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FOREWORD

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1 INTRODUCTION

The Video surveillance or closed circuit television (CCTV) and accompanying equipment forms a strategic part of City Power's Risk and Security management. The purpose of the equipment is to control and monitor activities at various City Power sites and to assist with emergency procedures for certain instances.

2 SCOPE OF WORKS

This specification covers City Power's requirements for the supply, installation, intergrade, programming to the remote site, testing and commissioning of CCTV at various premises of substations which entails the required hardware, software and accessories.

3 NORMATIVE REFERENCES

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 are encouraged to investigate the possibility of applying the most recent editions of the documents listed below.

SANS 10222-1:2013	Electrical security installations Part 1: General
SANS 10222-5-1-1	Electrical security installations Part 5-1-1: CCTV installations — CCTV surveillance systems for use in security applications — Operational requirements
SANS 10222-5-1-2	CCTV installations — CCTV surveillance systems for use in security applications — System design requirements
SANS 10222-5-1-3	CCTV installations — CCTV surveillance systems for use in security applications — Installation, planning and implementation requirements
SANS 10222-5-1-4	CCTV installations - CCTV surveillance systems for use in security applications — Testing, commissioning and hand-over requirements
SANS 10222-5-1-5	CCTV installations — CCTV surveillance systems for use in security applications — Maintenance requirements
CP_TSSPEC_237	Specification for Integrated Security Systems
ISO 14001:2015	Environmental Management System
OHSAS 18001-2007	Occupational Health and Safety Assessment

4 DEFINITIONS AND ABBREVIATIONS

Definitions

4.1. APERTURE NUMBER Of The LENS f index of the theoretical light gathering power of the lens, expressed as the ratio of the effective diameter of the lens (entrance pupil) to the focal length of the lens

4.2. CCTV camera unit that contains an imaging device that produces a video signal from an optical image

4.3. CCTV surveillance system: system that consists of one or more CCTV cameras, monitoring and associated equipment for transmission and controlling purposes, which might be necessary for the surveillance of a defined security zone

4.4. CCTV camera unit that contains an imaging device that produces a video signal from an optical image

4.5. CCTV camera equipment unit that contains a CCTV camera plus an appropriate lens and the necessary ancillary equipment

4.6. CCTV control unit equipment used to control and monitor the required operational functions of CCTV system

4.7. CCTV (surveillance) installation that consists of the hardware and software components of a CCTV system, that is fully installed and operational and that is used for monitoring a defined security zone

4.8. CCTV (surveillance) system that consists of camera equipment plus any monitoring and associated equipment for transmission and controlling purposes that might be necessary for the surveillance of a defined security zone

4.9. Focal length f distance, in millimeters, between the secondary principle point (plane) in the lens and the location (plane) in space where the image of a distant scene or object is focused. The longer the focal length, the narrower the angle of view

4.10. PoE Power over Ethernet (Ethernet cables)

4.11. PTZ Pan–tilt–zoom camera

Abbreviations

4.12.	CCD	Charge-coupled device
4.13.	CCIR	Comité Consultatif International des Radio communication (International Radio Consultative Committee)
4.14.	CCTV	Closed-circuit television
4.15.	dB	decibel
4.16.	OFC	Optical Fiber Cable
4.17.	PoE	Power over Ethernet (Ethernet cables)
4.18.	PTZ	Pan–tilt–zoom camera
4.19.	VCR	Video cassette tape recorder
4.20.	VHS	Video home system

5 ATTRIBUTES OF THE OPERATIONAL REQUIREMENTS DOCUMENT

The operational requirements document shall have attributes, which enable it to

a) Be applicable to any size or type of system at any time of its life, from initial concept to review,
b) Provide a framework for discussion and collation of the views of all the stakeholders,
c) Identify the role that CCTV will play in the overall security strategy,
d) Identify relevant and realistic performance goals,
e) Define key factors to be included in a test specification and act as a reference point for the analysis of test results,
f) Expose conflicts of opinion, especially in multi-agency schemes,
g) Allow priorities to be set for the acquisition, implementation and operation of the CCTV surveillance system,
h) Allow intergradation with existing software, hardware and or licensing issues
i) Identify future needs for system expansion at the outset,
j) Provide a basis for planning, phased implementation and investment appraisal,
k) Separate operational decision-making from technical decision-making, reassure, through commissioning tests and routine audits, that performance is linked to current or anticipated needs, and
l) Provide an audit trail for decision-making.

6 SYSTEM DESIGN CRITERIA

When designing a CCTV surveillance system installation, the following criteria shall be taken into account, bearing in mind the need to meet the operational requirement:

a) Determination of the zones or objects that require surveillance;
b) Determination of the number of cameras, and their locations, required to monitor the agreed zones or objects;
c) Evaluation of existing lighting and consideration of new or additional illumination;
d) Selection of cameras and equipment, depending on the environmental operating conditions;
e) Control-point configuration;
f) Power supplies;
g) Determination of functional and operating procedures; and
h) Maintenance.

The determination of the zones or objects to be covered by the CCTV system will be provided by the operational requirement document (see SANS 10222-5-1-1). All other aspects of the abovementioned criteria shall be considered by the designer or specifier of the complete CCTV system.

7 EXTENSIONS

To remain efficient, the alarm services initially installed in a building may from time to time require extensions or modifications (or both) during the life of the building.

