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FOREWORD

This specification was prepared by the following Work Group members:

Mpho Miranda Ntsiyene	Research and Development

The Work Group was appointed by Security Study Committee, which, at the time of approval, comprised of the following members:

Silvester Raseboka	Research and Development
Herson Somo	Research and Development
Francis Ngubeni `	Enterprise Support
Thulani Mbhele	Engineering Operations
Thabang Phokane	Enterprise Support

Recommendations for corrections, additions or deletions should be addressed to the:

Research and Development Chief Engineer
City Power Johannesburg (SOC) Ltd
P O Box 38766
Booysens
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1. INTRODUCTION

City Power's substations are susceptible to intrusion, theft and vandalism of infrastructure equipment and thus poses a risk of security and power supply been compromised. In an effort to reduce electricity-related injuries, fatalities, and economic crisis, as well as ensuring continuous supply of electricity, it is vital that the network is protected from unauthorised access and to keep the power on at all times within Johannesburg area. By ensuring that our network is secured, we increase the quality of supply and service to our customers and build trust and satisfaction with all stakeholders.

2. SCOPE

This specification covers City Power's requirements for the supply, installation, testing and commissioning of Intruder Security Systems at various premises of substations which entails the required hardware, software and accessories.

3. NORMATIVE REFERENCE

The following documents contain provisions that through reference in the text constitute requirements of this standard. At the time of publication, the editions indicated were valid. All standards andspecifications are subject to revision and parties to agreements based on this specification areencouraged to investigate the possibility of applying the most recent editions of the documents listed below.

SANS 1195: 2021	Busbars
SANS 1411-2	Materials of insulated electric cables and flexible cords - Part 2: Polyvinyl chloride (PVC)
SANS 1507	Electric cables with extruded solid dielectric insulation for fixed installations (300/500V to 1900/3000V)
SANS 2220-2-1	Electrical security systems Part 2-1: Access control systems: General characteristics
SANS 2220-2-3	Electrical security systems Part 2-3: Access control systems: Card readers
SANS 2220-2-4	Electrical security systems Part 2-4: Access control systems: Reader controllers
SANS 2220-2-6	Electrical security systems Part 2-6: Access control systems - Access cards
POPI act	Protection of Personal information Act
IEC 60898	Electrical accessories/circuit breakers for over current protection for household and similar installations
CP_TSGUID_014	Guidelines for installation of access control and monitoring system for protective structures.
ISO 9001:2015	Quality management systems
ISO 14001:2015	Environmental Management System
OHSAS 18001-2007	Occupational Health and Safety Assessment
CP_TSSPEC_017	Miniature Circuit breaker
CP_TSSPEC_208	Specification for low voltage service protection kiosk

CP_TSSPEC_237	Specification for integrated security system
CP_TSSPEC_239	Specification or metering antennas
CP_TSDRAW_100	Intermission Alarm output

4. DEFINITIONS AND ABBREVIATIONS

The definitions and abbreviations in the above documents shall apply to this specification. In addition to the definitions listed in this document, all those applicable to the normative references and SANS 2220-2 in particular shall apply.

4.1. **Controller**: A microprocessor based device responsible for the central processing of all the alarm signals generated by the security system at the substation.

4.2. **Detector**: a device that generates an alarm condition in response to intrusion, attempted intrusion or deliberate action by the user.

4.3. **Detection range**: The radial distance from the detector to the boundary of detection coverage.

4.4. **Boundary of detection coverage**: The boundary of the area within which a reference target moving towards the detector will initiate an alarm condition.

4.5. **Area of detection coverage**: The area within which detection of abnormal condition is provided by an intruder alarm system.

4.6. **Arm**: The act of setting the state of an alarm system or part of it so that an alarm condition will be signaled when an abnormal condition occurs.

4.7. **Disarm**: Setting the state of the alarm system so that an alarm condition cannot be signaled.

4.8. **Alarm condition**: When the alarm system detects an intrusion and sends a signal to the security control room.

4.9. **Fault condition**: a condition of an alarm system that prevents the system from functioning correctly.

4.10. **Fault signal**: Signal generated by an alarm system when the alarm system is in a faulty condition.

4.11. **Processor**: A device that processes the output from one or more sensors to determine whether an alarm condition should be generated.

4.12. **Security reference**: a means used to enable a detector system to identify and respond to the radiation of the transmitter only.

4.13. **Sensor**: The part of the detector that senses a change in condition so as to give a signal to indicate an intrusion, attempted intrusion or a deliberate action by the user.

4.14. **Tamper device**: A device designed to detect deliberate interference with the alarm system.

4.15. **Detection Zone**: An assessed area where abnormal conditions may be detected

4.16. **Control & Indicating Equipment**: Equipment for receiving, processing, controlling, indicating and initiating the onward transmission of individual alarm events.

4.17. **Tamper protection**: The application of electrical or mechanical means to prevent deliberate interference with an alarm system.

4.18. **Test condition:** A condition of an alarm system in which the normal functions are modified for test purposes.

4.19. **Communication**: The transmission of messages and/or information between intruder alarm system components.

4.20. **Batteries**: Standby power used by the alarm system in the event of a power failure so arranged that no interruption in the alarm system's integrity is experienced.

4.21. **Power unit**: a device that modifies, stores or isolates electrical power for an alarm system, and by means of an alternate power source provides uninterrupted power for a specified period of time for an alarm under normal conditions.

4.22. **ICASA**: The Independent Communications Authority of South Africa.

4.23. System Availability $= \frac{(\text{Amount of hours per month}) - (\text{amount of non-operational hours})}{\text{Amount of hours per month}} \times 100$

4.24. System Dependability $= \frac{\textbf{(Number of successful Detections)}}{\textbf{Number of alarms}} \times 100$

4.25. System Reliability $= \frac{100 - \textbf{(Number of faults}}{100} \times 100$

5. INTRUSION DETECTION SYSTEM

5.1 GENERAL REQUIREMENTS

5.1.1 The intrusion detection system required in this contract shall consist of zone input cards, a command terminal (one on each site), surface mounted roller shutter magnetic contacts, PIR infrared motions sensors, electro-magnetic door locks, small magnetic contacts for light duty doors and beam sensors in pairs. The latter will only be required if so listed in the Bills of Quantities.

5.1.2 The input control module cards shall be installed in the same enclosures as the Door Reader Controller wherever possible.

5.1.3 The systems shall be linked to City Power's integrated Security system, as well as the third parties armed response Control room.

5.1.4 On detection of an intruder, the system shall send alarms to both City Power and the armed response service provider's -control room.

5.1.5 The input control module cards shall be installed in the same enclosures as the Door Reader Controller wherever possible.

5.1.6 Subsequent to the alarm notification, pepper gas and fog shall be used to deter intruders from the affected area in line with the ISS specification CP_TSSPEC_237.

5.2 DIGITAL INPUT CONTROL MODULES

5.2.1 The Input Control Modules (ICM) in this project shall be of the high speed series 2 type for acknowledgement and monitoring of critical alarm points in the intrusion detection systems of the substations and depots in the project.

5.2.2 The ICM shall be suitable for a 24VDC regulated power supply and shall comply with UL294 and shall be 1076 listed and CE marked.

5.2.3 The typical inputs which shall be monitored and/or controlled are:

a) PIR intrusion detector signals
b) Tamper switch contacts of electro-magnetic locks
c) Door Monitor inputs
d) Fire alarms, etc.

