Terms of Reference

Procurement of a service provider for the:

1. Upgrading of the existing security systems and equipment.

2. Enhancing the ICT systems and equipment to:
   • Integrate with the new security systems and equipment and to
   • Provide all the ICT information and storage services/capacity required by the new security systems and equipment

3. Maintaining the Security and ICT systems and equipment for a period of 36 months.

DEVELOPMENT BANK OF SOUTHERN AFRICA

NOVEMBER 2019
## TABLE OF CONTENTS

1. PURPOSE .................................................................................................................. 8

2. CONTEXT ................................................................................................................... 8

3. SECURITY SYSTEMS, EQUIPMENT AND OTHER REQUIREMENTS – HIGH LEVEL .............................. 8

3.1 SECURITY SYSTEM AND EQUIPMENT REQUIREMENTS ........................................................................ 8

3.2 INSTALLATION OF SECURITY EQUIPMENT REQUIREMENTS – HIGH LEVEL ........................................... 9

4. ICT REQUIREMENTS – FUNCTIONAL ONLY .............................................................................. 10

5. COMPETENCY AND EXPERTISE REQUIREMENTS OF RESOURCES .................................................. 11

6. PROJECT REPORTING ARRANGEMENTS .................................................................................. 11

7. FUNCTIONAL AND TECHNICAL EVALUATION CRITERIA................................................................. 11

9. INTELLECTUAL PROPERTY .................................................................................................. 11

10. SCOPE OF WORK : FACILITIES AND ICT TECHNICAL SPECIFICATIONS ........................................... 11

10.1 OVERVIEW .................................................................................................................. 11

10.2 STANDARDS AND PERFORMANCE REQUIREMENTS ........................................................................ 13

10.3 PERFORMANCE REQUIREMENTS FOR END OF WORK DAY ......................................................... 14

10.4 PROVISION OF REQUIREMENTS AND INFORMATION .................................................................... 14

10.5 CAD DRAWINGS .......................................................................................................... 15

10.6 SUPPLIERS AND INSTALLERS .......................................................................................... 15

10.7 SYSTEM INTEGRATION .................................................................................................... 16

10.8 SOFTWARE LICENSES .................................................................................................... 16

10.9 CONFIDENTIALITY ......................................................................................................... 16

10.10 DESIGN RESPONSIBILITY ............................................................................................ 16

10.11 CO-ORDINATION ......................................................................................................... 17

10.12 DBSA ICT UNIT ......................................................................................................... 17

10.13 UNIT SECURE INSTALLATION ...................................................................................... 17
<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.14</td>
<td>DOCUMENTS AND DRAWINGS</td>
<td>18</td>
</tr>
<tr>
<td>10.14.1</td>
<td>DOCUMENT CONTROL</td>
<td>18</td>
</tr>
<tr>
<td>10.14.2</td>
<td>DOCUMENTATION</td>
<td>18</td>
</tr>
<tr>
<td>10.15</td>
<td>DRAWINGS</td>
<td>19</td>
</tr>
<tr>
<td>10.15.1</td>
<td>SHOP DRAWINGS</td>
<td>20</td>
</tr>
<tr>
<td>10.15.2</td>
<td>AS CONSTRUCTED DRAWINGS</td>
<td>20</td>
</tr>
<tr>
<td>10.16</td>
<td>TRAINING</td>
<td>21</td>
</tr>
<tr>
<td>10.17</td>
<td>PROGRAMMING</td>
<td>22</td>
</tr>
<tr>
<td>10.18</td>
<td>FACTORY ACCEPTANCE TESTING AND DELIVERY</td>
<td>23</td>
</tr>
<tr>
<td>10.19</td>
<td>TESTING AND COMMISSIONING</td>
<td>23</td>
</tr>
<tr>
<td>10.19.1</td>
<td>GENERAL</td>
<td>23</td>
</tr>
<tr>
<td>10.19.2</td>
<td>INSPECTION AND TEST PLANS</td>
<td>24</td>
</tr>
<tr>
<td>10.20</td>
<td>EQUIPMENT FAILURES AND PROGRAMMING DURING INSTALLATION AND COMMISSIONING</td>
<td>25</td>
</tr>
<tr>
<td>10.21</td>
<td>PRACTICAL COMPLETION</td>
<td>25</td>
</tr>
<tr>
<td>10.22</td>
<td>DEFECTS LIABILITY</td>
<td>26</td>
</tr>
<tr>
<td>11</td>
<td>GENERAL REQUIREMENTS</td>
<td>27</td>
</tr>
<tr>
<td>11.3</td>
<td>STANDARDS AND STATUTORY REQUIREMENTS</td>
<td>27</td>
</tr>
<tr>
<td>11.4</td>
<td>STATUTORY REGULATIONS</td>
<td>27</td>
</tr>
<tr>
<td>11.5</td>
<td>SPECIAL ENVIRONMENT CONDITIONS</td>
<td>27</td>
</tr>
<tr>
<td>11.6</td>
<td>DBSA STANDARDS</td>
<td>27</td>
</tr>
<tr>
<td>11.7</td>
<td>CONFLICT BETWEEN DOCUMENTS</td>
<td>27</td>
</tr>
<tr>
<td>11.8</td>
<td>OPERATIONAL ENVIRONMENTS</td>
<td>27</td>
</tr>
<tr>
<td>11.9</td>
<td>ELECTROMAGNETIC COMPATIBILITY REQUIREMENTS</td>
<td>27</td>
</tr>
<tr>
<td>11.10</td>
<td>GROUNDING OF EQUIPMENT AND CABLING</td>
<td>28</td>
</tr>
<tr>
<td>11.11</td>
<td>VERMIN AND INSECTS</td>
<td>28</td>
</tr>
<tr>
<td>11.12</td>
<td>FABRICATED EQUIPMENT</td>
<td>28</td>
</tr>
</tbody>
</table>
11.13  ENGRAVING / LABELING.................................................................................28
11.14  SAMPLES OF EQUIPMENT AND MATERIALS ..................................................28
11.15  SAMPLES/MOCK-UP OF PROPOSED SYSTEMS EQUIPMENT UPON AWARD ......29
11.16  EQUIPMENT LOCATIONS..................................................................................29
11.17  ‘AS NEW' CONDITION ON COMPLETION ......................................................29
11.18  MAINTAINING THE STATUS QUO.....................................................................29
11.19  UNIFORMITY OF EQUIPMENT ..........................................................................30
11.20  SPARE CAPACITY............................................................................................30
11.21  PENETRATIONS...............................................................................................30
11.22  EQUIPMENT REQUIREMENTS.........................................................................30
11.23  FITTINGS AND ACCESSORIES.........................................................................31
11.23.1  GENERAL ....................................................................................................31
11.23.2  POSITIONING AND RELATIONSHIP OF ACCESSORIES .........................31
11.24  LOCATION AND FIXING OF EQUIPMENT......................................................32
11.25  EQUIPMENT ENCLOSURES/PANELS.............................................................32
11.25.1  GENERAL ....................................................................................................32
11.25.2  EQUIPMENT CUBICLES..............................................................................33
11.26  TAMPER ALARMS............................................................................................33
11.27  PAINTING EQUIPMENT AND DEVICES........................................................33
11.28  POWER SUPPLIES..........................................................................................34
11.29  CABLELING FOR SECURITY SERVICES......................................................34
11.29.1  GENERAL ....................................................................................................34
11.29.2  CABLE INSTALLATION...............................................................................35
11.30  POWER CABLES, OUTLETS AND ISOLATORS............................................36
11.30.1  CABLE NUMBERING..................................................................................36
11.30.2  CABLE SETS...............................................................................................37
18.1 GENERAL .................................................................................................................. 49
18.2 VIDEO COMPRESSION ............................................................................................. 49
18.3 ON-BOARD VIDEO MOTION DETECTION (VMD) .................................................... 50
19. CCTV SYSTEM WORKSTATIONS ............................................................................. 51
19.1 GENERAL ................................................................................................................. 51
19.2 LIVE VIDEO .............................................................................................................. 51
19.3 PTZ CONTROL .......................................................................................................... 52
19.4 GRAPHICAL USER INTERFACE .............................................................................. 52
19.5 SEQUENCES, CAMERA GROUPS AND GUARD TOURS ........................................... 53
19.6 CCTV KEYBOARD CONTROL .................................................................................. 53
19.7 PERMANENT POINT TO POINT CONNECTIONS ................................................... 53
19.8 ALARM MANAGEMENT ............................................................................................ 54
19.9 RECORDED VIDEO VIEW ....................................................................................... 54
19.10 MOTION SEARCH .................................................................................................. 55
19.11 THUMBNAILS ........................................................................................................ 56
19.12 RECORDED VIDEO AND EXPORT FOR EVIDENCE ............................................ 56
19.13 ADMINISTRATION VIEW ....................................................................................... 57
20. SOFTWARE AND PROGRAMMING ............................................................................ 57
21. CAMERAS .................................................................................................................. 58
21.1 INTERNAL FIXED DOME CAMERA ....................................................................... 58
21.2 INTERNAL IP FIXED DOME CAMERA ..................................................................... 59
21.3 EXTERNAL FIXED CAMERA .................................................................................... 59
21.4 EXTERNAL IP FIXED CAMERA ............................................................................... 60
21.5 PAN TILT ZOOM CAMERA ...................................................................................... 61
21.6 IP PAN TILT ZOOM CAMERA ................................................................................. 62
22. LENSES ....................................................................................................................... 62
1. PURPOSE

The purpose of this Terms of Reference is to provide bidders with information related to the open tender requirements and assessments as well as a detailed technical specification to upgrade the current security systems and equipment and to extend the DBSA ICT systems and equipment required to ensure a fully integrated protection services system.

2. CONTEXT

The DBSA (DBSA) is a development finance institution wholly owned by the Government of South Africa. Since the DBSA is a commercial and public institution it requires effective protection services, systems and equipment to protect its people, clients and assets.

The DBSA needs to appoint a service provider that has the capability and experience to upgrade its security systems and equipment to a level that will serve its current and future needs, at a reasonable level. In addition, the service provider will be required to supply and install new IT systems and equipment that integrates smoothly with the new security systems and that can handle and manage the information flows and needs of these new systems.

The existing electronic security system at the DBSA includes Access Control and Closed-Circuit Television Surveillance (CCTV). The current system and equipment are more than 10 years old.

The contract will include the design, installation and maintenance of the equipment for a period of 36 months.

3. SECURITY SYSTEMS, EQUIPMENT AND OTHER REQUIREMENTS – HIGH LEVEL

The Service Provider should be able to perform the below outlined services:

Important to note that this is a list of system, equipment and some pre-implementation requirements. The detail installation / implementation technical specification requirements at the end of this TOR requires numerous additional works, materials etc.

3.1 SECURITY SYSTEM AND EQUIPMENT REQUIREMENTS

<table>
<thead>
<tr>
<th>Biometrics Access Control System – Bio &amp; Card (New Installation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>In-house</td>
</tr>
<tr>
<td>Externally</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CCTV (New Installation as well as repairing and re-aligning existing equipment)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pan-Tilt-Zoom (PTZ)</td>
</tr>
<tr>
<td>Fixed Cameras (Flir)</td>
</tr>
</tbody>
</table>
### Required for Main Security Control Room (New Installation)

<table>
<thead>
<tr>
<th>Item</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>On-line-Occurrence Book (OB)</td>
<td>• Software and all relevant peripherals</td>
</tr>
<tr>
<td>Monitors</td>
<td>• New monitors (10 x 55-inch Monitors)</td>
</tr>
<tr>
<td>Biometrics for Control Room Access Door</td>
<td>• Biometrics Camera</td>
</tr>
</tbody>
</table>

### Intrude Alarm Security Beams Systems (New Installation)

<table>
<thead>
<tr>
<th>Area</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canteen</td>
<td>• Alarm</td>
</tr>
<tr>
<td>Vulindlela Offices</td>
<td>• Alarm</td>
</tr>
<tr>
<td>C – Wing East side</td>
<td>• Alarm</td>
</tr>
<tr>
<td>D – Wing East Side</td>
<td>• Alarm</td>
</tr>
</tbody>
</table>

### 3.2 INSTALLATION OF SECURITY EQUIPMENT REQUIREMENTS – HIGH LEVEL

#### CAD DRAWINGS:
Submit drawings showing the following:

- Block diagram of all systems.
- Power supply requirements.
- Cut out dimensions.
- Fixing provisions for cameras and monitors.

Important to read section in technical specification for additional requirements

#### SHOP DRAWINGS:
Provide shop drawings of all equipment to be manufactured as part of the works.

- Fibre Optic Termination Panel (FOTP) and Patch Panel layouts and elevations for all Security Services.
- Building equipment cubicles.
- Locking device details.
- Cut-outs in doorframe and details for all devices.
- All details or devices as shown on the Security Services Drawings.
- Other equipment as required by the Facilities Department.

Important to read section in technical specification for additional requirements

#### EQUIPMENT CUBICLES

Equipment cubicles within the building shall be in security services equipment cupboards, plant rooms, and lift motor rooms or as shown on the drawings.

Important to read section in technical specification for additional requirements

#### INTERNAL AND EXTERNAL CAMERA HOUSINGS AND BRACKETS

Important to read section in technical specification for detail requirements
### 4. ICT REQUIREMENTS – FUNCTIONAL ONLY

The following is high level ICT functional requirements that must be taken into consideration when providing and installing new security systems and equipment. More detail requirements are included in the detail technical specification section of the report.

<table>
<thead>
<tr>
<th>Req. No</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Functional Requirements</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Application</strong></td>
<td></td>
</tr>
</tbody>
</table>
| 1 | The application (upgrade) must integrate with the following systems:  
  - SAP HCM (for employee information)  
  - Printing solution (requires a biometric print reader to enable printing)  
  - Asset Management (NETTRACE) to allow for movement of assets in and out of the Bank (DBSA)  
  - Active Directory |
| 2 | The solution must provide a capability for issuing cards to visitors/contractors in order to enter and leave the DBSA premises (this requires a card reader) |
| 3 | The solution must provide capability for biometrics (e.g. fingerprints) to allow employees to enter or leave the DBSA premises (this requires a biometric reader) |
| 4 | Fingerprint enrolment data should be saved on the DBSA database within the DBSA data centre on premise or in the cloud |
| **Infrastructure** | |
| 5 | DBSA requires a segregated network for security camera and streaming-related information/data. The following infrastructure is required:  
  - 4 x 48 ports CISCO Switches including ports for fibre connectivity  
  - 2 x Core Cisco Switch including ports for fibre connectivity and connectivity for server storage solution switch (single or dual core must be determined based on the specifications of the cameras and forecast of data to be stored over the required period)  
  - 1 X Storage should accommodate 3 months’ worth of data, before the data is transferred into the DBSA cloud storage for backup.  
  - 112 x Cat 6e cabling for the new CCTV IP cameras  
  - Splicing of existing fibre |
| **DBSA Infrastructure Specifications** | |
| 6 | The following DBSA infrastructure specifications apply:  
  - Database: MS SQL Server 2016  
  - Infrastructure: MS windows server 2016  
  - Network: Cameras will be connected to CISCO 3580 stack switches provisioned with POE |
5. COMPETENCY AND EXPERTISE REQUIREMENTS OF RESOURCES

It is the responsibility of the service provider to ensure that staff allocated to the project have the required knowledge, qualifications and experience to undertake the work. Only resources as approved by the DBSA in accordance with CV’s submitted by the service provider will be considered.

All reviews will be conducted in strict accordance with the standards specified in the scope of work and the following competencies are required:

- Biometrics Access Control Systems.
- Electronic-on-line-Occurrence-Book
- Alarm and Intrusion Detection Systems (Security Beams)
- Gallagher or Equivalent Security Software Systems.
- Hardware and Software Security Systems Integration.
- CISCO Systems and Equipment
- SAP Systems
- Database: MS SQL Server 2016
- Infrastructure: MS windows server 2016
- Network: Cameras will be connected to CISCO 3580 stack switches provisioned with POE

6. PROJECT REPORTING ARRANGEMENTS

To be agreed with the successful Tenderer.

8. INTELLECTUAL PROPERTY

All reports shall be regarded as the exclusive intellectual property of the DBSA for use as it pleases in promoting the organisation’s future business interests. Furthermore, the service provider undertakes to treat all work pertaining to this project with the highest degree of possible confidentiality for the duration of the project and afterwards.

9. SCOPE OF WORK

9.1 OVERVIEW

This specification details the minimum requirements for both the operational and technical aspects for the new DBSA Biometrics Access Control System, Digital Closed-Circuit Television (CCTV) System, Access Control Application and Security Network and Server/storage Infrastructure.