Careful consideration shall therefore be given at an early stage to the size and layout of ducts, chases, etc., so that they may (as far as can be foreseen) provide for such extensions and modifications with an adequate degree of flexibility.

Ease of maintenance and adequate protection against mechanical damage and unauthorized interference are also of importance. In allocating the space required for control, indicating and power supply equipment, it is necessary to ensure easy access to such equipment for maintenance purposes.

8 CCTV

The CCTV installation shall consist of IP cameras, digital video recorders, camera power supplies, Ethernet cables (PoE), and mounting racks as all stipulated further herein. Where cameras are mounted in or on building structures, they shall have IP based communication over Ethernet and shall be powered via POE.

9 EQUIPMENT OVERVIEW

NOTE This clause provides an overview of the individual items of equipment that comprise a CCTV system with regard to fundamentals of operation and the terms used to specify operational performance.

9.1 CAMERAS

9.1.1 GENERAL REQUIREMENTS

Cameras shall be securely fixed to buildings structures using small expanding type bolts. Where pole mounted cameras are installed on poles in outdoor applications a cross-arm mounting shall be used. The cross-arm shall have a steel strap, which bolts to a U-bracket with at least 2 x M10 bolts, washers and nuts around the top of the pole. Brackets for cameras shall consist of a wall or arm bracket, shall be manufactured from sturdy cast aluminum, and shall include internal cable wire management. Brackets shall be suitable to withstand rugged environments. Bracket shall be supplied and installed with cameras to suite pole-, corner-, or roof mounting as may be required for the particular position where the camera is to be mounted. Brackets shall further be powder coated and shall be fixed with stainless steel bolts and nuts in steel cross arms or with electro galvanized expanding fixings in to brick or concrete.

Specialized stainless steel camera brackets will be used for external PTZ cameras mounted onto buildings. These brackets will extend the camera 1m from the building to give unrestricted 360° viewing. These specialized brackets are adjustable and can swing to the sides for easy maintenance.

Camera domes shall be stand-of bracket mounted in buildings and on steel cross-arm brackets when

pole mounted. Fiber-optic cable shall be used to connect to outdoor, pole mounted units. The OFC shall be installed in conduit to the outside of the building and then via manholes and 50mm Ø uPVC sleeves in ground to a distribution box at the pole where the cameras are required. The OFC shall have fiber to copper converters at both end of the OFC run.

Ethernet cable to outdoor cameras on or in buildings shall be installed in 20mm or 25mm Ø electro galvanized conduits and draw boxes internally to buildings from the POE switch enclosure to an outlet box on the inside of the building. Where there is no direct access to the cable-managed bracket the Ethernet cable shall be installed in flexible spiral steel tubing to the camera.

Each Camera shall be equipped with A USB Connection to enable direct USB connection and a micro SD memory card slot. The USB connection shall also be used for A USB Wi-Fi adapter connection.

All cameras selected shall have full integration into the existing Network Video Recording system.

The following standard types of cameras are utilized:

9.1.1.1 Perimeter cameras

9.1.1.2 Door / gooseneck cameras

9.1.1.3 Vehicle license cameras

9.1.1.4 Passage / office cameras (Dome housing)

9.1.1.5 PTZ cameras

9.1.1.6 Special Temperature sensing cameras

9.1.1.7 Fisheye (360 O degree) Camera

9.1.1.8 Thermal Camera

9.1.1.9 Wireless Cameras

The above cameras shall comply with the minimum requirements as detailed in the paragraphs to follow.

9.1.2 PERIMETER CAMERA

The perimeter cameras shall conform to the following minimum requirements:

Type:	Outdoor Fixed Network Camera
Lens - Standard:	Minimum of F1.3, IR corrected, Megapixel resolution, P-Iris
Lens - Telephoto:	12.5-50 mm Telephoto Lens, P-Iris, F1.4
Resolution:	1080p 25/30 fps (WDR): 1920x1080 to 160x90Lightfinder and WDR
Light Sensitivity:	Colour: 0.18 lux, B/W: 0.04 lux, F1.3 HDTV 1080p 50/60fps: Colour 0.36 lux, B/W: 0.08 lux, F1.3
Operating temperature:	-40 °C to 50 °C
Casing:	IP66 rated

Analytics:	Cross Line Detection (tripwire), Video Motion Detection

9.1.3 DOOR (GOOSENECK & GENERAL OVERVIEW) CAMERA

The door cameras shall conform to the following minimum requirements:

Type:	Outdoor Fixed Network Camera with IR illumination
Lens:	Minimum of Fixed iris, Megapixel resolution, IR corrected 2.8 mm,F2.0
Light Sensitivity:	Colour: 0.8-100000 lux, F2.0, B/W: 0.16 lux, F2.0, 0 luxwith IR illumination on
Resolution:	720p 25 fps
Operating temperature:	-30 °C to 50 °C
Casing:	IP66 rated
Analytics:	Video Motion Detection

9.1.4 VEHICLE LICENSE CAMERA

The vehicle license cameras shall conform to the following minimum requirements:

Type:	Outdoor Fixed Network Camera with IR illumination
Lens:	Minimum of Varifocal, 3.0–10.5 mm, F1.4
Light Sensitivity:	Colour: 0.25 lux, F1.4 B/W: 0.05 lux, F1.4, 0 lux with IRillumination on.
Resolution:	720p 25 fps
Operating temperature:	-30 °C to 50 °C
Casing:	IP66 rated
Analytics:	Video Motion Detection

