1. Use Of Technology

These classroom design guidelines are intended for use by Architectural, Engineering & AV Integrators design teams as they design classrooms, meeting and conference rooms and other AV-equipped spaces for Allan Hancock College District (AHC). The guidelines are produced in an effort to standardize Audiovisual Technology types and functions throughout the District. The guidelines provide parameters regarding AHC’s requirements for classrooms, but will require interpretation and adjustment to suit the specific situations presented by individual classroom design projects. General classroom types shall accommodate the instruction of a variety of different subjects and instructional styles while maintaining common technology types and standard interfaces to technology. The standardization of equipment and interfaces to technology will promote ease of use for faculty and staff as they transition to classrooms throughout the District.

This is intended to be a document that accommodates changes in system technology throughout the years by keeping standards general and leaving off model numbers of specified equipment. For the occasional new milestone change, the general standards may be revised. Items such as infrastructure and concept should remain relatively static.

2. Communications System Requirements

Each AV-equipped room will provide for connectivity to the District’s data network. Both wired and wireless connections will be accommodated. Communications outlets are to be installed in the following classroom locations:

- Front Wall/Teaching Wall – provide a minimum of (2) communications outlets
- Side Walls – provide a minimum of (3) communications outlets at each side wall
- Rear Wall – provide a minimum of (2) communications outlets
- Side Wall adjacent to Instructor Station - provide a minimum of (3) communications outlets at wall.
- Instructor Station floor box - provide a minimum of (3) communications outlets at floor box.
- Ceiling mounted projector – provide (1) communications outlet
- AV Equipment Cabinet – provide a minimum of (3) communications outlets (in rooms with dedicated AV equipment cabinet locations). Provide (4) if in a space with videoconferencing.
- Wireless Access Point outlet – provide minimum of (1) communications outlet located above an accessible ceiling location within the classroom. Depending on the size of the classroom (number of potential wireless users) multiple access points may be justified.

Note: Rooms to be used as computer labs require additional communications outlets at student seating locations. Computer labs shall be designed to provide the distribution of power and communications to each student seat.

Architectural, Engineering & AV Integrators teams should also view the following AHC standards and design guidelines that refer to communications requirements:

- Communications Cabling, AHC Standard Specification
- Technology Room Design Requirements, Guidelines

3. General Room Audiovisual & Multimedia System Requirements

Audiovisual (AV) & Multimedia (MM) capabilities will support the use of integrated audio, video and computer based media for group instruction. The audiovisual system will support the display of images with the use of a ceiling mounted projector and projection screen. Voice reinforcement, where required, and audio reproduction will be provided using sound distribution through ceiling recessed loud speakers or wall mounted as needed. The instructor will operate the audiovisual system from the front of the room. Media source and monitoring equipment will be located in the instructor podium or A.V. Equipment Cabinet as required. Processing and control electronics will be located in the instructor podium. A room dedicated computer will be located at the instructor podium.
Typical audiovisual multimedia system and equipment details are as follows:

**Video/Computer Display**
A ceiling-mounted video projector will be used to display video and computer images on a motorized roll-down projection screen. Video projector requirements are as follows:

- Minimum light output requirements for projectors in classrooms are 3700 lumens.
- Closed captioning decoder built-in or by stand-alone equipment
- Data network connection for network control and future media display transport
- Minimum resolution: WXGA (1280 x 800 pixels)
- Projector mount: Ceiling panel mount. The Ceiling Panel shall feature two knockout panels for electrical and audio video boxes and shall contain a 1 1/2” NPS lock nut welded in place. It shall include a 1 1/2” x 3” NPS threaded pipe. BMS LCD LOCII or equivalent
- Source connection types to include VGA and a high-definition input such as DVI-D or HDMI, RJ45 and video inputs.
- Epson is the preferred manufacturer per specific projector needs. LCD technology.

**Ceiling** or wall mounted as needed **Media/Voice Playback Speakers**
A 70V and or 8 ohm ceiling-recess mounted speaker system will be deployed within spaces requiring audio support (in new construction). Coverage will be dependent on ceiling height and audience locations and will drive the number of speakers to be deployed accordingly. Speaker requirements are as follows:

- 70 volt system and or 8 ohm for even monaural playback
- Minimum 4” diameter cone
- Frequency range (-10bd): 75 Hz – 20 kHz
- Nominal sensitivity level 89dB SPL, 1W @ 1m (3.3 ft)
- Include plenum back can, speaker and grill
- Extron is the preferred manufacturer
- Minimum of two speakers

**Projection Screens**
Rooms shall be designed to accommodate a minimum of one projection screen. Screen requirements are as follows:

