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SECURITY

STANDARD TECHNICAL SPECIFICATION FOR A

INTEGRATED SECURITY SYSTEM FOR PRISONS

OCTOBER 2004

TECHNICAL SPECIFICATION FOR THE INTEGRATED SECURITY SYSTEM

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1 COMPRESSED AIR SYSTEM, PNEUMATIC LOCKS AND LOCKING DEVICES

This section includes the pneumatic locking and operating devices, under electrical control, for individual swing and sliding prison doors.

1.1 System components:

- a. Air compressors and storage tanks
- b. Filtering and drying equipment
- c. Air lines and associated fittings
- d. Pneumatic swing door locks
- e. Pneumatic sliding door locking devices

1.2 Compressed Air System and Components:

The tenderer in accordance with the component manufacturer's product requirements shall adequately size specific system components. The system shall be designed to provide a spare capacity of 100% of the normal operating load.

1.2.1 Air Compressors

The proposed Air Compressor shall be manufactured in accordance with ISO 9001 standards, and shall be certified in accordance with the following:

- CEE 89/392 machinery Directive
- CEE 87/404 simple pressure vessel Directive
- CEE 73/23 low voltage Directive
- Output measured in accordance with ISO 1217

A dual Screw driven air compressor system shall be provided with the individual compressors being mounted on CEE 87/404 approved air receivers.

The compressors shall be self-contained units incorporating all of the necessary filtering and air-drying components. The units shall comply with the following technical specifications:

Air-End	VT Rotary single stage air-end Lubrication by means of oil injection. Drive male rotor RM with a five lobe, offset profile. Drive female rotor RF with a six flute, offset profile.
Motor	7.5 kW - 10HP IP55 three phase 2 pole enclosed rated speed - 3000rpm @ 50HZ ; 3600rpm @ 60Hz insulation class F, service class S1.
Fan	Two pole, three phase, protection rating IP45, insulation class B, Direct coaxial.
Drives	Motor and compressor: Removable taper bushing pulleys and toothed v-belts.
Air dryer	Thermostat controlled cooling cycle, direct expansion, with Freon R134a gas.

	Pressure due point temperature 3 deg C. Clean air filtering degree 0.01um.
Capacity	145 psi / 1000 kpa – 1 .15 m3/h (1150 Litre/Min) based upon ambient air temperature of 20 degrees and atmospheric pressure of 100 kpa.
Working pressure	145 psi / 1000 kpa.
Noise level	64 dB(A) Measured in accordance with ISO 3744 +/- 3dB(A).
Max Dimensions	1170(W) x 650(D) x 1660(H).
Max Weight	335 kg.
Air receiver	275 or 500 litre
Maximum installation altitude	1000m
Minimum ambient temperature	+5 deg C
Maximum ambient temperature	+40 deg C

The compressors and pneumatic storage vessels shall be sized such that each compressor has the ability to meet the total air requirements under normal operation and not exceed a maximum 40 % duty cycle. The compressors shall be sized in order to provide sufficient air. The minimum size of pneumatic line between the remote pneumatic storage tanks and the doors that shall be 10mm, unless otherwise specified.

The following operational requirements shall be considered in order to size the compressor units:

- 1) **Cell and Stair Devices:** 8 operations per 24 hour period with a maximum of 4 operations in one hour
- 2) **Medium Use Corridor Device:** 150 operations per 24-hour period with a maximum of 15 operations per hour. (90% of all corridor doors may be considered medium use)
- 3) **High Use Corridor Device:** 320 operations per 24-hour period with a maximum of 40 operations per hour. (At a minimum, 10% of all corridor doors may be considered high use).
 - a. The compressor recovery time shall be no more than fifteen (15) minutes.
 - b. The Compressor shall incorporate the necessary starters, solenoid unloaders pressure switches, control gear, overload protection, circuit breakers and all other miscellaneous items electrical and other wise to

make this installation complete and in accordance with all the relevant S.A.B.S. regulations.

- c. The exhaust silencers/muffler shall possess a 60db rating or less

1.2.2 Alternating Compressor Controller:

Provide an automatic compressor controller system for the facility

- a. Under normal conditions, the compressors shall alternate. If one compressor is out of service or if the one compressor fails to start, the second compressor shall take over the duties of the first. If one compressor starts but cannot fulfill the demand, both compressors shall deliver air until the demand is met. The two compressors are to be installed in separate locations, and are to provide a redundant supply line.
- b. The compressor controller shall consist of, but not be limited to, across the line starters, motor circuit protectors, timers, counters, relays, pressure sensing switches and transformers with all necessary interconnection wiring.

1.2.3 Compressed Air Dryer:

- a. The air dryer for each air compressor system furnished shall be an integral component of the Air Compressor, and shall not require external control equipment.

1.2.4 Compressed Air Receiver/Storage Tanks:

- a. Receivers and compressed air storage tanks shall be sized to provide sufficient air storage to limit compressors to a maximum of six (6) starts per hour and permit each swing lock and sliding door locking device to operate two (2) times without input from the compressors.
- b. Storage tanks shall be required both at the compressor units as well as at remote locations for each control room area unless otherwise specified.
- c. The tenderer shall be responsible for the complete pneumatic reticulation design, and will ensure that no control room shall be taken out of service if a pneumatic line elsewhere in the pneumatic installation is damaged.
- d. Provide high pressure relief valves, air pressure gauges and pressure switches on all receivers and storage tanks
- e. Pressure regulators shall be provided to reduce line pressure to a maximum of 900ka PA.
- f. Automatic drains are to be provided, and shall be piped to the nearest floor drain

1.2.5 Air Quality

Air supplied to the devices shall have been processed through filtering, cooling and drying equipment and as a minimum, shall meet the following;

- a. Solid particulate matter shall be filtered to 5.0 micron or less
- b. Solid oil particles shall be filtered to 0.3 micron or less
- c. Oil aerosols to be less than 0.1 P.P.M @ 30 degrees C.
- d. The air must be free of water vapour to a pressure dew point of 3 degrees Celsius.

1.2.6 Air System Integrity

The air reticulation system shall incorporate a line pressure monitoring system, which shall be capable of detecting abnormal pressure drops of 0.01 bar.

The system shall be capable of detecting and isolating air leaks on both the main feed and control room supply lines. In the event of excessive air loss, the effected supply line shall be automatically terminated and the supply re-routed to the affected area.

The system shall be capable of generating an air supply status report on a 24-hour basis, and shall highlight potential problem areas where air loss exceeds pre-defined set points.

The status report shall form part of the overall system management application, which shall run on the management workstation.

1.3 Pneumatic operated security locks for individual swinging doors, complete with integrated electronic and pneumatic components.

Pneumatic swing door locks are to be installed in all corridor doors, where sliding devices cannot be installed due to a restriction in the corridor width.

1.3.1 Function

a. Normal Operation

- 1) When electrical power is applied to the solenoid valve, the latch-bolt shall retract. The bolt shall remain retracted as long as power is applied.
- 2) When power is removed, the latch-bolt shall extend, locking the door if closed, and allowing the door to be slam – locked if open.

b. Manual Operation

- 1) Each lock shall have a local manual key override lock/unlock feature, generally keyed on two sides.

- 2) Rotating the key shall mechanically retract the latch-bolt. Removing the key shall extend the bolt, locking the door if closed, and allowing the door to be slam-locked if open.

1.3.2 Components

a. Mechanical

- 1) The lock shall operate when supplied with air at a pressure between 275kPa and 860kPa.
- 2) The lock shall operate as a fail-secure slam-lock. The lock will unlock when energized.
- 3) At least the lock body shall be made of hot dipped galvanized steel or stainless steel, but all moving and non moving parts shall be of a high quality material which is maintenance free.
- 4) The lock shall be factory plumbed with a quick connect air fitting or fittings.
- 5) The lock shall be a high security lock and shall conform to ANSI or an equivalent international body.
- 6) Cylinder extensions shall be provided for locks keyed on two sides or keyed stop side where applicable.

b. Electrical

- 1) The solenoid valve shall be a low wattage, 12 or 24 VDC, continuous rated valve
- 2) The lock shall be provided with a lock status switch to provide interlocking capabilities
- 3) All switches shall be of the snap acting mechanical type or proximity type and shall have a 5-amp rating.
- 4) Locks shall be factory wired to a plug disconnect.
- 5) Lock status switches shall provide the following indications:
 - a) Locked and deadlocked indication
 - b) Unsecured indication.
 - c) Door closed indication

All medium and maximum security remote controlled pneumatic operated locks for individual swinging doors will be a mortised slam-locks, with automatic deadlocking for a prison door frame installation. The lock shall be supplied complete with all its integral electronic and pneumatic components. The lock and doorframe shall be deemed part of this tender.

1.3.3 Physical Characteristics:

- 1) The lock shall automatically deadlock when the door is slam-locked in the manual mode, even in the event of total loss or air and/or electric power
- 2) The lock shall have a mechanical deadlock actuator, and shall automatically deadlock when the door is closed.
- 3) Lock shall be designed to accept a mortise key cylinder. The key cylinder shall conform to ANSI.

1.4 Pneumatic operated sliding devices for cell, sally-port and corridor doors;

1.4.1 Components:

a. Mechanical

- 1) Door rollers shall be self-lubricating, incorporating sealed lifetime lubricated bearings. Rollers shall provide smooth and quiet operation. Full details of what is offered by the tenderer shall be included with the tender documentation.

The mechanism shall be guaranteed for a minimum life cycle of 1 million operations.

The door control mechanism shall have a proven history of installation in similar applications and the tenderer shall provide documented proof of a successful 1 Million-cycle test.

- 2) The door shall lock at the top and bottom in both the open and close positions.
- 3) The locking mechanism shall include an automatic mechanical deadlock feature.
- 4) The vertical lock bar shall be mechanically connected to the lock mechanism or to an emergency release latch above the door to ensure manual override.
- 5) Top and bottom door guides must be designed such that side motion of the door shall be limited to +/- 1mm or less to significantly reduce rattle induced noise.
- 6) The doorframe shall fit tightly over the door opening and all gaps shall be sealed with vandal proof material.

a. Electrical:

- 1) All Pneumatic, electric and control equipment required for the control of a single sliding door shall be pre-assembled as a single control tray in order to simplify installation and maintenance requirements.

- 2) Any external status devices shall be factory wired to a multi-pin connector located on the door control module within the control tray, which is to be situated above each door.
- 3) All switches (mechanical or proximity) necessary for the functioning of the door, and for the required door status indication, shall be rated in accordance with the door control module requirements.
- 4) Individually isolated 24VDC power supplies are required for CPU and I/O requirements.
- 5) All solenoid valves shall be a low wattage, 24 VDC, and be continuously rated.
- 6) The door control module shall be supplied with status switches to provide indication and interlocking capabilities
- 7) The status switches shall provide the following indications:
 - a) Door fully closed.
 - b) Door fully open.
 - c) Lock bar fully down.
 - d) Lock bar fully up.

b. Housing

- 1) Housing covers to be constructed of 2mm (minimum) cold galvanised steel plate and shall be secured with security screws to the sliding door housing.
- 2) Housing covers shall be hinged, and allow easy access to all working parts during maintenance.
- 3) The door hanger slot shall be securely baffled in both the door open and door closed position.
- 4) To reduce the possibility of hidden contraband, there shall be **no exposed flat surfaces** on the housing or in the door hanger slot.

All security sliding doors installed in front of cell openings shall have an emergency release mechanism installed inside the pneumatic housing compartment, with an access point on the housing compartment for emergency release.

All other security sliding doors shall have a hip high key release on both sides of the door unless otherwise specified.

The key release feature shall provide for electric control under normal conditions and mechanical control in the case of failure. The release mechanism shall be located approximately 1300 mm above the finished floor level.

c. Normal Operation

- 1) When the door is locked in the closed position, initiation of the open command shall cause the lock mechanism to release and the door to move to the fully open position and automatically deadlock.
- 2) When the door is locked in the open position, initiation of the closed command shall cause the lock mechanism to release and the door to move to the fully closed position and automatically deadlock.
- 3) Locking devices shall be capable of being controlled individually and in groups
- 4) The door shall be capable of opening or closing at a speed of plus minus 0.3 m/s Door speed shall be independently adjustable in each direction, and at each door within the maximum operating pressure of 5 bar.
- 5) The door shall decelerate as it reaches the fully open and fully closed positions by means of a mechanical cushion. The rate of deceleration shall be adjustable to ensure that the door opens and closes quietly.
- 6) The control mechanism shall allow for freewheeling of door in the event of total loss of air supply and /or electric power.
- 7) If an obstruction is placed in the path of the door, the door shall stall for a period of two seconds after which the door shall resume movement in the selected direction. The mechanism must be capable of being stalled indefinitely without **harming the device or pedestrians**. Once the obstruction is removed, the door should resume movement from any point in the door travel, without stalling. **The use of pressure as an indication medium to detect obstruction shall not be permitted.**
- 8) The maximum pressure exerted on an obstruction placed in the path of the door should not exceed 100 Newton, in order to protect both pedestrian traffic and the mechanical components within the device.
- 9) The mechanism should not rely on differential pressure as a means of detecting an obstruction to the normal movement of the door.
- 10) The operator shall be capable of 'instantly' reversing the direction of door travel at any point and immediately resuming the preset travel speed of the door. The change of direction should not affect the normal operation of the door or the detection of an obstruction.
- 11) A key release cylinder fitted at 1300mm above finished floor level shall electrically activate the door, duplicating the open/close functions of the security control system.

d. Manual Operation

- 1) In the event of total loss of air supply and /or electric power, individual doors may be released manually at the door. With the lock mechanism released, moving the door manually to the open or full closed position shall cause the door to automatically deadlock.
- 2) Manual operation of any door shall not interfere with the normal operation of other doors.

2. SECURITY MANAGEMENT SYSTEM (SMS)

2.1 General Description and System Overview:

The tenderer shall supply, install and commission a fully integrated multi-station security management system to facilitate the control and monitoring of all security sub-system components by means of a mouse activated operator workstation.

Operator consoles shall be located within each local control room as well as the Movement and Central control rooms within the facility.

The tenderer shall provide all materials, labour and supervision required to install, commission and document the complete system as required by this specification, and as indicated on the accompanying drawings.

The SMS shall have demonstrated proven operation in a correctional environment, and a list of reference sites shall be provided as part of the tender response.

2.2 Integrated Security Sub-Systems:

The following security sub-system hardware and software components shall be fully integrated into each operator workstation without the need for any additional control components such as keyboards, joysticks or proprietary operator panels.

System operators shall be capable of controlling all functions of the sub-system hardware components via a single mouse driven operator workstation running on a Windows NT/2000 operating platform and a single Security Management Application. The use of multiple applications in order to achieve sub-system integration shall not be accepted. All workstations shall be equipped with 21" SVGA VDU's.

2.2.1 Locking Sub-System

The locking sub-system hardware shall be integrated with the SMS via a high level Interface (HLI). The full functionality of the locking sub-system hardware shall be integrated with the SMS to provide enhanced features including but not limited to:

- Door Lock
- Door Unlock
- Door Inhibit
- Door lockdown
- Door lockdown time preset
- Door Status monitoring
- Door Alarm annunciation
- Door auto-close
- Hardware fault diagnostics.

The SMS shall provide the specific operational functionality as described in Section 2.14 of this specification.

The locking sub-system shall control and monitor all electrically and pneumatically controlled swing doors, sliding doors and gates within the facility.

The locking system control hardware (I/O points) shall be an integrated function of the door control module described in Section 5.2 of this specification.

2.2.2 I/O Alarm Monitoring Sub-System

An Alarm monitoring sub-system shall be provided to monitor specific hardwired alarm I/O points within the facility, which are available through other sub-system High Level Interfaces (HLI). Such Alarms shall include but not be limited to the following:

- DPS monitored door alarms.
- Panic/ Duress alarms.
- Standby generator alarms.
- Surge Voltage alarms.
- Air system alarms.

The alarm monitoring system control hardware (I/O points) shall be an integrated function of the door control module as well as the multiple I/O control modules described in Section 5.2 of this specification.

All alarm conditions shall be presented to the operator within the Fault queue as described in Section 2.14.2.11 of the specification.

2.2.3 Access Control Sub-System

The Access Control system shall control the log-on status of all operator workstations, which shall be achieved via a Biometric fingerprint reader installed at each operator workstation.

2.2.4 Intercom & Public Address Sub-System

The Digital Intercom and Public Address sub-system hardware shall be integrated with the SMS via a high level Interface (HLI). The full functionality of the system shall be integrated with the SMS to provide enhanced features including but not limited to:

- Station Call-In
- Station Fault Analysis
- Call In Divert
- Call Answer
- Call Cancel
- Call-In Queuing
- Tamper Alarm monitoring
- Threshold Monitoring (Disturbance detection)
- Individual station Speaker and Microphone sensitivity adjustment
- Page all

The Intercom and Public Address system shall enable the selection of any individual or group of intercom stations by any operator workstation within the facility.

2.2.5 CCTV Sub-System

The CCTV Matrix(s) shall be integrated with the SMS via a high level Interface (HLI) at each workstation or server. The full functionality of the system shall be integrated with the SMS to provide enhanced features including but not limited to:

- Camera to Monitor commands
- Sequence to Monitor commands
- Sequence programming commands
- Pan, Tilt, Zoom commands
- PTZ preset select commands
- PTZ preset save commands
- Monitor Blanking commands
- Black screen technology (See section 2.14.5)

The CCTV system shall consist of a modular and distributed matrix system, which shall provide the switching capability of video signals from cameras installed throughout the facility.

The High Level Interface (HLI) shall provide the logical connections with other security sub-systems such as the locking, Intercom and Digital Video recording systems.

Integration of the CCTV system with the SMS via potential free contacts shall not be accepted.

2.2.6 Digital Video Recording Sub-System

The Digital Video Recording system shall be integrated with the SMS system by means of a serial or IP protocol (High Level Interface) in order to enable logical recording of operator events, and shall have a sufficient number of channels to record all activity in the facility as indicated on the layout plans.

The full functionality of the DVR system shall be integrated with the SMS to provide enhanced features including but not limited to:

- Individual Channel Record and Stop commands based on other sub-system conditions such as Intercom, CCTV and Locking.
- Channel Playback select
- Play
- Stop
- Pause
- Back
- Left Jump
- Right Jump
- Left Shift
- Right Shift
- Plus
- Minus
- Log
- Search

- Analogue recording of captured material
- Zoom function on playback
- Minimum of 3 frames per second for every camera
- JPEG capture of pictures
- Embedded storage of recorded material

The search and playback facility shall be an integrated function of the SMS, and shall not require any third party software platform to perform these functions.

Upon operator request the SMS system shall be capable of instructing the DVR system to playback video images to allow proper investigation of the visual event. The SMS management workstation shall be capable of recalling associated historical Video and Audio data based upon events logged to the event recording database on the servers.

System supervisors with the correct user level shall be able to query the event database as described in Section 2.10.4, and by double-clicking on a specific event shall be presented with the associated Video and Audio footage automatically.

Each recorder shall be capable of recording a minimum of 16 Channels of video at 3 frames/s per channel concurrently.

Each DVR shall be capable of performing cyclical recording onto internal hard disk, and be able to store data internally for up to 10 days (at zero compression ratio) without the need for archiving.

The recorded images shall utilise JPEG or MJPEG at a zero compression rate for all recorded material.

The reviewing of video images by the operator shall not interrupt the recording modes. Video shall be viewed at various playback rates from the SMS workstation, which can be increase or decreased by the operator.

The search and playback of video sequences shall be an integrated function of the SMS, and shall not require any third party software to perform this function.

2.2.7 Perimeter Security Fence Sub-System

The Perimeter Fence system shall be fully integrated with the Security Management System by means of a TCP/IP socket interface (High Level Interface), in order to carry out logical connections with other security sub-systems such as the CCTV and Digital Video recording systems.

The operator shall be able to select a graphical layout of the entire facility, which shall also be automatically activated upon an alarm event from the perimeter fence system.

The Security management system shall be capable of, but not limited to the following monitoring and control functions relating to Perimeter Detection:

- Individual Taut Wire alarm status
- Individual Taut Wire maintenance status
- Individual Taut Wire healthy status
- Digital expansion Input status
- Field Node communication status
- Field cabinet tamper status
- Field Node logic monitoring status (Light on status)
- Field Node battery charger voltage
- Individual Taut Wire sensor deflection
- Sensor alarm Acknowledge
- Loop alarm Acknowledge
- Sensor alarm Reset
- Loop alarm Reset
- Inhibit Taut Wire Sensor alarm
- Inhibit Taut Wire Loop alarm
- Inhibit Digital Expansion Input alarm
- Inhibit Field cabinet Tamper alarm
- Individual Sensor sensitivity setting
- Loop sensitivity setting

2.2.8 Centralised UPS System

The full dual redundant centralized UPS 's shall be fully integrated with the Security Management System by means of a High Level Interface (HLI), to provide operators and technicians with detailed status and alarm conditions regarding the UPS systems.

Due to the Centralised configuration, the following detailed diagnostic information is required, and shall be presented to the operator via a drop down menu option within the SMS:

Battery Data:

- Battery Status
- Time Remaining in minutes
- Remaining Charge in %
- Battery Voltage
- Battery Temperature in Deg C

AC Input Data:

- Voltage per phase
- Power per phase

AC Output Data:

- Voltage per phase
- Power per phase
- Load % per phase

UPS Alarm Conditions:

- Battery Failure
- On Battery Power
- Low Battery
- Depleted Battery
- Over Temperature
- Output Overload
- Bypass Active
- Charger Failure
- Fan Failure
- Fuse Failure
- Communications Failure
- Shutdown Pending
- Shutdown Imminent

All alarm conditions shall be presented to the operator within the Fault queue as described in Section 2.14.2.11 of the specification.

2.2.9 Fire Detection System

The Main Fire Detection Panel shall be a full addressable smoke and heat detection system and shall be fully integrated with the SMS via a high level Interface (HLI) at the redundant SMS server workstations. The full functionality of the system shall be integrated with the SMS to provide enhanced features including but not limited to:

- Detector Healthy status
- Detector Alarm status
- Detector Fault/Maintenance status
- Detector Inhibit status

- Detector Inhibit Command
- Detector Un-inhibit Command

- Alarm Silence Command
- Alarm Reset Command
- Synchronise Clock Command
- Communication Failure Alarm

The position and status of each Detector, Sounder and Break-glass unit within the facility shall be indicated on the appropriate area map of the SMS.

A smoke Detection layer On/Off option shall be available through the menu structure, which shall toggle the display of the smoke detector icons on and off as required. This function is required to minimise congestion of icons on the area maps, due to the location of other sub-system equipment icons.

Upon an alarm condition regardless of Fire Layer status, the affected detector icon shall be displayed, and the alarm condition shall be presented to the operator within the Fault queue as described in Section 2.14.2.11 of the specification.

2.2.10 Nurse Call System

The Nurse Call system shall be a stand alone sub system with a reporting station (mimic control panel) situated in the hospital nurses station and shall provide the following information and functions:

- Nurse Call station active status
- Nurse Call station in-active status

A dedicated Nurse Call mimic panel shall be provided at the Nurse duty desk within the hospital section, and shall contain only the necessary nurse call icons to indicate the above mentioned functions. This shall be a hard-wired mimics panel for the annunciation of a nurse call-in.

2.3 System Configuration:

The Interactive Security Management System (SMS) shall consist of multiple Operator Workstations, situated in the local, movement, central control rooms and any other location so required by DCS, and shall be networked by means of a Fibre Optic Large Area Network (LAN). This network shall be a dedicated security network for use by the SMS only.

The network interface between control stations shall be by means of a Fibre Optic medium, and shall form a ring configuration from the Central Control and back to the central control room via each local control room or position to ensure easy fault finding in the case of a cable fault.

The Operator workstations shall serve as the graphic based operator interfaces between the corrections officers and the facility's locking controls system and other security subsystems as specified herein.

All operator functions shall be controlled by means of an optic mouse, and shall require the minimum movement and actions in order to complete a required task.

The operator VDU shall be recessed into the control console to ensure that operator visibility is maintained.

The audio sub-system components within each control room shall form an integral part of the control console and VDU, and shall not require the use of any external control equipment such as PTT buttons, Operator Keyboards etc.

All security sub-system control functions shall be interlocked to ensure that functional procedures are adhered to.

The following Interlock functions shall be programmed as an integrated function of the Security Management System:

- The selection of Cameras prior to Door opening
- The selection of Intercom communications prior to Door opening
- Automatic Camera select upon door opening
- Sally port door interlocking
- Monitored door interlocking
- Automatic Camera selection upon Intercom activation
- Automatic Video recording on camera image activity
- Automatic event recording on individual operator activity
- Automatic Control console “LOG-OFF” on control room door
- Interlock capability according to operator log-in level

Alarm processing, alarm logging, alarm response data entry, graphical and text based user interface, data entry, and other system management functions shall be performed by the SMS operator workstations connected to the SMS network. The operator workstations shall be located in the Central Control Room and other nominated locations.

The SMS server shall be located within the Central equipment room equipment cabinet, and shall implement 2x dual redundant servers each providing Hardware based Raid 5 redundancy configuration. (Raid 5 hardware controller card with the hard drives)

All Distributed control modules as described in Section 5 other than door control modules mounted in door headers are to be suitably mounted within secure and vandal proof enclosures to the approval of the Engineer and located in the respective buildings' security and communications equipment cupboard, or other secure area as approved by the Engineer and indicated on the security drawings.

The SMS shall utilise a single global database and shall be fully distributed to Distributed control modules connected to the SMS security network. All system operators shall have restricted password controlled (limited) access to this information/data from the operator workstations. The level of access shall be controlled by use of the Biometric logon facility available at each operator workstation.

The system shall be designed such that failure of any control module or operator workstation shall not functionally affect the operation of any other module, network, building or Operator workstation connected to the SMS network.

Similarly, should any area lose power or suffer a loss in communications due to a break in the communications cabling, all Distributed control modules installed in that area shall continue to operate with no loss of functionality.

The SMS shall be fully programmable to allow:

- Response instructions to be displayed for all alarms types.
- Use dynamic (**real time**) graphics to display device status.

- Initiate operator commands via system tailored icons.
- Display building layouts in a graphical representation.
- Easy to follow menus with single key select options with **pop-up screens** located on the VDU, to assist in the daily routine operations of each facility.
- Allocate alarm priorities.
- Set Alarm response properties.
- Set lock/unlock and access/secure operating schedules.
- Generate User defined reports.

The contractor shall allow adequate time to liaise with the Engineer, DPW and DCS representatives in order to detail any user specific requirements necessary for the operation of each building, sub system, alarm type, and alarm response configuration within the system. This shall include the configuration of maps, report formats, access schedules, alarm response instructions and the like, to suit each operator workstation. The liaison shall include for every sub system included in this installation.

The system shall be modular in design to allow for future system expansion (i.e. in excess 200 % of specified capacity) with minimum cost and disruption to the existing operational system.

Tenderers are to specify the systems total capacity for future expansions. Such upgrades shall not render a redundancy in field hardware, the Central Processing Units or any major component of software, firmware or operating systems. The tenderer shall note that all programmed software done in order to integrate all the sub systems and all other software, being written or purchased shall be the property of the Department of Correctional Services after hand over.

All un-compiled software shall form part of the final documentation and shall be handed over in three fold to the Department of Correctional Services after commissioning of this installation.

2.4 System Performance:

2.4.1 Central & Movement Operator Workstations

The interaction delay between activating a control icon on any given operator workstation and the controlled point activation, (i.e., the lock), shall be no greater than one second (1 sec).

The interaction delay between controlled point activation and any given operator workstation response either by activation of an audible alarm and/or the associate icon changing state (colour) shall be no greater than one second (1 sec).

The interaction delay between recalling any floor plan at any given operator workstation shall be no greater than one quarter of one second (0.25) second.

2.4.2 Local Operator Workstations

The interaction delay between activating a control icon on any given operator workstation and the controlled point activation, (i.e., the lock), shall be no greater than one half of one second (0.5 sec).

The interaction delay between controlled point activation and any given operator workstation response either by activation of an audible alarm and/or the associate icon changing state (colour) shall be no greater than one half of one second (0.5 sec).

2.5 Minimum Hardware Requirements:

2.5.1 Operator Workstations

Each Operator workstation shall consist of the following:

- a. 4U Industrial mount 19" PC workstation with a minimum of an Intel Pentium IV 2.4 GHz processor with 256Mb Ram with internal parity checking, loaded with Win 2000 operating system.
- b. One 1.44M Byte three and one half inch (3.5") disc drive, one removable 40 G Byte hard drive, and one 52 x CD Rom shall be fitted with the proper controller/s for all associated drives.
- c. A 21" video system **plasma Type** and video driver card that shall be SVGA compatible and shall have a resolution of 1600 x 1200, with 32-bit colour.
- d. All necessary daughter boards for integration to local area network, mouse, sound card, speakers, RS422 card, RS232 etc., shall be provided.
- e. A vandal resistant Biometric Fingerprint verification reader shall be provided at each workstation for automatic operator identification and logon.

2.5.2 Management Workstation

Management Workstations shall be provided as indicated on the layout drawings and schematic diagrams, and shall consist of the following:

- a. 4U Industrial mount 19" PC workstation with a minimum of an Intel Pentium IV 2.4 GHz processor with 256Mb Ram with internal parity checking, loaded with Win 2000 Operating System.
- b. One 1.44M Byte three and one half inch (3.5") disc drive, one 40 G Byte hard drive, and one 52 x CD Rom shall be fitted with the proper controller/s for all associated drives.
- c. A 21" video system plasma Type and video driver card that shall be SVGA compatible and shall have a resolution of 1600 x 1200, with 32-bit colour.
- d. A vandal resistant Biometric Fingerprint verification reader shall be provided for automatic operator identification and logon.

2.5.3 Server Workstation

A dual redundant server configuration shall be provided, and shall consist of the following:

- a. 2x 4U Industrial mount 19" PC workstation with a minimum of an Intel Pentium IV 3.2 GHz processor with 1Gb Ram with internal parity checking. Each server shall be provided with 3x 80G Byte IDE hard drives controlled by a Mylex Raid controller.
- b. One 1.44M Byte three and one half inch (3.5") disc drive and one 52 x CD Rom shall be fitted to each workstation.
- c. A 15" video system plasma Type and video driver card that shall be SVGA compatible and shall have a resolution of 1152 x 864 with 32-bit colour.

2.5.4 LAN Specification

Media

- a. Distance <100m: Ethernet Category 5 – UTP
- b. Distance >100m: Fibre Optics – 100Base-FX, 850nm Multimode
- c. Conversion Mod: TX/FX Single Mode/Plus-SC

Central Switch Hardware

The central control room switch stack shall be capable of supporting 10 Mbps and 10/100 Mbps traffic. The switch shall be capable of cascading for expansion purposes.

The unit shall provide support for a range of backbone options including Fast Ethernet over fiber, Gigabit Ethernet, Layer 3 switching and ATM via a high speed module.

2.6 Minimum Software Requirements:

- 2.6.1 The Security Management System (SMS) software shall be design specifically for this type of environment Management Applications, shall have a proven track record in the industry, and shall be an Off-the-shelf package available through a distributor network. The off-the-shelf software shall be programmed and tailored to the specified functions and features described herein and as indicated on the accompanying drawings.
- 2.6.2 The software shall convey an accurate floor plan of all areas that require display on the VDU. The software shall utilize the maximum resolution and colours of the SVGA monitor to enhance and simplify the displayed control and status information. Fast orientation and ergonomics will be the goal of the graphic displays.
- 2.6.3 The software shall provide integrated Biometric (Fingerprint) log-on security functionality with security level protection for all Mouse driven operator workstations. The Biometric (Finger print) logon facility shall be capable of providing a one to many search algorithm to confirm operator credentials, without the need for entering user details or the swiping of a personal

identification card. It must be noted that although this software may be an additional software package the same protocol of the two software packages is not negotiable

There shall be a minimum of sixteen (99) levels of access, and shall be expandable.

The software shall provide a user database within the Management workstation. The database shall support a minimum of two thousand (6000) users.

2.6.4 The software shall provide on-line utilities accessed through the Management workstation menu structure. These utilities shall provided the system supervisor with the ability to edit and update required data bases, system operating variable, report configuration and generation, alarm tags and point descriptions, etc. These utilities shall be protected by security levels and Biometric Access.

2.6.5 All software licenses shall be transferred to the Owner at completion of the project. This shall include but not be limited to all original installation disks, software manuals, equipment manuals, etc. All project specific applications software shall be transferred at the end of the contract period.

2.7 Spares Holding:

The tenderer should allow for the following minimum spares holding:

- a. One (1) SVGA 21" monitor as specified under hardware section of the specification. Packed in its original packaging. This shall include, power cords and interconnecting cables.
- b. One (1) fully equipped PC 19" Industrial mount workstation as specified in the hardware section of this specification, and which shall be capable of replacing any workstation in the facility with the exception of the servers. This shall include; power cords and all required interconnecting cables.

This also includes all the software packages required to operate the facility. When one of the workstations fails, an exchange of computers must ensure that the system is immediately on line and active.

- c. The equipment supplied under this section shall be fully supported and maintained locally by local contractors or support agents.

2.8 OPERATOR STATIONS (VISUAL DISPLAY UNITS)

2.8.1 General

The SMS system offered shall be capable of providing a multiple operator workstation environment, which may be configured for full or selective operational & functional monitoring and control of selected areas and functions.

Operator workstations shall be located as indicated in the tender drawings issued.

The operator workstations shall operate in both text and graphics based display. Any operator workstation enabled via the Biometric logon system shall be capable of controlling any area within the facility providing the respective operator is authorized to do so.

The operator workstation shall also be capable of implementing changes to the system configuration and parameters, provided the operator has the necessary administration rights.

Entries, deletions or modifications to the configuration shall be possible via the operator workstation VDU/Keyboard without loss of, or degradation to, any other system functionality.

The following workstation functions shall be possible:

- Displaying point status information.
- Manually initiating control commands.
- Displaying system events and alarms.
- Displaying staff, visitor and inmate photographs for positive identification.
- Enrolling and verifying staff, visitor and inmate fingerprints. (Visitation Management module)
- All prison management modules
- Guard patrolling records
- Assigning operator access levels.
- Altering time schedules and creating new time schedules.
- Assigning or modifying time schedules for automatic operation of monitored doors/gates and redirection of duress alarms and indicators appropriate to the user's building/department/etc.
- Overriding time controlled functions, momentarily, to allow operator control of doors/gates/and the like.
- Altering existing, or assigning new descriptions or actions.
- Displaying status of all alarm sectors within the user's areas.
- Remotely operate doors/gates within their restricted areas.
- Displaying all appropriate building activities.
- Performing on-line backup copies of complete system without any degradation in the overall system performance.
- Displaying building alarms including fire alarms, gas/vapour sensor alarms, duress push buttons, detection fence alarms etc.
- Enable the viewing of Sub-system status icons to be enabled or disabled through a built in menu structure of all sub systems and other equipment so required as part of this integrated system or DCS.

All of the above shall be restricted by user level based on the finger print access to the operator workstation.

In some cases access to any portion of the prison management system will be permitted with pass word access only. These operator work stations will be as requested and required by DCS

2.8.2 Monitors

All operator workstations shall be of robust construction, ergonomically designed to minimise operator fatigue and conform to the following minimum requirements:

Screen:	An effective viewing screen size of 21”.
Character set:	ASCII with near letter quality fonts with crisp, fully formed characters.
Contrast:	Sufficient brightness and contrast to be easily readable by an operator with average vision, but not to cause burn-in of fixed display on screen. Screen saver functionality shall be provided to prevent burn-in.
Mounting:	Semi-sunken mounting at 45° in an industrial frame complete with cooling fan and intercom console.
Power:	230 VAC 50 Hz.
Other requirements	On screen microphone and speaker set

2.8.3 Keyboards

Keyboards shall be supplied with all workstations, however shall only be used for commissioning and maintenance purposes. All operator functions shall be performed by means of an optical mouse, with system screens being designed so as to require the minimum operator action. Functions such as audio system Push to talk, volume up and down control etc shall be possible by means of function keys on the SMS workstation.

2.8.4 Printer

A high quality Inkjet printer shall be supplied, installed and commissioned as part of this contract, for use with the management workstation in order to generate user defined management reports.