The Scope of Work for this contract shall comprise the supply, installation, programming, testing, commissioning, training, documentation, final inspection and defects liability for all of the above-mentioned systems and equipment for the DBSA and shall include but not be limited to:
- Supply, install, programme and commission Biometrics Access Control System – Bio & Card
- Supply, install, programme and commission new CCTV IP cameras to meet the requirements of this specification.
- Supply, install, programme and commission all camera encoders (as required for IP cameras) to meet the requirements of this specification.
- Supply and install of network infrastructure to support the solutions
- Supply and install of server/storage infrastructure to support the solution
- Supply and install of access control application
- Install, programme and commission a client supplied IP Digital CCTV System Server within the DBSA Main Sever Room.
- Install, programme and commission a client supplied IP Digital CCTV System Workstation within the security office.
- Supply install and commission a Keyboard Video and Mouse Extender for the IP Digital CCTV System Workstation within the security office.
- Supply, install, programme and commission a Video Management Software with Random Array Independent Drives (VMS with RAID Solution) to meet the requirements of this specification. This solution shall be installed within the DBSA Main Server Room.
- Supply install and commission (12 off) 65" LED Monitors mounted on the desk within the security office.
- Supply and install blue Cat5e Network Patch Leads as required to patch between camera encoders and the client supplied network hardware.
- Develop graphic maps with active icon reporting in real time on the CCTV system workstation.
- Supply and install all required Camera Power Supply Units (PSU) complete with key lockable metal enclosures to meet the requirements of this specification.
- Termination Panels as required.
- Preparation of CAD Drawings to approved format.
- Programming workshop to confirm individual camera requirements.
- Systems programming and set-up, in accordance to current operations or as specified.
- Training of nominated personnel to effectively operate the installed Security systems.
- Testing and commissioning.
- Documentation such as “As Constructed” Drawings, “As Constructed” Manuals, Training Manuals and Operator Manuals.
- Defects warranty during the Defects Liability Period (DLP).
- Service and Maintenance during the Defects Liability Period (DLP).
- All cabling and fixing works, which will require access to, or modifications to the building structure or facilities shall not be carried out without prior consultation and approval of the DBSA Project Manager or the nominated Facilities representative.
- All cables must be on the cable tray
- Install surge arrestor for the Distribution supply board for all cameras
### FEATURES AND SPECIFICATIONS

<table>
<thead>
<tr>
<th>Features</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biometric Access Control- BIO and Cards</td>
<td>Finger print for DBSA Employees and Visitors</td>
</tr>
<tr>
<td>Pan-Tilt-Zoom (PTZ)</td>
<td>25 IP digital cameras 360 degrees</td>
</tr>
<tr>
<td>Fixed Cameras (Flir)</td>
<td>77 IP digital cameras</td>
</tr>
<tr>
<td>Monitor</td>
<td>12 off 65-inch LED</td>
</tr>
<tr>
<td>Sensor Type</td>
<td>1/2.8-inch Type Exmor CMOS Sensor</td>
</tr>
<tr>
<td>Optical Zoom</td>
<td>30X</td>
</tr>
<tr>
<td>Digital Zoom</td>
<td>12X</td>
</tr>
<tr>
<td>Maximum Resolution</td>
<td>2560 x 1440 / 1920 x 1080</td>
</tr>
<tr>
<td>Lens</td>
<td>f/1.6 ~ f/4.7, focal length 4.3 mm (wide) ~ 129.0 mm (tele)</td>
</tr>
<tr>
<td>Horizontal Angle of View</td>
<td>63.7° wide - 2.3° tele</td>
</tr>
<tr>
<td>Aspect Ratio</td>
<td>16:9</td>
</tr>
<tr>
<td>Light Sensitivity Colour (33 ms)</td>
<td>0.03 lux</td>
</tr>
<tr>
<td>Light Sensitivity Colour (250 ms)</td>
<td>0.008 lux</td>
</tr>
<tr>
<td>Light Sensitivity Mono (33 ms)</td>
<td>0.004 lux</td>
</tr>
<tr>
<td>Light Sensitivity Mono (250 ms)</td>
<td>0.001 lux</td>
</tr>
<tr>
<td>Day/Night Capabilities</td>
<td>Yes</td>
</tr>
<tr>
<td>Shutter Range</td>
<td>1/1 ~ 1/10,000 sec</td>
</tr>
<tr>
<td>Signal-to-Noise Ratio</td>
<td>&gt;50dB</td>
</tr>
<tr>
<td>IR Cut Filter</td>
<td>Yes</td>
</tr>
<tr>
<td>Wide Dynamic Range</td>
<td>130 dB</td>
</tr>
<tr>
<td>Iris Control</td>
<td>Auto iris with manual override</td>
</tr>
<tr>
<td>Backlight Compensation</td>
<td>Yes</td>
</tr>
<tr>
<td>Automatic Gain Control</td>
<td>Yes</td>
</tr>
<tr>
<td>Active Noise Filtering</td>
<td>3D Noise Filtering</td>
</tr>
<tr>
<td>Electronic Image Stabilization (EIS)</td>
<td>Yes</td>
</tr>
</tbody>
</table>

The systems shall be complete in all respects and shall include all equipment, materials, fittings, fixtures, cabling, cable enclosures, support systems and work which is obviously necessary for the proper function of each system. Where it is evident that work required to complete the installation has not been included in the price, the exclusion shall be clearly set out in the submission. Otherwise, it shall be assumed that such work is included and shall be supplied as a part of the contract works.

Where any architectural works are required to provide access for installation of the systems and/or associated services and devices, and this proves to be difficult to the extent that it will incur unforeseen costs, the Contractor shall request direction and be given approval by the DBSA Project Manager.

As part of the works, the Contractor shall liaise with the DBSA Project Manager to determine the exact final location of all services to be provided as part of the installation.

#### 9.2 STANDARDS AND PERFORMANCE REQUIREMENTS

The design, quality control, installation and testing of the complete installation shall comply with the international standards and local statutory authority regulations, building and fire regulations as amended.
9.3 PERFORMANCE REQUIREMENTS FOR END OF WORK DAY

All conduit installation, trenching or any other works shall be fully completed and “Made Good and made to be at its original state prior work commences” before the Contractor completes work for the day.

Items not made well, must be advised to the DBSA Project Manager and the required safety procedures put in place to the satisfaction of the DBSA Project Manager.

Road access shall always be available.

9.4 PROVISION OF REQUIREMENTS AND INFORMATION

As a minimum, submit the following items for approval and/or comment, as detailed below:

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DUE DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction Program</td>
<td>Seven (7) days from tender award</td>
</tr>
<tr>
<td>Equipment Samples</td>
<td>Two (2) weeks from tender award</td>
</tr>
<tr>
<td>Cable Schedule/Cable Numbering</td>
<td>Two (2) weeks from tender award</td>
</tr>
<tr>
<td>Factory Acceptance Testing Schedule</td>
<td>Two (2) weeks from tender award</td>
</tr>
<tr>
<td>Training Programme and Training Notes</td>
<td>Four (4) weeks from tender award</td>
</tr>
<tr>
<td>Factory Demonstration Test Specification</td>
<td>Fourteen (14) days prior to commencement of Factory Demonstration Test</td>
</tr>
<tr>
<td>‘For Construction’ Drawings</td>
<td>Six (6) weeks from tender award</td>
</tr>
<tr>
<td>Intention to Test</td>
<td>Two (2) weeks prior to testing</td>
</tr>
<tr>
<td>Testing Documentation</td>
<td>Two (2) weeks prior to testing</td>
</tr>
<tr>
<td>Completed Commissioning Test Sheets</td>
<td>Fourteen (14) days prior to Performance and Acceptance Testing</td>
</tr>
<tr>
<td>Commissioning Report</td>
<td>As part of documentation</td>
</tr>
<tr>
<td>Approved ‘As Constructed’ documentation, including drawings</td>
<td>Prior to granting of PC</td>
</tr>
<tr>
<td>Maintenance Programme</td>
<td>Two (2) weeks prior to commencement of commissioning testing</td>
</tr>
</tbody>
</table>

On request from the DBSA Project Manager provide a detailed schedule of all equipment to be installed within each building. The schedules shall identify:

- List of each device to be installed for each system.
- Total number of devices.
- Details of device type and manufacture to be supplied.
- Name of Installers/Sub-contractors to be used.
- Details of all types of cabling to be installed as part of the contract works.
- Block schematic cable diagrams indicating all system interconnecting cables including cable routes and cable types complete with core make up and numbers.
- Wiring diagrams detailing system interconnections and cable/core identification.
- Drawings of equipment cabinets, system schematics and the like.
- Drawings of proposed wiring routes showing conduits, cables and access requirements.
- Shop drawings of manufactured and installed equipment.

Submit data showing dimensions and space requirements for the following:
• Video Management Software with Random Array Independent Drives (VMS with RAID)
• Camera Power Supplies

Submit a detailed schedule of all equipment to be installed as part of these Works. The schedules shall identify:

• Project and Service.
• List of each device and item of equipment to be installed at each location.
• Quantity of devices to be installed in each location.
• Details of device type, manufacture, model and the like to be supplied.

The equipment schedule shall include a detailed block diagram for the security services installed as part of these Works, detailing the cable types and inter-connection between locations.

The equipment schedules shall be commented on and approved by the DBSA Project Manager, in writing, prior to the placement of orders for the appropriate equipment or any installation work being carried out.

In commenting on the equipment schedules, the DBSA Project Manager, may request the submission of any device or item of equipment, whether in the equipment schedules or not, to be submitted as an equipment sample.

The equipment schedules shall be submitted in conjunction with the ‘For Construction’ drawings.

Equipment schedules, specifications and samples shall be commented on and approved by the DBSA Project Manager, in writing, prior to the placement of orders for the appropriate equipment or any installation work being carried out.

9.5 CAD DRAWINGS

Submit shop drawings showing the following:

• Block diagram of all systems.
• Power supply requirements.
• Cut out dimensions.
• Fixing provisions for cameras and monitors.

9.6 SUPPLIERS AND INSTALLERS

All work shall be carried out under the direct supervision of the Contractor, whom shall remain responsible for the correct installation and operation of all equipment supplied and installed as a part of the nominated Works.

The equipment shall be installed by the Contractor or by the Supplier or specialist Sub-installers as recommended by the Manufacturer and/or Supplier.

All installers must be PSIRA registered and accompanied by a proof or copy of the certificate.

Provision of UPS hardware for critical CCTV system hardware such as switches, encoders, recorders, servers and workstations as deemed necessary.
9.7 SYSTEM INTEGRATION

The CCTV system shall interface, as described in this document, to provide a totally integrated security system.

9.8 SOFTWARE LICENSES

All software licenses for equipment and associated systems shall be supplied and installed as part of this Contract and shall become the property of DBSA. All fees and costs associated with any hardware or software licences shall be included in the tender sum.

9.9 CONFIDENTIALITY

The Security Services Drawings and the Technical Specification shall always be handled as confidential documents.

During the tender period, implement a process to control the issue, copy and eventual return of all documentation issued to and by the Contractor, with the Tender response. Failure to return all documents, complete with a register of all copies issued, may result in the Tenderer’s Submission being deemed to be non-conforming.

During the construction period, drawings may be copied for distribution and use on the project. However, all copies shall be registered, and drawings stamped.

The Contractor shall be able to account for drawings issued to all third parties.

9.10 DESIGN RESPONSIBILITY

The entire installation including all equipment proposed for the supply and installation of the integrated security system, including all devices installed by others requiring connection to the security systems provided as part of this contract, shall be capable of meeting the technical and performance requirements of this specification and contract drawings.

The works shall be carried out in cognisance that in most cases these facilities are public environments and all services provided shall be fit for the purpose of their intended use. Any defects, incompatibilities, shall be reported to Head: Properties and Facilities prior to any rectification works.

Each system and items of equipment for each system installed as a part of this project shall be complimentary in performance and duty and shall interface to each other to operate in the most efficient manner. This shall include the interface between the various systems, as well as all interfaces to the DBSA network, to be installed as part of this contract.

The Contractor shall ensure that the design and the operation of all equipment and the performance of all systems comply with the system of operations as further specified herein.

All system and equipment selections made by the DBSA Project Manager together with full design drawings, cable schedules and the like, in the form of “shop drawings”, prior to the purchasing of equipment and/or commencement of any installation works.

If any system installed as a part of this installation or individual item of equipment is found to be inadequate to maintain the specified performance, or operates in an unsatisfactory or non-compliant manner, then DBSA Project Manager may direct that the fault be rectified, or the equipment replaced.

Ensure that all systems installed as a part of this contract operate in accordance with the true intent and meaning of this specification and the contract drawings.
9.11 **CO-ORDINATION**

Co-ordination of all works shall include but not be limited to:

- Ensure all interfaces are provided and operate as required by DBSA.
- Ensure all protocols are provided and operational aspects and functions are clearly discussed and understood.
- Determine the final location of services provided as part of the Security Services installation.
- Ensure the security installation works are completed in accordance with the works program.
- Determine the location of devices to align with wall and ceiling mounted equipment, while maintaining the required coverage of the device.
- Contractor access into buildings to be pre-approved and arranged by DBSA.
- Ensure the intent of this Specification and the DBSA requirements are met.

9.12 **DBSA ICT UNIT**

The Unit shall be fully responsible for the following upon completion of the installation:

- Local Area Network (LAN) and all associated network switches
- Digital CCTV System Servers
- Digital CCTV System Workstations
- Allocation of IP addresses
- Access control application
- All databases
- Maintenance of all software licenses post implementation

9.13 **UNIT SECURE INSTALLATION**

The DBSA is a standard commercial/public building and all security systems and equipment should accordingly be installed. All equipment, materials, installation methods and workmanship shall be selected, designed and installed in a manner, which is cognisant of the environment and purpose intended.

This shall include, but not be limited to:

- Material and equipment selection shall be suitable for a commercial/public facility.
- All fixings required shall be tamper proof type and uniform throughout the installations.
- Consideration shall be given to heavy traffic areas and the repeated use of many devices when selecting locks, hinges and the like, which will need to be designed for such heavy-duty wear and tear.
- All fixing methods, manner of installation, workmanship and the like for equipment and devices shall be suitable for use in a general commercial/public facility.
- Wherever possible, devices shall be flush mounted, and all services securely concealed.
- All devices however shall remain serviceable without the need to damage infrastructure, finishes and the like. Wherever possible, service access shall be provided by others or as part of this contract.

Any equipment installed within these facilities which are considered by the Facilities: maintenance Specialist to be unfit for use in a general environment shall be replaced when requested by the DBSA Project Manager.
9.14 DOCUMENTS AND DRAWINGS

Where the copies of the documents in addition to the entitlement under the Project are requested, such additional copies of Documents will be available at the charge current at the time of request.

9.14.1 DOCUMENT CONTROL

The installation drawings and the specification shall be handled as Controlled Documents.

During the tender and construction period, a process shall be implemented to control the issue, copying and destruction of documentation issued.

Provide details of the proposed method by which all documentation (soft and hard copy) shall be protected and/or reproduced, to the satisfaction of the DBSA Project Manager.

The destruction of all documentation shall be logged and destroyed in an approved manner to the satisfaction of the DBSA Project Manager.

