

## 16.00 Audio Visual Services

*All the requirements of this Section are Mandatory.*

### 16.01 General

This Section outlines the minimum requirements for teaching and learning spaces fitted with Audio Visual (AV) equipment and services.

Where GU Standard Detail Drawings are referred to in this Section, it shall be the responsibility of the Head Consultant or Contractor to liaise with INS/LES, through OFM, to ensure that the nominated drawings reflect the current technical requirements.

### 16.02 Systems Design

#### 16.02.01 General Principles

The following principles impact on the design and specification of AV systems.

**Projector/display mounting position** – The position of projectors and other display devices is subject to the following;

- Data projectors shall be securely mounted in accordance with the manufacturer’s published specification
- The location of any data projector shall be specified to facilitate ease of access for routine maintenance without compromising security.
- Where proposed mounting height exceeds 3000mm affl a motorised projector lift of a type acceptable to INS/LES shall be installed to drop projectors to a safe working height for maintenance. The ‘home’ position of the lift will be the projector’s normal operating location.
- The lens of any projector shall be perpendicular to and on the centreline of the planned image.
- No amount of digital keystone correction is acceptable.
- Other display devices (LCD, Plasma, CRT) shall be mounted solidly to a wall or a secure mount
- All display devices must be mounted such that adequate free air is provided to maintain the ambient temperature at any point around the device within the maximum allowed by the manufacturer.
- Air-conditioning outfalls must not be located in proximity to data projectors
- Security devices as nominated by INS / LES will be applied to all display devices

**Lecterns/equipment racks** – The requirement for Lecterns is based on the following;

- A Lectern or Teaching Station conforming to the requirements outlined in **Section 15.00 Fitments** shall be provided in each standard teaching space
- In specialist spaces, suitable furniture will be designed to allow for equipment racks.
- Where equipment racks are specified the following rack dimensions and location shall apply for joinery design

Room type	Rack footprint	Rack location and number
Seminar	600x600mm	Built into teaching station. Single rack
Meeting	600x600mm	Built into room furniture. Single rack
Videoconference, Lecture Theatre, Auditorium	600x800mm	Source equipment (DVD, PC etc) shall be accessible from table/teaching station. Other equipment to be easily accessible for maintenance. Multiple racks may be required

- In all cases where racks are to be built into furniture there shall be 150mm space behind the rack for provision of services and cable access
- Adequate ventilation must be provided to all equipment racks

**Audio systems** – The specification of audio systems shall be developed as follows;

- A specialist Acoustics Consultant acceptable to INS/LES shall be appointed by the Head Consultant or Contractor to acoustically map any lecture theatre or other large space before

finalising the design of the space. This specialist Consultant must work with INS/LES to assist them in developing a specification for a suitable public address system for each theatre space within appropriate performance and budget limitations.

- The design of audio systems in theatres and other large spaces shall be biased towards maximising coverage and intelligibility whilst providing high quality audio for the majority of users.
- In specialist spaces (eg: cinema, screening rooms, boardrooms) a custom sound system will be developed to best reflect the primary purpose of the facility.

#### **16.02.02 Audiovisual System Design Documentation**

Unless directed otherwise by OFM, the system design and specification of AV systems for projects shall be undertaken by INS/LES in conjunction with the specialist Acoustics Consultant.

Appropriate documentation will be provided by OFM to enable the Contractor to obtain competitive quotations for the supply and installation of the systems, and will be reviewed for possible revision prior to equipment procurement to ensure that the most appropriate equipment model is sourced.

No deviations from the system design provided by INS/LES will be accepted unless specifically agreed to in writing by the Superintendent.

### **16.03 Systems Installation**

#### **16.03.01 Program**

No projector, display device or other AV component (with the exception of furniture, empty racks and projector mounting posts) shall be installed until a clean, dust-free environment is provided.

Adequate time must be allowed in the project schedule for AV installation and commissioning. **As a guide only**, the following are suggested assuming appropriate cables are installed prior to the AV Subcontractor's arrival onsite;

- Standard seminar/meeting room      One day
- Standard lecture theatre              Four to five days
- Videoconferencing                      One additional day

Security of AV equipment is to be maintained by the Contractor until handover.

#### **16.03.02 Acceptable Specialist AV Subcontractors**

Unless otherwise agreed by INS/LES a single specialist AV Subcontractor shall be selected to supply, install and program all audiovisual equipment.