- Size – screens shall be sized to accommodate good viewing at student seat locations. Minimum screen image height is 50” with a student seat location 25’ from screen. (standard rule is 1’ of screen image height for every 6’ of distance from screen.) Bottom of screen image shall be no less than 4’ above the finished floor.
- Aspect Ratio – typical aspect ratio shall be 16:10 (widescreen format).
- Screen location – screen shall be located at front wall. Screen material – screen material shall be a matte white with a black border. Screen material shall have a gain of approximately 1.0.
- Installation – manual screens shall be wall mounted. Typical classroom and meeting/conference space screens shall be manual with a Controlled Spring Return (CSR) for smooth screen retraction. Where required on larger (auditoria) image sizes, motorized ceiling recessed projection screens with a manual switch located near the instructor station and a low voltage parallel interface for AV system connection can be used. In either case, screen should be pushed away from the wall where required to accommodate whiteboard trays and other wall mounted equipment that may reside behind the screen.
- Manual screen preferred manufacturer to be Da-Lite wall mounted type, and should be the Model-C with CRS- HDTV format or equivalent. Wall mount spacer brackets to be used as required.
- Motorized screens shall be recessed ceiling mounted type manufacturer to be Da-Lite and should be the tensioned large Cosmopolitan® Electrol® - HDTV format.

**Projector Mounting Hardware with Security Capabilities**
BMS (security cage)

**AV Source Equipment**
Displayed computer images will be generated from a room dedicated computer or a laptop computer connected at the instructor podium. Standard video playback equipment will include a DVD/CD. For detailed requirements for source equipment see appendix A:

- A document camera will be a common auxiliary equipment type required in classrooms. See Instructor Podium requirements, Appendix A for additional details of auxiliary AV input connection types. Preferred document camera type to be Samsung Document Camera or equivalent.
- Apple TV or equivalent wireless data transfer device is an emerging piece of auxiliary equipment for use with mobile devices.
- Auxiliary equipment will be selected from the push button control panel from the podium for display on the projection screen and distribution through speakers.

**Audio Reproduction**

Audio will be reproduced with the installation of a 70V distributed and or 8 ohm system as part of the classrooms dedicated AV equipment (in new construction). Loudspeakers shall be recessed in the ceiling of the classroom reproducing sound from computer, audio and video playback sources. Audio distribution to the ceiling speakers is monaural. Larger rooms, such as Lecture Halls or Auditoria, will also require voice reinforcement as well as wall mounted speakers for more advanced stereo or surround sound source playback. Wireless microphones will be used by instructors in rooms requiring voice reinforcement. Assistive Listening Systems (ALS) will be included in all buildings. At least one portable ALS will be required per building to support ADA requirements in spaces with less than 50 occupants. In presentation/instruction rooms with 50+ occupants, an integrated ALS system will be required in that space. For both portable and installed ALS systems a minimum amount of headsets to accommodate of 4% of the total room occupants (but no less than 2) will be required per location. The ALS system will be RF based and will be 72mHz.

**AV System Control**

Media source selection, volume control, screen functions and other control options will be selected and controlled using a push button panel control panel located at the instructor podium. The model of the control panel should be coordinated with the Campus’ Media Services Department (see Appendix A) The buttons on the control panel shall include (but not be limited to):

- System On/Off
- Screen Up/Down
- Source selection (PC, Laptop, Aux., Doc Cam, etc.)
- Program Volume Up/Down/Mute
- Microphone Mute (if space allows, Vol Up/Down)
- Image Mute (to hide projector image if only audio is required)
- Source control (space permitting)

Control panel should have provisions for Ethernet connection for IP-based system control or remote management system implementation.

Secondary control of the projector will be available through built-in user interface pages using Extron Global Configurator®. (See item 4 below.)

**Specialty AV Equipment**

The classroom AV system shall be designed to allow for the connection of specialty equipment through an interface panel. The specialty equipment items currently identified include the following:

- Assistive Listening Equipment (ALS) - Portable ALS equipment shall be connected at the Instructor Station or AV equipment cabinet.
- Annotation tablet – the AV system shall be designed such that an annotation tablet, capable of providing electronic whiteboard functions from a tablet located at the instructor station, may be permanently connected.
- Apple TV or equivalent wireless data transfer device is a piece of auxiliary equipment for use with mobile devices.

**Portable AV Equipment**

Details for use of portable AV equipment in classrooms are as follows:

- Overhead projectors and Slide projectors – these portable projector types will use the installed projection screen for media display.
- Power and data connections are to be located at the classroom front wall for miscellaneous equipment use.
Special Conference Room AV Equipment
Special needs in Conference Rooms or Large Meeting Rooms may include table-top surface mounted AV controllers and inset LED monitors. The specialty equipment items currently identified include the following:

- Extron Hideaway® Brand (like the HSA 222S) to be mounted to the table surface and shall be connected at the AV equipment cabinet. See Floor Box/Poke-Throughs on page 10
- Multiple small LED flat screen monitors flush mounted in the conference table.

4. Help/ Remote Network Management Software

Extron Global Configurator® is deployed on the campus and all AV systems or lone networked AV peripheral devices can be added for remote monitoring and control (including automatic system shutdown timers, remove device control, error/status alerts, etc.).

5. AV Related Lighting And Low Voltage Cabling Requirements

**Lighting**
- A set of lighting switches shall be located adjacent to the instructor station.
- Lighting shall be circuited to allow a reduction of overall room light levels during allowing dimming during use of projector. Light levels dimmed through switching should still maintain enough light to allow students to take notes or work from documents located at their desktop.
- Higher level functioning rooms (typically Lecture Halls/Auditoriums) that require dimming capabilities should have lighting control connections to the AV control system.
- Lights in AV rooms should be circuited to allow fixtures adjacent to projection screens to be turned off during projection. Fixtures at writing board spaces and instructor stations should remain on during projection.
- Light fixtures should provide maximum directivity of illumination and minimal surface brightness to reduce the opportunity for glare and distribution of stray light onto image display screens.