The following shall be included:

Paper feed:	Page feed capable of accepting paper at least up to 242 mm (A4) wide. Single page paper shall be used to allow users to print out historical events and system activity.
Character set:	ASCII & Graphics.
Print speed:	Minimum of 150 characters per second at 10 cpi.
Print type:	Ink jet type using continuous A4 fan fold paper handling.
Ink Storage:	Ink cartridge, including 2 spare cartridges/printer.
Print direction:	Bi-directional in text mode.
Pitch:	User selectable (i.e. 10, 12 or 15).
Print colour:	Black on white paper.

The printer shall incorporate a visible control panel with LED indication for power on, paper out and ready.

The printer shall be installed and configured into the Management workstation to be installed within the Central Control Room..

The printer shall be supplied with both power and data cables of suitable length to suit the location. In addition, the printer shall be set up complete with one full box of paper and two spare ink cartridges each.

2.8.5 Mouse

All mouse devices shall be optical of robust construction and suitably secured by an interconnecting cable.

2.8.6 Networking

Each SMS workstation installed on the security LAN shall be capable of monitoring and reporting the current status of all workstations on the network.

Should communications between workstations or control equipment be disrupted, an alarm shall be generated at the Central Control Room Operator workstations to alert the operators of the failure within the communications network.

Alarms generated shall be displayed at the operator stations, while updating the system database with the Time, Date and relevant workstation detail.

Failure of any operator workstation shall not prevent communication between any other workstation or Distributed control modules and their associated devices.

2.9 SOFTWARE

2.9.1 General

Software packages shall be fully proven prior to being supplied, installed, tested and commissioned.

The operator interface software shall incorporate English language descriptions and messages using both text based menus and graphical/icon displays. All configuration (e.g. entering of alarm response properties, adjusting time schedules, user data, etc) shall be performed on-line without effecting the operation of the overall system.

Selective access to different operator functions shall be configured based on an operator's user level. User levels shall be determined from the Biometric verification each time an operator logs on to a workstation.

After any predefined period, if no operator activity has occurred at the operator workstations, that station shall automatically request Biometric verification failing which the station shall log off.

The time period before automatic logging off of workstations shall be user configurable, and shall be determined during commissioning of the system, in liaison with the Engineer and the representative of the Department of Public Works and DCS.

2.9.2 Operating System

The operating system shall be a recognised and widely accepted standard operating system that shall suit the requirements of the system to be installed. The operating system shall be a real time multi-user/multi-tasking system such as NT, W2000, Unix or QNX.

The operating system shall have proven and demonstrated reliable and stable operation in the security environment.

Facilities shall be provided by the Department of Correctional Services to store all programs on site and include all equipment necessary to backup and reload all system programs, including the operating system with all user specific system parameters.

2.9.3 System Access

Operators shall be required to "log on" to operator workstations using the finger print reader provided at each operator station before being able to access the system or user information, reset alarms or access any other system functions.

Access to all workstations shall be limited through allocation of access levels.

A minimum of 2000 users and 99 User levels shall be available. Only users allocated with a user level of 99 shall be capable of the assignment and changing of passwords to all levels.

Each operator shall be allowed to access different operator commands and functions, and view certain individually assigned events, menus and functions based on their assigned user level.

2.9.4 Scheduling

The SMS system shall have the ability to configure schedules which do not restrict the user to pre-determined times, dates or access levels. Access to and editing of these schedules shall be possible via the Management workstation. This scheduling as detailed above must be possible but only as an option in those cases where the user department require this facility.

The following schedules shall be configurable:

1. Automated Public Address Announcements.
2. Operator station Access times.
3. Designated Alarm priority changes.
4. Automated door locking/unlocking.
5. Cell and Passage lighting control.

2.10 ARCHIVING HISTORICAL DATA

2.10.1 General

Archiving of historical data shall take place automatically according to a configurable time frame, which shall be set via a Management workstation. The archived files shall be stored on the Raid 5 servers situated in the Central Control Room equipment rack. The system shall be capable of storing archived history files for a minimum period of 12 months.

The management workstation shall provide the option of backing up selected archived history files onto the 2 Gbyte DAT drive installed within the Management workstation.

Archived history files shall be read directly from the current or archived databases, without terminating or suspending the logging of current events.

2.10.2 Overwriting

The SMS software shall display an alarm to system operators warning of the imminent loss of archived data once the available disk space becomes full. The alarm shall occur with sufficient margin to allow the systems operator to execute a manual history file dump to the removable storage medium, if required (normally 80%). The percentage alarm set point shall be variable by the highest user level.

Should the disk space be 100% full the system will automatically start to dump the oldest archived data and rewrite the newest data in it's place.

2.10.3 System Logging

The server workstations shall be capable of logging the following data on request:

Data should only be logged if requested to. All events not required and not requested by the user department should not be logged at all.

Event related data:

Item	Database Fields
1	Time and Date Stamp
2	Equipment Type
3	Control Area
4	Equipment Designation
5	Equipment Location
6	Alarm/Event Type
7	Alarm/Event Status
8	Responsible Operator
9	Operator Workstation Name
10	Control Area
11	Alarm/Event Priority

Logged Events/Alarms:

Item	Intercom Events/Alarms
1.1	Intercom Station Call in

1.2	Intercom Station Activated
1.3	Intercom Station I/O Failure
1.4	Intercom Station Tamper Alarm
1.5	Intercom Station Threshold Alarm
1.6	Intercom Station Fault
1.7	Intercom Call-in Transferred
1.8	Intercom Call-in Unanswered
1.9	Intercom Station Isolated
1.10	Intercom Station Isolated warning
1.11	Intercom System Hardware Failure
1.12	Intercom System Communication Failure
1.13	Intercom Alarm/Failure Acknowledged
1.14	Intercom System Call Central Command
1.15	Intercom System Call Movement Command
Item	CCTV Events/Alarms
2.1	CCTV Camera Activated
2.2	CCTV PTZ Preset Edited
2.3	CCTV Sequence Selected
2.4	CCTV Sequence Edited
2.5	CCTV System Hardware Failure
2.6	CCTV System Communication Failure
2.7	CCTV Alarm/Failure Acknowledged

Item	DVR Events/Alarms
3.1	DVR Channel Record Command
3.2	DVR Channel Halt Record Command
3.3	DVR System Hardware Failure
3.4	DVR System Communication Failure
3.5	DVR Alarm/Failure Acknowledged

Item	Door Events/Alarms
4.1	Door Open Command
4.2	Door Closed Command
4.3	Door Fault on Closing
4.4	Door Fault on Opening
4.5	Door Forced Open Manually
4.6	Door Open outside of limits
4.7	Door Open for extended period
4.8	Door Control module Communication Failure
4.9	Door DPS Opened
4.10	Door DPS Closed
4.11	Door Interlock Override Command
4.12	Door Group Activated
4.13	Door Group Edited
4.14	Door Emergency Release Activated

4.15	Door Control System Hardware Failure
2.16	Door Control System Communication Failure
2.17	Door Alarm/Failure Acknowledged

Item	Gate Events/Alarms
5.1	Gate Open Command
5.2	Gate Stop Command
5.3	Gate Close Command
5.4	Gate Fault on Closing
5.5	Gate Fault on Opening
5.6	Gate Forced Open Manually
5.7	Gate Open outside of limits
5.8	Gate Open for extended period
5.9	Gate Control module Communication Failure
5.10	Gate Alarm/Failure Acknowledged

Item	Lighting Events/Alarms
6.1	Lighting Zone Activated
6.2	Lighting Zone De-activated
6.3	Lighting Zone Scheduled Reset

Item	Public Address Events/Alarms
7.1	Public Address Zone Manual Activation
7.2	Public Address Zone Scheduled Activation

Item	Intrusion Events/Alarms
8.1	Intrusion Zone Activated
8.2	Intrusion Zone Alarm Acknowledged

Item	Panic Button Events/Alarms
9.1	Panic Button Activated
9.2	Panic Button Activation Acknowledged

Item	UPS Events/Alarms
10.1	UPS Mains Failure Alarm
10.2	UPS Load on Bypass
10.3	UPS Battery Low
10.4	UPS Battery Failure
10.5	UPS Load not protected
10.6	UPS Surge Arrestor Failure
10.7	UPS Communication Failure
10.8	UPS Alarm/Failure Acknowledged

Item	Air System Events/Alarms
11.1	AIR System Compressor Off
11.2	AIR System Maintenance Request
11.3	Air System Zone Pressure Test Failure
11.4	Air System Zone Low Pressure Alarm
11.5	Air System Dryer Off
11.6	Air System Dryer Failure
11.7	Air System Compressor On Load
11.8	Air System UPS Alarm/Failure Acknowledged

Item	Emergency Air System Events/Alarms
12.1	Emergency Air System Zone Low Pressure Alarm
12.2	Emergency Air System Zone Low Pressure Alarm Acknowledged

Item	SMS Events/Alarms
13.1	New Operator Enrollment Successful
13.2	New Operator Enrollment Failed
13.3	Operator Details Edited
13.4	Operator Details Deleted
13.5	Workstation Logon Successful
13.6	Workstation Logon Failed
13.7	Workstation Unauthorised Access Attempted
13.8	Workstation Manual Logoff
13.9	Workstation Automatic Logoff
13.10	Workstation Inhibited
13.11	Workstation Re-instated
13.14	Workstation Online
13.15	Workstation Offline
13.16	Workstation Communication Failure
13.17	Workstation Alarm/Failure Acknowledge

2.10.4 System Reporting

The SMS shall be capable of performing SQL queries to the current or archived databases on the server workstations, format the data into customised reports which shall allow for the following:

- Display of all relevant information on any individual alarm point including alarm point identification by device number and alarm point status.
- Display all alarm points in the system in alarm or normal condition, as a single log.
- Display all emergency procedures applicable to any alarm type with corresponding alarm response actions and locations, per alarm device.

Reporting details shall include:

- Alarm point status
- Alarm count per device.
- Alarm activity over a time period, selected by time and date.
- Display of selected alarm transactions based on alarm type and a calendar / time period.
- Display system operators login/out history
- Display all operator commands entered by any or all operators based on time/calendar interval.

2.11 SYSTEM STATUS

The SMS shall provide a pop up menu option which, when selected, allows the system to display or print a list of current alarms, faults and conditions including the current fault conditions relating to SMS workstations, Distributes control modules, sub-system equipment hardware and associated devices.

In graphical display mode the system shall display maps of each building complete with all internal levels and shall indicate all systems equipment status (i.e. locked/unlocked; open/closed; secure/access; isolated/active; alarm; tamper etc).

2.12 CURRENT ALARM WINDOW

The system shall provide an efficient and reliable alarm handling procedure and shall include both audio and visual annunciation, logging to the database and recording of the history file the device description, point description, location, time and date the alarm occurred.

The system software shall have the ability to route only selected alarms to specific operator workstations, allowing different locations or applications to be segregated on a building or system basis.

All systems activity shall be presented to ensure proper actions have been taken and that no alarm is left unattended for any lengthy period. Alarms, which have been acknowledged, and not cleared/reset shall be clearly distinguishable.

Upon occurrence of an alarm(s) a user configurable audible tone shall sound at the operator workstation(s) and display an indication of the incoming alarm together with its priority.

If there are additional alarms to acknowledge the operator's station shall continue to sound the appropriate alarm tone, display the number of alarms waiting and identify the highest priority alarm.

The first alarm displayed shall be the highest priority alarm followed by the next highest priority alarm, etc.

All alarms are required to be separately acknowledged by the operator, by means of the mouse provided to acknowledge and reset each alarm separately.

Each time new alarms are created the system shall restack the alarms so the operator sees them in order of priority.

The system shall also have an alarm/event status display available to the operator at all times on the operator's station.

The display shall be a real-time dynamic display of alarms in the active state, or system component failures.

An audit trail shall be used to log the actions taken by all system operators in response to an alarm. The audit trail shall note:

- When the alarm was activated.
- When the alarm was acknowledged.
- Who acknowledged the alarm.
- When the alarm was restored.

The system shall record every user command, acknowledgment and log every operator login.

These transactions shall be routed to the history database.

Any alarm point which has been suppressed/inhibited by the operator shall on expiry of the time zone, or when unsuppressed by the operator, generate an alarm if the alarm point is in the "active" state. The report to the operator terminal shall be the same as described above.

Each alarm point shall have the facility for a description of the alarm occurring. A comprehensive outline for operator instructions, detailing all response actions shall be provided for all alarms.

2.13 GRAPHICAL DISPLAY

The SMS shall support a minimum of 200 colour maps for the purpose of displaying the location and real time status of any SMS input or output.

Graphical maps to be included within the initial configuration are to show in detail the following areas:

- Site plan showing all buildings and locations of all alarm points and operator workstations.
- A plan of each accommodation unit and building.
- All buildings devices/status/alarms and the like.
- All building tamper, communications, power and the like devices/status/alarms and the like.
- The perimeter fence and devices.
- Other maps as required to clearly display all alarm input within buildings, or an external equipment cubicle locations.

Each site map shall be provided with a site plan key, which shall be common to all maps and situated in the same position. The key shall provide a means for the operator to quickly navigate through the entire facility without the need to use standard navigation buttons or the main site map.

All device location and statuses shall be detailed on each map and coloured accordingly for ease of recognition of both the device type and real time status.

Text messaging identifying the device type, designation and alarm status shall be available in a “mouse over” or “icon” pop-up screen structure to minimise text on individual maps.

All text descriptors shall be approved by the Engineer prior to final acceptance. Liaise all requirements through the Engineer when programming these maps and other alarm/response descriptions.

Function key descriptions shall also be displayed as mouse over or pop-up screen hints.

Graphical map displays shall be of high resolution to enable accurate images to be represented.

The system shall allow maps to be linked by means of navigation buttons to allow operators to "zoom" in or out to display either additional detail or an overall map.

Point status and locations shall be clearly displayed using colour-coded icons. All icons shall display real time status of each point with continuous updates being provided to any dynamic screen display.

Updates shall occur every 1 second or less.

2.14 SECURITY MANAGEMENT FUNCTIONS

2.14.1 Configuration

The SMS shall consist of a multiple screen representation of the entire facility, which shall contain all of the necessary icons to control all security sub system equipment and devices situated throughout the prison. All icons shall be activated with the use of a mouse. All icons and status indicators shall be a minimum of 5mm in diameter. All symbols shall provide status by colour and/or associated text. All symbols shall be to the approval of both the Engineer as well as the representatives of PDW and DCS.

2.14.2 Global Function Operations:

Global function icons shall be located at the bottom of each graphic screen in the form of a footer window, which shall be common to all area maps. These icons, if active, shall control the global functions for the entire facility.

2.14.2.1 System Control

Activating this icon shall cause the system to switch to the system control screen. The System Control screen shall provide a complete system diagnostic window for all sub-system components and communication systems within the entire facility.

The diagnostic information shall include but not be limited to the following:

1. Compressor Status:
 - a. Low Oil Pressure
 - b. Compressor Tripped
 - c. Air Dryer Failure
2. Air Reticulation System:
 - a. Air Reticulation integrity per zone
 - b. Operating Air pressure in Kpa
 - c. Normal Air pressure status per zone
 - d. Emergency Air pressure status per zone
3. UPS System (Per Zone):
 - a. Load on Bypass
 - b. Load not protected
 - c. Mains Failure
 - d. Battery Fault
 - e. Battery Low
 - f. Surge Arrestor Failure
4. Control Hardware Status (Per Zone):

- a. TCP/IP communication Failure
- b. Control Network communication Failure
- c. Device Network communication Failure
- d. I/O Device Failure
- e. Communication Redundancy Integrity
- f. CCTV Matrix communication Alarm

5. Perimeter Protection System (Per Zone):

- a. Taut Wire Alarm
- b. Tamper alarm
- c. Sensor post alarm
- d. AC power failure
- e. Fire optic sense alarm
- f. Micro wave system TX/RX failure alarm

- 6. Door position switch violation alarm per DPS
- 7. Controlled door security violation alarm per door
- 8. Fire door security violation alarm per door
- 9. Panic Button activated alarm per Panic Button
- 10. Intercom Call In Failure per Intercom
- 11. Operator Log On Violation

Where applicable all alarm conditions shall allow for operator acknowledgement and automatic selection of the alarmed zone layout screen.

2.14.2.2 Site Plan

The site plan shall consist of an interactive miniature layout of the entire facility, and shall be situated on the bottom Right hand side of each operator screen.

The site plan shall provide the operator with a quick method to access an individual area to monitor and / or control.

The site plan shall also indicate critical operational information to the operator, which shall include but not be limited to the following:

- 1. Fire Doors Unsecured
- 2. Sally port Doors Unsecured
- 3. Local Control Room Logon Status
- 4. Local Control Room Call In
- 5. Local Control Room Communication Alarm

2.14.2.3 Volume Up

Activating and maintaining this icon shall result in an increase in the operator console speaker volume. The icon shall change status to RED to indicate activation of this function.

2.14.2.4 Volume Down

Activating and maintaining this icon shall result in a decrease in the operator console speaker volume. The icon shall change status to RED to indicate activation of this function.

2.14.2.5 Select

Activating this icon shall result in either the first audio call-in or the currently selected audio call-in in the Audio Call-in Queue to be answered. Upon answering the call, the call shall be removed from the Audio Call In queue on all workstations.

2.14.2.6 Reset

Activating this icon shall result in either the first audio call in or the currently selected audio call-in in the Audio Call-in Queue to be reset. Upon resetting the call, the call shall be removed from the Audio Call In queue on all workstations.

2.14.2.7 Push To Talk

Activating and maintaining this icon shall results in the PTT function being activated within the audio control hardware. Releasing the icon resets the PTT function

2.14.2.8 All Page

Activating the ALL PAGE icon on the footer window shall activate all Public Address station within the immediate area of control, and in the case of a Central Operator shall activate all stations within the facility. The PTT function shall be enabled and remain enabled until the ALL PAGE icon is selected again in which case the stations are de-activated and the PTT released.

The ALL PAGE icon shall change colour when active to clearly indicate the current status.

2.14.2.9 Call Central/Movement

Each local operator workstation's footer window shall contain a "Call Central" and a "Call Movement" icon. When selected the SMS shall generate a high priority call-in at the Central or Movement Control operator workstations. Central and Movement control room operators shall respond to these call-ins in the same manner as with a normal intercom station call request.

Movement Control workstations shall be equipped with “Call Central” functionality only.

2.14.2.10 Audio Call In Queue

The SMS footer window shall contain an Audio Call-in queue facility into which audio call requests are entered on a first in first out (FIFO) basis.

Upon receipt of an audio call-in from any intercom station in the facility, the call-in detail listing the control area, equipment designation and the specific location of the calling intercom station shall be entered into a FIFO queue.

The call-in priority of each Intercom station within the facility shall be individually configurable within the SMS, and station priority shall take preference over the FIFO queue. Intercom station call requests of higher priority e.g. Control room call-in requests shall be entered into the top of the queue.

The following methods of answering calls-ins shall be possible:

- a. Highlighting the desired call-in in the Audio queue and clicking on the “Select” icon in the footer window.
- b. Clicking repeatedly on the “Select” icon in the footer window, which shall automatically answer the oldest entry in the Audio queue.
- c. Double clicking on any entry in the Audio queue.

Any of the above-mentioned methods of answering a call-in shall reset the currently selected intercom station and enable the selected station as well as simultaneously removing the entry from the Audio queue on all workstations.

When the local operator workstations are logged on, call-ins from the relevant local area shall be directed to the local workstation. In the event that the call is not answered within thirty seconds, the call shall be forwarded to the Central Control room workstations. Call-ins from local areas in which a local operator is not logged in, shall be forwarded immediately to the Central Control room operators.

2.14.2.11 Fault Queue

The SMS footer window shall contain a Fault queue facility into which all security sub-system or control system faults are entered in order of priority.

Upon receipt of any security sub-system or control system fault, the relevant fault detail including the control area, equipment designation and the specific location of the fault shall be displayed as a pop-up screen on the Graphical display. Upon acceptance of this fault by the

control room operator by selection of the “alarm accept” icon the fault shall be entered into the Fault queue. By selecting this icon the control room operator accepts full responsibility for acceptance and reporting of the alarm, as this event is logged into the event logging system.

The Fault queue is intended to provide a quick reference to the system operator of current alarms, and is intended to replace functionality of the Current Alarm window described in section 2.12 of the specification.

Faults may be dealt with in the following ways:

- a. By right clicking on a specific fault in the queue, the operator shall be presented with an “Acknowledge” option again. Clicking on the Acknowledge option shall enter the acknowledgement into the event recording system again. The fault shall remain in the fault queue until such time that the fault is cleared. Only then will the fault automatically remove itself from the fault queue.
- b. By double clicking on a specific fault in the queue, the appropriate area map shall be displayed with the faulty equipment control icon clearly visible. The equipment icon shall display the fault detail in a mouse-over or “hint” fashion. Right clicking on relevant equipment icon shall present the operator with an “Acknowledge” option again. Clicking on the Acknowledge option shall enter the acknowledgement into the event recording system again. The fault shall remain in the fault queue until such time that the fault is cleared. Only then will the fault automatically remove itself from the fault queue.

Local operator workstations shall display alarms and faults related to the immediate area of control only. Central operator workstations shall display all current alarms within the entire facility.

2.14.2.12 Synchronized Clock System

All operator workstations footer windows shall contain a synchronized digital clock, which indicates the Date and Time in 24 Hour mode. The accuracy of the synchronised digital clock system shall be within +- one (1) minute within a thirty (30) day period, and shall be synchronised with the management workstation within the central control room each hour on the hour.

2.14.2.13 Operator Logon Details

The SMS footer window shall contain the detail of the currently logged on operator including full name and authorized user level.

2.14.3 Locking Operations:

2.14.3.1 Door Position status (Monitored Only):

There shall be a status icon for each monitored door to indicate the position of the door. The status icon shall illuminate red when the door is unsecured and shall be green when the door is secure.

Each DPS icon shall provide mouse over or “hint” fashion detail of fault conditions relating to the equipment element as well as indicating the equipment designation.

A right mouse click over any icon shall provide the operator with an option to acknowledge an alarm condition as well as to view the engineering properties of the element provided the necessary user level is active.

2.14.3.2 Unlock Icon (Swing Door):

There shall be a single control icon with visual status indication for each controlled swing door lock. Activating the UNLOCK command shall apply power to the lock and activate the UNLOCK control cycle. The associated status icon shall indicate red when the incorporated lock status switch indicates an unsecured state and green when the lock is secured. Each door icon shall provide mouse over or “hint” fashion detail of fault conditions relating to the door.

A right mouse click over any icon shall provide the operator with an options to acknowledge an alarm condition, to inhibit a door open command, or to view the engineering properties of the element provided the necessary user level is active. Inhibiting a door open command shall change the icon colour to blue.

2.14.3.3 Unlock / Lock Icon (Sliding & Fire Doors):

There shall be a single control icon with visual status indication for each controlled sliding door control mechanism. Activating the UNLOCK/LOCK icon shall either activate the UNLOCK cycle or the LOCK CYCLE of the mechanism in a toggle fashion. The associated status icon shall illuminate red when the door is unsecured and green when the lock is secured. Activation of this icon whilst the associated door is in travel shall cause the door to instantly change its direction of travel. Each door icon shall provide mouse over or “hint” fashion detail of fault conditions relating to the door.

A right mouse click over any icon shall provide the operator with an options to acknowledge an alarm condition, to inhibit a door open command, or to view the engineering properties of the element provided the necessary user level is active. Inhibiting a door open command shall change the icon colour to blue.

2.14.3.4 Open / Close / Stop Icons (Sliding gates):

There shall be three individual control icons with visual status indication for each controlled sliding gate. Activating the OPEN icon

shall activate the OPEN cycle of the controlled device Activating the CLOSE icon shall activate the CLOSE cycle of the controlled device. Activating the STOP icon while the device is in the OPEN cycle or CLOSE cycle shall STOP the device. The associated status icon shall illuminate red when the locking device is unsecured and shall be green when the locking device is secured. Each gate icon shall provide mouse over or “hint” fashion detail of fault conditions relating to the door.

A right mouse click over any icon shall provide the operator with an option to acknowledge an alarm condition or to view the engineering properties of the element provided the necessary user level is active.

2.14.3.5 Emergency release:

An Emergency release icon shall be provided for each housing unit day room area, which shall be used to initiate an automated opening sequence for Cell and Exercise yard doors. The opening sequence shall be configurable within the SMS in order to provide the most efficient opening sequence.

Activating this icon shall cause a pop-up window to appear on top of the graphically displayed area. Located within this window shall be text explaining to the operator that the activation of this function shall result in all controlled doors in the corresponding area to be released under an emergency procedure. Also located within this window there shall be three icons namely “Open”, “Close” and “Cancel”. Activating the icon with the text “Open” text will activate the emergency open routine. Activating the icon with the text “Close” text will activate result in the same doors to simultaneously close. Activating the icon with the text “Cancel” shall remove the pop-up window and resume normal operation.

Once an emergency release routine has been activated the doors in the controlled area shall open and indicate an emergency condition by flashing the affected door icons in RED. The activation of the emergency close routine shall return the icon status to normal.

2.14.3.6 Interlock Group Status

Activating a door lock icon that is part of an interlocked group of doors of which one or more doors are currently open, shall cause a pop-up window to appear on top of the graphically displayed area to indicate to the operator that an interlocked door is currently open and that the “Interlock Override” function should be activated to open the door.

Right clicking on the door icon shall provide the operator with an interlock lock group option, which when selected shall indicate each door contained in the relevant interlock group.

2.14.3.7 Interlock Override

Activating this icon shall enable the operator to override an interlocked door. The override function shall only remain active for 10 seconds. Activating a door control icon while override is active shall cause the associated door to unlock or open. When the override timeout limit is reached, the system shall return to normal operation.

During the active 10s period the Icon shall Flash RED to indicate activity.

2.14.3.8 Group Assign Icon

Activating this icon shall result in the door status icons of all doors in the corresponding Cell area to turn White. By toggling the door control icon whilst in the “Group Assign” mode shall toggle the door icon colour from White to Grey. A White icon shall indicate that the door is included in the controlled group, whilst a Grey icon indicates that it is not included in the group.

Upon activating the Group Assign icon for a second time the system shall return to a normal state and set the controlled door group into memory. Re-activation of the Group Assign icon shall cause the door control icons to indicate their current group assign status from memory.

2.14.3.9 Group Release:

Activating this icon shall cause a pop-up window to appear on top of the graphically displayed area. Located within this window shall be three icons namely “Open”, “Close” and “Cancel”. Activating the icon with the text “Open” text will result in the doors included in the Group Assign memory to Open. Activating the icon with the text “Close” text will result in the doors included in the Group Assign memory to Close. Activating the icon with the text “Cancel” shall remove the pop-up window and resume normal operation.

2.14.4 Intercom Operations

2.14.4.1 Audio Control – Staff/Cell Intercom Icon:

The SMS shall provide a control icon with visual status indication for each intercom station within the entire facility.

The icons shall be used to initiate or terminate an audio channel between the relevant control room operator’s audio console and the selected intercom station.

Each Intercom station icon shall provide mouse over or “hint” fashion detail of fault conditions relating to the station as well as indicating the equipment designation.

The alarm detail displayed by the “hint” function shall include:

- Intercom station Tamper alarm

- Intercom station Threshold alarm
- Intercom station I/O alarm
- Intercom station Communications alarm

All alarm conditions shall be presented to the operator within the Fault queue as described in Section 2.14.2.11 of the specification.

A right mouse click over any icon shall provide the operator with an option to acknowledge an alarm condition, to inhibit an intercom station, or to view the engineering properties of the element provided the necessary user level is active. Inhibiting an intercom station shall change the icon colour to blue.

a. Intercom Station Call Up:

Activating a staff or inmate station icon shall open a talk path between the operator and the associated intercom station. The associated status icon shall illuminate yellow to indicate an active channel.

Activating the staff station icon a second time shall close the talk path and the status icon shall extinguish.

b. Staff Station Call-In:

Upon activation of a Staff or Cell station call-in button located on the intercom station faceplate, the associated status icon shall illuminate and flash between yellow and grey with an audible tone. Activating the associated intercom station icon shall open a talk path between the operator and the staff station. The status icon shall illuminate yellow and the audible tone shall silence. Once complete, activating of the staff station icon a second time shall close the talk path and the associated status icon shall extinguish.

c. Automatic termination of an audio channel:

Should multiple audio call in's be received by the local operator, the operator shall only be required to select each audio icon once. The second icon selected shall initiate an audio channel to the appropriate intercom station and initiate an automatic de-select command to the previous channel.

d. Delayed Call-In:

Upon activation of a Staff or Cell station call-in button on an intercom station which falls under the control of a local control workstation, provided the particular operator is logged in, the call shall at first be routed to the local operator. If the local operator fails to respond to a call in within 60 seconds, the call is automatically routed to central control. This event is to be logged to the event recording system.

d. Audio Queue:

An Audio Call-in queue facility shall be provided as an integrated function of the SMS system. Refer to Section 2.14.2.10 for the functional requirement of this facility.

2.14.5 Closed Circuit Television (C.C.T.V.) Operation:

2.14.5.1 C.C.T.V. Fixed Camera Select

The SMS shall provide a single control icon with visual status indication for each CCTV Fixed Camera within the entire facility.

Activating a camera icon shall cause the associated camera to be switched to the relevant operator's spot monitor via the High Level Interface to the CCTV Matrix. By selecting another camera icon the spot monitor image shall change accordingly.

Camera to Monitor commands shall be configured within the SMS to determine the allocation of spot monitors to operator workstations.

Currently selected camera icons shall illuminate RED, whilst un-selected icons shall illuminate GREEN.

Each Camera icon shall provide mouse over or "hint" fashion detail of the camera designation.

A right mouse click over any icon shall provide the operator with an option to view the engineering properties of the element provided the necessary user level is active.

2.14.5.2 C.C.T.V. PTZ Camera Select

The SMS shall provide a single control icon with visual status indication for each CCTV PTZ Camera within the entire facility.

Activating a PTZ camera icon shall cause the associated camera to be switched to the relevant operator's spot monitor via the High Level Interface to the CCTV Matrix. By selecting any other camera icon the spot monitor image shall change accordingly.

Camera to Monitor commands shall be configured within the SMS to determine the allocation of spot monitors to operator workstations.

Currently selected PTZ camera icons shall illuminate RED, whilst un-selected icons shall illuminate PURPLE.

Each PTZ Camera icon shall provide mouse over or "hint" fashion detail of the camera designation.

A right mouse click over any icon shall provide the operator with an option to view the engineering properties of the element provided the necessary user level is active.

2.14.5.3 C.C.T.V. PTZ Control

Once a PTZ camera icon has been selected by the operator, the SMS shall provide a pop-up control window, which shall allow the following PTZ control functions:

- Pan Left
- Pan Right
- Tilt Up
- Tilt Down
- Simultaneous Pan Left, Tilt Up
- Simultaneous Pan Right, Tilt Up
- Simultaneous Pan Left, Tilt Down
- Simultaneous Pan Right, Tilt Down
- Zoom In
- Zoom Out
- Continuous rotate Left
- Continuous rotate Right
- Rotate Stop
- Preset Position Select
- Guard tour initiate

2.14.5.4 C.C.T.V. PTZ Preset Save

The SMS shall provide the operator with a menu option which shall initiate a pop-up control window, which shall allow the following PTZ control functions:

- PTZ Camera Select (1-n)
- PTZ Preset Select (1-99)
- Pan Left
- Pan Right
- Tilt Up
- Tilt Down
- Simultaneous Pan Left, Tilt Up
- Simultaneous Pan Right, Tilt Up
- Simultaneous Pan Left, Tilt Down
- Simultaneous Pan Right, Tilt Down
- Zoom In
- Zoom Out
- PTZ Preset Store Command
- PTZ Preset Load Command

The SMS shall be able to assign a specific PTZ Preset position to a standard fixed camera icon. The operator shall be able to click on a fixed camera icon, which shall load a PTZ preset position onto the appropriate spot monitor.

2.14.5.5 Sequence to Monitor Select

The SMS shall provide a single control icon with visual status indication for each Monitor within the individual control rooms or adjudicated positions.

A control room layout map shall be configured within the SMS, indicating the physical layout of the control desk and the CCTV monitors for the relevant SMS workstation.

The Monitor icon shall illuminate RED if a CCTV sequence has not been assigned to a specific monitor, and GREEN when a logical sequence has been assigned. The sequence number and description shall be displayed within the Monitor icon when a logical sequence has been assigned.

The operator shall be able to select the desired camera sequence by means of a Right mouse key function on the monitor icon.

Camera sequences may be assigned to any Monitor in the facility including the spot monitors if required, however the manual selection of a camera image shall automatically override the sequence allocation.

2.14.5.6 Perimeter Detection - Black Screen Technology

The SMS shall provide integrated Black screen technology, which shall enable the automatic selection of relevant Perimeter PTZ Cameras to allocated Monitors in the case of a Perimeter Detection alarm.

The SMS through its high level interface to the Perimeter Detection, CCTV and DVR sub-system hardware shall make logical selections of preset camera images to the alarm zone. The system shall allow for three simultaneous perimeter alarm conditions with cameras preset to include the full zone in each case and displayed on the three dedicated monitors for the perimeter fence alarms situated in the Central Control room.

Once an alarm has been activated and the camera preset to that zone, the control room operator shall be able to zoom in on the specific fault and escape attempt thus providing valuable recorded material for later use by the authorities.

The three monitors shall be installed adjacent to one another

Under normal conditions all three monitors shall be BLANK (Black), specifically to ensure that the operators attention is drawn to the monitors when an event occurs.

Once a Perimeter alarm is triggered, the relevant zone PTZ camera image shall be switched to the first monitor. Should a second

simultaneous alarm be detected the second monitor will display the preset PTZ image.

The three monitors shall be permanently connect to three dedicated recording channels in the Digital Video Recording system (DVR), which shall be automatically recorded (4 frames/s) the instant an alarm occurs.

The technology is required to ensure that all Perimeter alarm conditions are brought to the attention of the Central Control room operators immediately, and to present them with the necessary information to respond to the event.

The PTZ preset position monitor allows the operator to immediately view the alarm zone, and to follow the offender via the PTZ control functions.

2.14.6 Lighting and small power operations:

2.14.6.1 Cell Light Control Icon:

The SMS shall provide a control icon with visual status indication for each Cell light within the entire facility.

The icons shall be used to toggle the state of the Cell light. The status icon shall illuminate yellow when the light is on and shall be grey when the light off.

Each Cell light icon shall provide mouse over or “hint” fashion detail of light status as indicating the equipment designation.

A right mouse click over any icon shall provide the operator with an option to view the engineering properties of the element provided the necessary user level is active.

There shall be a single control icon with visual status indication within each cell on the graphical layout. The icon shall be used to toggle the cell light between the ON and OFF state. Central control operators shall be able to control any cell or day room lighting in the entire facility.

2.14.6.2 Day Room Bay Light Control Icon:

The SMS shall provide a control icon with visual status indication for the Day room high-bay lights for each housing units

The icons shall be used to toggle the state of the Day room lights. The status icon shall illuminate yellow when the lights are on and shall be gray when the lights are off.

3. DISTRIBUTED CONTROL SYSTEM

3.1 General

All Distributed control modules and associated hardware required to provide the alarm inputs, control outputs, access control, device monitoring and the like described in this document shall be included as part of this Contract.

The modules shall be designed to continually monitor all devices connected and supervise all general inputs (i.e. or alarm points) and cabling to control outputs.

As a minimum requirement, all inputs shall be "end of line resistor" monitored and provide indication of normal, alarm and tamper (open or short) conditions.

All inputs shall be continuously supervised for high or low impedance (using end of line resistors). Upon a change of this impedance an appropriate alarm shall be annunciate to the various devices (including operator's terminal, printer and history file).

All alarms generated in the field shall be received by the Distributed control modules, and shall generate an interrupt to signify to the system that an alarm has occurred, and report its status, which shall be enunciated to any or all devices such as operator stations, printers and the history file.

Various Distributed control modules shall be used dependant on the application, and as detailed below.

Any input throughout the system shall be able to be interlocked with any other input or output through software assignment of conditional logic.

It shall be possible to disable individual or groups of alarm inputs and control any output via any operator station.

During suppressed/inhibited mode, the alarm point wiring shall be monitored to detect any unauthorised tampering (i.e. tamper alarms shall be monitored 24 hours a day, every day).

The Distributed Control System shall consist of autonomous control systems located within each local control area. Each local control system shall be capable of utilising multiple processing units to perform the application specific logic functions, as well as to provide system redundancy.

The failure or loss of any single door or I/O control device shall not hamper the operation of any other control device or processing unit, and shall not degrade the overall system response time as indicated under Section 4.4 – System Performance Guidelines.