The specialist AV Subcontractor must be selected from those contracted by GU as a 'Preferred Supplier' of AV equipment and services. A current list of the University's approved suppliers will be provided by OFM.

For reasons of confidentiality with respect to the 'Preferred Supplier' status with GU, the specialist AV Subcontractor must be engaged directly by the Contractor, and shall not be engaged through another Subcontractor such as the Electrical Services subcontractor.

The AV equipment contract will include equipment racks, display devices, sound systems, security devices and all other equipment specified by the designer as a part of the AV package. It is not acceptable to split the specified scope of work between multiple AV Subcontractors unless approved by the Superintendent.

#### **16.03.03 Installation of Cables**

The Contractor may use a separate Subcontractor other than the specialist AV equipment installer to supply and/or install audiovisual cables subject to the approval of the Superintendent.

All cables must meet or exceed the cable specification later in this Section and included in the AV design.

For any requested deviation from the published specification, the Contractor shall submit a full specification demonstrating compliance with the published minimum specification.

The cabling installation Subcontractor shall be responsible for adhering to good cable management practices; including but not limited to;

- Appropriate bend radius
- Suitable looming and lacing
- Separation between data/power/audio/vision cable types where appropriate
- Protection from moisture, corrosive materials and other hazards.

#### **16.03.04 Equipment Installation Practices**

The specialist AV Subcontractor responsible for the supply and installation of AV equipment shall adhere to appropriate installation practices, including but not limited to;

- Provision of IEC-standard, 19" welded steel equipment racks to INS/LES specification
- Use of 6mm caged nut and GU standard security bolt Fibre, plastic or nylon cup washers must be used
- Rack-mounted power distribution
- Power cables shortened for best fit within equipment racks
- Audiovisual and control cabling to be loomed separate to power
- All blank rack spaces to be covered with vent panels
- Anti-tamper covers to be fitted to all equipment with front-panel knobs/switches
- Cable labelling to INS/LES specification

Power cables used within equipment racks shall be terminated with side-entry plugs (eg: Clipsal 418 or similar) wherever practical.

It is a requirement that all electrical work shall be undertaken by a suitably qualified person and in accordance with the requirements of [Section 20.00 Electrical Services](#).

The use of double adaptors of any type and switched domestic power boards is **not** acceptable.

### **16.04 Control System**

#### **16.04.01 General Requirements**

All AV systems in standard teaching spaces, meeting rooms and other nominated areas shall be controlled by an integrated control system acceptable to INS/LES. The current standard for AV control systems is the 'Netlinx' controller manufactured by 'AMX Corporation'.

Where specified in the AV design, the control system may be expected to interface to and control the following;

- VCR, DVD, Cassette, visualiser and other source devices
- Videoconference and/or teleconference codec
- Public address system volume levels
- Lighting systems
- Projection or other display devices
- Overflow/room linking systems
- Recording/presentation capture systems
- Other systems as adopted from time to time

In all but the most basic (projection/TV only) spaces, a programmable touch panel will be used as the user interface. Positioning of touch panel will be determined by INS/LES.

*All infra-red controlled equipment shall be internally modified for external control via an RCA (phono) socket on the back panel. Vendors shall honour full warranty on items modified in this way.*

#### **16.04.02 System Programs**

Where possible, AMX system programs will be provided by INS/LES and will be identical in rooms of like type.

Where AMX programming is undertaken by the Contractor, programs shall be written to conform with any coding standards in place at the time and shall be compiled for each individual room.

Standard user interface files shall be used unchanged. It is expected that the Contractor will reuse code in identical rooms to lower development, debugging and technical training costs.

Upon completion of the installation, the Contractor shall deliver to the INS/LES both electronic and hard copies of the program source code for each room in a format readily modifiable by any programmer qualified through appropriate AMX technical training.

***All intellectual property rights (copyright) shall be transferred to Griffith University at handover.***

Unless agreed otherwise 'modular' programming is acceptable only to the extent that source code and intellectual property are transferred to GU.

#### **16.04.03 User Instruction Panel**

A clear acrylic panel for equipment user instructions is to be provided and installed at 1600mm above f.f.l. adjacent to the Lectern/Teaching Station (refer GU Standard Detail Drawing No. GSD-502).

### **16.05 Master Antennae Television (MATV) and Cable Television distribution**

#### **16.05.01 General Requirements**

An MATV system for VHF, UHF and cable television signal reception shall be provided in all buildings. The system shall comprise all antennae, amplifiers, splitters and other components, necessary to provide noise and interference free reception of all available digital and analog television transmissions at each outlet.