9.1.5 DOME CAMERA

The dome cameras shall conform to the following minimum requirements:

Type:	Fixed Dome Network Camera
Lens:	Minimum of F2.8, Fixed iris, Megapixel resolution 2.8 mm
Light Sensitivity:	1.5-100000 lux, F2.8
Resolution:	1280x800 to 320x240 25fps
Operating temperature:	0 °C to 45 °C
Housing:	IP42 rated
Analytics:	Video Motion Detection

9.1.6 DOME CAMERA LONG RANGE

The dome cameras shall conform to the following minimum requirements:

Type:	Fixed Dome Network Camera
Lens:	Varifocal, 3.0-10.5 mm, Minimum of F1.4
Light Sensitivity:	Colour: 0.25 lux, F1.4 B/W: 0.05 lux, F1.4
Resolution:	1920x1080 to 160x90 25fps
Operating temperature:	0 °C to 50 °C

Housing:	IP42 rated
Analytics:	Video Motion Detection

9.1.7 PTZ CAMERA

The PTZ cameras shall conform to the following minimum requirements:

Type:	PTZ Dome Network Camera
Lens:	f=4.3-129 mm, F1.6-4.7, Autofocus, Auto Iris, 58.3˚- 2.1˚view
Light Sensitivity:	Colour: 0.15 lux at 30 IRE F1.6 B/W: 0.008 lux at 30 IREF1.6
Resolution:	280x720 (720p) to 240x135, 25fps
Pan:	360° endless, 0.05-700°/s
Tilt:	+20 to -90° with nadir flip, 0.05-500°/s
Zoom:	30x Optical, 12x Digital, Total 360x zoom
Operating temperature:	50°C to +50°C
Wide Dynamic Range (WDR):	130 dB
Casing:	IP66 rated
Analytics:	Video Motion Detection, Auto Tracking

9.1.8 TEMPERATURE ALARM CAMERA FOR CONDITION MONITORING

The temperature alarm cameras shall conform to the following minimum requirements:

Type:	Temperature Alarm Camera
Camera Sensor:	Sunsafe, Uncooled Micro bolometer amorphous silicon
Array Format:	640 x 480 or 384 x 288 pixels
Spectral Response:	7.5 to 13.5 µm LWIR
Temporal NETD:	50 mK at f/1.0
Temperature Range:	-40°C to 50 °C
Power Supply:	24VDC
Housing:	IP66 rated

9.1.9 FISHEYE (360 O DEGREE) CAMERA

The fisheye (360 ° degree) cameras shall conform to the following minimum requirements:

Type:	Fisheye (360 ° degree) cameras
Field of View	Ceiling Mount: 360°; Wall Mount: 180°; Flat Mount: 360°
Light Sensitivity:	Colour: 0.18 lux, B/W: 0.04 lux, F2
Resolution	4000×3000 to 320×320 (max. 30 fps/25 fps)
Audio	Two way
Operating temperature:	-40 ºC to 50 ºC
Power Supply:	24VDC
Housing:	IP66 rated
Analytics:	Video Motion Detection, Auto Tracking

9.1.10 THERMAL CAMERA

Type:	Heat sensing to improve visibility
Lens:	Varifocal, 3.0-10.5 mm, Minimum of F1.4

Light Sensitivity:	Colour: 0.25 lux, F1.4 B/W: 0.05 lux, F1.4
Audio	Two way
Resolution:	1920x1080 to 160x90 25fps
Operating temperature:	-40 ºC to 50 ºC
Housing:	IP66/7 rated
Analytics:	Video Motion Detection, Auto Tracking

9.1.11 WIRELESS PTZ DOME

Type:	Wireless PTZ Dome Camera
Lens:	f=4.3-129 mm, F1.6-4.7, Autofocus, Auto Iris, 58.3˚- 2.1˚view
Light Sensitivity:	Colour: 0.15 lux at 30 IRE F1.6 B/W: 0.008 lux at 30 IREF1.6
Resolution:	280x720 (720p) to 240x135, 25fps
Pan:	360° endless, 0.05-700°/s
Tilt:	+20 to -90° with nadir flip, 0.05-500°/s
Zoom:	30x Optical, 12x Digital, Total 360x zoom
Operating temperature:	50°C to +50°C
Wide Dynamic Range (WDR):	130 dB
Casing:	IP66 rated
Analytics:	Video Motion Detection, Auto Tracking

Note: Temperature alarm cameras to run on separate stand-alone system.

9.1.12 CAMERA POWER SUPPLIES

Where cameras cannot be directly powered from a POE switch, a POE injector shall be provided. The two types of injectors are listed below:

a) 802.3af

Supply of 48VDC and up to 350mA so that the power initiated does not exceed 15.4W and the power that is delivered does not exceed 12.95W. It shall be supported on Category 6 cable.

b) 802.3at

Supply of 50.0–57.0 VDC and up to 600mA so that the power initiated does not exceed 30W and the power that is delivered does not exceed 25.5. It shall be supported on Category 6 cable.

The POE injectors for dome cameras shall be housed in a solid plastic enclosure with a screw down lid and a neoprene seal in a groove between the lid and the box.

The box shall have knock-outs for 20mm Ø cable glands.

A separate power supply shall be used for each camera.

The power supply shall comply with the following specifications:

Enclosure rating:	IP66
Operating temperature:	-40 °C – +40 °C

Power supplies shall be mounted in the power distribution box at the pole where cameras are mounted.