**Lighting Control**
- Where lighting is controllable through the AV control system, redundant wall-mounted controls shall also be provided per Architect’s specification.
- Where designated, provide a Low Voltage Interface for remote switching of lights from the AV system in designated AV facilities. (See Low Voltage Remote Control Interfacing below)

**Day light control**
- Where window glazing allows exterior daylight or lighting from adjacent interior spaces into an AV space, window coverings should be provided to control the visual display environments. This can include manual or motorized shades (i.e. Mecco Shade) for scrim or blackout materials.
- Where shades and drapes are controllable through the AV control system, redundant wall-mounted controls shall also be provided per Architect’s specification.
- Where designated, provide a Low Voltage Interface for remote switching of shades from the AV system in designated AV facilities. (See Low Voltage Remote Control Interfacing)

**Low Voltage Cabling**
- All low voltage cabling for AV systems will be routed through conduit, wireways or other dedicated containment.
- Flush floor power distribution outlets and signal connection boxes will be required at locations where connections cannot reasonably be made at wall outlets.
- Flush floor electrical boxes will be required at designated locations for audiovisual signal and power connections. The size and density of cabling and connections will preclude the use of standard “poke-thru” type fittings.

**Low Voltage Remote Control Interfacing**
- Where required as part of the AV system integration into the room, lighting and shade/drape system low voltage interfacing will be included. This may include relay interface for motor control or RS232 conversion equipment
6. AV Room System Descriptions
The following system narratives can be applied to the various room layouts depending on their specific functionality requirements.

**DUAL SCREEN CLASSROOMS**
Audiovisual capabilities in the Dual Screen Classrooms will support the use of audio, video and computer based media for group instruction, study and presentation. The system will support the display of computer/video images with two ceiling mounted projectors and allow for voice and audio reproduction using ceiling mounted loud speakers. The system will be operated from the front of the room at a push-button control panel at the Instructors Podium. Media sources and control/processing equipment will be located in a dedicated and secure AV equipment rack.

<table>
<thead>
<tr>
<th><strong>Dual Screen Classroom</strong></th>
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</thead>
<tbody>
<tr>
<td><strong>Occupancy</strong></td>
</tr>
<tr>
<td><strong>Instructor arrangement</strong></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Electronic Image Display</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Image Displays - Equipment</strong></td>
</tr>
</tbody>
</table>
| **Media sources** | • Dedicated computer with wired keyboard and mouse  
• Interface connection for laptop computer  
• CD/DVD player access from podium computer  
• Auxiliary high resolution input (for document camera)  
• HDMI/Display Port connection for HD PC, tablet or media sources |

<table>
<thead>
<tr>
<th><strong>Sources and Input Locations</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Media sources, equipment location</strong></td>
</tr>
<tr>
<td><strong>Signal Routing, equipment location</strong></td>
</tr>
<tr>
<td><strong>Input Locations</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Sound Systems</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Program Audio Reproduction</strong></td>
</tr>
</tbody>
</table>
| **Speech Audio Reproduction** | Provide the following microphones as applicable (dependant on room size and requirements:  
• Wired gooseneck microphone for instructor  
• Wireless lapel microphone  
Speech audio is reproduced through ceiling recessed loudspeakers. |
| **Audio System Electronics** | Provide the following capabilities  
• DSP processing for each input and output channel.  
• Automatic mic mixing for all microphone input channels  
• Discrete volume controls for speech and program audio  
• Output zones as shown on drawings |
| **ADA Support** | • Integrate ALS System with audio system electronics  
• Provide closed-captioning decoding |

<table>
<thead>
<tr>
<th><strong>Control Systems</strong></th>
</tr>
</thead>
</table>
| **Control Panels** | Provide the following Control Panels:  
• Push-button control panel located at instructor’s podium |
| **Control Processing** | Control processing equipment is located in the equipment rack located in the podium at the front of the room. |
### LARGE CLASSROOMS

Same as Dual Screen Classroom

### MEDIUM CLASSROOMS

<table>
<thead>
<tr>
<th>Medium Classroom</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Occupancy</strong></td>
<td>40-60</td>
</tr>
<tr>
<td><strong>Instructor arrangement</strong></td>
<td>Instructor’s podium at room front.</td>
</tr>
</tbody>
</table>

#### Electronic Image Display

<table>
<thead>
<tr>
<th>Image Displays - Equipment</th>
<th>Provide a single ceiling mounted LCD projectors, 3700 ANSI lumen, 1280 x 800 (WXGA) minimum native resolution.</th>
</tr>
</thead>
</table>
| **Media sources**          | • Dedicated computer with wired keyboard and mouse  
                              • Interface connection for laptop computer  
                              • CD/DVD player access from podium computer  
                              • Auxiliary high resolution input (for document camera)  
                              • HDMI/Display Port connection for HD PC, tablet or media sources |