9.14.2 DOCUMENTATION

- Prior to final inspection and testing, one (1) copy of all ‘As Constructed’ documentation and a CD with the electronic format documents and drawings shall be submitted to the DBSA Project Manager for approval in hard and soft copy.
- Prior to being granted Practical Completion, the documentation, including electronic format CD, shall be provided to the DBSA Project Manager, prior to delivery to DBSA.
- Manuals shall be compiled using the Microsoft Office word processing package or other approved package and supplied in the nominated format medium as well as in hard copy unless otherwise specified.
- All drawings shall be compiled in a nominated drawing format and supplied on the nominated format medium as well as in hard copy.
- Manuals shall be arranged with a table of contents and index to provide a logical referencing system.
- On receipt of written approval, final issues of the manuals shall be produced on good quality high white 100 g/m² paper.
- Two (2) sets, or as required in the Main Contract, of “As Constructed” documentation neatly bound and indexed and the electronic format CD, shall be delivered as part of this project, once approval of draft copy is provided.
- Text shall be in English and as specified in the Main Contract.
- Manual covers shall be hard bound with an A4 three (3) ring loose-leaf file.
- The Contract and equipment details shall be embossed on the front cover and the spine.
- Colours of covers and embossing shall be confirmed with the DBSA Project Manager.
- Numbered-ridged dividers shall be provided between each section of the manuals.
- Standard equipment manuals for equipment installed as part of this contract, shall be provided where available.
- The manufacturer or supplier provided standard equipment manuals shall not replace the installed system specific manuals, which shall fully describe the actual systems, "As Installed".
- The drawings shall be approved by the DBSA Project Manager prior to the issue of draft copies for review.
- All drawings shall comply with the relevant Local and International Standards and shall be provided in reproducible format.
- Drawings shall be provided in accordance with Clause 3.13.7 As Constructed Drawings.
- The drawings shall be produced in the A1 format for Builders requirements and A3 format for DBSA. (Refer to the drawing requirements.)
The documentation as a minimum shall include the following sections:

- Title Sheet (format to be advised).
- Index of complete set of documents.
- Index of each volume
- General System Overview. This is a one-page, non-technical description of the actual works. All technical terms and jargon shall be fully explained.
- General Description of System Operation including each sub-system. This is a non-technical description of the installed system, how the equipment operates and user functionally.
- Detailed System Implementation Documentation and block diagram.
- Full user operating instructions in the form of Training Notes, for each system including detailed procedures for:
  o start up each system;
  o shut down of the various systems, (under normal and emergency conditions);
  o general system changes, (Card details, Door Schedules, overrides, CCTV programming
  o override procedures;
  o Recovery procedures and the like.
- All supplier and manufacturers Operational Manuals.
- Full maintenance manuals and trouble-shooting instructions for each system.
- Manufacturers’ Data and Information.
- ‘As Constructed’ drawings, folded and bound in plastic sleeve (one drawing per sleeve). Electronic copies in format required by DBSA.
- All “Shop Drawings” of equipment installed as part of this contract.
- Schematic Diagrams for each system “As Constructed”.
- A complete set of test data results for each system/zone as requested in the commissioning test criteria sheets.
- Cable and Termination Schedules for all systems and enclosures in the ITP format as nominated.
- Completed programming sheets for each installed system, including all system and hardware logins, passwords and access codes as may apply.
- Manufacturers’ Warranties.

9.15 DRAWINGS
The following shall apply:

- The locations shown on drawings for devices, equipment panels, termination panels, and the like, are indicative and final locations shall be determined on-site to comply with site requirements, building structures, features, and other services.
- Where dimensions are shown on Drawings, check all pertinent dimensions and conditions on or about the site before the commencement of work.
- On a set of drawing prints, provided at the commencement of the construction stage, indicate any variations to device locations, termination panel location and layout, major cable and cable enclosure routes, any other system points, underground conduits, draw in pits and the like.
- The drawing prints shall always be with the Contractor and amended daily and available for inspection by the DBSA Project Manager. Add information permanently and legibly using identical symbols to those on the drawings.
9.15.1 SHOP DRAWINGS

Provide shop drawings of all equipment to be manufactured as part of the works. This shall include:

- Fibre Optic Termination Panel (FOTP) and Patch Panel layouts and elevations for all Security Services.
- Building equipment cubicles.
- Locking device details.
- Cut-outs in doorframe and details for all devices.
- All details or devices as shown on the Security Services Drawings.
- Other equipment as required by the Facilities Unit.

Shop drawings shall be submitted prior to the purchase or manufacture commencing, with enough time to allow ten (10) working days for comment to be returned.

All shop drawings shall be legible and accurate, drawn by a competent draftsperson in accordance with relevant drawing standards. Select drawing scales to afford clarity. Typically, for termination panels and the like, use scales not less than 1:10 for assemblies and 1:5 for details.

Drawings shall be signed and dated by the Contractor and approved by the DBSA Project Manager.

9.15.2 AS CONSTRUCTED DRAWINGS

Legible and accurate “As Constructed” drawings, drawn by a competent draftsperson in accordance with relevant drawing standards, shall be provided as a pre-requisite to the granting of practical completion.

Select drawing scales to afford clarity. Typically, for termination panels and the like, use scales not less than 1:10 for assemblies and 1:5 for details.

Drawings shall be signed and dated by the Contractor and approved by the DBSA Project Manager.

The drawings shall be counter signed and dated to confirm that they have been review and approved, for issue.

As Constructed drawings shall:

- Show all works/variations completed during the currency of the Contract.
- Show details of all types of cabling installed as part of the contract works.
- Show block schematic cable diagrams indicating all system interconnecting cables including cable routes and cable types complete with core make up and numbers.
- Show detailed floor plans indicating cable routes and designated circuit identification.
- Show wiring diagram detailing system interconnections and cable/core identification.
- Be suitable for high quality reproduction.
- Be free of copyright conditions and the like that may constrain the DBSA Project Manager from using, copying or referring to them.
- Be prepared by a qualified CAD operator.
- Be provided in AutoCAD 2006 or higher on CD ROM.

One (1) copy of all As Constructed drawings shall be provided for approval.
Once written acceptance of the As Constructed drawings is provided by the DBSA Project Manager, provide:

- One (1) paper copy of all drawings in DBSA A3 format; and
- Two (2) copies in nominated software format.

**9.16 TRAINING**

Training sessions shall comprise of operator and administration training. Each training session should commence with a general system overview, followed by specific system user and administration training.

Operator training shall include but not be limited to the following topics:

- Navigating through live and recorded video views
- Navigating using graphic maps
- Changing the layout of viewing panes
- Displaying cameras into different layout options
- Displaying cameras in sequences and groups
- Retrieving and viewing recorded footage
- Taking snapshots of footage
- Saving selected video footage
- Keyboard use
- PTZ control
- Alarm management and handling
- Motion searching
- Viewing saved and exported footage

Administration training shall include all operators training as well as all administration functions including but not limited to the following topics:

- Setting up user accounts and passwords
- Allocating user privileges
- Restricting cameras and camera groups from being accessed by selected operators
- Modifying equipment configurations (recording rates)
- Developing and modifying camera sequences, groups and guard tours
- Configuring alarm inputs and outputs
- Creating graphic maps and assigning associated cameras and monitors
- Assigning Video Management Software with Random Array Independent Drives (VMS with RAID) to cameras and creating recording schedules
- Assigning backup Video Management Software with Random Array Independent Drives (VMS with RAID) to cameras and creating recording schedules
- Exporting video footage
- Basic fault finding and troubleshooting
- Determining network faults versus system faults
Provide on-site training to nominated DBSA staff. Training shall be comprehensive, “hands on”, covering all aspects of operations using all equipment, as installed in accordance with this document.

Submit a detailed training program no less than four (4) weeks after award of the contract for review by DBSA and a final training program four (4) weeks prior to the commencement of training. Allow to fully train six (6) groups of up to three (3) staff and provide all training aids and notes. Training shall be undertaken on a “live” working system.

Each group should receive as a minimum a four (4) hour formal training session on the installed equipment to familiarise themselves with all operations.

The Contractor shall at the completion of all training issue Accreditation Certificates to all staff/contractors confirming their attendance and completion of all training and the ability to use all system-based equipment to the satisfaction of the Security and DBSA.

The training facilitator shall have a comprehensive knowledge of the operating systems, system software, equipment hardware and the like and have proven successful training experience.

All training aids and notes necessary to provide effective training to the staff shall be supplied to and remain the property of DBSA.

Training shall occur at the Contractor’s premises and/or at a venue arranged by DBSA on site.

Prior to final acceptance of the installation by the Head: Properties & Facilities, comprehensive training on the installed system for both operational and administration staff shall be completed.

At the completion of the training all system users shall have a comprehensive knowledge of the operating systems, system software, equipment hardware and the like allowing them to operate the system to the level of their password access.

Four (4) weeks prior to the commencement of training, submit a final outline of the training schedule clearly stating the duration of the proposed training sessions, the number of persons to participate in each session and the detailed outline of items to be addressed in the training of each system.

Provide hourly rates applicable for further training sessions beyond that offered in the Schedule of Unit Rates.

9.17 PROGRAMMING

The Contractor shall carry out programming of all systems supplied under this Contract (i.e. or interfaced to), including initial setup and data entry in accordance with the requirements of each area/zone, local/remote operation or network interface to other systems.

The Contractor shall provide and assist DBSA with all configuration pro-forma sheets that shall be made available from the Contractor two (2) Weeks prior to final commissioning to allow for cross checking of information by DBSA and final programming by the Contractor.

The programming shall include, but not be limited to:

- Parameter setup for all Security Services systems, equipment, interfaces and integrations components.
- Setup of required reports generation and the like necessary for each system to operate, log and report correctly.
- Device identification tailored to DBSA l’s preferred nomenclature.
• Graphical mapping, icon placement and identification.
• Any work necessary for each system to fully integrate with other nominated systems, operate as specified, log and report correctly.

9.18 FACTORY ACCEPTANCE TESTING AND DELIVERY

The Factory Acceptance Test (FAT) shall be undertaken at the Contractors workshop prior to installation on site.

The system of operation shall be reviewed to demonstrate compliance with the technical requirements of this specification and the interface between systems. Enough devices must be connected to the systems for factory test to satisfactorily demonstrate technical compliance. As a minimum the follow components shall be included within the Factory Acceptance Testing:

• CCTV workstation and all associated display monitors
• All graphical maps required under this Contract
• 10% of cameras
• 10% of camera encoders
• Camera power supplies

Before Factory Acceptance Testing submit the proposed Factory Acceptance Testing report for review by the Facilities & Security. The proposed report shall be returned with correction as required. The report shall show all test results, performance test data and all other information relating to essential requirements of the Specification.

Prior to Factory Acceptance Testing the systems shall be pre-assembled, pre-programmed and adjusted for optimum performance to provide a good overview of the operation of the systems.

In carrying out the factory tests:

• Check that all equipment is fully operational, as previously tested and confirmed by the Contractor.
• Demonstrate to the Facilities & Security the correct operation of all system functions.
• Provide a comprehensive Factory Acceptance Test report outlining all test results, performance test data and all other information relating to essential requirements of the Specification and/or deemed necessary by the Facilities & Security.
• Make any minor adjustments/changes as necessary as approved by the Facilities.

Any equipment, which fails to operate correctly, shall be replaced and the Facilities will be provided with a report on the failure and the rectification that will occur.

Delivery of items to site shall be in accordance with installation schedule/program as approved by the DBSA Project Manager.

9.19 TESTING AND COMMISSIONING

9.19.1 GENERAL

The following testing shall be undertaken as part of this contract:

• Commissioning testing of the entire installation.
• Performance and Acceptance testing of the installation.

Each phase of testing shall be documented and all test sheets for all commissioned items shall be provided to the DBSA Project Manager.

The systems Inspection and Test documents shall include Quality Assurance and Control procedures.

A written notice of intention to test shall be provided not less than twenty-one (21) working days prior to the carrying out of such tests.

Before any testing, submit the proposed Inspection and Test Plan (ITP) for review by the DBSA Project Manager, Security and IT personnel. The ITP’s shall show all test results, performance test data and all other information relating to essential requirements of the Specification. All ITP shall provide comment and sign off lines.

Testing and Commissioning shall include the installation and operation of all equipment installed as a part of this contract.

Provide all test equipment, associated ancillaries, personnel, and the like to fully test and commission the installed equipment to the satisfaction of the Facilities: Maintenance Specialist.

In carrying out the commissioning tests:

• Check all equipment is fully operational.
• Demonstrate to the DBSA Project Manager the correct operation of all system functions.
• Provide a comprehensive final ITP report outlining all test results, performance test data on all cables, and any other information deemed necessary by the DBSA Project Manager.
• Testing and Commissioning report that will be submitted to form part of the project documentation following the completion of the works.

Any equipment, which fails to operate correctly, or is found installed incorrectly shall be rectified or replaced immediately.

The total integrated system shall operate without any failure or disruption to the operation of the system for a period of one (1) week. The installation and equipment shall only be accepted after satisfactory completion of commissioning and a one (1) week fault free period. If any test is unsuccessful or the system fails to operate fault free for the one (1) week period, the equipment shall be replaced as appropriate and subject to a new one (1) week test. Such delays shall not affect the overall works program or contract cost.

9.19.2 INSPECTION AND TEST PLANS

The ITP shall define the process required to test each point, its alarm response and interface to other systems and its return to normal status. This shall include correct nomenclature, point identification, system logging and the like.

The ITP shall show general, process, inspection and acceptance details including but not limited to:

• Provide a unique number for each Plan, description, title, page number – of - and ITP process.
• Provide supplier’s company name.
• Provide installer’s company name.
• Provide revision status and date of ITP.
• Provide customer’s name, contract number, contract description/title.
• Identify the process step by a unique number.
• Identify the device audits individual devices number.
• Include the manufactures details, part no, serial no, etc.
• Define the system to which the device is connected.
• Define the normal status of each device and system.
• Define the test procedure, inspection and test points.
• Define the correct system response and related Specification point.
• Define other required system response, acceptance criteria and identifying characteristics.
• Define checks required to confirm correct response.
• Define the return to normal status.
• States the checks required of the system to confirm return to normal status.
• Details of person responsible for inspection/test on each ITP sheet.
• Identify reference documents for all tests.
• ITP authorisation signature and date.
• Provision for acceptance signatures.
• Provision for verification signatures.

A typical ITP shall be prepared for each system and device type. The ITP shall be completed for each device when the commissioning and testing is carried out.

The ITP shall be completed and signed off on a complete operational system and provided to the DBSA Project Manager prior to the final inspection for Practical Completion.

9.20 EQUIPMENT FAILURES AND PROGRAMMING DURING INSTALLATION AND COMMISSIONING

All equipment failures shall be documented and recorded by the Contractor in a Failure Summary Report. The Failure Summary Report shall, as a minimum detail:

• Date of failure;
• Parent equipment name;
• Details of failure;
• Remedial action taken, and
• Number of occurrences of failure.

During the conduct of commissioning the Contractor shall:

• Including all other items in this Specification, confirm that all equipment is fully operational.
• Allow for programming changes and camera view adjustments as a result of testing during commissioning and final inspection by the DBSA Project Manager.
• Rectify or replace any equipment that fails to operate correctly, or is considered by the DBSA Project Manager, to be installed incorrectly.
• Provide all passwords required and/or programmed as part of these works to the DBSA Project Manager.

9.21 PRACTICAL COMPLETION

Practical completion shall only be granted after:
• A physical inspection of the works and functional testing is completed.
• Testing and commissioning of all installed equipment is completed, and commissioning sheets signed off by the DBSA Project Manager.
• DBSA Project Manager is satisfied that the system is operating in the correct and specified manner.
• All nominated staff is trained to a demonstrable level of competency, where the staff may carry out their required functions when requested by the DBSA Project Manager.
• DBSA has accepted all systems and confirmed that all training has been provided to staff.
• All information is provided to the DBSA Project Manager for final approval. This includes all documentation as specified in this Contract.
• All systems equipment has been proven to operate faultlessly for a total period of one (1) week following the successful commissioning of the complete system.
• All Drawings and Documentation required under this contract and approved by the DBSA Project Manager is provided in hard and soft copies to DBSA.

If all the above criteria are met, Practical Completion shall be granted.

Failure of the system during the one (1) week test will incur a further two (2) weeks of testing after the faulty part is repaired and commissioned, until the complete system operates faultless for one (1) continuous week.

9.22 DEFECTS LIABILITY

A warranty for all equipment, materials, works and the like shall be provided for a Defects Liability Period of fifty-two (52) weeks. The Defects Liability Period shall only commence from the date when Practical Completion is granted in writing by the Facilities: Maintenance Specialist.

During the Defects Liability Period attend on-site within four (4) hours of notification of a failure of the equipment and associated systems installation. This call out requirement shall apply on a 24-hour day, 7-day week basis.

All works implemented as a part of this contract which prove to be faulty from workmanship or materials shall be, without additional charge, ‘fully maintained and serviced’ during the defect’s liability period.

‘Fully maintained and serviced’ shall include:

• Repair of all equipment, materials and works which prove faulty within the nominated period.
• Replacement of all faulty equipment, materials and works with equipment within the nominated repair time to ensure no loss of service.
• Quarterly maintenance inspections of the system to test and verify continued operation of the whole system in accordance with the performance parameters specified by the equipment manufacturer. Where any variances to the system performance have been identified since the granting of practical completion, such variances shall be rectified by the contractor at the contractor’s expense.

All works carried out during each visit shall be recorded and copies of all records forwarded to DBSA within seven (7) days of conducting the visit. DBSA’s defined security procedures for access to and during site attendance over the defect liability period shall always be followed.

DBSA reserves the right, on failure to perform such corrective works, to engage others to finish such work without further notice the costs of such works shall be deemed a debt to the Contractor.
10 GENERAL REQUIREMENTS

10.3 STANDARDS AND STATUTORY REQUIREMENTS

The design, quality control, installation and testing of the complete installation shall comply with the international standards and local statutory authority regulations, building and fire regulations as amended.