5.2.4 Input contacts on modules shall be programmed to generate an audible alarm and a flashing red LED at the specific emergency escape door when the door is jammed open or held open for a period which exceeds a predetermined period of time. This function shall be provided at each specific door which is required to close after the Rex Button or emergency escape button is activated to allow exit through the door. The audible alarms shall be in the form of a surface mounted horn and flashing LED lamp combination next to the particular door. The tamper switch contact of an electro-magnetic lock shall likewise be wired into the ICM to generate an alarm if the magnet is jammed open or where tampering of the wiring has taken place.

5.2.5 The ICM units shall be of the modular PC board type shall contain input and output terminals, 2 form-C relays, discreet components, a processor and communication ports.

5.2.6 The ICM shall thus have:

a) 16 software configurable alarm inputs (1KΩ resistors for line suppression)
b) 2 non-supervised alarm inputs
c) 2 alarm (form-C, 5A) output relays
d) 1 RS485 interface (contacts for 2 wire or 4-wire connection)
e) One power input (24VDC)
f) 8 DIP switches for addressing
g) 2 status LED's

5.2.7 The card shall be wired into the multi-drop RS485 daisy-chain of communication wiring on a site and shall communicate directly with the System Interface Controller (SIC) or the Dual Reader Controller (DRC), whichever is in use as system controller on a site.

5.2.8 The card shall be suitable to be mounted in a steel enclosure together with other control cards such as the DRC module cards. Mounting shall be with stand-off insulated posts.

5.2.9 The PIR's in an area such as an MV switchgear room shall be connected to the inputs on the card and the inputs shall be programmed to inhibit PIR's when the area is entered using an access card to prevent false alarms. The PIR's shall be automatically enabled in such an area when a signal is received from the control system indicating the exit of the area or the locking thereof by the access controls.

Primary Power (DC):	The ICM is for use in low voltage, power-limited, class 2 circuits only
DC Input:	24VDC ±15%. 350 mA
Environmental Temperature:	Operating: 0˚ to +70˚C
Storage:	-55˚ to +85˚C
Humidity:	0 to 95% RHNC
Approvals:	UL 294 and 1076-listed, CE-marked, ROHS compliant

5.3 ALARM KEYPADS

5.3.1 Alarm keypads with LCD displays terminals shall be provided and installed as may be required in this specification to serve as a command reader from which user commands can be issued to execute local I/O functions.

5.3.2 The terminal shall be in the form of a durable encased unit and shall be mounted outside the door of the control room of the site.

5.3.3 The LCD display on the unit shall be of the 32 character backlit type and the keypad of the unit shall be a 16 position keypad containing figures 1 to 9 and 0, 4 function keys and a return and CMD key.

5.3.4 The display and keypad unit shall be supplied with 24VDC power from a dedicated 230VAC/24VDC power supply

5.3.5 The interface with the System Interface Card (SIC) shall be via it's direct, multi-drop 2-wire RS485 or through a DRC port. The terminal shall normally be used as stand-alone RS-485 device in this project. In this mode it shall be possible to connect an optional card reader with Data1/Data0 or clock/data output to provide Card only, Card or PIN or Card and PIN capability.

5.3.6 The terminal shall support all "approved for use" reader technologies that communicate using Data1/Data0 or clock/data communication.

5.3.7 The terminal shall provide command status and other text feedback during reader operations

5.3.8 The terminal shall have arm-, disarm-, bypass- and force alarm mask groups.

Primary Power:

Voltage:	24 VDC ±15%
Current:	175 mA terminal only

Reader:

Power:	Pass-through (non-regulated)
LED Control:	2-wire or 1-wire bicolour LED
Buzzer Control:	Available with 1-wire LED control
Interface:	2-wire RS-485, or Wiegand

Environmental:

Operating Temperature:	0˚C to 50˚C
Storage Temperature:	-20˚C to 70˚C
Humidity:	0% to 95% RHNC

Physical:

Technology: Communication RS-485: up to 1219m max, 24 AWG, 100ohm impedance Wiegand: up to 152m max, 18 AWG stranded wire

Approvals: FCC approved, UL-listed, CE-marked

5.4 SURFACE MOUNTED ROLLER SHUTTER MAGNETIC CONTACTS

5.4.1 The unit shall be suitable to be mounted overhead or at floor level as the need may arise on a site and shall be of the industrial heavy-duty type.

5.4.2 The unit shall consist of a two part, door mounted magnet and a door frame mounted housing, containing the switch and the wiring connection.

5.4.3 Both these parts shall be of heavy cast aluminum and the switch shall be of the reed type encased in an exclusive polyurethane potting material to prevent damage due to moisture or humidity.

5.4.4 The switch shall be of the normally open type and shall switch from NO to NC when the door or shutter is closed.

5.4.5 The contacts of the switch shall operate when the gap between the magnet and the switch assembly exceeds 75mm. Positioning on site shall be done to attain this requirement.

5.4.6 The two assemblies shall be fixed to the shutter and the frame with heavy duty tamper free stainless steel screws. Screws shall preferably be fixed into the steel frame and shutter by means of tapped holes.

5.4.7 The unit shall have a 4 wire tail for connection and the wiring of the tail shall be in stainless steel armoring for connection to the neatest draw box. These connections shall be as short as possible.

5.4.8 Refer to clause "Error! Reference source not found. Error! Reference source not found." for installation of wiring and cables in conduit systems.

5.5 PASSIVE INFRARED MOTION SENSORS

5.5.1 Passive infrared motion (PIR) sensors are required in this contract for the monitoring of intrusion into protected and secured areas when such areas are locked or where permanent occupation does not take place.

5.5.2 The sensors shall be of the volumetric type i.e. the PIR shall have a 360° coverage. The PIR shall thus cover a diameter of 9,3m when mounted at a height of 3m.

5.5.3 The unit shall have a PIR element and shall have digital processing facilities and shall be fitted with an EOL 3k3 resistor.

5.5.4 The PIR shall be suitable to operate with a power supply of 9 to 15 VDC and the current consumption shall be 8.7mA.

5.5.5 The target speed range of the PIR shall be between 300 mm/s and 30 mm/s.

5.5.6 The unit shall be fitted with a Fresnel lens and shall be suitable for operation in a temperature range of -10°C and +65°C.

5.5.7 The sensor shall comply with UL/CUL and EN50131, Grade 2.

The positions of PIR's shown on the layout drawings accompanying this specification.

Detection Range: height	Coverage diameter of 9.3m at 6.3m mounting
Optics:	Fresnel lens
Power supply:	9 to 15 VDC
Current consumption (nom.):	8.7 mA

Alarm relay:	<24 VDC, 50mA, NC
Tamper relay:	<24 VDC, 50mA, NC
Target speed range:	30cm/s to 3m/s
Ambient conditions:	-10 to +55˚C
Relative humidity:	Max. 95%
IN50131-2-2:	Grade 2
UL/CUL variant:	available
IR BEAMS	
Type:	Photoelectric Detector
Detection Range:	60m
	Features: Quad high power beams, IP65 waterproof structure & Tamper function
Maximum detection range:	60m
Detection method:	Quad infrared beam interruption detection
Interruption time:	Variable between 50/100/250/500 ms.
Power Source:	10.5 – 30 VDC
Operating temperature:	-25˚C - +60˚C
Operating humidity:	95% (max)
Alignment angle:	±90˚ Horizontal, ±10˚ Vertical

6. ALARM SYSTEM REQUIREMNTS

6.1 General requirements

This specification covers intruder alarms used at substation to detect and alert the control Room. An Alarm system shall consist of detection, Pepper Gas, security lights, Fog Cannon (smoke lock), communication system, controller and self-power system.