The Contractor may use a specialist Subcontractor other than the specialist AV equipment installer to supply and/or install the MATV system subject to the approval of the Superintendent.

MATV outlets shall be provided within the equipment rack space in all Lecture Theatres, Seminar rooms, Meeting Rooms, Computer Teaching rooms, Video Conferencing rooms and other nominated areas.

MATV outlets will be cabled back via an accessible riser duct with lockable door to roof mounted antennae.

All outlets for MATV distribution shall be terminated with PAL/'Belling Lee' style sockets; only those provided for direct connection of a receiver/decoder for Satellite, Cable or other commercial service may be terminated with 'F' type sockets.

In teaching spaces where an equipment rack is not installed, provide an MATV outlet at a position nominated by INS/LES.

#### **16.05.02 Testing and proof of performance**

It is the responsibility of the MATV contractor to provide signal level at each outlet tested for compliance against AS1367.

The Contractor shall provide a report identifying the test equipment and procedure employed and proof of performance against the specification.

### **16.06 Audio Visual Cabling**

#### **16.06.01 Cabling Locations**

Audio, video, remote control and other special cabling (tie lines) are required between the following locations or equipment in accordance with the AV Specification

- Video/data projection and equipment rack;
- Equipment rack and Bio-Box/equipment room where specified

- As required elsewhere for specific situations as noted in SDFs and as determined in consultation with INS/LES.

**16.06.02 Conduits for AV Cabling**

All AV cabling shall be run in conduits. Conduits shall be installed as follows in accordance with the requirements of **Section 20.00 Electrical Services**, Clause 20.10 General Wiring.

**Seminar rooms** - Three (3) 50mm conduits to be provided for AV cabling only between the equipment rack/lectern position and the ceiling cavity.

**Theatres/larger spaces** - Four (4) 50mm conduits to be provided for AV cabling only between the equipment rack/lectern position and the ceiling cavity

**Additional conduits/specialist spaces** - The size and quantity of any additional conduits will be specified at the end of the AV design phase.

Conduit elbows are not to be used in any conduits for audio, video and control cabling. Bends must not be less than eight (8) times the diameter of the conduit.

**16.06.03 Cable Types**

All cable types will be clearly specified on the AV design documentation. Where a Contractor wishes to use alternative cable types, they must demonstrate in advance to the satisfaction of INS/LES that they meet or exceed the specification below. Red cable shall not be used for any audiovisual cabling.

Any RG59 vision cable that is not contained wholly within the equipment racks or lectern shall be capable of transporting high definition serial digital video signals and shall be equivalent to Belden 1505A.

All UTP and serial digital vision cable dedicated to audiovisual signal transport shall be **white**.

**16.06.04 Connectors & Terminals**

All connector types at terminations shall be clearly specified or indicated on. Alternative connectors are **not** acceptable to INS/LES.

All serial digital vision cable shall be terminated with true 75 Ohms connectors that are specified to perform to specification for the transport of high definition video signals. These connectors shall be electrically and mechanically equivalent to Kings 2065 series

Analog video connectors shall not be used with serial digital vision cable.

**16.06.05 Services Required in Teaching/Meeting spaces**

The following services are required at the locations nominated in addition to any provided for general use. Location of all services to be as nominated by INS/LES.

Room	Service	Qty	Location
Lecture theatre, Auditorium, videoconference	Data	8	Within equipment rack
		2	Present above lectern for customer use
	Dynalite (where specified)	1	Within equipment rack
Seminar	MATV	1	Within equipment rack
	Data	4	Within equipment rack
	Dynalite (where specified)	1	Within equipment rack
Meeting	MATV	1	Within equipment rack
	Data/Telephone	4	Within equipment rack
		2	At meeting table
	Dynalite (where specified)	1	Within equipment rack
	MATV	1	Within equipment rack

### 16.06.06 Telephones in teaching/meeting spaces

Analog telephones shall be provided only within or adjacent those spaces with an installed audiovisual system. All telephones deployed in common use spaces shall allow internal calls only.

