to ensure proper functioning and ready for integration, including: • Operation of the IP intercom system. • training for control room personnel on system operation, including call management, and access control features.
Handover	• Fully installed IP based two-way intercom system. • Complete documentation, including user manuals, datasheets and configuration documents. • Commissioning report detailing the tests performed and confirmation of the system's readiness. • Ongoing technical support and maintenance services shall be available for system troubleshooting and updates.

5.3.12 Communication Cabling

Item	Minimum Parameter
General	• All cables and conductors (except fibre optic cables) installed for outdoor equipment acting as control, communication, or signal lines shall include surge protection appropriate to the line voltage/technology. • Horizontal cabling for all Access Control System (ACS) equipment and associated devices shall be the responsibility of the Contractor. • Cable sizes and types shall follow the cable schedule; where unspecified, the Contractor shall design cabling in accordance with SANS 10142-1 (SA Wiring Code) and relevant OEM requirements. • Prior to delivery, cables shall be checked for dielectric integrity, correct core configuration, continuity, and absence of visible defects. • Core colours/numbers shall be maintained throughout installation; colour coding shall conform to drawings. • Cable ends shall be sealed/capped immediately after cutting.

Item	Minimum Parameter
	• All cables and terminations shall be secured to prevent mechanical stress on glands, conductors, or terminals. • Cabling shall be routed via designated sleeves, conduits, trays/ladders, or backbone systems per drawings and the contract.

CAT6 (UTP or FTP)	**Cable Type & Construction**
	• Category: CAT6 (250 MHz electrical bandwidth; suitable for 100 Mbps/1 Gbps operation).
	• Shielding: FTP (F/UTP) — overall aluminium foil shield with drain wire for EMI protection.
	• Conductors: Solid bare copper, 23–24 AWG (no CCA).
	• Jacket: LSZH/LSHF (low smoke, halogen-free).
	• Fire/safety properties (state intent, not codes only):
	  ○ IEC 60332-1: flame-retardant (cable will not propagate fire).
	  ○ IEC 61034: low smoke emission (improves visibility & safety in fire).
	  ○ IEC 60754-2: halogen-free (no corrosive/toxic halogen acids when burning).
	• Impedance: 100 Ω ± 15 %.
	• Colour: Grey (unless drawings state otherwise).
	
	Installation
	• Maximum permanent link length: 90 m (max channel 100 m).
	• No joints/couplers/splices allowed in horizontal runs.
	• Use shielded RJ45 modular plugs/jacks rated for CAT6 FTP.
	• Termination scheme: T568B site-wide (unless drawings specify otherwise).
	• Shield/drain earthing at ONE end only (equipment-room side) to avoid ground loops; insulate at the remote end.
	• Maintain segregation from power as per SANS and drawings; where co-routing is unavoidable, use metallic segregated containment or increased spacing.
	• Respect manufacturer pull tension and minimum bend radius.
	
	Testing & Acceptance
	• Field test each permanent link with a calibrated certifier using CAT6 Permanent Link adapters: PASS required for
	  ○ Attenuation – Signal loss along the cable
	  ○ NEXT – Near-End Crosstalk – Pair to pair noise
	  ○ PSNEXT – Power-Sum Near-End – All pairs noise test
	  ○ ACR – Attenuation to Crosstalk Ratio – Signal vs noise ratio
	  ○ Return loss – Return loss – Signal echo from bad termination
	  ○ Wiremap – Correct pin to pin wiring
	• Verify shield continuity and single-end earth bonding.

Item	Minimum Parameter
	• Submit certificates per link at handover
Door Station	**Standards & Performance** • ITU-T G.652.D: standard low-water-peak single-mode fibre for low attenuation. • ITU-T G.657.A1: bend-insensitive single-mode for tighter indoor routing without excess loss. • ISO/IEC 11801 OS2: classification for outdoor/long-reach single-mode backbone performance. • IEC 60794-1-1: construction/performance for outdoor cables (mechanical/environmental). **Design & Topology** • All backbone links shall be single-mode OS2. • Ring topology with physically diverse paths is required for inter-building resilience (route diversity). • Spare capacity: provide ≥ 25 % spare fibres above calculated need (core count per cable schedule/design). • Marking: cables shall be clearly marked with manufacturer, fibre type, and core count. **Mechanical Protection** Each fibre cable shall have CST (corrugated steel tape) armouring unless permanently routed in dedicated: • 50–110 mm HDPE duct, or • HDPE micro-duct, or • Unistrut/Sprague system, or • PVC conduit. **Installation** • Follow manufacturer tension and bend radii strictly (especially for G.657.A1). • No mid-span joints; splice/termination only at designated ODFs or patch panels. • Connector/polish type shall match the project connector schedule (e.g., LC/UPC or LC/APC where specified). • Cables to be labelled at both ends (end-device, route, ODF port mapping). **Testing & Acceptance** • OTDR testing at 1310 nm and 1550 nm, both directions; submit native traces + PDFs. • End-to-end loss measurement; connector loss ≤ 0.5 dB per mated pair; splice loss ≤ 0.2 dB; total link loss ≤ design budget. • Provide core-by-core test tables and updated fibre schedule.
Signal / Mylar-Screened Cabling	**Minimum Requirements** • 8-core, 0.5mm^2 foiled **Aluminium-Mylar screened** with an internal drain wire to reduce cross-talk and electromagnetic interference.

Item	Minimum Parameter
	• Mylar screening shall be applied both per pair and overall where practicable. • Number of cores shall be sufficient for interface requirements. **Installation & Handling** • Signal cabling shall be routed separately from power conduits to minimize induced noise. • All signal cables shall be continuous (no jointing) and properly terminated at labelled junctions and panels. • Outdoor signal cables must be run in underground sleeves or flexible/galvanized steel conduits; indoor signal cables in cable trays or PVC conduits.
Power Cabling	**Minimum Requirements** • All power cabling shall comply with **SANS 10142** requirements and OEM power-input specifications for each device. • Power cabling shall use 2.5 mm², 3-core Cabtyre cable for equipment supply where applicable or sized according to IEC or SANS standards for current carrying capacity, voltage drop, earth continuity, and safety. • All power equipment shall include earth conductors and be earthed in accordance with the electrical code. **Installation & Containment** • All unarmoured conductors shall be installed within conduits, trunking or cable skirting; **open wiring is not permitted**. • Indoor cabling shall be protected within PVC conduits linking junction boxes and distribution points; all accessories including bends, adaptors, junction boxes etc. shall be provided. • Colour coding of conductors shall comply with SANS 10142 phase/sub-circuit identification.
Cable Containment / Management	• All communication and power cabling supported, secured, and protected from mechanical or environmental damage. • Use cable trays, conduits, raceways, sleeves, backbone/spine systems per drawings. • Surface-mounted conduit/trays where exposed wiring cannot be avoided.
Commissioning & Handover – Cabling	**Testing** • CAT6A: ANSI/TIA-568 performance tests. • Fibre: OTDR/attenuation tests. • Signal cables: continuity and integrity verification. • Power: continuity, earth, insulation tests and issue CoC where applicable or required. **Documentation**

Item	Minimum Parameter
	• Cable schedules, as-built drawings, test results, termination lists, and manufacturer datasheets. • Routing and labelling diagrams included for handover. **Support** • Contractor shall provide technical support and maintenance services for troubleshooting and warranty.

5.3.12.1 Network switches (where required)

a. Outdoor switches/ media converters shall be industrial type switches mounted on din-rails.

b. All switches shall be easily accessible for maintenance purposes.

c. Switches shall be fed via dedicated power points from a UPS supply.

d. All Access switches shall support PoE (and PoE+ where required) to power cameras, telephones, etc.

e. Switches will support VLAN's and trunking features mostly for segmenting IP video surveillance and Quality of Service.

f. All switches shall be managed type and STP (Spanning Tree Protocol) is required along the perimeter to ensure that redundant link takes over communication in case of fibre break or communication failure.

g. All switches shall have a minimum of 30% spare capacity to cater for future expansions.

h. Security Requirements

   i. Network Access Control (NAC) to prevent the propagation of viruses on the network

   ii. 802.1x and identity based network services to ensure that only authorised devices are can connect on the network.

   iii. Port security in order to prevent MAC addresses flooding attacks.

   iv. Other applicable security protocols already used on the existing infrastructure.

i. Managed media converters can only be used on the perimeter if they have layer 2 switching, STP, SNMP, CLI, VLAN, PoE and are secured as required above.

j. All switches and media converters shall utilise or support SFPs (small form-factor pluggable) transceivers with LC connectors. All links between access switches/ media converters will be 1G and all standard switch device ports shall support 100MB with PoE capability.

k. Access switches in the server room are required to have 1000MB data capability on all ports to be utilised to connect servers and network storage devices.

l. Make brand of switches are/shall be Cisco network switches and planet managed media converters.