Each control systems shall be capable of communicating in a peer-to-peer configuration over a communication network utilizing a non-proprietary, commercially available technology and open protocol.

The communication network shall be configured in a transparent net – sub net topology. All door control modules in a local control zone (i.e. housing pod) shall be connected to one or more local sub networks to provide isolation from network failures, errors and communication traffic, which may occur in other control zones.

The use of discreet multi-core cabling to each door to control door functions shall not be accepted as an alternative to a bus topology.

3.2 System Modules:

- a. All system modules shall share the same control language and programming structure, where applicable.
- b. All system modules shall have built-in comprehensive self-test and self-diagnostic capabilities.
- c. All system modules shall have built in status indication of power supply voltages and module processor healthy indication to show proper operation.
- d. All 24 VDC system modules shall have on board voltage regulation for logic power supply.
- e. All system modules shall have on board, auto-resetting over – current protection devices for the logic supply and field input circuits.
- f. The system modules shall provide all necessary logic functions, timing functions, input points, output points memory, communication capabilities and software for the operating functions and features shown in the contract documents.
- g. All system modules shall be general non-location specific in their construction. They shall be made location specific and operationally customized by software configuration of network variables during the installation process.
- h. The system shall be stable at all times without the risk of losing any information due to chance (industrial PLC)

3.2.1 Door Modules:

The door module shall be such to cater for the full requirements of sliding and swing doors, and shall be installed in a recessed housing or door header located above the door or lock.

The module shall be provided with two separate 24VDC power supplies in order to supply the CPU and I/O power requirements separately. The two supplies shall be galvanic ally isolated from one another within each module.

The module shall have a minimum of five (5) high current, solid-state contacts for the control of pneumatic components, locking devices and Cell Lights.

The module shall also have a minimum of four (4) optically isolated inputs for the monitoring of door position switches and / or reset call switches.

The module shall also provide for the connection of a minimum of two (2) intercom staff or cell stations with call buttons.

The door module shall incorporate full digital audio capability with the ability to connect a minimum of two staff or cell intercom stations directly, without the need for additional/external audio hardware at each door. **Should the offered module be separate modules, the rate for supply and installation and space provision for this will be the responsibility of the tenderer and at his cost.**

The module shall also be used as an interface to other security and miscellaneous monitored and controlled devices.

The door module with the following minimum requirements, shall allow for the direct termination of all field signals, speakers, call request buttons, light relays etc, as well as the connection of the data, Audio and power services, without the need for external switching relays or communication devices:

Power Supply Requirements

1. CPU Supply Voltage: 24VDC
2. I/O Supply Voltage: 24VDC
3. Supply Protection: Self Resetable Fuses
4. Input Protection: Individual Opto Isolation
5. Output Protection: Short circuit proof

Output Requirements

The module shall allow for the direct termination of the following Output points:

2x Sliding / Swing Door Open solenoid valve
2x Sliding Door Close solenoid valve
2x Lock Bar Up solenoid valve
2x Lock Bar Down solenoid valve
2x Cell Light Interface Relay supply

2x Intercom station speakers

Technical Specification (Outputs)

4 x 24VDC 500ma Solid state outputs (Solenoid Valve Supply)
2 x 24VDC 1A solid state outputs (Cell Light Interface Supply)
2 x 24VDC 50W 2 Pole N/O Contact Relays (Intercom Station)

Input Requirements

The module shall allow for the direct termination of the following Input points:

2x Sliding Door Closed
2x Sliding Door Open
2x Lock Bar Up
2x Lock Bar Down
2x Sliding Door Obstruction Detection

2x Swing Door Lock Secure
2x Door Position Switch Closed
2x Audio Request 1
2x Intercom Station call buttons
2x Intercom station microphones

Technical Specification (Inputs)

6 x 15-24VDC source @ 10mA
2 x 0VDC sink @ 10mA

Termination of services

The module shall allow for the direct termination of the following Buss terminations:

CPU Power Supply (24VDC)
I/O Power Supply (24VDC)
Communication Protocol
Audio Bus

All services shall be terminated with Pluggable connectors with securing screws

3.2.2 Control Modules:

The control panel modules shall be designed to be installed within each local control room cabinet. The module shall provide for the control of 16 Output points and 16 input points. Connection to the control panel will be via front mounting Pluggable screw cage terminations.

- a. Communication - refer to section 5.2.3
- b. Outputs – 16 points current - 500mA – 24VDC
- c. Inputs – 16 points – 24VDC

16 way input modules compatible with the control system shall be used to receive status information of panic buttons, DPS devices etc.

16 way output modules compatible with the control system shall be used to control status indicators cell and dayroom lighting etc.

3.2.3 Communication Network:

The communication network shall provide for communication between system control modules. **The network shall be segmented into sub-nets for each control zone and/ or area. The network shall be configured so as to provide a one-half (0.5) second worst case latency from input point**

activation to programmed output point response for modules located on the same sub-network.

Sub-net-to-Sub-net latency shall be one second or less under the same conditions. Sub-net to sub-net interface shall be provided by means of a bridge to provide electrical isolation between sub-nets.

Data error checking and network data collision detection shall be an integral function of each system module and the system network protocol.

All system modules shall be capable of authentication of data by system protocol interrogation without the need for specific diagnostic equipment.

The communication network shall meet the following **minimum** specifications:

- a. Communication data rate: a minimum of 500 kilo bits per second (Kbs)
- b. Network Transceiver DC isolation from the network buss with an international standard proven protocol
- c. Minimum network length: 500m
- d. Cabling: Cat 5 UTP - 0.2mm square shielded twisted pairs
- e. Designed to comply with: FCC part 15 level B and VDE 0871 Level B
- f. Electrostatic Discharge: 15kV no errors, no hardware failures to 20 kV

3.2.4 Intercommunication audio Bus:

The intercommunication audio bus shall be installed in the same cableway system as the communication network and module power supplies.

Should additional cabling be required in the offered solution, this associated cost shall both be the responsibility and at the cost of the tenderer, as well as all associated cost as a result of this.

The Audio data bus shall provide full digital audio communications to each door control module on the individual bus segments.

Dual Audio/data networks shall be acceptable, which shall eliminate the need for an additional audio bus cable.

3.2.5 Maintenance and Spare equipment

The contractor shall provide 10% spares of all system modules, control modules, door modules including peripheral equipment, with a minimum of one modules of each type.

The contractor shall provide the Using Agency with the following:

1. One printed copy of all application source code that is specific to this project, including comments; I/O lists, binding lists and a complete instruction document detailing the replacement of each module type.
2. One copy of all application source code that is specific to this project in digital format (CDRom or 1/4" disks). The files contained shall include both compiled and un-compiled source code.

The contractor shall demonstrate that the un-compiled source code contained on the digital media is the current version of the code contained in the system modules.

3. One system-programming device to facilitate control module replacement and/or expansion.

4. CONTROL PANEL SHEETMETAL WORK

4.1 General:

All control cabinets shall be adequately sized with an additional 25% spare capacity, and shall house the necessary control equipment, which shall include but not be limited to the following:

Control system racks, modules and processors
CPU and I/O 24VDC power supplies
Camera 24VAC transformers
Lighting Interface Relays
Small power protection equipment
Field terminations
Intercom Pre-amplifier
Public Address Power amplifier
Audio switching circuitry
CCTV Matrix
CCTV Multiplexers
Local Operator 19" Workstation
Fibre Optic conversion equipment
LAN services

Control Cabinets shall be sized so as to be installed in the locations as indicated in the contract drawings.

4.2 Panel Construction:

Metal cabinets shall be constructed of materials in size, thickness and type that are suitable for the final installation environment and normal operating conditions. All cabinets shall be IP28 rated.

1. Panels are to be manufactured with a suitable means of anchoring and/or affixing to permanent plant structures. Panels should be modular in nature to facilitate ease of installation and must have a suitable method for anchoring to adjacent panels.

2. Panels and structural members shall be cleanly welded, and shall be free of gaps in corners. All joins shall be free of protruding and/or sharp edges that may cause injury. Panel work shall be inspected prior to installation to ensure that an acceptable level of workmanship has been applied during the manufacturing process.

The use of standard 19” modular cabinets is preferred to the manufacture of purpose made panel work. Drawings of all-purpose build panels shall be submitted for approval prior to manufacture.

3. All cabinets are to be supplied as floor mount units with bottom entry cable access. The cabinets shall be supplied with a plinth recessed from the front of the cabinet by a minimum of 50mm.
4. Louvered openings shall be supplied on all panels requiring excessive heat dissipation.
5. All panels housing equipment that requires routine maintenance shall be supplied with hinged and lockable doors, with handles to allow easy but controlled access to the equipment. Doors shall be manufactured consistent with the panels supplied. All panels shall make use of a common keying system. Screw type access panels shall only be accepted in areas where structural conditions prohibit the use of hinged doors.
6. All panels shall be painted as per the architect’s detail.
7. All wire ways, laminated counter tops and counter supports shall be, and do not form part of security contract explicitly noted otherwise on the contract drawings.
8. It remains the contractor’s responsibility to ensure that adequate notice has been taken of the architectural requirements prior to finalisation of cabinet detail.

5. CONTROL PANEL ASSEMBLY

5.1 Manufacture and Supply

The panels shall be supplied complete with all necessary floor channels and securing bolts, inter-panel wiring, bus wiring, trough wiring, accessories and all necessary equipment to provide a complete assembly.

5.2 Layout

The layout of the panels in the control room/s is shown on the accompanying drawing/s, and all dimensions shall be adhered to. The layout of control equipment in the panels shall be the responsibility of the contractor. Attention should be paid to the effects of Electromagnetic coupling, and the overall responsibility for providing an acceptable control system shall remain with the contractor.

Panels shall be of the single-row (simplex) type comprising one or more modules mounted adjacent to each other, or of the double-row (duplex) type consisting of two,

four or more modules mounted back-to-back. Dust proof seals shall be provided on all doors. Rubber seals will not be acceptable.

All holes through which wiring must pass shall have chamfered edges or grommets to prevent damage to insulation.

5.2.1 Simplex Panel

This panel shall comprise one, two or more modules mounted side-by-side, each module being of the unit construction, free standing cubicle design to enable a complete panel to be removed from the end or the middle of a suite of panels without affecting the operation of adjacent panel.

It must be possible to remove the rear portion with associated wiring and fittings, leaving only the channel base and bus-toughing with bus-wires and trough-wires undisturbed. Also, it must be possible to remove the bus-toughing without disconnecting any through-running wires.

Each simplex module shall have a cover fitted over the slot in the rear of the bus-toughing. Each suite of panels shall have slot cover plates on the extreme ends of the bus-toughing. Cover plates shall also be provided to blank-off holes in the sides of the end panels of a suite.

Vertical wiring troughs shall be provided on each side of the rear portion. Each trough shall have a maximum depth of 50mm and shall be fitted with insulated covers divided into three sections

The panel must be complete with fuses and links, terminals wiring and associated vertical and horizontal “wash lines”, blank gland plates, earthing bars together with all remaining accessories, swing frames or full length doors, if specified, labels and cubicle lights.

5.2.2 Duplex Panel

This shall consist of two, four or more modules mounted back-to-back and connected by a horizontal trough which constitutes the roof of the corridor formed by the two modules or rows of modules. This trough secures the modules and shall be used for inter panel, bus- or trough- wiring. The corridor formed by the two rows shall be provided with a dust proof door at each end.

5.3 Panel Finish

After fabrication is complete the metal surfaces shall be thoroughly degreased and cleaned of all mill scale and rust by means of shot- or sand –blasting or by pickling.

After cleaning the equipment shall be given one coat of an approved primer followed by two coats of an approved finishing paint of colour as specified. In the case of cold-rolled sheets the preparation may be waived providing an etching primer or other approved means is used.

The panels and toughing shall be finished light grey, No. 631 to BS. 381C with a semi-gloss (egg shell) finish.

The front and rear mounting channels shall receive an undercoat and two coats of bright black paint. Interior surfaces of the panels and the fuse and link mounting brackets shall have a gloss white finish.

Paint work damaged during transport or erection shall be made good by the Contractor, and one litre of un-thinned paint of each colour shall be provided on handover of the project.

5.4 ACCESSORIES

5.4.1 Fuses

The domestic type of cartridge fuse is preferred which has the cover plate and fuse carrier coloured as follows:-

- 5 amp - White
- 15 amp – Green (for d.c. Control Circuits)
- 15 amp – Blue (for a.c circuits V.T.)
- 30 amp – Red
- links – Black (rated for 30 amps continuous).

All d.c. circuits shall have a fuse in each phase leads.

Labels shall be affixed alongside each fuse group designating the purpose and size of the fuses.

Fuses are to be mounted as near to top and rear of panel as practicable so as to provided maximum access to their terminals and to equipment mounted at the top of the faceplate. Fuses shall not project beyond rear of panel.

5.4.2 Terminals

All terminals for connection to field wiring shall be to approval.

Not more than two conductors shall be connected to any side of a terminal.

Panel wiring shall be connected to the side of the terminal strip, which is nearest the front of the panel whilst cable tails and trough wiring shall be connected to the side nearest to the panel rear.

These terminal strips shall be mounted on the sides of each panel in such a manner as to permit easy access to all equipment after the terminals have been wired. Separate terminal studs shall be provided for incoming leads and for the corresponding internal wiring leads.

Each terminal strip shall be complete with 5% spare terminals. The terminals shall be provided with labels.

5.5 General

5.5.1 Wiring Identification

Wiring leads shall be marked at both ends with an approved type of marking device, permanently marked with black letters impressed on a white background.

Interlocking type ferrules are preferred and shall match the size of wire onto which they will be fitted. The “slip-on” type is preferred but for the smaller sizes of wire the “clip-on” type are acceptable.

For all wire without lug terminations, the ferrule must not fall off when disconnecting the wire and in this regard, the use of one strand of wire to retain the ferrule is acceptable providing that this is used in a very neat manner.

Ferrules should be handed so as to read the right way up on the cable terminal strips and to read from insulation to crimped lug in the case of relay and instrument connections, etc.

5.5.2 Cable Gland Plates

Removable blank gland plates shall be provided. They shall be fixed to the panel by hexagon headed screws. All drilling of gland plates, cabling, making-off and connection of cable tails shall be the responsibility of the contractor.

5.5.3 Earthing

A tinned copper earth bar shall be provided per panel and shall be fitted to the bottom rear at a position such that it can be connected to the earth bar of the adjacent panel by the use of a copper-connecting strap.

The Contractor shall ensure that all metal non-current carrying parts are effectively connected to this earth bar either by means of their mounting arrangement on the panel or by means of a special earthing conductor.

5.5.4 Labels

Labels shall be provided on the front of each panel, also in the interior for fuses and terminal strips.

Labels shall have a minimum thickness of 1mm and shall not discolour or distort in service. Labels made from white/black/white sandwich board, engraved through one white layer to give black letter on a white background, are preferred although labels made from white opal Perspex having black-filled lettering are acceptable provided that the medium used for filling is black brushing cellulose lacquer.

Filling waxes are not acceptable.

For labels manufactured from sandwich board, the depth and angle of engraving cut shall be such that the black lettering shall be clearly visible and legible when viewed at an angle of 45 degrees. Width of cut is to be taken as width of exposed “Black”.

The label edges shall be chamfered to give an overall neat finished appearance.

5.5.5 Panel Lighting

Each panel shall be provided with an internal lamp suitable for a 220-volt a.c. supply.

A switch shall be provided in each panel.

5.6 INSPECTION AND TESTS

The user reserves the right to inspect the panels in the manufacturer's works at any stage of their manufacture. The Contractor shall advise the user in writing within 7 days of commencement of assembly /wiring etc.

Tests shall include insulation resistance, earth continuity and wiring accuracy tests in the manufacturer's works.

The Commission reserves the right to test the panels in the manufacturer's works before dispatch. Testing can be carried out "piecemeal", i.e. on individual panels or circuits as they become completed, as it is unnecessary to wait for all panels to be completed before testing is arranged.

The Contractor shall give the user at least 3 days notice of the date on which panels will be ready for final inspection and testing.

5.7 DRAWINGS

As soon as they become available, duplicate copies of the panel, shall be handed to the user.

The contractor's panel and wiring diagrams shall be submitted for approval within three months of placing the order. These wiring diagrams will be approved by the user in principle only, as the user regards these diagrams as an intermediate step used by the Contractor to assist in the manufacture of control/relay panels.

The user may on occasion supply their own panel wiring diagrams and these may be used by the contractor to assist in manufacture. The user reserves the right to correct any manufacturing errors that may be found and to charge the contractor with appropriate costs.

6. LIGHTNING/SURGE SUPPRESSION

6.1 General:

The contractor shall provide and install all the necessary Transient Voltage Surge Suppression (TVSS) devices, for the protection of the electrical/ electronic control equipment, communication and data lines. TVSS devices shall protect all AC and DC circuits from the effect of lightning induced over voltages, internally generated transients and utility switching transients.

6.2 TVSS Technology – AC Power Applications

- 6.2.1 The primary suppression path shall be pure silicon avalanche diodes
- 6.2.2 Silicon avalanche diodes must be bi-polar, of grade A, +- 5 % tolerance
- 6.2.3 Surge suppression devices shall provide ‘power on’ and ‘failure’ indication. An optional remote status capability for indication of primary suppression path failure shall be available.
- 6.2.4 All AC TVSS devices shall be UL listed and bear the UL label on each component. All AC TVSS devices shall be tested in accordance with the ANSI/IEEE testing standard.
- 6.2.5 Gas tubes, Selenium plates, MOV or Hybrid type suppressors will not be accepted
- 6.2.6 AC power protection units shall be in accordance with the specifications and regulations as proposed by the IEC.
- 6.2.7 AC protection components shall be installed on the supply side of the local control room UPS.

6.3 TVSS Technology – DC Applications

- 6.3.1 The primary suppression path shall be pure silicon avalanche diodes
- 6.3.2 Silicon avalanche diodes must be bi-polar, A grade, +- 5% tolerance.
- 6.3.3 Surge suppression devices shall operate in parallel to the protected circuit shall not employing switching components and have no series resistance.
- 6.3.4 Surge suppression devices shall provide a minimum of 5 joules or silicon avalanche diode per line, not per device.
- 6.3.5 Initial clamping voltage shall not exceed the signal line voltage by more than 25% unless recommended by the security equipment manufacturer.
- 6.3.6 Gas tubes, selenium plates, MOV or hybrid type suppressors will not be accepted
- 6.3.7 Coaxial transient suppressor: TCS-CP 1 or approved equal.

6.4 Application

- 6.4.1 Install TVSS devices on all AC supply lines and communication lines to protect against surges induced on all control lines, sensors, data lines and cables, which enter and exit buildings.
- 6.4.2 Communication protection devices shall be mounted in IP54 enclosures with all wiring in the enclosure to be kept in plastic wiring troughs.

The incoming cables shall be separated from outgoing cables.

There shall be an earth bar in the lower corner of each enclosure and shall be sized to accept a 16mm square BCW. The Bare Copper Wire shall be terminated to the nearest earth mat.

- 6.4.3 AC protection devices can be located in the equipment cabinet and must be installed prior to any distribution (i.e. multi-outlets).

The contractor shall ensure that lightning surges of 10Ka @ 8/2 can be safely accommodated by the TVSS devices installed without damaging the surge suppression equipment permanently.

7. UNINTERRUPTIBLE POWER SUPPLY SYSTEM

7.1 General:

The contractor shall supply, install and commission an adequately sized dual redundant hot standby centralised uninterruptible power supply system for all security related equipment including but not limited to Closed Circuit Television equipment, Control hardware, Operator workstations, Audio control equipment, Alarm monitoring systems and Sliding/Swing door locking devices.

The UPS system shall be centralised and consist of a full dual redundant UPS units each individual UPS unit shall be capable of supplying the total load requirement of the security installation.

The contractor shall take note that a 25% spare capacity shall be allowed in the supplied centralised UPS (dual redundant) system to allow for system growth as well as to sufficiently allow for system start ups.

The units shall receive their power supply directly from the main / emergency power (generator) supply of the facility, within the Central equipment room provided. The contractor shall be responsible for the complete UPS power reticulation system including the supply of the Incoming and outgoing distribution cabinet, appropriately sized supply cables to each local control area, all DB's required and associated with this supply and all necessary surge protection equipment.

The UPS system shall enable the entire security system to operate independently of the general facility power supply, and shall be capable of providing at least 35 minutes of uninterrupted power per individual UPS (**not per set**) in the case of failure of the facility supply.

In the event of a failure of the facility and emergency (standby generator) power sources, the UPS system shall provide visual and audible fault indication and report the appropriate condition to the local and central operator workstations.

The interface to the Security Management System shall be via a high level interface (HLI) to the SMS server situated in the Central equipment room control cabinet. Interface. Interface via dry contact shall not be acceptable.

7.2 Construction:

The uninterruptible power supply shall have a three phase output voltage of 380 VAC (star configuration) and a full load current capable of supplying all systems indicated herein.

The contractor shall utilise each of the single phase 230VAC for distribution of UPS power.

The contractor shall note that the UPS shall be considered the main earth reference for the entire security installation and all earthing for the security installation shall be done from this point.

The units shall operate with an input voltage of 380 VAC, three phase, 50 Hz.

The output frequency stability when operating without an input (inverter mode) shall be not less than $\pm 0.25\%$. Static voltage regulation shall not exceed $\pm 3\%$ with a dynamic regulation of at least $\pm 10\%$ for any load change not exceed 20% of full load rating. The contractor is responsible for sizing UPS systems to meet the correct requirements.

7.2.1 The unit shall operate normally with a $\pm 12\%$ input voltage with **an unity** power factor, from 0 degree to 40 degree C n a humidity of 0 % to 95 % and shall deliver 200% of rated power for 10 seconds and 125% for 10 minutes.

7.2.2 All units shall feed power **on line** and in the event of a loss AC input power, the unit shall continue to provide power to the equipment.

Output power shall remain constant during transfer to/from input AC line power of DC source inverter power.

In the event of an inverter malfunction the unit will indicate and sound an inverter malfunction alarm and the inverter will shut down. The inverter shall shut down and drive an alarm when the input voltage drops below 12% of rated input voltage.

7.3 Batteries

The batteries shall be sealed lead acid/gel/cell maintenance free type. The batteries shall have heavy duty, radial grids for mechanical strength with low grid corrosion rate and PCV plastic separators for low internal resistance.

Batteries shall be sized as recommended by the manufacturer to supply the necessary DC power to the UPS system for the extended run time required.

The batteries shall be protected with a circuit breaker and the charger shall give a fault indication and shut down if an over voltage condition exists.

The charger shall receive source power from the same AC line circuits as the UPS AC inputs.

Sufficient batteries shall be provided in order to supply 230 volts to the load for a period of time as required above. The complete system (batteries and UPS) shall be furnished and guaranteed by the same manufacturer.

The batteries shall be sealed lead acid/gel/cell maintenance free type. The batteries shall have heavy duty, radial and be guaranteed for a period of 10 years.

7.4 Status Indication

7.4.1 The unit shall have an indicator panel with the following condition indicators:

- a. UPS Overload
- b. Electronics Fault
- c. Battery Fault
- d. Ambient Temperature warning
- e. Percentage load per UPS
- f. Lamp Test
- g. Operation on Manual Bypass
- h. Operation in Online Mode
- i. Operation on Battery

7.5 Integration with the Security Management System

The Dual redundant centralized UPS's shall be fully integrated with the Security Management System by means of a High Level Interface (HLI), to provide operators and technicians with detailed status and alarm conditions regarding the UPS systems.

Due to the Centralised configuration, the following detailed diagnostic information is required, and shall be presented to the operator via a drop down menu option within the SMS:

Battery Data:

- Battery Status
- Time Remaining in minutes
- Remaining Charge in %
- Battery Voltage
- Battery Current
- Battery Temperature in DegC

AC Input Data:

- Frequency per phase
- Voltage per phase
- Current per phase
- Power per phase

AC Output Data:

- Frequency per phase
- Voltage per phase
- Current per phase
- Power per phase
- Load % per phase

UPS Alarm Conditions:

- Battery Failure
- On Battery Power
- Low Battery
- Depleted Battery
- Over Temperature
- Input Supply Out of Limits
- Output Out of Limits
- Output Overload
- Bypass Active
- Bypass Inhibited
- Charger Failure
- Fan Failure
- Fuse Failure
- Diagnostic Test Failure
- Communications Failure
- Shutdown Pending
- Shutdown Imminent

All alarm conditions shall be presented to the operator within the Fault queue as described in Section 2.14.2.11 of the specification.

8. CELL, DOOR INTERCOM AND PUBLIC ADDRESS SYSTEM

8.1 GENERAL

The system shall consist of a full duplex intercommunication system to provide digital voice communication, public address, voice recording, event logging, and interface to other security sub-systems.

Intercom stations shall be connected in a modular bus configuration in order to reduce cabling requirements. Point to point systems shall not be considered.

Analogue/digital hybrid systems making use of separate data and audio bus cabling shall not be accepted, and the tenderer shall provide sufficient technical literature to fully evaluate the data/audio protocol utilized by the system.

The system shall be compatible with standard voice over IP products (IP Telephony), which employ such protocols as SIP, and be capable of communicating both data and audio signals over standard TCP/IP and UDP Protocols. Where possible the system should make use of existing Large Area Networks for the transmission of control and Audio data.

The overall design of the system software and cabling shall be such that as far as practical, failure of one part (building) of the system does not affect normal operation of any other part of the system.

The system shall employ full duplex digital audio technology and provide clear undistorted speech communications, free from background noise and/or external interference.

Amplification shall be provided at each intercom or PA station in order to provide the option of piping music to groups or individual stations as required.

The system shall be capable of transmitting at least 32 simultaneous full duplex conversations via the TCP/IP network running between control areas, whilst being capable of transmitting two simultaneous full duplex conversations across any local intercom station bus, in order to pipe music to all speakers, whilst simultaneously holding a conversation with any selected intercom station.

The intercom system shall be capable of being fully integrated with the SMS via a bi-directional high level interface to allow remote monitoring of all intercom station calls by the SMS with select calls being used to trigger the CCTV system camera and display of door and gate intercoms to the SMS operator terminals, in a picture-in-picture format. All such interfacing of systems shall be configured such that if any one system fails to operate, the other systems shall continue to operate without any detrimental effect.

8.1.1 Cell and Passage Door Intercom Stations

The contractor shall supply, install and commission a networked Cell and passage door Intercom System to the locations nominated in the accompanying drawings. Monitoring locations shall be provided in each local control room, with the primary central monitoring location to be installed in the Central Control room.

Calls originated from cell and passage door intercom stations shall be routed to the respective local control room SMS Operator terminal.

A Call diversion facility in the event of un-answered or unattended mode shall be provided, and shall be configured to the engineer's specification.

All conversations between Control stations and Cell intercom stations shall be digitally recorded on the cell intercom digital recording system.

The Digital Recording System shall be expandable to cater for future system expansion.

8.2 GENERAL OVERVIEW

The systems major components shall be located as follows:

8.2.1 Central Control Room

19" rack mount Central Processor located within an equipment rack in the Central Control Room security equipment cupboard.

Rack mount Ethernet based Communication Controllers to interface to the local control racks situated in the Local control room equipment cupboards.

Digital Voice Recording System located within an equipment rack in the Central Control Room security equipment cupboards.

System power supplies.

8.2.2 Local Control Locations

19" rack mount local controller.

Rack mount Ethernet based Communication controller to interface to the Central Control Room intercom rack.

Rack mount Communication Master controller cards to interface to intercom stations in a Bus configuration.

8.3 SYSTEM OF OPERATION

8.3.1 General

Within each nominated building, the contractor shall supply and install an integrated intercom system. The system shall be complete with cell and passage digital intercom stations, 19" rack mountable field controllers to provide voice communications to the local control room and/or the Central Control Room.

The system shall provide the following minimum system functions:

8.3.1.1 Normal calls

Calls initiated from Cell/Staff Intercom stations to system operators or vice versa

8.3.1.2 Alarm calls

Emergency calls initiated by officers or automatically triggered by system events such as audio level alarms.

8.3.1.3 Tamper calls

Tamper calls initiated when an attempt is made to gain unauthorized access to intercom station electronics

8.3.1.4 Database for prisoner data

The system shall provide a database for prisoner and/or staff personal data. It shall be possible to import existing prisoner databases by means of an import tool. It shall be possible to display data from the central database on multiple operator workstations according to authorisation levels. Editing of database entries shall be password protected.

8.3.1.5 System error messages and event logging

System errors and disturbances shall be displayed on appropriately configured operator workstations according the type and location of the error or event. Disturbances such as raised voice levels in cells shall automatically generate alarms, which shall be documented in a log file and on a printer.

System functionality shall not be influenced in the event of failure of any one part of the system or operator station. Each operator workstation shall be configured as an autonomous system. In the event of an operator system failure, the functionality of that station shall be transferred to another operator workstation on the system according to a pre-configured set of rules.

8.3.1.6 Data Integrity

In the event of power failure, the actual status information in the system at the time of the failure shall not be lost. When the power is reconnected, all status information at the time of the power failure shall be retrievable and will be displayed on the relevant screens.

8.3.1.7 Listen-in

A “Listen-in” function shall be provided, and configured in accordance with the engineer’s specification, to provide either overt or covert operation or to be disabled altogether.

Overhearing (listening-in) from one cell to another via the cell station shall not be possible.

8.3.1.8 Public Address system

It shall be possible to annunciate messages in two ways:

- By initiating a group call to a selected group or all intercom stations.
- By initiating a group, or all PA stations which have been configured on the system.

Any operator workstation on the system shall be capable of being configured with PA functionality as required.

8.3.1.9 Audio level detection

Each intercom station shall be capable of automatically detecting excessive Audio Levels, and shall be configured remotely by means of the installation bus cabling. The system supervisor shall be capable of individually setting the audio alarm level sensitivity of each cell intercom station.

8.3.1.10 Call Monitor

A Call Monitor facility shall be provided, which shall provide the operator with station identification together with information of inmate(s) housed in appropriate cells. The call monitor shall display the calls and events from individual cell intercom stations in a priority based text listing.

The Call Monitor function shall be capable of displaying the following information.

Normal calls, Tamper calls, Alarm calls, Guard present, Intercom Station Error, Intercom Station Failure

It shall be possible to configure the call or event priority on the operator GUI.

The system shall automatically provide the operator with inmate data including a list of inmates housed in this area as well as an option to select a specific name on this list as well as a photograph and a graphical representation of the area in which the inmate is being housed, should this be a requirement of DCS.

8.3.2 Establishing a Call

At a minimum the system shall be capable of establishing calls in the following three ways:

8.3.2.1 Search by data

It shall be possible to select a specific field within the database by which to search for an inmate i.e. the Surname and name field may be selected and an inmate search performed by typing the inmate Surname and name into the system.

Once the entry has been found a simple keystroke shall establish a call to the appropriate intercom station.

8.3.2.2 Respond to Normal Calls

Call-ins shall be entered into Call-in queue on a first in – first out (FIFO) bases, and sorted by priority level. Priority levels shall be set for each intercom station on the system. On receiving a call-in the operator shall only need make a single keystroke to answer the highest priority call that has been in the queue for the longest period of time. It shall also be possible to select a specific call-in and initiate a call by making a single keystroke.

8.3.2.3 Response to Alarm Calls

The system shall be capable of automatically detecting raised audio levels at nominated intercom stations. It shall be possible to configure the system to automatically initiate calls to intercom stations that report audio level alarms. The system must have the facility to de-activate this reporting or detecting capability.

8.3.3 Call & Event Logging

All calls and events shall be logged to a log file. Log files shall be named and stored by date.

The current or historical log files shall be displayed on the screen or printed out on request. The system shall maintain log files for a minimum of six months. The system shall provided the operator with a warning prompt indicating the files should be backed up if required for a longer duration.

8.3.4 System Maintenance

The system shall be provided with a system configuration tool whereby system parameters may be set for individual intercom stations. All system parameters shall be downloaded from a Central station, and shall not require the opening of intercom points in order to change system parameters.

All setting changes shall be automatically updated in the work-files without saving. When loading the maintenance tool, the last entered data in the work-files shall be used.

8.3.5 Operator Microphone and speaker set

Activation of calls or the selection of calls in the control rooms shall be done by selecting the intercom icon on the SMS. When the call is connected, this event shall be recorded at the central controller processor including date, time, cell call station number and duration of the call.

When the icon has been selected the call will be connected. By selecting the same icon a second time will cancel the call.

When the call has been activated, a microphone situated on the plasma SMS screen shall serve as the control room microphone.

The speakers situated on the SMS plasma screen provided in each control room shall serve as the listening in speaker set.

It shall also be possible to answer calls by means of lifting an operator handset from the cradle in locations where a handset is specified.

Call shall be cancelled by replacing the handset. When the call is connected, this event shall be recorded at the central controller processor including date, time, cell call station number and duration of the call.

A tone shall sound from the intercom whenever a call is answered.

Upon cancellation of a call the Operator station shall indicate the next priority call for that building.

8.3.6 Call Routing

If a call is not answered or cancelled locally within a user adjustable pre-determined time of 30-600 seconds the call shall be automatically switched to the Central Control station.

8.3.7 Multiple or Simultaneous Calls

Cell calls arriving at the local control panel or nominated Central Control Room operator's terminal shall be queued so that calls are listed and answered consecutively, in accordance with their priority and chronological arrival time.

Cell calls from Buildings, which are in attended mode and have been switched through to Central Control Room by default, shall have priority over calls from Buildings in unattended mode.

The system shall have programming capability for priority queuing so that inmates with medical or other problems can be assigned a higher precedence to pre-empt existing lower

Priority cells shall be highlighted on the Central Control Room operator's terminal.

8.3.8 Public Address

It shall be possible to initiate a public address call from any operator control station to a building or group of cells that is under his control utilising the cell intercom units within their area of responsibility.

The system shall also have the capability to provide control of general public address speakers to nominated areas.

8.3.9 Suppression of Call

An operator shall be able to suppress calls from an individual cell or group of cells. This shall be initiated in the event of nuisance calls from cells. The suppression of the call function shall only be available when enabled via a high-level password control allocated to a supervisor.

Once a cell has been isolated calls initiated from the cell shall not register at the operator stations. The cancellation of calls shall be recorded in the event logging system.

After a pre-determined time period a (5-30 minutes) a message shall be generated and displayed at the local control station or the Central Control station to remind the operator that the cell is in the isolated state. The operator shall either:

1. Acknowledge the message only. In this case the cell intercom shall remain isolated for a further period, and so on, until the "cell isolate" is reset.
2. Reset the cell intercom. In this case the cell intercom shall operate as previously described.

All activity including suppression of intercom unit(s), acknowledgment of reminder message and reset of intercom unit shall be recorded on the CPU events log and system printer.

The ability to implement the call suppression feature shall only be able to be activated and deactivated from a restricted access menu.

8.3.10 Cell Monitoring

The System shall have the capability of individually setting the Audio level Alarm set point for each intercom station.

Raised voices in cells shall automatically trigger an alarm condition once the set point has been reached. The alarm condition shall be reported to the local control station as an alarm call-in.

The Audio level set point for each station shall be configured over the data network, and shall not require the station to be removed.

This function shall be de-selectable

8.3.11 Future Expansion

The Cell Intercom system shall be capable of being expanded for extended use within the total complex for future extensions. All upgrades to provide this service shall not affect the existing service as specified in this document or render the equipment, as specified, redundant in any form.

All system upgrades shall be configured using similar equipment and operate in the same manner in all respects. Any upgrades should cause minimal disturbance to the existing service.

8.4 INTERCOM STATIONS

Intercom stations shall be mounted in flush wall boxes as detailed on the Engineer's drawings. The accommodating wall boxes complete with acoustic material, conduits and draw wires for cabling access and cabling are to be supplied and installed as part of this project.

Intercom stations shall consist of a vandal resistant, momentary action, call switch, speaker and microphone mounted into a stainless steel flush plate.

