



UNIVERSITY  
*of*  
OTAGO

*Te Whare Wānanga o Otāgo*  
NEW ZEALAND

University of Otago

Building Technologies – Standards Suite

CHAPTER 6: CLOSED CIRCUIT TELEVISION (CCTV) SYSTEM STANDARD

# DOCUMENT CONTROL

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# BUILDING TECHNOLOGIES STANDARDS SUITE INDEX

This document is only one chapter of the University of Otago Building Technologies Standards Suite.

The Building Technologies Standards Suite consists of the following chapters (chapter highlighted refers this document):

Chapter 1	Introduction
Chapter 2	Cabling Infrastructure Pathways Standard
Chapter 3	IT Infrastructure – Generic Cabling Systems Standard
Chapter 4	IT Infrastructure – Passive Optical LAN Cabling Standard
Chapter 5	Electronic Safety and Security (ESS) Systems Standard
<b>Chapter 6</b>	<b>Closed Circuit Television (CCTV) System Standard</b>
Chapter 7	Audio Visual (AV) Cabling Standard
Chapter 8	Labelling Standard

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## 1. DOCUMENT PURPOSE

This document is CHAPTER 6: CLOSED CIRCUIT TELEVISION (CCTV) SYSTEM STANDARD and forms part of the University of Otago Building technologies Standards Suite.

Its purpose is to provide design consultants and contracts the guidance that shall be followed when either designing, installing, maintaining, or performing changes to a University of Otago CCTV system.

### 1.1. Document sponsor

This document has been developed and is controlled by the University of Otago.

The contractor or designer shall adhere to the latest published edition of all standards and technical documents for all responses and construction work. Should a conflict exist between the standards or any scope of work, the contractor shall notify the consultant or University of Otago Proctor's Office of any conflict and seek clarification prior to continuation.

All queries, errors, omissions, or suggestions related to this document are to be directed to:

The Proctor's Office

University of Otago

PO Box 56

Dunedin 9054

New Zealand

Email: [deputy.proctor@otago.ac.nz](mailto:deputy.proctor@otago.ac.nz)

### 1.2. Outcome statement

By using this document and relative standards, designers and contractors will meet the University of Otago's standards for the safety, design, installation, and support of CCTV systems environments that the University manages and operates.

### 1.3. Chapters

The Building Technologies Standards Suite covers the following Information and Communication Systems. Each system is presented as a separate chapter:

- Chapter 1 – Introduction to Building Technologies Standards Suite
- Chapter 2 - Cabling Infrastructure Pathways Standard
- Chapter 3 - IT Infrastructure – Generic Cabling Systems Standard
- Chapter 4 - IT Infrastructure – Passive Optical LAN Cabling Standard
- Chapter 5 - Electronic Safety and Security (ESS) Systems Standard





- Chapter 6 - Closed Circuit Television (CCTV) System Standard
- Chapter 7 - Audio Visual (AV) Cabling Standard
- Chapter 8 – Labelling Standard



## 2. USING THIS DOCUMENT

This document shall be read in conjunction with all other Chapters in the BUILDING TECHNOLOGIES STANDARDS SUITE that carry other relevant information regarding the installation of CCTV systems, including but not limited to Pathways, Equipment rooms, Cabinets, GCS, POL, AV, ESS and documentation requirements.

The design consultant, contractor and University staff shall refer to CHAPTER 1: INTRODUCTION TO BUILDING TECHNOLOGY STANDARDS for an overview of the standards suite requirements.

### 3. REFERENCED DOCUMENTS

#### 3.1. UoO REFERENCE DOCUMENTS

The following documents to be referred to:

- Installation Specification for Gallagher Access Control System at University of Otago (Rev v01 dated February 2016)
- Closed Circuit Television (CCTV) Security Systems Policy (<https://www.otago.ac.nz/administration/policies/otago676292.html>)

#### 3.2. STANDARDS

Installation of the CCTV shall be carried out in compliance with the relevant standards detailed below.

##### 3.2.1. Standards & Guidelines

Standard	Standard Description
Ministry of Justice	Private Security Personnel and Private Investigators Act 2010
NZS 4512:2010	Fire detection and alarm systems in buildings
NZS 4514:2009	Interconnected smoke alarms for houses
AS/NZS 3000:2007	Electrical Wiring Rules
AS/NZS 3604:2011	Timber-framed buildings
NZS 4219:2009	Seismic Performance of Engineering Systems in Buildings
AS/NZS 62676.1.1:2020	Video surveillance systems for use in security applications - Part 1-1: System requirements - General
The Privacy Commissioner ISBN 04 478 11730 2	Privacy and CCTV: A guide to the Privacy Act for businesses, agencies, and organisations
EN-62676-4	Video surveillance systems for use in security applications - Part 4: Application guidelines



Should a conflict exist between respective above-mentioned standards and/or with specifications documents, the order above shall dictate the order of precedence in resolving conflicts. This order of precedence shall be maintained unless a lesser order document has been adopted as code by a local or central government entity or as determined by University of Otago.

All the above-mentioned documents listed are believed to be the most current releases of the documents, however it is the responsibility of the contractor to determine and adhere to the most current versions of related standards at the time of installation.

### 3.2.2. UoO's Service Provider Standards

Standard	Standard Description
Confidential February 2016 (Revision v01)	Installation Specification for Gallagher Access Control System at University of Otago

### 3.3. WEBSITES

- <http://www.legislation.govt.nz/>
- <http://www.otago.ac.nz>
- <http://www.telepermit.co.nz/PtcSpecs.html>
- <https://www.justice.govt.nz/assets/Documents/Publications/cpted-part-1.pdf>
- <https://www.justice.govt.nz/assets/Documents/Publications/cpted-part-2.pdf>

### 3.4. LATEST REVISIONS

The users of this document shall ensure that their copies of the above-mentioned New Zealand Standards and the New Zealand Building Code are the latest revisions. Amendments to referenced New Zealand and Joint Australian/New Zealand Standards can be found on <http://www.standards.co.nz>.

## 4. DEFINITIONS AND ABBREVIATIONS

For the purposes of this document the following definitions and abbreviations shall apply.

### 4.1. Definitions and Abbreviations

Term	Definition
Application Specific Cabling	System manufacturers design
As built	Final set of drawings produced at the completion of a construction project, including all changes made to the original construction drawings
ACID	Access Control and Intruder Detection Systems
ACS	Access Control System
BMS	Building Management Systems
Building backbone cabling	Cable that connects the building distributor to a floor distributor
Campus	An area or site which contains several University buildings, and includes the grounds in which a cabling system is installed
Campus backbone cabling	Cable that connects the campus distributor to the building distributor(s)
Campus distributor	Distributor from which the campus backbone cabling starts
Category 5 (Cat 5)	For the purposes of this document, cabling components which provide a permanent link that, when tested, do not meet AS/NZS 11801-1 Class D performance
Category 5e (Cat 5e)	For the purposes of this document, cabling components which provide a permanent link that, when tested, meet AS/NZS 3080 [AS/NZS 11801-1] Class D performance
Category 6 (Cat 6)	A definition of cabling components which provide a permanent link that, when tested, meet AS/NZS 11801-1 Class E performance