9.2 Video recorders

9.2.1 General

The video recorder required in this contract shall be of the 19" rack mount type and shall have an IP recording rate of 240Mbps.

The recorder shall operate with the latest Windows operating system, 64bit operating system and the necessary software to communicate with the existing City Power recording platform used for video streaming.

Recorders shall be supplied with power from the UPS cabinet specified further herein.
The recorder shall further have and comply with the following features and specifications:

9.2.2 Time-lapse recorders

A time-lapse recorder has the ability to record at different speeds, thus extending the overall recording periods. The recording periods can range from 3 h to 960 h. The 3 h, 6 h and 12 h mode records continuously at a slow speed. For recording periods longer than 12 h, the recording takes place in a step mode.

9.2.3 Typical features associated with time-lapse recorders

The following is a list of some typical features found in most time-lapse recorders:

a) Selectable recording mode: depending on the model, from 3 h to 960 h recording is possible;
b) Horizontal resolution: the ability to switch between colour and monochrome to provide higher resolution in monochrome;
c) Still frame: the ability to display a single frame for analysis;
d) Alarm recording: an alarm input will switch the recorder from a time-lapse mode (or standby mode) to 3 h real-time recording for a defined time
e) Alarm search: the ability to fast-forward until an alarm input is detected;
f) Time and date: this information can be superimposed on selectable parts of the screen;
g) Repeat record: at the end of the tape it can either stop or rewind itself and re-record;
h) Time and date search: the ability to fast-forward the tape to the required part based on the time and date;
i) End-of-tape alarm: either a local or remote alarm (or both) to alert a person that the tape end has been reached;
j) Programmable recording: to start or stop recording and set recording modes at specific times;
k) Battery backup: in the event of a power failure all main settings, such as time and date, programme recording, etc will be retained;
l) Clock output: output from an internal synchronization clock to a video switcher;
m) Series recording: at the end of the tape, an output signal will start another recorder to provide continuous recording;
n) One-shot recording: this allows the recorder to be set to record one frame at preset intervals;
o) Emergency recording: an external trigger signal will switch a recorder to the recording mode even if the power is off or the recorder is set in the stop position; and
p) RS-232 output: to enable the recorder to be interfaced to other equipment.

9.2.4 Video image/frame storage disk

The real-time or time-lapse video recorder provides the means for serially recording consecutive frames over a period of time. Even with time and date search, the time taken to locate a particular scene or incident is usually fairly lengthy, since

9.2.5 Requirements

IP Recording Rate:	240Mbps
Channel Count:	60
Analogue Encoding:	Up to 32 encoder channels
Storage Options:	2TB / 4TB / 8TB / 10TB/ 24TB
Chassis Type:	3U 19-inch rack-mount chassis
CPU:	Xeon E3-1275v2 3.5GHz Quad Core
Operating System:	Latest Windows Professional 64-bit
RAM:	8GB DDR3 (4 x 2GB) 1600MHz
On-board NICs:	Dual 10/100/1000 Ethernet ports
Optical Drive:	CD/RW-DVD/RW
Operating System Drive(s):	1 x 250GB internal SATA hard drive
RAID Controller:	Adaptec 8805 RAID controller
Video Storage:	Up to 8 SATA 7200 RPM hard drives
Serial Port:	2 x serial ports
USB Ports:	4 x USB 2.0
Video Output:	1 x VGA, 1 x DVI-D
Power Supply:	Dual 420W, 8-5A redundant power supplies
Rail Kit:	Rack-mount rail kit
Operating Temperature:	5ºC to 40ºC
Regulatory Compliance:	CE, FCC (Class A), UL 60950, ROHS

9.2.6 Video Viewing Station

A specialized rack mounted 21" video monitor shall be supplied together with the video recorder on each site where CCTV is required.

The monitor shall be used for setup of cameras (OSD) and for viewing pre-recorded video data on the video recorder.

The monitor shall be powered from the UPS cabinet specified in this document.

9.3 Video transmission

9.3.1 General

Video signal transmission is a key component in any CCTV system.

9.3.2 Coaxial cable

Coaxial cable type RG59 is the most widely used video transmission medium for short to medium

distances.

9.3.3 Optical fibre

Optical-fibre links offer quality signal transmission, reliability and immunity from electromagnetic interference. Optical-fibre transmitters and receivers are required to convert electrical signals into light signals and vice versa.

a) Single mode: small in diameter, producing few reflections of light and used for long transmission runs of many kilometres, and

b) Multi-mode graded index: larger diameter, producing many reflections of light, and used extensively in CCTV security applications. The advantages of using an optical-fibre transmission system, includes the following:

c) Complete electrical isolation between the camera and related equipment from the control end, i.e. the monitor, recorder, printer, etc.

d) Immunity from radio frequency and electromagnetic induction interference;

e) Inherent transmission security;

f) No fire hazards;

g) Absence of crosstalk; and

h) No radiation of radio frequency and electromagnetic induction interference.

9.4 Camera housings

9.4.1 General

Camera housings are available in a variety of shapes, sizes, and configurations and fall into two categories, viz. internal and external. External housings protect the camera from environmental conditions, such as extremes of heat, rain, dust and dirt, as well as tampering. However, in both types of housings the lens of the camera shall be as close to the front glass as possible to eliminate side view interference caused by the actual housing enclosure.