10.4 STATUTORY REGULATIONS

The installation shall comply with, and all equipment shall have a certificate of compliance to the relevant standards, statutory authority and/or regulations.

10.5 SPECIAL ENVIRONMENT CONDITIONS

The installation shall comply with the requirements in the appropriate areas for Special Environment Conditions.

Ensure all special environment conditions are met with appropriate product and work practices. Where required have a certificate of compliance to the relevant standard, and/or statutory authority and/or regulations.

10.6 DBSA STANDARDS

All works shall be carried out in accordance with DBSA standards.

10.7 CONFLICT BETWEEN DOCUMENTS

Where any conflict is noted between the requirements of the Contract, specified standards or statutory regulations the Facilities: Maintenance Specialist shall be notified, in writing, detailing the nature of the conflict.

10.8 OPERATIONAL ENVIRONMENTS

All equipment supplied shall be suitable for continuous operation at an ambient temperature of between -15 and 50 degrees Centigrade and 0 to 95% non-condensing humidity.

10.9 ELECTROMAGNETIC COMPATIBILITY REQUIREMENTS

The total integrated system shall be such that it does not cause any interference, nor shall it be affected by electromagnetic transmissions.

In the event of the inherent characteristics of equipment being such that interference is possible, such equipment shall be provided with effective interference suppression devices and techniques to eliminate the interference.

Ensure that all equipment supplied and installed under this Contract does not interfere with the reliable operation of other systems connected to the common power supply or located within the project environment or adjacent buildings.

Upon request from the Facilities: Maintenance Specialist, demonstrate any possible cause of noise generated within the project environment which may affect the reliability of any equipment supplied under this Contract through simulation or any other method necessary to identify the interference. Possible
measures to eliminate any identified interference shall be discussed and confirmed with the Facilities: Maintenance Specialist.

10.10 GROUNDING OF EQUIPMENT AND CABLING

All installed equipment and cables must be properly earthed as per specified standards or statutory regulations applicable.

10.11 VERMIN AND INSECTS

All enclosures, cabinets, ducting, housing and conduits shall be sealed or otherwise protected to prevent the entry of vermin or other insects which could damage the equipment, cabling or degrade the performance of the installed system.

10.12 FABRICATED EQUIPMENT

Fabricated equipment shall be of robust, symmetrical and unwarped construction.

Metalwork shall be neatly and accurately cut and free from undulations or any other distortions.

Form bends and folds in sheet metalwork with a suitable bending machine.

Neatly execute welding with the finished weld ground or filed smooth, seamless and level with the surrounding surface.

All fabricated metal work shall be painted. The colour of the paint finish shall be as directed by the Facilities: Maintenance Specialist.

10.13 ENGRAVING / LABELING

For engraving/labelling, use machine engraving/labelling with upper case letters, unless otherwise specified.

All engraving/labelling shall be uniform throughout the site.

All panels and equipment shall have engraved/printed labels permanently fitted. Obtain prior approval from the Facilities: Maintenance Specialist in respect to letter heights, colours and nomenclature.

All equipment within cubicles, panels, racks and the like shall have engraved/printed labels fitted.

All engraving/labelling throughout the installation shall be uniform in:

- Material.
- Lettering style.
- Line thickness.
- Fill colours.
- General layout.
- Fixing method

10.14 SAMPLES OF EQUIPMENT AND MATERIALS

Samples of equipment, fixings and fixtures, devices, outlets, cabling, materials and workmanship showing terminations for all types of cable to be used, identification labels, shop drawings of cable looming, equipment rack layout, equipment cabling and the like shall be submitted on a board providing an effective display of the sample for inspection to the Facilities: Maintenance Specialist for comment within fourteen (14) days of award of the contract. The samples shall be retained for inspection comparison during the contract works.
The Facilities: Maintenance Specialist has criteria for the standard of equipment, workmanship and materials to be supplied and installed as a part of this contract shall retain the samples. Any sample item that does not comply may be rejected by the Facilities: Maintenance Specialist and shall be replaced at no cost to the Contract.

Samples shall be submitted for equipment, which will be installed in visible locations and as required by the Facilities: Maintenance Specialist.

Samples shall be submitted at such a time to allow fourteen (14) days for approval and the necessary procurement time such that delivery to site will not delay the works.

10.15 SAMPLES/MOCK-UP OF PROPOSED SYSTEMS EQUIPMENT UPON AWARD

As part of the Factory Acceptance Testing, demonstrate the systems to DBSA, to qualify their full compliance with the specification about their system current status of development.

Provide all systems and device samples for selection by the Facilities: Maintenance Specialist and DBSA IT representative, which shall include all equipment, and sample set up on appropriate boards to display correct fitting.

Arrange as required by the Facilities: Maintenance Specialist and DBSA, system demonstrations and mock-ups for evaluation by the Facilities: Maintenance Specialist and DBSA IT representative.

A final full “Mock-up Test” using the specified equipment on the DBSA cable LAN to confirm suitability of all system components and operations proposed for the Works shall also occur as the Final Factory Acceptance Test prior to delivery of the systems.

10.16 EQUIPMENT LOCATIONS

Refer to the Drawings for all equipment locations.

10.17 ‘AS NEW’ CONDITION ON COMPLETION

Proper care shall be taken to protect all apparatus, materials and equipment stored or installed on site.

Any fitting, accessory, cabling, materials or item of equipment which form part of the work shall not be used for any purpose other than approved testing.

The works including all materials and equipment shall be handed over at the date of practical completion in ‘as new’ condition.

Should the Facilities: Maintenance Specialist consider any components including wiring to be unsuitable, they shall be removed and replaced at no cost to the Contract.

10.18 MAINTAINING THE STATUS QUO

When the execution of the works causes damage, repair such damage with materials compatible with the surrounding material and finish off flush with the surface on which they occur.

This shall include but not be limited to the re-establishment or making clean of all ceiling panels, wall finishes, bitumen roadways, paths, lawns, irrigation pipe work, sprinklers and other areas necessary to be re-established which are damaged in the course of this Contract.
10.19 UNIFORMITY OF EQUIPMENT
Maintain uniformity of equipment, installed as a part of this contract, with DBSA’s systems or equipment as noted in this document.
Co-ordinate the supply of uniform equipment from the various suppliers.

10.20 SPARE CAPACITY
Equipment enclosures providing battery backup and Power Supply Units shall have a minimum future installed spare capacity to accommodate the full population of the installed hardware.

10.21 PENETRATIONS
10.21.1.1 FIRE RATING OF PENETRATIONS
Penetrations through fire rated building elements shall be sealed with an approved fire rated material/method after the installation of services. Under this contract employ an approved installer utilising approved methods and materials to carry out such works to fire proof the penetrations. Proposed installer, methods and materials shall be submitted for approval to the Facilities: Maintenance Specialist.

10.21.1.2 PENETRATIONS
All unused or partially used penetrations shall be made good to the satisfaction of DBSA. This shall include all flushing and the trimming of openings.

10.21.1.3 CEILING CUT-OUTS
All ceiling cut-outs required for conduit penetration to surface mounted equipment and for the flush mounting of equipment shall be provided as part of these works. Equipment shall not be secured to the Ceiling grid. All heavy items of equipment such as monitors and PTZ cameras shall be fixed to the slab so that no weight or stress is placed on the Ceiling grid.

10.22 EQUIPMENT REQUIREMENTS
All equipment supplied and installed as part of this contract shall comply with the appropriate standard and the following requirements.
All equipment unless otherwise stated shall be 19" rack mountable, modular in design and allow expansion of equipment without redundancy of installed equipment.
Cooling shall be by natural ventilation in cubicles and by forced ventilation in equipment racks.
All switching contacts shall be rated by the component manufacturer for 100,000 operations at the installed current rating and operating current (i.e. AC or DC).
Relay coils shall be suitable for operation from their respective supply voltage +20%, -25% in the battery powered equipment and +15% in mains only powered equipment.
A frequency of 1000 Hz shall be used for test and reference purposes in audio circuits.
Cabling shall be protected against damage by current overloads.
Cable liable to bending during service or maintenance shall be of a flexible multi-core type.
Plugs and sockets shall be labelled with the circuit they are connected to.
Cabling within equipment shall be neatly laced and tied and supported on metal brackets as necessary.
Interconnections between equipment and internal modules shall be via plug socket connections, wherever possible.

All indication lamps shall be LED.

10.23 FITTINGS AND ACCESSORIES

10.23.1 GENERAL

Device heights and types of devices are provided within this Specification. Notify the Facilities: Maintenance Specialist in writing of any conflict found between sections of the documents.

Inspect and become familiar with the drawings, floor plans, wall construction and facing to ensure adequate fixing, access and installation space for ceiling and wall mounted outlets and equipment.

All fittings shall be new and of type/make as specified elsewhere.

All fittings shall be installed flush unless otherwise specified.

In all external areas, face plates and fixtures shall have mastic or silicon type sealant installed between the face plate and the wall and is fixed using tamper proof screws.

Wherever possible wall and ceiling structures should be reinforced during construction to allow standard fixing arrangements to be used to mount equipment securely.

Submit for approval a detailed schedule listing all secure fixings to be used.

10.23.2 POSITIONING AND RELATIONSHIP OF ACCESSORIES

Ensure that the positioning and relationship of all accessories are rationalised as further specified.

All equipment in adjacent areas shall be aligned horizontally and/or vertically.

Where devices and equipment are shown on drawings as being adjacent, but at different heights, if they are located within one metre of each other, they shall, unless specifically necessary for pendant type connections, be aligned vertically one above the other.

Due care and consideration shall be given to outlets from other trades, (e.g. mechanical services connections and the like), so that if they are installed and co-ordinated at the same heights, they are aligned vertically one above the other.

Special care shall be given to ensure that common sizing, colour and brands are utilised for accessories.

Where outlets are installed in brickwork and/or tile coursing, care and consideration shall be given to the orientation of the fittings within the tile coursing, so that they line up with the tile jointing, preferably with outlets located on the junctions of four tiles.

Where fittings are mounted within brickwork, care shall be taken that the wall boxes are aligned centrally on/or between mortar joints and that where possible flush plates and/or fittings are of standard brick dimensions.

Compliance with the South African Building Codes and regulations shall take precedence over all details provided on drawings or within the specification.

Generally, the position of outlets is available off drawing elevations but where they are not shown, the exact position shall be approved by the Facilities: Maintenance Specialist.

If any confusion has arisen as to the exact position of any equipment, clarification shall be sought from Facilities: Maintenance Specialist as to the exact positions of these items.
Heights of equipment shown or specified are indicative only and heights shall be adjusted throughout the works to approved levels to align with joints, adjacent outlets and fixed furniture items.

10.24 LOCATION AND FIXING OF EQUIPMENT

Rigidly fix equipment neatly and symmetrically to rigid supports.

All exposed fixings shall utilise a tamper proof head or permanent fixing.

Ensure fixings are in accordance with engineering practice and suitable for the purpose intended.

Heights shown on drawings or specified are the heights from finished floor level to the centre of the equipment, unless stated otherwise.

The locations shown on the drawings for all fittings and accessories are approximate only and final locations shall be determined on-site to comply with site requirements and shall be approved by the Facilities: Maintenance Specialist.

The precise location of all equipment shall be ascertained prior to commencing the installation works.

10.25 EQUIPMENT ENCLOSURES/PANELS

10.25.1 GENERAL

All panels, racks and cubicles shall be complete with dust seals on doors.

In general, all enclosures shall meet with Ingress Protection category IP66 standards and be located as indicated on the drawings or to the satisfaction of the Facilities: Maintenance Specialist.

Externally located enclosures shall comply with the above and be constructed from 5152/H34 or equivalent minimum 2.5 mm thick marine grade aluminium with powder coated finish.

External enclosures shall be IP66 rated.

Where necessary, panels, racks and cubicles shall be supplied with rear mounting plates and top entry cable gland plates to facilitate top entry of cables from over-head cable trays, cable ducts or conduits.

Holes provided for cable access shall be suitably flanged and sealed to prevent moisture ingress and provide protection of cables.

Panels and/or escutcheons shall be fitted with knurled chrome plated thumb screws.

The screw heads shall be fitted with screw driver slots.

Screws shall be complete with captive fibre washers.

Panels, racks and cubicles shall be securely fixed in position or located as indicated using suitable fixings. This includes eye bolts, wall brackets/angles, pole clamps and the like.

Suitable key locking chromium plated handles shall be fitted to all enclosures. Where necessary, multiple locking arrangements using lever handles shall be fitted to enclosures requiring more than one locking point.

All keys for enclosure locks shall be of a high security rating and supplied in duplicate.

All equipment panels, racks and cubicles shall be complete with a tamper switches connected to an SMS alarm/reporting system.

Where possible, 19-inch racking shall be utilised to accommodate equipment with special attention being given to providing adequate access for service accessibility to on-board diagnostic indicators and rear mounted connections.
All equipment enclosures shall be labelled appropriately to clearly indicate their function.

Each section of cubicle, enclosure and rack shall be labelled to indicate equipment/device identification, number and local power supply circuit number.

Submit drawings with construction and finish details of all equipment enclosures, panels, racks and cubicles to the Facilities: Maintenance Specialist prior or purchase of manufacture.

Drawings shall include all details such as metal work type and thickness, IP Ratings, cables access facilities, paint finish method and colour, proposed equipment layout and the like.

10.25.2 EQUIPMENT CUBICLES

Equipment cubicles within the building shall be in security services equipment cupboards, plant rooms, and lift motor rooms or as shown on the drawings.

All equipment cubicles to be supplied and installed as a part of this contract, shall comply with the following:

- Mounted in a secure location in security equipment cupboards.
- Fitted with tamper switches connected to the Security Management System (SMS).
- Fitted with approved high security key locks to access door.
- Fitted with terminals designed for the size and type of cables installed.
- Clearly and permanently numbered terminals.
- Include laminated circuit schedule (detailing all terminated and spare cable cores) mounted on the inner door of the enclosure.
- Be constructed of mild steel, minimum thickness 2.0mm fully welded.
- Concealed hinges to access door. Note: it shall not be possible to remove hinge pins while the door is in the closed position.
- All cables shall be neatly arranged and loomed.
- Access doors shall open 180 degrees to allow easy access to terminals.
- All equipment shall be appropriately labelled to indicate their function.
- All screws shall be complete with captive washers.

10.26 TAMPER ALARMS

All equipment housings, equipment racks, enclosures, cubicles for all systems and sub-systems, cameras, intercom units, intrusion detection devices, duress push buttons and the like shall be fitted with tamper switches interfaced to the appropriate alarm inputs to provide immediate alarm warning at the SMS.

Tamper alarms shall be monitored 24 hours a day.

Tamper alarms shall report as a priority alarm.

All cabling necessary to connect the tamper alarms into the SMS shall be installed as part of this project.

10.27 PAINTING EQUIPMENT AND DEVICES

All metal work shall be free from grease, rust scale and shall be finished with an approved factory applied paint system of a selected approved colour.

Ensure finished surfaces of all paint work not otherwise specified, are free from bubbles, runs or any other imperfections and have a high gloss finish.

All touching up of paints shall be accurately matched to the factory applied finish.
Submit colour and finish sample to the Facilities: Maintenance Specialist for comment and approval prior to painting or powder coating.

10.28 POWER SUPPLIES

The AC power supply to the security installation shall be provided at a nominal 240VAC 50 Hz from the Essential Supply in each nominated communications cupboard in each building.

All equipment supplied and installed as part of this contract, shall be capable of operating over the following voltage and frequency variations:

- Voltage 240VAC +/- 6%
- Frequency 50Hz +/- 5%

Battery supported power equipment panels shall comply with and provide the following:

- House the power supply unit and the standby batteries within a metal cabinet complying with local wiring rules.
- Provide transformers and voltage rectification equipment required to supply power to equipment panels and connected devices.

Exposed plug-in step-down transformers shall not be accepted.

The power supply unit for field equipment shall be independent of the control and communication equipment power supply.

10.29 CABLING FOR SECURITY SERVICES

10.29.1 GENERAL

All terminated cabling shall be neatly tied/loomed to prevent damage to terminations, stress on cables and interference or obstruction of other services.

All cables within a loom shall be grouped to allow easy work on a selected number of cables, e.g. by door, camera location or area.

All wiring shall comply with the latest issue of the Local Supply Authority where relevant, any additional requirements specified hereunder, and the installation and cable route shall be to the satisfaction of the Facilities: Maintenance Specialist.

