AV Design
Work in Progress V1

Issued for Review and Comment.

Ottawa Carleton District School Board

133 Greenbank Road, Ottawa

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INTENT

This document is intended to describe the audio-visual system functional requirements and design approach for each room/space for client stakeholders and project team to review, comment, and/or approve.

Comments/requests for changes that require further approval will result in an issuance of a revised version of this document for further review and approval.

Following the receipt of approval, full system detailed design and 33% tender documents will be developed.

This document is not intended to be a complete system narrative for construction or procurement.

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ROOM LIST

ROOM TYPE	QTY
Boardroom	1
Trustee Meeting Room	1
Small meeting room (B400)	1

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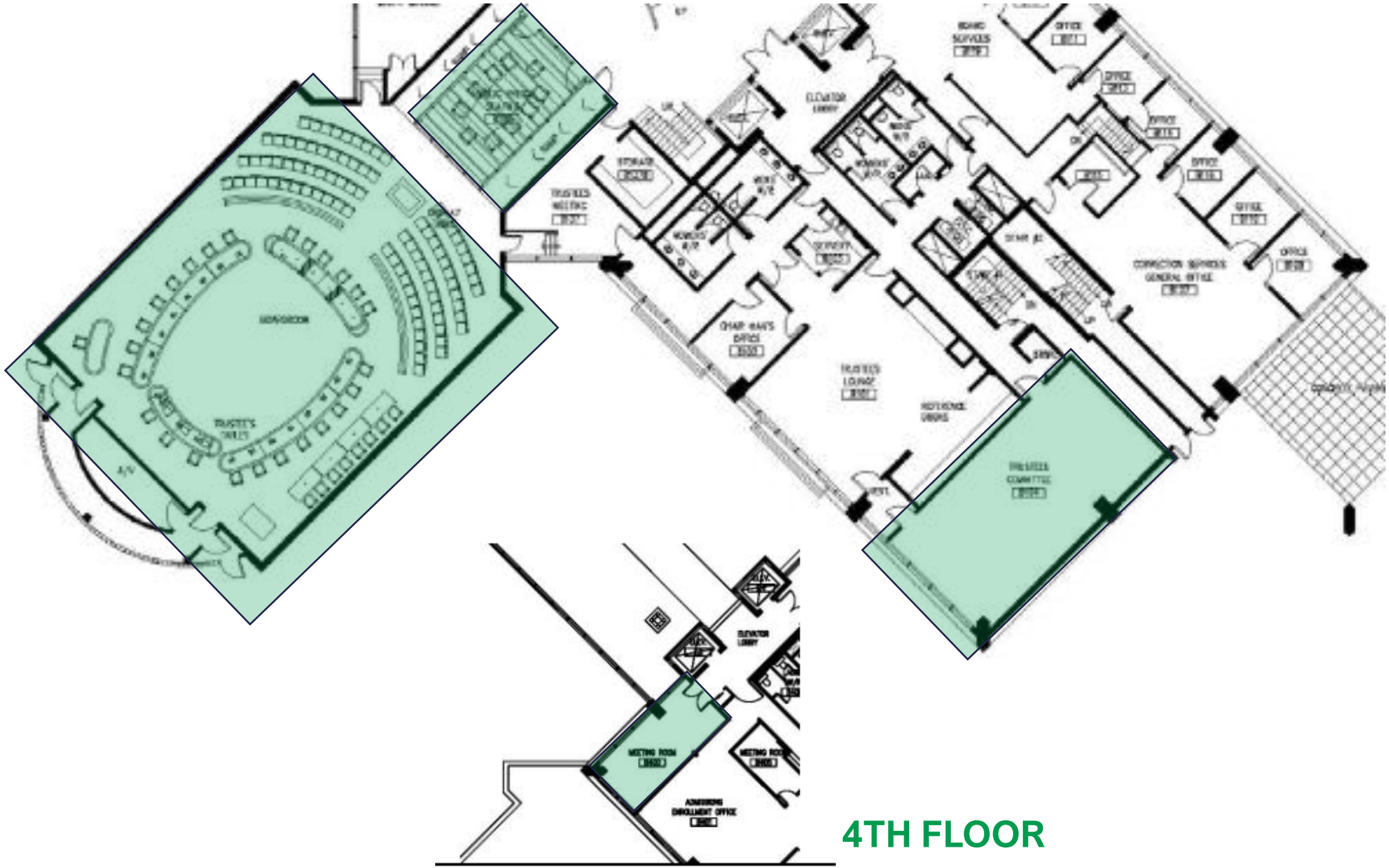
AV EQUIPPED LOCATIONS GROUND FLOOR