Cell intercom units shall be designed/constructed/installed as follows:

- Front plate to be stainless steel 3 mm thick with 2.5 mm radius corners.
- The Speaker grille will be a grid pattern of 3 mm holes.
- A 3 mm thick baffle plate with a corresponding 3 mm offset grid pattern.
- Mylar speaker with 5 watt power rating.
- The microphone shall have a minimum 36 DB dynamic range.
- The unit is to be fixed to the back box using 4 security screws.
- An exterior, which does not facilitate the concealment of contraband.
- Sealed to the mounting surface with an anti-pick mastic or silicon beading agent.
- The electronics so designed so that shorting any pair of intercom unit cable pairs will not cause damage or blow a fuse in any part of the system.
- A tamper alarm separate to the call alarm to notify the respective operator station of an intercom unit's removal.
- A call LED protected by a flush polycarbonate lens will operate when the call button is pushed.
- The call button is to be a robust, vandal resistant push button manufactured of stainless steel.
- The call button shall activate a micro switch and bear against a solid shoulder, which resists knock through. An internal neoprene gland seals the button to IP65.
- Build in 1-Watt amplifier with software adjustable gain.
- Cabling shall be a Cat5, bus feed, fully digital transmission of speech and data.
- Adjustable microphone sensitivity

Intercom station electronic circuitry shall be optically isolated from the incoming data/audio bus.

8.5 DIGITAL AUDIO RECORDING SYSTEM

A digital voice recording and playback system shall be supplied and installed as part of the Works.

The central processor and associated peripherals shall support digital recording for a minimum of 32 channels without the requirement for additional central processors installed in each local area.

The system shall support up to 32 channels of voice data information per central processor.

Time and date stamping shall be automatically logged to all audio channels.

Central processors for the digital voice recording system shall be installed in the Central Control Room Security equipment panels.

The voice recording system central processor shall provide immediate access to, and recording of, voice inputs via an onboard storage medium to a minimum capacity of 1200 hours of on-line data.

Each unit shall have an in-built audio tape deck or output jack complete with compatible headphones for monitoring of conversations without interruption to normal operation.

A CD-drive shall be installed as part of the central processor configuration for the archival of data.

The audio recording system shall provide the following alarm conditions:

- Recording medium capacity consumed by 80%
- Audio recording system non-operational due to power failure or failure of unit to record.

When the hard disk reaches full capacity the system shall automatically over write the oldest dated data file. Access to the voice recording system shall be controlled by password authorisation. A minimum of three levels of access rights shall be provided.

The Intercom system supplied and installed, as part of these works shall be interfaced to the voice recording system.

All voice communications shall be automatically recorded on a digital recording medium with time and date being encoded on the same channel as each conversation.

8.6 NON-CONTACT INTERCOMS

Provide individual audio monitoring and recording of the non-contact visiting booths in the nominated locations.

Provide visitation intercom stations to the same specification to that of the cell and passage intercom stations, however without the call button.

All voice communications shall be automatically recorded on a digital recording medium with time and date being encoded on the same channel as each conversation.

8.7 DOOR INTERCOM OPERATION

The door intercom system shall be configured to provide the functionality shown on the drawings.

In general, when a door intercom point is activated the intercom shall be answered from the relevant SMS operator station via a dedicated handset or by selection of the intercom icon on the SMS with a picture-in-picture image of the general area of the call point displayed on the same SMS operator station.

The SMS terminal shall include a graphical display to connect and cancel intercom calls as elected.

The video image shall remain active until:

- The respective door is opened and subsequently closed.
- The call is terminated by the SMS operator.

In the event of a door intercom point not being answered within the default time period of 30 seconds or the relevant SMS operator terminal being off-line the call shall automatically divert to the Central Control Station.

8.8 PUBLIC ADDRESS SYSTEM.

The public address system shall be provided as an integral part of Intercom system.

The system shall include internal public address to nominated buildings via ceiling or wall mounted speakers and externally mounted horn-type speakers for non-building areas such as exercise yards and external association areas at the locations indicated on the drawings.

PA stations shall be provided with a built-in 10W audio amplifier, and shall be capable of providing a continuous music channel if required.

8.9 CABLING

Bus Cabling between individual intercom and PA stations shall consist of the following:

- 1.) 1x 3 Core 1,5mm Power Cable
- 2.) Cat5 Data/Digital Audio Cable.

All intercom circuit cabling shall be terminated to the relevant Master Controllers situated in the local control racks.

9. CLOSED CIRCUIT TELEVISION SYSTEM (CCTV)

9.1 Acceptable Manufactures:

The contractor shall provide the manufacturer and model detail of all CCTV system components in the Section referring to (Information to be rendered by tenderer) of the tender document.

The CCTV components selected shall be suitable for installation in a maximum-security facility, and shall require the prior written approval of the Department.

9.2 General:

The contractor shall provide a complete closed circuit television system to comply with the requirements as detailed throughout this document, and which shall comply fully with the requirements of this specification for a direct supervision facility.

The system shall contain a microprocessor-based video-switching matrix utilising fiber optic technology as trunk lines from each local matrix to the Central and Movement control rooms.

The system shall support a serial interface capable of communicating via proprietary hardware and software in order to route switching commands from any operator workstation to the relevant switching matrix.

Fixed camera lenses shall be interchangeable in order to adjust received images to comply with the requirements of direct supervision as detailed in the security guidelines of the Department.

9.3 Camera Equipment:

All cameras provided shall be the product of a single manufacturer whose product have been UL rated.

9.3.1 Interior Wall Mount Camera Locations

Interior wall mount camera shall comply with the following specifications:

a. Camera

1/3" CCD Colour cameras incorporating the latest CCD technology shall be used throughout the facility. The camera shall require a maximum of 0.4 lux for usable video and 0.8 lux for full video. The camera shall include the following features:

- back light compensation – on/off
- an automatic shutter with an adjustable limit
- fixed or automatic white balance. Automatic sensing 3200K to 5500K
- Video output 1.0Vp-p plus minus 0.1 Vp-p, 75 ohms
- Aperture correction: horizontal and vertical
- Horizontal Resolution Minimum 582 TVL
- Auto shutter, 1/50 to 1/100 000
- BNC video out

- Working temperature minus 20 degrees to 50 degrees Celsius

The camera shall incorporate the latest digital signal processing technology, and shall offer enhanced video quality.

Innovative digital adjustment control will automatically set colour.

The camera shall be compatible with standard auto-iris and DC controlled lenses

The camera shall have the supply voltage of 24VAC or DC and shall be suitable for a **PAL B** colour system.

b. Camera lens

A 1/3" format camera lens with a 6mm fixed focal length is required.

Image focusing shall be performed by the camera.

The auto iris and iris video input signal should have a supply voltage ranging between 8 and 12 VDC.

The lens shall be an auto iris lens with an f-stop iris range of 1.4 to 64.

The operating temperature of the lens shall be between minus 20 degrees and 50 degrees Celsius.

c. Camera Housing

Internal housings shall be vandal-proof and suitable for a 1/3" format CCD camera. The housing shall be UL rated and include a camera-mounting cradle that can be rotated 180 degrees.

The housing shall contain an abrasion resistant viewing window. The rear end of the housing shall contain 3 fittings to permit the passing of the video, AC power and PTZ control wiring.

9.3.2 Interior Ceiling Locations

Interior ceiling mount cameras shall comply with the following specifications:

a. Camera

1/3" CCD Colour cameras incorporating the latest CCD technology shall be used throughout the facility. The camera shall require a maximum of 0.4 lux for usable video and 0.8 lux for full video. The camera shall include the following features:

- back light compensation – on/off
- an automatic shutter with an adjustable limit
- fixed or automatic white balance. Automatic sensing 3200K to 5500K
- Video output 1.0Vp-p plus minus 0.1 Vp-p, 75 ohms

- Aperture correction: horizontal and vertical
- Auto shutter, 1/50 to 1/100 000
- Horizontal resolution minimum 582 TVL
- BNC video out
- Working temperature minus 20 degrees to 50 degrees Celsius

The camera shall incorporate the latest digital signal processing technology, and shall offer enhanced video quality.

Innovative digital adjustment control will automatically set colour.

The camera shall be compatible with standard auto-iris and DC controlled lenses

The camera shall have the supply voltage of 24VAC or DC and shall be suitable for a **PAL B** colour system.

b. Camera lens

A 1/3" format camera lens with a 6mm fixed focal length is required.

Image focusing shall be performed by the camera.

The auto iris and iris video input signal should have a supply voltage ranging between 8 and 12 VDC.

The lens shall be an auto iris lens with an f-stop iris range of 1.4 to 64.

The operating temperature of the lens shall be between minus 20 degrees and 50 degrees Celsius.

c. Maximum Security Ceiling Mount Housings

Ceiling mount housings shall be rated for maximum-security applications. These housings shall be used for all high security conditions where cameras are required, and shall be suitable for a 1/3" format CCD camera

The housing shall be manufactured from cold-rolled steel and shall be equipped with a viewing window. The access doors shall be secured by a quality key lock.

Cable entry access shall be through the rear of the housing.

The housing shall include a slide out shelf with an adjustable mini tilt bracket to allow for camera mounting.

9.3.3 External Camera Locations

External mount cameras shall comply with the following specifications:

a. Camera

1/3" CCD Colour cameras incorporating the latest CCD technology shall be used throughout the facility. The camera shall require a maximum of 0.4 lux for usable video and 0.8 lux for full video. The camera shall include the following features:

- back light compensation – on/off
- an automatic shutter with an adjustable limit
- fixed or automatic white balance. Automatic sensing 3200K to 5500K
- Video output 1.0Vp-p plus minus 0.1 Vp-p, 75 ohms
- Aperture correction: horizontal and vertical
- Auto shutter, 1/50 to 1/100 000
- Horizontal resolution minimum 582 TVL
- BNC video out
- Working temperature minus 20 degrees to 50 degrees Celsius

The camera shall incorporate the latest digital signal processing technology, and shall offer enhanced video quality.

Innovative digital adjustment control will automatically set colour.

The camera shall be compatible with standard auto-iris and DC controlled lenses

The camera shall have the supply voltage of 24VAC and shall be suitable for a **PAL B** colour system.

b. Camera lens

For some outdoor applications fixed focal length lenses are required and for others pan tilt cameras are required under this contract as indicated in the camera schedule.

Fixed focal length camera lens

Image focusing shall be performed by the camera.

The auto iris and iris video input signal should have a supply voltage ranging between 8 – 12 VDC.

The lens shall be an auto iris type with an f-stop iris range of 1.4 to 64.

The operating temperature of the lens shall be between - 20 degrees and 50 degree Celsius.

Pan Tilt Zoom camera lens

A 1/3" format camera lens with a variable focal length of 8 to 48 is required.

The lens shall be an auto iris type with an f= Stop iris range of 1.4 to 360.

The auto iris and iris video input signal supply shall be between 8 and 12 VDC.

The operating temperature of the lens shall be between –20 and 50 degrees Celsius.

c. Camera Housing:

The Outdoor camera housing shall be manufactured from extruded aluminum and shall include a one-piece camera mounting cradle with front and rear end caps. The viewing window shall be manufactured of glass. The housing shall be equipped with an integral heater designed to ensure minimal fogging due to inclement weather. The housing shall be suitable for a 1/3” format CCD camera.

The cable entry access shall be through the rear of the housing. Inside the housing shall be a removable cradle assembly for to mount the camera and lens. The cradle shall be able to rotate with 36 degrees.

The enclosure shall at least be manufactured to IP65.

d. Sun Shield

A sun shield to protect the camera from direct sun shall be provided for all outdoor housings.

e. Tamper Kit

A tamper kit for suitable for outdoors housing shall be provided.

f. Blower

A fan/thermostat combination shall be provided for outdoor housing units. The fans shall be UL listed.

The thermostat shall operate between 26 and 35 degrees Celsius.

The supply to the blower shall be 230VAC, 50 Hz or 24V AC or DC.

g. Pan/tilt Unit

Weatherproof outdoor pan/tilt units are required for all outdoor pan/tilt cameras. The pan tilt offered shall be a compact, low profile unit and shall be constructed from corrosion-resistance material. The devices offered shall be fully system compatible with CCD cameras, lenses and housing combinations.

The motor of the pan/tilt unit shall be capable of a 100% duty cycle, to permit continuous operation, and shall require low maintenance.

Minimum set point adjustment:

- Pan (Horizontal): 15 - 355 degrees
- Pan (Vertical) +20 - -90 degrees
- Pan/Tilt Speed: 6.3 degrees / Second
- Operating Temp: -20 to 60 degrees C
- IP Rating: IP66
- Power Supply: 240VAC 50Hz

PTZ Functional Requirements:

- Full featured pan/tilt/zoom/auxiliary control
- Auto-pan/random pan
- Multidrop RS485 communication protocol
- Communication to Matrix Switchers via a proprietary protocol
- Minimum of 3 auxiliary outputs
- Minimum of 99 preset positions
- Minimum of 8 alarm presets positions
- 10-bit resolution for position accuracy

9.4 Mounting Brackets:

All brackets shall be of the heavy-duty type.

9.4.1 Outdoor use

All brackets shall be suitable for outdoor use and shall be able to carry a load of at least 60kg.

9.4.2 Indoor use

All wall-mounted cameras shall be provided with locking, swivel, adjustable heads with an adjustable pan of 360 degrees and tilt of 180degrees.

9.5 Monitors:

All CCTV monitors supplied shall be super high-resolution colour monitors.

All Monitors, Cameras and associated hardware shall be supplied by the same manufacturer, to ensure system compatibility.

The monitors composite video output channel shall be compatible with the Digital Video Recording Input Channel impedance.

All equipment shall be PAL compatible, and shall be supplied with 230 V, 50Hz.

9.5.1 Sequencing and/or dedicated monitors

Sequence Monitors shall be at least 14” super high resolution colour monitors, and where applicable shall be mounted in recessed mounting brackets as indicated in the control room layout drawing.

9.5.2 Spot Monitors

Spot Monitors shall be at least 14” super high resolution colour monitors, and where applicable shall be mounted in recessed mounting brackets as indicated in the control room layout drawing.

Each control room shall be equipped with at least one spot monitor.

9.5.3 Quad Monitors

Quad Monitors shall be installed in control rooms requiring in excess of five (5) sequencing monitors (>20 Cameras).

Quad monitors shall be at least 20” high-resolution colour monitors, and the quad image shall be obtained through the installation of Real Time quad units.

Multiplexers shall not be used for this purpose in order to avoid the effects of time slicing.

9.6 CCTV Matrix Switchers

9.6.1 A Matrix switcher shall be installed within each control room panel, and networked via a proprietary protocol to the Master Matrix switcher/s situated in the Central Control room.

9.6.2 The local CCTV matrix shall be fully integrated with the local operator control workstation, from which commands shall be issued to the Matrix via a serial protocol. The use of camera selection via potential free contacts shall not be accepted.

9.6.3 The driver interface between the operator console and the matrix shall be capable of issuing the complete command language set of instructions via the serial link, and shall include the ability to control the PTZ functions of appropriate cameras.

- 9.6.4 By selecting the appropriate icon on the operator control console, the camera image shall be transferred to the spot monitor via the switcher output channel. The matrix shall be capable of reverting to a pre-programmed sequence display after a programmed timeout period.
- 9.6.5 The Central matrix switchers shall be capable of selecting any camera in the facility by issuing a command to the relevant matrix via the proprietary protocol.
- 9.6.6 All switchers will include a 16 character camera title, non-volatile memory back up, on screen status line and on-screen configurations menus.

9.7 Matrix Switcher Functional Requirements

- 9.7.1 The switchers provided shall be microprocessor-based units and modular in construction.
- 9.7.2 The unit shall be fully programmable and be capable of switching any camera input to any monitor output either via a serial command or automatically via an internal camera sequence.
- 9.7.3 Programmed sequences shall be capable of being run in the forward or reverse direction
- 9.7.4 All units shall be capable of controlling external PTZ cameras via an integrated RS485 Multi-drop output.
- 9.7.5 Any monitor or group of monitors shall be capable of display cameras under alarm conditions
- 9.7.6 The switchers provided shall be equipped with a 230V, 50 Hz power supply.
- 9.7.7 Video switchers shall be equipped with keyboard an external keyboard port to enable system configuration and system control in the event of serial communication failure.
- 9.7.8 The quantities of input and output modules as well as the matrix switcher model shall be determined by the contractor to provide a complete and functional system.

9.8 Quad video Processors (QVP):

Quad Video Processors may be installed in order to reduce the number of recorded channels within the installation.

The QVP shall produce high quality Real Time video output.

Each input channel shall enable automatic gain and level control.

No external synchronization shall be required, and the unit shall accept inputs with a 2:1 interlaced source.

The unit shall be programmable and enable either Quad, Full screen or sequenced display with a programmable dwell time.

The unit outputs shall be capable of displaying current time and date information as well as an 8-character camera title.

9.9 Colour Video Multiplexes:

Colour Video Multiplexers shall be provided to enable action alarming on camera inputs, in order to minimize the number of cameras in the sequence queue on all control room sequence monitors.

The unit shall be programmable and enable either Quad, Full screen or sequenced display with a programmable dwell time.

The unit outputs shall be capable of displaying current time and date information as well as an 8-character camera title.

10. DIGITAL VIDEO RECORDING (DVR) SYSTEM

10.1 General

10.1 The CCTV Matrix system shall provide the Digital Video Recording system with video signals in order to record all activity relating to door control and Audio selection.

10.2 The DVR system shall automatically record activity on any camera in the facility, and shall be capable of simultaneous playback of any recorded channel via a dedicated DVR LAN. **Only embedded DVR systems shall be accepted.**

10.3 The contractor shall employ the necessary number of Digital Video Recorders in the system to ensure complete coverage of the facility, and to ensure all events have been recorded.

10.4 The play back, viewing of live video or video archiving shall have no impact on the recording of images or the normal recording frame rate. The DVR system, although fully integrated with the Security Management System, shall be a standalone solution in terms of its hardware, software and networking requirements.

10.5 In the case of a failure on the DVR system, the CCTV matrix system shall not be affected. The DVR shall provide for built-in and suitably terminated video loop outputs that are failure independent of the digital video recording process in the DVR.

10.6 In case of failure of the DVR control station, or the failure of any one DVR on the networked DVR system, the recording process and configuration of the remaining DVR units shall not be affected.

10.7 In the case of failure of the LAN interconnecting the networked DVR system, or failure of any camera input, the configured, automated recording process of the individual DVR units shall not be affected.

- 10.8 In the case of a network communications, camera or power input failure to any DVR of the DVR control station, the system shall, upon re-establishment of the required input(s); provide automated recovery of the configured recording process.
- 10.9 The DVR shall provide for configurable image recording rate per individual camera input in the range of zero (in the case of no motion or picture change) to 32 images per second. The DVR shall be capable of recording at a minimum totaled rate per DVR of 64 images/sec for up to 16 cameras activated simultaneously, and at SHVS resolution.
- 10.10 All necessary hardware and accessories, including cabling that is required for the effective operation of the DVR system, shall be included by the tenderer.

10.2 Functional Requirements

- 10.2.1 The system shall include the necessary software required for performing the following operations:
1. Digital Recording
 2. Viewing of Live Images
 3. Playback of Recorded Images
 4. Image Archiving both by means of CD and VHS recordings to a SHVS resolution.
- 10.2.2 The system shall allow the pre-programming of various recording configurations, and shall be capable of operating in the following modes:
1. Continuous minimum recording rate at 4 frames / second
 2. Start and stopping of recording according to a pre-programmed schedule
 3. Automatic recording upon activity detection
 4. Alarm triggered recording
 5. Recording upon operator request
- 10.2.3 Continuous recording shall allow the automatic recording of images without the need for operator intervention. For as long as the recorders are powered they shall continue to record.
- 10.2.4 Alarm recording shall allow the recording to record certain input channels when an alarm condition exists. The alarm event shall be communicated to the DVR from the SMS system by means of a serial or IP protocol.
- 10.2.5 Recording on alarm event, or automatic activity detection, will save on storage space and reduce non-essential image recording.
- 10.2.6 Scheduled recording shall allow the recorders to record certain input channels only during specific times in the day. The remainder of the time the channel shall remain idle and thereby save storage space.
- 10.2.7 The recorded video shall retain information relating to the recording process such as time, date, and video source. This data shall be used by the search mechanism for efficient search and playback functionality.

- 10.2.8 The capture date, start time and stop time shall be stored for each clip, whilst the source of the video (camera ID information as generated internally within the DVR) shall be stored for each stream.
- 10.2.9 A search and reporting utility shall allow efficient tracking of alarms, incidents, operator logs and service requests.
- 10.2.10 The system shall provide sufficient storage capacity to ensure 7 days of continuous recording per input channel without the need for archiving. Storage capacity shall be expandable. (The memory required shall be calculated on worse case conditions allowing movement for all 16 cameras connected to the DVR)
- 10.2.11 Each recorder shall store the recorded images on its own hard drive. As the hard drive becomes full, the oldest images shall be transferred for archiving within a central archiving server.
- 10.2.12 Configuration of the archiving system shall be possible via the system software from the management workstation within the central control room.
- 10.2.12 In the case of no archiving done by the user department the recorder will automatically start re-recording over the oldest recorded material.

10.3 DVR Recording Multiplexer:

- 1. The DVR shall be able to record on at least 16 PAL camera inputs.
- 2. The sampling rate of the DVR shall be at least 64 images per second.
- 3. The DVR recording multiplexer setup shall allow for individual control of frame rate, image quality, trigger type, and video motion detection. For example, camera 1 records at 18 ips while camera 2 records at 4 ips.
- 4. During recording, all video shall be compressed to a size that will provide a recorded image of SVHS quality.
- 5. The recorded material shall be recorded in MJPEG format.

10.4 Hardware Alarms:

- 1. The DVR shall have 16 dry contact alarm inputs.
- 2. Each alarm input shall be selectable as either normally open or normally closed.
- 3. Each alarm input shall be capable to trigger recording on a variable figure as required.
- 4. The alarm recording time shall either be adjustable, or allow recording for as long as the alarm is present.
- 5. The DVR shall have at least one alarm output that can be triggered on detecting motion on any selected camera.

10.5 Network Alarms:

- 1. The DVR shall be capable to receive recording triggers on a TCP/IP network.
- 2. The network trigger shall allow for individual camera recording, i.e., associate a selected camera with the network trigger.

10.6 Continuous recording:

1. It shall be possible to have the DVR record on any camera continuously without any triggers.

10.7 Video Motion Detection:

1. The video motion detection (VMD) shall allow for at least 300 programmable VMD zones on any camera.
2. The VMD sensitivity shall be adjustable.

10.8 Playback:

1. On playback, it shall be possible to distinguish between the following 4 recording trigger types on playback:
 - Hardware alarm recording
 - Network triggered recording
 - Continuous recording
 - VMD triggered recording
2. It shall be possible to select a video clip based on the starting and end times, with a resolution of 1 minute.
3. It shall be possible to select a video clip based on the camera number.
4. It shall be possible to play back any number of cameras simultaneously in a split screen display.
5. It shall be possible to save any image during playback to a removable magnetic medium, (such as 1.4MB floppy) in a standard image format (Jpeg).
6. The playback shall give a time resolution of milliseconds.
7. The playback shall have a single image digital zoom function.
8. The video data shall have tamper detection.

10.9 Backup:

1. It shall be possible to make a permanent backup of any video clip to a removable magnetic medium.
2. It shall be possible and included with this contract to make a permanent backup of any video clip via a 6 head video recorder onto a VHS tape.
3. It shall be possible to make a permanent backup of any video clip to a network server.
4. The DVR shall offer the option of a backup scheduler to allow automated periodical backups.

10.10 User Access:

1. The DVR shall have individual password control of up to 6 users.
2. It shall be possible to assign individual rights to users.

10.11 Video Outputs:

1. The DVR shall have 5 video outputs for the purpose of live monitoring.
2. Each video output shall have independent control and be able to switch any of the video inputs.
3. Video output switching shall either be manually or sequenced with programmable delays.

4. Camera title shall be overlaid on the video with date and time on at least 1 video output.
5. The DVR shall provide a terminated output for each input video signal, suitable for distributing the incoming camera video signals to other standard analogue video input devices.

10.12 Memory:

The DVR shall be able to support up to 1000 GB of memory per recorder.

The DVR shall be supplied at a minimum of 120 GB of memory per recorder.

10.13 Self Diagnostics:

1. The DVR or its support system shall be able to automatically detect critical failures (any kind of recording failure) within 60 minutes.
2. The DVR or its support system shall be able to automatically report system failures to a manned support desk within 5 minutes of detection.
3. It shall be possible to completely remotely configure the DVR via a TCP/IP network. It shall however be possible to do the same through the provided control panel of the DVR.
4. It shall be possible to download camera pictures remotely to a support desk.
5. The option shall be available that in the event that a single (video) hard disk fails, the recorder shall not lose any recorded footage.
6. The option shall be available that in the event that a single (video) hard disk fails, the recorder shall continue to record without interruption.

10.14 Other:

1. It shall be possible to label camera names on the DVR.
2. The option shall be available to set and automatically synchronise the time clock of the DVR to a national time standard on a daily basis. For this purpose, the DVR shall be connected to a single point time reference via a network.
3. The DVR shall have a recording scheduler to allow different multiplexer setups for different times of the day and week.
4. The DVR shall have camera signal loss detection with a mechanism to inform a central operator in the event of a camera signal loss on any of its video inputs.

10.15 System Topology

10.15.1 The tenderer shall propose an acceptable system topology that will ensure the recording of all events within the CCTV system.

10.15.2 Recorders shall be placed at strategic positions throughout the facility, and network together via the DVR LAN.

10.15.3 The DVR LAN shall allow for the following operations:

1. Transfer of event commands to the appropriate DVR.
2. Configuration of recording schedules and modes of operation.
3. Playback of recorded images.
4. Viewing of Live images.

- 10.15.4 The management workstation within the central control room shall be capable of configuring all DVR's on the network, without the need for local intervention.
- 10.15.5 The communication between recorder and the server management workstation shall be IP based. The communication media for connecting the various elements of the system will be dedicated fibre optic cables that shall be installed by the security contractor, as well as the DVR LAN.
- 10.15.6 The offered DVR equipment and technology shall have a proven track record in the local market with established local factory capabilities offering ongoing engineering, upgrade ability and product repair support.

11. FIXED PANIC PUSH BUTTON ALARM SYSTEM

11.1 Panic buttons

The panic buttons shall consist of a latching industrial type red mushroom head button with key release.

The device shall be flush mounted in a standard 100mm by 100mm socket outlet connection box.

These panic buttons are required in all offices where contact between inmates and staff may occur.

11.2 Activation

Activation of any push button shall sound an audible tone in the associated control room and cause the associated icon on the operator control console to flash.

The audible tone may be silenced from the control console causing the icon to remain steady with a red colour. The emergency condition of the icon shall only be reset once the latched button has been reset with the key release.

All panic condition are time and date stamped and logged within the management workstation together with the current operator detail.

12. EMERGENCY RELEASE SYSTEMS:

As specified by the hardware schedule the following emergency release functions shall be provided for sliding cell door locking devices.

12.1 Emergency Air Release System

12.1.1 The contractor shall provide compressed air emergency release tank(s) and valve assembly in order to unlock all cell doors simultaneously in the case of an emergency. The system shall be defined in groups, which shall be activated by operating a manual air valve in the case of a total loss of air and/or electric power.

- 12.1.2 The emergency release tank(s) and valve assembly shall be installed in a lockable cabinet as per the architectural layout. The cabinet shall be clearly labelled "Emergency release system"
- 12.1.3 The emergency release system shall be totally manual in operation. Once the system has been activated, the doors shall unlock and remain unlocked until the system is deactivated. Once unlocked, doors may then be manually moved to the open position.
- 12.1.4 Non return valves shall be installed into the supply line of each tank to prevent a loss of emergency air pressure when the compressor is not loading the tank.
- 12.1.5 The air lines supplying each group of doors in the emergency release system shall be run in the same raceway/conduit as the normal air supply lines.
- 12.1.5 Air tubing for the emergency release system shall be a minimum of 6mm outside diameter, and shall be colour coded.

13. SECURITY HOLLOW METAL DOORS AND FRAMES

13.1 Clearance and Tolerances

13.1.1 Edge clearance shall be as follows:

- a. Between doors and frames at head and jambs: 3.5mm
- b. At door sills where no threshold is used: 10mm max (A.F.F.)
- c. At door sills where threshold is used: 20mm max (A.F.F.)
- d. Between edges of pairs of doors: 3.5mm

13.1.2 Manufacturing tolerances shall be maintained within the following limits:

- a. Frames for single door or pair of doors width, measured between rabbets at the head: Nominal opening width +1.6mm – 0.8mm; height (total length of jamb rabbet): Nominal opening height +1.2mm
- b. Cross section profile dimensions:
 - 1. Face: +1mm
 - 2. Stop: +1mm
 - 3. Rabbet: 0.5mm
 - 4. Depth: 1mm
 - 5. Throat: 1.6mm
- c. Frames overlapping walls are to have a throat dimension of 3.2mm greater than dimensioned wall thickness to accommodate irregularities in wall construction section.
- d. Hardware cut-out dimensions:
 - 1. Template dimensions +0.5mm
 - 2. Hardware location: +1mm

- e. Doors:
 - 1. Width: +1.25mm
 - 2. Height: 1.25mm
 - 3. Thickness: 1.16mm
 - 4. Hardware cut-out dimensions: Templates dimensions +0.4mm
 - 5. Hardware location: +0.8mm

13.2 Requirements for Security Hollow Metal Frames

13.2.1 Materials:

Frames shall be constructed of commercial quality steel, which complies with the SATM A366 standard. The steel shall be free of scale, pitting, coil breaks or other surface defects. Metal thickness shall be not less than 2mm.

13.2.2 Fabrication

All frames shall be custom-made welded units of the sizes and types shown on approved shop drawings and in compliance with ASTM E1450 and the SABS equivalent standard. All frames shall be manufactured to ANSI/NAAMM HMMA 863-90(8d).

- a. All finished work shall be strong and rigid, neat in appearance, square, and free of defects, warps or buckles. Pressed steel members shall be straight and of uniform profile throughout their lengths.
- b. Jamb, header, and sill profiles shall be as scheduled by the architect and the door and frame details as shown on the approved shop drawings.
- c. Corner joints shall have all contact edges closed tight with faces and stops either butted or mitered. Corner joints shall be continuously welded. The uses of gussets or splice plates will be unacceptable.
- d. Minimum depth of stops in doorframe openings shall be 16mm and in glass or panel openings shall be 32 mm.
- e. Frames with call switches will be provided with factory cut hole and enclosed in an enlarged lock pocket per manufacturers recommendations.
- f. Frames having jamb mounted remote operated locks, door position switches, staff stations and/or other electronic hardware will be provided with factory installed back boxes and conduit with compression fitting which shall be grout tight.
- g. Frames for multiple openings shall have mullion members which, after fabrication, are closed tubular shapes conforming to profile shown on approved shop drawings, and having no visible seams or joints.

All joints between faces or abutted members shall be welded and finished smooth. All joints between stops of abutted members shall be welded along the depth of the stop and shall be left neat and uniform in appearance.

- h. A Styrofoam filler pad shall be permanently placed underneath each hinge reinforcement.
- i. Glass stops to be match drilled and held in place by two (2) Phillips head screws. Mortar guards will be provided at each hole. The screw holes in the removable stops will be 3.2mm larger than the diameter of the screw to allow for adjustment. Screw head will be of sufficient size to conceal the hole in the removal stop.
- j. All glass stop screws to be torx self tapping
- k. All frames with either stripping shall have a continuous mortar guard at the point of installation. Screw holes to be filed located by installer.
- l. Provide mortar guards at all silencers.

13.2.3 Hardware Reinforcements and Preparation:

Frames shall be mortised, reinforced, drilled and tapped for all tem plated hardware including surface mounted hardware in accordance with the final approved hardware schedule and tem plated provided by the hardware supplier.

- a. Minimum thickness of hardware reinforcing plates shall be as follows;
 - 1. Hinge and pivot reinforcements: 6mm x full width of hinge x 250mm in length.
 - 2. Strike reinforcements; 3.5mm
 - 3. Flush bolt reinforcements: 3.5mm
 - 4. Closer reinforcements: 3.5mm
 - 5. Reinforcements for surface applied hardware: 3.5mm

13.2.4 In cases where electrically operated hardware is required and where shown on approved shop drawings, hardware enclosures and junction boxes shall be provided and shall be interconnected using galvanized steel 20mm conduit, elbows and connectors. Also, where shown on submittals drawings, junction boxes with access plates shall be provided to facilitate the proper installation o f wiring. Access plates shall be the same size as the frame and fastened with a minimum of four tamper proof machines screws, but not to exceed 150mm o.c. All conduit ends to be deburred at the factory. Where frames are to be grouted in places, the conduit shall be connected to lock pockets and boxes with compression type fittings and grout tight. Frames with lock pockets and/or electrically operated hardware, which do not allow access for control conduit installation (by others), shall be provided with the conduit installed to the perimeter of the frame. Bu the hollow metal manufacturer.

13.2.5 Floor Anchors:

Floor anchors with two holes for fasteners shall be fastened inside jambs with at least four (4) spot welds per anchor.

- a. Where no scheduled, adjustable floor anchors, providing no less than 50mm height adjustment, shall be fastened in place with at least four (4) spot-welds per anchor.
- b. Plate thickness of floor anchors shall be the same as frame.

13.2.6 Jamb Anchors:

- a. Frames for installation in masonry walls shall be provided with adjustable jamb anchors of the yoke a strap type made from the same gauge steel as frame. The number of anchors provided on each jamb shall be as follows;
 1. Frames up to 2.25m height: 4
 2. Frames 2.25m to 2.5m height: 5
 3. Frames over 2.5m height: 1 anchor for each 450mm or fraction thereof.
 4. Frames for installation in pre-finished concrete openings shall be purchased and countersunk for expansion bolt anchors and provided with hat shaped reinforcements, same thickness as frame, secured in place with at least four (4) spot welds each. The number and spacing of anchors provided shall be as specified above.
 5. Frames to be installed in pre-finished concrete, or masonry openings, but not to be anchored using expansion bolts, shall be constructed and proved with anchoring systems of suitable design as shown on the approved shop drawings.
- b. Mortar/plaster guards made from no less than 0.5mm steel shall be welded in place at all hardware preparations on frames to be set to masonry or concrete openings. Preparations are to be totally sealed to prevent any mortar, grout or plaster from entering the protected area.
- c. All frames shall be provided with two (2) temporary steel spreaders welded to the feet of the jambs to serve as bracing during shipping, handling and installation.

13.2.7 Removable Glazing Stops:

Removable glazing stops shall be pressed steel angles 32mm x 32mm minimum, not less than 2.5mm or 32mm x 32 m steel tubes, not less than 2mm. Stops shall be tight fitting at the corner joints and secured in place with hardened tamper proof button head torx self-tapping machine screws spaced 230mm maximum. Stops shall be installed on the most secure (non-prisoner) side of the frame. The frame underneath the glazing stops and the inside of the glazing stop shall be treated for maximum paint adhesion and painted with rust inhibitive primer prior to installation in the frame.

13.3 Requirements for Security Hollow Metal Doors:

13.3.1 Materials:

Doors shall be constructed in compliance with all the SABS standards for security doors, and shall be manufactured to the requirements as detailed in ANSI/NAAMM HMMA 863-90(8d) using commercial quality steel, which complies with the correct SABS standard. The steel used shall be free from scale, pitting, coil, breaks or other surface imperfections. The steel shall also be free of buckles, waves or any other defect caused by the use of improperly leveled sheets. Face sheets shall not be less than 2mm.

13.3.2 Fabrication:

All doors shall be custom made of the types and sizes shown on the approved shop drawings, and shall be prepared for hardware per the final approved hardware schedule.

- a. Door edge seams shall be welded and finished smooth.
- b. Door thickness shall be as specified by the architectural drawings and requirements. All doors shall be rigid, heat in appearance, and free from warp or buckle. Edge bends shall be true and straight and of minimum radius for the gauge metal used.
- c. Face sheets shall be stiffened by continuous vertically formed steel sections spanning the full thickness of the interior space between door faces. These stiffeners shall be 1mm minimum, spaced so that the vertical interior webs shall be no more than 100 mm o.c., unless supported by test data, and securely fastened to both face sheets by welding. Spaces between stiffeners shall be filled with fiberglass or mineral rock wool batt-type material.
- d. A continuous steel channel shall reinforce the vertical edges, not less than 2mm, extending the full length of the door. The top and bottom edges shall be closed with a continuous channel also not less than 2mm, welded to both face sheets not more than 75mm o.c. unless supported by test data. The 2mm closing end channel shall be continuously welded to vertical reinforcing channel at all four corners producing a fully welded perimeter reinforcing channel.
- e. The top end channel shall be fitted with a flush closing channel of not less than 1.3mm. The flush closing channel shall be welded in place at the corners and at the center. Installation of closer channel using screws, security or otherwise shall be deemed unacceptable. The end channel and flush closer channel shall be installed such that they are permanent and non-removable.
- f. The security contractor shall allow for one door to be picked at random on site after installation of the door, to be cut opened to check for compliance. One security swing door and one security sliding door will be selected for this purpose.