The overall performance (O) of each security system during operation shall be monitored on a monthly basis and shall have an overall performance above 88% when calculated according to the criteria listed in DISPVACE8, namely:

(a) System availability, which shall be greater than 98%
(b) System dependability, which shall be greater than 95%
(c) System reliability, which shall be greater than 95%

Where overall performance is (O) = (a)*(b)*(c). If overall performance is below 88% then remedial action must be taken. The method of calculation of the MTBF shall be as stated in IEC 271 and IEC 300. Where batteries are

used, the battery shall operate for at least 12 months. The manufacturer of the alarm system shall conform to the registration requirements of SAIDSA.

The system should be designed to be hard wired and wireless as far as possible and should include condition monitoring of the devices in all the associated wireless devices

The system should be able to communicate via GSM to the current City Power Control room software. No Radio's will be accepted as the communication media as they are uni-directional and City Power need to have full bi-directional control over their installed alarming systems.

The design of the system should include one or multiple magnetic fail open door locks in order to control the access to the substations from the City Power Control room. These door locks should be integrated in the complete design of the alarm system. A suitable indication system indicated the system Armed/Disarmed should be installed on the outside of the substation.

6.2 Operating conditions

The intruder security system is expected to operate in settings under the following conditions:

Altitude	0m to 2500m
Temperature	-30°C to 50°C
Diurnal range	30°C
Humidity	all weather operation
Barometric pressure	76 to 104kPa
Pollution level	III for outdoor components

The equipment shall withstand dust and severe pollution conditions. Exposed parts shall withstand continuous severe ultra-violet radiation without degration. Circuits shall be provided with over voltage arrestors to protect against transients and lighting.

7. DETECTORS/SENSOR

7.1. General requirements

7.1.1 Reliability

The detector shall have a reliability of 95%

7.1.2 Interface capability

A detector shall provide contacts for interface with a controller

7.1.3 Accessibility

A detector enclosure shall be so constructed and mounted that electrical tests and operations are possible without the removal of the device from its mounting. It shall not be possible to adjust the detector or housing without operating the tamper devices.

7.1.4 Alarm period

The alarm condition generated by a detector shall continue for at least 1s. This means that the detector will communicate to the controller for at least 1s that an intrusion has occurred. If a siren is included with the alarm system, the siren shall sound for 2 minutes when an alarm condition is detected.

7.1.5 Corrosion resistance

The components of a detector shall be inherently corrosion resistant or treated so as to offer adequate protection against corrosion.

7.1.6 Communication

The alarm system shall be designed and constructed to accommodate a communication module that allows for communication between the substation and the security control centre.

7.1.7 Earthing

Earthing of the structures, panels and cabling shall be according to the requirements in SCSASABK2.

7.2. Functional requirements

7.2.1 Operating voltage

(a) An alarm condition shall be generated by the alarm system if the supply voltage or the battery voltage falls below the minimum operating voltage of the circuit.

(b) A detector tested in accordance with the operating voltage test specified in SANS 2220-1.1 shall comply with all the requirements state in this document.

(c) When an event occurs in the field, an alarm or notification shall be sent automatically to the remote control and monitoring center.

(d) The system shall perform an integrity polling every twelve hours to update the status, any abnormality shall be identified, flagged and registered as alarms.

(e) The system shall come with a remote control functionality to enable remote operation by control centre.

7.2.2 The following alarms or events shall be monitored and recorded

(a) GPS location

(b) Communication status or level

(c) Front Door Open/close

(d) Door open or close, where applicable

(e) Power On/Off

(f) Intruder Alarms

(g) Door open for too long

(h) Battery low or battery level

(i) Vibration or Temper alarm.

(j) Last communicated time stamp

7.2.3 Tamper protection

(a) It shall not be possible to alter the condition of the enclosure or the detector, or to change the existing area of detection without causing an alarm condition.
(b) It shall not be possible to gain access to the electrical circuits adjust controls and tamper with the device without the tamper device causing the detector to generate an alarm signal.
(c) It shall not be possible to interfere with the operation of the detector by disconnecting the circuit of the detector system.
(d) It shall not be possible to disable the tamper devices using normally available tools such as knives or screwdrivers.

8. POWER UNIT

8.1 Power supply

The power unit shall operate by means of a safety transformer that draws its power from the mains supply and is rectified into 12 V dc. The lifetime of the power supply shall be more that 60 000 h. The power supply shall include a secondary battery and charger as a backup. The power supply should be protected against transients and lightning surges. The battery shall have an operating life of 12 months.

8.2 Secondary battery

The secondary battery shall be able to supply the alarm system with power for at least eight hours in the event of a mains failure. The minimum ampere-hour capacity of the battery shall be calculated using the following formula:

$$C = 1.25\ (A_1 \cdot t_1 + A_2 \cdot t_2)$$

Where

C is the capacity of the battery (A.h)

A_1 is the total current consumed by the alarm system in the case of a mains failure when no alarm r fault signal (other than mains failure alarm) is indicated (A).

A_2 is the total current consumed by the alarm system when the alarm system is in alarm mode (A)

t_1 is the standby time of the alarm system (h)

t_2 is the alarm load time of the alarm system (h)

8.3 Power unit enclosure

When the power unit is operating at full load, with a fully charged secondary battery, and the ambient temperature is 40°C. The steady temperature of the enclosure shall not exceed 80°C.

9. CONTROLLER

9.1 General requirements

The controller shall be a microprocessor –based device responsible for the central processing of all the alarm signals generated by the security system at the substation. The controller shall maintain a real time sequential record of alarm events. Time shall be stored in month, day, hour, minute and second.

9.2 Construction

A controller shall consist of the following:

(a) A transaction memory that stores all alarm signals generated over a twelve-month period or 1000 transactions.

(b) The output capability to send information to the intruder detector systems, tamper protection devices and power supply unit to reset once an alarm has been acknowledged by the security control centre.

(c) The input capability to monitor intruder detector alarm signals, tamper protection devices and power supply unit alarms.

(d) The interface capability with the communication unit in order to send alarm signals to the security control room and receive instructions to reset the alarm condition.

(e) The controller shall provide an interface for connection to access control devices such as a reader controller and access control controller.

(f) The system shall be configured to have a decision making process at the controller so that the controller transaction time does not exceed 1s.

(g) The controller shall be menu driven and display status of all access point simultaneously.

(h) To change settings on the controller the operator use a password. Each operator's transaction on the controller shall be recorded together with the password, date and time.

(i) Where access control and intruder alarm monitoring is on the same central processor the controller shall simultaneously handle message traffic from the readers, intruder alarm system and operational functions such as file maintenance, time updating and real time output control updating. In addition, the output capability to send information to the access control system. As well as the input capability to monitor access control system signals. The alarm signal shall have the highest priority and shall override other activities. It shall be possible to recall and execute the last transaction prior to the alarm condition.

(j) Where CCTV is an option the alarm signal may be used as an input to the CCTV system, so the controller shall be able to interface with the CCTV controller.

9.3 Reliability

The controller reliability shall be 95%. The lifetime of the controller shall be at least 60 000h.