9.4.2 Internal housings

Internal housings protect the camera and lens from tampering and are usually made of lightweight material.

Other housings include the following:

a) **Triangular type**, which is mounted in the corner of a room or at the intersection of two walls and the ceiling;

b) **Recessed in ceiling or wall type**;

c) **Housings for covert surveillance**, such as sprinkler heads, passive infrared (PIR) detectors, wall signs or wall clocks; and

d) **Specicfality housings** that can withstand high mechanical impact from hand thrown or fired projectiles, extreme high temperature, dust, sand, liquid, and explosive gas.

9.4.3 External housings

External housings are often referred to as weatherproof or environmental housings. These shall include

a) A sun shield fitted on top of the housing in high-heat sunny climates,

b) A heating element for extreme cold conditions or to prevent condensation,

c) Gas pressurization to prevent the ingress of dirt and dust in extremely dirty conditions,

d) Washers and wipers if rain or mist is a problem, and

e) Flame and explosion protection, especially in a mining environment.

10 MAINTENANCE

10.1 General

It is recommended that the CCTV contractor provide a maintenance plan that details the tests to be undertaken, a recommended list and quantities of spares to be held, the service periods, and special test instruments and tools required. This information will form part of any maintenance agreement to be concluded between the end-user and the relevant contractor – often referred to as the "service provider". The term "maintenance" relates to two basic types, namely, preventative and breakdown maintenance. Two other maintenance terms often referred to, are first-line maintenance and second-line maintenance.

10.2 Preventative maintenance

Preventative maintenance is the regular servicing of the CCTV system. It is sometimes referred to as routine maintenance or service. Routine visits shall be made on a scheduled basis at a frequency dependent on the environment, quality of the system components, and the system duty cycle, all of which affect the nature and severity of the wear on the system during usage.

Maintenance routines shall include all of the operations as detailed in the typical maintenance schedule forming part of this standard.

10.3 Breakdown maintenance

Even with regular preventative maintenance visits, equipment can still fail, requiring the calling out of the maintenance technician. This type of call-out is generally referred to as breakdown or emergency maintenance. Depending on the situation, the breakdown might require an immediate response, or a longer response time shall be agreed with the end-user (for example, the response to a problem within 48 h). All maintenance shall be in compliance with the SANS 10222-5-1-5

11 TESTING

11.1 General

Various types of system tests can be used to evaluate the performance of the CCTV system to ensure that it meets its operational requirement. These tests might consist of some or all of the following:

a. Full test, testing all aspects of performance with regard to the total system;
b. Partial test, testing some or all aspects of performance of specific parts of the system; and
c. Spot checks, partial testing of the system, carried out at random or to some pre-determined pattern.

This might be considered as "worst case scenario" testing. It is often used to confirm that previous tests have been carried out correctly. The spot check has the advantage of requiring minimum resources.

11.2 Detailed system tests

The generic types of test shall be sub-divided into more detailed types of tests.

11.2.1 Feasibility testing

This test is carried out at the planning stage. Various options, including selection, placement and adjustment of equipment, are tried out in order to see what can be achieved. The tests can be carried out at typical locations on a site "worst case scenario" or cover the whole site, i.e. at every proposed camera position.

11.2.2 Setting-up testing

This test shall be carried out by the installer or contractor before the hand-over. It allows for final adjustments to be made to the equipment. It is an opportunity to ensure that the commissioning test will be merely a formality.

11.2.3 Commissioning testing

This is a test of a system after it has been set up by the installer or contractor. It aims to demonstrate to the end-user, the effectiveness of the overall system in meeting the operational requirement. This test shall be as comprehensive as possible, as the results will be used to confirm end-user acceptance that the system is fit for operational use. Acceptance of the system will pass responsibility for any remedial action to the end-user.

11.2.4 Coverage testing

A test target facing the camera shall be used for each area, at points within or near the area to be observed. The test target shall be positioned so as to ensure that the limits of the system are fully explored. This test target might be an individual, a physical object or a specifically designed CCTV test chart or model. The coverage test shall aim to:

a) Confirm the area to be viewed in terms of coverage specified in the operational requirement;
b) Confirm the size of the image of the target; and
c) Show the existence and extent of all blind spots.

11.2.5 Effectiveness of view test

The "effective field of view" from a camera is the useful view as displayed on the monitor. This might be reduced by blind spots caused by obstructions or areas that are poorly lit.

11.2.6 Routine testing

The purpose of these tests is to ensure that the equipment is still functioning in accordance with the current operational requirement. It shall either confirm that no significant performance changes took place,

or expose any shortfalls. It might include repetition of some or all of the commissioning tests, or a spot check based either on random selection or on some other means of determination.

11.2.7 Objective performance testing

The usual methods of testing CCTV systems are very subjective and might vary from site to site. This lack of consistency and objectivity in performance testing might lead to some of the legal problems mentioned in the commissioning section. At the very least, it shall cause confusion as to just what is an acceptable system. The most common causes of poor quality recordings are as follows:

a) the subject is too small or not long enough in view;

b) the images are out of focus or moving objects are blurred; and

c) cameras are not covering the relevant areas or the light was insufficient.

Although many of the problems might be the result of poor system design and specification, the final commissioning testing does not always make them apparent. The absence of a simple but reliable accepted performance standard was identified as a key issue. This has led to the development of a device called the ROTAKIN (see figure 1 of SANS 10222 5-1-4).