Cables shall meet the requirements of the appropriate standard for installation, cable size, use and environment.

All cabling shall be concealed and installed on metal cable tray, cable duct and conduits.

Cabling shall be installed with due regard to future removal and replacement of cables.

All cables shall be new and delivered on site in unbroken reels, and with the ‘manufacturers’ label attached.

All cables shall have stranded copper conductors unless specified otherwise.

Cables shall be installed in a manner eliminating any possibility of strain on the cable itself or on cable terminations.

Conceal all wiring wherever possible with due regards to future removal and replacement of cables.

Where unavoidably exposed to view, cables shall be enclosed in conduit or ducting installed as inconspicuously as possible.
Where PVC cables are installed in ducting, each circuit cable shall be grouped and taped at approximately 3,000 mm intervals. Tag each circuit at entry and exit to ducting.

When setting out cable routes for all services/trade’s drawings indicating proposed routes shall be sent to the Facilities: Maintenance Specialist for review.

The cables shall be installed in roof and ceiling spaces on tray, catenary, clipped to floor slab above or roof members as required.

Where cabling is installed in roof space above a remote device a “courtesy loop” of three (3) metres of extra cable shall be secured in the roof space to facilitate the minor relocation of a device in the future.

Group cables in major runs and follow the route of corridors, and the like, and the structural features of the building (i.e. parallel or normal to the building axis) as far as possible.

Cables shall be supported clear of ceiling tiles and be kept separated from other building services.

Observe cable size, rating, and de-rating factors in accordance with relevant Standard and/or manufactures requirements.

**10.29.2 CABLE INSTALLATION**

During the installation of cables should any kinks or abrasions to insulation, braiding, sheathing or armouring occur, the affected cable shall be withdrawn and replaced with new cable.

In the event of finding evidence for reasonable doubt as to the non-compliance with this clause, the Facilities: Maintenance Specialist reserves the right to direct that the suspect cable be withdrawn for inspection. The cable shall be withdrawn and replaced if required at no further cost.

All cables shall be installed under the 'loop into fittings' system with adequate slackness behind equipment, to facilitate removal for inspection, adjustment or replacement.

No joints or connections along the cable shall be permitted.

Cables shall be terminated at the device end using soldered connections and finished using a heat shrink to cover all bare wires. No cores shall be exposed outside the cable.

All cables terminating on a screw, bolt or stud shall be fitted with approved crimp.

Crimped lugs shall be fitted using the correct size and type of crimping tool.

Further to the requirements of local rules for terminations. The cabling outer sheath shall be cut back to allow terminations to be correctly fastened. The terminal connector, spare cores and exposed cable shall be suitably insulated in heat shrink to give continuous covering from the cable outer sheath to the connector. Cable numbering shall be located at or near the heat shrink.

Exposed cable cores of any kind shall not be acceptable and shall be finished as per the Facilities: Maintenance Specialist requirements.

The lugs current rating shall match as near as is possible the rating of the cables, but in no circumstances shall it be less than the cable current rating.

Flat washers together with an approved type of securing washer shall be used when fixing cable lugs to the screw, bolt or stud.

Any one conductor of a size up to and including 2.5 sq.mm entering a terminal shall have its bared conductor end doubled back on itself to ensure a robust and secure connection.

Two or more conductors entering a terminal shall be firmly twisted together and excess length cut off providing only 3 mm of exposed conductor.
No cables shall be drawn-in or installed in any given area until:

- The conduit installation in the given area is complete.
- Concrete encasing conduits have been poured.
- Wall surfaces are of a finished unpainted state.

Tough plastic sheathed cable used internally in the installation shall, unless otherwise specified, be:

- Multi Core.
- Hidden from view. When required to be chased into walls, they shall be enclosed in conduit.
- Neatly installed and parallel with the axis of the building.
- Kept 150mm clear of hot water pipes, flues and any other heat generating sources.
- Fixed with approved neoprene ties when installed on cable tray, in suspended ceilings and on metalwork and the like.

Cables shall be neatly loomed, securely fixed to the tray and installed parallel with the edge of the tray.

Cables in duct, on trays or other open space enclosures shall be arranged on the tray to avoid unnecessary crossover of cables, spaced to allow adequate ventilation and prevent heating of cables, separated to provide segregation between independent services.

Cable trays shall be coloured in accordance with the DBSA’s colour coding for all site cabling reticulation.

10.30 POWER CABLES, OUTLETS AND ISOLATORS

As required, engage the services of a licensed Electrical Sub-Contractor, who is approved to undertake work on the site to install, terminate and commission all electrical wiring for the distribution of power and all associated outputs.

Following the approval of all works by the Facilities: Maintenance Specialist, qualified electrical trade’s persons shall carry out all works requiring access to or alterations to electrical distribution boards.

Reticulate 240 VAC essential power to all equipment as required.

The minimum size of cable shall be 2.5 sq. mm (7/0.67) for 230 Volt circuits, 0.75 sq. mm (24/0.20) for ELV power circuits.

Due consideration shall be given to voltage drop when calculating cable sizes.

The Contractor shall be responsible for the reticulation of power to serve all security service field equipment, unless otherwise specifically detailed. Install power to provide a combined isolation switch/circuit breaker to each equipment cubicle, equipment rack, equipment panel and the like. Provide all outlets, cabling, circuit breakers, isolators and the like as required.

10.30.1 CABLE NUMBERING

All cables shall be allocated and identified with a unique cable number. Cable identification numbers shall be allocated using an established prefix and approved labelling system which shall be submitted for approval by the Facilities: Maintenance Specialist.

All cables including patch leads shall be clearly labelled. Labels shall be affixed within 20mm of each termination.
Labels shall be ‘Z’ type for cables less than 8mm diameter and Unilabels for cables greater than 8mm diameter (or the Facilities: Maintenance Specialist’s approved equivalents).

Cables shall be fitted with labels at the following points:

- On every cable sheath next to the heat shrink at each cable end.
- On every cable sheath every 300mm for cables in cable pits.
- On each cable group in a cable riser identifying board, door, or device.
- At any additional point on the cable sheath (or around the core bunch) where the requirements above are not readily traceable from the core terminations or exposed cable.
- Within all cable pits

Cable identification tags shall be orientated uniformly to read left to right from the logical viewing point horizontally and from bottom to top viewed from the right where installed vertically.

10.30.2 CABLE SETS

Provide all cable sets and patch leads necessary to the complete the installation.

All cable lengths shall be measured on site prior to manufacture.

All cable sets shall be clearly and permanently labelled to the approval of the Facilities: Maintenance Specialist.

10.30.3 SPECIAL CABLING

Where equipment is being supplied and installed under this Specification and it requires special cabling (i.e. screened cables, unshielded twisted pair, coaxial, optical fibre, blown optical fibre or other special types of cable), provide these cables.

Design the cabling system network and determine the type of cable required for interconnection of the various components, which make up the total system to be installed to comply with the performance requirements of the appropriate act, regulation, standard or performance requirements of this Specification, whichever requires the higher performance.

Ensure correct shielding is provided to all data, audio and video cabling to remove all EMI.

10.31 CABLE ENCLOSURES

All cabling shall be installed in cable enclosures unless protected from mechanical damage by building structures. Cable enclosures shall be installed as follows:

- Within internal ceiling or roof spaces via catenary system.
- Cast into concrete walls, floor slabs, in wall cavities and the like, rigid or flexible PVC conduit may be installed.
- In plant and service rooms and other areas rigid or flexible steel conduit, steel cable duct or steel cable tray shall be installed. All steel conduit or cable duct shall be painted to match the adjacent structures.
- Cabling in risers shall be installed on a cable tray for the full height of the riser with equipment panels, cubicles and fibre optic termination panels mounted over the top of the cable tray wherever possible to reduce space usage.
- All cable enclosures and conduits shall be concealed. No surface mounted cable enclosures or conduits shall be installed without consulting the Facilities: Maintenance Specialist.
- Supply and install all cable enclosures and conduits necessary for the installation of cabling for the various systems specified in this document.
10.32 IDENTIFICATION OF CONDUITS

All conduits to be installed shall be correctly colour coded to comply with relevant standards.

Conduits shall be colour coded as follows:

- Orange - Electric power above ELV
- White - Fibre Optic Cabling, communication circuits including all ELV circuits (i.e. Security).

10.33 CONDUITS

All conduits installed shall comply with the minimum requirements of this specification and any relevant standards.

Unless otherwise specified, conduit used throughout the installation shall be light duty rigid PVC.

All conduit work shall comply with the following:

- Relevant local or international standards for conduits and fittings.
- Oval conduits shall not be installed.
- Minimum size of conduit shall be 20mm.
- Conduits shall be provided with due consideration to reasonable spare internal capacity drawing in of future cables and heat expansion.

All conduits and ducts shall be of an adequate size and have reserve capacity for at least one additional circuit unless the conduit size is specified.

Conduit saddles (double saddles) shall be spaced a maximum of 1,200mm apart.

Where saddles cannot be fixed to the building structure a suitable bracket shall be supplied and installed.

Conduits shall be a minimum of 1,500mm clear of gas and hot water pipes. Conduits shall be installed parallel with these pipes.

Conduits installed in cavity walls shall be fixed to the external surface of the inner-face and shall not touch the outer-face.

All PVC conduit joints shall be made solid and water proof using an approved PVC welding solution.

Metallic conduit exposed to the weather shall be galvanised finish and painted to match the wall finish.

Supply and install a 1.5 mm2 TPI draw wire in all conduits whether containing cables or not.

Flexible conduit shall be steel PVC sheathed conduit.

Where it is unavoidable to use exposed conduits, refer to Facilities: Maintenance Specialist prior to installation commencing.

Install conduits far enough above ceilings and below floors to avoid accidental piercing by nails and the like or restricting removal of ceiling tiles or floor panels. Where possible install conduits 150mm clear of the underside of roof decking.

Half saddles will not be accepted.

All surface conduits shall be finished and painted to match surroundings.

10.34 PVC CONDUITS

Use conduit with a minimum size 20mm.
Conduits to be stamped with conduit class, size and appropriate standard approval.

Set conduits where exposed to view or where permanent deformation of the cross section will occur.

For sets and bends use applied heat in a manner that does not cause deformation of the conduit diameter or discolouration.

Install PVC expansion couplings in straight conduit runs every two (2) lengths when under roofs and every three (3) lengths in other locations irrespective of intervening conduit fittings or where conduits pass across structural expansion joints.

Install saddles so conduits are held firmly in place yet allow for movement due to linear expansion and contraction of the conduits. Half saddles will not be accepted.

Where conduit passes through a fire-wall, sleeve with next size steel conduit extending 300mm either side of the fire-wall. Seal the gap at each end of steel conduit with intumescent material.

10.35 STEEL CONDUIT

Before installation, clean the threads of conduits and fittings to bright metal using taps and dyes. Internally ream ends of the conduits free of sharp edges and projections. Paint exposed threads on metal conduits installation with a zinc rich paint.

Where conduits terminate in wall boxes, specifically fabricated metal boxes, switchboards and termination boxes fix them in grip entries welded to the box or by locknuts each side of the box material.

In the case of locknuts, fit a female PVC bush after the inner locknut.

Bends shall be made with tools specifically designed for bending steel pipe, with easy sweeps and shall comply with manufacturer’s recommended bending radius and shall be not less than three times the external diameter of the conduit.

Conduit bends, sweeps and installation method shall not cause mechanical stress enough to result in deformation. Any conduit, which is deemed by the Facilities: Maintenance Specialist to have been stressed or steel work deformed, shall be replaced.

Make joints in galvanised conduits and water pipe installations watertight by applying thread seal tape or other approved jointing material to threads.

All exposed external conduits shall be galvanised steel.

Use steel screwed conduit fittings with Class B conduit, galvanised where applicable.

10.36 STEEL CABLE DUCT

10.36.1 GENERAL

Fabricated from not less than 1.2mm zinc anneal with machine folded return edges for rigidity. Steel cable ducts shall only be installed in plant rooms, equipment rooms, roof spaces or risers.

The steel cable duct shall:

- Minimum dimensions shall be 50mm x 50mm and cable not to exceed 60% of useable capacity.
- Be equipped with clip-on removable covers fixed with screws at each end and having a maximum length of each cover section of 1,200mm.
- Be complete with matching couplings, tees, elbows, reducers and the like as required.
- Be equipped with steel couplings between duct sections, which will maintain mechanical strength and electrical conductivity.
• Be fitted with integral partitions throughout its length where it is necessary to accommodate different services within the common ducting envelope.
• Be fitted with matching bends sets etc. and other accessories.
• Wherever possible mount ducts with the lid uppermost. Allow adequate space above for access to the duct.
• Match components one with the other and ensure the fixing system is complete with angle pieces, brackets and the like, as required. Ensure that the heads of fixing bolts are inside the duct.
• Where ducts are mounted with the lid downwards, provide approved fibre cable retainers at maximum 600mm intervals.
• Allow for the termination of ducts in the respective items of equipment.

Co-operate with other trades prior to and during the installation of cable trays and ducts to ensure that the system is installed in an efficient manner.

10.36.2 FLAT ON WALLS
Single ducts may be fixed direct to the wall surface. For groups of ducts use supports of P3300 galvanised mill strut (at maximum 1,500mm vertical centres) fixed horizontally on the wall and spanning the total width of ducts.

10.36.3 FLAT ON UNDERSIDE OF CONCRETE SLABS
Single ducts may be fixed direct to the slab. Fasten multiple ducts to galvanised P3300 Uni-strut spanning total width of ducts.

10.36.4 DOWN FROM SLAB OVER
Use supports of Uni-strut galvanised P1000 with 10mm galvanised threaded rod hangers at 1500mm centres.

10.36.5 SUSPENDED OFF WALLS AND ABOVE CEILINGS
Use supports of Uni-strut P1000 or galvanised rigid MS cantilever brackets at 1500mm centres. Supports shall be securely supported from walls or the ceiling support system.

At each support bracket fix to the structure and to each duct with at least two (2) fixings.

10.37 CABLE TRAY
Cable tray shall be of a width required to provide support for cables to be installed on the tray and shall be a minimum of 150mm wide.

The cable tray shall be:
• Manufactured from minimum 1.2mm MS sheet.
• Fabricated and shaped to provide rigidity, such that when loaded with cables plus 50kg point load at mid span, they do not deflect more than 10mm at any point.
• Perforated with slotted holes over the entire tray area suitable for attachment of fittings/fixings using metal thread studs and nuts or nylon tray nuts complete with matching splice plates, tees, transitions and the like, as required and suitably radiused at changes of direction.
• Use trays that have a minimum bending radius of 300mm.
• In ceiling spaces install horizontal runs of cable to avoid other fittings and services and where possible within the space 150mm above the ceiling surface unless otherwise shown on drawing(s). Allow enough space for further removal of ceiling tiles.
• In equipment room and roof spaces the position of tray runs shown are approximate only. Install as directed on site to avoid other fittings and services.
• Allow for the termination of trays at the respective items of equipment.
Co-operate with other trades prior to and during the installation of cable trays to ensure that the system is installed in a co-ordinated manner.

At each support bracket, fix to the structure and to each tray with at least two (2) fixings.

10.38 CONDUIT FITTINGS

Use junction boxes of adequate size to allow the installation of cables without damage to the cabling. Junction box faceplates are to be secured using security screws.

Conduit elbows and tees are not permitted in this installation unless specified or shown on drawings.

All conduit fittings except for wall boxes shall be of a material and finish compatible with the type of conduit system to be installed.

10.39 PROVISION FOR DRAWING IN OF CABLES

Conduit installations shall be so arranged that wiring can be readily drawn in or out without damage to cabling and without:

- Removal, damage or alteration to any part of the building structure is necessary.
- Without disruption to the conduit installation continuity.

The removal of access panels, floor traps, ceiling traps/tiles (at draw-in box positions) or electrical fittings shall not be deemed to be damage to parts of the building structure.

10.40 CONDUIT TO BE CONCEALED

Install conduits within wall cavities, secure ceiling space, contained in floor slab or walls, chased into brick or block work walls to be rendered and otherwise hidden by finished building structures. Should it appear not to be possible to conceal a conduit, clarify the position with the Facilities: Maintenance Specialist and do not proceed with installation until advised by Facilities: Maintenance Specialist.

Carry out chasing required and grouting in of recessed boxes, conduits and the like. Finish grouting flush with the wall surfaces.

10.41 CONDUIT AND CONDUIT FITTING INSTALLATION

Unless otherwise specified, draw-in boxes shall be installed in a straight conduit installation at a maximum distance of 12m apart and in other positions that will facilitate the ready drawing in of cables. Where conduit runs are grouped together in accessible locations, draw-in boxes shall be grouped together at defined and approved positions.