Item	Minimum Parameter
Industrial Network Switches	**Minimum Parameter** • Industrial type, DIN-rail mountable, outdoor-rated. • 4 port or 8 port x 10/100/1000 Base-T ports with PoE/PoE+ support. And 2 x 1Gbps SFP uplink ports. • Managed switch with full Layer 2 functionality. • Support for PoE / PoE+ on required ports to power cameras, intercom, Ip phones and other devices. • VLAN support, trunking, and QoS features for IP video segmentation. • STP (Spanning Tree Protocol) enabled for redundant link failover. • Minimum 30% spare port capacity for future expansion. • Network Access Control (NAC) to prevent virus propagation. • 802.1x and identity-based network access to restrict unauthorized devices. • Port security to prevent MAC flooding attacks. • Compliance with existing infrastructure security protocols. • SFP slots supporting LC transceivers; 1 Gbps uplinks and 100 Mbps for standard device ports with PoE support. • Server room access switches: all ports capable of 1 Gbps to connect servers and network storage. • Make/Brand: Cisco Industrial Switches.
Managed Media Converter	**Minimum Parameter** • Industrial type, DIN-rail mountable, outdoor-rated. • Managed Layer 2 functionality with VLAN, STP, SNMP, and CLI support. • PoE capability on ports where required. • Security features identical to industrial switches (NAC, 802.1x, port security). • SFP support with LC transceivers; 1 Gbps uplinks and 100 Mbps device ports.
Door Station	**General / Installation** • All switches and media converters shall be mounted in accessible locations for maintenance. • Power via dedicated UPS-supplied power points. • Cabling and connections must follow structured cabling practices. • All physical installation and mounting hardware included. **Commissioning** • Configure VLANs, STP, PoE, trunking, and QoS per network design. • Test port speeds, PoE functionality, and SFP uplinks. • Verify security configurations (NAC, 802.1x, port security). • Provide operational demonstration and training for control personnel. **Handover**

Item	Minimum Parameter
	• Fully installed and configured industrial network switches. • Configuration documentation, including VLANs, trunking, port assignments, and PoE maps. • Test and commissioning reports detailing network performance and redundancy verification. • Ongoing technical support for troubleshooting and firmware updates.

6 GENERAL

6.1 Site Conditions

#36 The equipment shall be suitable for installation within the conditions of the Port or marine environment as described below.

Altitude:	Sea level up to 2500m above
Temperature range:	-5°C to +45°C
Relative humidity:	up to 95% RH
Atmospheric conditions:	Salt laden. Electrolytic corrosion conditions prevail in all areas. Marine environment
Lightning conditions:	Severe, equipment must withstand and be immune to a maximum lightning ground flash density of 11 flashes per km² per annum
Wind Speed:	120kph

#37 All new outdoor installations shall be suitable for coastal environments. No mild steel installation shall be supplied and used for any of the works without prior approval.

6.2 Maintenance and Warranty

#38 All equipment used shall come with a certified warranty with a minimum 2 years, and an option to extend (with a letter from the manufacturer which shall be issued to Transnet with the end user being TNPA, stating warranty/extended-warranty periods and guarantees on those periods, independent of the *Contractor*).

#39 The system implementing Contractor must be accredited and certified by the manufacturer as an EXPERT (or equivalent) integrator, whether as a direct or indirect contractor.

#40 System warranty shall take effect from date of first use, after site acceptance testing.

#41 Contractor shall supply commissioning and operational spares required for a period of one year after commissioning, and special tools required for maintenance purposes, as detailed in Section 8.

6.3 Designs, Calculations by the *Contractor*

#42 All documents, for which prior approval is required, shall be timeously submitted to the *Employer* for review and approval, prior to placement of orders, fabrication or manufacture.

#43 The *Contractor* shall or as necessary, appoint specialist *Subcontractors* and OEMs to undertake the designs, calculations and drawings, which shall be prepared and checked by suitably qualified and experienced professional engineer/ technologist/ technician, registered with the Engineering Council of South Africa (ECSA) or an equivalent institution recognised by ECSA.

#44 Designs, calculations and drawings shall not be prepared and checked by the same person and shall be reviewed and accepted by the *Employer* before the commencement of fabrication.

#45 The *Employer* may, at his /her sole discretion, request additional design calculations, drawings and associated information, as deemed necessary for verification of the correctness and compliance of the designs.

#46 Where calculations are applicable and required, the *Contractor* shall submit all required calculations in a neat and legible manner. Where calculations are performed using specialised software programs, the *Contractor* shall also furnish copies of the final native software files, without any exclusions. The calculations shall be provided in a professional, neat format, to include, but not be limited to, the following, in the order as stated below:

- Summary of assumptions and conclusions.
- Table of contents.
- List of all associated drawings.
- List of compliancy standards.
- List of all text and references used.
- Calculations.

6.4 Documents and Drawings by the *Contractor*

#47 The *Contractor* shall be solely responsible for the submission of any drawings that are to be provided by his appointed specialist *Subcontractors* and/or OEM's. Drawings shall be accompanied by instruction manuals properly bound for maintenance purposes. The drawings and manuals shall conform to specifications and standards in Section 3 and 4.

#48 The scope of information to be provided by the *Contractor* as part of the handover documents shall include, but is not limited to:

- FATs and SATs documentation (includes test procedures, punch-list, test-sheets, drawings and equipment list and certificates).
- Data sheets and associated detailed specifications of equipment.
- Operations and maintenance manuals.
- Where applicable, detailed designs and calculations. The native software files for any detailed design calculations undertaken in software programmes shall also be provided to the *Employer* for verification purposes.
- As-built drawings in hard and soft copies ('dwg' and 'PDF' formats).
- Any other as-built documentation as required by the *Employer*.
- Other information required for the completion of engineering design reviews.

- Critical and routine spare part lists.
- Equipment guarantees/ warrantees.
- Cable schedules.
- Applicable systems software and licenses, including all final programming of equipment on CD-ROMs.
- Approach paper/ method statement.
- Patching Schedule and/or Schedule of IP addresses, switch ports used, PoE on and off, etc.
- Equipment lists.
- Specification of software.
- Documents and Drawings Register.
- Configuration documents.

#49 All project engineering drawings shall include, but not be limited to, the following:

- Detailed system schematics/ loop diagrams showing equipment wiring terminations.
- General Arrangement diagrams of panels, junction boxes, turnstiles, boom-gates and poles, etc.
- Redlines of Employer's design drawings (site plans and building floor plans layouts).

6.5 Safety

#50 The *Contractor* shall take all necessary safety precautions to prevent static electricity discharge, sparking and any other unsafe condition, which could pose a safety risk to personnel, property and/or equipment.

#51 The location and extent of potentially explosive atmospheres shall be identified and indicated on hazardous area classification drawings. All electrical equipment and instruments for use in hazardous classified areas shall be supplied with a hazardous area certificate issued by a certifying authority approved by SABS/SANS/IEC. Certificates shall be indexed and filed in a certification register.

6.6 South African Electrical Compliance

#52 Any equipment designed and fabricated/manufactured overseas shall have an electrical certificate of compliance to South African Regulations before it is delivered (and operated) in South Africa. The compliance certificate(s) shall fully cover high voltage, medium voltage and low voltage equipment. These certificates shall be issued by an accredited South African professional engineer.

6.7 *Employer* QA Representative

#53 The *Contractor*'s QA requirements shall be as set out in the Works Information.