Hand-over certificate

Contract/order No.: _____

Contact description: _____

Name of contractor/installer: _____

Contract completion date: _____

Hand-over date: _____

As-built drawings included **Yes ☐/ No ☐** **(please tick as appropriate)**

Manuals/documentation provided **Yes ☐/ No ☐** **(please tick as appropriate)**

Training received **Yes ☐/ No ☐** **(please tick as appropriate)**

_____

Remarks and exceptions

NOTE This section will include any relevant information or components regarding the outstanding items (i.e. the exceptions to the original contract work) to be completed and the agreed period of time for such completion. If this list is lengthy, it should be referred to in this section and a separate exception list attached to the hand-over certificate.

_____

_____

_____

_____

Signed by:	**Contractor/installer:**	**End-user's representative:**
Signature:	_____	_____
Name:	_____	_____
Date:	_____	_____

12 TRAINING

12.1 General

Another important aspect of the commissioning and hand-over process is the training of operating staff and, to a lesser extent, the end-user's maintenance staff. The details of training provided shall have been given in the specification. The training shall include an understanding of all the functions in the system as well as the operation. A good starting point shall be the aims and objectives of the system as stated in the specification. The specification shall then form a large part of the training programme. There are no fixed rules for training, because every installation is different. Even so, no matter how small the system is; someone shall be trained to operate it. The ATP shall make provision for acceptance of the specified training requirement. The training aspects in the training section shall be considered.

12.2 Operator training

The installing company shall provide this training by using the operation and maintenance manuals described in 6.2 of the SANS 10222-5-1-4:2015. The complexity of the installed system might require that follow-up training be provided once the user is familiar with the system operation. This aspect shall also be addressed in the ATP.

12.3 First-line maintenance

In cases where the end-user has technicians on site to provide first-line maintenance, the contractor shall provide such training. The technical manual shall include a fault-finding flow chart to assist the technicians in localizing a fault to a modular level.

12.4 Second-line maintenance

In cases where the end-user has skilled technicians on site to provide second-line maintenance to component level, the supplier shall provide such training.

12.5 Factory training

It might be necessary to include a requirement that the end-user's technicians receive training at the premises of the manufacturer. In certain cases, this might include an overseas trip, which, due to the costs, might not be possible.

13 DOCUMENTATION

Full technical and descriptive details, relating to all the items offered in this enquiry, shall be submitted so the offer can be fully evaluated.

The information shall include:

a) Products catalogue
b) Name of the manufacturer
c) Relevant type test certificates
d) Contact of the supplier

14 QUALITY MANAGEMENT

A quality management system shall be set up in order to assure the quality during removal, transportation and disposal of scrap metals. Guidance on the requirements for a quality management system may be found in the following standards: ISO 9001:2015. The details shall be subject to agreement between the purchaser and supplier.

15 HEALTH AND SAFETY

A health and safety plan shall be set up in order to ensure proper management and compliance during removal, transportation and disposal of scrap metals. Guidance on the requirements of a health and safety plan shall be found in ISO45001:2019 standards. The details shall be subject to agreement between City Power and the Supplier.

16 ENVIRONMENTAL MANAGEMENT

An environmental management plan shall be set up in order to ensure the proper environmental management and compliance is adhered to during removal, transportation and disposal of scrap metals. Guidance on the requirements for an environmental management system shall 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 SHEQ Policy.

Annex A – Bibliography

None

Annex B - Revision information

DATE	REV. NO.	NOTES
NOVEMBER. 2021	0	First issue
SEPTEMBER 2022	1	Second issue Added thermal camera and wireless PTZ Update ISO requirements and Technical schedule

TECHNICAL SCHEDULES A & B:
ITEM NO 1 – PERIMETER CAMERAS

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

Table 1: Technical A & B Schedule - Perimeter Cameras

Item	Sub-clause CP_TSSPEC_294	Description	Schedule A	Schedule B
1.	9.1.2	**Perimeter Camera**		
1.1.		Type: Outdoor Fixed Network Camera	Required	
1.2.		Lens - Standard:	F1.3, IR corrected, Megapixel resolution, P-Iris	
1.3.		Lens - Telephoto:	12.5-50 mm P-Iris, F1.4	
1.4.		Resolution:	1080p 25/30 fps (WDR): 1920x1080 to 160x90Lightfinder and WDR	
1.5.		Light Sensitivity:	Colour: 0.18 lux, B/W: 0.04 lux, F1.3 1080p 50/60 fps: Colour 0.36 lux, B/W: 0.08 lux, F1.3	
1.6.		Operating temperature: °C	-40 - 50	
1.7.		Casing:	IP66 rated	
1.8.		Analytics:	Cross Line Detection (Trip Wire), Video Motion Detection	
1.9.		Locally Supported	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: _____

PERIMETER CAMERAS

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_294**	**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: _____

TECHNICAL SCHEDULES A & B:
ITEM NO 2 – DOOR CAMERAS

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

Table 1: Technical A & B Schedule - Perimeter Cameras

Item	Sub-clause CP_TSSPEC_294	Description	Schedule A	Schedule B
2.	9.1.3	**Door Camera**		
2.1.		Type: Outdoor Fixed Network Camera with IR illumination		
2.2.		Lens:	Minimum of Fixed iris, Megapixel resolution, IR corrected 2.8 mm,	
2.3.			F2.0	
2.4.		Light Sensitivity:	Colour: 0.8-100000 lux, F2.0, B/W: 0.16 lux, F2.0, 0 lux	
2.5.			with IR illumination on	
2.6.		Resolution:	720p 25 fps	
2.7.		Operating temperature: °C	-30 - 50	
2.8.		Casing:	IP66 rated	
2.9.		Analytics:	Video Motion Detection	
2.10		Locally Supported	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: _____