9.4 Accessibility

The controller shall be constructed and mounted in such a way that electrical test and operations can be carried out without the controller having to be removed from its mounting.

9.5 Environmental requirements

The controller, detector and power unit and communicator shall not be adversely affected when tested under the following atmospheric conditions as listed in 7.2.

Additional environmental tests on the controller shall be done in accordance with SANS 2220-1.8 and SANS 0222-2.4.

9.6 Off-line operation

(a) As a stand-alone system, the alarm system controller shall be able to store all the substation security system data and parameters to cover at least 1000 transactions or one month. When communication is restored, all transactions shall be uploaded to the security control room

.

(b) Provision shall be made for repeating of any corrupted message between the substation security system and the central processor as well as between the central controller and the security control room.

9.7 Battery back-up

The controller shall be fitted with a battery back-up unit that can supply power to the controller for at least 8 hours in the event of a mains failure.

The backup power source shall have an operating life span of at least two years in protective enclosure.

The power supply shall have a built-in charger and the power shall automatically be transferred to battery power upon AC input failure and the unit shall further have thermal overload protection.

The backup power source shall be protected against incoming surges.

10. COMMUNICATION UNIT

10.1 General requirements

- The GSM unit must be an approved ICAASA band width approved within South Africa.

- The unit must be a bi-directional unit that can accept SMS commands and send SMS commands.
- The unit should include additional input and output features
- An on board receiver (433 MHz) should be integrated on the GSM/Alarm panel design to receive the wireless peripherals and their condition monitoring status. These devices will be programmed into the micro-processor on the alarm board.
- The functionality and firmware/software of the unit should be easily integrated into the current City Power alarm and software infrastructure.
- The unit must be able to be programmed remotely via the GSM network.
- The micro-processor IC must be integrated into the PC Board design.
- Programming of the unit should be user friendly.
- Should the GSM module fail the alarm will not lose any alarming functionality.
- The unit will include non-volatile memory.
- The unit will not be susceptible to EMI interferences.

10.2 Environmental

The performance of the communication equipment shall not degrade under the following ambient conditions.

The equipment shall withstand non-metallic dust conditions.

Circuits shall be provided with over voltage arrestors to protect against transients and lightning.

10.3 Electromagnetic compatibility

Telecommunication equipment shall meet the safety requirements as stipulated in IEC 60950 and all other requirements of the Telecommunications Act No 103 of 1996. All equipment shall comply with the following international EMC specifications:

(a) Immunity requirement EN 300 386-2 of ETS 300 386-1 and the corrigendum if 1997.
(b) EN500 82-2

If the supplier cannot offer equipment that conforms to the above specifications, then the supplier shall state the additional cost per terminal required of City Power to modify the offered equipment in order to meet the specifications.

10.4 Signal performance

The signal transmitted from the substation shall have a minimum range of 50km. The equipment shall operate in signal channels approved by the Independent Communications authority of South Africa (ICASA). The manufacturer shall state the guarantee standard and optional power of the offered equipment. The signal

power levels shall be measured at the antenna ports. The supplier shall in additional provide the following information:

(a) Is the frequency used as reserved licensed frequency, which company has reserved the frequency?

(b) The geographical area, name and coordinates where the frequency is operational.

(c) Frequencies at which the signal waves are transmitted.

(d) Bandwidth or amount frequency (MHz) occupied by the transmitted signal.

(e) Modulation scheme (or method) and bit rate (or speed) of transmitted signal.

(f) Antenna type.

(g) Antenna diameter (m).

(h) Antenna gain (dB).

(i) Antenna polarization (H/V) i.e. horizontally or vertically polarized.

(j) Transmit power (dBm/W) / Receiver sensitivity Threshold (dBm).

(k) Fixed loss (dB): Transmit and receive, as a percentage of lost power.

(l) Type of service, i.e. is information transmitted as date, voice, telemetry, paging or all.

(m) Range of transmitted signal (km).

10.5 Alarms

The alarm circuits on the communication equipment shall be self-resetting once the alarm event has occurred. A visible indication of receiver and transmitter fail alarm shall be provided on the front panel of the communication unit. A comprehensive diagnostic tool must provide the following information:

10.5.1 Display all communication unit alarms that occur.

10.5.2 It shall be possible to verify signal level from the management terminal.

10.6 Antennae and feeder cables

An external antenna shall be an all-metal construction. All materials used shall be able to withstand all climatic conditions prevailing in South Africa. Non-metal parts shall withstand continuous severe ultra-violet radiation without degradation. All fixing materials for antennae and feeders shall be non-corrosive. Mechanical strength of antennae and antennae fixtures shall be such that no damage is caused under the following wind speed conditions when mounted on a pole, wall or mast:

10.6.1	Recurrence interval of wind	1 in 50 years
10.6.2	terrain category	2 class B
10.6.3	Altitude	up to 2500m
10.6.4	Gust profile	3 seconds

The earth cable from the feeder earthing kit shall be taken to the nearest proper earth point in such a way that bends in the cable are minimized.

11. NETWORKING AND DATA CABLES.

11.1. General Requirements

11.1.1. Various cable types are required in this contract for the networking of the control and monitoring system and for the transmission of data on the sites in this contract.

11.1.2. Mylar shielded cable and Ethernet cable are mostly required in buildings. Links between buildings on a site or links between a substation building and outdoor cameras shall be done over fiber-optic cable using media converters.

11.1.3. It is a stringent requirement of this contract that no cable shall be bare and exposed and all cable, indoors and outdoors, installed between cabinets containing equipment or between equipment shall be installed in electro galvanized conduit or in flexible stainless steel tubing.

11.1.4. Final connections in flexible tubing from the nearest draw box to equipment shall be as short as possible to eliminate tampering.

11.1.5. Conduit systems for wiring installation shall consist of electro-galvanized conduit and draw boxes of 20mm or 25mmØ and conduit shall be mounted on surface of brick or concrete on galvanized spacer saddles installed at distances of not more than 1,5m apart. The spacing of saddles shall be planned properly on site and the end-of-conduit-run saddles shall be installed very close to the end of the conduit or very bear any off-set of the conduit at draw box conduit entries.

11.1.6. Saddles shall be fixed to concrete or brick with small expanding bolts.

11.1.7. Conduit systems shall be completed from end to end before cable is draw in and conduits and draw boxes shall be clean before wiring or cabling is installed.

11.1.8. All fiber and CAT6 testing documentation and as-built drawings shall be submitted by the data cabling contractor as part of the handover / commissioning process as well as the cabling manufacturer warranty issued for the site, upon completion.

11.1.9. All CAT6 cable shall be terminated in quality RJ45 outlets. All CAT6 cabling and associated components shall be of the same reputable brand.

11.1.10. End splices of fiber optic cable shall be complete with pigtails and fiber optic pigtail plugs.

11.1.11. Mylar shielded cable and Ethernet cable shall be installed in separate conduit runs and shall not be installed together in conduits and shall also not be installed together with 230V power cable in a single conduit run.

11.1.12. Mylar shielded instrumentation cable in this contract shall be utilized for equipment such as door controllers, card readers and card reader system controls and other networking purposes.

Refer to clause "10 Mylar Cable" for the specification_237 of Mylar shielded cable.

11.1.13. CAT 6 Ethernet cable in this contract shall be used for connection of cameras to Ethernet switches (POE) internal rack connections of digital recording equipment to switches and system control cards to Ethernet

switches. Ethernet cable shall also be used on both ends of fiber optic cable via media converters for connections to outdoor pole mounted cameras.