#54 The *Employer* may choose to appoint a QA/QC representative to monitor and report on some or all aspects of the production and fabrication processes. Full cooperation shall be extended to the appointed QA/QC representative. Associated costs for such services will be borne by the *Employer*.

6.8 Other

#55 Earthing philosophy shall comply with TNPA electrical standards and specifications.

#56 Cables, boxes, cabinets and equipment shall be marked and labelled as per TNPA specifications.

#57 The SI system of units and measures shall be used to express all numerical quantities.

#58 Use of any component or device, not expressly specified herein, that is required to implement the work, shall be subject to Transnet project manager's approval of required submittals.

#59 The following materials shall not be used or installed:

a. Asbestos in any form.
b. PCBs (poly-chlorinated biphenyls).
c. Mercury.
d. Viton seals.
e. Any paints containing lead or chromates (including in the tinters).

7 PACKAGING, TRANSPORTATION AND HANDLING

The following general items are applicable to all equipment forming part of the works:

#60 If any equipment requires special maintenance or attention during storage, this shall be clearly stated prior to placement of orders and the Employer's attention shall be drawn to this fact.

#61 The Contractor shall be responsible for loading all materials and equipment at the OEM premises, transportation, handling and off-loading thereof on Site, including also any further handling of equipment until it is placed in the final, permanent position.

8 SPARES, TOOLS AND CONSUMABLES

8.1 Spares required after Final Handover

#62 The Contractor shall provide to the Employer a list of all critical and recommended spares as prescribed by the specialist subcontractor/OEMs, which shall cover the operational requirements after final handover of the works. These lists shall include the following:

a. Description of spare part.
b. Supplier contact details.
c. Suggested stock levels.
d. Prices.
e. Lead-times for ordering and delivery of such spares.

#63 The Employer may issue an instruction to the Contractor to supply and deliver spares for operation and maintenance of the equipment after final handover. Separate payments will be made by the Employer for the provision of such spares.

9 OPERATION AND MAINTENANCE MANUALS

#64 Technical maintenance and operating manuals shall be provided for each type and model of equipment. Technical manuals shall include all technical data, construction information and leaflets for each individual component used in the equipment as provided. Where generic manuals are provided, an addendum shall be provided, indicating the applicable project specific components.

#65 Manuals shall be of a good quality and cover the following, as a minimum:

a. Technical descriptions of the equipment and component parts.

b. General arrangement drawings.

c. Installation instructions with drawings or pictures.

d. Operating and maintenance instructions for all components.

e. Detailed parts lists, accompanied by exploded view-type drawings, clearly detailing the part and uniquely identifying it.

f. Spare part ordering instructions.

#66 Any special instructions pertaining to storage of spare parts or their shelf life shall be included in the maintenance manual. All drawings requested for component location, dismantling and re-assembly for maintenance purposes shall be included in the maintenance manual.

#67 All special tools required for operation and maintenance of the equipment shall be presented in the form of a schedule in the operating and maintenance manual respectively. The content of the training manual shall be based on the content of the technical, operating and maintenance manuals.

#68 The Contractor shall provide a recommended spare parts list with order numbers.

10 MEASUREMENT AND PAYMENT

10.1 General

#69 The tendered rates shall be deemed to include all and every cost item required for the completion, handover and commissioning of the scope of the works in full compliance with these specifications, the Works Information and the drawings, including, but not limited to, the following:

a. Design (including shop drawings), supply and installation of the works that are required to deliver a complete, fully functional and fully compliant system.

b. Supply of installation and commissioning spares and operational spares required for normal wear and tear during plant operation for the period of one year after commissioning.

c. Supply of special tools required for maintenance purposes.

d. All testing and commissioning activities that are required to get the installed equipment ready for operations.

e. Compilation and submission of all handover documentation as described in these specifications.

f. Training of Employer's operational staff, as detailed in these specifications.

#70 Allowances to be made in the tendered rates are as described below.

10.2 Pay Items

#71 Access control system infrastructure

a. The tendered rates shall cover all costs for the supply and installation of the Access Control and Intercom equipment, including, but not limited to, procurement, transport, storage, inspections and testing, designs and drawings for approval (multiple reiteration), installation and commissioning of the equipment, and all works that are required to ensure that the systems are fit for purpose, completely functional, operable and compliant in all aspects.

b. The rates shall also include all accessories, fixings, screws, mounting brackets, software and the like.

#72 Electrical Equipment

a. The tendered rates for power cables and internal network power supply units where required shall cover all costs for the supply and installation of cables, including, but not limited to, procurement, transport, handling, inspection, installing on cable management systems, cutting, termination, temporary sealing and testing of cables, including suitable fire stopping material where required.

#73 Spare Equipment

a. The tendered rates shall cover all costs for the supply and installation of all spare equipment, including, but not limited to, procurement, transport, storage, inspections and testing, programming, designs and drawings for approval (multiple reiteration), and all works that are required to ensure that the systems are fit for purpose, completely functional, operable and compliant in all aspects.

Document Approval and Sign-Off:

Prepared By:	Tebogo Mahlalela C&I Senior Engineer	Date
Reviewed By:	Zukisani Makani C&I Engineer	Date
Reviewed By:	Bongiwe Thiso C&I Technician	Date
Authorized By:	Malibongwe Mlonzi Senior Manager Electrical	Date
Accepted By:	Specialist: Security System	Date

Transnet National Ports Authority

CCTV Surveillance System

Technical Specification

ENG-C&I-SP-0002

01	March 2026	Issued for use
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Contents

1 ACRONYMS AND ABBREVIATIONS

The acronyms and abbreviations applicable to this report are summarised in the following table:

Abbreviation	Description
BMS	Building Management System
FoV	Field of View
OEM	Original Equipment Manufacture
OTDR	Optical Time-Domain Reflectometer
PA/ PAS	Public Announcement / Public Announcement System
PC	Personal Computer
PIDS	Perimeter Intruder Detection System
PE	Port Elizabeth
PoE	Power over Ethernet
PON	Port of Ngqura
PSIM	Physical Security Information Management
PTZ	Pan, Tilt and Zoom
CCTV	Circuit Closed Television
ACS	Access Control System
ICT	Information Communications Technologies
PVC	Polyvinyl Chloride
SAT	Site Acceptance Test
SI	International System of Units
STP	Shielded Twisted Pair
CST	Corrugated Steel Tape
TCP/IP	Transmission Control Protocol/ Internet Protocol
TIA	Telecommunications Industry Association
TNPA	Transnet National Port Authority

Abbreviation	Description
UPS	Uninterruptible Power Supply
URS	User Requirements Specification
ORS	Owners Requirements Specification
UTP	Unshielded Twisted Pair
SABS	South African Bureau Standards
VLAN	Virtual Local Area Network
24/7	24 Hours a Day, 7 Days a Week
GUI	Graphical User Interface

2 PURPOSE OF THE SPECIFICATION

The purpose of this technical specification is to set out the minimum technical requirements for functional quality, standardisation and system standards for the detailed design (where required), supply, installation, construction, testing and commissioning of equipment and associated infrastructure for a CCTV Surveillance system for a project where required by the Port security management.

3 DOCUMENT TERMINOLOGY

This document makes use of the words shall, should, may and will, with regard to requirements and specifications. To avoid any confusion among these terms, their legal and binding meaning, is indicated here. The reader is advised to be familiar with their contextual usage and meaning.
In this document the word:

a. Shall is used to indicate a mandatory requirement.

b. Should is used as a preference.

c. May is used as a permissive (i.e. neither mandatory nor necessarily recommended).

d. Will is used as a declaration on behalf of something/ someone else.

The word should shall be treated as a requirement by the contractor, although it may be negotiated, amended, approved or declined by the employer based on appropriate justification.

4 GUIDELINES, STANDARDS AND SPECIFICATIONS

All equipment and material to be supplied for the project must be designed, assembled and inspected in accordance with the publications shown in tables below. Each publication shall be the latest revision and addendum in effect on the date the specification is issued for construction unless noted otherwise.

Where conflicts occurs the more stringent requirement of the code, standards and project specifications must be met.