#### Sources and Input Locations

<table>
<thead>
<tr>
<th>Media sources, equipment location</th>
<th>The media sources are located in the equipment rack located in the podium at the front of the room.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signal Routing, equipment location</td>
<td>Audio and video signal matrixing/routing equipment is located in the equipment rack located in the podium at the front of the room.</td>
</tr>
<tr>
<td>Input Locations</td>
<td>Inputs located at Instructor’s podium at the front of the room. USB connections at work surface will facilitate storage device connection at the dedicated PC within the Instructor Desk or other remote location.</td>
</tr>
</tbody>
</table>

#### Sound Systems

<table>
<thead>
<tr>
<th>Program Audio Reproduction</th>
<th>Sound from audio, video and computer sources is reproduced through loudspeakers mounted flush in the ceiling.</th>
</tr>
</thead>
</table>
| Speech Audio Reproduction  | Provide the following microphones as applicable (dependant on room size and requirements:  
                              • Wired gooseneck microphone for instructor  
                              • Wireless lapel microphone  
                              Speech audio is reproduced through ceiling recessed loudspeakers. |
| Audio System Electronics    | Provide the following capabilities  
                              • DSP processing for each input and output channel.  
                              • Automatic mic mixing for all microphone input channels  
                              • Discrete volume controls for speech and program audio  
                              • Output zones as shown on drawings |
| ADA Support                 | • Integrate ALS System with audio system electronics  
                              • Provide closed-captioning decoding |

#### Control Systems

| Control Panels | Provide the following Control Panels:  
                 • Push-button control panel located within the table  
                 • Display handheld remote control |
<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Control Processing</td>
<td>Control processing equipment is located in the table control panel.</td>
</tr>
</tbody>
</table>

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**Dual Screen Classroom**

<table>
<thead>
<tr>
<th>Occupancy</th>
<th>50-75</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instructor arrangement</td>
<td>Instructor’s podium at room front.</td>
</tr>
</tbody>
</table>

#### Electronic Image Display
Image Displays - Equipment

Provide two single ceiling mounted LCD projectors, 4000 ANSI lumen, 1280 x 800 (WXGA) minimum native resolution.

Media sources

- Dedicated computer with wired keyboard and mouse
- Laptop computer
- CD/DVD player
- Auxiliary high resolution input (for document camera)
- HDMI/Display Port connection for HD PC or media sources

Sources and Input Locations

Media sources, equipment location
The media sources (DVD, etc.) are located in the equipment rack located in the podium at the front of the room.

Signal Routing, equipment location
Audio and video signal matrixing/routing equipment is located in the equipment rack located in the podium at the front of the room.

Input Locations
Inputs located at Instructor’s podium at the front of the room. USB connections at work surface will facilitate storage device connection at the dedicated PC within the Instructor Desk or other remote location.

Sound Systems

Program Audio Reproduction
Sound from audio, video and computer sources is reproduced through loudspeakers mounted flush in the ceiling.

Speech Audio Reproduction
Provide the following microphones as applicable (dependant on room size and requirements:
- Wired gooseneck microphone for instructor
- Wireless lapel microphone
Speech audio is reproduced through ceiling recessed loudspeakers.

Audio System Electronics
Provide the following capabilities
- DSP processing for each input and output channel.
- Automatic mic mixing for all microphone input channels
- Discrete volume controls for speech and program audio
- Output zones as shown on drawings

ADA Support
- Integrate ALS System with audio system electronics
- Provide closed-captioning decoding

Control Systems

Control Panels
Provide the following Control Panels:
- Push-button control panel located at instructor’s podium

Control Processing
Control processing equipment is located in the equipment rack located in the podium at the front of the room.

MEDIUM MEETING ROOM

Audiovisual capabilities in the Medium Meeting Room will support the use of audio, video and computer based media for group collaboration and presentation. The system will support the display of computer/video images with a ceiling mounted projector and allow for audio reproduction using ceiling mounted loud speakers. The system will be operated from the front of the room at a push-button control panel at the podium.

Media sources and control/processing equipment will be located in a dedicated and secure AV equipment rack in the podium.

Meeting Room

Occupancy 12-20

Participant arrangement Around central table

Electronic Image Display

Image Displays - Equipment
Provide a single ceiling mounted LCD projector, 3700 ANSI lumen, 1280 x 800 (WXGA) minimum native resolution.