11.1.14. Optic Fiber Cable (OFC) in this contract shall comply with the requirements of clause "13 Optic Fiber Cable" herein and shall be used for installation between buildings on a site and between buildings on a site to field equipment such as cameras in outdoor substations. OFC shall be terminated in housings, patch panels and cubicles using appropriate termination equipment, plugs and pigtails. OFC outside buildings shall be installed in underground sleeves.

11.1.15. Single runs of OFC shall be mounted in a conduit and draw box system on surface in building structures. Galvanized metal trucking may be used where more than one OFC is installed on the same main OFC route. OFC may be installed together with power cable in the same conduit, underground sleeve or trucking route.

11.1.16. Fiber optic cable splice boxes shall be of the 24 port ST panel type

Refer to clause "13 Optic Fibre Cable" for fibre optic cable specifications_ 237.

11.1.17. No cable may be mounted open internally to a building or externally to a building.

11.1.18. No conduit or trucking may be installed externally on buildings.

11.1.19. Conduit and draw box systems shall be terminated at both ends of a run in the cabinet, panel or housing. Conduit shall not be stopped short of such a termination so that cable is not exposed, even for a short distance. The last section of cable from a draw box to any device shall be housing in metal spiral tubing where conduit cannot be terminated in the device itself i.e. cameras and PIR's.

11.1.20. The cost for draw-boxes shall be covered in the Contractors priced unit rates for conduit.

11.1.21. Instrumentation cable ends in cabinets or housings shall be kept as short as possible.

11.2. Racks for Equipment

11.2.1. Racks (cabinets) in this Contract shall be of the 19", 42u x 600 x 1000mm deep type complete with 4-way, 10-way rack mounted PDU, bottom gland plate and perforated doors.

11.2.2. Floor standing cabinets shall be with either a glass- or steel door. The type of door to be provided shall suite the conditions on site.

11.2.3. It can be accepted that substation rooms and depots shall have steel doors with dust proof door seals.

11.2.4. 12 U Swing frame, wall mounted cabinets will be used in locations requiring remote cabinets. These will be linked to the main data cabinet with CAT 6 cable or OFC.

11.2.5. Cabinets shall be of the totally enclosed type (no open sides) and manufactured to the international standards on CNC machinery before being powder coated to a thickness of 70 Microns.

11.2.6. Cabinets shall consist of components which can be assembled on site. Components shall be in the form of separate side panel, rear panel, top panel, bottom panel and doors. Doors shall be fitted with lockable swing out handles.

11.2.7. Steelwork shall be 1,2mm mild steel and powder coated. Steelwork shall be properly phosphate before powder coating. Side and back rails shall be of the same type and finish as the casing of the cabinet.

11.2.8. The cabinet shall rack mount rails shall be 450, 85 mm apart and shall be the full height of the cabinet. These shall be installed both in the front and back of the cabinets. A 42U rack shall have an internal rack unit height dimension of 1866 mm.

11.2.9. Cabinet design shall allow for easy access for adjustments (front, back and sides), space saving door utilization, conveniently placed cable ducts and easy cable entry and exit points of the cabinet allowing for a smooth and friendly installation experience.

11.2.10. The rack shall a 10 way rack mounted PDU power distribution to supply 230VAC to network equipment and switches. The PDU in the stack shall be shared as a common resource among all the switches.

11.2.11. The video recording equipment, Ethernet switches and system controllers and the applicable power supplies, together with all apparatus for such equipment will be mounted in racks.

11.2.12. The positions of racks are shown on the layout drawings accompanying this specification.

11.3. Ethernet Switches

11.3.1. Ethernet switches shall be of the 24 SFP port, 10/100Mbps, and be suitable for Power over Ethernet (POE+) use.

11.3.2. The switch shall be full IEEE 802.3at (POE+) networking protocol compliant and shall support IPv4 and IPv6 routing.

11.3.3. The switch shall be suitable for a single universal IOS image across all license levels for an easy upgrade path for software licenses.

11.3.4. Software support for IPv4 and IPv6 routing, multicast routing, modular quality of service (QoS), Flexible Net Flow (FNF), and enhanced security features shall be included.

11.3.5. Fiber modules are specified further herein.

11.3.6. The necessary stacking kit shall be supplied with each switch. The stacking cables shall have a bandwidth of 480Gbps.

11.3.7. Racks are specified in clause "14 Metal Enclosures" hereof.

Copper Ports:	24 10/100 Mbps data PoE+
Power:	Dual redundant, modular and three modular fans providing redundancy
PoE:	Full IEEE 802.3at (PoE+) with 30W power on all copper ports in 1 rack unit
Protocol:	Software support for IPv4 and IPv6 routing, multicast routing, modular quality of service (QoS)
	Single universal IOS Software image across all license levels, providing an easy upgrade path for software features
Warranty:	Enhanced limited lifetime warranty (E-LLW) with next business day (NBD) advance hardware replacement and 90- day access to Technical Assistance Centre (TAC) support
Network Modules:	4 x Gigabit Ethernet with Small Form-Factor Pluggable (SFP) receptacles
Temperature:	Operating: -40 - 75˚C

Storage:	-40 - 75˚C
Humidity:	Operating: 5 - 95% (Non-condensing)
Storage:	5 - 95% (Non-condensing)
Locally Supported:	Yes

11.3.8. Fiber optic network modules are required in this contract for fiber optic cable connections to the Ethernet switches specified earlier herein.

11.3.9. The module shall have a dual color LED indicator beneath each slot which shall give the following indications:

a) Off - Link is off

b) Green - Link is on, no activity

c) Blink Green - Activity on link, no faults

d) Blink Amber - Link is off due to a fault or because it has exceeded a limit set in the switch software

e) Amber - Link to the SFP is disabled

11.3.10. Link faults shall occur when non-compliant cabling is connected to an SFP port.

11.3.11. The module shall fit network switch and shall lock in when fully inserted.

11.3.12. Proper wrist earth straps shall be used by the Contractor when installing or removing equipment from the rack.

11.4. Fiber to Copper Converters

11.4.1. The fiber to copper converters for this Contract shall be of the 1000Mbps, Gigabit, Single-mode type media converter LC type.

11.4.2. The converter shall transparently convert to/from 1000Base-T Ethernet signals and 1000Base– LX optical signals to extend an Ethernet connection over a Single-mode Fiber backbone.

11.4.3. The converters shall be used in positions at the Ethernet switch on both side of the Single mode fiber cables between buildings on a Depot site or between an indoor substation Ethernet switch and an outdoor Ethernet switch in a cabinet at the poles in an outdoor substation for PTZ camera signal routing back to the video recorder in the 42U Data Cabinet.

12. MARKING AND LABELLING

12.1. Alarm system

Alarm system components shall be legibly and indelibly marked with the following information:

(a) The manufacturer's name, trademark or trade name.

(b) A serial number.

(c) The rated supply voltage and frequency as well as the rated power.

(d) When relevant, the terminals shall be identified by means of numbers, colours or other means.

(e) Output voltage at minimum input voltage, for no load and full load

(f) Output voltage at maximum input voltage, for no load and full load.