The *Contractor* shall adhere to the following further requirements:

a. All installations shall be inspected and witnessed in accordance with this specification, the OEM's instructions and recommendations and the approved quality control plans for each activity.

b. All calibration and test equipment shall hold valid, traceable calibration certificates, which shall be held on site and shall form part of the quality control dossiers.

c. All equipment, instruments and accessories shall, where appropriate, be calibrated and tested at the manufacturer's premises or by a duly authorised representative of the manufacturer.

d. All test and calibration certificates shall be included in the on Site quality control dossiers and the as-constructed data packs.

4.1 Transnet Standards and Specifications

The Transnet standards and specifications listed below, shall take precedence in terms of compliance.

	Document Title	Document No.
[1]	CAD Drawing Standards	ENG-STD-0001
[2]	Specification for plant & equipment Tag numbering	1924701-SP-0006
[3]	Contractor Documentation Submittal Requirements	DOC-STD-0001
[4]	Transnet Group - Integrated Electronic Security and Related Systems Specification: Part 6.17. Auxiliary And Related System	-
[5]	Transnet Group - Integrated Electronic Security and Related Systems Specification: Part 5.2. General Specification	-
[6]	Transnet Group - Integrated Electronic Security and Related Systems Specification: Part 6.21. Security System installation Standards	-
[7]	Specification For The Supply And Installation Of Medium Voltage And Low Voltage Electrical Cables	TPD: 003-CABLESPEC
[8]	Specification For Earthing And The Protection Of Buildings And Structures Against Lightning	TPD: 004-EARTHINGSPEC
[9]	Specification For Electrical Installations To Buildings Other Than Dwellings Houses	TPD-001-EL&PSPEC
[10]	Specification For Corrosion Protection	TNPA-SHEQ-PD-QUAL-SPEC-008

It is the responsibility of the *Contractor* to ensure that he/she obtains all of the *Employer*'s standards (latest amendments apply). The *Employer* shall not be held liable for any losses incurred by the *Contractor* which may arise as a result of non-compliance of the Works by the *Contractor* to the standards.

4.2 National and International Standards

These national and international standards must be adhered to, except where it conflicts with Transnet standards.

Where South African National Standards (SANS) do not cover a specific item, the *Contractor* shall ensure that the item is supplied and installed in compliance with all other relevant/mandatory national and/or international standards, as applicable. Where South African National Standards (SANS) fully cover the item(s) in question, further reference to associated international standards is not required.

The *Contractor* may request approval by the *Employer* for the adoption of a standard not listed in the tables below. Acceptance of such standards will however be at the sole discretion of the *Employer*.

	Document Title	Document No.
[11]	(International Code for the Security of Ships And of Port Facilities) ISPS Code – Parts A and B	SOLAS/CONF.5/34

Document Title		Document No.
[12]	Degrees of protection provided by enclosures (IP code)	SANS IEC 60529
[13]	Optical fibre cables	SANS IEC 60794
[14]	Splices for optical fibres and cables	SANS 61073-1
[15]	Electrical security installations Part 5-1-2: CCTV installations - CCTV surveillance systems for use in security applications - System design requirements	SANS 10222-5-1-2
[16]	National Fire Protection Association National Fire Codes	NFPA Standards
[17]	EIA/TIA-568 Commercial Building Telecommunications wiring standard	EIA/TIA-568
[18]	EIA/TIA-569 Commercial Building for Telecommunications pathways and Spaces	EIA/TIA-569
[19]	EIA/TIA-606 Administrative Standards for the Telecommunications infrastructure of Commercial Building	EIA/TIA-606
[20]	EIA/TIA-568A premises cabling standard	EIA/TIA-568A
[21]	The application of the National Building Regulations	SANS10400
[22]	Power over Ethernet standard	IEEE 802.3at
[23]	Standard for Ethernet	IEEE/ISO/IEC 802.3
[24]	Design, Installation, Commissioning and Maintenance fire detection and alarm systems	BS EN 5839 Part 1
[25]	Design of Voice Alarm Control and Indicating equipment	BS EN 54 Part 16

In addition to the specifications above, the design shall comply with the following relevant South African Acts, Standards and Regulations and shall apply in the order of precedence as listed below:

a. Occupational Health and Safety Act 85 of 1993
b. South African National Standards and Codes of Practice
c. IEC Standards and Recommendations
d. International Standards and Codes – ISO, DIN, BS, ASME, ASCE, ANSI, ASTM, EU
e. All local, provincial or S.A. Government laws in force at the time.

5 SPECIFICATION

5.1 General Requirements

#1 The installation of the CCTV Surveillance system (VMS, NVRs and cameras) shall include any programming/ configuration and testing of all the equipment as required including complete integration of the systems with the respective main Video management and recording system through the ICT network infrastructure, and any other existing or new systems/ equipment as applicable and required referenced in the Works Information, this specification, drawings, bill of quantities and any other associated documentation.

#2 The new CCTV infrastructure to be installed shall be compatible with the existing CCTV Video management system (VMS) or the latest upgrade version of the Employer preferred VMS with all camera features, analytics and LPR functionality accessible on the system.

#3 Connection of CCTV cameras to the servers shall be done through the Transnet enterprise network cisco switches (Installed by the ICT Network Contractor) housed in the indoor network distribution cabinets.

#4 Equipment fixing shall comply with the Transnet Group - Integrated Electronic Security and Related Systems Specification: General Specification. Where the specification requirements clashes with other related standards used on the Project, the Contractor shall notify the Project Manager of such developments.

#5 The use of Subscription Software license shall not be/ is not allowed, all software and firmware shall make use of perpetual software Licensing, Contractor to indicate to the Employer all licencing information including type, MSAs, SLAs, software lifecycle and applicable future costs.

#6 It will be the responsibility of the Contractor to ensure that the respective specialist subcontractor/ OEM fully co-operates, co-ordinates, supports and supplies any technical and associated information to the Employer and Others as required, to ensure that the systems are fully integrated, both electrically and electronically.

#7 All equipment supplied to, or by the installation Contractor for installation shall be safely stored and protected from the weather to prevent loss or damage. The Contractor shall be responsible for the replacement of equipment lost or damaged whilst in his/her care.

#8 The Contractor shall be responsible for transporting all equipment from the site project store to the installation site.

#9 The Contractor shall be responsible for providing all storage, scaffolding, ladders and cherry-picker required to effect the installation.

#10 Pre-installation requirements activities

a. Prior to any procurement and installation of equipment, Contractor shall conduct a site survey to assess existing conditions and identify installation requirements.

b. Provide detail designs and datasheets for the equipment as required.

c. Prepare a method statement and risk assessment specific to the installation site.

d. Coordinate with the client regarding power supply requirements and any preparatory civil works (e.g., foundation for barrier mounting, trenching for cabling).

#11

#12

#13 The main functions of the CCTV system in the Port include the following:

a. Real time surveillance.

b. Recording of real time events and historical video data for video evidence of a security event and

c. Provide a deterrent to criminal and unacceptable behaviour.

#14 High-definition security cameras with advanced video analytics shall be strategically placed to monitor and record activities within the facility and its surroundings. The latest camera models offering improved image quality and analytics capabilities shall be employed.

#15 An advanced number plate recognition system shall be integrated into the access control process for vehicles. This system must accurately capture and identify number plates, facilitating efficient vehicle monitoring and management.

#16 CCTV cameras shall be installed at all access points and critical areas within the buildings.

#17 The system shall incorporate as standard motion detection video analytics and have activities recorded and stored.

#18 The CCTV network shall be secure against both physical and network intrusion. The contractor shall provide an effective network protection and securing strategy.

#19 The CCTV solution shall be IP based and be able to operate 24/7.

#20 CCTV equipment network settings such as IP address and mask will be provided by Employer (ICT department) upon Request.

#21 Equipment installed in a hazardous areas shall comply with ATEX standard.

#22 All Tendered cameras and server equipment shall be of the latest versions and still maintain compatibility with existing system.

