DBN26/02/01: DEPARTMENT OF JUSTICE: VULAMEHLO MAGISTRATE COURT: REPAIRS & RENOVATIONS OF OFFICE BUILDING: COMPLETION CONTRACT

VOLUME 2 (E): RETURNABLE DOCUMENTS

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 e 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 extend65mm 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 d460mm 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 PULISHED 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 top 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 taunt 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/Stealthful 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 by commisionable 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 transientvoltages 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 nor.

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 900 - 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°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 hanger s 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

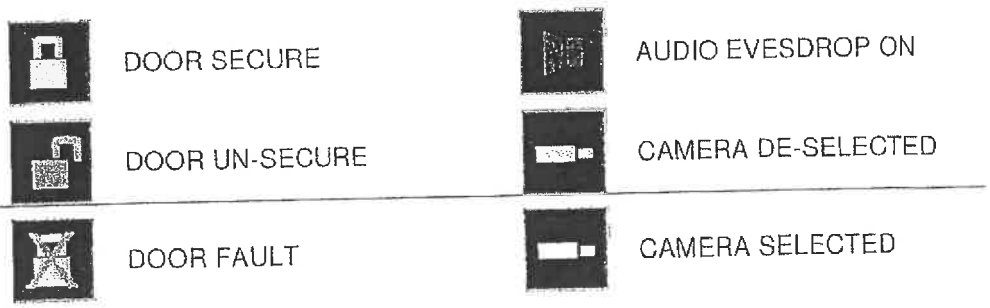
Where a trench is to be cut through bituminous or concrete pavement and shoulders the excavation shall be saw cut in straight alignments. The excavated material shall be back-filled in accordance with this specification to within 150mm of the pavement level and compacted to a density at least equal to 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




PA UN-SELECTED


PA SELECTED


PANIC BUTTON NON ACTIVE


PANIC BUTTON ACTIVE


PANIC BUTTON ACK


AUDIO CH OFF


AUDIO CH CALLING


COMPRESSOR HEALTHY


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

VECHICLE LOOP DETECTOR IN-ACTIVE

VECHICLE 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/mm^2
Weld strength: 75 – 80%
Solidity: 35%
Weight:9.34kg/m^2
Height of panel: 6.0m

Coating: Galfan Class A coated to SANS spec.10224-2:2003 (min. 240g/m^2)
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/mm^2
Weld strength: 75 – 80%
Weight: 5.92kg/m^2
Height of panel: 6.0m
Coating: Galfan Class A coated to SANS spec.10224-2:2003 (min. 240g/m^2)
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 be 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 or 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	

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

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 worn 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 liked 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-he-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

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 m^2

22.2.4.5 Every floor of a building larger than 300 m^2 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 mm^2.

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 it's 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 it's 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. tire. 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

DPW-23 (EC): SCHEDULE FOR IMPORTED MATERIALS AND EQUIPMENT

Project title:	***VULAMEHLO MAGISTRATE COURT: REPAIRS AND RENOVATIONS OF THE OFFICE BUILDING: COMPLETION CONTRACT***		
Tender no:	*DBN26/02/01*	**Reference no:**	*6308/0658/26/1B*

This schedule should be completed by the tenderer. *(Attach additional pages if more space is required)*

Item	Material / Equipment	Rand (R) (Excluding VAT)
1.		R
2.		R
3.		R
4.		R
5.		R
6.		R

The Contractor shall list imported items, materials and/or equipment which shall be excluded from the Contract Price Adjustment Provisions (if applicable) and shall be adjusted in terms of currency fluctuations only. Copies of the supplier's quotations for the items, materials or equipment (provided that such costs shall not be higher than the relevant contract rate as listed above) should be lodged with the Principal Agent / Engineer of the Department of Public Works and Infrastructure within 60 (sixty) days from the date of acceptance of the tender. No adjustment of the local VAT amount, nor the contractor's profit, discount, mark-up, handling costs, etc. shall be allowed.

These net amounts will be adjusted as follows:

FORMULA:

The net amount to be added to or deducted from the contract sum:

$$A = V\left(\frac{Z}{Y} - 1\right)$$

A = the amount (R) of adjustment

V = the net amount (supplier's quotation) (R) of the imported item

Y = exchange rate at the closing date of tender submission

Z = exchange rate on the date of payment.

Name of Tenderer	Signature	Date