13.3.3 Hardware Reinforcements:

Doors shall be mortise, reinforced, drilled and tapped at the factory for all template hardware including surface mounted hardware, in accordance with

the final approved hardware schedule and templates provided by the hardware supplier.

- a. Minimum sizes for hardware reinforcements shall be as follows;
 1. Full mortised hinges and pivots: 4mm
 2. Surface applied maximum security hinges; 6mm plate
 3. Reinforcements for lock mountings, conceals holders, or surface mounted closer: 2mm
 4. Internal reinforcements for all other source applied hardware: 2mm
 5. Lock bolt keeper closer: 2mm

13.3.4 Glass Moldings and Stops:

Where specified, doors shall be provided with steel moldings to secure glazing included in this contract in accordance with glass sizes and thickness shown on approved shop drawings or detailed else where in this document. If not specified on either of the above the tendered shall allow for 175mm x 700 mm x 6mm high impact glass for all swing and sliding doors equipped with view panels. The following door types will be equipped with view panels unless specified differently else where:

- a. Control Room doors
- b. Cell doors
- c. Hospital ward doors
- d. Fixed glass melding shall be no less than 2mm and shall be welded to both face-sheets at 125mm o.c maximum
- e. Removable glass stops shall be pressed steel angels 32mm x 32mm minimum, not less than 2mm. Stops shall be tight fitting at the corner joints, and secured with button head, self-tapping torx screws located 230mm o.c maximum.
- f. Where glass thickness dictates, 2mm offset surface mounted glass stop shall be used. The corners shall be tight fitting and the glass stop shall be secured to the face of the door using button head, self-tapping torx screws spaced 230mm o.c maximum.

13.4 Finish

- 13.4.1 All hollow metal doors and frames shall be thoroughly cleaned and coated inside and out with a fine grade corrosion resistant iron oxide-zinc chromate primer. After fabrication, all tools marks and surface imperfections shall be dressed clean by grinding, filling and sanding as necessary to make all faces and vertical edges smooth, level and free of all irregularities. Doors shall be treated to insure maximum paint adhesion and coated on all exposed surfaces with a rust inhibitive primer which shall be fully cured before shipment.

13.5 ASTM Compliance

- 13.5.1 All hollow metal doors and frames provided shall comply with the following ASTM standards:

ASTM	F1643-95	Horizontal impact test – Hollow metal sliding detention doors
ASTM F1450-97		Edge crush test – Hollow metal sliding detention doors
ASTM F1450-97		Racking test – Hollow metal sliding detention doors
ASTM F1450-97		Static load test – Hollow metal sliding detention doors
ASTM F1450-97		Horizontal impact test – Hollow metal swinging detention doors
ASTM F1643-95		Tool manipulation attack test – Hollow metal sliding detention doors
ASTM F1643-95		Remote unlocking force test – Hollow metal sliding detention doors

13.5.2 A copy of the relevant manufacturers ASTM certification shall be submitted together with the tender documents.

14. MISCELLANEOUS HARDWARE FOR SECURITY DOORS

14.1 Product Description:

14.1.1 Hinges:

- a. Full Mortise Detention Hinges shall be 115mm x 115mm x 6mm, investment cast stainless steel prime painted, with hospital tips and integral studs on both leaves.

Pins shall be hardened stainless steel, concealed and non-removable. Each hinge shall be supplied with eight (8) flat head torx machine screws.

- b. Surface Mounted access floor hinges shall be 75mm x 100mm x 6mm, fabricated from bonderised steel and prime painted. Hinge barrels shall be solid with no visible pin line. Pin shall be fully welded. Each hinge lead shall be countersunk and be supplied with four (4) flat head torx screws.

14.1.2 Pulls

- a. Grip Type Door Pulls shall be cast of brass or bronze with satin finish unless specified otherwise in hardware schedule. Overall length, 225mm hand hold, 135mm grip clearance, 40mm attachment holes, 200mm o.c. Provide tow (2) oval head torx screws. Provide clear lacquer finished baked for 15 mm at 175 degrees Celsius and allow to cool before packaging.
- b. Knob Type Door Pulls shall be cast of bronze with stain finish unless specified otherwise in hardware schedule. Diameter, 80mm projection, 55mm. Provide three (3) oval head torx crews. Provide clear lacquer finish, baked for 15 min at 175 degrees Celsius and allow to cool before packaging.
- c. Flush type door pulls, or equal and approved shall be cast of brass or bronze with satin finish unless specified otherwise in hardware schedule. Size, 100mm x 125mm x 4mm x pocket grip 25mm deep. Provide four (4) oval head torx screws. Provide clear lacquer finish, baked for 15 min Celsius and allow to cool before packaging.

14.1.3 Magnetic Door Position Switches

Recessed magnetic door position switches shall be a magnet mortised type assembly used for remotely monitoring the door status / position. The device shall be moisture resistant and fit within hollow metal doorjamb. The device shall be field adjustable on 2 axis and supplied with a 1m vinyl jacketed lead wire and a 3 pin Molex connector. The device shall be all steel construction. The switch and magnet shall be encased in epoxy resin. The overall dimension shall be 30mm x 125mm x 25mm.

14.1.4 High Security Door Closer

High Security Closer/door position switches shall be controlled by overhead concealed or closers, which have been tested to ten million (10,000,000.00) opening-closing cycles. Closers shall have full hydraulic rack and pinion action with high strength cast iron cylinder. Spring power shall be adjustable from size ii through to size V. Hydraulic fluid shall be a the region no seasonal adjustment for temperature ranging from 50 degrees C to -0 degrees C. Separate tamper-proof screw valves shall provide independent regularization of latch speed, general speed and hydraulic back check. Regulating screws shall be accessible through a heavy duty mounting plate when finish plates are removed. Closer shall have an integral electro-mechanical device rates not less than 24 VAC @ 10 amperes to detect and signal rotation of the closer pinion. This device shall be field adjustable to allow setting for each door and fitting with a protective shield. Installation of the finish plate shall fully conceal all adjustment mechanisms. Closer shall have an extra heavy-duty forged steel concealed arm. The low friction track roller shall be attached to the arm by a threaded mounting. Closers shall have a metal track designed to prevent jamming and to eject foreign objects placed in the track mortised into the top of the door. The exposed fasteners shall be torx drive with a security pin.

14.1.5 Floor Mount Door Stops

Wall or Floor Mounted Door Stops shall be a tamper resistant device that is embedded into the wall or floor with an epoxy resin adhesive. Bumper shall be the frame size in diameter x 90mm long and made from a non-hazardous silicone elastomer, 80 durometer. The threaded and grooved steel mounting shank shall be 16mm diameter and embedded into the bumper at least half the length of the bumper. Mounting shank shall extend 65mm beyond the bumper bottom for embedding into the wall of floor.

14.1.6 Louver Design:

Louvers shall be of the welded inverted type construction providing free air delivery as specified. A rectangular louver shall not exceed 460mm in width without being reinforced at its midpoint by a vertical rectangular steel bar at least 6mm x 40mm. Insect screens and / or flattened expanded metal shall be provided on louvered doors where shown on drawings.

15. SPECIFICATION FOR SECURITY DETECTION FENCE

NOTE: USE THE LATEST DETECTION FENCE SPECIFICATION AS PUBLISHED ON THE DPW WEBSITE

15.1 General

The Perimeter Protection Subsystem shall be based on the following stand-alone systems:

- a. Electronic Detection Fence
- b. Fibre optic vibration Detection
- c. Microwave detection system in vehicle sally port

The Electronic Detection Fence shall employ the following two integrated technologies:

- a. Taut wire Detection

15.1.1 The fibre optic vibration detection system shall be based on vibration and deformation of the fibre cable. The fibre deformation shall be picked up on the receiver end and will only go into alarm if a human moves in the area around the underground fibre cable as is detailed under Section 18 of this specification) This cable shall be installed outside the outer perimeter fence as indicated in the fence layout drawing.

15.1.2 The physical perimeter shall consist of an inner fence of 3m in height and an outer fence of 5m in height as well as a fibre detection cable buried underground to detect any intrusion from outside the prison perimeter.

The Electronic taut wire detection system shall be implemented on the 3m inner fence, as described in this specification.

Furthermore the fibre shall be installed 600mm outside the outer perimeter fence buried 100mm underground.

In the sally port a microwave detection system will be activated for after hour activation when this area are not patrolled.

15.2. TAUT WIRE DETECTION FENCE

15.2.1 The contractor shall furnish labour, equipment, and materials for the following systems in this Section of the specification:

- a. Security electronic equipment and cabinets.
- b. Taut wire perimeter detection system.
- c. Field *Fiber-optic communication equipment*.
- e. Perimeter Controller.
- g. Alarm encoder/transmitter.
- h. Event logging PC.
- i. Report printer.
- j. Surge protectors.

- k. Power supplies.
- l. Training.
- m. Spare Parts.

15.2.2 Cooperation With Other Trades:

The contractor shall coordinate the work as detailed in this paragraph of the specification with that of other paragraphs of this specification as well as all other contracting disciplines as required to ensure that the entire work of this project will be carried out in an orderly, complete, and coordinate fashion.

15.3 SYSTEM DESCRIPTION

- 15.3.1 The taut wire fence and alarm system shall act as an electronic barrier to detect and alarm escape attempts.
 - 1. The taut wire system shall be installed as a stand-alone system located on the facility side of the inner perimeter fence.
 - 2. The electronic barrier shall consist of the following:
 - a. A protective 2700 mm high barrier with 27 taut barbed wires stretched between anchor posts and supported by a number of slider posts and sensor switches.
 - b. 600 mm wide side walk shall be constructed directly below the taut wire system and extend 400 mm to the facility side of the taut wire fence as shown on the layout drawings. The sidewalk shall run the continuous length of the inside of the inner perimeter fence as indicated on the perimeter fence layout drawing.
 - d. All corners shall be designed so the taut wire intersects.
 - 3. Climbing over the wires, spreading them apart or cutting the wires causes an alarm condition.
 - a. When force is applied to the taut wires, they produce an equivalent movement in the direction of the sensor. A sensor detects the movement and signals an alarm condition. The system shall alarm when adjacent wires are forced apart with a maximum allowable separation between wires without an alarm as follows:
 - 1. 90 mm from bottom wire to the sidewalk.
 - 2. 90 mm between wires below 1170 mm (13 wires).
 - 3. 110 mm between wires above 1170 mm and 2710 (14 wires).
 - 4. A deflection force no less than 5Kg and no greater than 10Kg perpendicular to the wire axis shall activate an alarm at any point along the fence.
 - b. The system shall be installed as a zoned, automatic, supervised alarm detection system.

1. The alarm condition is transmitted from the post mounted, zone field microprocessor *via redundant fiber-optic loop to the perimeter Master Controller*. All signal and power lines entering each Perimeter Security Enclosure (PSE) or Security and Communications Cabinet (SCC) shall be protected with recoverable surge protectors.
2. Each detection zone shall be equipped with *fiber-optic communication equipment* to eliminate lightning surge problems.
3. Each independent *defined intrusion event* shall effect a unique signal display on the perimeter controller.
4. The supervised circuit in the system causes a tamper alarm to signal if:
 - a. Sensor circuitry is disturbed (opened or grounded).
 - b. Tamper switches are activated situated in the control cubicles in the field or control room.
5. The location at any point at which an attempt is made to tamper with the system shall be identified at the perimeter controller.
 - c. Microwave sensors shall be incorporated into the system and used as separate zones protecting the vehicle sally port. (one zone only)
 - d. System status and all alarm conditions shall be reported to the system operator from the stand alone transponders to a perimeter controller.
1. From the perimeter controller each zone shall be capable of zone access, alarm acknowledge and alarm reset. The perimeter controller shall have a distinctive audible alarm. Alarm shall annunciate both visually and audibly. The same shall be possible from central control.
2. Any zone may be placed in access mode at the perimeter controller, but shall signal an alarm condition if circuit supervisory limits are exceeded or if any tampers are activated.
3. The perimeter controller shall interface with an event printer located in Central Control. The event printer shall print a date and time stamped message indicating all alarms, alarm resets, and zone accesses.
- e. System status and all alarm conditions shall be reported to the system operator from the perimeter controller to a graphics display unit.
 1. The graphic display unit shall be as shown on the plans with red, yellow, and green round icons for each zone and shall be situated on the Graphic user interface situated in central control.

Furthermore the fiber link between the fence controller and the graphic user interface shall be by done through a RS232 or RS485 link.
- f. The perimeter controller shall interface

with an alarm logging printer located in Central Control. The alarm logging dot matrix printer shall print a time and date stamped message for each alarm, access and reset function performed at the perimeter controller. The system shall be configured such that failure of the printer, removal of the printer, or turning the printer off shall not affect the operation or performance of the perimeter system.

- g. The perimeter controller shall interface with a rack mounted event logging PC located in central control or a Secured Electronics Room. The event logging PC shall log all alarm, access and reset data.
- h. All fixed components of the perimeter alarm system shall receive power from the UPS provided in central control or a main electronics equipment room.

15.4 PRODUCTS

15.4.1 Movement transfer wires

- 1. High, tensile, double-braided barbed wire.
 - a. Minimum breaking strength of 439 Kg
 - c. Barbed 4 points.
 - d. Average spacing of the barbs is not to exceed 125 mm
 - e. Galvanised steel.

15.4.2 Anchor Post accessories: Link rods, with breakaway connecting strips, designed to break off whenever a vertical force acts upon them.

- 1. All Anchor Post accessories shall be constructed of a non corrosive material namely hot dipped galvanized.

15.4.3 Slider Post accessories: Slider mechanism with accessories that serve to support the wire system, converting vertical force into horizontal movement.

- 1. All Slider post accessories shall be constructed of stainless steel.

15.4.4 Sensor Switches: Sensor switch shall be designed to operate in a temperature range of -40 to 125 degrees C. Sensor switches below 1000mm shall be provided with a limiter as required to protect the sensor from physical damage that may result from an escape attempt or wire break.

15.4.5 Sensor Post Accessories: Sensor post shall be designed to contain the sensor switches and permit their positioning at any point along the post.

- 1. At a minimum, the sensor post accessories shall be constructed of galvanised steel.

15.4.6. Sensor Post Reporting Unit: The Sensor Post Reporting Unit shall be a microprocessor based unit with the capability of monitoring the required number of sensors. The microprocessor shall:

1. Report alarm conditions.
2. Report tamper conditions.
3. Filter and reset false alarm conditions
4. Self-adjust to environmental conditions if sensor is not capable of self adjustment.
5. Provide dry contact outputs to the stand alone transponder for tamper, alarm, and trouble conditions (trouble alarms where applicable).

15.5 FIELD TRANSPONDER

- 15.5.1 Field transponders shall be provided in each perimeter enclosures to accept dry contact inputs for alarm, tamper and convert the signals in multiplexed RS-485 or RS-422 data.
- 15.5.2. The unit shall accept supervised (class B) dry contacts as inputs and shall provide dry contact outputs. The unit shall have features or characteristics as follows:
 1. Accept four (4) dry contact supervised inputs.
 2. Provide two (2) dry contact outputs. One form C relay shall be provided and connected to one output.
 3. Output contact rating - 500 mA minimum @ minimum 50V.
 4. Input voltage - 9-15VDC.
 5. Equipped with transient suppression.
 6. Supervised circuits - inputs.
 7. Temperature Operating: -20 deg C to +70 deg C
 8. Humidity - 20% to 95% condensing.
 9. Unit shall be field addressable.
 10. Shall interface with the Perimeter Controller.

15.6 PERIMETER CONTROLLER

- 15.6.1 The perimeter controller shall employ multiplexing technology for communications with remote transponders. The perimeter controller shall be installed in the Central Control console as shown on the drawings.
- 15.6.2 The perimeter controller shall have the following characteristics or features.

1. Standard panel mounting for 19 inch EIA rack. Rack space requirements shall be no greater than as shown on the drawings.
2. Monitored Zones - 40 capability.
3. Complete with power supply.
4. Communications Bus Requirements: Two (2) 0.5 mm sq shielded twisted pairs.
5. Multiplex Bus Mode: Two (2) wire duplex.
6. Communications Bus Configuration: Class A.
7. Alarm indication per zone - Audible and visual.
8. Tamper indication per zone - Audible and visual.
9. Trouble indication per zone - Audible and visual (Where applicable).
10. Event Log Timer - Event shall be logged to the nearest second.
11. Programming Control - Key coded program switch.
12. System Control - Control shall be front panel keypad commands. Each zone shall be capable of being placed in access, alarm acknowledge and alarm reset.
13. Remote Map Driver - Unit shall drive a remote graphic display on the graphic user interface positioned in central control.
14. Power Supplies and Unit shall supply power to remote fence mounted sensors and associated multiplexer transponders.
15. Port for outboard printer connection.
16. Port for outboard event logging PC.

15.7 ALARM LOGGING PRINTER

- 15.7.1 A 24-pin, wide carriage, dot matrix alarm logging printer and associated interconnect cables shall be provided in Central Control.
- 15.7.2 The printer shall have the following features:
 1. Minimum of 240 characters per second, draft.
 2. Minimum of 180 characters per second, NLQ.
 3. Serial and Parallel interfaces.
 4. Minimum 4K buffer.

5. Tractor feed.
6. Compatible with the perimeter controller.

15.8 EVENT LOGGING PC

- 15.8.1 An event logging PC and associated interconnect cables shall be provided in the security electronics equipment room or central control.
- 15.8.2 The event logging PC shall include the following features:
 1. Pentium processor operating at a minimum of 2400 MHz.
 2. A minimum of 128 MB of RAM memory
 3. A minimum of 20 000 + MB hard disk drive.
 4. A 3.5" floppy diskette drives.
 5. A CR ROM drive.
 6. 250 MB streamer tape back-up unit.
 7. Graphic accelerator card providing 2 MB of VRAM memory.
 8. Minimum 40-speed CD-ROM player.
 9. Sound card.
 10. Stereo Speakers.
 11. Voice synthesizer alarm message card.
 12. Necessary quantities of parallel and serial communication ports as required to effect interconnection of all required security equipment, plus one spare parallel and one spare serial port.
 13. A two button Microsoft compatible mouse.
 14. A multi-scanning SVGA 17", 0.26 mm dot pitch, non-interlaced colour monitor capable of displaying graphics at 1280 x 1024 pixels resolution to display the activity system.
 15. Required interface cards to interface with the perimeter controller and report printer.
- 15.8.3. The event logging PC and software shall support a minimum of 50 zones. The installer shall furnish and install equipment for the actual number of zones as shown on the attached drawings, plus a 40% spare capacity without the addition of hardware or software.

- 15.8.4 The system shall include all operating and application software to provide operation as specified. All supplied software shall be the latest factory release.
- 15.8.5 The system shall include data acquisition software that stores event data and provides custom reports to display or print stored data. The software shall be compatible with Microsoft Windows (latest available version). Report data may be sorted by any field and limited to select time and date range. Data shall be stored in a format compatible with Microsoft Access. Event data shall include:
1. Alarm events: time, date, and zone number (Activation and reset).
 2. Tamper events: time, date, and zone number (Activation and reset).
 3. Access events: time, date, and zone number (Activation and reset).

15.9 REPORT PRINTER

- 15.9.1 A LaserJet-type report printer and associated interconnect cables shall be provided in Central Control room.
- 15.9.2 The report printer shall include the following features:
1. 600 dpi resolution.
 2. 500 sheet automatic or manual feed paper bin.
 3. Capability of printing 220mm x 280mm (8 ½" x 11") or 220mm x 360mm (8 ½" x 14") paper.
 4. Fonts compatible with the application software.
 5. Printer shall be capable of printing at least 8 pages per minute.

15.10 POWER AND COMMUNICATIONS CABLE

- 15.10.1 All cables must comply with the taut wire and data multiplexer manufacturer recommendations.
- 15.10.2 Exterior wire and cables shall be installed in schedule 40 PVC conduit and rated for direct burial use.
- 15.10.3 Power distribution wire from the main equipment room to remote processors, transponders, microwave units, or other remote electronics on the site perimeter shall be minimum 2.5 mm sq copper and shall be increased in size as necessary to ensure no more than 5% (AC or DC) voltage drop from the main equipment room to the remote equipment. Submit power voltage drop calculations for all fields located perimeter equipment.
- 15.10.4 Provide spare two pair 0.5 mm sq twisted pair, direct bury type cable

between all perimeter system enclosures and the head end to create a loop around the perimeter system. Provide 1000mm of spare cable for each cable in each perimeter system enclosure.

- 15.10.5 All cables shall be, rated for direct burial and approved for wet locations.
- 15.10.6 All conductors shall be rated for direct burial and approved for wet locations in accordance with SABS.
- 15.10.7 Signal and power cables shall be separate cables and not combined as part of the same cabling jacket.

15.11 SURGE PROTECTORS

Surge protectors shall be provided in accordance with SABS regulations.

15.12 ACCESSORIES

The system shall include all accessories required to perform the functions described in this Section.

15.13 MARKERS AND NAMEPLATES

15.13.1 Cable Tags:

- 1. Cable tags shall be provided in accordance with SABS.

15.13.2 Nameplates:

- 1. Precision engraved letters and numbers with uniform margins.
- 2. Character sizes shall be a minimum of 50 mm high.
- 3. Indoor : Shall be phonemic, two colour laminated stock, 2 mm thick, machine engraved to expose inn core colour (white).
- 4. Outdoor: Shall be Standard aluminum alloy plate stock, minimum 1 mm thick, engraved areas shall be enamel filled or background enameled with natural aluminum engraved characters.
- 5. All nameplates shall be permanently attached.

15.13.3 Zone Identification:

- 1. In order for the officers inside the compound to easily identify zone locations, at the top of each sensor post, a 250mm x 200mm sign shall be installed. The sign shall face the inside compound
 - a. All zones shall be identified by zone number.
 - b. Reflective white numbers on a dark blue background shall be used.
 - c. All signs shall be visible from a distance of 12 meters.

2. In order for the perimeter patrol officer to easily identify zone locations, at the end of each zone a 500mm x 250mm sign shall be installed. The sign shall face the perimeter road.
 - a. All zones shall be identified by zone number.
 - b. Reflective white numbers on a dark blue background shall be used.
 - c. All signs shall be visible from a distance of 12000mm.

15.14 POWER SUPPLIES

Switch mode type power supplies shall be furnished with characteristics as required to support the operational performance of the sensor and signal processors. Demand load on the power supplies shall not exceed sixty (60) percent of the rated fuel load capacity of the power supply.

15.15 ENCLOSURES

All 600 mm x 600 mm exterior post mounted enclosures shall be vented and must have the following features:

1. 1.5 mm stainless steel plate construction.
2. Continuously welded seams.
3. Hasp and staple for a heavy duty lock.
4. Hospital grey finish.
5. Equipped with magnetic tamper switch connected to processor tamper circuit.
6. Painted white so as to reflect radiated heat from the sun.

15.16 POSTS, FOOTERS AND SIDE WALK

15.16.1 Posts and Footers: Post and footers shall be an integral part of the side walk.

1. All posts shall be equidistant, maximum 3000 m separation on centre.
2. All posts shall be installed in accordance with manufacturer recommendations.
3. All anchor posts shall be installed in accordance with the manufacturer recommendations.
4. Slider and sensor post shall be installed in accordance with the manufacturer recommendations.

15.16.2 Sidewalk and Post Footers: A concrete sidewalk shall be installed directly below the taut wire fence and shall run the continuous length of the system.

1. Sidewalks shall be 100 mm thick through out and 600mm wide as shown on the civil drawings and must include a gravel base with the appropriate wire mesh reinforcement.
 2. To prevent cracking and chipping, sidewalk expansion joints shall be installed as necessary.
 3. Expansion material shall be installed between the sidewalk and all posts mounted in the sidewalk barrier.
- 15.16.3 Concrete: All concrete shall be as specified by the Civil Engineer. At a minimum the concrete shall have a minimum compressive strength of 20MPa at 28 days.
- 15.16.4 Earth: Trenches and holes shall be excavated and formed as necessary to support the sidewalk and posts.
- 15.16.5 Rock: Holes in solid rock shall be 25 mm wider than pipe diameter, and at a minimum 300 mm deep for sensor posts, and 460 mm deep for anchor posts. Holes shall be back filled with non-shrink grout.
- 15.16.6 Backfill: Backfill and fill materials shall be installed in layers not exceed to exceed 150 mm in depth.
1. Moisten or aerate each layer as necessary to facilitate compaction to the required density.
 2. Do not place back fill or fill materials on surfaces that are muddy, frozen, or contain frost or ice.
- 15.16.7 Compaction: Each layer of fill and back fill shall be 90% of the maximum density.

15.17 TAUT WIRE

- 15.17.1 Sensor, anchor and slider posts: All zone sections shall be 2700 mm.
- 15.17.2 Zones: The system shall be configured as shown on the drawings.
- 15.17.3 Tension strips: Breakaway tension strips shall be installed at the anchor posts.
1. Tension strips shall be designed to break when a force of 20 Kg +/- 5Kg is applied.
 2. Each taut wire shall be connected to an individual tension strip.
- 15.17.4 Tensioners
1. Tensioners shall be galvanised, ratchet wheel type with a minimum of four teeth per ratchet.

2. At one end of the zone, each taut wire strand shall be attached to an individual tensioner.
- 15.17.5 All wires shall be stored on the factory shipping reel until the wire is installed on the sensors.
- 15.17.6 Corner Configurations: All taut wire corner configurations shall be an intersecting type installation.

15.18 MICROWAVE DETECTION SYSTEM

General: The Contractor shall install microwave transmitter/receivers at locations as shown on the drawings and specified herein.

Installation: Microwave equipment shall be mounted on steel posts as shown on the drawings. Manufacturer's representative shall provide supervision for installation of equipment.

System Alignment: Manufacturer's representatives shall perform equipment alignment and shall set thresholds as required to optimize system performance.

15.19 GROUNDING

- 15.19.1 A continuous 70mm sq, bare, stranded, copper grounding conductor shall be buried a minimum of 600 mm under the taut wire system's sidewalk and run the continuous length of the sidewalk.
- 15.19.2 At each sensor post, via cad-weld connections, the grounding conductor shall attach to the ground bus located inside the enclosure. Also, a 70mm sq grounding conductor shall bond the sensor post, processor post, and the nearest inner and outer fence post to the 70mm sq ground ring.
- 15.19.3 At a point nearest the main electronics equipment room, a 70 mm sq, bare, stranded, copper conductor shall bond the buildings electrical system ground bus to the 70mm sq ground ring buried under the taut wire system's sidewalk. All direct buried ground connections shall be cad-weld type connections.
- 15.19.4 All systems described in this section shall be grounded in accordance with SABS and the manufacturer recommendations and meet the minimum requirements of the following:

15.20 SURGE PROTECTION

- 15.20.1 All metallic data, communications, video, and sensor lines entering or leaving a building shall be protected with surge protection devices.
- 15.20.2 Grounding of protective devices shall be in accordance with the manufacturer's recommendations and/or as described in these specifications and drawings.

- 15.20.3 All signal line protective devices shall be located at the terminal point nearest the cable interface with the exterior cable plant. Devices shall be mounted to the back panel of the cabinet.
- 15.20.4 Where equipment is fed from a panel board not protected by a panel board protector, provide a branch circuit protector installed at the panel board.

15.21 CLEAN UP

At the end of each day, the Contractor shall be responsible for the clean up, removal, and secure disposal of all debris.

15.22 TESTING

- 15.22.1 The Contractor shall notify the Engineer two (2) weeks prior to the system tests so that arrangements can be made to have The DPW and DCS personnel witness the tests.
- 15.22.2 Each penetration of the taut wire system shall produce an alarm.
- 15.22.3 If an alarm is not detected on the first try of any test, the test shall be deemed a failure and all testing will cease.
- 15.22.4 The Contractor shall be allowed time (not to exceed 1 hour) to make the necessary repairs before continuing the test. If additional failures are noted during the test, the test shall cease and be rescheduled for another day.
- 15.22.5 If the test is deemed a failure by the Engineer, DPW or DCS personnel, the Contractor shall be responsible for all cost incurred by the Government for scheduling a second test.
- 15.22.6 Taut Wire System: Test each system function step by step as summarised herein.
1. The simulated intrusion attempts shall be performed by a person weighing 45 Kg or more.
 2. Safety equipment shall be provided by the Contractor and proper precautions shall be taken when performing the tests.
 3. Each attempt shall be terminated upon detection.
 4. Simulated escape attempts shall be performed at two (2) locations in each zone unless otherwise directed by the Engineer.
 5. Fast Climb: Approach and make contact with the fence and rapidly try to scale the fence.
 6. Slow/Stealthy Climb Over: Approach and make contact with the fence and slowly, deliberately, and stealth fully attempt to climb to the top of the fence.

7. Climb Through: Spread wires apart and attempt to climb through.
8. Tamper: Remove cover on zone processor.
9. Trouble: In each zone, remove one side of the alarm communications wire from the processor board.
10. Cut Test: The contractor must have the ability to simulate a "Cut Test" in any zone identified by the Contracting Officer.

15.22.7 Microwave System: Test system function step by step as summarized herein.

1. Fast Walk: Walk rapidly between the transmitter and receiver.
2. Slow Walk: Walk slowly between the transmitter and receiver.
3. Fast Belly Crawl: Rapidly crawl on your belly at the point nearest the transmitter inside the sally port. Repeat procedure near the receiver and at the midpoint of the system.
4. Slow Belly Crawl: Slowly crawl on your belly at the point nearest the transmitter inside the sally port. Repeat procedure near the receiver and at the midpoint of the system.
5. Tamper: Remove transmitter cover. Repeat the same procedure for the receiver.

15.23 SPARE PARTS

The Contractor shall provide the institution with the following spare parts upon system completion:

1. 20 Sensor Switches.
2. 2 Fence Mounted Processors.
3. 900 m of Taut Barbed Wire.
4. 2 Copies of System Software.
5. Tensioners (2)
6. Links (10)
7. Break-away connecting strips (25)
8. Tension tester (2)

15.24 INSULATORS

All fence wires shall be isolated from the fence support structure to accommodate short circuit detection and non-lethal pulses. Insulators shall be of such design to forbid

removal and will not be able to carry a vertical load of more than 30kg. Once in place wires cannot be removed without destruction of the insulators. All insulators shall be UV protected (Nylon 6 glass filled).

15.25 INTERMEDIATE POSTS

The intermediate posts must accommodate basket weaving that cannot be removed once installed without destroying or creating an alarm. Intermediates must accommodate the main and top structure.

15.26 STRAIN POSTS

Strain posts will allow re-tensioning of fence wires and shall withstand wire tension force as well as additional loading of a reasonable intruder without causing permanent deformation. Strain post shall accommodate the main and top structures.

15.27 CIVIL

Civil construction will include route preparations, and casting a 1200mm wide concrete slab with welded mesh steel reinforcing a nominal thickness of 100mm and a minimum compressive strength of 20Mpa.

All existing electrical services as well as the cables required for this installation shall be installed in PVC sleeves in the concrete slab to ensure that these services can be maintained after completion of the contract.

The area underneath the concrete plinth shall be cleared of all vegetation prior to casting and treated with a suitable sterilization herbicide to prevent any vegetation growth.

The contractor shall allow and install a PVC sheet underneath the concrete slab, to prevent any vegetation growth.

16. UNDERGROUND DETECTION SYSTEM

16.1 PURPOSE OF SYSTEM

The purpose of the underground detection system is to detect any weight applied to the ground above the installed system and to report these events to a central control unit. The system will be applied in order to ensure maximum coverage in the detection area.

16.2 DESCRIPTION OF SYSTEM

16.2.1 Zones

The system will be installed in specific lengths called **Zones**. Each zone can provide and report its own intrusion alarms, therefore providing precise information on the area of any intrusion attempt.

16.2.2 Detection units

Each zone will be equipped with a detection unit, the detection unit will include the transmitter, receiver, alarm processing unit and the required detection cable.

The detection cable will be a standard multi-mode fibre optic cable, repairable with easy fit connectors.

The parameters on the alarm processing unit must be adjustable in both the amplitude and frequency domain. The system must be commissionable to allow for maximum probability of detection (POD) and minimal nuisance alarms (NAR) and false alarms (FAR).

16.2.3 Field Network

The field network will consist of field units, master controller and a redundant fibre-optic communication ring network.

16.2.3.1 Field Units

Each sector shall be equipped with a field processor unit, performing all the functions associated with a particular sector. A field processor shall provide for / contain the following sub- systems:-

- Digital inputs
- Relay outputs
- Processor
- Data communication
- Reset key switch transmitter type

Field processors shall be installed between two each sectors. The enclosure shall be manufactured from Stainless steel. Enclosures shall be rated IP 65 and fitted with a door lock and tamper switch.

A sector reset button will be accessible from inside the perimeter fence and shall be of the transmitter type.

All cable entries to field units, if exposed shall be protected against vandalism by means of stainless steel covers.

16.2.3.2 Data Communication

Field processors are linked with a fibre optic serial data communication cable, in a closed ring configuration.

16.2.3.3 Power

A single phase power feed will supply the field processors.

(230V should be supplied to each field node.)

All equipment shall be protected against lightning surges and transient voltages to all the relevant SABS specifications and regulations

16.3 Master Controller

The master controller will poll all the field processors, execute the control program, drive the mimic and send events to the system control computers.

The master controller will be based on a Linux operating system, with a Graphic User Interface (GUI).

No SCADA package shall be provided. The system should however be able to interface with an external SCADA package via a MODBUS ASCII or socket interface as required.

The interface definition will be documented and delivered with the system as part of the deliverable of this project. (Proof of the operability of the interface must be given.)

The master controller must log and report all system and user events.

16.4 Operation

16.4.1 Detection

Each field controller will announce at least the following alarm events:

- Fibre disturbed
- Fibre cut
- Tamper

The system will be able to report each event at every sector whether the previous indication has been reset or not.

The following alarm reporting and control sequence shall be executed in the event of an alarm:-

- Alarm indication flashing
- Sounder activated

When the alarm is accepted by the operator activating the sector accept button on the GUI, the system:-

- Silence the sounder
- Alarm indication is on (stop flashing)

When the sector reset key switch is activated:-

- The alarm indication follows the alarm status
- The flashing light is deactivated

16,5 MAINTAINABILITY

Maintenance will be guided from central control.

16.54.1 Status Alarm

The system shall indicate a status alarm under the following conditions:-

- Any of the fibre detection units faulty
- Loss of data communication
- Remote processor malfunctioning

16.5.2 Diagnostic Tools

A diagnostic screen shall be included at the master indicating the following:-

- On/off line status of field processors
- The calibration status of individual sensors

The diagnostic software shall include a data recording facility to record all the digital and analogue signals from any selected field processor unit.

16.5.3 Installation

The detection equipment will be installed in accordance with the supplier specifications, the installation specifications must be presented before installation commences.

The detection cable must be installed at buried depth of 100mm beneath the surface in non-compacting soil. (Riversand) The strip of backfill will be 150mm by 1,4m wide. The detection cable installed will be sufficient to cover the specified area.

18. CABLING

18.1.1 General

Supply, install, connect, and terminate all cabling necessary to complete the installation, including all power and UPS distribution, audio, data, control, fibre-optic (where applicable), communications cabling and device cabling.

All cabling shall be supplied and installed as a part of this Sub-contract.

All terminated cabling shall be neatly tied/loomed to prevent damage to terminations and interference or obstruction of other services.

Strain relief shall be provided for cables connected to rack mounted equipment.

All cables shall have stranded copper conductors and shall be PVC insulated with overall PVC sheath, unless otherwise specified.

All cabling shall be concealed and installed on metal cable tray, cable duct and conduits.

Cabling shall be installed with due regard to future removal and replacement of cables.

All cables shall be new and delivered on site in unbroken reels, and with the "manufacturer's" label attached.

Due consideration shall be given to voltage drop when calculating cable sizes.

Installation and cable route shall be to the satisfaction of the Engineer.

Cables shall be installed in a manner eliminating any possibility of strain on the cable itself or on cable terminations.

No joints or connections will be permitted. Adequate loose cable shall be left behind all equipment to facilitate removal for inspection, adjustment or replacement.

Coaxial cable for CCTV cameras shall be 75 Ohm impedance with pure copper centre conductor and pure copper braided shield providing minimum 95% braid coverage.