In inaccessible positions, conduit boxes shall not be used to change direction in or branch off from the conduit installation.

Not more than one bend shall be used between any draw-in positions. Where more than one bend is required, the change of direction shall be achieved by setting the conduit in a large radius bend.

Ducts, conduit and conduit fittings including conduit box lids and duct covers shall not be installed or shall be visible on the surface of any floor, wall or ceiling unless necessary.

All conduits and boxes shall be capped in an approved manner against the ingress of dirt, moisture or foreign matter. This procedure shall be carried out immediately after the installation of the conduit and shall remain in place until the permanent wiring is installed.
Before the permanent wiring is drawn in, conduits shall be dried internally and freed of any foreign matter. Always refer to drawings and study the requirements of other services. Mechanical ventilation ducting, piping and the location of other reticulation equipment and allow to install conduit and ducting clear of same.

Conduit fittings shall be rigidly secured to the conduit. Conduit tees will not be permitted -3-way conduit boxes shall be used instead.

High impact PVC or nylon conduit bushes shall be fitted at all conduit ends.

The conduit installation in all positions shall:

- Be installed in an orderly manner grouped and in one plane where practicable.
- Be installed parallel with the major axis of the building structure.
- Be securely fastened to rigid supports with approved clips or saddles. Single sided clips and saddles are not an approved fixing.

12. DIGITAL CCTV SYSTEM

12.1 SYSTEM OVERVIEW

The new Digital Closed-Circuit Television (CCTV) System shall be an approved equivalent Digital Video Management System consisting of digitally compressed video and data signals streamed over the existing DBSA Local Area Network (LAN). The CCTV System and required systems architecture shall be non-proprietary, including all systems equipment, end of line devices and communication protocols.

All remote monitoring workstations shall view and control cameras over the hospital IP Network through the Digital Video Management System (DVMS). Remote monitoring stations shall be in positions as indicated on the drawings.

The CCTV System is to be supplied, installed and commissioned at DBSA and shall include:

- A networked CCTV data base.
- Video encoders for analogue camera termination at each nominated location.
- Control software located on a DBSA supplied workstation at each nominated location.
- Video Management Software with Random Array Independent Raid (VMS with RAID) to record and store video at each nominated location.
- CCTV cameras and associated equipment such as cameras, lenses, housings and brackets.
- Graphical User Interface (GUI) platform for operator interface.
- CCTV monitors and associated equipment such as mounting brackets and KVM extenders.

The CCTV system shall form a fully integrated system controlled from the DBSA Security Office. The equipment shall allow camera control, camera selection, display control and monitoring from the nominated control locations.

12.2 SYSTEM REQUIREMENTS

The Digital CCTV System shall be capable of connecting any combination and quantity of IP video cameras, IP video encoders, IP video decoders, CCTV monitors (LED), CCTV keyboard controllers, Servers, Graphical User Interface (GUI) workstations, Video Management Software with Random Array Independent Drives (VMS with RAID), alarm inputs and outputs, audio inputs and outputs and provide real time virtual matrix type CCTV functionality.

The CCTV system shall include but not be limited to the following:
• Fixed cameras as located on the drawings to view pedestrian entry and exit at movement control locations.
• Fixed and Pan/Tilt/Zoom (PTZ) cameras as located on the drawings to view pedestrian walkways and provide views for general surveillance purposes.
• IT supplied CCTV system workstation and server (CPU, monitor, keyboard and mouse) in nominated locations.
• LED colour monitors to nominated locations.
• Video Management Software with Random Array Independent Raid (VMS with RAID) for recording of selected cameras.
• Necessary control equipment to provide the control and monitoring of the CCTV system as specified.

The Video Management Software with Random Array Independent Raid (VMS with RAID) servers and CCTV system workstations shall form a networked partition able system to allow control of any video stream from the Security Operations Room, subject to access restrictions.

The architecture of the system shall be completely modular to enable system expansion without the redundancy of installed equipment.

The video surveillance system shall be capable of expansion without limitation of cameras, monitors or workstations including:

• Additional IP cameras,
• Additional video encoders,
• Additional video decoders,
• Additional storage devices Video Management Software with Random Array Independent Raid (VMS with RAID)
• Additional CCTV monitors, keyboard controllers and CCTV workstations.

Access to recorded video shall be transparent and independent of the location of the recording hardware. All such access shall be password controlled and limited by user access privileges. Multiple viewing of time synchronised video frames from multiple cameras shall be possible to assist with the correlation of events from multiple cameras and recorders.

The CCTV system shall be capable of connection and operation of major PTZ camera manufactures including but not limited to an approved equivalent brand.

The system shall have the ability to incorporate additional video analytics as an additional software licence, or licences, in the future for extended VMD capabilities such as object detection, counting, object introduction, traffic flow detection and the like.

The system shall have the capability to create users, assign passwords and define access rights to the various applications including:

• Configuration of networked video storage devices etc.
• Cameras that can be viewed or controlled.
• Viewing and control of recording.
• Restrict areas within the site map.
• Restrict certain menu selections.

All CCTV system equipment shall always be time and date synchronised to maintain the integrity of recordings and consistency of logged data to enable a valid audit trail to be established. This shall include synchronization with the DBSA network clock.

All video images shall be easily viewable and retrievable via the CCTV workstation and shall provide a quality enough to be exported as a DVD via a DVD +/- R/W drive. All such export of video data for use by others shall be suitable for viewing via Windows based applications or shall include all viewing software
with the exported data to allow off site viewing by others without the need to obtain any additional or unique software. All exported video data shall include watermark authenticity complete with markers to indicate any changes that have been made to the image file.

The system configuration data shall be password protected with access to selected data only being accessible via the configuration mode.

Upon power failure, all system set-ups, sequence information and presents shall be retained for access on power restoration. Battery backed-up memory is not acceptable.

The system shall support text insertion for camera identification, presenting current date/time and other system/operator status information.

13. VIDEO MANAGEMENT SOFTWARE WITH RANDOM ARRAY INDEPENDENT DRIVES (VMS WITH RAID SERVERS)

Video Management Software with Random Array Independent Drives (VMS with RAID) Servers shall be supplied and installed by the Security Contractor. The Security Contractor shall supply, install and program all Video Management Software with Random Array Independent Drives (VMS with RAID) server software.

Recording and playback shall be performed simultaneously such that it does not affect the recording from cameras/encoders.

Video Management Software with Random Array Independent Drives (VMS with RAID) servers shall support synchronized playback of up to 25 cameras/encoders simultaneously to a single CCTV workstation. Playback synchronization shall be guaranteed to within 40ms (1 frame).

The Video Management Software with Random Array Independent Drives (VMS with RAID) server shall store recorded video on hard disk for the specified number of days being fourteen (30) days.

Recordings shall be split into one-hour segments.

The Video Management Software with Random Array Independent Drives (VMS with RAID) server software shall automatically manage free disk space by deleting recordings older than the specified number of days or when a minimum disk space threshold is met.

Video Management Software with Random Array Independent Drives (VMS with RAID) must allow a video thinning threshold to be set whereby after a specified time, recorded video is thinned down to just I-frames.

The CCTV administrator(s) shall have the ability to schedule recordings as follows:

- Start on receipt of an alarm from a camera/encoder for a set duration of time.
- Set to run 24 hours x 7 days x 365 days/year
- Time scheduled using start and stop time at the same time on selected days of the week. By starting at a specific time on a specific day and recording 24 hours every day until a specific stop time on a specific day e.g. Start Monday 09:00 and stop Friday 18:00.

The Video Management Software with Random Array Independent Drives (VMS with RAID) server shall also record alarms as well as video from selected cameras/encoders.

The Video Management Software with Random Array Independent Drives (VMS with RAID) shall act as central storage for alarms so that when one CCTV system operator acknowledges an alarm, all of the other operators will see that it has been acknowledged.
Video Management Software with Random Array Independent Drives (VMS with RAID) shall generate an alarm in the event of the following:

- Low disk space i.e. less than 75% of minimum disk space
- Camera(s) not recording
- Hard disk failure
- RAID array failure
- Power supply failure
- Video Management Software with Random Array Independent Drives (VMS with RAID) offline
- License expired

It shall be possible to record the same camera/encoder on multiple Video Management Software with Random Array Independent Drives (VMS with RAID) servers.

Primary or backup Video Management Software with Random Array Independent Drives (VMS with RAID) server failures shall be reported to all CCTV workstations.

The administrator shall configure Primary and Backup Video Management Software with Random Array Independent Drives (VMS with RAID) servers for each camera. The recording schedules and alarms must then be synchronized between the Primary and Backup Video Management Software with Random Array Independent Drives (VMS with RAID) server. In the event of a Primary Video Management Software with Random Array Independent Drives (VMS with RAID) server failure the Video Management Software with Random Array Independent Drives (VMS with RAID) workstations will be switched to playback and use alarms from the Backup Video Management Software with Random Array Independent Raid (VMS with RAID) server. In the event of the Backup Video Management Software with Random Array Independent Drives (VMS with RAID) server failing the Primary Video Management Software with Random Array Independent Drives (VMS with RAID) server will continue to record and manage alarms. The administrator should not be required take any action in this instance.

14. SYSTEM RECORDING REQUIREMENT

Video inputs for each camera/encoder shall be recorded onto the nominated Video Management Software with Random Array Independent Drives (VMS with RAID).

The system shall be configured to continuously record each camera unless otherwise specified.

Review of pre-recorded video shall be displayed in various modes including, but not limited to full screen, split screen (4, 9, 12, 16 or combination thereof) as well as sequential.

All recorded information shall be date time stamped and stored within event files for easy retrieval.

The system shall be configured, programmed and set-up to record and store all system cameras each at a minimum frame rate of 6 frames per/sec at 4CIF resolution.

The system shall be configured, in coordination with the DBSA and the Facilities: Maintenance Specialist, to provide the minimum recording rates detailed above and store all images for a minimum of fourteen (30) days recording on the hard disk drive.

15. DATABASE SERVER

The CCTV Database Server shall be supplied by DBSA and shall be connected to the Local Area Network to serve as the system administrator for all the CCTV system components (Video
Management Software with Random Array Independent Drives (VMS with RAID, Encoders, Decoders, workstations.) as well as acting as the central repository for alarms.

The CCTV database server shall be proven and current software applications to undertake performance to the minimum CCTV international standards, with all licenses and authorized certifications. The Contractor shall provide details of the minimum hardware specification for this device upon award of this Contract.

The DVMS database server shall, as a minimum, integrate with the following:

- The CCTV Graphical User Interface (GUI).
- Video Encoders and Decoders.
- Video Management Software with Random Array Independent Drives (VMS with RAID Conventional Cross Point Matrix)
- Include the logging of all CCTV and NVR System alarms, events and operator actions Server.

The CCTV database system server shall authenticate all security devices and users authorized to connect to the network. The CCTV database server shall manage all communications over the LAN. The CCTV database server shall incorporate on board security to protect it from unauthorized access by supporting the following features:

- All network ports not used for normal functionality will be blocked to prevent network hacking.
- Allow password protection to prevent unauthorized administration access.
- A Firewall is to be available on each DVMS server to allow access restriction by individual IP addresses. SSL and other non-IP address specific security measures are deemed insufficient.
The Access Control Application must:

- Provide rule-based capability to manage access control within the DBSA campus
- Provide capability to manage employee access profile (including Biometric data and photos).
- Provide integration capability to DBSA systems (including but not limited to Human Capital, Microsoft Active Directory, Microsoft Identity Management and NETTRACE (Asset Management).
- Provide capability for visitor management (including management of profiles, photos, access register, etc.). Visitors should be able to register via an online channel, and only verify their profile on arrival.
- Provide capability for notification to all the people (employees and visitors) within the DBSA site in the event of an emergency. This notification can be done via SMS or web.
- Provide all the listed functionality using mobile and web channels.
The following are the main components of Security Network and Server/storage Infrastructure:

- 4 x 48 ports CISCO Switches including ports for fibre connectivity
- 2 x Core Cisco Switch including ports for fibre connectivity and connectivity for server storage solution
- 1 X Storage should accommodate 3 months’ worth of data, before the data is transferred into the DBSA cloud storage for backup.
- 112 x Cat 6e cabling for the new CCTV IP cameras

The following are the main system security requirements that must be enabled:

- Provide ability to set user access and security privileges per user type.
- Provide ability to manage user profiles per user and per group.
- The solution must be designed and secured in terms of storage/server, network, database, transport and application layers, using proven methods and technologies e.g. SSL.
- The solution must adhere to South Africa laws and regulations in terms of data collection, management, storage, dissemination and archiving e.g. POPIA.
- DBSA requires that protective, preventative and detective measures must be under taken to ensure safeguarding and preservation of personal data collected and processed for this required solution. Security controls must include, but not limited to, the following:
• Use of encryption method to secure biometric template through enrolment to recognition stage. This risk control is to address the risk of forgery, privacy data leakage or misuse and unauthorised entry.
• Significantly low rate of false acceptance and rejection, as well as a high true acceptance and rejection rate. This risk control is to ensure that invalid access is denied and vice versa.
• Provide detailed software and/or hardware maintenance plan/schedule with respect to patch updates and version; to ensure that known defects and/or security vulnerabilities are swiftly addressed.
• The ability to record and retain access logs for an auditable trail.
• The ability to send notification on set triggers.

18. DIGITAL VIDEO ENCODERS

18.1 GENERAL

The CCTV system shall consist of Digital IP cameras connected to an encoder. The encoder shall accept a digital (composite) video input and compress the video signal using and stream it over the Local Area Network (LAN).

Once on the network the video signal shall be capable of the following:

• Being viewed on a CCTV system workstation
• Being displayed on a video monitor using an IP decoder
• Being recorded by a Video Management Software with Random Array Independent Drives (VMS with RAID)

Video encoders shall meet the following minimum requirements:

• Each encoder shall support IP independent configurable streams
• Each of the above streams shall support QCIF, 2CIF and 4CIF resolutions and 30 to 60 frames per second (fps). 4CIF at 25 frames per second simultaneously on both streams should also be possible. Configuring any resolution at any frame rate shall be possible, per video stream.
• Allow multiple brands of CCTV Controller Keyboards to be interfaced directly to an encoder/decoder via its serial port.
• Video encoders shall be able to create an alarm in case of Video Motion Detection (VMD) or video loss caused by a defective camera, cable or camera masking.
• Video encoders shall support simultaneous transmission in Point to Point or Point to Multipoint links, to display video on Monitors through Decoders or Management software.
• Video encoders shall be 19-inch rack mounted, unless otherwise specified.

18.2 VIDEO COMPRESSION

The Encoder architecture must support either MPEG4 and/or H.264 (ISO 14496-10) video compression. DSP Codec implementations will not be considered due to their inherent performance limitations, which can result in reduced frame rate, reduced video quality, video artefacts and increased bandwidth utilization.

To guarantee that the video performance of the Encoder is not affected by other functionality, it shall also incorporate a separate host processor, which is only responsible for audio, Video Motion Detection (VMD), Activity Controlled Framerate (ACF), Alarms, Serial (PTZ) and network communication. The host processor must not perform any video operations to ensure that video is unaffected during maximum processor load.

The Encoder shall:
• Be capable of the following resolutions at full frame rate even during high motion levels:
  o CIF Resolution (2560 x 1440)
  o 2CIF Resolution (2560 x 1440)
  o 4CIF Resolution (2560 x 1440)

• Guarantee full frame rate video (120fps PAL) under high motion at CIF, 2CIF and 4CIF resolutions

• Support three (3) simultaneous streams at CIF and two (2) simultaneous streams at 2CIF resolution and two (2) streams at 4CIF. Each stream must allow independent configuration of bit rate, frame rate, I frame interval, rate control mode and motion data. All streams must still guarantee full frame rate during high motion levels.

• Allow each stream bit rate target to be configurable between 56kbps and 4096kbps.

• Support Capped Bit Rate (CBR) control, which always guarantees full frame rate video and adjusts the quality dependant on the level of motion in the scene.

• Support Activity Controlled Framerate (ACF) to ensure that minimal storage and network capacity is used when no motion takes place in the video scene. During periods of very low motion, the frame rate will drop to 1fps (approximately 60kbps) and when motion occurs the frame rate will return to full frame rate (60fps/60fps) within 100ms. It must be configurable using a Region of Interest (ROI) editor that can select regions of the scene where the motion will be ignored. An activity sensitivity parameter must be configurable to allow the filtering out of very low motion in the scene.

• Stream full frame rate video to any number of live video Decoders with an aggregate video bandwidth of up to 20Mbps using IP connections.