12.2. Manufacturer's specification

A detector, controller, power unit and communication unit shall be supplied together with the following information on or in the packaging:

(a) Performance characteristics

(b) Power supply requirements

(c) Wiring and mounting instructions

(d) Output ratings

(e) Instructions for adjustment, including specification for any special tools required

(f) Advice on maintenance and servicing

(g) Advice on how to avoid inappropriate use and potential false operation of the detector and alarm system

(h) The worst case output ripple voltage over the full range of input voltages and output currents.

(i) If the power unit incorporates control and indicating equipment, then the following shall be indicated:

(j) Output voltage at the power supply interface to the rest of the alarm system at maximum and minimum input voltages.

(k) Maximum continuous current that shall flow to the rest of the alarm system.

(l) With a secondary battery, indicate the time taken to switch from the mains supply to the battery supply in the event of a power failure.

13. WIRING

City Power requires all installation and configuration shall follow drawing CP_TSDRAW_100

14. INSPECTION AND TEST METHODS

14.1. Inspection

Visually examine each component of the alarm system in the sample for compliance with all the relevant requirements as stipulated in the specific alarm system specification.

14.2. Test conditions

Carry out the tamper and operating voltage tests in SABS 2220-1.1 under testing conditions as specified in SABS 2220-1.8. If the alarm system has more than one detector and a detector has more than one sensor, carry out the tests on only one sensor.

14.3. Test equipment and tools

A list of recommended equipment and tools needed for onsite and workshop maintenance shall be provided by the suppliers. Recommended test equipment shall be made detailing the required test equipment specification and not merely quoting a particular manufacturer's model number.

14.4. Documentation

The supplier shall provide documentation detailing the following:

14.4.1. Electrical and mechanical specifications and parameters for the equipment.

14.4.2. Wiring diagrams of the equipment.

14.4.3. Installation, commissioning and maintenance procedures.

15. INSTALLATION

Installation shall follow the outline draws on CP_TSDRAW_100

16. WARRANTY

- Contractor warrants that all work furnished (material and labour) under this contract will be of good quality, free from faults and defects.
- Contractor shall provide a parts and labour guarantee on all work, unless otherwise specified herein, Contractor guarantee shall be for a period of one years from date of acceptance, except where any specific guarantees from a supplier or equipment manufacture extends for a longer time.
- Contractor guarantee shall cover all costs associated with troubleshooting, repair, and replacement of defective work, including cost of labour, transportation, lodging, materials, and equipment.
- The Contractor shall perform manufacturer's recommended preventative maintenance on all applicable components and/or devices.
- Guarantee shall not cover any damage to material or equipment caused by accident, misuse, unauthorized modification or repairs by City Power.
- The Contractor shall guarantee that the application software/firmware remains current at all times with the latest enhancements; supported by the manufacturer with technical support.
- Contractor shall promptly respond to City Power's requests for service during the guarantee period. Contractor shall provide repair service as soon as reasonably possible upon request from City Power, but in no case shall service response exceed eight (8) hours from time of request.
-

17. QUALITY MANAGEMENT

A quality management plan shall be set up in order to assure the quality of during design, development, production and servicing. Guidance on the requirements for the services quality management TPVS may be found in the following standards: ISO 9001:2015. The details shall be subject to agreement between the purchaser and supplier.

18. HEALTH AND SAFETY

A health and safety plan shall be set up in order to ensure proper management and compliance of the Intruder detection and deterring system. Guidance on the requirements of a health and safety plan may be found in OHSAS 45001:2018 standards. This is to ensure that the services provided conforms to standard operating procedures and City Power SHERQ Policy. The details shall be subject to agreement between City Power and the Supplier.

19. ENVIRONMENTAL MANAGEMENT

An environmental management plan shall be set up in order to ensure the proper environmental management and compliance of the Intruder detection and deterring system (i.e. during design, development). Guidance on the requirements for an environmental management TPVS may be found in ISO 14001:2015 standards. The details shall be subject to agreement between City Power and the Supplier. This is to ensure that the asset created conforms to environmental standards and City Power SHERQ Policy.

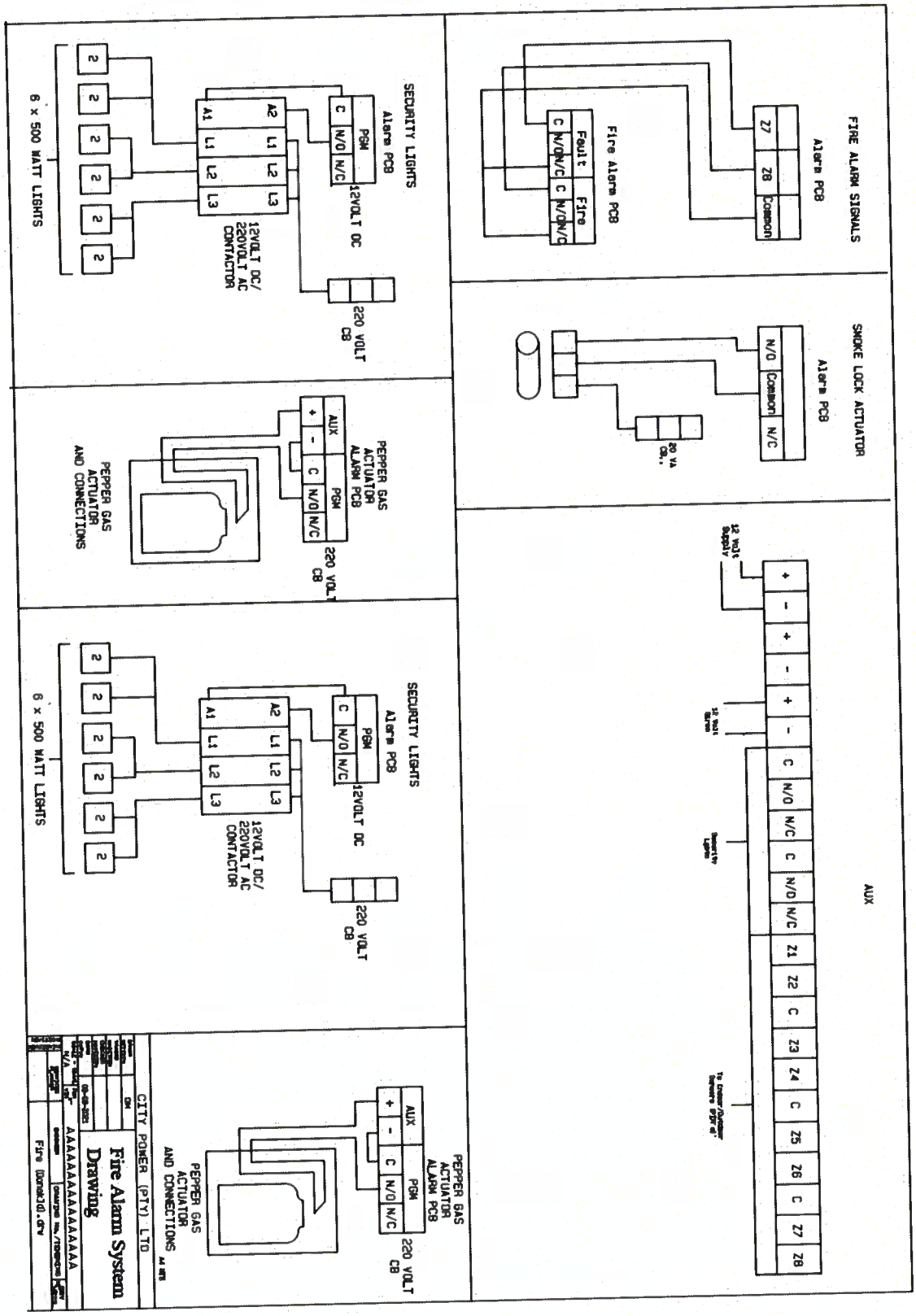
ANNEX A- BIBLIOGRAPHY

None

ANNEX B - REVISION INFORMATION

MARCH 2022	0	First issue

ANNEX C – DRAWING



ANNEX D - ITEM NO 1

Technical Schedules A & B

Schedule A: Purchaser's specific requirements
Schedule B: Guarantees and technical particulars of equipment offered