18.1.2 Cable Damage

During the installation of cable should any kinks or abrasions to insulation, braiding, sheathing or armoring occur, the affected cable shall be withdrawn and replaced with new cable.

18.1.3 Cables in Ceiling Space

Cables shall be supported at intervals not exceeding 1000 mm utilising catenary wires, approved trimmers, roof or ceiling support members.

Cabling in major cable routes shall be installed on cable trays.

A minimum clearance of 400 mm shall be maintained from false ceilings, luminaries, hot water pipes or other heat or electrical noise generating equipment.

Cables shall be neatly grouped together and supported using approved clips or ties.

18.1.4 Cables in Conduits

In addition to the general requirements, cables shall be installed in conduits in such a way to prevent twisting or kinking of cables or damage to cable sheaths.

Communications, data or security cables installed in underground conduits shall be complete with external nylon jacket.

18.1.5 Cables in Ducts

Where cables are installed in ducting, cables shall be grouped and taped for easy identification.

Holes in duct through which cables pass shall be grommetted.

Changes in direction of duct shall be set such that the maximum bending radius of cables enclosed in the duct will not be exceeded.

18.1.6 Cables on Trays

Cables shall be neatly loomed, securely fixed to the tray and installed parallel with the edge of the tray.

Cables shall be arranged on the tray to:

- Avoid unnecessary crossover of cables,
- Spaced to allow adequate ventilation and prevent heating of cables, and separated to provide segregation between independent services.

18.1.7 Cable Numbering

Generally all cables shall be allocated and identified with unique cable number.

All cables including patch leads shall be clearly labeled. Labels shall be affixed within 250 mm of each termination.

Cables shall be fitted with tags at the following points:

- On the cable sheath next to the gland at each end.
- In cable pits.
- At any additional point on the cable sheath (or around the core bunch) where the preceding requirements are not readily traceable from the core terminations.

Cable identification tags shall be orientated uniformly to read left to right from the logical viewing point horizontally; and from bottom to top viewed from the right where installed vertically.

Duplication of cabling and equipment identities shall be avoided.

18.1.8 Co-ordination and Separation of Services

Install services for each respective section and system and physically separate from other systems to a discipline and coordinated layout plan. Adjacent services shall run approximately parallel. Crossing services shall cross at approximate right angles.

Individual services between common points of the work shall follow similar parallel routes. Cables shall be parallel to the building major axes.

Separation distances shall not be less than the following:

- Power cables - 100mm
- ELV and Communication cables to parallel power cables - 300mm
- ELV and Communication cables to power cables crossed at 90° - 100mm
- Any trade to finish floor level - 80mm
- Any trade to structure - 20mm

18.1.9 Co-ordination and Feasibility

The drawings, schematics and specification indicate the main routes and positions for the various services installations and equipment in relation to the building and other services.

Check the details shown on the drawings and co-ordinate the detail layout with the building structure and other services. Submit full details of proposed major cable routes for approval before proceeding.

18.1.10 Special Cabling

Where equipment to be supplied and installed under this specification requires special cabling (i.e. screened cables, unshielded twisted pair, coaxial, optical fibre or other special types of cable), these cables shall be provided as part of this Sub-contract.

It shall remain the responsibility of the Sub-contractor to design the cabling system network and determine the type of cable required for interconnection of the various components, which make up the total system to be installed, to comply with the Sub-contract documents.

18.1.11 Wiring Diagrams

Deliver to the Head Contractor in accordance with the scheduled works programme:

- Details of all types of cabling to be installed as part of the Sub-contract works.
- Block schematic cable diagrams indicating all system interconnecting cables including cable routes and cable types complete with core make up and numbers.
- Detailed floor plans indicating cable routes and designated circuit identification.
- Wiring diagram detailing system interconnections and cable/core identification.

18.1.12 Coaxial Cabling

Coaxial cabling used for the purpose of Closed Circuit Television (CCTV) within buildings or other approved short haul distances shall, as a minimum be RG-59B/U with a solid copper core and 95% copper braid shield. The copper shall have less than 2.0% impurities.

18.2 FIBRE OPTIC CABLING

The backbone multi-mode fibre optic cabling and conduit system between buildings shall be installed in a star topology from the Central equipment room to each local control area. The system shall be installed in such a way that a failure of a single cable shall not affect the operation and communications to other local areas from the Central Control Room.

18.2.2 Other Security Services Fibre Optic Requirements

Fibre optic cable shall be supplied and installed in the quantities and location indicated on the drawings for other elements of the security services installation as part of these works.

These requirements are generally to remote CCTV and SMS locations and will generally require conventional tight buffered 80/125 multi-mode fibre-optic cable approved for in-ground installation in sealed in-ground conduit.

18.2.3 General

A fibre-optic cabling network shall be provided for the connection and integration of various services to all nominated buildings. The fibre optic cable for the security services installation forms part of this contract.

The dedicated security services fibre optic cables will be terminated as part of this contract at 19" equipment racks or equipment cabinet installed in the nominated buildings.

Patch fibers to extend the fibre cable from the equipment racks or cabinets at which the cable terminates to the security equipment racks shall be provided in a ST terminal array. Optical fibre fly-leads to connect security services equipment to this point shall be supplied and installed by the security services sub-contractor.

The nominated security services element of the fibre optic cable network shall be utilised solely for the distribution of all security services.

Leave an excess of three meters of fibre neatly coiled up at each termination to provide spare fibre for any re-termination work in the future.

Cables shall be broken out into an approved Fibre Optic Termination Panel (FOTP) as per the cable manufacturer's specifications.

Optical pigtails shall be terminated on the trunk side of the patch panel, using ST Bulkheads.

18.2.4 Fibre Optic Termination Panel (FOTP)

All FOTP shall be 19" rack mountable, or mounted in a suitable enclosure in the equipment racks and equipment enclosures. Security services FOTP in buildings will be supplied and installed as part of this contract.

All FOTP shall provide for fibre optic termination and any through splicing and/or patching facility.

The FOTP's shall be an industry standard type and shall consist of:

- Fibre optic patch panel capable of terminating "ST" style bulkheads.
- Number of terminations as required for cable and core numbers.
- Splice organiser cassettes shall be provided to accommodate all the splices.
- PVC gland entries shall be provided for up to six incoming optical fibre cables.
- An approved strain relief fixing shall be provided for each central strength member.
- Cable strain relief/management provision shall be provided for internal and outgoing optic patch cables.

18.2.5 Optic Fibre Transmitter Receiver

High quality optical fibre transmitters and receivers, International Fibre Systems or Fibre Options manufacture, or Engineer approved equivalent, shall be supplied and installed as part of these works.

Fibre optic transmitters/receivers shall be located within Equipment Racks and equipment cubicles.

Transmit/Receive (Tx/Rx) equipment shall:

- Be 19" rack mountable.
- Have fully enclosed printed circuit boards.
- Use duplex "ST" type fibre optic connectors.
- Use BNC coaxial connectors.
- Use RJ45 connectors for LAN connections.
- Have screw clamped power connections.
- Have "Plug & Play" operations, using modules for rack mounting.
- Data modules shall be user programmable for RS232, RS422 and RS485, as a minimum.
- Have automatically re-settable fuses to module power supplies.
- Battery back-up for power supply modules.
- Have no electronic or optical adjustments.
- Operate over a temperature range of -10°C to $+50^{\circ}\text{C}$.
- Be fully compatible with the connected equipment (i.e. without any performance degradation).
- Include self-adjusting AGC circuitry.
- Utilise frequency modulation (FM) or 8-bit digital encoding.

Optical fibre transmitters and receivers shall be located within equipment racks, equipment cubicles, camera poles and other nominated locations.

Provide optical fibre transmitters and receivers with an optical fibre budget of 18dB, including a 2.5 dB minimum margin.

Provide non-rack mount modules, as required or directed by the Engineer, for alternative locations (e.g. inside the bases of camera poles).

18.2.6 Technical

The TX/RX equipment shall comply with the following minimum technical requirements:

- Minimum video technical specifications:
- Meet the requirements of the EIA/TIA RS-250C standard for medium-haul transmission.
- 8MHz (-3dB) bandwidth.
- Level unity gain (+/-2%) from 0Hz to 5MHz.
- 65dB Crosstalk (minimum) at 4.43MHz.
- Optical loss budget of 15dB.
- Include AGC circuit, self adjusting. The AGC circuit shall not cause short term video signal synchronisation pulse, luminance or chroma crushing when the luminance levels of the video signal changes from 0% to 100% luminance and back to 0% luminance at intervals exceeding 60 seconds.
- The RX/TX unit's technical specifications (e.g. SNR, bandwidth, transmission characteristics, and the like) shall not change with the change in ambient temperature.
- The RX/TX unit's technical specifications (e.g. SNR, bandwidth, transmission characteristics, and the like) shall apply for the previously specified optical loss budget.
- No intermodulation 'noise' shall be measurable on video signals.
- No sub carrier 'noise' shall be measurable on video signals.
- The sub carrier used to transmit audio and/or data shall be a different frequency for each direction of transmission.
- The sub carrier frequencies for each RX/TX unit, at each end of the optical fibre core shall not drift to within 100kHz of each other when the differential ambient temperature variation is at the maximum specified level (i.e. one TX/RX unit is operating at an ambient temperature of – 100C and the other TX/RX unit is operating in an ambient temperature of +700C).

18.3 CABLE ENCLOSURES

18.3.1 General

All cable enclosures including conduits, cable trays, cable ducts and the like required to facilitate the installation of cabling within the building shall be supplied and installed as part of this Sub-contract.

All cabling shall be installed in cable enclosures, unless protected from mechanical damage by existing building structures.

Cable enclosures shall be installed as follows:

- Within internal ceiling or roof spaces, wall cavities and the like rigid or flexible PVC conduit may be installed.
- On external building walls, walkways and other areas rigid or flexible steel conduit or steel cable duct must be installed. All steel conduit or cable duct must be painted to match the existing adjacent structures.
- All underground conduits shall be heavy duty PVC.

All conduit shall be concealed unless it is unavoidable that the conduits be exposed. No surface mounted conduits are to be installed without consulting the Engineer.

Supply and install all conduits necessary for the installation of cabling for the various systems specified in this document.

18.3.2 Conduits

All conduits shall comply with the minimum requirements of this specification and referenced standards. Unless otherwise specified conduit used throughout the installation shall be light duty rigid PVC.

All conduit and installation shall comply with the following:

- AS 2053 "Non Metallic Conduits and Fittings" or AS2052 "Metallic Conduits and Fittings".
- Oval conduits shall not be installed.
- Minimum size of conduit shall be 20 mm.
- All conduits shall be of an adequate size and have reserve capacity for at least one additional circuit unless the conduit size is specified.
- Power, lighting and extra low voltage systems shall be installed in separate conduits.
- Conduit saddles shall be spaced a maximum of 1200 mm apart.
- Where saddles cannot be fixed to the building structure a suitable bracket shall be supplied and installed.
- Conduits shall be a minimum of 1500 mm clear of gas and hot water pipes.
- Conduits shall not be installed parallel to gas or hot water pipes.
- Conduits installed in cavity walls shall be fixed to the face of the inner leaf and shall not touch the outer leaf.
- All PVC conduit joints shall be made solid and waterproof using an approved PVC welding solution.
- Metallic conduit exposed to the weather shall be galvanised.
- A 2.5 sq. mm. TPI draw wire shall be installed in all conduits whether containing cables or not.

- Underground conduit shall be heavy-duty (HD) underground PVC conduit, unless otherwise specified.
- Flexible conduit shall be steel PVC sheathed conduit.
- Where exposed conduits are unavoidably required, the approval of the Head Contractor shall be required prior to installation commencing.
- Conduits shall be installed far enough above ceilings and below floors to avoid accidental piercing by nails and the like or restricting removal of ceiling tiles or floor panels.
- To the maximum extent possible, conduits shall be installed 150 mm clear of underside of roof decking.
- Half saddles shall not be installed.

18.3.3 Light Duty Rigid PVC Conduits

Install PVC expansion couplings in straight conduit runs every 2 lengths when under roofs and every 3 lengths in other locations irrespective of intervening conduit fittings or where conduits pass across structural expansion joints.

Install saddles so that conduits are held firmly in place yet allow for movement due to linear expansion and contraction of the conduits.

Half saddles shall not be installed.

Where conduit passes through a fire wall, sleeve with next size steel conduit extending 300 mm either side of the fire wall. Seal gap at each end of steel conduit with intumescent material.

18.3.4 Steel Conduit

Before installation, clean the threads of conduits and fittings to bright metal by the use of taps and dyes. Internally ream ends of the conduits free of sharp edges and projections.

Paint exposed threads on metal conduits installation with a zinc rich paint.

Where conduits terminate in wall boxes, specifically fabricated metal boxes, switchboards and termination boxes fix them in grip entries welded to the box or by locknuts each side of the box material.

In the case of locknuts, fit a female PVC bush after the inner locknut.

Bends shall be made with tools specifically designed for bending steel pipe, with easy sweeps and shall comply with manufacturers recommended bending radius and shall be not less than three times the external diameter of the conduit.

Conduit bends, sweeps and installation method shall not cause mechanical stress sufficient to result in deformation. Any conduit which is deemed by the Engineer to have been stressed or steel work deformed shall be replaced.

Make joints in galvanised conduits and water pipe installations watertight by applying thread seal tape or other approved jointing material to threads.

All exposed external conduits shall be galvanised steel.

Use steel screwed conduit fittings with Class B conduit, galvanised where applicable.

21.3.5 Steel Cable Duct

Fabricated from not less than 1.2mm zinc anneal with machine folded return edges for rigidity.

Steel cable ducts shall only be installed in plant rooms, equipment rooms or roof spaces.

Minimum dimensions shall be 50mm x 50mm and cable not to exceed 60% of useable capacity.

Be equipped with clip-on removable covers fixed with screws at each end and having a maximum length of each cover section of 1200mm.

Be complete with matching couplings, tees, elbows, reducers and the like as required.

Be equipped with steel couplings between duct sections, which will maintain mechanical strength and electrical conductivity.

Be fitted with integral partitions throughout its length where it is necessary to accommodate different services within the common ducting envelope.

Be fitted with matching bends sets etc. and other accessories.

Wherever possible mount ducts with the lid uppermost. Allow adequate space above for access to the duct.

Match components one with the other and ensure the fixing system is complete with angle pieces, brackets and the like, as required. Ensure heads of bolts face inside the duct.

Where ducts are mounted with the lid downwards, provide approved fibre cable retainers at maximum 600mm intervals.

Allow for the termination of ducts in the respective items of equipment.

Co-operate with other trades prior to and during the installation of cable trays and ducts to ensure that the system is installed in an efficient manner.

Flat on Walls:

- Single ducts may be fixed direct to the wall surface. For groups of ducts use supports of P3300 galvanised millstrut (at maximum 1500mm vertical centres) fixed horizontally on the wall and spanning the total width of ducts.

Flat on Underside of Concrete Slabs:

- Single ducts may be fixed direct to the slab. Fasten multiple ducts to galvanised P3300 Unistrut spanning total width of ducts.

Down from Slab Over:

- Use supports of Unistrut galvanised P1000 with 10mm galvanised threaded rod hangers at 1500mm centres.

Suspended off Walls and Above Ceilings:

- Use supports of Unistrut P1000 or galvanised rigid MS cantilever brackets at 1500mm centres.
- Supports shall be securely supported from walls or ceiling support system.
- - At each support bracket fix to the structure and to each duct with at least 2 fixing studs.

18.3.6 Cable Tray

Manufactured from minimum 1.2mm MS sheet.

Fabricated and shaped to provide rigidity, such that when loaded with cables plus 50kg point load at mid span, they do not deflect more than 10mm at any point.

Perforated with slotted holes over the entire tray area suitable for attachment of fittings/fixings using metal thread studs and nuts or nylon tray nuts complete with matching splice plates, tees, transitions and the like, as required and suitably radiused at changes of direction.

Use trays that have a minimum bending radius of 300mm.

In ceiling spaces install horizontal runs of cable to avoid other fittings and services and where possible within the space 150mm above the ceiling surface unless otherwise shown on drawing(s). Allow sufficient space for further removal of ceiling tiles.

In equipment room and roof spaces the position of tray runs shown are approximate only.

Install as directed on site to avoid other fittings and services.

Allow for the termination of trays at the respective items of equipment.

Co-operate with other trades prior to and during the installation of cable trays to ensure that the system is installed in a coordinated manner.

At each support bracket, fix to the structure and to each tray with at least 2 fixing studs.

18.3.7 Heavy Duty PVC Conduits

All underground conduits shall be heavy duty rigid PVC.

Heavy duty conduits are to be size nominated on drawings.

Make joints between conduits and between conduits and accessories solid and waterproof.

Junction boxes and the like in heavy duty conduit systems shall be complete with a neoprene gasket.

Protect conduits exposed to sunlight with an approved painted steel cover.

Install conduits to the manufacturers preferred recommended practice.

Conduit fittings such as elbows, bends, tees etc. shall not be installed in underground conduit runs. All changes in direction shall be made using large radius sets in the conduits.

18.3.8 Conduit Fittings

Use junction boxes of adequate size to allow installation of cables without damage to the cabling installation.

Conduit elbows and tees are not permitted in this installation unless specified or shown on drawings.

All conduit fittings with the exception of wall boxes shall be of a material and finish compatible with the type of conduit system to be installed.

18.3.9 Provision For Drawing In Of Cables

Conduit installations shall be so arranged that:

- Wiring can be readily drawn in or out without damage.
- Removal, damage or alteration to any part of the building structure is avoided.
- No disruption to the conduit installation continuity occurs.
- Draw wires are provided in all conduits.

The removal of access panels, floor traps, ceiling traps/tiles (at draw-in box positions) or electrical fittings, shall not be deemed to be damage to parts of the building structure.

18.3.10 Conduit to be Concealed

Conduit shall be installed within walls, wall cavity, secure ceiling space, contained in floor slab, chased into walls to be rendered and otherwise hidden by finished building structures.

Where exposed conduits are unavoidably required, the approval of the Engineer shall be required prior to installation commencing.

18.3.11 Conduit and Conduit Fitting Installation

Unless otherwise specified, draw-in boxes shall be installed in a straight conduit installation at a maximum distance of 12m apart and in such other positions as will facilitate the ready drawing in of cables. Where conduit runs are grouped together in accessible locations, draw-in boxes shall be grouped together at definite and approved positions.

In inaccessible positions, conduit boxes shall not be used to change direction in or branch off from the conduit installation.

Not more than one bend shall be used between any draw-in positions. Where more than one bend is required, the change of direction shall be achieved by setting the conduit in a large radius bend.

Ducts, conduit and conduit fittings including conduit box lids and duct covers shall not be installed or shall be visible on the surface of any floor, wall or ceiling.

All conduits and boxes shall be plugged in an approved manner against the ingress of dirt, moisture or foreign matter. This procedure shall be carried out immediately after installation of the conduit and shall remain in place until the permanent wiring is installed.

Before the permanent wiring is drawn in, conduits shall be dried internally and freed of any foreign matter. Refer at all times to drawings and study the requirements of other services, e.g.

mechanical ventilation ducting, piping and the location of other reticulation equipment and install conduit and ducting clear of same.

Conduit fittings shall be rigidly secured to the conduit. Conduit tees will not be permitted – 3 way conduit boxes shall be used instead.

High impact PVC or nylon conduit bushes shall be fitted at all conduit ends.

Conduit installation in all positions shall:

- Be installed in an orderly manner and grouped, and in one plane where practicable.
- Be installed parallel with the major axes of the structure.
- Be securely fastened to rigid supports with approved type clips or saddles. Single sided clips and saddles are not an approved fixing.

18.3.12 Support Structures

Install support structures truly vertical or horizontal and parallel with major axis' of the building.

18.3.13 Conduit - Flexible

Flexible conduit shall only be installed between rigid conduit and equipment subject to movement or vibration and across seismic joints.

18.4 UNDERGROUND CONDUITS

18.4.1 General

In areas adjacent to site common services trench conduit shall be installed in this trench in accordance with Head Contractor requirements and be coordinated with other services.

Generally installation shall comply the requirements detailed further in this document.

Where the common services trench is not adjacent then:

- Install conduits a minimum of 400mm below finished ground.
- Install conduits to the manufacturer's preferred recommended practice
- Excavate trenches straight and true and to an adequate depth to provide the required cover for conduits
- Ensure the bottom of trenches are flat and clear of protrusions such as rocks, tree roots and the like, prior to installation of conduits and backfill.
- Provide all shoring sheet piling or support necessary to maintain safe excavation of all trenching.
- Arrange conduits so that the makers identification and the conduit category are uppermost in clear view.
- Install conduits from buildings with a slight fall to the first junction box or cable pit external to the building.
- Whether containing cables or not, underground conduits shall be provided with a 7/0.67 (2.5 sq.mm) PVC insulated draw wire.
- Make joints between conduits and accessories solid and waterproof.
- Cover conduits with 150mm depth of rubble free sand and place an identification tape, 150mm above the conduit along the entire length of the installation.
- Use orange plastic tape, approximately 150mm wide and indelibly marked 'DANGER ELECTRIC CABLE BELOW' at not more than 1 meter intervals.
- Complete backfilling of trenches clean fill and compact to match surrounding material.
- Lay a bed of clean absorbent sand 100mm deep in the bottom of trench with 200mm cover or clean fill over cables or conduit.
- Backfilling and tamping of trenching where passing under buildings, paths, car parks, and other load bearing areas shall be carried out in layers, 20mm maximum thickness.
- Where conduits pass through pits PVC unsheathed cables shall be continuously enclosed in conduit with a junction box for each conduit run installed within the pit.

18.4.2 Cable Pits

Cable pits shall conform to the following:

- Install cable pits at locations required to facilitate the installation of cabling without causing damage to the cables.
- Provide cable pits with lids.
- Ensure concrete lids are molded with the word "Electric Cables", "Earth Pit" or "Communications Cables" as required.

- Neat fitting holes shall be drilled in fibrous cement pits for conduit/pipe entries and 4 x 50 mm holes shall be drilled in the bottom of the pits for drainage purposes.
- Install all pits level and with the lids flush with finished ground level.
- Minimum size to facilitate cable installation including minimum bonding radius.
- Be minimum size indicated on drawings.
- Pits shall match the manufacture and installation of pits installed by the electrical services sub-contractor.

18.4.3 Dewatering

De-water all excavations required to facilitate the installation of all in ground services and work to the satisfaction of the Engineer. All water removed from excavations shall be effectively discharged from the site.

Dewatering shall include water generated from any source entering the excavations.

18.4.4 Excavation in Rock

The Sub-contractor shall make himself fully aware of all naturally occurring ground conditions including the extent of rock likely to be encountered in the excavations and make all necessary allowances in his tender for excavating in the ground as found. No claims for excavating in hard ground, root or any other adverse conditions will be entertained.

18.4.5 Bituminous Paved Surfaces

Where a trench is to be cut through bituminous or concrete pavement and shoulders the excavation shall be saw cut in straight alignments. The excavated material shall be back-filled in accordance with this specification to within 150mm of the pavement level and compacted to a density at least equal to the adjoining undisturbed ground and not less than 90% modified AASHO density in the top 200mm backfill.

For bituminous pavements a selected base course material of equal or better quality than the existing course shall be placed and compacted to a density of not less than 95% modified AASSHO with the surface finishing flush with the existing shoulder surface and up to 25.4mm below the existing sealed pavement.

The pavement shall be sealed with a tack coat of bitumen emulsion and compacted bituminous pre-mix to finish flush with the existing seal.

19. TECHNICAL SUPPORT DOCUMENTATION

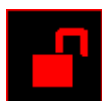
19.1 SMS Workstation Icons



DOOR SECURE



AUDIO EVESDROP ON



DOOR UN-SECURE



CAMERA DE-SELECTED




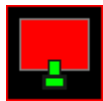
DOOR FAULT



CAMERA SELECTED

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-  PA SELECTED
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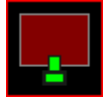
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-  AUDIO CH CALLING
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-  COMPRESSOR FAILURE
-  UPS HEALTHY
-  UPS FAILURE
-  FENCE ZONE DETECTION HEALTHY
-  FENCE ZONE ALARM ACK
-  MOTION DETECTION HEALTHY
-  MONITORED DOOR SECURE
-  MONITORED DOOR OPEN
-  AIR PRESSURE HEALTHY
-  AIR PRESSURE LOW
-  DPS SECURE
-  DPS UN-SECURE
-  CELL LIGHT OFF
-  CELL LIGHT ON
-  PC WORKSTATION HEALTHY



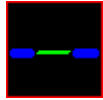
MOTION DETECTION ALARM



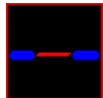
PC WORKSTATION FAILURE



MOTION DETECTION ALARM ACK



ROLLER SHUTTER SECURE



ROLLER SHUTTER UN-SECURE



DAY ROOM BAY LIGHTS OFF



DAY ROOM BAY LIGHTS ON



LIGHT GROUP NOT SELECTED



LIGHT GROUP SELECTED



GROUP PROGRAM MODE IS NOT SELECTED



GROUP PROGRAM MODE IS SELECTED



DOOR GROUP OPERATE NOT SELECTED



DOOR GROUP OPERATE SELECTED



EMERGENCY GROUP NOT SELECTED



EMERGENCY GROUP SELECTED



VEHICLE LOOP DETECTOR IN-ACTIVE



VEHICLE LOOP DETECTOR ACTIVE

20. OUTER PERIMETER FENCE

NOTE: USE THE LATEST OUTER PERIMETER FENCE SPECIFICATION AS PULISHED ON THE DPW WEBSITE

20.1 Perimeter security fencing

The Perimeter Security Fence must not to be closer than 20m from the site boundary. It will enclose all the holding units and all the support buildings accessible to prisoners or supporting inmate activities.

The perimeter fence consist of Heavy, high security welded panel fence, with rectangular mesh

20.2 Standard Fencing Specifications

□ Posts

Curved 101.6mm x 4.5mm Grade W 300 Hot dipped galvanised tubular posts to radius specified with 3mm capping plate. Posts have predrilled 11mm diameter. holes for M8 bolts to fix cover plate to posts. Refer to details for top rail fixing plate. Posts to be positioned in Class 6, 103mm ID P.V.C x 2.58mm wall thickness x 1500mm long sleeves set in 500mm x 500mm x 1500mm 15MPA concrete foundation. Ground conditions may require additional concrete.

□ Covering plate

Covering plates required on all curved posts from ground to top of post 50mm x 5mm flat steel required, predrilled with 11mm diameter. holes for fixing mesh to post.

□ Fixing Accessories

Cover plates to posts: M8 x 150mm galvanised cup-square bolts with galvanised washers and shear off nuts.

Top rail to post & post at corners: M10 x 40mm galvanised cup-square bolts with galvanised washers and shear off nuts.

Corner post bracket: M12 U - bolt galvanised with galvanised washers and shear off nuts.

□ Welded wire mesh panels

Heavy, high security mesh, electrically welded at every intersection

20.3 Mesh Type (1)

3-5-8S Welded mesh panels

Inside apertures: 72.2mm x 8.7mm

Wire diameter. 4mm

Width of panel: 3.050m

Tensile Strength of wire: 600 – 750 N/mm²

Weld strength: 75 – 80%

Solidity: 35%

Weight: 9.34kg/m²

Height of panel: 6.0m

Coating: Galfan Class A coated to SANS spec.10224-2:2003 (min. 240g/m²)
Section of mesh through concrete beam or in ground to be bitumen dipped up to 100mm above ground level

Mesh Type (2)

3-5-8/10 S Welded mesh panels

Inside apertures: 72.2mm x 9.7mm

Wire diameter. Vertical - 3mm
Horizontal – 4mm

Width of panel: 3.050m

Tensile Strength of wire: 600 – 750 N/mm²

Weld strength: 75 – 80%

Weight: 5.92kg/m²

Height of panel: 6.0m

Coating: Galfan Class A coated to SANS spec.10224-2:2003 (min. 240g/m²)

Section of mesh through concrete beam or in ground to be bitumen dipped up to 100mm above ground level

□ **Toprail**

50mm x 50mm x 5mm Angle Iron top rail. Predrilled holes according to detail drawings including 50mm x 5mm covering plate to clamp Razor Wire coil to angle iron top rail .

Galvanising

All posts, rails and cover plates to be Hot dipped galvanised in accordance with ISO 1461 (Min.70 microns)

20.4 Additional

Razor Wire Coil (1)

Barbed Tape Concertina 730mm dia. Medium barb - Barbed Tape Concertina Coil.
Galfan Class A coated to SANS 10244-2:2003 (Maximum stretch – 10m)

Razor Wire Coil (2)

Barbed Tape Concertina 610mm dia. long barb - Barbed Tape Concertina Coil.
Galvanised (Maximum stretch 10m)

20.8 Gates

Refer to detail drawings.

The frame to be constructed of 60 x 40 x 2mm rectangular steel tubing and Hotdipped galvanised to ISO 1461 (Min thickness 45 micron). Each gate must consist of two leaves of same size.

Locking devices to client's specification.

Each section of the gate must be secured to the gate post by means of 3 approved hinges. Proposed hinges to be submitted for approval before fitting.

The gate must be installed in such a way that the leaves can open in both directions.

Each gate must be clad with the same mesh as that of the fence using similar coverplate & bolting system.

The gap between the bottom of the gate and the road surface shall not exceed 50mm

Closing frame and side panels: refer to detail drawings.

20.9 Erection of the fencing posts

After excavation of the fencing post holes, 1300mm of the 103mm ID P.V.C sleeve with positioning bolt to be set vertically in concrete foundation. Slide post into sleeve. Minimum 5 days setting time to be allowed before positioning posts. After setting of concrete the top 200mm PVC sleeve to be cut off before erection of posts. Care must be taken to ensure all posts are aligned (vertically and at tops), plump, perpendicular and in the correct position on the route of the fencing. All sleeves must be encased in a 25/19 concrete footing of adequate size. The contractor shall note that all galvanising shall be done after manufacturing of the posts.

Prior to erection of the fence poles permission shall be obtained from both the Clients representative as well as Civil consultant of the Department to ensure that all conditions have been met.

20.10 Concrete slab for outer security fence

A 25/19mm concrete slab must be cast in situ along the inside of the external fence. The dimensions of the slab shall be as follows: 1550 x 100mm or other as specified on top of prepared ground level. The wire mesh of the fence shall be free from the concrete slab. A gap of 50mm wide must be provided at 3.00m intervals, to provide drainage.

20.11 Preparation of the fence lines

The fence lines and the eight metre strip between the inner and the outer fence shall be prepared in such a way that each zone length runs on the same gradient. Marginal gradient changes will only be allowed on zone ends. Approval for gradient changes in soil preparation shall only be done once written approval from the Engineer has been obtained.

20.12 Preparation of six metre strip between the outer and the detection fences

The eight metre strip between the inner and the outer fence shall be cleared of all vegetation, treated with a suitable sterilization herbicide, preventing any vegetation growth and the area shall be covered by a layer of 19 mm single sized stone on a geotextile similar to Bidim U34 as part of this contract.

The contractor shall include in his offer the cost to maintain this area for the full duration of the contract and shall include as part of his offer a suitable sterilization herbicide treatment once every six months for the full duration of his maintenance contract.

The contractor shall note that it shall be the responsibility of the fencing contractor to do all liaison regarding all civil work with the civil consultant of the Department of Public works. All information required e.g. soil conditions, back filling etc. shall be

taken into consideration during the tender period and no additional costs as a result of poor liaison shall be tolerated.

21. PRISON MANAGEMENT SYSTEM

21.1 The Scope of the System

The proposed prison management system will be able to interface with DCS South Africa on a continuous basis to update all required information that may change between the systems. This “required information that may change” is the specified fields laid down by DCS as fields that legally may change on the records of an inmate.

Similar activities in the proposed prison management system must be grouped together for ease of use and for security reasons. The list of the required functionalities that includes but are not limited to are detailed and explained in Table1

Table1

	Function	Description
	1 Inmate Admission	
1	Wizard	Take inmate into prison with admission file
2	Body List	List of inmates arriving from DCS per truck
3	Intake report	Report of all inmates admitted and processed
4	Inmate Admission report	Report about intake information of an inmate and signed of by the inmate
5	En-roll	Enrol the inmate on the fingerprint scanning database from the ATM and Inmate verification systems

	2 Inmate Detention	
1	Trails for inmates	Inmates awaiting hearings at a later stage.
2	Fines payments	Minimise sentence or close warrant by paying part of sentence fine amount
3	Appeals	Appeal against sentence/warrant
4	Body Marks	Tattoos, cuts, mutilations
5	Admission details	Security classification, privilege group, date of admission, photo...
6	Personal details	Telephone number, ID, address
7	Characteristics	Hair colour, length, eye colour, predator
8	Contacts	Next of kin, family, contact or non-contact visits
9	Warrants	All warrants given to a person, court , jurisdiction and sentence articles
10	Sentences	Sentence based on all warrants, offence, offence types and effective sentence date
11	Escapes	Escape from prison.
12	Assets	Belongings that the prisoner bring or acquire in prison
13	Qualifications	Read, write, qualification on admission or that he acquire inside the prison
14	Medical History	Information about medical sickness and history
15	Housing	Which unit an inmate is allocated to, enemies, co-defendants and gang affiliation
16	Incidents	Breaking of prison rules and results to the inmate
17	Discipline	Action taken against prisoner for incidents or breaking of rules
18	Mail	All mail an inmate receives from contacts and history
19	Sentence Calculator	Calculates the release date based on warrant sentence, amnesty and fines paid on sentences
20	Temporary Security Risk	Indicate the risk the inmate might have on escapes , violence and medical concerns
21	SAP62	Warrant/sentence history from DCS
22	SAP69	Outstanding warrants/sentences from DCS

	2 Inmate Detention	
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23	Representation	Legal Representation in upcoming cases
24	Sentence Reviews	Review of sentence if Magistrate has -7 years experience
25	Movement and Transportation	Sending inmates out of the prison for a temporary period
26	ID -Documents	Status of ID-documents and applications
27	Food Refusal	When an inmate goes on hunger strike and when he starts eating again and the reason for going on a hunger strike.
28	Aliens	Non-citizens in prison, requests to deport and other info.
29	Registration of transfer	Transfer of inmate between prisons request
30	Previous convictions	All counts of previous types of convictions and time spend in prison for them
31	Inmate Bail	Paying of outstanding bail in more than one payment
32	Complaints and requests	Complaints, requests and feedback from and to inmates
33	EDMS	Document scanning and management like warrants or sentences
34	Privilege groups	All privileges per group that an inmate belongs too
35	Food	Preference and diet groups per inmate
36	Inmate Incentives	All incentives an inmate receives for good behaviour
37	Inmate Detention Report	All information about an inmate in report form and sign-off by an inmate
38	Parole	Entering of release and parole dates
39	Reprint or modify of Body list	Modify/delete list of inmates arriving from DCS
40	Sentence Parole	Modification of sentence calculation dates to conform to DCS dates.