Term	Definition
Category 6A (Cat 6A)	A definition of cabling components which provide a permanent link that, when tested, meet AS/NZS 11801-1 Class E <sub>A</sub> performance
Catenary wire	A wire supported at two points kept under mechanical tension to provide a support to which cabling may be fastened.
CCTV	Close Circuit TV system
Channel	End to end transmission path connecting two pieces of application specific equipment (includes patch cords and work areas cables)
Clear working spaces	A ventilated working space allowing quick unrestricted egress or escape in the event of emergency
Consolidation Point	Connection point in the horizontal cabling subsystem between a floor distributor and a telecommunications outlet
Contractor	Where the term “Contractor” is used within this document it shall be interpreted as the “Communications Contractor”.
Deputy Proctor	A person also acting at UoO security manager.
Designer	A person who plans the look, or workings, or both, of something prior to it being made, by preparing drawings or plans
Distributor	The term used for a collection of components (such as patch panels, patch cords) used to connect cables
Enclosure	A housing for accommodation of equipment and cabling that includes mounting rails and protective panels
EPS	Emergency Phone Stations – External and internal stations used by staff, students, contractors or visitors to escalate a security duress or panic situation to Campus Watch
Equipment footprints	The vertical and horizontal planes occupied by a piece of equipment in normal operation
ESMS	Electronic Security Management System (Gallagher System)
ESS	Electronic Safety & Security Systems

Term	Definition
Generic cabling system (GCS)	Structured telecommunications cabling system, capable of supporting a wide range of standardised applications. Standards based design
Horizontal cabling	Cable connecting the floor distributor to the terminal equipment outlets
IDS	Intruder Detection Systems
Installer	A person that places or fixes equipment or machinery in position ready for use. The party(s) responsible for the supply, installation, testing and warranty of cabling systems
Integrator	A person that places or fixes active IT equipment e.g., network switching, Wireless Access Points, servers, desktop computers etc. in position and configures, programs them ready for use. The party(s) responsible for the supply, installation, testing and warranty of active equipment systems
INTS	Intercom Systems
Manufacturer	A person or company that makes cabling goods for sale
NVR	Network Video Recorder
Power over Ethernet	Power over Ethernet (PoE) is a technology for wired Ethernet local area networks (LANs) that allows the electrical current necessary for the operation of each device to be carried by the generic cabling system rather than by power cords. Typical uses include VoIP phones, WAPs, IP CCTV cameras, or lighting.
Power Over SCS or GCS cabling	Power over structured telecommunications cabling (application specific cabling) or power over generic cabling (non-application specific cabling)
Proctor's Office	The UoO security office is being managed by the Proctor's office. The security office is also known as the Campus Watch.
Permanent link	Transmission path between the telecommunications outlet and the floor distributor
RAS	Refuge Area Stations

Term	Definition
SCP	Security control panel which is part of the ACID system
Service Distributor (SD)	Equivalent to distributor 1 in ISO/IEC 11801-1
Service Outlet (SO)	Equivalent to a TE Outlet in ISO/IEC 11801-1
Single vendor system	A system provided by a single vendor to help reduce operational, configuration, and management complexity
Site	See <b>Campus</b>
Structured Cabling System	Specific cabling solution designed with a set of cabling and connectivity products that are constructed (engineered) according to standardised rules to facilitate specific connectivity requirements e.g., Nurse Call (Staff Assist). Legacy design.
Suitably qualified person	A person with the professional qualifications and experience in the industry to undertake the design and supervision of the works
Terminal Equipment Outlet (TEO)	Fixed connecting device which provides and interface to the terminal equipment. N.B. The term telecommunications outlet is used in some other parts of the ISO/IEC 11801 series, while the term terminal equipment outlet is used within AS/NZS 11801-1 and this document.
UoO	University of Otago
Velcro™	A proprietary form of Hook & Loop fastener/cable tie
VMS	Video Management System





## 5. CCTV: OVERVIEW

### 5.1. Purpose of this standard

The purpose of the standard is to guide the following stakeholders in terms of CCTV (Closed Circuit Television) systems designs, installation, maintenance, and upgrades:

- CCTV Design consultants
- CCTV Project Managers
- Architects
- UoO Project Team
- UoO Proctor's office
- UoO Facilities management
- UoO ITS team

It is still important that this document shall be read in relation to related industry standards, manufacturer warranty requirements and industry best practice.

### 5.2. CCTV

University of Otago has main campuses located in Dunedin, Christchurch, and Wellington. Rest of the UoO sites are considered remote sites located in various parts of New Zealand.

The CCTV forms an integral part of the overall staff, student, and asset safety management system.

The CCTV comprises of:

- CCTV: Avigilon (Bosch cameras):
  - Internal and external dome cameras
  - External thermal imaging cameras
- Integration of 3<sup>rd</sup> party systems:
  - Emergency evacuation assistance: Refuge Area Stations (Talk-A-Phone)
  - Security duress or panic situation: Emergency Phone Station (EPS)
  - Access Control and Intruder Detection systems (ACID): Gallagher

#### 5.2.1. CCTV requirements

The following is high level requirements in terms of the CCTV:

- All CCTV head end also needs to be connected to the applicable building or communications rack UPS network
- Cameras to be connected back to the Campus Distributors at 444 and 325, with exception with remote sites having VMS onsite
- UPS network to allow for a 2-hour battery backup power supply.

### 5.2.2. CCTV system overview and requirements

The CCTV System consists out of:

- Avigilon cameras and NVRs
- NVRs are located inside 444 and 325 with remote sites being the exception
- The CCTV system is integrated with the Gallagher ACID system and RAS

The following is current issues and future requirements:

- RF connections (Not affectively using 2.4GHz channels)
- Need for checklists in terms of design, commissioning, and maintenance

### 5.2.3. Integration of 3<sup>rd</sup> party systems

#### 5.2.3.1. Panic/Duress systems overview and requirements

The Emergency Phone Stations (EPS) buttons and Refuge Area stations (RAS) are connected to the ACID monitoring and the CCTV system, but not currently working.

- EPS and RAS activations i.e., pushing call button, to activate the VMS to capture the EPS or RAS user at the applicable EPS or RAS via the nearest available CCTV camera.

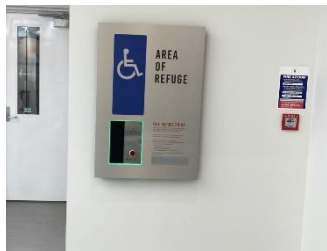
External EPS: Example 1:



Internal/External EPS Station: Example 1:



Internal Refuge Area Station: Example 1:



### 5.2.3.2. ACID (Access Control and Intruder Detection) system overview and requirements

The ACID system is connected to the CCTV VMS (Video Management System) to allow for the following:

- Card reader transactions to activate the VMS to capture card holder at the applicable card readers, via the nearest available CCTV camera

## 6. DESIGN, INSTALLATION AND MAINTENANCE CRITERIA

### 6.1. Criteria for use

The designer and contractor shall refer to sources and publications outlined at the beginning of this document for general design, installation, and maintenance guidance.

### 6.2. CCTV Exclusions

Refer to the Design and Coordination section for exclusions.