#23 Cameras on entrance or exit lanes for cars and trucks shall be installed as follows;

a. 1-LPR: for both cars and trucks licence plate recognition

b. Same different height mount bracket

i. 1- Adjacent driver recognition FoV IR fixed camera for cars

ii. 1- Adjacent driver recognition FoV IR fixed camera for trucks

c. 1 - fixed IR camera to monitor the top/ roof of trucks entering and existing mounted on gantry or mast pole.

d. 1-fixed IR camera to monitor passengers walking through each half turnstile.

e. 1-PTZ cameras on 9m mast a few meters from the gantry on either side with FoV of the whole gantry gate entry and exit lanes as well as walkways.

f. 1-PTZ cameras on a 9m masts shall be homed towards outside the port monitoring traffic approaching the port.

#24 Inside the building there shall be fixed dome cameras strategically mounted on the wall/ ceiling monitoring main entrances and the general areas in the buildings.

5.2 Video Management system (VMS)

#25 The Video Management System (VMS) shall serve as the central platform for video monitoring, recording, storage, playback, analytics, and integration with associated security systems.

#26 The works under this Contract shall be based on integration into and expansion of the existing VMS platform installed at the respective Port.

5.2.1 General VMS Integration, Licensing and Storage

#27 The Contractor shall integrate all newly installed cameras and devices into the existing VMS platform at the respective Port. Replacement of the existing VMS shall not be permitted unless explicitly instructed by the Employer or the scope.

#28 The Contractor shall provide all additional VMS channel licences required for the integration of new cameras, including any associated device, analytics, or driver licences necessary for full functionality.

#29 The Contractor shall ensure that all supplied cameras and devices are fully compatible with the installed VMS platform and supported via native drivers, smart drivers, or manufacturer-supported generic drivers, as applicable.

#30 The Contractor shall assess the existing VMS infrastructure, including servers, storage, and network capacity, and shall upgrade or expand the system where required to accommodate the additional cameras without degradation of performance.

#31 The Contractor shall provide and install additional storage capacity where required to support the expanded system. Storage sizing shall be based on:

a. Camera resolution, frame rate, and compression

b. Recording mode (continuous and/or event-based)

c. Employer-defined retention period (to be confirmed)

Storage calculations shall be submitted for approval prior to implementation.

#32 All cameras shall be fully integrated into the VMS with complete functionality, including live viewing, recording, playback, analytics, alarm handling, and video export.

#33 The integration shall not negatively impact the performance, stability, or availability of the existing VMS system. The Contractor shall ensure adequate system resources are available to support the expanded solution.

#34 Where edge storage (SD card or equivalent) is supported, cameras shall provide configurable recording failover capability in the event of VMS or network interruption, with automatic re-synchronisation to the VMS upon restoration of connectivity.

#35 The system shall support continuous and event-based recording as defined per camera.

#36 Video retention shall be minimum [X days – As per existing or Employer to define, typically 30/60/90] at full operational resolution and frame rate.

#37 Storage calculations shall be submitted and approved during design.

#38 The system shall support video export in standard formats with watermarking for evidentiary integrity.

5.2.2 VMS Functional Compliance and Upgrade Requirements

#39 The Contractor shall assess the existing VMS platform and confirm its ability to support the functional requirements of the expanded CCTV system.

#40 Where the existing VMS does not support any required functionality, the Contractor shall provide and implement the necessary upgrades, licences, or modules to achieve full compliance.

#41 The integrated system shall support, as a minimum, the following functions within the existing VMS environment:

a. Live viewing of all cameras

b. Continuous and/or event-based recording

c. Playback and export of recorded video in standard formats suitable for evidentiary use

#42 The Contractor shall ensure that all camera features, including analytics, alarms, and events, are fully accessible and configurable within the VMS.

#43 The Contractor to ensure VMS shall support integration of camera-side events including motion detection, tamper alarms, analytics events, and device status monitoring.

#44 The Contractor shall ensure that camera configuration functions (where supported by the device) are accessible directly through the VMS without reliance on third-party software tools.

#45 The system shall support event and alarm management, including triggering of actions such as recording, live view display, PTZ preset activation, and digital outputs.

#46 The Contractor shall ensure that all components (existing and new) are time-synchronised via NTP or equivalent protocol.

#47 The Contractor shall ensure that the VMS environment maintains secure access control, including user authentication, role-based permissions, and activity logging.

#48 The Contractor shall ensure that the VMS system remains scalable and capable of accommodating the additional cameras and future expansion without degradation of performance.

5.2.3 License Plate Recognition (LPR)

#49 Where LPR functionality is required, the Contractor shall integrate LPR cameras and associated capabilities into the existing VMS platform at the respective Port.

#50 The Contractor shall assess the existing VMS and confirm its capability to support LPR functionality. Where limitations exist, the Contractor shall provide all necessary upgrades, licences, modules, or integrations required to achieve full LPR functionality within the VMS environment.

#51 The integrated system shall support real-time capture and recognition of vehicle licence plates under defined operational conditions, including day and night operation.

#52 The Contractor shall ensure that LPR functionality is fully accessible within the VMS interface and does not rely on standalone systems, unless explicitly approved by the Employer.

#53 Each LPR lane shall be individually configurable within the VMS, including:

a. Continuous or event-based detection modes

b. Adjustable recognition parameters

c. Frame rate and processing configuration

#54 The Contractor shall ensure that recognised licence plate data is captured, recorded, and stored within the VMS environment, including as a minimum:

a. Timestamp
b. Captured image
c. Recognised licence plate number
d. Camera/lane identification

#55 The system shall support search, filtering, and retrieval of LPR data within the VMS based on:

a. Licence plate number
b. Date and time
c. Camera or lane

#56 The Contractor shall ensure integration of LPR events with associated systems where required, including access control and barrier systems, enabling automated or operator-driven actions.

#57 The Contractor shall verify and optimise LPR performance through configuration and calibration during commissioning to suit site-specific conditions, including camera positioning, vehicle speed, and environmental factors.

#58 Where required, the Contractor shall upgrade or configure the VMS and associated systems to ensure that LPR data, events, and alarms are handled without degradation of system performance.

#59 The Contractor shall demonstrate LPR functionality and performance during Site Acceptance Testing (SAT), including capture accuracy, event generation, and integration with the VMS and associated systems.

#60 The LPR system shall support South African number plate formats and be configurable for multiple plate standards where required. The system shall achieve a recognition accuracy rate suitable for operational enforcement and security use cases under normal environmental conditions.

#61 LPR cameras shall include or support appropriate IR illumination and shall be capable of reliable operation in day/night conditions, including low light, glare, rain, dust, and varying weather conditions typical of port environments.

#62 The LPR system shall provide real-time transmission of recognised plate data (including timestamp, image snapshot, confidence score, and lane ID) to the VMS and/or integrated external systems via standard interfaces (API, SDK, or VMS-native event streams).

#63 All LPR events and captured metadata shall be time-synchronised via NTP or equivalent synchronisation protocol to ensure consistency across VMS, LPR, and integrated access control systems.

#64 The system shall maintain a searchable audit trail of all LPR events for a configurable retention period, aligned with Port operational and security requirements.

5.2.4 VMS Configuration and Integration Requirements

#65 The Contractor shall configure all newly integrated cameras and devices in accordance with an approved naming convention aligned to the Employer's standards. Naming shall, as a minimum, include site, location, camera type, and unique identifier.

#66 All cameras, servers, and VMS components shall be synchronised to a common NTP source. The Contractor shall verify and ensure consistent timestamping across all live and recorded video.

#67 The Contractor shall configure recording profiles for all cameras in accordance with operational requirements, including:

a. Continuous recording and/or event-based recording
b. Frame rate, resolution, and compression settings
c. Retention period (as defined by the Employer)

#68 All cameras shall be recording as intended and verified during commissioning.

#69 Cameras shall be logically grouped within the VMS by site, zone, and function (e.g. perimeter, access control, buildings) to enable efficient monitoring and operation.

#70 The Contractor shall configure user roles and permissions within the VMS in accordance with Employer requirements, ensuring controlled access to live view, playback, export, and configuration functions.

#71 The Contractor shall configure all camera and system events within the VMS, including:

a. Motion detection and analytics events
b. Tamper alarms
c. LPR events
d. Device faults

Events shall trigger appropriate actions such as recording, alarms, notifications, and camera call-ups.