	3 Inmate Tokens	
1	Inmate Token Balance	Balance of tokens per inmate
2	Tokens Balance	Balance of all inmate tokens
3	Request for Convert	Requests that token be converted to cash
4	Month-End	Convert all outstanding tokens to cash for all inmates
5	Saving Fund Balance	Balance per inmate transferred to Saving fund
6	Special Fund Balance	Balance per inmate transferred to Special fund
7	Saving Fund Transfer	Transfer of Saving fund to inmate when leaving prison
8	Special Fund Transfer	Transfer of special funds for special services

	4 Inmate Development	
1	Visitation	All visitors and visiting hours a prisoner get
a	Visit Monitoring	Search for all visitations per period or inmate
b	Booking wizard	Display the open times for a visit per day
c	View Visitations	allocate an inmate + contact to a visit table open for a specific time and day
2	Inmate Schedule	Where an inmate should be at a certain time and the modules an inmate is allocated to
3	Vocational training	Inmate training to be productive in the community
4	Domestic Prison Upkeep	Cleaning of the prison and terrain
5	Education	Classes presented to the inmate by the prison
6	Religion	Church and other religious activities
7	Psychological Evaluation	Psychological and mental counselling inc. trauma
8	Labour Allocation	Teams assigned to fulfil a task in/out prison
9	Tokens/Gratuities	Tokens/gratuities received for work done in prison based on levels and scales
10	Prison industries	Tool making and other industries for prisoners
11	Prison Activities	Other Activities like breakfast or lunch that need to be scheduled
\12	Social Work Services	Management of an inmate for social integration back into the community
14	Scores	Points received for completing a course or activity in prison
14	Attendance	Attendance per week for courses and activities also influence scores
15	Sundry	All other aspects that make up a daily structured day of the prison and inmate
16	Inmate Profile	Profile reports and case notes that will accompany an inmate with evaluations and parole hearings supplied by development officers
17	Case Management	Case evaluations of how an inmate performs in prison and where he face problems within the prison
18	Sport & Recreation	All sport and scores allocated per inmate

	5 Inmate Release	
1	Release on Transfer	Release to another facility
2	Release on Death	Release of the inmate's body and assets after death
3	Release on Sentence served	Release into community.
4	Release on Parole	Inmate release on parole after the parole hearing took place and sentence have been commuted.
5	Parole Board Selection	Selection of dates a parole board will be available
6	Parole Board	Members and contact information about members of the parole board
7	Request for parole	Selection of inmates that qualify for a parole board hearing
8	Parole Hearing	Actual case hearing and parole evaluation per inmate selected for a parole hearing date
9	Transfer	Transfer of inmate back to DCS
10	Temporary Release	Release of inmate for temporary period
11	Release into Police Custody	Release into Police custody for a period
12	Release on Warrant of Liberation	All warrants of liberation inmates receive in prison that minimise his sentence time
13	Release on Amnesty	All amnesties an inmate receive that will minimise his sentence time
14	Release on Appeal	Release on inmate after an appeal was successful against a sentence
15	G326 Release form	Report that accompanies an inmate when released back to DCS
16	Assets	Assets that is still in prison custody by the time the inmate is released
17	Inmate Transactions	The release process will not allow an inmate to be released before his cash has not been paid out.
18	Amnesties/Remission of Sentences	Assigning of amnesties or remissions to inmates to bring their release date down

6 Cashless Society		
1	Inmate cash history	All accounts and payees of an account
2	Transfer to DCS	All money that will accompany an inmate when transferred to DCS
3	Deposit	Money coming into an inmates account
4	Other transactions	All purchases against an inmate account not done in the ATM
5	Inmate Transactions	History of all transactions per inmate account
6	Tokens Cash deposit	Change gratuities/tokens to cash for cashless money
7	Deposit on hold	Release of money received after it has been verified and paid into the account
8	Transaction on hold	Release of money to supplier for purchases made by an inmate at the end of the month
7 Staff Management		
1	Medical history	Medical concerns of a staff
2	Staff Appointment	Department and level in the prison
3	Personal details	Personal information like address and ID
4	Add new staff wizard	Get staff info from HR and other
5	Staff Qualification	All qualifications a staff member have
6	Group Access	All staff are assigned to predefined groups who have access to certain functionalities specified
8 Security Management		
1	Committees	All committees in the prison with inmates and staff
2	Members	All members belonging to a committee
3	Mandate	Mandate of a committee to improve or change policies or ways an activity is conducted in prison
4	Agenda	Every meeting agenda and decision per committee

	9 Facility Management / System Management	
1	Facility Selection	Allocation of inmates to a cell and creating of a structural lay-out of the prison with capacity
2	Labour Allocation	Teams assignment for activities inside prison
3	Prison Industries	Assignment of industries available
4	Education	Assignment of different training facilities
5	Vocational training	Allocation of where vocational activities will be held and when
6	Religion	Assign all spiritual facilities and dates
7	Case Management	Schedule case management module times and locations
8	Social Work Services	Assign Social service courses and schedules
9	Staff Access	Security to give staff access to certain features within the prison management system
10	Visit groups	Schedule when and whom will visit the prison on official business like the President
11	Sundry	Allocation of where sundry activities will be held and when
12	Psychological Evaluation	Allocation of where psychological evaluations activities will be held and when
13	Activities	Allocation of where other activities will be held and when
14	Gratuity scales and levels	Creating scales and levels for gratuity and tokens
15	Privileges and Restrictions	List of all privileges in the prison
16	Privilege Groups	Creating of groups of privileges for inmates
17	Groups	Group an inmate belongs to like Basic, standard or Advanced
18	Token-split	Divide the token amounts into different accounts
19	Roll Call Report	Report the number of inmates currently in prison
20	Token Scales and Levels	Assign levels and scales to tokens and gratuities
21	Facility Monitor	Monitor the locks of cells and how many inmates are allocated to a cell

	10 System Editor	
1	Modify system and dropdown values	All system and dropdown values are modified in this section.
2	Security Settings	Security for staff to access Management system
	11 Intelligence	
1	Log New SIR	Capture intelligence information
2	Assign/view reports	Route to correct level
3	Visual Map	Show where incident, report occurred
4	Intelligence Reports	Track trends and report all info
5	Intelligence Officer Wizard	Finalise the intelligence report and close the case or send it to a higher level
6	Inmate Mandatory Drug testing	Test the inmate for drugs and record the findings
7	Staff Mandatory Drug testing	Test staff on a regular basis for drugs and capture the findings
8	Visitor Drug testing	results of tests on visitors for drugs
9	MIS	Daily reports that need to be completed for DCS
10	Reports	Add hoc reports for daily management of prison and prison management system information
	12 Integration	
1	KKS	Transfer diets and amounts for purchases to KKS per inmate name. Update balance from management system to KKS
2	Mike Psychological evaluation)	Send inmate name and prisoner number to Mike System
3	Medical System	Transfer inmate name and prisoner number to medical system from prison management system. Report on medical findings to MIS
4	Accounting	Report to consolidate inmate account balance with amounts being kept on the financial system
5	DCS	Transfer of inmate information that does not match or changes throughout the inmate's stay in prison to and from DCS.
6	PABX	Transfer of amounts placed on hold by an inmate for calls to PABX. Update balances to PABX system at end of month when amounts are paid to PABX
7	HR	Transfer of staff
8	Jut Stat	Book library system for lending out books to inmates
9	MP2 system	Transfer required of orders placed for other goods purchased by inmates

	13 ATM	
1	Verify Inmate	Verify that the inmate with his fingerprint and biometric scanning
2	Balance enquiry	Inmate can see what his balance is of items on hold
3	Statement	Shows the status of all transactions and deposits
4	Money transfer	Place money on hold for KKS or PABX to buy items from the commissary or telephone time
	14 Password Management	
1	Password Modify	This allows the user self instead of the network administrator to modify or change his/her password on the SQL Server Database

21.2 Functional Descriptions

The following details are requirements of the Prison Management System (PMS) and clarifies the above table.

21.2.1 Inmate Admission

This is the first step in adding an inmate to the PMS system. When an inmate arrives to be admitted his name and DCS number is entered into the Body List. The inmate is then admitted by making use of the Admission wizard, which groups all the necessary screens and fields required to admit an inmate successfully together.

An admission report is then printed out and signed by the inmate and the admission officer to verify correctness of the information. The inmate's fingerprint is then scanned for use on the "ATM" and security systems. The whole process takes around 10 to 15 minutes per inmate.

The system has been streamlined for private prisons with the wizard to admit up to 300 prisoners per day and is the only system that admitted 2995 prisoners within a period of 5 months. The wizard can be customized to include more or less screens, depending on the client's requirements.

21.2.2 Inmate Detention

These functionalities are updated throughout the stay of the prisoner in prison and include all relevant information about the inmate and the crimes the inmate committed.

On every screen is a record selector that displays the inmate's name, ID, DCS number and a current photo of the inmate for identification purposes.

The Sentence Calculator, which automates the hand-process of most prisons, will work out the precise incarceration period of the inmate up to the last day. The Sentence Calculator can be modified to accommodate any country's legal requirements in calculating the sentence. The Sentence Calculator will also

take into account any amnesties, remissions of sentences, concurrent sentences and split concurrent sentences.

The Detention group of functions also includes an EDMS. The simplistic electronic document scanning sub-function will save all scanned files like warrants and sentences into the database and will display the saved information on-screen. This minimise the need for the Detention officers to retrieve the physical file of an inmate that may be stored off-site or somewhere in a filing cabinet.

21.2.3 Inmate Tokens

An inmate receives tokens as an incentive to participate in educational activities. These tokens can be converted to “virtual cash” and used to buy condiments or saved up ‘till the time the inmate is released. The tokens form part of the “Cashless Society”

While a part of the money goes to the inmate self, another part goes to a “Special fund.” The special fund is usually something like a victim fund, used to help people that was victimised by the type of crime the inmate committed, or a tools fund, used to supply the inmate with tools of a trade he practiced in prison. When the inmate leave the prison the tools is his or hers to keep to enable them to start a more productive live outside prison.

Tokens can be converted to “virtual cash” at the end of each month for the whole prison or any time there is money for a specific inmate throughout the month.

21.2.4 Inmate Development

This is the part where an inmate’s daily roster is scheduled and tasks are assigned to the inmate. PMS currently caters for any variety of training classes the inmate may want to attend and the prison provides like religion or education. Inmates receive tokens for the classes they attend on a daily basis and scores they receive for assignments completed.

Prison industries is also included in this group and instead of inmates receiving tokens, inmates receives gratuities for work done and work sessions completed on a weekly basis. An inmate can work in an industry and by working harder and more productive will increase his gratuities by stepping to the next level and scale. Each industry has its own level and scale and amount assigned to each level and scale. The harder the inmate works, the more gratuities the inmate will receive.

At the end of each month the gratuities will also be converted to “virtual cash” and makes up part of the total “Cashless Society”

21.2.5 Inmate Release

This is the process and wizards needed to release an inmate from prison after his sentence is served, commuted or he died inside the prison. Parole board hearings and members of the parole board are also captured in this section. After the inmate and his assets and cash has been released a report is printed

and information is send back to DCS. The inmate is then removed from the active list of inmates in the prison and his information is archived, but can be retrieved at any point from the database.

21.2.6 Cashless Society

The Cashless Society consists of the ATM, gratuities and tokens and any other money the inmate may receive from visitors or through mail. (*Read more on ATM in point 13 below*)

Physical money is removed when it enters the prison through normal channels, put into a trust and kept there. This minimise the corruption of staff and inmates inside and outside the prison.

The Cashless society works like a debit card. Money is deposited when the inmate arrives in prison, when visitors bring money on visits, through mail the inmate receives or through gratuities and tokens.

The inmate then transfers money out of his account either through the ATM or through the finance department. The money transfer or deposit will then influence the balance of the inmate positively or negatively.

Money is placed on hold and verified before it is made available to the inmate. All monies deposited or transferred out will have a 24-hour wait before the transaction is committed to ensure correctness or to cancel the transaction.

At the end of each month each inmate receives a statement showing the amounts deposited and the transactions incurred on a daily basis for that month.

When the inmate is released from the prison the “virtual cash” available is paid out in real currency with the inmate’s assets.

21.2.7 Staff Management

Staff management is the group of functions that is needed to keep track of who works in which department and what their job qualification is, together with the staff’s personal information and illnesses that may affect the staff’s work performance.

With these staff functions the Group Access and Individual Access will grant the staff or groups of staff access to certain functions in PMS that pertains to the functions the staff need to access. These include view, modify or no-access rights.

21.2.8 Security Management

For security reasons all committees and their mandates, members and agendas need to be specified and updated every time a meeting is held inside the prison. These subsets of functions capture the information and can be retrieved for security or other reasons whenever it is required.

21.2.9 Facility Management / System Management

Facility/System Management is the part where the inmates are assigned to cell locations to stay, classes and industries are assigned to prisoners and scores are assigned to inmates for performance.

The system will warn the user when an inmate is assigned to a cell that has his enemy in the same cell. The system also checks to see whether space is available in a specified cell before allocating the inmate to that cell. When an inmate moves to another cell the inmate may not be assigned to that cell before he is removed from the previous cell.

The Inmate Daily Roster or Schedule as it is also called schedule classes and work sessions for inmates based on a begin to end date or on the number of classes required to complete a course from a specific start date. The area where the course or work session will take place is assigned which also knows the size of the group that can be accommodated per session.

The sessions can be rotated to be in the morning the one day and the afternoon the next day or all in succession at the same time every day or on an ad-hoc basis. Depending on the time slots open and that location available.

After the session has been assigned inmates can be linked to the tasks available. If the course is full no more inmates will be assigned to a specific instance of a course or task. However if an inmate is removed from whatsoever task another inmate can be assigned to the open position.

Based on an inmate's performance in prison his privileges may be either increased or removed. This will also affect the inmates level and scale of "money" the inmate may receive. This is an incentive to help improve the inmate's behaviour and to let the inmate realise that when he is more responsible and work harder and improves his personality the more benefits he will have.

Included as a sub-function is the Roll Call Report which will show the amount of inmates currently in prison, inmates that is on parole, inmates that is temporarily out of prison and the amount of space available in prison on a daily basis.

21.2.10 System Editor

In the System Editor the administrator of the system can modify or add to the values displayed in dropdown lists of PMS. It is not necessary for developers to recode the system or add values through the database to update the lists.

In the Security Settings sub-function the administrator is able to change the staff's database password. PMS make use of mixed mode authentication and every user that is assigned to work on PMS will need a secure database password. This is where it will be assigned or removed.

21.2.11 Intelligence

The Intelligence module tracks all reports about incidents and what the status of it is, what resources have been assigned to it and where the incident occurred. This will then predict tendencies of incidents and preventative measures can be put in place before incidents happen.

The MIS (also called Daily reports) is the feedback to DCS on all incidents and requests and daily activities of the prison.

The system also includes a ad-hoc report generator that makes use of SQL and visual table linking to generate reports within seconds about anything the user requires from the PMS database. Users only need to be trained to write standard SQL statements and how tables are linked to one another to manage the daily activities of the prison without ever having the need for developers to develop simple ad-hoc reports. Currently a list of 138 reports is supplied with the application that is grouped per user-defined category.

21.2.12 Integration

PMS currently has links to 9 different systems, but can without having to spend enormous amounts of time and money be linked to other systems. The information can be transferred either one or two way on an ad-hoc basis or once off or on a continuous basis.

PMS was designed in an Object Orientated way with effect that DLLs have been developed to interface to and from the database, making it easier for other applications to communicate to The PMS and pass information back and forth. The only requirement is that the interaction happens through Microsoft enabled applications.

21.2.13 ATM

The ATM functions like a normal ATM where you can check your balance, transfer funds from one system to the next or get a statement of transactions and deposits. The inmate will thus manage his or her own funds and make sure that the transactions incurred are correct.

The PMS' ATM was developed with illiterate people in mind which does not know how to read or write. When an inmate logs on to the ATM, usually through a fingerprint scanner, smart card or other biometric device, the inmate's balance is shown visually with the help of graphics representing the currency of the specified country. When money is deposited, the currency will increase and when funds are transferred, i.e. to the commissary system to buy cool drinks, money is decreased in a visual manner. Lets say for example an inmate has R100 in his account available, a one hundred rand bill will be shown. Let s say he then wants to transfer R10 to the telephone system. He selects transfers and select a R10 bill and the system he wants to transfer it to on the screen. The system will then display one R50 bill and two R20 bills in his account and R10 in the commissary account. When he is happy that this is what he wants to do the transaction is confirmed and the necessary funds are transferred to and from the individual systems.

21.2.14 The PMS Password

If staff need to modify their passwords in The PMS for security reason it can be done by the staff member self through this function by typing in the new password and then verifying it. The next time the staff member logs on to the system, the system will ask for the new password.

21.3 Strategic Outputs

- 21.3.1 Inmate management system
- 21.3.2 Inmate scheduling system
- 21.3.3 Intelligence module for management of incidents and escapes on a strategic level
- 21.3.4 Inmate money management system and “ATM”
- 21.3.5 Management Information System that shows statistical and trend information.
- 21.3.6 Data mining of any information required to generate user-specific reports on the inmate and his incarceration in the prison.
- 21.3.7 Integration to and from other systems that may make up the rest of the prison management system like a medical system.

21.4 Goals of the System

The system strives to be an off-the-shelf system with one interface to most or all functionalities required to manage and rehabilitate an inmate while also improving the management processes of prisons.

Benefits of the System

By implementing the proposed solution the following benefits must be realized:

1. A “cashless” society will be achieved and money circulation will be minimized which has an effect of less bribes and crimes inside the prison.
2. All inmates can be assigned to a scheduled day through the inmate daily roster that means that inmates can be tracked at any time and a constructive rehabilitation program can be allocated to an inmate to better the indisposition of the inmate.
3. All information on an inmate is kept from admission to release.
4. The sentence calculator will accurately calculate the incarceration period up to the last day and take into account split concurrent sentences and sentences running in parallel. This function can be customized to fulfil any legal system’s requirements with minimal or no coding effort.
5. Reports can be generated on the fly using the build-in custom report generator and minimal knowledge of SQL statements.
6. The PMS is database independent and will run on any RDBMS available.
7. The user-interface is Windows-based, making it easier for Windows users to use the system.
8. The PMS interface with other systems on a database- and Business Object level to transfer information between systems.

22. TELEPHONE AND DATA CABLING

The Purpose of this portion of the specification is to ensure that standard and proper cabling practices are complied with at all times.

22.1. GENERAL

- 22.1.1 The purpose of this specification is to define the process to implement new cabling or alter existing cabling infrastructures.
- 22.1.2 All cabling must be installed in accordance to international standards as defined in ISO/IEC 11801. This standard provides the specifications that have to be complied with.
- 22.1.3 Should issues arise during site inspections which are not defined within this standard, these should be discussed with the Engineer or the representative of DPW and to obtain a resolution.

22.2. CERTIFICATION

- 22.2.1 The Cabling specifications must adhere to that of KRONE, MOLEX and AVAYA brands.
- 22.2.2 Cable certification will be enforced. The person performing/conducting the installation must produce a signed certificate in this regard.

22.3. QUALITY CONTROL

- 22.3.1 It will be the responsibility of the contractor to conduct inspections of sites (or order inspections of sites) to ensure that all installations strictly comply with the latest set of specifications.

22.4. CABINETS

22.4.1 Cabinet Specifications:

The standard 19" rack mount cabinets (25u, 34u and 43u) will be used, to accommodate all the required equipment, i.e. patch panels, brush panels, network hardware etc. Sizing of the cabinet should be based on the principle of being able fit the required equipment in with at least a minimum expansion factor of 20% within the space provided in the cabinet. The size of the cabinet required will be provided by the contractor, should this not meet the above standard consultation with Engineer or the representative of DPW is required.

Cabinets will be POWDER COATED metal based, have lockable glass front doors, removable side and back panels, dual electric fans, and have a power socket distribution array housed inside the cabinet.

Smaller cabinets (9u and 12u) fitted against the wall, should be fitted above a height of 1.9 metres unless stipulated by the customer, and

the cabinet should be of the swing frame type and fitted to allow for the cabinet to open a full 180 degrees in the open position.

Cabinets should be supplied with a dedicated electrical supply fed from the distribution board and not from the nearest wall mounted socket.

The Cabling installer must confirm that the cabinet size specified will be able to house the LAN equipment that is to be installed in it.

The Cabling installer should make provision for a sleeve within the cabinet in order to keep a copy of the cabling CAD for reference purposes.

22.4.2 Cabinet Positioning:

The position of the cabinet should be installed centrally on the floor in order to reduce unnecessary LAN infrastructure requirements for that floor.

The position of the cabinet should not be installed next to any floor personnel's desk and where possible in a server room.

Each floor should have a dedicated cabinet.

The position of the cabinet shall be as per the issued drawing by the Engineer.

Sufficient space must be provided behind the cabinet to enable a technician to work with ease.

22.5. CABLING INTO THE CABINET

22.5.1 Cabling reticulating into the cabinet should have at least an additional 2 meters of cable slack to enable limited cabinet movement should this be required in future.

22.5.2 Cables leading into the cabinet should be encapsulated within an EGA-Duct trunk.

22.5.3 The UTP specification is CAT 5E.

22.5.4 All cabling installations must be fully compliant to the TIA/EIA-568-A standard, which provides additional specifications for connecting hardware and cable at transmission speeds of up to 100 MBPS.

22.6 PATCH PANELS

- 22.6.1 Patch panels should be neatly mounted in the cabinet in order to minimise the obstruction of equipment faceplates by flyleads.
- 22.6.2 Flyleads within the cabinet should only be long enough to easily interconnect between the two given points.
- 22.6.3 Two or more long spare patch leads should be supplied per cabinet and are to be housed within the cabinet.
- 22.6.4 Patch panels should be of the KRONE or MOLEX type with interchangeable modules.
- 22.6.5 Proper labelling techniques and tools should be utilised when labelling within the patch panel. A clear adhesive or a window holder must cover the labels in order to prevent the accidental loss of labels.
- 22.6.6 The placement of hubs/switches and patch panels should be alternated inside the cabinet.
- 22.6.7 The patch panels for data distribution must be in multiples of 24 way RJ45 19" rack mount.

22.7. ELECTRICAL SUPPLY TO CABINETS

- 22.7.1 Electricity supply to all installed cabinets should have a clean earth and a direct connection to an independent MCB (Miniature Circuit Breaker), suitable to the load to be carried in the cabinet.
- 22.7.2 Provision should be made for as many electrical points with-in the cabinet, as the maximum possible number of electronic units/devices that can be mounted in the cabinet at a time.

22.8. CABLING TO INDIVIDUAL OFFICES

- 22.8.1 Where cables have to be routed down a wall, the cables must be housed in EGA-Tube trunks up to the connection point.
- 22.8.2 The wall connection point(s) must not exceed a distance of 1.5 meters from the desk.
- 22.8.3 Power, data and voice cables from workstation to connection point must be strapped with cable ties or Spiral.

22.9. CABLING TO OPEN PLAN OFFICES

- 22.9.1 Cabling for data, voice and power should be provided to desktops from the ceiling via power poles, which will ensure no interference between the three different media housed within the pole.

22.9.2 Placement of poles should be such to maximise the number of desks served by a single pole placement, taking into account a maximum 3 meters distance from any desk to the connection point.

22.9.3 Pricing and specifications of the poles must be included in any quotation.

22.10 NUMBERING

Cables must be marked and tagged according to the following standards:

22.10.1 Data Points

Data Points should be marked as follows: F##C#P### (Floor-Concentrator-Point).

22.10.1.1 If the number following the Alphanumeric Character (such as F, C or P) is a single or double digit and space was left for more digits, it should not be marked with leading zeros (e.g. 01 or 001). This is done to save space on the tags.

22.10.1.2 A typical number would therefore be F2C1P8 (and not F02C1P008). No leading zeros are required on any tagged numbers.

22.10.1.3 The “F” followed by one or two digits indicate the floor number to which that point is connected.

22.10.1.4 The range is as follows: -9 to 0 (being basements to ground) and 0 to 99 (being the upper levels). If there are intermediate floors between 0 and 1, they will be tagged M1, M2, M3 etc. as they continue upward.

22.10.1.5 The “C” followed by one digit is the “cabinet” number on that floor. “Cabinet” refers to the equipment cabinet into which the cables converge. Note that the term “cabinet” is used regardless of what technology is inside, be it repeaters, hubs, switches or even ATM concentrators. Some buildings have very large floor areas and, given the specification of 100 MHz UTP cabling that is installed, in such circumstances there may be more than one cabinet placed on a floor. Therefore our standard includes the option of identifying the concentrating point of the cables.

22.10.1.6 The range of digits allocated to a Cabinet is 1 to 9.

22.10.1.7 The “P” followed by one to three digits is the point number of the connection on that concentrator.

22.10.1.8 The range starts from 1 to 999.

22.10.2 Voice Points

22.10.1.9 Numbering of voice points is identical to that of data points except that the P is replaced with a V.

22.10.1.10 A typical voice point would therefore be numbered F2C1V8.

22.10.3 Up-Links

22.10.3.1 Up-links should be marked as follows: **UP##F##C# (UP-link no. # <pointing to> Floor no. # <pointing to> Cabinet no. #)**

22.10.3.2 If the number following the Alphanumeric characters (such as UP, F or C) is a single or double digit and space was left for more digits, it should not be marked with leading zeros (e.g. 01 or 001). This is done to save space on the tags. A typical number would therefore be UP1F2C1 (and not UP01F02C1). No leading Zeros are required on any tagged number sequences.

22.10.3.3 The “UP” followed by one or two digits indicates the up-link number as counted from the central module from which all up-links are dispersed in a star formation.

22.10.3.4 The range is 1 to 99.

22.10.3.5 The “F” followed by one or two digits indicate the floor number to which that point is connected.

22.10.3.6 The range is as follows: -9 to 0 (being basements to ground) and 0 to 99 (being the upper levels). If there are intermediate floors between 0 and 1, they will be tagged M1, M2, M3 etc. as they continue upward.

22.10.3.7 The “C” followed by one digit is the “cabinet” number on that floor.

22.10.3.8 The range of digits allocated to a Cabinet is 1 to 9.

22.10.3.9 A typical up-link would therefore be numbered UP1F3C2

Horizontal-Links

22.10.3.10 Fibre Optic must be used to interconnect devices that are situated over 90m from each other on the same horizontal plane inside a building.

22.10.3.11 These **Horizontal-Links** should be marked as follows: **HL#F##C#(Horizontal-Link no. # <pointing to> Floor no. #, Cabinet no. #)**

- 22.10.3.12 The “HL” followed by one digit indicates the horizontal-link number as counted from the central module from which all horizontal-links are dispersed in a star formation.
- 22.10.3.13 The range allocated to a horizontal-link is 1 to 9.
- 22.10.3.14 The “F” followed by one or two digits indicate the floor number to which that point is connected.
- 22.10.3.15 The range is as follows: -9 to 0 (being basements to ground) and 0 to 99 (being the upper levels). If there are intermediate floors between 0 and 1, they will be tagged M1, M2, M3 etc. as they continue upward.
- 22.10.3.16 The “C” followed by one digit is the “cabinet” number of the department on that floor.
- 22.10.3.17 The range of digits allocated to a Cabinet is 1 to 9.
- 22.10.3.18 A typical horizontal-link would therefor be numbered HL1C3.

22.11 CABLE TAGGING

- 22.11.1 Only 9-mm heat shrink or Brady tagging may be used on the UTP cabling and the tag should be placed within 10 cm from the point where the UTP cable enters the RJ-45 connector.
- 22.11.2 All cabling installations must include a 3 m fly lead and a patch lead for each individual point are to be left with the floor manager at the site.
- 22.11.3 No cabling to a connection point (excluding fly-leads`) will be allowed via cabling laying on the floor, not even if the cable is in any form of ducting.
- 22.11.4 Stripping of cable sleeves at connection points must be reduced to the absolute minimum i.e. 13mm – 16mm as per KRONE and MOLEX.
- 22.11.5 Any cabling to be undertaken on that floor should be indicated on a copy of the current version of the floor plan cabling layout and MUST then be approved by the floor manager and/or the LAN Administrator. After the installation has been signed off, this updated version of the floor plan cabling layout must be placed in the cabinet in the sleeve provided for this purpose.
- 22.11.6 KRONE and MOLEX wall connection points must be used and must be of the embedded style type.
- 22.11.7 The maximum number of power outlets that can be accommodated inside the cabinets according to the circuit breaker must be specified within the cabinet.

22.12 SUSPENSION OF CABLES

22.12.1 Cables should be suspended properly in dual steel ducting with data and voice cables separated from the power cabling, in any ceiling or raised floor scenario.

22.12.2 Where possible, cables must be directed away from any inductive source.

22.13 SWITCHES

22.13.1 Specification

22.13.1.1 Switches must be mounted in the 19" rack. Mounting bracket costs must be included in the quotation.

22.13.2 Topology

22.13.2.1 Sufficient port capacity must be catered for the number of users on the floor.

22.13.2.2 No terminals on a floor will be directly connected to a switch.

22.13.2.3 For data cabling, only fibre optic cables will be allowed to interconnect devices on separated floors or between buildings.

22.13.2.4 Fibre Optic must be used to interconnect devices that are situated over 90m from each other on the same horizontal plane inside a building.

22.13.2.5 Server(s) or Router devices should be connected to the main switch stack. Vendors should bear this in mind when deciding on the size of the main switch.

22.14 DRAWINGS

Two different CAD drawings will must be supplied for each site.

22.14.1 Detailed floor plan.

22.14.1.1 Detailed floor plans that clearly indicate the location of the cables, switches and points that were installed. The CAD plan will be fully readable (in other words, all points should be clearly marked on the plan by means of legends or otherwise.)

22.14.2 Backbone CAD.

The backbone CAD must consist of the following information:

22.14.1.2 Indication of all network hardware components on the network.

22.14.1.3 Indication of the types of cabling installed. I.e. UTP, fiber, matrix.

22.14.1.4 Identification of the names for each component. I.e. IP address and MAC address.

22.14.1.5 Indication of the location of the router.

22.14.3 These CAD's are to be compiled in Visio in soft copy after initial installation and after any change to the network irrespective of the extent thereof.

22.15 ACCEPTANCE

22.15.1 UTP - Entire installation will be tested with a Cat 5 cable scanner before acceptance and payment of the installation will be authorised.

22.15.2 Fibre Optic – All splices and connectors must be tested from both ends by means of an Optical Time Domain Reflectometer (OTDR) and the printed results must be submitted.

23 AUTOMATIC FIRE ALARM INSTALLATION

23.1 INTRODUCTION

This Standard Technical Specification forms part of, and shall be read with, the Conditions of Contract, Supplementary Specification, schedules, drawings and other parts that form part of the tender/contract documents.

23.1.1 SCOPE

23.1.1.1 This Standard Technical Specification covers the general technical requirements for automatic fire detection systems and installations. The following aspects are covered:

- System requirements
- Equipment requirements
- Installation methods and materials
- Commissioning and handing over
- Documentation and drawings

23.1.1.2 The Supplementary Specification, drawings and schedules will take precedence over this Standard Technical Specification.

23.1.1.3 The Supplementary Specification, drawings and schedules shall be referred to for the specific requirements for the system.

23.1.2 DEFINITIONS

See also the definitions in EN 54-1 and BS 839-1.

Analogue Addressable System

In an analogue addressable system the control equipment receives analogue signals from the sensing devices in the system and knows with which sensing device it is communicating by reading the address of each sensing device.

Analogue

The term analogue refers to an electronic signal which can represent a large number (e.g. 256) of values. This signal can be in the form of a current level, pulses, frequency or any combination of these.

Addressable Device

A device is addressable if the control equipment can communicate with the device, or select such a device by sending an address to it.

Approved

Approved shall mean accepted by the Department for a specific installation. The Department does not keep a list of approved equipment, and equipment accepted for a specific installation does not necessarily imply approval or acceptance for another installation.

Access Levels

The levels of access applicable to the control panel. (These definitions modify those of BS 5838-4 in that level 4 is added and level 1 allows the silence function).

Level 1 : No password or key : Access by members of the general public. In addition the “silence” function shall be accessible or operational.

Level 2 : Password or key : Access by the person responsible for the system and trained on the system, and for system maintenance.

Level 3 : Password or key : Access by persons trained to reconfigure the system.

Level 4 : Password or key :

- (a) Access by persons authorised by the system owner to allocate passwords to levels 2 and 3.
- (b) Access by persons trained and authorised by the manufacturer to repair, or to alter the firmware, thereby changing its basic mode of operation.

Conventional System

A system is conventional if the control equipment determines the status of the zone wiring as follows:

Fault : low or no current

Normal : current within limits

Fire : high current

Short circuit : abnormally high current

Control Equipment. Unit. or Panel

The control equipment receives information from the field devices and displays information as described in BS 5839-4 or EN 54-2.

The following references have the same meaning:

- Control equipment
- Control unit
- Control panel
- Fire panel
- Fire alarm panel

Detector

That part of an automatic fire detection system which constantly, or at frequent intervals, monitors suitable phenomena, such as smoke, fire, heat, etc.

Detectors are also field devices.

22.1.3 STANDARDS AND REGULATIONS

See Addendum “A” for a list of the applicable standards. In all cases the most recent amendments, of the standards, shall apply.

22.1.3.1 The completed system and its components shall be in accordance with the following regulations:

- The wiring of premises (SABS 0142)
- Occupational Health and Safety Act (Act 85, 1993)
- Local municipal by-laws and regulations
- Local fire regulations
- Regulations of Telkom
- Regulations of the local electrical and gas supply authorities
- National Building Regulations Act No 103 of 1977 (SABS 0400)

22.1.3.2 The design of an automatic fire detection system, the equipment supplied for the system, and the installation of such equipment shall be in accordance with the Standards listed below. The equipment and components shall be deemed to have been tested and approved by a reputable and recognised international test laboratory to prove compliance with at least one or more of these Standards. Copies of test certificates shall be provided by tenderers with their tenders:

EN 54 : Components of automatic fire detection systems
BS 5445 : Components of automatic fire detection systems
BS 5839 : Fire detection and alarm systems for buildings

22.1.3.3 Material for which an SABS specification exists, shall be in accordance with such a specification, and shall bear the SABS mark.

22.1.3.4 All equipment used shall originate from suppliers which have been certified in accordance with SABS ISO 9001 (ISO 9001) or SABS ISO 9002 (ISO 9002) for quality assurance. Copies of certificates of approval shall be provided by the tenderers with their tenders.

22.1.3.5 Equipment designed to BS 5446, Fire systems for residential premises, or similar other standards, are not acceptable.

22.1.4 DESIGN

22.1.4.1 Any uncertainty which may exist in regard to the specification requirements shall be submitted to the Department in writing. .

22.1.4.2 The requirements and design standards of the specification shall be adhered to unless otherwise approved by the Department or it's authorised representative in writing.

22.1.4.3 Small items of equipment forming part of a system are not covered by this specification. However, the Department still requires that the total system shall comply with the highest standard of the design and fire protection practice.

22.1.5 MATERIALS

22.1.5.1 All materials used on the contract shall be new and of the very best of their respective types and kind.

22.1.5.2 No equipment or parts older than 2 years, at the commencement of the contract, shall be installed in this system.

22.1.5.3 All equipment and parts used in a particular system shall originate from one supplier as far as practicable.

22.2 SYSTEM REQUIREMENTS

22.2.1 REMOTE INDICATOR LIGHTS

22.2.1.1 Detectors mounted in hidden areas, or areas which may be kept locked for specific reasons, shall each be provided with a permanently marked remote indicator LED light mounted in a conspicuous position on the wall outside the area and close to the point of entry into such areas. The method and equipment used to mount the remote LED shall be acceptable to the Department.

22.2.2 SOFTWARE

22.2.2.1 The requirements stipulated hereunder in connection with the availability and the usage of software for computer based equipment (not fire control panels) which is to be supplied to the Department in terms of the contract, shall be adhered to:

- a. Computer based systems shall not become unserviceable due to the loss of, or damage to software.
 - b. It shall be possible to reinstate software after maintenance or after possible damage to the software. Full back-ups must therefore be available on site.
- 22.2.2.2 Software shall be loaded when so required, even if the time at which the software is to be loaded, does not suit the supplier of the software.
- 22.2.2.3 The Department shall also be able to reload software on systems without the assistance of the supplier or contractor.
- 22.2.2.4 The Department will only be interested in reloading of software into a system for which the software was originally written, and not in the copying of software from one system to another.
- 22.2.2.5 Back-ups of software shall be supplied to the Department for future use.
- 22.2.2.6 The Department will use the original contractor or supplier of the system to reload software, whenever possible or practicable.

2.3 SCADA SOFTWARE

Software to be used for monitoring and reporting, or SCADA (Supervisory Control and Data Acquisition) application, shall comply with the following requirements:

- 22.2.3.1 The software shall be able to run on an MS-DOS based PC computer.
- 22.2.3.2 Software packages shall be approved by the Department for the installation.
- 22.2.3.3 The software shall not be system specific, i.e. it shall be compatible with a number of control panels on the market.
- 22.2.3.4 The software shall be available from a supplier other than the manufacturer of the equipment.
- 22.2.3.5 Upgrading of the software shall be possible at a later stage without changing the system configuration.
- 22.2.3.6 See Addendum "A" for some acceptable software.

22.2.4 FIRE ZONES

Devices shall be grouped into zones as follows, unless the zones are indicated on the drawings and/or Supplementary Specification:

- 22.2.4.1 A zone shall not have more than 20 field devices.
- 22.2.4.2 Each building shall have separate zones.

- 22.2.4.3 The roof space shall be on a separate zone or zones.
- 22.2.4.4 The floor area of a single zone shall not exceed 2000 m²
- 22.2.4.5 Every floor of a building larger than 300 m² shall be on a separate zone.
- 22.2.4.6 Every area enclosed by fire walls shall be on a separate zone.
- 22.2.4.7 In analogue addressable system, each zone shall be enclosed by 2 line isolators.