Related CCTV systems that are outside the scope of these standards include:

- a) Network equipment, such as servers and switches that are connected to the Campus Watch
- b) Wireless LAN equipment
- c) Generic Cabling Systems (cabling associated to ethernet connections and associated hardware (patch panels, cabinets etc.)

### 6.3. Existing CCTV

CCTV that has been provided in accordance with earlier standards will be retained in service unless there is sufficient justification for replacement of the CCTV as part of an upgrade or redevelopment, or if the CCTV performance is inadequate.

Any existing CCTV that is deemed to be retained by the University or project manager shall be tested to the appropriate performance specification. If the link fails, it shall be either:

- a) Replaced
- b) Brought up to this specification
- c) Removed from service if no longer required

### 6.4. New CCTV systems

The following to be considered as future improvements:

- The Refuse Area Stations (RAS) to integrate with the ACID monitoring.
- Need to include levels of detail for cameras (Observe, Forensics, Detection)
- Cameras to include AI functions i.e., detect fires

The following schedule provides a summary of the various new CCTV components deployed at UoO:

Component	Location	Make	Model	Use
Virtual Server	UoO Campus Data Centre	VMWare	Dell	<p>Hosting the VMS (Video Management System)</p> <p>Based at 444 and 325 CD</p> <p>Failover clustering</p> <p>Downtime only 2 minutes</p>
Video Management System (VMS)	Campus Watch Control Room	Avigilon	Dell	Hosting the VMS for the Campus CCTV system
Cabinets	ICT rooms	NA	NA	Connecting cameras to the UoO wider network
Cameras	Refer to section 7.4.1 for camera locations and camera applications	<p>Avigilon:</p> <ul style="list-style-type: none"> <li>• Internal H2 IIR) range</li> <li>• External H4 Thermal (IR) range</li> </ul>	H2 and H4	<ul style="list-style-type: none"> <li>• H2: For internal use</li> <li>• H4: For external use</li> </ul>

## 7. SYSTEM REQUIREMENTS

### 7.1. General

Product specifications, general design considerations, and installation requirements are provided in this written document. Any quantities, cable routes, locations, types, and installation details for the specific project, shall be detailed on associated services layouts, design specifications and project specific scope of works documents.

The CCTV shall generally include but not be limited to the following equipment:

- Video Management Servers - Located in the data centres (325 and 444)
- Front end user PCs - Located in the Campus Watch Control room at the Dunedin Office
- IP controllers – Connected back to the Video Management Servers to allow for 3<sup>rd</sup> party devices to be connected to the CCTV network
- IP cameras – Internal and external and deployed
- Internetwork equipment - Network switches, Routers and WAN and edge network equipment – Supplied, installed, maintained, and configured by the UoO ITS team
- Uninterrupted Power Supply – Supplied and installed and maintained by UoO ITS team - Located in the applicable for distributors (Data cabinets) within the CCTV camera or head end equipment vicinity

The contractor shall design, furnish, and install all equipment, accessories and material required for a complete turnkey solution.

### 7.2. System functionality – CCTV

#### 7.2.1. General

The CCTV System's main function is to detect any unauthorised movement in selected areas. Detection is achieved by internal and external cameras with pre and post movement detection recording. Cameras consists out of internal dome cameras (wall or ceiling mount) and external PTZ, fixed full body (for number plate recognition and wall or ceiling munt dome cameras.

The CCTV system video data is used for live viewing and post incident footage review purposes.

The VMS (Video Management Software) and server is in the Campus Distributors (325 and 444)

The following is achieved by the front-end user terminals, inside the security control room:



- Live viewing of all cameras deployed throughout UoO sites
- Cameras covering alarm activated areas i.e., duress button activation, intruder detected, or door propped or forced open
- Spot monitor to live view or review footage of selected cameras

Old analogue cameras are to be replaced with new IP dome cameras, when cameras are faulty, or the area is being upgraded i.e., renovation projects.

The CCTV system shall generally include but not be limited to the following:

- Network Video Recorder (NVR).
- Video Management Software.
- IP Cameras.
- PoE Network Switches; and
- Uninterruptable Power Supply (UPS).

All required licences, software and support shall be supplied with the system. Licence expansion shall be linear although block licence purchasing is acceptable for up front deployment. The system shall include a minimum three-year warranty and software support unless otherwise specified.

The system shall support the following general requirements:

- Full high-level integration with and access control or intrusion detection system.
- Support IP addressable, PoE cameras.
- Provide video authentication, checksums, and reporting to ensure videos are not altered in any way; and
- Provide simultaneous viewing of both live and recorded video through a web browser interface.

### **7.2.2. NVR**

The NVR and any associated control hardware shall be 19" rack mountable and installed into the specified ICT cabinet. UoO uses the Avigilon and located in the UoO Data Centre (444 and 325).

All new NVRs shall be sized to accommodate all cameras detailed plus an additional 25% expansion. The current NVR (Dell PowerVault NX3200) with 3 HDD stacks, each consisting out of 8No 4TB HDD. This is minimal technical specifications for NVRs and any new deployments will require that the NVR will be suitable for the number of cameras deployed and connected to the NVR.



The NVR shall record images from all cameras for a period of not less than 31 days without overwriting of data. Recording resolution shall be a minimum of 1920 x 1080 at 15 frames per second (FPS). Images shall be stored in RAID disk array (RAID-5) supporting hot-swap replacement of faulty disk drives. NVR storage requirements shall be calculated at 80% of continuous recording on all cameras.

Recorded content shall be accessible through a network connection to allow control and viewing by local staff throughout the facility or by permitted operators from remote locations via the client private network or (secured/private) Internet connection. There shall be capability to make permanent copy of events selected by local or remote operator onto a DVD, Blu-Ray disc, or other high-capacity permanent external storage medium. External (network) connection is required if off-site backup or review is required.

The system shall have motion detection capability that enables recording only when there is activity in the camera's field of view. It shall allow customisable activity detection zones with configurable pre and post alarm periods for each camera.

The NVR shall have the following live view requirements:

- Support D1 and 1080p live view display.
- E-Map & Snapshot support.
- Video quality configuration including image quality, resolution, and FPS.
- Camera event triggers: schedule, motion detection, or I/O alarm; and
- Intelligent video analysis.

The NVR shall have the following recording requirements:

- Support frame rates from 1–30 FPS on a per camera basis.
- Manual, continuous, motion detection, I/O alarm, and scheduled recording.
- Export/mount recordings support.
- Configurable pre-recording & post-recording time (currently continuous recording).
- The ability to define recording schedules.
- The ability to define zones where a recording trigger would not be enabled.
- Allow customisation of recording triggers, resolution, and frame rates for individual cameras for storage considerations; and
- Video streams between camera and network video recorder must be able to be configured for both unicast and multicast transmission modes.

The NVR shall have the following playback requirements:





- Up to 4 channel synchronous and asynchronous playbacks.
- Web interface support.
- The system should support pause, stop, previous recording, next recording, fast forward, slow motion, and digital zoom in/out.
- Allow recorded video to be played back in the forward or reverse direction, frame by frame, and from beginning or end of the clip using standard VCR-like buttons.
- Snapshot support.
- Intelligent video analysis; and
- Image enhancements including brightness, contrast, saturation, and sharpness.