DOOR CAMERAS

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_294**	**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: _____

TECHNICAL SCHEDULES A & B:
ITEM NO 3 – VEHICLE LICENSE CAMERA

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

Table 1: Technical A & B Schedule - Perimeter Cameras

Item	Sub-clause CP_TSSPEC_294	Description		Schedule A	Schedule B
3.	9.1.4	**Vehicle Licence Camera**			
3.1.		Type:		Outdoor Fixed Network Camera with IR illumination	
3.2.		Lens:		Varifocal, 3.0–10.5 mm, F1.4	
3.3.		Light Sensitivity:		Colour: 0.25 lux, F1.4 B/W: 0.05 lux, F1.4, 0 lux with IR illumination on.	
3.4.					
3.5.		Resolution:		720p 25 fps	
3.6.		Operating temperature:	°C	-30 – 50	
3.7.		Casing:		IP66 rated	
3.8.		Analytics:		Video Motion Detection	
3.9.		Locally Supported		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: _____

VEHICLE LICENSE CAMERA

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_294**	**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: _____

ITEM NO 4 – DOME CAMERAS

TECHNICAL SCHEDULES A & B:

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

Table 21: Technical A & B Schedule - Dome Cameras

Item	Sub-clause CP_TSSPEC_294	Description		Schedule A	Schedule B
4.	9.1.5	**Dome Camera**			
4.1.		Type:		Fixed Dome Network Camera	
4.2.		Lens:		Minimum of F2.8, Fixed iris, Megapixel resolution 2.8 mm	
4.3.		Light Sensitivity:		1.5-100000 lux, F2.8	
4.4.		Resolution:		1280x800 to 320x240 25fps	
4.5.		Operating temperature:	°C	0 – 45	
4.6.		Housing:		IP42 rated	
4.7.		Analytics:		Video Motion Detection	
4.8.		Locally Supported		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: _____

DOME CAMERAS

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_294**	**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: _____

TECHNICAL SCHEDULES A & B:
ITEM NO 5 – DOME CAMERA LONG RANGE

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

Table 22: Technical A & B Schedule - Door Camera Long Range

Item	Sub-clause CP_TSSPEC_294	Description	Schedule A	Schedule B
5.	9.1.6	**Dome Camera Long Range**		
5.1.		Type:	Fixed Dome Network Camera	
5.2.		Lens:	Varifocal, 3.0-10.5 mm, Minimum of F1.4	
5.3.		Light Sensitivity:	Colour: 0.25 lux, F1.4 B/W: 0.05 lux, F1.4	
5.4.			Colour: 0.25 lux, F1.4 B/W: 0.05 lux, F1.4	
5.5.		Resolution:	1920x1080 to 160x90 25fps	
5.6.		Operating temperature: °C	0 to 50	
5.7.		Casing:	IP42 rated	
5.8.		Analytics:	Video Motion Detection	
5.9.		Locally Supported	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: _____

DOME CAMERA LONG RANGE

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_294**	**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: _____

TECHNICAL SCHEDULES A & B:
ITEM NO 6 – PTZ CAMERA

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

Table 23: Technical A & B Schedule - PTZ Cameras

Item	Sub-clause CP_TSSPEC_294	Description		Schedule A	Schedule B
6.	9.1.7	**PTZ Camera**			
6.1.		Type:		PTZ Dome Network Camera	
6.2.		Lens: Minimum of		f=4.3-129 mm,f F1.6-4.7, Autofocus, AutoIris, 58.3° - 2.1° view	
6.3.		Light Sensitivity:		Colour: 0.15 lux at 30 IRE F1.6 B/W: 0.008 lux at 30 IRE F1.6	
6.4.		Resolution:		280x720 (720p) to 240x135, 25fps	
6.5.		Pan:		360° endless, 0.05-700°/s	
6.6.		Tilt:		+20 to -90° with nadir flip, 0.05-500°/s	
6.7.		Zoom:		30x Optical,12x Digital, Total 360x zoom	
6.8.		Operating temperature:	°C	-50 - +50	
6.9.		Wide Dynamic Range (WDR):	dB	130	
6.10		Casing:		IP66 rated	
6.11		Analytics:		Video Motion Detection, Auto Tracking	
6.12		Locally Supported		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: _____

PTZ CAMERA

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_294**	**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: _____

TECHNICAL SCHEDULES A & B:
ITEM NO 7 – TEMP ALARM CAMERAS FOR CONDITION MONITORING

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

Table 24: Technical A & B Schedule – Temp. Alarm cameras for condition monitoring

Item	Sub-clause CP_TSSPEC_294	Description		Schedule A	Schedule B
7.	9.1.8	**Thermal Camera**			
7.1.		Type:		Temperature Alarm Camera	
7.2.		Camera Sensor:		Sun-Safe Uncooled Micro-bolometer	
7.3.		Resolution:		640 x 480 384 x 288 pixels	
7.4.		Temporal NETD:		50 mK at f/1.0	
7.5.		Temperature Range:	°C	-40 – 50	
7.6.		Power Supply:	VDC	24	
7.7.		Housing:		IP66 rated	
7.8.		Locally Supported		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: _____