22.2.5 SPARE CAPACITY

- 22.2.5.1 20% spare capacity shall be allowed in the design of the control panels, loops, zones, etc.
- 22.2.5.2 The control panel shall have facilities to accommodate a further two detector circuits, additional to the required number of zones, without having to replace or add additional cabinets (extensions) to the control panel, unless specified otherwise.

22.3 EQUIPMENT REQUIREMENTS

22.3.1 QUALITY OF EQUIPMENT

Only equipment complying with the following shall be used:

- 22.3.1.1 The equipment required under any contract shall be of the latest manufactured equipment of its kind on the market.
- 22.3.1.2 The equipment shall preferably be manufactured in the RSA, and equivalent or replacement equipment shall also be available in the RSA.
- 22.3.1.3 Replacement units shall be available for the equipment and the complete maintenance of equipment shall be undertaken in the RSA.
- 22.3.1.4 Equipment shall have been installed in the RSA in a similar installation as the one specified in the Supplementary Specification and shall have operated reliably and satisfactorily for at least 1 year.
- 22.3.1.5 Equipment shall exist of completely enclosed units and the units shall be vermin-proof.
- 22.3.1.6 All items of equipment shall be fitted with nameplates containing information, such as serial numbers, model numbers, type numbers, manufacturer's name, etc. This information, together with the description of each and every piece of equipment, shall be listed in the Maintenance Manual.

- 22.3.1.7 All components and PC boards shall also be marked with type numbers and descriptions and this information shall be contained in the Maintenance Manual.
- 22.3.1.8 No equipment without detailed specifications and/or testing results will be allowed.
- 22.3.1.9 All components of the system offered and installed, shall be available for a period of at least 15 years from the onset of the contract. A certificate of guarantee to this effect shall be submitted by the supplier of such components.

22.3.2 FIRE ALARM PANELS (CONTROL PANELS)

- 22.3.2.1 Control panels shall conform to BS 5839 part 4 or EN 54-2. See clause 1.3.2.
- 22.3.2.2 A control panel shall be able to function as a stand-alone unit, together with its own power supplies, and shall not be dependent on external control equipment, such as computers, for functioning.
- 22.3.2.3 Provision in the form of suitable terminals, connectors, or ports, shall be made on the control panel for the connection of peripheral equipment, such as computers, printers and interface equipment, to enable the accumulation of data generated by detectors and the control panel, to be used for future reference, or for the relaying thereof to remote monitor or control equipment.
- 22.3.2.4 Control panels shall be constructed for minimum power usage in both battery and mains power supply modes.
- 22.3.2.5 The control panel shall be of the wall mounted type, and shall also be suitable for mounting flush in a console, if so required in the Supplementary Specification.
- 22.3.2.6 Battery charging equipment mounted in the control panel, or elsewhere, shall be mounted in such a way that 230 Volt terminals and wiring and other mains voltage equipment are shielded against accidental contact. All shields shall be marked "230 VOLT".
- 22.3.2.7 No 230 Volt terminals shall be placed directly next to other terminals containing wiring at other voltages.
- 22.3.2.8 Reset of the control panel shall only be possible at access level 2.
- 22.3.2.9 Terminals shall be clearly grouped and marked with a label strip for identification, so as to simplify installation and connection of wires on site by installation personnel. All outgoing and incoming terminals, and all other equipment in the control panel, shall be suitably labelled to simplify maintenance and installation, and all panel mounted equipment shall likewise be labelled. Outgoing and incoming power and field wiring shall be individually, and correspondingly, numbered at each point of termination.

22.3.2.10 The control panel shall have knock-outs in the bottom plate thereof to terminate conduiting for all power cabling, and knock-outs in the top plate thereof to terminate conduiting for signal and other electronic cabling/wiring. Holes drilled on site for this purpose will not be acceptable.

22.3.2.11 All identification labels, as well as wire terminal numbers, shall be clearly shown on all wiring diagrams in the Maintenance Manual.

22.3.2.12 It shall be possible to silence the audible alarms without influencing the visual alarms or alarm transmissions to the Fire Brigade. This shall be possible at access level 1.

22.3.3 CONVENTIONAL FIRE ALARM PANELS (CONTROL PANELS)

22.3.3.1 Conventional Control panels shall be conformed to BS 5839-4 or EN 54-2. See clause 1.3.2.

22.3.3.2 The control panel shall be suitable to operate in conjunction with conventional detector heads or detector bases.

22.3.3.2 The control panel shall further have the facilities to execute the following functions:

- a. Transmission of a general fire alarm to the Fire Brigade. Transmitting equipment shall however not be supplied with the control panel unless specifically specified in the Supplementary Specification.
- b. Switching off of air conditioning equipment in case of a general fire alarm.
- c. Closing of dampers over ventilation openings in case of a general fire alarm.
- d. The connection of an external repeater panel for remote indication of fire and fault alarms.
- e. A maintenance mode or "one man test facility" for routine testing shall be possible where the control panel resets a fault or alarm condition a short time after the event. This will allow easy testing of the field devices. The control panel shall give a warning when it is in this mode.

22.3.4 ANALOGUE ADDRESSABLE FIRE ALARM PANELS (CONTROL PANELS)

22.3.4.1 Analogue Addressable Control panels shall conform to BS 5839-4 or EN 54-2. See clause 1.3.2.

22.3.4.2 Type of System

- a. An analogue addressable system consists of a control panel connected to analogue addressable field devices. The control panel continuously monitors a number of parameters of the field devices, makes decisions and takes actions based on the information received.
- b. Sensing devices shall not switch into an alarm state. All decisions shall be taken by the control panel only.
- c. To enable the system to be tailored to suit the protected building and to permit future changes, the alarm management shall be configurable from the control panel via a keypad. This configuration shall be maintained under power failure conditions in non-volatile memory.
- d. The front panel of the control panel shall comprise a keyboard, alpha numeric display, text and indicator LEDs, etc. The occurrence and location of an event shall be displayed on the screen.
- e. Outputs for communicating with devices such as remote text display units, graphic display units, computers, printers and intelligent mimic panels shall be provided where necessary.
- f. Control panels shall incorporate facilities for operating as stand-alone units, or as part of a network with full communication capability.
- g. Control panels shall be supplied complete with printout facilities. Only connections (a printer port and 24 Vdc power connector) for a portable printer shall be required, unless otherwise specified.
- h. The control panel shall further have the facilities to execute the following functions:
 - Transmission of a general fire alarm to the Fire Brigade. Transmitting equipment shall not be supplied with the control panel unless specifically specified in the Supplementary Specification.
 - Monitored switching off of air conditioning equipment In case of a general fire alarm.
 - Monitored closing of dampers over ventilation openings, switching on of stairwell pressure fans, etc. in case of a general fire alarm.
 - Monitored alarm outputs, e.g. sirens.

- Monitored outputs and inputs for gas control panels.
- i. Consecutive alarms shall be stored by the control panel in chronological order and shall have the ability to determine the priority order of alarms by means of repetitive receipt of data from detectors.
- j. The transmission of all data shall be via a two-wire system, which shall carry both the supply voltage and the data.
- k. The type of wire or cable used shall be suitable for the speed of data transmission so that signals can be carried over without losses or corrupted data. Wiring shall meet the requirements of the detection system manufacturer, which requirements shall be published in a formal wiring specification.

22.3.4.3 Ring (loop) Wiring

- a. Wiring shall to be arranged in a return loop (ring), in such a manner that, in the event of an open circuit or a short occurring on the line, the control panel communicates with the detectors from both sides of the loop.
- b. The arrangement shall be such that during an open or short circuit no more than 20 detectors shall be deactivated. To enable this, line isolators shall be provided on the line on each side of each zone.

22.3.4.4 Master Control Panel

- a. The purpose of a master control panel will be to communicate with more than one satellite fire control panel, to simplify the central monitoring and control of the other satellite panels.
- b. A master control panel will be required when two or more control panels are to be linked. This master control panel shall conform to all the requirements of the other control panels and shall be of the same manufacture as the other control panels.
- c. The master control panel shall have its own battery back-up system.
- d. All communication to computers, the Fire Brigade, etc. shall be handled by the master control panel.
- e. All communication between satellite and central panels, as well as between satellite panels, shall

utilise a protocol which verifies the receipt and accuracy of each message sent. Receipt of all messages shall be acknowledged by the receiving panel, and messages shall be retransmitted by the sending panel in the event of failure to receive such an acknowledgement. An industry standard method, such as a CRC check sum technique, or similar, shall be used to verify the accuracy of each message received. Messages received incorrectly shall be retransmitted by the sending panel. Retransmission shall continue until the receiving panel acknowledges receipt of a correctly received message. If, after a number of transmission attempts, the transmitting panel still does not receive an acknowledgement from the receiving panel, it shall register a fault signal.

22.3.4.5 Remote Display/Mimic Panels

- a. Remote display/mimic panels, or fireman's panels, shall communicate with the control panel. No "hard wiring" to these panels will be allowed.
- b. Remote panels shall function completely independently of the control panels, and shall not affect the functioning of the control panels.

22.3.4.6 Programmability

- a. The control panel shall be fully programmable through the keypad on the front of the panel, and through an RS 232 port by using a separate computer.
- b. It shall be possible to make back-ups of the programmed data onto separate magnetic media by means of an external computer linked to an RS 232 port on the control panel.

22.3.4.7 Communications

- a. Communications with other equipment, such as computers, shall be achieved through RS 232 ports using a fully documented public domain protocol. The protocol documentation shall also be included in the Maintenance Manual so that it will be possible for another party to communicate with the control panel without the approval of the control panel manufacturer.
- b. All communications with other equipment shall be bi-directional, and at least the functions and displays

available on the front of the control panel shall be possible through the communications port. Programming of the control panel by means of other equipment is not required (except as described earlier).

22.3.4.8 Local Printer

- a. A printer shall be available as an option.
- b. The printer shall provide a hard copy of the following:
 - Alarms
 - Faults
 - Maintenance data
 - Control panel operations
 - Outputs Operated
 - Configuration report
 - Status report
- c. The printer shall print out the following information for each alarm or signal:
 - Type of Alarm or Fault
 - Device Type
 - Device Number
 - Zone Number
 - User message
 - Day
 - Date
 - Time
- d. It shall be possible to set the printer to print out alarms, faults, control panel operations, and outputs operated, either individually or- in any combination.

22.3.4.9 Device Addresses

- a. Each sensing device shall be numbered individually and uniquely to correspond with its address on the control panel.
- b. If a detector head is moved from its base to another base, the address of such a detector shall remain at its original location indicated on the control panel.
- c. The address of each device shall be manually set to the desired value.

22.3.4.10 Display

- a. The control panel shall be equipped with an alphanumeric display capable of displaying at least 80 characters.
- b. A message of at least 40 characters long per device shall be programmable and displayable on the display.
- c. The display of the following reports/information shall be possible:
 - Device information
 - List of devices isolated
 - List of devices that need maintenance
 - List of the most resent events
 - I/O mapping
 - Device messages

With reference to 22.3.4.9(0), the following will also be acceptable to the Department:

"If a detector head. is moved from. its base to another base, and this result, in the address being moved to another zone, then an alarm shall be generated in the control panel. This alarm can only be cancelled by replacing the head in its original zone.

22.3.4.11 Device Status

Addressable devices shall be polled by the control panel and the equipment condition and analogue status shall be read and stored in the control panel. The varying status of each device shall be assessed by software algorithms and the control panel shall indicate the following conditions:

a. Analogue Detectors

- Detector removed
- Incorrect type of Detector
- Detector failed
- Detector contaminated
- Pre-alarm
- Fire Alarm
- Detector healthy

b. . Interface to contacts

- Fire Alarm
- Interface removed
- Interface faulty
- Contact wiring open circuit
- Contact wiring short circuit
- Contacts normal

22.3.5 POWER SUPPLY

- 22.3.5.1 Power supplies shall conform to BS 5839-4 or EN 54-4. See clause 22.1.3.2.
- 22.3.5.2 The Power pack of the control panel shall be able to accept an incoming 230 Volt single phase supply and shall be equipped with transformers, rectifiers, inverters, condensers and integrated circuits for the supply of stabilised power to the control panel equipment and detector circuits.
- 22.3.5.3 The power supply unit shall be equipped with over voltage protection and spike arresters to prevent damage to the equipment by lightning or other spikes, or damage due to over voltages.
- 22.3.5.4 The battery charger shall be able to deliver the full charging current to discharged batteries, and thereafter the charger shall automatically vary the charging current to the batteries as may be required by battery voltage conditions.
- 22.3.5.5 Batteries shall not be subjected to overcharging.
- 22.3.5.6 The battery charger shall be protected against reverse polarity and short circuits on the DC supply side.
- 22.3.5.7 The power pack of the control panel shall regulate the supply voltage to detectors so that detectors or bases are operated in their nominal supply voltage range.
- 22.3.5.8 Upon loss of mains power, the power supply unit shall automatically revert to battery power, where after the system shall remain fully operational for a period of 24 hours and shall be able to operate the total alarm load for a further period of 1 hour. The unit shall automatically revert back to mains power upon mains power restoration and manual resetting of the unit shall not be necessary.
- 22.3.5.9 The power supply shall be equipped with the following indications on the front of the unit:
 - a. "Mains On" : green LED
 - b. "Charger Fault" : amber LED
- 22.3.5.10 Batteries shall be mounted in a separate ventilated padlockable cubicle. Batteries shall be mounted in such a way that contamination of other equipment by batteries cannot take place. Batteries shall be in a special plastic container to contain any possible spillage.
- 22.3.5.11 Any supply fault, charging fault or low battery voltage shall be transmitted to the control panel so that an alarm can be generated.
- 22.3.5.12 No fuses or switches shall be accessible on the front of the power supply unit without opening the door.

22.3.5.13 Batteries shall be of the sealed lead acid type and the sizes of the batteries to be used shall be indicated on a label in the battery cubicle.

22.3.5.14 Batteries shall be charged to 85% of their capacity within 24 hours.

22.3.6 DETECTORS AND DETECTOR BASES IN GENERAL

22.3.6.1 Ionization smoke detectors, optical smoke detectors and heat detectors are covered under this heading.

22.3.6.2 The detector base shall be such that the detector head is held firmly in the base by means of an insert and twist (bayonet) action.

22.3.6.3 Reverse polarity or faulty circuit wiring shall not cause damage to the detector head or base.

22.3.6.4 The detector base shall be suitable for surface mounting on a ceiling and shall fit on a 65 mm standard C-type electrical outlet box with fixing holes at 50 mm centres. Fixing lugs or holes in the base shall be substantial and shall withstand repeated insertion and removal of the head without damage.

22.3.6.5 The base shall be provided with wire terminals suitable for wire sizes up to 1,5 mm².

22.3.6.6 The wiring terminals of the unit shall be able to accept wiring lugs and shall be of the screw and clamp plate type to hold a lug firmly pressed against its contact surface. Spring loaded push-in contacts will not be acceptable.

22.3.6.7 Terminals for circuit wiring shall be clearly marked.

22.3.6.8 The base shall be suitable for the connection of a remote indicator LED.

22.3.6.9 The detector or base shall be fitted with a local indicating LED, which shall flash/illuminate under an alarm condition.

22.3.7 CONVENTIONAL DETECTORS AND DETECTOR BASES

22.3.7.1 Conventional detectors and bases shall conform to BS 5445 or EN 54 or BS 5839. See clause 22.1.3.2.

22.3.7.2 It shall be possible to reset detectors from an alarm condition to normal by disconnecting the supply voltage to the unit.

22.3.7.3 Upon removal of a detector head, the control panel shall indicate that a head has been removed and also the zone where the head has been removed.

22.3.7.4 The base at end of circuit, in the case of radial circuits, shall be suitable to accept a termination resistor/circuit.

22.3.8 ANALOGUE ADDRESSABLE DETECTORS AND BASES

22.3.8.1 Analogue addressable detectors and bases shall conform to BS 5445 or EN 54 or BS 5839. See clause 22.1.3.2.

22.3.8.2 The removal of a detector from the base shall not affect the operation of other detectors on the line.

22.3.8.3 The control panel shall indicate when a detector head has been removed and also the address where it has been removed. Likewise it shall indicate when a wrong type of head is inserted in a base, as well as its address.

22.3.8.4 The detector shall be suitable to operate on a two-wire system carrying both power and signals for the operation of each and every detector in the system.

22.3.8.5 The detector shall be able to receive, and decode signals transmitted to it by the control panel. Upon receipt of a signal directed at its particular address, the detector shall transmit data back to the control panel for processing and storage thereof by the control panel. Such data transmitted shall represent the analogue values present in the electronic circuits of the detector head/base combination at that point of time.

22.3.8.6 The detector, when "addressed" by the control panel, shall transmit data to enable the control panel to deduce the following basic information:

- a. The type of head generating the data (i.e. ionisation, optical, heat, etc.)
- b. The address of the detector
- c. The reference limits of calibration of the detector
- d. The % visible or invisible combustion particles per meter present in the detector chambers at that point in time, or the temperature measured at the detector.

22.3.9 MANUAL CALL POINTS (BREAK GLASS UNITS)

22.3.9.1 Manual call point units shall be in accordance with BS 5839-2, except that it shall be resettable i.e. the front face of the unit shall not be a frangible element.

22.3.9.2 The unit shall be finished in RED.

22.3.9.3 The unit shall be large enough to cover a 65 mm □conduit draw box when the unit is surface mounted.

- 22.3.9.4 Flush mounted units shall be provided with a special flush mounting box, which can accept electrical conduit terminations.
- 22.3.9.5 Surface mounted units shall be deep enough to terminate 20 mm conduits into the unit, and shall be mounted solidly on the wall by means of their back plates.
- 22.3.9.6 Addressable manual call point units shall be fitted with an address card, which will enable communication with the control panel.
- 22.3.9.7 The wiring terminals of the unit shall be able to accept wiring lugs, and shall be of the screw and clamp plate type to hold a lug firmly pressed against its contact surface. Spring loaded push-in contacts will not be acceptable.

22.3.10 AUDIBLE ALARMS (SOUNDERS)

- 22.3.10.1 Sounders shall conform to BS 5839 part 1 and part 4.
- 22.3.10.2 The sounders shall operate off a 24 volt DC supply. Electronic sounders will be preferable.
- 22.3.10.3 The sound level for sounders and audible alarms shall be as follows:
 - Audible indications (e.g. in the control panel) • 65 dB(A) at 1 m
 - Evacuation sounders - at least 103 dB(A) at 1 m
 - Outdoor sirens - 112 dB(A) at 1 m
- 22.3.10.4 The frequency, or major frequency in a two tone alarm, shall lie in the range of 500 to 1000 Hz.

22.3.11 FIRE BRIGADE SIGNALLING FACILITIES

- 22.3.11.1 The transmitting equipment, when required for the transmission of a general fire alarm to the local Fire Brigade, shall form an integral part of the fire control panel.
- 22.3.11.2 The transmitting equipment shall be fully compatible with the receiving equipment already installed at the Fire Brigade. Any facilities necessary to accomplish this compatibility shall be included in the transmitting equipment.
- 22.3.11.3 The output to the Fire Brigade shall be a monitored output.
- 22.3.11.4 The transmitting equipment shall not be supplied, unless specifically specified in the Supplementary Specification.

- 22.3.11.5 Even if the transmitting equipment is not specified in the Supplementary Specification, a appropriate port, or ports, shall be provided on the control panel for connecting any future transmitting equipment.

22.3.12 FLAME DETECTORS

All flame detectors designed to detect hydrocarbon fires shall comply with at least the following requirements, in addition to the specified standards:

- 22.3.12.1 Flaming fires shall be detected by the flame detector by detecting infra-red and/or ultraviolet radiation emitted from the flames.
- 22.3.12.2 Detectors that monitor only ultraviolet radiation will not be acceptable.
- 22.3.12.3 At least two different radiation frequencies shall be detected and analysed by the flame detector in order to increase the reliability of the detector in the presence of the following:
- Artificial light sources
 - Sunlight
 - Hot vibrating bodies
 - Arc welding
 - Lightning
- 22.3.12.4 Flame detectors shall be fitted with automatic self-test circuits which will simulate a fire condition by generating artificial radiation through the lenses. Dirty lenses shall, therefore, also generate a fault.
- 22.3.12.4 The flame detector shall be able to detect a 0,1 m SQ. petrol fire at a distance of 14 m.
- 22.3.12.5 Detection integration time shall be adjustable up to 30 seconds.
- 22.3.12.6 The detector shall have at least a 50% sensitivity at a horizontal angle of 45° from the centre line.

22.4 INSTALLATION METHODS AND MATERIAL

22.4.1 DEVICES

- 22.4.1.1 The base of a detector shall always be mounted in the area which it protects so that the indicator LED can be seen from the doorway which normally provides access to the room. The indicator LED shall face towards the main entrance or lobby or side of main approach in the passage. See also clause 22.2.1.1.

- 22.4.1.2 Bases shall be provided with dust caps to protect the base against dust and dirt whilst construction work is in progress. This is only applicable to bases that contain electronic components.
- 22.4.1.3 Surface mounted units shall be solidly fixed to the wall by means of their back plates.
- 22.4.1.4 Manual call point units shall be mounted at 1,4m above finished floor level, unless otherwise specified in the Supplementary Specification.

22.4.2 CIRCUIT WIRING

- 22.4.2.1 The following methods are acceptable for the wiring of detector circuits:
 - a. Steel conduit and conduit accessories cast into, or built into, the building structure and wired with insulated conductors of a type which complies with the requirements of this specification.
 - b. Steel conduit and conduit accessories, surface mounted in building structures and wired with insulated conductors of a type approved by the Department.
- 22.4.2.2 Wires and cables may also be installed in wiring trunking and armoured cable may also be installed on cable racks, all as specified further herein.
- 22.4.2.3 Cables with stranded wires shall be terminated by the crimping on of lugs. No stranded wires without lugs will be accepted.
- 22.4.2.4 T-Junctions shall be made only in approved draw boxes at detector outlets.
- 22.4.2.5 Separate wiring installations for detector circuits, evacuation communication wiring, audible alarms, electrical lock wiring, card reader wiring, AC and DC power circuits, remote control circuits and monitor wiring, video cables, computer cables, etc., shall all be done in separate conduit- or trunking installations. Detector wiring shall not be installed together with any other wires in wire-ways.
- 22.4.2.6 Detector wiring may share the same draw boxes or expansion joint boxes with other fire fighting system wiring or security system wiring, but the boxes shall be subdivided by means of steel plates.
- 22.4.2.7 All electrical work and wiring associated with "FIRE DETECTION SYSTEMS", shall be carried out in compliance with the requirements of the "STANDARD SPECIFICATION FOR ELECTRICAL EQUIPMENT AND INSTALLATIONS FOR MECHANICAL SERVICES" of the Department.

22.4.2.8 No wiring shall be installed vertically for more than 1,5 m. Cables installed over vertical distances of more than 1,5 m, shall be properly supported at intervals of less than 1,5 m.

22.4.3 ARMOURED CABLES

22.4.3.1 Armoured cables shall be used in sleeves, in cable tunnels and on cable racks or trays.

22.4.3.2 Armoured cables shall have twisted pairs and/or screens if so required in the wiring specification of the manufacturer of the equipment.

22.4.4 CONDUIT AND CONDUIT ACCESSORIES

22.4.4.1 The Contractor for the fire detection system shall be responsible for the supply and installation of all conduits, conduit accessories, wiring trunking and cable trays, as may be necessary or required for the system, unless specified otherwise in the Supplementary Specification.

22.4.4.2 Conduit and conduit accessories shall be cast in, or built into, the building structure in new buildings. No surface mounting will be acceptable in new buildings or structures.

22.4.4.3 Surface mounted conduit and conduit accessory work will be allowed only in existing buildings.

22.4.4.4 Steel conduit and conduit accessories surface mounted on building structures, steelwork and woodwork, shall be done neatly and in straight lines and shall be saddled at 1 m centres with spacer saddles.

22.4.4.5 M4 machine screws shall be used for fixing of spacer saddles onto steelwork. Suitable holes shall be drilled and tapped in the steelwork for this purpose.

22.4.4.6 Steel conduit and conduit accessories, surface mounted in roof spaces of buildings or structures with pitch roofs, shall follow the roof structural elements.

22.4.4.7 The quality of materials and the methods of installation of steel conduit and conduit accessories shall be carried out in compliance with the requirements of the "STANDARD SPECIFICATION FOR ELECTRICAL EQUIPMENT AND INSTALLATIONS FOR MECHANICAL SERVICES" of the Department and SABS 0142.

22.4.4.8 Conduit installations shall be done in such a way that detector circuit wiring can be done without interruption and without T-joints.

22.4.4.9 Round draw boxes for detectors shall be mounted hard against the ceiling in the case of false ceilings or ceilings of pitch roof buildings and detector bases shall be mounted against boxes so that no open wiring occurs anywhere in a conduit and wiring system.

22.4.4.10 No sprague tubing or PVC conduits shall be used in detector circuit wiring systems. Only flexible conduit which is not of the spiral type may be used in special applications.

22.4.5 WIRING TRUNKING

22.4.5.1 The quality of materials and the methods of installation of wiring trunking shall be carried out in compliance with the requirements of the "STANDARD SPECIFICATION FOR ELECTRICAL EQUIPMENT AND INSTALLATIONS FOR MECHANICAL SERVICES" of the Department.

22.4.5.2 Trunking shall be fitted throughout with covers.

22.4.5.3 PVC wiring trunking may be used only to house detector circuit wiring, but then only as specified in the section "CIRCUIT WIRING" in the Specification and only with the type of cable as specified.

22.4.5.4 No wiring trunking may be used in microfilm vaults and in high risk areas such as fuel. oil. tyre. paint, wood. paper, cardboard box storage areas, record rooms, and vaults.

22.4.6 CABLE RACKS AND LADDERS

22.4.6.1 The quality of materials and the methods of installation of cable racks and ladders shall be carried out in compliance with the requirements of the "STANDARD SPECIFICATION FOR ELECTRICAL EQUIPMENT AND INSTALLATIONS FOR MECHANICAL SERVICES" of the Department.

22.4.6.2 No cable racks and ladders may be used in microfilm vaults and in high risk areas such as fuel. oil. tyre. paint, wood. paper, cardboard box storage areas, record rooms, and vaults.

22.4.6.3 Armoured cable may be mounted on cable racks and ladders.

22.4.6.4 The type of wire or cable used shall be suitable for the speed of data transmission, so that signals can be carried over without losses or corrupted data.

22.4.7 LIGHTNING AND SURGE PROTECTION

- 22.4.7.1 All wiring going out from and coming into any building shall be fitted with suitable surge absorbers, which have been approved by the manufacturer of the equipment. This includes 230 V supplies, telephone lines and detector lines.
- 22.4.7.2 Special attention shall be given to the proper connecting and earthing of the system.

22.5 COMMISSIONING OF SYSTEMS

22.5.1 COMMISSIONING AND HANDING OVER TESTS

- 22.5.1.1 The testing of the system shall be done in the presence and to the satisfaction of an authorized representative of the Department.
- 22.5.1.2 Tests shall include simulation of fire conditions in each zone to prove the efficiency of all aspects of the system to the satisfaction of the Department.
- 22.5.1.3 All equipment, material, etc., which may be necessary for these tests shall be supplied by the Contractor, including a suitable smoke generator.
- 22.5.1.4 The Contractor shall do his own complete commissioning tests before the actual first take-over tests are done. This is to satisfy himself that everything is working and is in accordance with the specification.

22.6 DOCUMENTATION, DRAWINGS AND MAINTENANCE

22.6.1 BLOCK PLAN

- 22.6.1.1 An approved block plan, indicating the zones and appropriate zone reference numbers, shall be installed at all control panels and repeater panels.
- 22.6.1.2 The block plan shall be discussed with the Fire Prevention Officer of the Department before manufacturing takes place.
- 22.6.1.3 The block plan shall have a professional appearance. Text shall be in English and at least one other official language to be decided in conjunction with the Department and the User Department. A freehand drawing or badly finished plan will not be acceptable.
- 22.6.1.4 The block plan shall clearly indicate the position of the zone in which a fire has started, when read together with the displays and indications on the control panel.

- 22.6.1.5 Non-fading material shall be used for the artwork. The block plan shall be mounted in a frame behind glass, or shall be covered with a transparent stick-on material, to protect the artwork.
- 22.6.1.6 The block plan shall be mounted in an approved position at the control panel.
- 22.6.1.7 For an addressable system, the addresses of all field devices shall be shown on the block plan.
- 22.6.1.8 The exact requirements of the panel and block plan will be specified in the Supplementary Specification.

22.6.2 TRAINING PROGRAM

- 22.6.2.1 Tenderers shall allow in their tender prices for a training course, to train on site at least four (4) persons, as nominated by the User Department from his own operating personnel. The training shall be adequate for the installation, to ensure that operating staff fully understand the system. During this period, the personnel shall be made fully conversant with the operation of, and daily maintenance required for, each item of equipment of the system. The training, especially on computer equipment and control panels, shall be of such a standard that will enable the User Department to carry out his own in-house training of other personnel.
- 22.6.2.2 The training course shall start only after first take-over inspection of the system.
- 22.6.2.3 The training course shall be carried out in the language medium as chosen by the User Department.
- 22.6.2.4 The Operating Manual of the contract shall include a full description of the contents of the training course, referred to in clause 22.6.2.1. above.

22.6.3 OPERATING INSTRUCTIONS

- 22.6.3.1 Instruction cards, indicating clearly the procedure to be followed in the event of a "FIRE" alarm, shall be supplied and framed under Perspex in approved teak or non-ferrous material frames. The instruction cards shall be in English and at least one other official language to be decided in conjunction with the Department and the User Department. The frame shall be neatly mounted on the walls alongside the control panel and external indicator panels respectively, where they can be clearly read.
- 22.6.3.2 In the case of the control panel, the instruction card shall also state clearly the procedure to be followed in the event of a "FAULT" alarm.

22.6.4 OPERATING MANUALS

22.6.4.1 Three complete sets of the Operating Manuals, in English, shall be provided to be used by the User's personnel who will operate the system. The Operating Manuals shall be in the form of plastic display binders, and shall contain the following:

- a. Complete operating instructions.
- b. Action to be taken during "FAULT" and "FIRE" conditions.
- c. Names, telephone and facsimile numbers, and addresses of contact personnel.
- d. Operating procedures, as contemplated in clause 6.3 hereof.

22.6.4.2 The Operating Manuals shall contain no technical information. This shall be included in the Maintenance Manuals.

22.6.4.3 A concept copy of the Operating Manual(s) shall be submitted to the Department's consultant, at least two (2) weeks prior to the anticipated first hand-over of the installation, for scrutiny and possible amendment.

22.6.4.4 First delivery of an installation will not be taken unless acceptable manuals are submitted prior to the first hand-over inspections.

22.6.5 MAINTENANCE MANUALS

22.6.5.1 Three complete sets of the Maintenance Manuals, in English only, shall be provided. The manuals shall contain the following:

- a. A complete set of "as built" drawings of the contract, in a form acceptable to the Department. No drawings shall be smaller than A4 size. Large drawings shall be reduced to A3 or A4 size for inclusion in the manuals, provided they remain legible.
- b. A complete set of "machine shop" drawings of the contract, showing dimensions, finishes, general arrangements of panels, consoles, computer assemblies, etc.
- c. A complete set of wiring diagram drawings of all equipment, showing component identification, types and values.
- d. block diagram drawing for each piece of equipment containing more than one PC board, showing the interconnections of boards, complete with connector and plug numbers, and PC board identification markings.
- e. A complete list of all equipment containing the following information:

- i. Name of the equipment (or description thereof).
 - ii. Serial number of equipment.
 - iii. Type number of equipment.
 - iv. Manufacturer of equipment.
 - v. Equivalent replacement model of equipment (where applicable).
 - vi. Names, addresses, telephone and facsimile numbers of firms supplying equipment.
- f. A complete and comprehensive description of the operation of the system and of each individual piece of equipment.
 - g. A complete and comprehensive description of the maintenance of the system and of each individual piece of equipment in respect of daily, weekly, monthly or annual maintenance.
 - h. Advanced technical information of the system may also be bound into the Maintenance Manuals as additional information. Any literature not in the English language, shall have the English translation attached.

22.6.5.2 A concept copy of the Maintenance Manual(s) shall be submitted to the Department's consultant, at least two (2) weeks prior to the anticipated first hand-over of the installation for scrutinizing and possible amending.

22.6.5.3 First delivery of the installation will not be taken, unless acceptable manuals are submitted prior to the first hand-over inspections.

22.6.6 MAINTENANCE

22.6.6.1 Maintenance and Guarantee

- a. The tenderer for this contract shall allow in his tender price for the maintenance of the complete installation for a period of twelve (12) months, starting from the date of the first take-over of the contract by the Department.
- b. It is a specific requirement of this contract that the Contractor shall allow for monthly inspection visits during the 12 month maintenance period, and that he shall submit full reports for each monthly visit. The reports shall contain the status of the system as well as the faults which occurred on the system during the previous month.
- c. arge of the responsible person appointed by the User Department for this purpose. The Contractor shall complete the log book, showing all maintenance done by him, as well as repairs of faults which may have occurred.
- d. The log book shall also contain the following information:

- Date
- Type of fault reported and by whom
- Date of fault report
- Work done
- Name and signature of person carrying out the work
- Name and signature of the person in charge of the v . site.

- e. The log book shall be filled in in TRIPLICATE. One copy shall accompany the monthly report to the Regional Representative of the Department, one copy shall be for the Contractor's own use, whilst the third copy shall remain in the logbook as a record.
- f. The Contractor shall also allow for a complete maintenance service of the system after every six (6) months, i.e. two such services in the twelve (12) month guarantee period. The logbook shall also be filled in and reports submitted for these services to the Regional Representative of the Department.
- g. The reports shall be submitted to the Department within seven (7) days of the service. Serious faults shall immediately be reported to the Regional Representative and the Consulting Engineer by telephone.
- h. No maintenance or repair work shall be done on site without the knowledge, and approval, of the responsible person in charge on the site.

22.6.6.2 Maintenance Program

- a. The Contractor shall draw up a complete maintenance program document for the system, which shall enable the User Department to maintain the system on a daily basis. This program must be inserted into both the Operating Manuals and Maintenance Manuals.
- b. This document shall be in English and at least one other official language to be decided in conjunction with the Department and User Department, and shall indicate clearly the steps to be taken to prevent failure of the system.
- c. The normal maintenance, which is, for example, necessary for the maintenance of batteries in the system, shall be clearly indicated in the documentation in a separate section.

ADDENDUM 'A'
TO THE STANDARD SPECIFICATION
FOR AN AUTOMATIC FIRE ALARM INSTALLATION

This addendum contains a list of applicable standards and other information that may change. The most recent amendments and publication is applicable. Please verify that this is the latest revision.

A1. APPLICABLE STANDARDS (NOT A COMPLETE LIST)

EN 54 - COMPONENTS OF AUTOMATIC FIRE DETECTION SYSTEMS.
Or BS 5445

Part 1 Introduction

Part 2 Control and indicating equipment (draft)

Part 4 Power supplies (draft)

Part 5 Heat sensitive detectors - point detectors containing a static element.

Part 6 Heat sensitive detectors - point detectors, rate of rise only.

Part 7 Specification for point type smoke detectors using scattered light, transmitted light or ionization.

Part 8 Specification for high temperature heat detectors.

Part 9 Methods of test of sensitivity to fire.

BS5839 - FIRE DETECTION AND ALARM SYSTEMS FOR BUILDINGS

Part 1 Code of practice for system design, installation and servicing;

Part 2 Specification for manual call points.

Part 3 Specification for automatic release mechanisms for certain fire protection equipment.

Part 4 Specification for control and indicating equipment.

Part 5 Specification for optical beam Smoke detectors

SABS 0400 : 1990 THE APPLICATION OF THE NATIONAL BUILDING REGULATIONS.

SABS ISO 9000 to 4: QUALITY MANAGEMENT AND QUALITY ASSURANCE STANDARDS

SABS ISO 9000 Guidelines for selection and use

SABS ISO 9001	Model for quality assurance in design/development, production, installation and servicing
SABS ISO 9002	Model for quality assurance in production and installation.
SABS ISO 9003	Model for quality assurance in final inspection and test.
SABS ISO 9004	Guidelines

A2. SCADA SOFTWARE (REFER TO CLAUSE 2.3)

Monitoring software shall be similar and equivalent to the following. Other software shall be submitted for approval.

- a. Turbo link
- b. Ziton (ZG 100)
- c. Genesis
- `d. DMacs