Item	Sub-clause CP_TSSPEC -317	Description	Schedule A	Schedule B
1		**General Requirements**		
1.1	5.1	System availability	> then 98%	
		System dependability	> then 95%	
		System reliability	> then 95%	
1.2	5.2	**Operating conditions**		
		Altitude	0m to 2500m	
		Temperature	-30°C to 50°C	
		Diurnal range	30°C	
		Humidity	All weather operation	
		Barometric pressure	76 to 104kPa	
		Pollution level	III for outdoor components	

Note: Ticks, Cross [√, X], Astrick [*], Word [Noted] or TBA ["To Be Advice"] will not be accepted

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Name in block letters Signature

Full name of company: _____

ANNEX D - ITEM NO 1

Technical Schedules A & B

Schedule A: Purchaser's specific requirements
Schedule B: Guarantees and technical particulars of equipment offered

Item	Sub-clause CP_TSSPEC -317	Description	Schedule A	Schedule B
2				
2.1	**6.1**	**General requirements**		
	6.1.1	Reliability	> then 95%	
	6.1.2	Interface capability	Required	
	6.1.3	Accessibility	Required	
	6.1.4	Alarm period	2 minutes	
	6.1.5	Corrosion resistance	Required	
	6.1.6	Communication	Required	
	6.1.7	Earthing	Required	
2.2	**6.2**	**Functional requirements**		
	6.2.1	Operating voltage		
		(a) An alarm condition shall be generated by the alarm system if the supply voltage or the battery voltage falls below the minimum operating voltage of the circuit.	Required	
		(b) A detector tested in accordance with SANS 2220-1.1	Required	
		(c) When an event occurs in the field, an alarm or notification shall be sent automatically to the remote control and monitoring centre.	Required	
		(d) The system shall perform an integrity polling every twelve hours to update the status, any abnormality shall be identified, flagged and registered as alarms.	Required	
		(e) The system shall come with a remote control functionality to enable remote operation by control centre	Required	

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Deviation schedule

Any deviations from this specification shall be listed below with reasons for deviation. In addition, evidence shall be provided that the proposed deviation will at least be more cost effective than the specific by City Power.

Item	Sub-clause CP_TSSPEC-317	Proposed deviation

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ANNEX D - ITEM NO 2

Technical Schedules A & B

Schedule A: Purchaser's specific requirements
Schedule B: Guarantees and technical particulars of equipment offered

Item	Sub-clause CP_TSSPEC -317	Description	Schedule A	Schedule B
2.2	6.2.2	The following alarms or events shall be monitored and recorded:		
		(a) GPS location	Required	
		(b) Communication status or level	Required	
		(c) Front Door Open/close	Required	
		(d) Door open or close, where applicable	Required	
		(e) Power On/Off	Required	
		(f) Intruder Alarms	Required	
		(g) Door open for too long	Required	
		(h) Battery low or battery level	Required	
		(i) Vibration or Temper alarm.	Required	
		(j) Last communicated time stamp	Required	

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ANNEX D - ITEM NO 2

Technical Schedules A & B

Schedule A: Purchaser's specific requirements
Schedule B: Guarantees and technical particulars of equipment offered

Item	Sub-clause CP_TSSPEC -317	Description	Schedule A	Schedule B
2.3	**6.2.3**	**Tamper protection**		
		(a) It shall not be possible to alter the condition of the enclosure or the detector, or to change the existing area of detection without causing an alarm condition.	Required	
		(b) It shall not be possible to gain access to the electrical circuits adjust controls and tamper with the device without the tamper device causing the detector to generate an alarm signal.	Required	
		(c) It shall not be possible to interfere with the operation of the detector by disconnecting the circuit of the detector system.	Required	
		(d) It shall not be possible to disable the tamper devices using normally available tools such as knives or screwdrivers.	Required	

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ANNEX D - ITEM NO 3

Technical Schedules A & B

Schedule A: Purchaser's specific requirements
Schedule B: Guarantees and technical particulars of equipment offered

Item	Sub-clause CP_TSSPEC -317	Description	Schedule A	Schedule B
3.	7.1	Power supply	10 V dc 60 000 h Operating life 12months	
	7.2 7.3	Secondary battery Power unit enclosure	Ambient temperature 40 °C < 80°C	
	8	**CONTROLLER**		
	8.1	General Requirements		
	8.2	**Controller**		
	8.3	a) Data storage capacity.	1000 actions /one month 60 000h	
	8.2	b) Expected lifetime.	xxx	
	8.2	c) Number of alarm input connection points.	xxx	
	8.4	d) Number of alarm output connection points.	xxx	
	8.4	e) Method of interface with communication unit.	test while mounted	
		f) Accessibility for electrical tests.	Yes/No	
	8.2	g) Interface for access control provided.	1s	
	8.2	h) Maximum controller transaction time.	Required	
	8.2	i) Real time clock with h, m, s, day and month.	Required	
	8.2	j) Pass word required to change settings.	Required	
		k) Interface for CCTV provided.		

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ANNEX D - ITEM NO 3

Technical Schedules A & B

Schedule A: Purchaser's specific requirements
Schedule B: Guarantees and technical particulars of equipment offered

Item	Sub-clause CP_TSSPEC -317	Description	Schedule A	Schedule B
3	**8**	**CONTROLLER**		
	8.3	Reliability	> then 98%	
	8.4	Accessibility	Required	
	8.5	Environmental Requirements SANS 2220-1.8 and SANS 0222-2.4	Required	
	8.6	Off-line operation (a) As a stand-alone system, the alarm system controller shall be able to store all the substation security system data and parameters to cover at least 1000 transactions or one month. When communication is restored, all transactions shall be uploaded to the security control room. (b) Provision shall be made for repeating of any corrupted message between the substation security system and the central processor as well as between the central controller and the security control room.		
	8.7	Battery back-up		
5	**9**	**COMMUNICATION UNIT**		
	9.1	General Requirements		
	9.2	Environmental		
	9.3	Electromagnetic compatibility (a) Immunity requirement EN 300 386-2 of ETS 300 386-1 and the corrigendum if 1997. (b) EN500 82-2		
	9.4	Signal Performance	range < 50km	
	9.5	Alarms		

	9.6	Antennae and feeder cables		
	9.6.1	Recurrence interval of wind	1 in 50 yrs	
	9.6.2	terrain category	2 class B	
	9.6.3	Altitude	Up to 2500m	
	9.6.4	Gust profile	3 sec	

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Item	Sub-clause CP_TSSPEC-317	Proposed deviation

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ANNEX D - ITEM NO 4

TECHNICAL SCHEDULES A & B:

Schedule A: Purchaser's specific requirements
Schedule B: Guarantees and technical particulars of equipment offered