Media sources
- Dedicated computer with wired keyboard and mouse
- Interface connection for laptop computer
<table>
<thead>
<tr>
<th>Sources and Input Locations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Media sources, equipment location</strong></td>
</tr>
<tr>
<td><strong>Signal Routing, equipment location</strong></td>
</tr>
<tr>
<td><strong>Input Locations</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sound Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Program Audio Reproduction</strong></td>
</tr>
</tbody>
</table>
| **Audio System Electronics** | Provide the following capabilities:  
  - DSP processing for each input and output channel.  
  - Discrete volume controls for speech and program audio  
  - Output zones as shown on drawings |
| **ADA Support** |  
  - ALS System provided as needed via portable equipment.  
  - Provide closed-captioning decoding (as part of projector electronics or as standalone processor) |

<table>
<thead>
<tr>
<th>Control Systems</th>
</tr>
</thead>
</table>
| **Control Panels** | Provide the following Control Panels:  
  - Push-button control panel located in the podium. |
| **Control Processing** | Control processing equipment is located in the equipment rack located in the podium at the front of the room. |
Audiovisual capabilities in the Small Meeting Room will support the use of audio, video and computer based media for group collaboration and presentation. The system will support the display of computer/video images with a wall mounted LCD flat panel display and allow for audio reproduction using side mounted display loud speakers. The system will be operated from the table at a push-button control panel in a flip-up panel at the table. Media sources and control/processing equipment will be located in a dedicated and secure AV equipment rack.

<table>
<thead>
<tr>
<th>Meeting Room</th>
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</thead>
<tbody>
<tr>
<td>Occupancy</td>
</tr>
<tr>
<td>Participant arrangement</td>
</tr>
</tbody>
</table>

**Electronic Image Display**

- **Image Displays - Equipment**: Provide a single wall mounted LED 50” – 65” TV, 1920 x 1080 minimum native resolution.
- **Media sources**:
  - Laptop computer
  - CD/DVD player
  - Auxiliary high resolution input (for document camera)
  - HDMI/DisplayPort connection for HD PC, tablets or media sources

**Sources and Input Locations**

- **Media sources, equipment location**: Any media sources (DVD, etc.) are located in a portable equipment rack located in the cabinet at the front of the room when needed.
- **Signal Routing, equipment location**: Audio and video signal matrixing/routing equipment is provided through the display equipment.
- **Input Locations**: Inputs located at the table.

**Sound Systems**

- **Program Audio Reproduction**: Sound from audio, video and computer sources is reproduced through the display side speakers
- **Audio System Electronics**: Provide the following capabilities
  - DSP processing for each input and output channel.
  - Discrete volume controls for speech and program audio
- **ADA Support**: ALS System provided as needed via portable equipment.

**Control Systems**

- **Control Panels**: Provide the following Control Panels:
  - Push-button control panel located within the table.
  - Display handheld remote control.
- **Control Processing**: Control processing equipment is located in the table control panel or via the display.

**STUDY ROOM**

Audiovisual capabilities in the Study Room will support the use of audio, video and computer based media for small team collaboration and discussion. The system will support the display of computer/video images with a wall mounted LCD flat panel display and allow for audio reproduction using side mounted display loud speakers. The system will be operated from the display handheld remote control or by a wall mounted small push-button control panel. Media sources are provided via portable equipment.

<table>
<thead>
<tr>
<th>Meeting Room</th>
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</thead>
<tbody>
<tr>
<td>Occupancy</td>
</tr>
<tr>
<td>Participant arrangement</td>
</tr>
</tbody>
</table>
### Electronic Image Display

<table>
<thead>
<tr>
<th>Image Displays - Equipment</th>
<th>Provide a single wall mounted LED 42&quot;-50&quot; TV, 1920 x 1080 minimum native resolution.</th>
</tr>
</thead>
</table>
| Media sources             | • Auxiliary high resolution input for laptop computers  
                            • Auxiliary AV input  
                            • HDMI/DisplayPort connection for HD PC or media sources |

### Sources and Input Locations

<table>
<thead>
<tr>
<th>Media sources, equipment location</th>
<th>Any media sources will be provided by portable equipment.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signal Routing, equipment location</td>
<td>Audio and video signal matrixing/routing equipment is provided through the display equipment.</td>
</tr>
<tr>
<td>Input Locations</td>
<td>Inputs located at the front wall.</td>
</tr>
</tbody>
</table>

### Sound Systems

<table>
<thead>
<tr>
<th>Program Audio Reproduction</th>
<th>Sound from audio, video and computer sources is reproduced through the display side speakers</th>
</tr>
</thead>
</table>
| Audio System Electronics  | Provide the following capabilities  
                            • DSP processing for each input and output channel.  
                            • Discrete volume controls for speech and program audio |
| ADA Support               | N/A                                                                                         |

### Control Systems

| Control Panels | Provide the following Control Panels:  
                             • Push-button control panel located at the front wall.  
                             • Display handheld remote control. |
<table>
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</thead>
<tbody>
<tr>
<td>Control Processing</td>
<td>Control processing equipment is located in the wall control panel or via the display.</td>
</tr>
</tbody>
</table>

### Additional equipment including VCR decks and Apple TVs can be provided by request

### Audiovisual Equipment Standards

The Allan Hancock College campus has determined specific equipment and manufacturer to be deployed throughout the campus to help ensure some consistency.

#### Control System Equipment

Extron Electronics will be used for all base level and advanced AV / Multimedia control systems. Use Extron Media Link® series (MLC104 IP Plus, etc.) control wall plates (note: match infrastructure requirements if other plates are used) with built-in controller for typical/small-medium spaces and Extron IPL 250 control processor and TouchLink™ touch control panels for larger classrooms or conference spaces with extended control requirements such as distance learning or videoconferencing.