#72 All camera analytics shall be fully integrated and configurable within the VMS. The Contractor shall ensure that analytics events are correctly detected, transmitted, and displayed within the system.

#73 The Contractor shall configure video streams (primary, secondary, tertiary where applicable) to balance image quality, recording requirements, and network performance.

#74 Where supported, the Contractor shall configure camera parameters via the VMS, including but not limited to:

a. Resolution and frame rate
b. Compression settings
c. Exposure and image settings
d. PTZ presets and tours

#75 All cameras shall be configured to report health status to the VMS, including:

a. Online/offline status
b. Communication faults
c. Storage or recording failures (where applicable)

#76 The Contractor shall ensure that recorded video can be exported from the VMS in standard formats suitable for evidentiary use, including timestamp integrity and playback compatibility.

#77 The Contractor shall ensure that configuration of all cameras and devices is standardised across the system, unless otherwise required for specific operational needs.

#78 All VMS configurations shall be verified during commissioning, including:

a. Recording functionality

b. Event triggering

c. Playback and retrieval

d. Timestamp accuracy

e. Naming and grouping structure

#79 patching, or system modification. Firmware upgrades that introduce additional camera functionality shall remain compatible within the VMS without requiring new driver packages, provided they remain within the approved compatibility framework of the installed system.

5.3 Equipment Specification

5.3.1 Cameras

#80 Suitable lenses shall be selected to ensure that each camera achieves the required field of view, detection capability, and operational coverage as defined per location in the design and equipment schedule.

#81 The CCTV system shall deliver stable, high-definition video streams suitable for real-time monitoring, operational decision-making, and forensic investigation. Image quality shall be sufficient to support identification of persons, vehicles, and events within the defined surveillance zones under all operational conditions.

#82 All CCTV cameras shall be powered via PoE or PoE+ (IEEE 802.3af/at or higher where required), unless otherwise specified for special applications in the equipment schedule.

#83 Cameras shall automatically adapt to changing environmental and lighting conditions, including low-light and high-contrast scenarios, to maintain usable operational image quality at all times.

#84 Where operation in total darkness is required, the Contractor shall provide appropriate technology as defined in the equipment schedule, including but not limited to IR illumination, low-light, thermal, or hybrid imaging systems.

#85 The system shall provide real-time monitoring of alarm events, video analytics triggers, device health status, and network status, all of which shall be reported to the VMS or central monitoring platform.

#86 Where perimeter thermal detection is specified, camera mounting heights, spacing, and field of view shall be determined through detailed design to ensure continuous coverage, subject to Employer approval during design finalisation.

#87 Where hybrid or PTZ cameras are used in conjunction with thermal systems, the combined solution shall ensure seamless tracking, detection, and verification capability, with mounting and spacing determined by approved engineering design and operational requirements.

#88 All equipment installed within hazardous area zones shall comply with applicable hazardous area certification requirements (e.g. IECEx, ATEX, or equivalent internationally recognised standards) and shall be installed in certified explosion-proof housings where required.

#89 All cameras and subsystems shall be fully compatible with the installed VMS platform and shall operate without requiring modification of core VMS software, manual driver patching, or non-standard integration scripts. All integration shall be via supported native, smart, or manufacturer-certified interfaces.

#90 Where specific technical parameters are defined in the equipment schedule, those parameters shall take precedence over general requirements, provided that VMS compatibility, performance intent, and interoperability are not compromised.

#91 All cameras shall support secure configuration and operation, including encrypted management access, secure authentication mechanisms, and prevention of unauthorised access via default credentials or unsecured protocols.

#92 All cameras shall support network time synchronisation (NTP or equivalent) to ensure consistent timestamping across all VMS recordings, alarms, and integrated systems.

#93 The Contractor shall perform full system commissioning including focus calibration, field of view verification, integration testing with the VMS, and validation of all alarm and analytics functions prior to system acceptance.

Equipment	Minimum Parameter
Cameras	
Outdoor Visible Light IR Fixed Dome Camera	Security Bullet camera with infrared (IR) night vision • IP Camera • Min. Resolution 4 MP, 30fps • Automatic Varifocal lens with : ≤ 3.2mm to ≥ 10mm range, auto iris, remote focus and zoom • Built in IR: With min. 30m range • Power: Via PoE • Min. compression: H.265, H.264 • Minimum 3 streams, Intelligent streaming • Tamper detection • Video motion detection • Dome Bubble: Polycarbonate, clear with anti-scratch coating • Ingress Protection Min.: IP66 • Impact Protection Min.: IK10 • Finish: Aluminium/ rust free material, RAL 9003 or white • Indoor: Complete with recessed ceiling mount kit, or wall surface mount plate/ bracket, tamper resistant – No wiring exposed. • Outdoor: Surface mount plate/ bracket, vandal resistant – No wiring exposed. • Pendant: Treaded screw interface for Pendant hardware – No wiring exposed. • VMS: Camera shall form part of the Qognify supported devices/ vendor list of cameras and encoders that have been tested and certified to work with the VMS.
Outdoor Visible Light Fixed Bullet Camera	Security Bullet camera with infrared (IR) night vision • IP Camera • Min. Resolution 4 MP, 30fps • Automatic Varifocal lens with: ≤ 3.2mm to ≥ 10mm range, auto iris, remote focus and zoom • Built in IR: With min. 30m IR distance • Power: Via PoE • Motion Detection: Selectable sensitivity and threshold

Equipment	Minimum Parameter
	• Compression: H.265, H.264, MJPEG • Minimum 3 streams, Intelligent streaming • Intelligent Defog - automatically adjusts parameters for best picture in foggy or misty scenes (switchable) • Tamper detection • Video motion detection • Ingress Protection Min.: IP67 • Impact Protection Min.: IK10, including the front glass of the camera • Finish: Aluminium/ rust free material, RAL 9003 or white • Pole mount: Pole mount adapter/ bracket for camera • Wall mount: surface mount plate/ bracket, tamper resistant • Outdoor: Surface mount plate/ bracket, vandal resistant • Pendant: Treaded screw interface for Pendant hardware • VMS: Camera shall form part of the Qognify supported devices/ vendor list of cameras and encoders that have been tested and certified to work with the VMS.
Outdoor Visible light PTZ camera	• IP Camera • Min. Resolution 4 MP, 30fps • Lens: Min. 30x motorised zoom, ≤ 6.6mm to ≥ 198mm, auto iris, remote focus and zoom • Built in IR: With min. 150m range (recognition) • Power: Via PoE/+ (injector supply where required) • ONVIF compliant • Compression: H.265, H.264, MJPEG • Minimum 3 streams, Intelligent streaming • Intelligent Dynamic Noise Reduction • Intelligent Defog - automatically adjusts parameters for best picture in foggy or misty scenes (switchable) • Pan Range: 360° continuous • Min. Tilt Angle: -90 deg. to 5 deg. (auto flips) • Tamper detection • Ingress Protection Min.: IP66 • Impact Protection Min.: IK10 • Finish: Aluminium/ Corrosion-resistant material, RAL 9003 or white • Pole mount: Pole mount adapter/ bracket for camera • Wall mount: Surface mount plate/ bracket, tamper resistant • Pendant: Treaded screw interface for Pendant hardware • VMS: Camera shall form part of the Qognify supported devices/ vendor list of cameras and encoders that have been tested and certified to work with the VMS.