Item	Sub-clause CP_TSSPEC-317	Description	Schedule A	Schedule B
4.	10.2	**Intrusion IO Card**		
4.1.		Primary Power (DC) The ICM is for use in low voltage, power-limited, class 2 circuits only	Required	
		DC Input	24 VDC ±15%. 350 mA	
4.2		**Environmental**		
		Temperature °C	Operating: 0 - +70	
		Humidity	0 to 95% RHNC	
		Approvals	UL 294 and 1076-listed, CE-marked, ROHS compliant	
		Locally Supported	Yes	

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Full name of company: _____

DIGITAL INPUT CONTROL MODULES

Deviation Schedule

Any deviations offered to this specification shall be listed below with reasons for deviation.In addition, evidence shall be provided that the proposed deviation will at least be more cost-effective than that specified by City Power.		
Item	**Sub Clause of CP_TSSPEC_317**	**Proposed deviation**

Note: Ticks, Cross [√, X], Astrick [*], Word [Noted] or TBA ["To Be Advice"] will not be accepted

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ANNEX D- ITEM NO 5

Technical Schedules A & B:

Schedule A: Purchaser's specific requirements

Schedule B: Guarantees and technical particulars of equipment offered

Item	Sub-clause CP_TSSPEC -317	Description	Schedule A	Schedule B
5.	10.3	**Alarm Keypad**		
5.1.		**Primary Power**		
		Voltage	24 VDC ±15%	
		Current	175 mA terminal only	
5.2.		**Reader**		
		Power	Pass-through	
		LED Control -non-regulated	Required	
		Buzzer Control	2-wire or 1-wire bicolor LED	
		Interface	Available with 1-wire LED control 2-wire RS-485, or Wiegand	
5.3.		Environmental		
		Operating Temperature °C	0 - 50	
		Storage Temperature °C	-20° - 70	
		Humidity	0% to 95% RHNC	
5.4.		Physical		
		Mounting: Surface-mount or 3-gang box.	Required	
5.5.		Technology		
		Communication:RS-485: up to 1219m max, 24 AWG, 100ohm impedance Wiegand: up to 152m max, 18 AWG stranded wire	Required	
7.6.		Approvals	FCC approved,UL-listed, CE-marked	
7.7.		Locally Supported	Yes	

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Deviation Schedule

Any deviations offered to this specification shall be listed below with reasons for deviation. In addition, evidence shall be provided that the proposed deviation will at least be more cost-effective than that specified by City Power.		
Item	**Sub Clause of CP_TSSPEC_ 317**	**Proposed deviation**

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ANNEX D- ITEM NO 6

TECHNICAL SCHEDULES A & B:

Schedule A: Purchaser's specific requirements
Schedule B: Guarantees and technical particulars of equipment offered

Item	Sub-clause CP_TSSPEC-317	Description		Schedule A	Schedule B
6.	10.5	**PIR**			
6.1.		Detection Range	m	Coverage diameter of 9.3 at 6.3 mounting height	
6.2.		Optics		Fresnel lens	
6.3.		Power supply	VDC	9 to 15	
6.4.		Current consumption (nom.)	mA	8.7	
6.5.		Alarm relay		<24 VDC, 50mA, NC	
6.6.		Tamper relay		<24 VDC, 50mA, NC	
6.7.		Target speed range		30cm/s to 3m/s	
6.8.		Ambient conditions	°C	-10 to +55	
6.9.		Relative humidity (max)	%	95	
6.10		IN50131-2-2		Grade 2	
6.11		UL/CUL variant		Available/Required	
6.12		Locally Supported		Required	

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Deviation Schedule

Any deviations offered to this specification shall be listed below with reasons for deviation.In addition, evidence shall be provided that the proposed deviation will at least be more cost-effective than that specified by City Power.		
Item	**Sub Clause of CP_TSSPEC_317**	**Proposed deviation**

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Full name of company: _____

ANNEX D - ITEM NO 7

TECHNICAL SCHEDULES A & B:

Schedule A: Purchaser's specific requirements
Schedule B: Guarantees and technical particulars of equipment offered

Item	Sub-clause CP_TSSPEC-317	Description	Schedule A	Schedule B
7.	11.3	**Ethernet Switch:**		
7.1.		Copper Ports:	24 10/100 Mbps data PoE+	
7.2.		Power: Dual redundant, modular power supplies and three modular fans providing redundancy	Required	
7.3.		PoE: Full IEEE 802.3at (PoE+) with 30W power on all copper ports in 1 rack unit	Required	
7.4.		Protocol: Software support for IPv4 and IPv6 routing, multicast routing, modular quality of service (QoS).	Required	
7.5.		Single universal Cisco IOS® Software image across all license levels, providing an easy upgrade path for software features	Required	
7.6		**Warranty:** Enhanced limited lifetime warranty (E-LLW) with next business day (NBD) advance hardware replacement and 90-day access to CSICO Technical	Required	
		Assistance Centre (TAC) support	24 PoE+ 435W	
7.7.		**Network Modules:** 4 x Gigabit Ethernet with Small Form-Factor Pluggable (SFP) receptacles	Required	
7.8		<u>Environment:</u> Operating Temperature: °C	-40 – 75	
7.9		Storage Temperature: °C	-40 – 75	
7.10		Humidity: %	Operating: 5 - 95 (Non-condensing)	

7.11		Locally Supported:	Storage: 5 - 95(Non-condensing) Yes	

Note: Ticks, Cross [√, X], Astrick [*], Word [Noted] or TBA ["To Be Advice"] will not be accepted

Tender Number: _____

Tenderer's Authorised Signatory: _____

Name in block letters Signature

Full name of company: _____

Deviation Schedule

Any deviations offered to this specification shall be listed below with reasons for deviation.In addition, evidence shall be provided that the proposed deviation will at least be more cost-effective than that specified by City Power.		
Item	**Sub Clause of CP-TSSPEC-317**	**Proposed deviation**

Note: Ticks, Cross [√, X], Astrick [*], Word [Noted] or TBA ["To Be Advice"] will not be accepted

Tender Number: _____

Tenderer's Authorised Signatory: _____
Name in block letters Signature

Full name of company: _____

ANNEX D- ITEM NO 8

TECHNICAL SCHEDULES A & B

Schedule A: Purchaser's specific requirements
Schedule B: Guarantees and technical particulars of equipment offered

Item	Sub Clause of CP-TSSPEC-317	Description	Schedule A	Schedule B
8	SANS	**Testing**		
	2220:1.8	a) Alarm system environmental training.	Test report number	
	2220:1.2	b) Active infrared detectors (if used).	Test report number	
	2220:1.5	c) Passive infrared detector.	Test report number	
	2220:1.7	d) Power unit.	Test report number	
		e) Access control (if used).	Test report number	
		f) Communication system.	Test report number	
		g) CCTV (if used)	Test report number	

Note: Ticks, Cross [√, X], Astrick [*], Word [Noted] or TBA ["To Be Advice"] will not be accepted

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Deviation Schedule

Any deviations offered to this specification shall be listed below with reasons for deviation. In addition, evidence shall be provided that the proposed deviation will at least be more cost-effective than that specified by City Power.		
Item	**Sub Clause of CP_TSSPEC_317**	**Proposed deviation**

Note: Ticks, Cross [√, X], Astrick [*], Word [Noted] or TBA ["To Be Advice"] will not be accepted

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ANNEX E

Non stock item