The NVR shall have the following management requirements:

- Allow for integration with the client's authentication mechanisms i.e., Active Directory for user authentication.
- Allow for remote access and users access from other computers on the network provider they carry the appropriate desktop application and credentials.
- Be accessible and manageable through a web browser including full control of cameras.
- Scalable to support a minimum of 60 cameras on a single NVR.
- Support admin/spectator user privileges.
- Provide event notification via SMS, email, and text alerts.
- Allow notifications can filtered by camera, event type, and schedule.
- Recordings should be able to be backed up to an external storage or remote server, inside the Campus Distributors, to allow for recordings for no less than for 30 Days to be retrievable
- Include system and event logs.
- Include a built-in NTP server (Currently one located inside the Campus Distributors locations (325 and 444)
- Allow HTTP tunnel support.

### **7.2.3. User Management**

The VMS application shall store information about users of the CCTV system. A user is defined as an authorised security control room operator and authorised management staff from the Proctor's office.



The VM will allow users, according to their approved access level to complete certain tasks within the VMS and not limited to the following

- Live viewing of selected cameras
- Footage retrieval, footage export and footage viewing
- Reviewing system event logs
- Set up and remove CCTV system users
- Changing privacy masking of camera etc.

#### **7.2.4. Remote Monitoring and Access**

The contractor shall set the system up to be capable of being monitored and supported remotely either via direct or a set of network configurations (i.e., firewall rules, port-forwarding, etc.). Alerts & Notifications

The VMS shall support the automatic sending of emails and SMS text messages because of defined events or alarms. The ESMS shall allow operators to define the contents of the email or VMS text message. Dynamic text, such as the details of an alarm, is to be automatically entered by the VMS, along with any static text defined by the operator.

The VMS shall support sending emails by specifying an SMTP server and any relevant authentication credentials that may be required by the SMTP server. In addition, the VMS shall support sending emails over an encrypted SSL connection to the SMTP server.

The VMS shall keep a history of all sent messages including the type of message (SMS text or email), the time and date they were sent, the recipient, any retry attempts and so forth.

The VMSS shall include comprehensive alarm management functionality to allow any kind of security or access event to be trapped and brought to the attention of a Campus Watch control room operator via a monitoring station or some other person via text messaging or email.

#### **7.2.5. Logging & Reporting**

The VMS shall include an event log that records every event that takes place within the software itself. This log is to allow events to be viewed in real-time or used to view historic events that have already occurred within the system.

The event log shall be capable of purging low-risk event details from the log on a set schedule e.g., 31 days, to avoid system lag and performance impacts.

The VMS shall include a comprehensive audit log, detailing every change that was made to the system programming, who made the change and when it was changed.

The VMS shall include basic reporting features throughout the application.

## **7.3. Video Management System (VMS)**

### **7.3.1. Integration & Support of Other Applications**

The VMS application shall allow integration to a variety of proprietary and third-party systems and applications such:

- Intruder detection systems.
- Access control systems.
- Intercom systems.
- Duress systems; and
- Building management systems.

The VMS application shall act as a central hub for the coordination of activities and events within and between any disparate systems at the UoO Main Security Control room (Campus Watch). The VMS application shall provide a single point of operation for the most typical types of control and monitoring security activities on site.

## **7.4. Cameras**

All cameras shall be fully integrated IP devices that utilise Power over Ethernet (PoE). The use of analogue cameras is not permitted. Cameras shall be high resolution, high sensitivity colour devices and should accommodate monitoring visibility day and night. All cameras shall be equipped with vandal resistant housing appropriate for outdoor or indoor environment as specified.

Camera lenses shall be multicoated to minimise reflections and equipped with auto-iris control.

Lenses shall be appropriate to the camera selected and be manufactured of high-quality optical material.

All mounting hardware shall be proprietary and supplied with the cameras. Enclosures and housings for cameras shall be of the smallest size or diameter possible to accommodate the range of lenses and cameras applicable and shall be compatible with the camera/lens combination.

All ceiling mounted cameras shall have flush ceiling mounted enclosures unless a specific camera is specified. Cables and equipment shall be accessible from beneath the ceiling. Where dome enclosures are surface mounted, all cables and equipment shall be accessible from a removable lower half of the dome.



The camera shall be connected to the housing by a safety chain or wire. The dome shall not introduce critical optical distortion at any tilt angle and shall introduce optical attenuation of no greater than one f-stop.

Housings for exterior use shall be rated at IP66, include thermostat-controlled heating and cooling as required. Indoor housings shall be dustproof.

All installed cameras shall be mounted, connected, aimed, and focused online with manufacturer and client requirements.

The following general characteristics is required as a minimum in terms of CCTV cameras deployed at UoO:

- Must be compatible with the building main ACID (Gallagher) and CCTV (Avigilon).
- Must use TCP/IP protocols.
- Must be IP65 rated and or suitable for the environment it will be deployed in.
- Voice enabled, if needed.
- Thermal imaging cameras required in specific areas in dark and night conditions detection purposes.

#### **7.4.1. CCTV camera functions - Primary**

The following functions shall be achieved with the cameras deployed in the various areas and immediate areas:

- Detection
- Observation
- Forensic review
- Recognition

##### **7.4.1.1. Detection**

Cameras deployed to provide a detection function shall:

- Provide continuous view of the scene captured
- Minimum resolution of 25 PPM (Pixels per meter)
- Lens and coverage distance:
  - 3.6mm – 68m
  - 10mm – 181m
- Horizontal Width – 154m

#### 7.4.1.2. Observation

Cameras deployed to provide an observation function shall:

- Provide continuous view of the scene captured
- Minimum resolution of 65 PPM (Pixels per meter)
- Lens and coverage distance:
  - 3.6mm – 27m
  - 10mm – 72m
- Horizontal Width – 61m

#### 7.4.1.3. Forensic

Cameras deployed to provide an observation function shall:

- Provide high resolution scene recording
- Provide general identification of an object's characteristics, time of event and location of the event
- Minimum resolution of 131 PPM (Pixels per meter)
- Lens and coverage distance:
  - 3.6mm – 14m
  - 10mm – 36m
- Horizontal Width – 31m

#### 7.4.1.4. Recognition

Cameras deployed to provide a recognition function shall:

- Include the following sub-functions:
  - License plate recognition
  - Facial recognition
  - Object recognition (i.e., blue short-sleeve shirt)
  - Pattern recognition (i.e., checkered short sleeve shirt)
  - Crossline detection (i.e., Geo fencing)
  - Object temporal characteristics (i.e., cigarette in left hand)



- Colour recognition (i.e., blue trousers)
- People count
- Minimum resolution of 262PPM (Pixels per meter)
- Lens and coverage distance:
  - 3.6mm – 7m
  - 10mm – 18m
- Horizontal Width – 15m

#### 7.4.2. CCTV camera functions - Secondary

The following functions shall be achieved with the cameras deployed in the various areas and immediate areas:

The cameras will also allow for the following secondary functions:

Prosecution

- Loss prevention
- Deterrence
- Intruder detection
- Access control identification and/or audit of events
- Resource allocation for operational management purposes
- Safety
- Asset control (e.g., laptop left in cafeteria)

#### 7.4.3. CCTV schedules

The following table is an example and to be included by the Security consultant in their specification:

Camera number	Area	Immediate Area	Camera primary function	Camera secondary function
1 (R)	Entrance to Dental School	Public admission automatic doors leading to reception	Identification of visitors to Dental School	Monitor pedestrian path north side of the school

Camera number	Area	Immediate Area	Camera primary function	Camera secondary function
2 (O)	Fire Exit NE of building	Internal Fire exit and NE corridor	Monitor fire door status	Monitor misuse of exit
3 (F)	South Facing External Wall	South rear staff entrance	Monitor & identify persons entering & leaving staff entrance	Monitor car parks adjacent to south side of building

The security consultant also needs to include the following abbreviations at each camera location on their applicable CCTV layout drawings:

- (D) Detection
- (O) for Observation
- (F) for Forensics
- (R) for Recognition.