Equipment	Minimum Parameter
PTZ Hybrid (Thermal + visible light) IR camera	Dual (thermal + video PTZ) cameras shall be used to monitor the perimeter and for fire detection where required. • IP Camera • Min. thermal Resolution min.: 400(H) x 300(V) • Visible Resolution: min. 4MP • ONVIF compliant • Where required: Intelligence features - Fire detection and alarms • Power: Via PoE/+/+ (injector supply where required) • Varifocal lens (automatic varifocal) • Compression: H.265, H.264 • Intelligent Dynamic Noise Reduction • Tamper detection • Video motion detection • Weatherproof: IP66, with rain sensing wiper (optional, where required) • Finish: Aluminium/ rust free material, RAL 9003 or white • VMS: Camera shall form part of the Qognify supported devices/ vendor list of cameras and encoders that have been tested and certified to work with the VMS.
Fixed Hybrid (Thermal + Visible light) IR vision camera	Contractor shall provide IP Thermal hybrid Bullet camera with the following minimum specifications or above: • IP Camera • Visible Resolution: 4 MP • Min. thermal Resolution: 2400(H) x 300(V) • WDR • Intelligent Dynamic Noise Reduction • ONVIF compliant • Built in IR: min. 30m IR Distance • Power: Via PoE • Varifocal lens (automatic varifocal): on visible light • Compression: H.265, H.264 • Where fire detection function is required: Heat detection with alarms, Smoke detection with alarm • Tamper detection • Video motion detection • Weatherproof: IP66, Vandal resistant: IK10, anti-corrosion material • VMS: Camera shall form part of the Qognify supported devices/ vendor list of cameras and encoders that have been tested and certified to work with the VMS.

Equipment	Minimum Parameter
Automatic Licence Plate Recognition (ALPR)	• Contractor shall provide IP Automatic number/ licence plate recognition (ALPR) solution with the following minimum specifications or above: • IP Camera • Visible Resolution: 4 MP or above at 30fps • License Plate Recognition Distance to a minimum of 8m (day and night) • Capture and Recognize License Plates from Vehicles (small cars and trucks) Traveling up to 80 kph (day and night) • Camera shall detects tilt and roll angle automatically. Shall have built-in licence plate capture capabilities that optimizes video settings based on mounting height, distance to vehicle ,and expected vehicle speed • Motorized (automatic) Vari-focal Lens • WDR • ONVIF compliant • Built in IR: min. 30m IR Distance • Power: Via PoE • Compression: H.265, H.264 • Tamper detection, Electronic Defog • Video motion detection • Weatherproof: IP66, Vandal resistant: IK10, anti-corrosion material • License Plate Recognition system - The camera shall automatically captures vehicle license plate images and recognizes license plate numbers and letters. During playback on the System, an operator should be able to perform a license plate search by Time and Date to view thumbnail images of all plates captured during the specified time period or should enter a license plate number to search for vehicles recorded with that plate. • VMS: Camera shall form part of the Qognify supported devices/ vendor list of cameras and encoders that have been tested and certified to work with the VMS.
PoE Surge Protection	• All perimeter and externally outdoor mounted cameras supplied by the contractor are to be protected against power surges with suitable inline 100 BaseT single PoE protection devices which shall meet or exceed the following design and performance specifications. • Cable CAT6 • Clamping Voltage <70 V • Max Discharge Current 4.5kA (coarse protection) • Max Discharge Current 300A (fine protection) • Pairs Protected 1-2, 3-6, 4-5, 7-8 • Standards Compliance Fast Ethernet 802.3u; IEC 11801; IEEE 802.3 • Data Rate >200 Mbps

Equipment	Minimum Parameter
	• Bandwidth (3dB) per pair >350 Mhz
General	
Wiring	The Contractor shall allow for all wiring to make this system fully functional.
Labelling	All equipment shall be neatly and professionally labelled using Traffolyte or approved equivalent labelling.
Others	Provision and installation of any additional items that are required to render this installation complete and fully functional as required.

5.3.2 Camera Mount and Housing

#94 External cameras shall have IP66 rated housings and function satisfactorily in all weather conditions.

#95 Perimeter cameras shall be mounted on top of suitable camera masts at required heights for better monitoring (PTZ at 9m, fixed and thermal at minimum 3m or 6m).

#96 Where both cameras types are required on the same pole, the 9m pole will be used, with the fixed camera mounted at 3m height and thermal at 6m.

#97 PTZ pole shall be hot-dip galvanized steel (and painted) and 9m high.

#98 3m – 6m poles shall be either be hot-dip galvanised (and painted) or fibre-glass GRP.

#99 Gooseneck poles (1m to 2m) shall be 316Stainless-steel (and painted) or hot-dip galvanised (and painted).

#100 Camera masts shall be mounted on suitably sized and constructed concrete bases to withstand the mass of the masts and any wind moments on the masts.

#101 All ceiling mount cameras shall be mounted with in-ceiling mount kits, and no wires shall be exposed.

#102 All wall/pendant mount cameras shall be mounted with OEM recommended mounting bracket wall, and no wires shall be exposed.

#103 Cabling for all outdoor installations shall be run through galvanized steel conduit pipes or flexible steel conduit, no PVC pipes shall be used. Contractor to refer to referenced specification for further guidance.

#104 Plinths must be designed and constructed to support these masts.

#105 All steel camera masts shall be earthed.

#106 Camera masts and poles shall be selected and designed with guidance from the Transnet Security Camera mast specification.

5.3.3 Communication and power and Cabling

#107 All cables and conductors, except fibre optic cables, that act as a control, communication, or signal lines shall include surge protection.

#108 The CCTV network shall be secure against both physical and network intrusion. The contractor shall provide an effective network protection and securing strategy.

#109 CCTV network equipment and recording information shall be access controlled.

#110 Horizontal cabling of CCTV equipment shall be a responsibility of the *Contractor*.

#111 All CCTV equipment shall use CAT6 cabling or Fibre where required.

#112 Jointing of cabling shall not be allowed.

#113 All CAT6 cabling shall be no more than 90m.

#114 CCTV network equipment and recording information shall be access controlled.

5.3.4 Power Supply

#115 The CCTV cameras on perimeter shall be powered through PoE switch in the junction box, where power budget is not sufficient, the Contractor shall supply injectors for the cameras.

#116 Cameras in the building shall be powered from the ICT network switches in the server room (RCK) provided by the ICT Contractor.

6 GENERAL

6.1 Site Conditions

#117 The equipment shall be suitable for installation within the conditions of the Port or marine environment as described below.

Altitude:	Sea level up to 2500m above
Temperature range:	-5°C to +45°C
Relative humidity:	up to 95% RH
Atmospheric conditions:	Salt laden. Electrolytic corrosion conditions prevail in all areas. Marine environment
Lightning conditions:	Severe, equipment must withstand and be immune to a maximum lightning ground flash density of 11 flashes per km² per annum
Wind Speed:	120kph

#118 All new outdoor installations shall be suitable for coastal environments. No mild steel installation shall be supplied and used for any of the works without prior approval.

6.2 Maintenance and Warranty

#119 All equipment used shall come with a certified warranty with a minimum 2 years, and an option to extend (with a letter from the manufacturer which shall be issued to Transnet with the end user being TNPA, stating warranty/extended-warranty periods and guarantees on those periods, independent of the *Contractor*).

#120 The system implementing Contractor must be accredited and certified by the manufacturer as an EXPERT (or equivalent) integrator, whether as a direct or indirect contractor.

#121 System warranty shall take effect from date of first use, after site acceptance testing.

#122 Contractor shall supply commissioning and operational spares required for a period of one year after commissioning, and special tools required for maintenance purposes, as detailed in Section 8.

6.3 Designs, Calculations by the *Contractor*

#123 All documents, for which prior approval is required, shall be timeously submitted to the *Employer* for review and approval, prior to placement of orders, fabrication or manufacture.

#124 The *Contractor* shall or as necessary, appoint specialist *Subcontractors* and OEMs to undertake the designs, calculations and drawings, which shall be prepared and checked by suitably qualified and experienced professional engineer/ technologist/ technician, registered with the Engineering Council of South Africa (ECSA) or an equivalent institution recognised by ECSA.

#125 Designs, calculations and drawings shall not be prepared and checked by the same person and shall be reviewed and accepted by the *Employer* before the commencement of fabrication.

#126 The *Employer* may, at his /her sole discretion, request additional design calculations, drawings and associated information, as deemed necessary for verification of the correctness and compliance of the designs.

#127 Where calculations are applicable and required, the *Contractor* shall submit all required calculations in a neat and legible manner. Where calculations are performed using specialised software programs, the *Contractor* shall also furnish copies of the final native software files, without any exclusions. The calculations shall be provided in a professional, neat format, to include, but not be limited to, the following, in the order as stated below:

- Summary of assumptions and conclusions.
- Table of contents.
- List of all associated drawings.
- List of compliancy standards.
- List of all text and references used.
- Calculations.