• Support an unlimited number of receivers using IP Multicast regardless of total aggregate bandwidth.

### 18.3 ON-BOARD VIDEO MOTION DETECTION (VMD)

Each Encoder shall be able to perform VMD at the source on the Encoder host processor.

The Encoder will support the following functionality:

• VMD can be enabled or disabled on each Encoder.

• When enabled, VMD will not degrade the video performance of the Encoder as it is run on a separate host processor that is not responsible for video compression. With VMD enabled, full frame rate is still guaranteed at all resolutions and bit rates.

• The VMD algorithm is categorized as level 2 as it detects localized motion at an individual instance in time. Therefore, objects may only form part of a target and are irregular in shape. Level 1 algorithms that analyse video activity across the entire screen are not acceptable.

• Two (2) VMD modes will be available:
  o Normal Mode – Detecting significant motion of foreground objects in the field of view. The significance of an object is determined by the configuration parameters. An example is a door entry in which all personnel entering a building are to be recorded. This mode supports direction detection including left, right, up, down, horizontal and vertical. Predefined parameters for common video scenes will be provided including Parking Lot, Office, Corridor and Perimeter.
  o Museum Mode - Detecting the presence of a new static background object, such as an abandoned suitcase in a passage. Alternatively, to detect the removal of a static object from a scene, such as the theft of a painting from the wall of a passage. In both these museum mode situations moving foreground objects are ignored.

• Each VMD mode will allow the configuration of the following parameters:
  o Region of Interest (ROI) editor that allows the selection of multiple regions where motion will be ignored from a grid of 396 cells.
  o Configurable 0 to 100% motion sensitivity threshold.
• Minimum object size (in cells) to filter out objects regarded as too small.
• Maximum object size (in cells) to filter out objects regarded as being too large.
• Persistence time (in milliseconds) to specify how long an object must be moving before it triggers an alarm.
• Dwell time (in milliseconds) to limit the frequency of VMD alarms transmitted.

19. CCTV SYSTEM WORKSTATIONS

19.1 GENERAL

The Security Contractor shall supply, install and program the Digital CCTV System control software onto the nominated DBSA supplied workstation.

All functions must be found in menus and context menus.

Common functions must have a toolbar icon or button and a keyboard shortcut.

It must be possible to perform many functions using “drag and drop” mouse control.

19.2 LIVE VIDEO

CCTV Workstations shall display live video (and audio) from up to 100 encoders on a single PC, all at full frame rate.

It shall be possible to display live video on four (4) separate screens per workstation and allow twenty-five (25) live streams on each monitor.

The Operator must be able to choose video pane layouts including 2x2, 3x3, 4x4, 5x5 and custom layouts.

It shall be possible to maximize the video panes (or any single pane) to full screen.

The camera/encoder name must be overlaid on the video pane to maximize the display usage.

To maximize the usage of the PC display, live controls must only be overlaid on the video when the PC mouse hovers over the video pane.

It shall be possible to configure a camera/encoder to display video motion data as green rectangular overlays highlighting the motion in the video pane. This feature can be used to aid the operator observing motion when several encoders are being displayed on the screen.

Where provided it shall be possible to listen to audio from individual encoders.

It must be possible to take snapshots of the current live video pane and save them as a bmp file in a nominated directory.

An “On Demand” button must be available on the live controls to allow instant recording of the video and audio from the Encoder.

Interlace filtering must be available for 4CIF video to filter out PC artefacts produced by interlaced cameras connected to the Encoder.

It shall be possible to display video and audio bit rates; frame rate and resolutions on each video pane.

It shall be possible to show text on screen display (OSD) when video is displayed on a Decoder. The OSD must detail the camera name, number, date and time (in the time zone of the transmitter) all of which can be configured to be displayed on the top or bottom two (2) lines of the display.
19.3 PTZ CONTROL

It shall be possible to connect PTZ devices to Encoders via the RS232/422 serial data port.

Each Encoder must be able to operate major PTZ camera manufactures, including but not limited to:

Variable speed and direction PTZ control must be utilized using the PC mouse control by dragging a directional pointer around the video pane. This includes zoom in, zoom out, focus near, focus far and multiple speed pan and tilt operations.

Named pre-sets (up to 6) and custom commands (up to 10) must be supported per camera.

User priorities between 1 and 10 must be allocated for PTZ enabled Encoders.

A user with the highest priority shall take immediate control of the PTZ operations. When a user with the same or lower priority tries to take control of a camera this will be refused, and the user denied access shall be given the name of the user in control. User PTZ connections must timeout after thirty (30) seconds of inactivity.

Users must be able to hold PTZ connections permanently when required.

19.4 GRAPHICAL USER INTERFACE

Cameras must be organised into a hierarchy of sites according to each location.

Sites shall contain cameras/encoders, decoders, Video Management Software with Random Array Independent Drives (VMS with RAID, servers, workstations and alarm sources.

Each site can have one or more associated map for ease of navigation.

Maps must display cameras/encoders, decoders and alarm sources.

The video from a camera/encoder shall be displayed by double clicking on the camera icon in the map, or by dragging the camera from the map into a live video pane.

When in the Recorded Video View, a camera shall be selected from a map and double clicked on or dragged into a playback pane to show recorded video.

All maps must include an icon which allows (by double click or drag and drop) live video from all cameras in the map to be displayed in one operation. Camera icons shall be capable of rotating to indicate their angle of orientation.

The map should be configurable to pop up upon the receipt of an alarm received from a camera on the map.

It shall be possible to navigate to any site using a map.

It shall be possible to display maps on any monitor connected to the CCTV workstation.

It shall be possible to navigate by stepping forwards or backwards through recently viewed maps.

A drop-down list shall show the list of sites in their hierarchy that can be jumped to directly upon selection.

A button must be available to allow direct navigation to the map associated to the site one step above in the hierarchy (i.e. ‘up one level’).

It shall be possible to display video from an entire site and or group in one operation (selection or drag and drop).
19.5 SEQUENCES, CAMERA GROUPS AND GUARD TOURS

The CCTV Workstation must support the following ‘Virtual Matrix’ functionality;

- Sequence – A list of cameras/encoders that are sequenced through in a live video pane or display on a remote monitor. Each Sequence will support the following:
  - Sequence of cameras/encoders.
  - Sequence of PTZ pre-sets on encoder/camera.
  - A mixed sequence of cameras and camera PTZ pre-sets.
- Each camera will have an individual dwell time.
- Camera Groups – A group of cameras/encoders that can be displayed at the same time across multiple live video panes or remote monitors.
- Guard Tours - A sequence of Camera Groups
- Scheduled Tasks – Time scheduled tasks that can be configured per user to do the following:
  - Start a Camera Group or Guard Tour in a video pane or Decoder when the user logs in.
  - Schedule a Camera Group or Guard Tour to start and stop at specific times of the day.
  - If a user is not assigned a task, they will view video from cameras/encoders they last viewed.

19.6 CCTV KEYBOARD CONTROL

It shall be possible to use a CCTV Keyboard (an approved equivalent) connected to the system to allow full virtual matrix control without the need for PC keyboard or mouse control.

It must be possible to assign numbers automatically to objects such as cameras, encoders, decoders, sequences, camera groups and guard tours. It shall also be possible to manually number objects to any numbering scheme from 1-4 digits.

The CCTV Keyboard shall control the following functions:

- Display video on a video pane (1-50) or Decoder.
- Control camera/encoder PTZ using the keyboard joystick.
- Control PTZ displayed on a decoder without displaying in a video pane.
- Command PTZ presents (1 to 6).
- Display sequences in a specific video pane or decoder.
- Start sequences, next/previous, pause/resume.
- Display camera groups in specific panes or decoders.
- Acknowledge alarms (such as device unavailable on the network).
- Stop video from a specific video pane using the keyboard OFF button.

19.7 PERMANENT POINT TO POINT CONNECTIONS

It shall be possible to configure a monitor to have a permanent connection to a camera/encoder. Any video, audio (two way) and serial data connections can be made permanent.

It shall be possible for other users to see which monitors permanent connections have but not change them. Multicast, IP connections for video and audio shall be supported in permanent connections.
19.8 ALARM MANAGEMENT

Alarms must be sent from cameras/encoders to their associated Video Management Software with Random Array Independent Drives (VMS with RAID). They are then forwarded to CCTV workstations, subject to access restrictions.

Alarms must be time stamped at the source.

It must be possible to produce alarms for the following events:

- Motion Detection
- Video Loss (including detecting if the camera is deliberately covered or spray painted)
- Alarm inputs (1 to 4)

It shall be possible to arm detection areas during specific time periods.

All alarm history shall be recorded onto the nominated NVR together with the recorded video.

Alarms shall be displayed in a dedicated alarm stack in live and recorded views.

In recorded video, alarms must be displayed as vertical red lines at the exact time that they were sent from the camera/encoder.

The CCTV Workstation should be configured to have the following actions upon alarm:

- Visual notification – cleared once acknowledged.
- Map displayed containing the alarm source that is flashing.
- Single or continuous sound (configurable wave file).
- Display video from a single camera/encoder or camera/encoder group (including move PTZ to preset position).
- Display video from a single camera/encoder or camera/encoder group (including move PTZ to preset position) on dedicated alarm screens (blank screen monitoring).
- Activate a looped video replay which shall display live video as well as a looped replay from prior and post alarm.
- Activate an alarm output on the encoder (if applicable).
- Start recording from one or more cameras/encoders.

The Alarm list must be “docked” or positioned as required on the PC screen.

19.9 RECORDED VIDEO VIEW

The CCTV Workstation operator shall be able to switch from the Live Video View to the Recorded Video View to allow the playback of video, audio (if applicable) and motion data from cameras.

The Recorded Video View must contain the following functionality:

- Up to 25 playback panes can be displayed.
- Playback can be performed simultaneously with live video displayed on a second PC monitor video pane(s) or monitor/decoder.
- The operator can choose from playback pane layouts including 2x2, 3x3, 4x4, 5x5 and custom layouts.
• A camera/encoder can be selected from the map or hierarchy and dragged (or double clicked) into a playback pane to view the recordings.
• Entire sites or camera groups can be displayed at once in up to 25 playback panes.
• Available video and audio footage for each camera/encoder displayed on the timeline.
• The timeline can be displayed on a per-second to per-month resolution depending on how far the timeline is zoomed in.
• The timeline can be freely dragged from left to right using the mouse.
• Buttons (and keyboard shortcuts) are available to freely scroll forwards and backwards through time as well as jump to the oldest and latest recording footage.
• The timeline can be shown for a selected custom time range.
• It is possible to jump to a specific start time and date.
• VCR type controls are available including play, fast forward, rewind
• Single frame forwards and single frame step backwards are fully supported.
• Jog Shuttle control allows fine control of speed including frame by frame forwards, \( \frac{1}{4}\) speed, \( \frac{1}{2}\) speed, normal speed, \( x2\) speed, \( x8\) speed, and frame by frame step backwards, rewind \( x2\) and rewind \( x8\) speed.
• For all forward speeds, all frames are rendered and displayed (i.e. \( x8\) 60fps is actually 480fps).
• Recordings can be played back from up to 25 cameras/encoders simultaneously, all at full frame rate. This can be done with each camera/encoder individually starting at a different time, or all of the cameras/encoders can be synchronized to display recordings with an accuracy of 40ms. Therefore, simultaneous frame-by-frame stepping backwards, and forwards is possible within 40ms accuracy.
• The same camera/encoder can also be played back in multiple playback panes, all at different times and speeds.
• A replay video feature shall be available from the Live Video View to quickly jump to the Recorded Video View and play the last 30 seconds of recorded footage.
• Video and audio can be played back, from the selected time in the time line, to a decoder. Once displayed in the decoder the video can be paused or played.
• Each playback pane can be zoomed into using a digital zoom from 100% to 800%. Once zoomed in, the recording can be played back and freely scrolled around using the PC mouse.

19.10 MOTION SEARCH
It must be possible to perform Motion Search on ranges of footage using the following functionality:
• A histogram is overlaid on the timeline indicating motion levels between 0% and 100%. Scenes with no motion will be shown as a flat line at the bottom of the timeline. Motion between 1% and 100% will be shown as a histogram.
• Motion Search can be performed on the whole video scene, or selected regions can be ignored using a region of interest editor (ROI).
• Directional motion search can be used to identify motion moving in a specific direction(s) including up, down, left, right, horizontal and vertical.
• Museum Mode can be used to detect the presence of a new static background object, such as a left suitcase. Alternatively, it can be used to detect the removal of a static object from a scene, such as the theft of a painting. In both these museum mode situations moving foreground objects are ignored. Sensitivity and integration time (how long the object have appeared or disappeared from the scene) parameters can be configured.
• Minimum cell and maximum cell sizes can be set to ignore objects that are considered too small or too large.
• A 0% to 100% motion threshold bar is available to select the level of motion that the operator is interested in.
• “Next” and “Previous” incident buttons can be used to navigate through motion that crosses the threshold or through alarms.
• Video motion data can also be displayed from selected cameras/encoders during playback. This is displayed as green rectangles highlighting the motion in the video as per the camera/encoder VMD configuration at the time of recording.

19.11 T HUMBNAILS

Thumbnails (video snapshots) shall be displayed to assist the operator reviewing recorded video footage. The CCTV Workstation must be able to generate thumbnails (36) from 8 hours of footage within 2 seconds. Thumbnails must be displayed based on following options:

• Time – 36 thumbnails, at equal intervals over the duration of footage displayed in the playback timeline.
• Alarms – A thumbnail displayed for every alarm displayed in the playback timeline.
• Motion – A thumbnail for every point in the Motion Search profile that is higher than the motion threshold bar.

All Thumbnails are redisplayed in real time if there are any changes to the timeline or motion threshold.

19.12 RECORDED VIDEO AND EXPORT FOR EVIDENCE

CCTV Workstations must allow the export of video and audio (if applicable) footage for a specified time and date to the standard MP4 file format for use with third party players such Windows Media Player.

Upon export, the original recording segment can be protected from automatic deletion if required.

Exported recordings must be watermarked using a digital signature on each frame and the whole exported recording encrypted using the SHA-1 hashing function combined with 1024-bit public-private key pair. A standalone player must be able to validate the exported recording. Watermarking alone is not enough as entire sets of frames can still be removed from the recording and still be regarded as valid.

Exported recordings must contain the camera name, encoder name, IP address, date and time that can be played back in a standalone player.
Recordings should be exported with an optional standalone player directly to a CD, DVD, Hard disk or DAT drive.

19.13 ADMINISTRATION VIEW

The system shall include a restricted Administration View that is only accessible by authorised persons. The Administration View shall be used to create the central database, configure the devices and allocate user privileges.

The Administrator View will have the following features:

- Create multiple operator accounts, each with their own password.
- Allocate the following privileges to each user on a per camera or per site basis:
  - List cameras or sites in hierarchy.
  - View the video from the camera/encoder.
  - Playback recordings from the camera/encoder.
  - Record from the camera/encoder (on demand recording).
  - Control the PTZ functions of the camera/encoder.
  - Export recording evidence from the camera/encoder.
- Each user can be allocated up to 1 of 3 specific streams on each camera/encoder.
- List all devices such as cameras, encoders, decoders and CCTV servers on the network.
- A configurable auto site builder shall be available so the CCTV system can automatically build a site database hierarchy based on the camera/encoder, decoder and Video Management Software with Random Array Independent Drives (VMS with RAID location together with associated sequences, Camera Groups, Guard Tours, recordings and video loss alarms for each camera/encoder and site.
- Create a new site database and site hierarchy.
- Drag and drop devices into the hierarchy.
- Allocate cameras to sequences, groups and Guard Tours.
- Configure alarm inputs (sources) and alarm outputs
- Create Maps from bmp files and assign to sites.
- Add cameras, alarm inputs (sources) and monitors to maps.
- Configure camera vistas in the map to indicate the camera view.
- Access the web page configuration for all cameras, encoders, decoders and servers in the site Database.
- Assign Video Management Software with Random Array Independent Drives (VMS with RAID servers to cameras/encoders and create recording job schedules.
- Copy Video Management Software with Random Array Independent Drives (VMS with RAID server jobs to other cameras/encoders for ease of setup.

20. SOFTWARE AND PROGRAMMING

The correct programming of the CCTV Management System and associated software is a critical requirement of this contract. Perform all programming of the CCTV Management System as directed by the Facilities: Maintenance Specialist or nominated representative.
All programming of system configurable items shall be protected against accidental or deliberate modification by unauthorized persons.

The manufacturer shall be engaged, at the Security Contractor’s expense, to perform correct programming of the system, if and as directed by the Facilities: Maintenance Specialist or nominated representative.