Room Type	Location
Meeting room	Specific socket at meeting table; phone to tabletop
Standalone seminar room	Specific wall socket immediately adjacent teaching station
Grouped (adjacent) seminar rooms	Specific wall socket prominently located in shared corridor/entry adjacent rooms
Any videoconference room	Desk/wall mount adjacent equipment rack.
Lecture Theatre, Auditorium	To be patched to an AV port to be nominated by INS/LES

### 16.07 Video/Data Projection

Lecture Theatres, Seminar Rooms, Computer Teaching and other areas nominated to have a Video/Data projection system require the following:

- A video/data projector as specified by INS/LES; including a three years hardware warranty.
- The location of the *projector* support will be determined by the required screen size and the make and model of Video/Data projector to be installed.
- Cabling between the equipment rack and the data projector location as per AV Design Specification
- A twin CAT6 data outlet **inside** the ceiling space adjacent to the Video/Data projector.
- A double GPO mounted inside the ceiling adjacent the data projector and on the same circuit as the FOH equipment rack

### 16.08 Linkable Rooms

Where stated in the Technical Brief or SDFs that there is a requirement to link two rooms, the general requirements for the system to be provided are as follows:

- The two rooms should be adjacent or in close proximity. Distant rooms or those in adjoining buildings should be linked by other means e.g. Video Conferencing.
- Linkable/Expandable Seminar rooms should be designed such that the Lecterns/Teaching positions are adjacent when the operable wall between the rooms is opened i.e. between the two projection surfaces.
- The AV design shall allow for all signals including audio to be available in both rooms.
- In linkable Lecture Theatres, remotely controlled video cameras shall be provided to allow bi-directional visual communication.
- In linkable Lecture Theatres, microphones shall be provided to allow for audience questions to be heard in both rooms.

### 16.09 Audio Systems

A high quality Public Address (PA) system shall be provided in all teaching and AV equipped meeting rooms for the playback of audio from DVD, VHS, PC and other content sources. In lecture theatres, amplification will also be provided for microphones.

All theatres and other large spaces will be acoustically mapped during the design stage as previously outlined in this Section by a competent acoustic consultant acceptable to INS / LES in order to provide input into the design of the public address system and provide optimal intelligibility and coverage.

APreference is for a single PA system to be specified to handle both vocal and playback audio, with appropriate processing for each to attain the desired performance. Separate systems may be specified where acceptable results cannot be achieved with a combined system.

Equalisation, delay, feedback processing and mixing shall be handled by means of a DSP audio mixer/router specified by INS/LES. Four (4) discrete outputs will generally be available for the house PA system plus a fifth for any hearing augmentation system.

### **16.10 Hearing Augmentation**

In all-spaces greater than 100m<sup>2</sup> in area where a PA system is installed, a hearing augmentation system will be provided in accordance with BCA D3.7. Hearing augmentation systems shall provide even coverage throughout the entire space unless a restricted area is specified.

Where an Audio Frequency Inductive Loop System is specified, the Contractor will be required to submit a design for the loop and proposed test plan, and at completion of installation demonstrate compliance with the specification by means of objective testing.

Loops installed in adjacent rooms shall be designed to maximise coverage and limit spill into any other space.

In general, loops will not be required in Seminar and Meeting rooms and smaller areas of less than 100m<sup>2</sup>. Where a larger space can be created by opening the operable wall between two smaller spaces, provide audio loops which will serve the combined area.

Hearing augmentation systems shall be installed in any space with a permanently installed videoconferencing or other audio conferencing systems.

### **16.11 Video Conferencing**

Where videoconferencing is nominated for any space, the system shall be designed and specified by INS/LES to ensure complete compatibility with other corporate systems. System design shall include camera and microphone positions.

No deviations from the published specification are acceptable unless specifically authorised by INS/LES.

In addition to electrical and space design guidelines the following are specific requirements of any videoconference space:

- Dual projection or wall mounted displays
- 'Tandberg 6000MXP' codec with accessories as specified
- Small room layout must allow camera to be framed on any single participant
- Fixed furniture must be provided in all rooms to ensure optimal seating positions
- Provide a permanently lit sign with Room Name, Campus, and 'Griffith University' opposite the 'viewing wall' camera. The sign and light details are to be agreed with INS/LES.

Compliant hearing augmentation systems are to be deployed in all new videoconference spaces.

### **16.12 Registration of AV Assets**

As soon as practical prior to the granting of Practical Completion of the Project, the Contractor shall obtain from its AV Subcontractor and provide to the Superintendent, a list of all AV equipment provided under the Contract including serial numbers, MAC address where appropriate, value and location by room number.