#### 7.4.4. Camera locations and application

The following schedule provides a summary of the various UoO areas and immediate locations CCTV cameras are required and the camera application:

UoO Area	Immediate area where CCTV coverage is required	Camera application (Detect, Observation, Forensic Review, Recognition)
Faculties	Receptions – Main entry door	Detection and Identification
Faculties	Reception – Reception counter and waiting areas	Detection and Observation
Faculties	Staff Only areas – Main entry and exits	Forensic Review
Faculties	Lab entry and exit points	Forensic
Faculties	Fire stair entry and exit point	Detection and Observation
Faculties	Lifts	Observation
Faculties	Lift Foyers	Observation

UoO Area	Immediate area where CCTV coverage is required	Camera application (Detect, Observation, Forensic Review, Recognition)
Faculties	RAS	Detection and Forensic Review
Faculties	Communal areas - Corridors	Observation
Faculties	Lecture Theatres – perimeter entry and exit points	Forensic Review
Faculties	Meeting rooms and small lecture spaces – Main entry and exit points	Observation
Faculties	Perimeter entry and exit points – Ground level, lower ground, level 1 (balcony areas) and main entry to building services plant room areas	Detection and Forensic Review
Faculties	Engineering and labs where hazardous equipment and substances are managed	Detection and Forensic review
Cafes and recreation building and areas	Fire stair entry and exit point	Observation
Cafes and recreation building and areas	Lifts	Observation
Cafes and recreation building and areas	Lift Foyers	Observation
Cafes and recreation building and areas	RAS	Detection and Forensic Review
Cafes and recreation building and areas	Communal areas - Corridors	Observation
Cafes and recreation building and areas	Lecture Theatres – perimeter entry and exit points	Forensic Review
Cafes and recreation building and areas	Meeting rooms and small lecture spaces – Main entry and exit points	Observation
Cafes and recreation building and areas	Perimeter entry and exit points – Ground level, lower ground, level 1 (balcony areas) and main entry to building services plant room areas	Detection and Forensic Review



UoO Area	Immediate area where CCTV coverage is required	Camera application (Detect, Observation, Forensic Review, Recognition)
Cafes and recreation building and areas	Areas where high risk activities being undertaken i.e., rock climbing	Detection and Forensic review
Cafes and recreation building and areas	Gym main entry and exit points	identification
Cafes and recreation building and areas	Point of Sales	Forensic review
Student Accommodation	Receptions – Main entry door	Detection and Identification
Student Accommodation	Reception – Reception counter and waiting areas	Detection and Observation
Student Accommodation	Staff Only areas – Main entry and exits	Detection and Forensic Review
Student Accommodation	Fire stair entry and exit point	Detection and Observation
Student Accommodation	Lifts	Observation
Student Accommodation	Lift Foyers	Observation
Student Accommodation	RAS	Detection and Forensic Review
Student Accommodation	Communal areas - Corridors	Observation
Student Accommodation	Meeting rooms and small lecture spaces, whanau spaces and games rooms – Main entry and exit points	Observation
Student Accommodation	Perimeter entry and exit points – Ground level, lower ground, level 1 (balcony areas) and main entry to building services plant room areas	Detection and Forensic Review
Student Accommodation	Areas where high risk activities being undertaken i.e., rock climbing	Detection and Forensic review
Student Accommodation	Gym main entry and exit points	identification
Administration Buildings	Receptions – Main entry door	Detection and Identification
Administration Buildings	Reception – Reception counter and waiting areas	Detection and Observation

UoO Area	Immediate area where CCTV coverage is required	Camera application (Detect, Observation, Forensic Review, Recognition)
Administration Buildings	Staff Only areas – Main entry and exits	Forensic Review
Administration Buildings	Fire stair entry and exit point	Detection and Observation
Administration Buildings	Lifts	Observation
Administration Buildings	Lift Foyers	Observation
Administration Buildings	RAS	Detection and Forensic Review
Administration Buildings	Communal areas - Corridors	Observation
Administration Buildings	Perimeter entry and exit points – Ground level, lower ground, level 1 (balcony areas) and main entry to building services plant room areas	Detection and Forensic Review
Administration Buildings	Point of Sales	Forensic review

#### 7.4.5. Camera technical requirements

The following schedule provides a summary of the various cameras and minimum technical requirements:

Item	Technical Category	Minimum Requirements
1	Network Security	<ul style="list-style-type: none"> <li>• Password protection.</li> <li>• IP address filtering.</li> <li>• HTTPS encryption.</li> <li>• IEEE 802.1X network access control (EAP/TLS).</li> <li>• Digest authentication.</li> <li>• User access log.</li> <li>• Centralized certificate management</li> <li>AES encryption (256 bit)</li> </ul>
2	Supporting Open SSL	Yes

Item	Technical Category	Minimum Requirements
3	Supported network protocols	<ul style="list-style-type: none"> <li>• IPv4/v6;</li> <li>• HTTPS,</li> <li>• QoS Layer 3 DiffServ.</li> <li>• SFTP.</li> <li>• CIFS/SMB.</li> <li>• SMTP.</li> <li>• Bonjour.</li> <li>• UPnP.</li> <li>• SNMP v1/v2c/v3 (MIB-II).</li> <li>• DNS and DNSv6.</li> <li>• DynDNS.</li> <li>• NTP.</li> <li>• RTSP.</li> <li>• RTP.</li> <li>• TCP.</li> <li>• UDP.</li> <li>• IGMP and ICMPv6.</li> <li>• RTCP.</li> <li>• ICMP.</li> <li>• DHCP.</li> <li>• ARP.</li> <li>• SOCKS.</li> <li>• SSH.</li> <li>• NTP.</li> <li>• SIP</li> <li>• IGMP V2/V3</li> <li>• CHAP</li> <li>• Auto-MDX</li> </ul>
4	Video compression	H.264 and M-JPEG
5	Memory	256 MB RAM, 256 MB Flash
6	Power	Power over Ethernet
7	Ethernet	100BASE-TX
8	Backlight compensation	Yes
9	Iris Control	Automatic with manual override option
10	Lens Focal Length (mm)	4.3 – 129mm
11	Lens Zoom	30x
12	Operating Temperature (Degrees Celsius)	-40 to 65 Degrees Celsius