The software and programming requirements shall be tested and demonstrated to their fullest extent, for the approval of the Head: Properties & Facilities, Head of Protection Services and DBSA IT representative, during the Factory Acceptance Testing.

The system software shall:

- Select any input or group of inputs to designated outputs either manually or automatically.
- Allow blank screening of static video inputs after a pre-determined time. This shall be software enabled/disabled.
- Be capable of dedicating a video input to video output disabling the control of the input and output until reset by the operator.
- Allow text displayed to video outputs to be tailored to user requirements.
- Be capable of restricting operator access to select video inputs at each keyboard controller. It shall also be capable of restricting individual operator access at each keyboard controller (a minimum of eight (8) access levels shall be provided).

21. CAMERAS

Cameras shall be mounted on existing building structures. Where the building does not provide the ability for the camera to be mounted at the specified minimum height of three (3) meters the nearest possible height shall be acceptable upon approval by the Facilities: Maintenance Specialist.

Submit shop drawings of the proposed building structure modifications required for the mounting of cameras. Provide drawings for each building and camera installation required.

Drawings submitted shall detail the proposed height of the cameras for each building location.

21.1 INTERNAL FIXED DOME CAMERA

The internal fixed dome camera baseline is a WV CW474 colour camera, integrated with a vandal resistant dome, or an approved equivalent, meeting these minimum requirements:

<table>
<thead>
<tr>
<th>System Features</th>
<th>Fixed Camera Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>WV CW 484</td>
</tr>
<tr>
<td>Type</td>
<td>1/3&quot; Charged Couple Device (CCD) CCIR standard, PAL colour signal</td>
</tr>
<tr>
<td>Pick up device</td>
<td>Internal Transfer Super-Dynamic CCD with 753(H) x 582(V) pixels</td>
</tr>
<tr>
<td>Scanning system</td>
<td>2:1 interlaced</td>
</tr>
<tr>
<td>System Features</td>
<td>Fixed Camera Specification</td>
</tr>
<tr>
<td>-------------------------</td>
<td>----------------------------------------------------------------</td>
</tr>
<tr>
<td>Scanning</td>
<td>625 Lines / 50 Fields / 25 Frames</td>
</tr>
<tr>
<td>Video output</td>
<td>1.0 Volt (p-p) at 75 ohms</td>
</tr>
<tr>
<td>Horizontal Resolution</td>
<td>480 Lines colour 470 lines B/W</td>
</tr>
<tr>
<td>S/N Ratio</td>
<td>Better than 50 dB</td>
</tr>
<tr>
<td>Power supply</td>
<td>24 VACS</td>
</tr>
<tr>
<td>Lens mount</td>
<td>'C' and 'CS' mount with video drive auto iris capability</td>
</tr>
<tr>
<td>Minimum Screen</td>
<td>2.4 lux at f1.4 (AGC on, colour)</td>
</tr>
<tr>
<td>illumination (@ 75%</td>
<td>0.3 lux at f 1.4 (AGC on, B/W)</td>
</tr>
<tr>
<td>reflectivity) for</td>
<td></td>
</tr>
<tr>
<td>useable video</td>
<td></td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-10°C to +50° C</td>
</tr>
<tr>
<td>Additional Features</td>
<td>Selectable (automatic) Electronic Shutter Speed</td>
</tr>
<tr>
<td></td>
<td>Electronic Sensitivity Adjustments</td>
</tr>
<tr>
<td></td>
<td>Automatic Gain Control</td>
</tr>
<tr>
<td></td>
<td>Digital noise reduction</td>
</tr>
<tr>
<td></td>
<td>Digital backlight compensation</td>
</tr>
<tr>
<td></td>
<td>Digital Wide Dynamic Range Circuit</td>
</tr>
</tbody>
</table>

### 21.2 INTERNAL IP FIXED DOME CAMERA

Internal IP fixed dome cameras shall meet all minimum requirements, as outlined in section 0. Each camera shall provide the same level of functionality as a digital video encoder, as specified in section 0.

All IP fixed cameras shall be compliant with the Institute of Electrical and Electronics Engineers (IEEE) 802.3af standard for Power over Ethernet (PoE).

### 21.3 EXTERNAL FIXED CAMERA

The external cameras installed, as a part of these Works shall conform to the following requirements:

<table>
<thead>
<tr>
<th>System Features</th>
<th>Camera Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>WV-CP 484 (or an approved equivalent meeting this intent)</td>
</tr>
<tr>
<td>Type</td>
<td>1/3” type double speed Charged Couple Device (CCD) colour image sensor</td>
</tr>
<tr>
<td>System Features</td>
<td>Camera Specification</td>
</tr>
<tr>
<td>--------------------------</td>
<td>---------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Pick up device</td>
<td>Interline transfer CCD with 752 (H) x 582 (V) pixels</td>
</tr>
<tr>
<td>Scanning system</td>
<td>2:1 interlaced</td>
</tr>
<tr>
<td>Scanning</td>
<td>625 Lines / 50 Fields / 25 Frames</td>
</tr>
<tr>
<td>Video output</td>
<td>1.0 Volt (p-p) at 75 ohms</td>
</tr>
<tr>
<td>Horizontal Resolution</td>
<td>&gt; 480 Lines</td>
</tr>
<tr>
<td>S/N Ratio</td>
<td>Better than 50 dB</td>
</tr>
<tr>
<td>Power supply</td>
<td>24 VACS</td>
</tr>
<tr>
<td>Lens mount</td>
<td>'C' and 'CS' mount with video drive auto iris capability</td>
</tr>
<tr>
<td>Minimum Screen</td>
<td>0.5 lux at colour mode, 0.06 lux at B/W mode, at F1.2 optional lens</td>
</tr>
<tr>
<td>illumination (@ 75%</td>
<td>0.6 lux at colour mode, 0.08 lux at B/W mode, at F1.4 optional lens</td>
</tr>
<tr>
<td>reflectivity) for useable</td>
<td>video</td>
</tr>
<tr>
<td>video</td>
<td></td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-10°C to +50°C</td>
</tr>
<tr>
<td>Whit Balance</td>
<td>ATW1, ATW2 or AWC (optimised for high pressure sodium lighting)</td>
</tr>
<tr>
<td>Additional Features</td>
<td>Auto Back Focus adjustment function</td>
</tr>
<tr>
<td></td>
<td>Auto image stabilizer function</td>
</tr>
<tr>
<td></td>
<td>Scene change detection alarms</td>
</tr>
<tr>
<td></td>
<td>Digital motion detector</td>
</tr>
<tr>
<td></td>
<td>Electronic sensitivity enhancement</td>
</tr>
<tr>
<td></td>
<td>Remote control functions with single coaxial cable for camera set-up and configuration from the equipment cubicle.</td>
</tr>
</tbody>
</table>

**21.4 EXTERNAL IP FIXED CAMERA**

External IP fixed dome cameras shall meet all minimum requirements, as outlined in section 0. Each camera shall provide the same level of functionality as a digital video encoder, as specified in section 0.

All IP fixed cameras shall be compliant with the Institute of Electrical and Electronics Engineers (IEEE) 802.3af standard for Power over Ethernet (PoE).
### 21.5 PAN TILT ZOOM CAMERA

The Pan Tilt Zoom (PTZ) cameras baseline is an IV PTZ day/night colour camera, or an approved equivalent, providing these minimum requirements:

<table>
<thead>
<tr>
<th>System Features</th>
<th>Camera Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>Spectra IV (or an approved equivalent meeting this intent)</td>
</tr>
<tr>
<td>Type</td>
<td>1/4” Charged Couple Device (CCD) CCIR standard, PAL colour signal</td>
</tr>
<tr>
<td>Pick up device</td>
<td>Interline transfer CCD with 752 (H) x 582 (V) pixels</td>
</tr>
<tr>
<td>Scanning system</td>
<td>2:1 interlaced</td>
</tr>
<tr>
<td>Scanning</td>
<td>625 Lines / 50 Fields / 25 Frames</td>
</tr>
<tr>
<td>Video output</td>
<td>1.0 Volt (p-p) at 75 ohms</td>
</tr>
<tr>
<td>Horizontal Resolution</td>
<td>&gt; 460 TV Lines (Colour) &gt;540 TV Lines (B/W)</td>
</tr>
<tr>
<td>S/N Ratio</td>
<td>Better than 50 dB</td>
</tr>
<tr>
<td>Power supply</td>
<td>24 VACS</td>
</tr>
<tr>
<td>Lens</td>
<td>Focal Length 3.4 – 119mm (minimum), 35 x optical zoom, 12 x digital zoom</td>
</tr>
<tr>
<td>Colour/B&amp;W Control</td>
<td>Automatic removal of IR filter and conversion from colour to B&amp;W, with manual override</td>
</tr>
<tr>
<td>Focus</td>
<td>Automatic with manual override</td>
</tr>
<tr>
<td>Iris</td>
<td>Automatic with manual override</td>
</tr>
</tbody>
</table>
| Minimum Screen illumination (@ 75% reflectivity) for useable video | 0.55 Lux (colour)  
0.00018 Lux (B&W) |
| Operating Temperature            | -10°C to +50°C                                                                       |
| Panning and Tilt Range           | 360º continuous, 0º - 90º                                                            |
| Pan Speed                        | 0.1º - 80º/sec manual                                                                |
| Tilt Speed                       | 0.1º - 40º/sec manual                                                                |
| Pre-sets                         | 256                                                                                   |
### System Features

<table>
<thead>
<tr>
<th>Camera Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pre-set Pan / Tilt</strong></td>
</tr>
<tr>
<td>Speeds</td>
</tr>
<tr>
<td>400º/sec, 200º/sec</td>
</tr>
<tr>
<td><strong>Controls</strong></td>
</tr>
<tr>
<td>Pan/Tilt, Pre-set Positions,</td>
</tr>
<tr>
<td>Home Positions</td>
</tr>
<tr>
<td><strong>Alarm Inputs/Outputs</strong></td>
</tr>
<tr>
<td>7 Alarm Inputs, 2 Auxiliary</td>
</tr>
<tr>
<td>Outputs</td>
</tr>
<tr>
<td><strong>Additional Features</strong></td>
</tr>
<tr>
<td>Digital Auto Flip Dome</td>
</tr>
<tr>
<td>Rotation</td>
</tr>
<tr>
<td>Variable Scan Speed</td>
</tr>
<tr>
<td>Privacy Zone Masking Function</td>
</tr>
<tr>
<td>PTZ Patrol Function</td>
</tr>
<tr>
<td>IP66 External Vandal Resistant Housing Option</td>
</tr>
</tbody>
</table>

### 21.6 IP PAN TILT ZOOM CAMERA

IP Pan Tilt Zoom (PTZ) cameras shall meet all minimum requirements, as outlined in section 0. Each camera shall provide the same level of functionality as a digital video encoder, as specified in section 0.

### 22. LENSES

#### 22.1 GENERAL

All camera lenses supplied under this contract shall be Vari-focal, manual zoom or electronic zoom.

All lenses shall include video drive auto iris.

The lens focal length shall be selected by the Contractor to provide the required field of view as specified at each location. Final adjustments will be arranged under the supervision of the Client and Facilities: Maintenance Specialist.

All manual zoom lenses shall include appropriate locking mechanisms to prevent any vibrations or unauthorised tampering/affecting the zoom/focus settings.

The locking mechanism shall be tamper-proof.

Nominally the lens focal length must be in accordance with the defined views as detailed in this document. However, should lens changes be necessary, the Contractor must provide alternative (i.e. of different focal length) lenses in exchange at no additional cost.

#### 22.2 FIELD OF VIEWS

The Contractor must locate all cameras as shown on the drawings to view the area(s) as indicated. The following minimum guidelines are provided to assist in the final adjustment and locating of cameras and lenses:

A minimum of 85% of the mark "security zone" must always be viewed and recorded.
The angle of view should ensure that all persons within the "security zone" does not exceed 30 degrees from the horizontal viewing plane.

All items of fixed equipment must be in full view with 100% of the object width overlap on all sides, top and bottom.

The Contractor must notify the Facilities: Maintenance Specialist in the event of any difficulties in meeting compliance with the above.

### 22.3 FINAL ADJUSTMENT OF LENS SETTINGS

Lens and camera adjustments must be verified at night to provide optimum coverage during both day and night conditions. All settings must be “locked” and recorded for future reference.

Adjustment of settings and recordings shall include flange ring setting, iris, focus and zoom. Adjustments are to include the use of standard colour TV test patterns to improve fine tuning for maximum image quality.

In addition, all cable numbers/descriptions, equipment makes, and models must also be recorded and presented in a detailed commissioning document to be provided to the Facilities: Maintenance Specialist prior to the granting of practical completion.

### 23 CAMERA HOUSINGS

#### 23.1 GENERAL

All housings shall be sealed to prevent ingress of dust, insects and moisture.

Housings shall provide the facility for termination of conduit fittings. All cable entries shall be concealed internal to the housing or via the housing bracket.

All cameras housings and brackets shall be fitted with tamper proof security screws. Security screws shall be "post button head" type. Fixings on all external camera brackets and housings shall be manufactured from marine grade 316 stainless steel.

Submit samples and details of all proposed housing to the Facilities: Maintenance Specialist for comment and approval prior to supply or manufacture.

The following features shall be required as part of the housing design:

- Building or slab mountable on custom designed and manufactured brackets.
- Polycarbonate or Lexan vandal proof viewing window/dome.
- All conduit and cable entries shall be within the camera housing or bracket and shall be made airtight using an approved epoxy sealant.
- Camera Housings shall be of adequate size to permit easy adjustment of camera operating controls and to facilitate ease of servicing.

Housings shall conform to the following clauses:

- Suitably sized to accommodate one (1) camera fitted with a lens and all cabling.
- Tamper proof and Waterproofed, as required to satisfy local conditions.
- Fitted with optical smoked viewing dome.
- Incorporate matching sunshade to provide protection from solar radiation and to minimise rain and direct sunlight falling upon the viewing panel for external units.
• Fitted with precision cut rubber gaskets to removable covers to provide a dust, moisture and weather proof seal.
• Powder coated after manufacture (colour to approval of Facilities: Maintenance Specialist).
• Reasonable measures shall be taken in mounting cameras to minimise the risk of camera theft or damage.

23.2 INTERNAL CAMERA HOUSINGS
The internal dome housing shall meet the requirements of the area they are installed in and be flush mounted into the ceiling and secured correctly to the Manufacture’s requirements.
The internal camera domes (i.e. where fixed body cameras are utilised) shall be a maximum of 200 mm diameter.

23.3 EXTERNAL CAMERA HOUSING
External camera housings shall be provided to the Facilities: Maintenance Specialist for approval and be of rugged construction and highly vandal resistant.
Any external camera housings shall be weatherproof, sealed to prevent ingress of dust, insects, and moisture and have an IP rating of IP66. All housings are to incorporate a sun shield that shall also divert rain away from the viewing window.

23.4 TAMPER ALARMS
All camera housings and equipment enclosures shall be fitted with tamper switches connected to the alarm inputs on the Encoder. All tamper switches shall be monitored 24-hours a day.

23.4 CAMERA BRACKETS
Camera brackets must be welded steel (i.e. plastic brackets will not be considered). Brackets must match the camera housing construction and provide adequate adjustment to ensure optimum viewing positions are achieved.
All adjustments must be securely fixed such that accidental or deliberate misalignment of cameras is not possible.
Brackets must be electroplated and painted to match camera housings. Brackets must be rigid and vandal proof.
24. CAMERA POWER SUPPLIES

The camera power supplies installed, as a part of this works, shall conform to the following minimum requirements:

<table>
<thead>
<tr>
<th>Features</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input current</td>
<td>1.2A@ full load</td>
</tr>
<tr>
<td>Output voltage</td>
<td>24VAC</td>
</tr>
<tr>
<td>Channels/unit</td>
<td>10</td>
</tr>
<tr>
<td>Fault Output</td>
<td>1SPDT relay and LED</td>
</tr>
<tr>
<td>AC Output indication</td>
<td>Output Channel Status LED’s Green = OK Red = Fault</td>
</tr>
<tr>
<td>Dimensions</td>
<td>425 x 270 x 85 mm</td>
</tr>
<tr>
<td>Input Voltage</td>
<td>240Vac / 50-60Hz</td>
</tr>
<tr>
<td>Safety Standards</td>
<td></td>
</tr>
<tr>
<td>EMC Standards</td>
<td></td>
</tr>
<tr>
<td>Mounting</td>
<td>Wall Mounted Enclosure</td>
</tr>
</tbody>
</table>