#### Interfacing / Connection Plates

Extron Electronics will be used for standard connection plates at walls, etc. Minimum connections will include HD15-F VGA and stereo 3.5mm audio jacks, composite video and stereo audio RCA-F jacks and HDMI (for computer, use the 3.5mm jack with the VGA for audio connection). The HDMI will support DVI and DisplayPort connections with appropriate adapter cables. Reference Extron AAP-104 or RGB478xi with appropriate connection plates (note: match infrastructure requirements if other plates are used). At tables, a flip-up plate can be used with the connection cables housed within that can be pulled out for peripheral connectivity. Reference Extron CableCubby™ series (i.e. Cable Cubby 600).

#### Remote Management Software
Extron Global Configurator® is deployed on the campus and all AV systems or lone networked AV peripheral devices can be added for remote monitoring and control (including automatic system shutdown timers, remove device control, error/status alerts, etc.).

**Videoconferencing Equipment**
Tandberg videoconferencing codecs and desktop systems will be used for any videoconferencing applications on campus to be consistent with other hardware currently deployed.

**Floor Box/Poke-Throughs**
FSR, Inc. FL-500P-6 or units with equivalent capacity will be used for combining audiovisual, power and data within one combined unit under Instructor Stations and Conference Room table legs on the ground floor. On other higher floors (if a floor box type cannot be used), a higher capacity poke-through will be used such as the Wiremold Evolution 6 or 8 (depending on the capacity required). In some cases, a Wiremold AV3 or other type poke-through can be used if cabling (data/AV) is to just pass-through into the furniture (like a desk or table).

7. **Av System Specific Cabling Requirements**
The cable types listed in the table below are specified for fixed installation within the base-building raceway and within fixed equipment racks. Unless specifically noted elsewhere, these are NOT acceptable for flexible cables used within lecterns or credenzas or for connection of portable equipment.

Where plenum rated cables required, plenum equivalents shall meet the same performance characteristics as non-plenum cables listed below

All speaker cable shall be sized by the Audiovisual Integrator to produce less than 1dB of loss in the speaker/cable circuit.

All video cable shall be sized by the Audiovisual Integrator to meet the industry standards.

The Audiovisual Integrator shall select the UTP cable type (Cat 5, Cat5e, Cat6, Extron Skew-Free UTP, (Non-Plenum & Plenum) MediaTwist, etc.) for correct operation of AV over UTP equipment.

With all future buildings, we will use Cat-6a where AV / Multimedia runs will not exceed 100’ if it is only an analog signal. If the run is longer, a Skew-Free UTP Extron cable will be used to send those signals.

If the AV / Multimedia signal is a mix of analog and digital the standard should be to only use Extron Skew-Free UTP and Extron DTP26 cable for analog and digital signal runs.

Extron MTP T AV Transmitter and Extron MTP R AV Receiver will be used to send and receive composite video, audio signals.

Extron MTP T 15HD RS Transmitter and Extron MTP RL 15HD RS Receiver will be used to send and receive VGA and RS-232 signals.

These two examples are only the starting point in signal Transmitter and Receiver over CAT 6a, Skew-Free UTP and DTP26 cables for digital and analog signals, as the system is enhanced other Extron Transmitters and Receivers will be used to provide the required system configurations.

Rooms and conference rooms that have the need for access to analog and digital signals to be sent to a display unit, will be outfitted with one of Extron’s Tilt-Up HSA - Hideaway Surface Access Enclosure. This is a tilt-up, architectural solution for inconspicuous computer-video interface connector access and control. Architectural Adapter Plates or AAPs are available with hundreds of connector combinations to meet the needs of any application.