TEMP. ALARM CAMERAS FOR CONDITION MONITORING

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_294**	**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: _____

TECHNICAL SCHEDULES A & B:
ITEM NO 8 – FISHEYE (360 O DEGREE) CAMERA

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

Table 24: Technical A & B Schedule – Fisheye (360 ^{O} Degree) Camera

Item	Sub-clause CP_TSSPEC_294	Description		Schedule A	Schedule B
8.	.9.1.9	**FISHEYE (360 O DEGREE)**			
8.1.		Type:		Fisheye (360^{O} degree) camera	
8.2.		Analytics :		Video Motion Detection , Auto Tracking	
8.3.		Resolution:		4000×3000 to 320×320 (max. 30 fps/25	
8.4.		Audio:		Two Way	
8.5.		Temperature Range:	°C	-40 – 50	
8.6.		Power Supply:	VDC	24	
8.7.		Housing:		IP66 rated	
8.8.		Locally Supported		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: _____

FISHEYE (360 ^{O} DEGREE) CAMERA
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_294**	**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: _____

TECHNICAL SCHEDULES A & B:
ITEM NO 9 – THERMAL CAMERA

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

Table 24: Technical A & B Schedule – Fisheye (360 ° Degree) Camera

Item	Sub-clause CP_TSSPEC_294	Description		Schedule A	Schedule B
8.	9.1.10	**Thermal Camera**			
8.1.		Type:		Heat sensing	
8.2.		Light Sensetivity:		Colour: 0.25 lux, F1.4 B/W: 0.05 lux, F1.4	
8.3.		Resolution:		1920x1080 to 160x90 25fps	
8.4.		Audio:		Two Way	
		Analytics		Video Motion Detection, Auto Tracking	
8.5.		Temperature Range:	°C	-40 – 50	
8.6.		Power Supply:	VDC	24	
8.7.		Housing:		IP66 rated	
8.8.		Locally Supported		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: _____

THERMAL CAMERA
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_294**	**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: _____

TECHNICAL SCHEDULES A & B:
ITEM NO 10 – WIRELESS PTZ DOME

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

Table 23: Technical A & B Schedule - PTZ Cameras

Item	Sub-clause CP_TSSPEC_294	Description		Schedule A	Schedule B
6.	9.1.11	**Wireless PTZ Camera**			
6.1.		Type:		Wireless PTZ Dome Camera	
6.2.		Lens: Minimum of		f=4.3-129 mm,f F1.6-4.7, Autofocus, AutoIris, 58.3˚ - 2.1˚view	
6.3.		Light Sensitivity:		Colour: 0.15 lux at 30 IRE F1.6 B/W: 0.008 lux at 30 IRE F1.6	
6.4.		Resolution:		280x720 (720p) to 240x135, 25fps	
6.5.		Pan:		360° endless, 0.05-700°/s	
6.6.		Tilt:		+20 to -90° with nadir flip, 0.05-500°/s	
6.7.		Zoom:		30x Optical,12x Digital, Total 360x zoom	
6.8.		Operating temperature:	°C	-50 - +50	
6.9.		Wide Dynamic Range (WDR):	dB	130	
6.10		Casing:		IP66 rated	
6.11		Analytics:		Video Motion Detection, Auto Tracking	
6.12		Locally Supported		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: _____

Wireless PTZ Dome Camera
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_294**	**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

TECHNICAL SCHEDULES A & B:

ITEM NO 11 – VIDEO RECORDERS

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

Table 25: Technical A & B Schedule - Video Recorders

Item	Sub-clause CP_TSSPEC-294	Description		Schedule A	Schedule B
9.	9.2.5	**Video Recorders**			
8.1.		IP Recording Rate	Mbps	240	
9.2.		Channel Count		60	
9.3.		Storage Options	TB	24	
9.4.		Chassis Type		3U 19 inch rack-mount chassis	
9.5.		CPU		Xeon E3-1275v2 3.5GHz Quad Core	
9.6.		Operating System		Latest Windows Professional 64-bit	
9.7.		RAM		8GB DDR3 (4 x 2GB) 1600MHz	

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: _____

TECHNICAL SCHEDULES A & B:

Video Recorder(Continued)

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

Table 25: Technical A & B Schedule - Video Recorders continued

Item	Sub-clause CP_TSSPEC-294	Description	Schedule A	Schedule B
9.8.		On-board NICs	Dual 10/100/1000 Ethernet ports	
9.9.		Optical Drive	CD/RW-DVD/RW	
9.10		Operating System Drive(s)	1 x 250GB internal SATA hard drive	
9.11		RAID Controller	Adaptec 8805 RAID controller	
9.12		Video Storage	Up to 8 SATA 7200 RPM hard drives	
9.13		Serial Port	2 x serial ports	
9.14		USB Ports	4 x USB 2.0	
9.15		Video Output	1 x VGA, 1 xDVI-D	
9.16		Power Supply	Dual 420W, 8-5A redundant power supplies	
9.17		Rail Kit	Rack-mount rail kit	
9.18		Operating Temperature °C	5 – 40	
9.19		Regulatory Compliance	CE, FCC (Class A), UL 60950, ROHS	
9.20		Locally Supported	Yes	
9.21		3 Years Extended Warranty	Required	

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: _____

Video Recorder

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_294**	**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: _____