Item	Technical Category	Minimum Requirements
13	Pre-position accuracy	0.05 degrees
14	Dynamic noise reduction	Yes
15	Quad streaming capability	Yes
16	Edge recording capability and capacity	Yes, via memory card option (2TB)
17	ONVIF Conformance	<ul style="list-style-type: none"> <li>• Profile S</li> <li>• Profile G</li> <li>• Profile M</li> <li>• Profile T</li> </ul>
18	IP rating and impact protection	<ul style="list-style-type: none"> <li>• IP65 (Internal) and IP66 (External cameras)</li> <li>• IK10</li> </ul>
19	SNR	>55dB
20	Frame rate	15fps to 30fps
21	Video performance sensitivity	<ul style="list-style-type: none"> <li>• Colour: 1.19 Lux</li> <li>• Mono: 0.013 Lux</li> <li>• With IR: 0.01 Lux</li> </ul>
22	Latency	<120ms
23	Exposure control	Automatic and manual options
24	Day / Night controls	Automatic
25	White balance	Automatic and manual options
26	Privacy masking capability	Yes
27	Display stamps	<ul style="list-style-type: none"> <li>• Camera name</li> <li>• Logo</li> <li>• Date</li> <li>• Time</li> </ul>
28	Alarm inputs	1 – Activating voltage (3.3VDC)
29	Alarm output	2 – 0.5A 30VAC
30	Audio streaming and standard	<ul style="list-style-type: none"> <li>• Full duplex</li> <li>• G.711</li> </ul>



The cameras to be connected, via the CCTV system VLAN, to the to the VMS inside the CDs (Campus Distributors), which are connected back to the monitoring stations at the Campus Watch Security Control Room.

#### **7.4.6. Network integration**

##### **7.4.6.1. CCTV head end equipment**

The network video recorders and VMS, located at the Campus Distributors (325 and 444) is connected to the CCTV network via the UoO ITS supplied, installed, and configured network.

##### **7.4.6.2. Front end user PCs and CCTV monitors in the Campus Watch Control Room**

The front-end user OPC's and CCTV spot monitors, located at Campus Watch Control room, is connected to the CCTV network via the UoO ITS supplied, installed, and configured network.

The CCTV spot monitors are connected and monitored via the Avigilon client software and integrated into any relevant alarm systems in the Gallagher ACID software.

##### **7.4.6.3. System Warranty**

The CCTV solution is to be supported with a vendor's warranty for a period of not less than 5 years.

#### **7.5. Legacy systems**

The CCTV design shall consider the interface requirements of legacy equipment in existing installations. If any discrepancies noted, they should be highlighted in writing to the University or its representative.

Legacy systems are to be updated if possible and if not then directly integrated into the Avigilon system. If that is not possible then the equipment MUST be upgraded

## 8. DESIGN REQUIREMENTS AND DESIGN COORDINATION

### 8.1. General

1. The design consultant shall be responsible for a thorough and accurate design to enable installers to provide a correct installation, testing, commissioning, and functional system as described in the design specification and as per this standard.
2. The Designer shall also provide a fully coordinated design to allow for a fully integrated, and operational system.
3. Detailed design shall specifically include but not necessarily be limited to the following:
  - a. Design of individual systems that make up the electronic security systems as described herein including system layout, selection of materials, design of system operation, working methodology, selection of hardware and equipment.
  - b. Design of fixing and support details.
  - c. Design of seismic details.
  - d. Design of all hardware and installation required to comply with fire rating and smoke sealing requirements of the fire specification and standards.
  - e. Design of trimming and flashing details for penetrations through roofs/walls associated with these systems.
  - f. Detailed co-ordination of the CCTV with building works, and other building services.
  - g. Maintaining of any existing services and integration of existing services with new as specified.

### 8.2. Aesthetic design

In all cases the CCTV systems shall be designed and installed in a manner that is suitable for the building and not in conflict with the environment.

#### 8.2.1. Heritage buildings

The contractor shall refer to the UoO BTSS CHAPTER 1: INTRODUCTION for all heritage building requirements.

### **8.3. Environmental considerations**

The contractor shall refer to the UoO BTSS CHAPTER 1: INTRODUCTION for all environmental considerations.

### **8.4. Design Documentation**

For CCTV designed and installed systems at UoO campuses, items generally considered to be in scope include the following:

1. A formal scope of works document detailing all components, actions, responsibilities, accountabilities, and co-ordination applicable to the CCTV deployment for respective projects.
2. Undertake a design process in accordance with NZ Construction Industry Council CIC Guidelines.
3. Layout drawings and schematics detailing the construction of the CCTV encompassing:
  - a. CCTV servers
  - b. Camera locations and coverage areas
  - c. Associated risers and comms room/plant room locations
  - d. Applicable cable pathways etc.
4. Subject to specific project-based scope documents, further items that may need to be included:
  - a. Catenaries and conduits routes from the supplied cable trays.
  - b. Penetration locations and sizing through the floor, wall, and structural beams.
  - c. System interfacing i.e., Fire detection system, BMS, etc.
  - d. Automated doors.
  - e. Remote CCTV monitoring and remote access requirements.
  - f. Servers, backup systems and connection to uninterruptible power supplies (UPS).
  - g. Local Area Network (LAN) and Wireless Local Area Network (WLAN) routing and switching requirements i.e., CCTV servers' connections to CCTV cameras, RAS activation and triggering specific CCTV camera(s) with the RAS vicinity

- h. CCTV server and screens PSU (Power supply units) power load requirements.

## **8.5. Design Coordination**

Where the CCTV work is dependent upon or carried out in conjunction with other works (such as building, structured cabling or electrical works), the security contractor shall coordinate the CCTV installation activities with the project manager and UoO's Facilities Management team with respect to:

- Liaison with all members of the building services design and respective project management teams, and other contractors or system providers as required.
- Attendance at meetings called by the main contractor, architect, engineers, or other members of the project team.
- Use of the works site and access facilities.

### **8.5.1. Design - Scheduling of the works and site construction resources and utilities**

- Scheduling of the works and site construction resources and utilities.
- Interface with structured cabling, electrical, mechanical, fire and lift service contractors; and
- Reinstatement and remediation of building surfaces and/or groundworks.

Refer to Annexure A: Coordination schedule.

### **8.5.2. Electrical Services**

Co-ordination with electrical services includes the following:

- Mounting requirements for any electrical feeds, isolators or socket outlets required by the CCTV system.
- Any shared services routes ensuring that all installed cabling meets separation and segregation requirements pertaining to electrical safety and system performance; and
- Any integration with other systems i.e.:
  - RAS
  - ESS



### **8.5.3. Generic Cabling Systems (GCS)**

Co-ordination and liaison regarding:

- Any CCTV hardware to be mounted in ICT cabinets and communication room spaces i.e., inside the telecommunication rooms and ICT risers.
- Shared support systems to ensure adequate reticulation space for system cabling.
- The provision of any cabling for CCTV cameras; and
- UPS'.

All cabling installed by the structured cabling contractor for CCTV cameras shall be fully terminated and tested prior to use.

### **8.5.4. Lift/Vertical Transport Services**

Co-ordination and liaison regarding:

- Any integration with any lift car or vertical transport systems. The security contractor shall be responsible for coordinating the mounting of CCTV cameras inside the lift with the lift contractor and the structured cabling contractor.