See table on following pages for specific cable and connector types allowed:
<table>
<thead>
<tr>
<th>Signal Type</th>
<th>Description</th>
<th>Acceptable Mfgs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Audio (analog line/mic level)</td>
<td>Shielded twisted pair, 22 AWG</td>
<td>Belden 9451, Liberty 22-1P-EZ</td>
</tr>
<tr>
<td>Audio (digital)</td>
<td>110 ohm, Low Capacitance STP</td>
<td>Belden 1800B, Liberty 24 1p DIG-AUDIO</td>
</tr>
<tr>
<td>Audio Speaker Level, constant voltage</td>
<td>Stranded 18 AWG</td>
<td>Belden 5300UP Liberty 18-2C</td>
</tr>
<tr>
<td>Audio Speaker Level 8 ohm, short run</td>
<td>Stranded 16 AWG</td>
<td>Belden 5200UP Liberty 16-2C-TTP</td>
</tr>
<tr>
<td>Audio Speaker Level 8 ohm, medium run</td>
<td>Stranded 14 AWG</td>
<td>Belden 5100UP Liberty 14-2C-TTP</td>
</tr>
<tr>
<td>Audio Speaker Level 8 ohm, long run</td>
<td>Stranded 12 AWG</td>
<td>Belden 5000UP, Liberty 12-2C-TTP</td>
</tr>
<tr>
<td>Audio Speaker Level 8 ohm, long run</td>
<td>Stranded 10 AWG</td>
<td>Belden 5T00UP, Liberty</td>
</tr>
<tr>
<td>Bundled RGBHV with optional control and audio</td>
<td>Composite cable with mini hires coax</td>
<td>Belden, Extron, Liberty with video, audio, control</td>
</tr>
<tr>
<td>pairs</td>
<td></td>
<td>elements as required</td>
</tr>
<tr>
<td>Baseband Video</td>
<td>RG-59</td>
<td>Belden 1505A</td>
</tr>
<tr>
<td>CATV Trunk Line</td>
<td>RG-11U Quad Shield</td>
<td>Belden 7731A</td>
</tr>
<tr>
<td>CATV Drop Line</td>
<td>RG-59U Quad Shield</td>
<td>Belden 9100, Liberty RG59-CCS</td>
</tr>
<tr>
<td>Control (Cresnet, Axlink)</td>
<td>STP 22 AWG UTP 18 AWG</td>
<td>Liberty LLinx-U, Belden 1502P or control system mfg certified equal</td>
</tr>
<tr>
<td>Extron STP22 Serial Control/Audio Cables</td>
<td>22 AWG, color-coded</td>
<td>Extron</td>
</tr>
<tr>
<td>Control (serial, dry contact, etc)</td>
<td>Varies</td>
<td>Belden, Liberty, West Penn</td>
</tr>
<tr>
<td>Fiber for data transport</td>
<td>Varies</td>
<td>Client std mfg and type (MM/SM)</td>
</tr>
<tr>
<td>Fiber for AV signal transport</td>
<td>Varies</td>
<td>Client std mfg and type (MM/SM)</td>
</tr>
<tr>
<td>UTP for media transport (non IP)</td>
<td>CAT 5e or CAT 6 as req</td>
<td>Cat 5e- Belden 1701A</td>
</tr>
<tr>
<td>Extron Skew-Free UTP Analog signal</td>
<td></td>
<td>Cat 6-1874A</td>
</tr>
<tr>
<td>Non-Plenum &amp; Plenum</td>
<td></td>
<td>Extron</td>
</tr>
<tr>
<td>Extron DTP26 cable</td>
<td></td>
<td>Extron</td>
</tr>
<tr>
<td>Digital signal</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| UTP for control (non IP) | CAT 5e or CAT 6 as req | Cat 5e- Belden 1701A  
Cat 6-1874A (orange jacket) |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>UTP for control (IP based)</td>
<td>CAT 5e or CAT 6 as req</td>
<td>Client std mfg and data color</td>
</tr>
<tr>
<td>UTP (IP transport)</td>
<td>CAT 5e or CAT 6 as req</td>
<td>Client std mfg and data color</td>
</tr>
<tr>
<td>UTP (Network cabling/patch cords)</td>
<td>CAT 5e or CAT 6 as req</td>
<td>Client std mfg and data color</td>
</tr>
<tr>
<td>UTP (Network crossover)</td>
<td>CAT 5e or CAT 6 as req</td>
<td>Client std mfg and data color (red if no Client standard exists)</td>
</tr>
<tr>
<td>Lectern, credenza, cart and portable cables:</td>
<td>Use highly flexible, pre-made or molded cables. Select AWG, number of conductors, pairs and/or shield as required depending on specific function</td>
<td>Extron or Liberty as required</td>
</tr>
<tr>
<td>Other Cable Types not listed</td>
<td></td>
<td>Cable shall be submitted for approval prior to installation</td>
</tr>
</tbody>
</table>

Note: Substitutions must be submitted for approval however CommScope, Canare, West Penn, and Extron cables are generally acceptable provided the cable is meets or exceeds the performance of those cables shown above.

**Connectors**

<table>
<thead>
<tr>
<th>Connector Type</th>
<th>Acceptable Mfg and Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/4 Inch Cable Connectors</td>
<td>Neutrik “NP” Series or comparable product by Switchcraft.</td>
</tr>
</tbody>
</table>
| BNC Cable Connectors | 3 piece, true 75Ω crimp type. (Must be compatible with cable type.)  
Kings, Liberty, Extron, Canare, ADC, Trompeter, Cambridge |
| F Cable Connectors | True 75Ω crimp type. (Must be compatible with cable type.)  
Gilbert, Trompeter, T&B |
| Loudspeaker Cable Connectors | Neutrik Speakon NL4FC or NL8FC |
| XLR Cable Connectors | Neutrik “X” series or comparable product by Switchcraft |
| RCA Cable Connectors | Canare RCAP-C*, Liberty Z400 Series |
| Recessed BNC Panel Connectors | Neutrik NBB75DFIB or comparable product by Canare for rack panels or wall plates (recessed). |
| Non-recessed BNC Panel Connectors | Neutrik NBB75FI or comparable product by Canare (with insulating washers) for floor boxes (non-recessed). |
| RJ-45 (Data) Panel Connectors for non IP Signals | Neutrik NE8FAV-Y110 or comparable product by Canare for rack panels or wall plates (recessed). |
| RJ-45 (Data) Panel Connectors | All LAN Jacks must match client standard mfg and color |
| Electrical/Electronic Hardware                | Telco 66-type punch blocks are not acceptable. All materials located in plenum spaces must be plenum-rated. |
|                                           | Phoenix UK, USK series or comparable product by Cinch, Beau for terminal barrier strips; provide marker strips. |
|                                           | ADC ICON series or comparable product by AVP, Switchcraft for split ring punch blocks; provide marker strips. |
|                                           | Trimm 426J-3 or comparable product by ADC for x-mas trees; provide identification strips. |

Concealing Cable Harnessing for Retrofitting Rooms with No Existing Floorplate

AV track raceway will be utilized in environments where exposed cabling from a wall to the podium position is required. The AV track raceway is ADA compliant. Manufacturer to be Extron.