6.4 Documents and Drawings by the *Contractor*

#128 The *Contractor* shall be solely responsible for the submission of any drawings that are to be provided by his appointed specialist *Subcontractors* and/or OEM's. Drawings shall be accompanied by instruction manuals properly bound for maintenance purposes. The drawings and manuals shall conform to specifications and standards in Section 3 and 4.

#129 The scope of information to be provided by the *Contractor* as part of the handover documents shall include, but is not limited to:

- FATs and SATs documentation (includes test procedures, punch-list, test-sheets, drawings and equipment list and certificates).
- Data sheets and associated detailed specifications of equipment.
- Operations and maintenance manuals.
- Where applicable, detailed designs and calculations. The native software files for any detailed design calculations undertaken in software programmes shall also be provided to the *Employer* for verification purposes.
- As-built drawings in hard and soft copies ('dwg' and 'PDF' formats).
- Any other as-built documentation as required by the *Employer*.
- Other information required for the completion of engineering design reviews.

- Critical and routine spare part lists.
- Equipment guarantees/ warrantees.
- Cable schedules.
- Applicable systems software and licenses, including all final programming of equipment on CD-ROMs.
- Approach paper/ method statement.
- Patching Schedule and/or Schedule of IP addresses, switch ports used, PoE on and off, etc.
- Equipment lists.
- Specification of software.
- Documents and Drawings Register.
- Configuration documents.

#130 All project engineering drawings shall include, but not be limited to, the following:

- Detailed system schematics/ loop diagrams showing equipment wiring terminations.
- General Arrangement diagrams of panels, junction boxes, turnstiles, boom-gates and poles, etc.
- Redlines of Employer's design drawings (site plans and building floor plans layouts).

6.5 Safety

#131 The *Contractor* shall take all necessary safety precautions to prevent static electricity discharge, sparking and any other unsafe condition, which could pose a safety risk to personnel, property and/or equipment.

#132 The location and extent of potentially explosive atmospheres shall be identified and indicated on hazardous area classification drawings. All electrical equipment and instruments for use in hazardous classified areas shall be supplied with a hazardous area certificate issued by a certifying authority approved by SABS/SANS/IEC. Certificates shall be indexed and filed in a certification register.

6.6 South African Electrical Compliance

#133 Any equipment designed and fabricated/manufactured overseas shall have an electrical certificate of compliance to South African Regulations before it is delivered (and operated) in South Africa. The compliance certificate(s) shall fully cover high voltage, medium voltage and low voltage equipment. These certificates shall be issued by an accredited South African professional engineer.

6.7 *Employer* QA Representative

#134 The *Contractor*'s QA requirements shall be as set out in the Works Information.

#135 The *Employer* may choose to appoint a QA/QC representative to monitor and report on some or all aspects of the production and fabrication processes. Full cooperation shall be extended to the appointed QA/QC representative. Associated costs for such services will be borne by the *Employer*.

6.8 Other

#136 Earthing philosophy shall comply with TNPA electrical standards and specifications.

#137 Cables, boxes, cabinets and equipment shall be marked and labelled as per TNPA specifications.

#138 The SI system of units and measures shall be used to express all numerical quantities.

#139 Use of any component or device, not expressly specified herein, that is required to implement the work, shall be subject to Transnet project manager's approval of required submittals.

#140 The following materials shall not be used or installed:

a. Asbestos in any form.
b. PCBs (poly-chlorinated biphenyls).
c. Mercury.
d. Viton seals.
e. Any paints containing lead or chromates (including in the tinters).

7 PACKAGING, TRANSPORTATION AND HANDLING

The following general items are applicable to all equipment forming part of the works:

#141 If any equipment requires special maintenance or attention during storage, this shall be clearly stated prior to placement of orders and the Employer's attention shall be drawn to this fact.

#142 The Contractor shall be responsible for loading all materials and equipment at the OEM premises, transportation, handling and off-loading thereof on Site, including also any further handling of equipment until it is placed in the final, permanent position.

8 SPARES, TOOLS AND CONSUMABLES

8.1 Spares required after Final Handover

#143 The Contractor shall provide to the Employer a list of all critical and recommended spares as prescribed by the specialist subcontractor/OEMs, which shall cover the operational requirements after final handover of the works. These lists shall include the following:

a. Description of spare part.
b. Supplier contact details.
c. Suggested stock levels.
d. Prices.
e. Lead-times for ordering and delivery of such spares.

#144 The Employer may issue an instruction to the Contractor to supply and deliver spares for operation and maintenance of the equipment after final handover. Separate payments will be made by the Employer for the provision of such spares.

9 OPERATION AND MAINTENANCE MANUALS

#145 Technical maintenance and operating manuals shall be provided for each type and model of equipment. Technical manuals shall include all technical data, construction information and leaflets for each individual component used in the equipment as provided. Where generic manuals are provided, an addendum shall be provided, indicating the applicable project specific components.

#146 Manuals shall be of a good quality and cover the following, as a minimum:

a. Technical descriptions of the equipment and component parts.

b. General arrangement drawings.

c. Installation instructions with drawings or pictures.

d. Operating and maintenance instructions for all components.

e. Detailed parts lists, accompanied by exploded view-type drawings, clearly detailing the part and uniquely identifying it.

f. Spare part ordering instructions.

#147 Any special instructions pertaining to storage of spare parts or their shelf life shall be included in the maintenance manual. All drawings requested for component location, dismantling and re-assembly for maintenance purposes shall be included in the maintenance manual.

#148 All special tools required for operation and maintenance of the equipment shall be presented in the form of a schedule in the operating and maintenance manual respectively. The content of the training manual shall be based on the content of the technical, operating and maintenance manuals.

#149 The Contractor shall provide a recommended spare parts list with order numbers.

10 MEASUREMENT AND PAYMENT

10.1 General

#150 The tendered rates shall be deemed to include all and every cost item required for the completion, handover and commissioning of the scope of the works in full compliance with these specifications, the Works Information and the drawings, including, but not limited to, the following:

a. Design (including shop drawings), supply and installation of the works that are required to deliver a complete, fully functional and fully compliant system.

b. Supply of installation and commissioning spares and operational spares required for normal wear and tear during plant operation for the period of one year after commissioning.

c. Supply of special tools required for maintenance purposes.

d. All testing and commissioning activities that are required to get the installed equipment ready for operations.

e. Compilation and submission of all handover documentation as described in these specifications.

f. Training of Employer's operational staff, as detailed in these specifications.

#151 Allowances to be made in the tendered rates are as described below.

10.2 Pay Items

#152 Access control system infrastructure

a. The tendered rates shall cover all costs for the supply and installation of the Access Control and Intercom equipment, including, but not limited to, procurement, transport, storage, inspections and testing, designs and drawings for approval (multiple reiteration), installation and commissioning of the equipment, and all works that are required to ensure that the systems are fit for purpose, completely functional, operable and compliant in all aspects.

b. The rates shall also include all accessories, fixings, screws, mounting brackets, software and the like.

#153 Electrical Equipment

a. The tendered rates for power cables and internal network power supply units where required shall cover all costs for the supply and installation of cables, including, but not limited to, procurement, transport, handling, inspection, installing on cable management systems, cutting, termination, temporary sealing and testing of cables, including suitable fire stopping material where required.

#154 Spare Equipment

a. The tendered rates shall cover all costs for the supply and installation of all spare equipment, including, but not limited to, procurement, transport, storage, inspections and testing, programming, designs and drawings for approval (multiple reiteration), and all works that are required to ensure that the systems are fit for purpose, completely functional, operable and compliant in all aspects.

Document Approval and Sign-Off:

Prepared By:	Tebogo Mahlalela C&I Senior Engineer	Date
Reviewed By:	Zukisani Makani C&I Engineer	Date
Reviewed By:	Bongiwe Thiso C&I Technician	Date
Authorized By:	Malibongwe Mlonzi Senior Manager Electrical	Date
Accepted By:	Specialist: Security System	Date