### **8.5.5. Building Works**

Co-ordination with construction services and builders may be required for any of the following:

- Identification, sizing and marking out of all penetrations required for the CCTV system cabling.
- Sealing/flushing of all services penetrating any portion of the external skin of the building e.g., cladding, roof, floor, etc.
- Construction of equipment rooms, panel housings, entry facilities and required floor and ceiling bundling, sealing, including any passive ventilation, etc.
- Construction of all communications risers.
- Access panels in ceiling for cable ladders and other equipment requiring access for maintenance and servicing.
- Removal and reinstatement of tiles in ceilings, roof cat walks and platforms, crange and access for plant erection.
- Placing, casting in and protection of conduits within any structural wall, floor, or ceiling space.
- Responsibilities pertaining to the cleaning of equipment rooms and riser locations.

- Signage on doors for security system spaces and all communications riser cupboards.
- Utilisation of door jambs and window frames for cable pathways in areas where wall access is not available.
- Details of weight of equipment and services clearances required.
- Structural bracing and support required in floors, walls, and ceilings for cameras.

## **8.6. Uninterruptable Power Supply (UPS) design**

1. A UPS will be required to provide battery back up to any associated network equipment, if not already covered under a new project or a renovations project.
2. Final approval of any UPS should be sought from the client representative prior to ordering. UoO reserves the right to supply any such network equipment at their own cost. In the event the client does provision such hardware the contractor shall detail system power consumption details and issue it to UoO.
3. Refer to UoO BTSS CHAPTER 3: IT Infrastructure – Generic Cabling Systems Standard in relation to UPS power.

## **8.7. Network Equipment design**

1. Any network equipment required to facilitate the complete operation of the CCTV system shall be detailed in the security contractor's tender submission (unless otherwise tagged out in the scope of works of drawing layouts).
2. All network equipment shall be 19" rack mountable and be mounted into an ICT cabinet. Equipment shall be sized to accommodate all cameras specified plus an additional 25% expansion.
3. Final approval of any network equipment should be sought from UoO ITS representative prior to ordering. UoO reserves the right to supply any such network equipment at their own cost. In the event UoO does provide such hardware, the security contractor shall detail any specific requirements to allow the system to function correctly.

## 9. INSTALLATION AND MAINTENANCE REQUIREMENTS

### 9.1. Maintenance - General requirements

All maintenance performed on any component of the system must be recorded in the schedule kept onsite by the client.

The installer must carry out the maintenance routine as required by the manufacturer and record the maintenance in the schedule. The O&M manual shall be stored in a secure place with a register logging access and return of the manual by the technician.

Any onsite spares required to meet the ongoing system maintenance and support requirements shall be supplied as part of the project scope.

### 9.2. Commissioning requirements

#### 9.2.1. Client Inspections

UoO's Proctor will nominate a representative which might make periodic inspections of the project in progress.

Upon completion of the project, UoO's nominated representative will perform a final inspection of the installed electronic security system. The final inspection will be performed to validate that the electronic security system is installed as defined in this specification, as detailed within scope of works document, and drawing packages.

#### 9.2.2. Manufacturer Inspections

Any system manufacturers shall undertake site inspections to level required to qualify the CCTV system for a manufacturer warranty. Manufacturer inspections shall be considered part of the security contractor's project scope incurring no additional costs to the client. These inspections shall be arranged by the security contractor, notifying the project manager and security consultant of inspection dates and times.

Evidence is to be provided for all manufacturer inspections in the form of a declaration of conformance confirming compliance with respective manufacturer system requirements.

#### 9.2.3. Testing and Commissioning

The CCTV system shall be commissioned in accordance with the manufacturer's instructions and client operational requirements. All commissioning shall be completed by personal trained in the setup and operation of the installed system.

Prior to sign off, the CCTV system shall be fully tested by the contractor to ensure the system is functioning as specified and as intended. The system testing shall incorporate the following aspects at minimum:

- Review all work for completeness against wiring diagrams, as-builts and shop drawings. This included checks of all cable and component labelling.

- Visual check of all camera fixings and network cabling connections to the cameras, CCTV spot monitors, front end user PCs and NVRs.
- Test full system operation under mains failure.
- Test each alarm input, card reader and output device for correct operation. These include the below at a minimum:
  - Each alarm initiating device, i.e., RAS station.
  - All features and functions of the system as specified herein.
- Test the generations of system alerts and notifications, and the associated distribution to staff.
- Ensure the correct focusing and alignment of all cameras.
- Test all third-party system interfaces including but not limited to:
  - RAS
  - ESS

A commissioning plan shall be submitted to the security consultant for review and approval prior to commissioning commencement. Full commissioning reports on system operation must be provided at practical completion and signed by contractor. A copy of this commissioning report must be left on site as part of the final documentation.

#### **9.2.4. Training**

Prior to handover of the CCTV system, the contractor shall undertake a full training session with the client's nominated staff.

The training session shall include at minimum:

- System overview and layout; inspection and explanation of each of the system components.
- Networks and transmission equipment overview.
- System operation and functionality.
- An overview of all features provided by the system.
- Basic maintenance and trouble shooting.
- Basic system adjustments.
- System pre-sets.
- Addition and removal of users (and key fobs) from the system.
- Setup and amendment of system schedules.
- System alerts and notifications.
- System reporting.

The contents and makeup of the training session shall be approved by the client prior to delivery to staff. All training material shall be included as part of the final documentation.

### **9.2.5. Practical Completion**

This contract or installation shall be deemed complete at the date the main contract has been deemed practically complete. All testing, commissioning and readiness for normal operation shall be complete and the installation under this contract at this point shall be considered 'handed over' to the client and the defect free liability period shall commence.

### **9.2.6. Final Acceptance**

Completion shall mean the end of the defects liability period or when defects notified during the defect's liability period have been made good, whichever occurs last.

### **9.2.7. Documentation**

For all work undertaken on site, the following shall be provided at a minimum to the project manager for review by a nominated client representative, prior to completion/client acceptance:

- Contractor and supplier contact details.
- Bill of materials listing the products and materials used, including manufacturer details and product codes.
- Details of all system licences and support entitlements.
- Full commissioning reports and system schedules detailing all controller interfaces.
- System testing report signed and dated by the contractor.
- As-Built drawings showing locations of all installed hardware and associated labelling.
- System schematic drawings.
- Time and date stamped digital photos of completed works covering installed cabling and equipment.
- Manufacturer's declaration of conformance and warranty certificates.
- Contractor sign-off letter detailing any associated installation warranty.
- Ongoing servicing and system maintenance requirements and details of any associated maintenance plan.
- System operation and training material.

All documentation shall be provided in both hard and soft copy format. A bound, type written hard copy shall be left onsite, available for onsite maintenance requirements. The soft copy shall be provided on a USB flash drive. As built drawings shall be provided in AutoCAD and in PDF format, or as otherwise agreed with the project manager.

This information shall be compiled and supplied to the project manager or nominated representative within two weeks of the practical completion of the works.

#### **9.2.7.1. Shop Drawings and Product Technical Data**

Technical data sheets and shop drawings shall be submitted by the successful contractor for review. This shall include a complete solution design and installation drawings, along with data sheets, performance specifications, test data and product samples:

- Requested for architectural approval.
- Required to implement the specified solution.



- That shall be reasonably requested by the project manager, architect or consultant detailing any work to be undertaken by other trades.