Appendix A AG Podiums

PODIUM

EON Designs FLASH Level 3 Podiums with Custom Cut Outs (or equivalent EONS designs model)

EXTRON INTERFACING EQUIPMENT

IN 8 input Scaling Switcher
MLC IP Plus Controller
DVD / VHS– DV+ Control module
Nine Button Pad-9BLB
MPA Audio Power Amp
Two Output DVI Distribution Amp
6 Gang Wall Plate Architectural Adapter Plate for MLC Controller
6 Gang Mud Ring
2 Gang Wall Plate Architectural Adapter Plate
2 Gang Mud Ring
Low-Profile AAP Mounting Frame
(2) VGA Interface Remote Connector Plate
Two USB A Female to USB B Female Adapters
(2) Architectural Adapter Plate Silk-Screened Panels S-Video / L & R Audio
Architectural Adapter Plate Silk-Screened Panels RCA-Video / L & R Audio
Universal Rack Shelf Kit for 9.5” Deep Products
Basic Rack Shelf for 9.5” Deep Products
(3) One Unit High Blank Panel
Two Unit High Blank Panel
6’ Male to Male VGA Molded Connectors with Audio Cable
3’ Male to Male VGA Molded Connectors with Audio Cable
15-pin HD Male to BNC Male Mini High Resolution Cable

COMPUTER EQUIPMENT
INTERNAL PODIUM CABLING

(1) DVI-D / DVI-D Single Link Cable, Black, 2 Meter 6.6 ft
(2) DVI-D / DVI-D Single Link Cable, Black, 1 Meter 3.3 ft
(1) Power Extension Cord, 1 ft
(1) 3 RCA Male / 3 RCA Male, High Quality Audio / Video Cable, 6 ft
(1) Premium Grade 24K Gold Composite Video RCA 75-ohm Cable, Yellow Band, 75 ft
(1) MiniDin4 (S-Video) Male + 2 RCA Male, 6 ft
(2) 3.5mm Stereo Male / 3.5mm Stereo Male, 2 ft
(1) 3.5mm Stereo Male / 3.5mm Stereo Male, 6 ft
(3) 2 RCA Male / 2 RCA Male, High Quality Audio Cable, 3 ft
(1) HD15 (SVGA) Male + 3.5 Stereo Male / HD15 (SVGA) Male + 3.5 Stereo Male, Double-Shielded, 3 ft
(1) DB9 Male / DB9 Female Serial Cable Black 6ft.
(2) USB Type A Male / Type B Male Cable, 2.0 Version, Black, 6 ft
(1) 14/2 (14AWG 2C) 105 Strand Speaker Cable White 12 ft. Spool
(1) High Quality 3 RCA Male (RGB) Component Video Cable, 3 ft

Podium Diagram

Appendix B    Conduit Runs
AV CONDUITS RISER — DUAL SCREEN CLASSROOM

NTS
AV CONDUITS RISER - SINGLE SCREEN CLASSROOM

KEY
PRJT VIDEO PROJECTOR
PRJS PROJECTION SCREEN LV CONTROL
SPKR CEILING SPEAKER
AVFB CONSOLIDATED AV, POWER AND DATA FLOOR BOX
AT LECTERN OR INSTRUCTOR STATION.
C.O CONDUITS ONLY

All Audio
1"

All Audio & Control
1"

(1) 1\" C.O AUDIO
(1) 1\" C.O AUDIO
(1) 1\" C.O AUDIO

(1) 1\" C.O CONTROL
(2) 1 1/2\" VIDEO

(2) 1 1/2\" with 1 spare C.O. VIDEO

TO PROJ. SCREEN
RAISE/LOW SWITCH

(2) 1 1/2\" C.O.
TO NEAREST
CABLE TRAY

CONSOLIDATION BOX
SIZE AS REQ'D NEMA
- - CLG

(2) 1 1/2\" VIDEO

(1) 1\" C.O CONTROL
(1) 1\" C.O CONTROL
(1) 1\" C.O CONTROL

FLOOR BOX
- - AVFB

(1) 1\" C.O AUDIO
(1) 1\" C.O AUDIO
(1) 1\" C.O AUDIO

(1) 1\" C.O AUDIO
(1) 1\" C.O AUDIO
(1) 1\" C.O AUDIO

SPKR-1
- - CLG

SPKR-4
- - CLG

SPKR-5
- - CLG

SPKR-8
- - CLG

THRU

THRU

(2) 1 1/2\" sparestubbed
out above ceiling

NTS
Appendix C AG Podium Images

Full Podium Image with Laptop