This required package of work shall be referred to as “Shop Drawings”.

The contractor shall submit shop drawings along with a schedule detailing any/all deviations from the specification and design. Failure to comply with this requirement, shall result in the contractor being responsible for complete rectification to meet the design and specification at their cost regardless of whether a review has been carried out or not.

The contractor’s submission shall present sufficient detail to allow verification that the proposed equipment and solution can be installed, maintained, operated, and modified to meet the system design requirements. The contractor shall ensure that they have made allowance for a fully functioning solution that has included the total site dimensions, any adjusted dimensions or actual dimensions that can reasonably be expected to be encountered onsite. All dimensions shall be metric. The solution shall allow for ease of serviceability, while maintaining security of all equipment supplied or installed. The contractor shall ensure that they coordinate with other trades, all design requirements, including finishes and material specified by other consultants including but not limited to lift, architectural, structural, mechanical, and electrical consultants.

Submitted technical data and shop drawings shall be submitted in the format required by the main contractor. All shop drawing submissions shall be reviewed within 15 working days of their receipt, unless otherwise specified and any adjustments required shall be identified using “clouds”. All adjusted shop drawings shall be resubmitted as a clean new revision for review or acceptance.

#### **9.2.7.2. Operation and Maintenance Manuals (O&M)**

The contractor shall submit documentation to enable the client to operate and maintain all equipment deployed as a part of this contract. Documentation shall include any details allowing the client to adjust, alterations or additions to the supplied solution and shall have the ability to expand beyond the solution deployed.

All supplied documentation (written, pictorial, audio, or video) shall be in English. All material supporting the installed solution shall be succinct and written in a manner that allows the client’s non-technical personnel to understand and use. The compilation of the manual shall be undertaken by a suitably qualified person, capable of detailing the overall systems architecture, operation, and any other required information to provide the client the ability to understand and operate the installed solution.

O&M manuals shall be submitted to the ICT/ELV consultant for approval prior to final acceptance.



### **9.2.7.3. As Built Drawings**

Prior to practical completion, prepare and publish as-built documentation and manuals. Document the design as per NZCIC Construction Design phase requirements for Electrical Ancillary Services. Submit the documentation for review and approval.

As-built documentation shall be submitted to the ICT/ELV consultant for approval prior to final acceptance.

### **9.2.7.4. Maintenance Schedules**

A maintenance schedule shall be provided detailing the manufacturer's maintenance routine and recommended system tests or activities to ensure optimal system performance.



## **A APPENDIX A: Services Coordination**

### **A.1 Table**

#### **A.1.1 Table**





1.1 Annexure A: Services Coordination

SOW Category	SOW Details	Electrical Contr.	Security Contr.	Main Building Contr.	Generic Cabling Systems Contr.	Architect	Mech	Hydr	Fire prot.	Fire safety	Structural	Civil	UoO
ACS (Access Control System)	ACS: Supply and install ACS hardware	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Architectural	Architectural: Confirm door locks with architect door schedule	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Architectural	Architectural: Comfirm card reader and camera colours, positions and set outs with architect	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SOW Category	SOW Details	Electrical Contr.	Security Contr.	Main Building Contr.	Generic Cabling Systems Contr.	Architect	Mech	Hydr	Fire prot.	Fire safety	Structural	Civil	UoO
Architectural	Architectural: Confirm card reader and camera colours, positions and set outs with architect	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
CCTV	CCTV: Supply and install CCTV equipment	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Telecommunication Spaces	Telecommunication Spaces: Confirm and coordinate spacing with architect and UoO	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Electrical	Power: Issue rack power load to electrical for UPS provision	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



SOW Category	SOW Details	Electrical Contr.	Security Contr.	Main Building Contr.	Generic Cabling Systems Contr.	Architect	Mech	Hydr	Fire prot.	Fire safety	Structural	Civil	UoO
Electrical	Power: Confirm security head end equipment power load with electrical contractor for UPS supply and installation	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Electrical	Power: Confirm power loads to electrical for locks and SCP PSU GPOs	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
GCS (Generic Cabling Systems)	GCS: Confirm SCP locations with data contractor for data cabling supply and installation	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SOW Category	SOW Details	Electrical Contr.	Security Contr.	Main Building Contr.	Generic Cabling Systems Contr.	Architect	Mech	Hydr	Fire prot.	Fire safety	Structural	Civil	UoO
GCS (Generic Cabling Systems)	GCS: Confirm camera and SCP locations with data contractor for data cabling supply and install	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
IDS (Intruder Detection System)	IDS: Supply and install IDS equipment	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Networking	Network: Supply and install UoO approved switches	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Networking	Networking: Supply networking requirements to UoO	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

SOW Category	SOW Details	Electrical Contr.	Security Contr.	Main Building Contr.	Generic Cabling Systems Contr.	Architect	Mech	Hydr	Fire prot.	Fire safety	Structural	Civil	UoO
Networking	Networking: Confirm IP address blocks with UoO for applicable service devices	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Networking	Networking: Confirm routing details and requirements for applicable service with UoO	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
GCS (Generic Cabling Systems)	Patching: Comfirm ports with UoO to be patched	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
GCS (Generic Cabling Systems)	Patching: Supply patch leads (patch panel and device end)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SOW Category	SOW Details	Electrical Contr.	Security Contr.	Main Building Contr.	Generic Cabling Systems Contr.	Architect	Mech	Hydr	Fire prot.	Fire safety	Structural	Civil	UoO
GCS (Generic Cabling Systems)	Patching: Intall patch leads (patch panel and device end)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Telecommunication Spaces	Racks: Confirm rack ID and location within rack for security head end equipment installation	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Telecommunication Spaces	Racks: Equipment rack weight to be issued for wall and floor reinforcement	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reticulation	Reticulation: Supply and installation of cable trays	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SOW Category	SOW Details	Electrical Contr.	Security Contr.	Main Building Contr.	Generic Cabling Systems Contr.	Architect	Mech	Hydr	Fire prot.	Fire safety	Structural	Civil	UoO
Reticulation	Reticulation: Supply and installtion of primary path under ground and above ground conduits and ducts	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reticulation	Reticulation: Supply and installation of catenary and secondary path conduits	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reticulation	Reticulation: Provide wall and floor penetration details to main contractor for implementation	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SOW Category	SOW Details	Electrical Contr.	Security Contr.	Main Building Contr.	Generic Cabling Systems Contr.	Architect	Mech	Hydr	Fire prot.	Fire safety	Structural	Civil	UoO
Reticulation	Reticulation: Provide wall and floor penetration details to main contractor for implementation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Seismic restraining	Seismic restraining: Seismic restraining cable trays and primary overhead ducts	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Seismic restraining	Seismic restraining: Seismic restraining equipment cabinets	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>





SOW Category	SOW Details	Electrical Contr.	Security Contr.	Main Building Contr.	Generic Cabling Systems Contr.	Architect	Mech	Hydr	Fire prot.	Fire safety	Structural	Civil	UoO
Telecommunication Spaces	Telecommunication Spaces: Confirm and coordinate spacing with architect and UoO	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Telecommunication Spaces	Wall prep: Confirm cabinet sizing, weight and setouts with arch for wall preparation	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>