4TH FLOOR

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MEETING

Meeting or collaborative spaces

M-01 SMALL MEETING ROOM – B400

Collaborative Room Functions

☑	Presentation from Laptops		Operator Controlled
	Multi-display Presentation from Laptops		Audio Recording
☑	Wireless Presentation from Laptops		Video & Audio Recording
	Software calling from Laptops		Voice Lift (local mics >>> speakers)
☑	Teams / Zoom Room Calling (w/ Laptop - BYOD)		Streaming
			iMag (Local Camera to Display)
	Video Teleconferencing		Live TV Viewing
	Audio Teleconferencing		Assistive Listening [x] Hearing Assist [x] Live Captioning
☑	Wifi Network Connectivity (by others)		Simultaneous Interpretation [x] Languages

User Experience

Operation experience

User shall bring their own laptop to the room.
User shall connect their laptop using one of the following methods:

- Wireless presentation USB dongle (requires execution of non-installed application)
- Wireless presentation through application installed on users laptop, tablet or phone. (requires execution of installed application on device)

User can connect to Unified Communication (UC) platform of choice (Google Meet or Zoom) using the USB dongle to facilitate hybrid meetings.
The display shall power up automatically upon laptop connection.
The display shall power off automatically upon laptop disconnection after a short delay.

Audio and Visual experience

The display shall be UHD 3840x2160 resolution.
The audio from the laptop shall playback via the soundbar.

Technology

Display

A single UHD display, wall mounted.

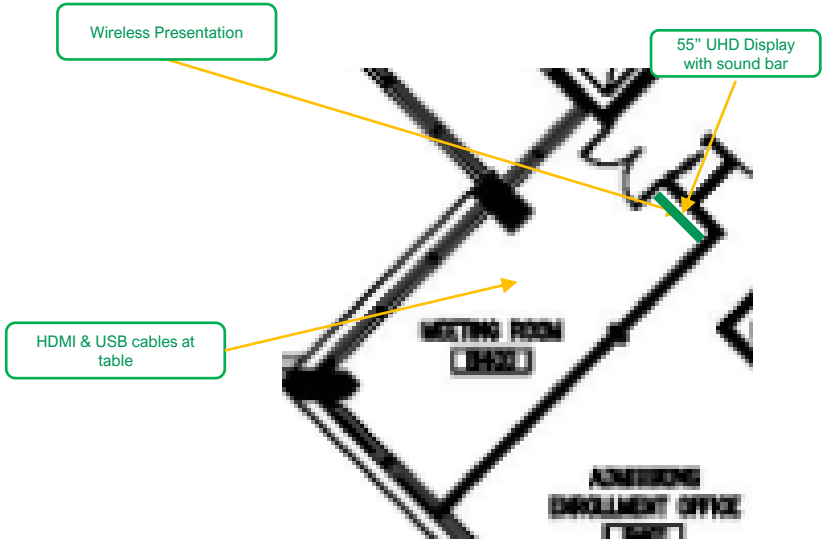
Presentation

A USB dongle based encrypted wireless presentation system with 2 USB dongles for presentation connectivity. Bidirection audio and video allow for connection to UC soft codec (Google Meet or Zoom) via the USB dongle.

Audio

Audio is delivered through the all-in-one sound bar with speakers, microphones and camera.

Representative of meeting room technology only. Not a representation of furniture style, colour, or architectural room design finishes.



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M-02 TRUSTEE MEETING ROOM

Collaborative Room Functions

☑	Presentation from Laptops	☑	Operator Controlled
☑	Multi-display Presentation from Laptops		Audio Recording
☑	Interactive Display / Whiteboarding		Video & Audio Recording
☑	Wireless Presentation from Laptops	☑	Voice Lift (local mics >>> speakers)
☑	Software calling from Laptops		Streaming
	Google Meet / Zoom Calling (from Laptop)		iMag (Local Camera to Display)
	Video Teleconferencing		Live TV Viewing
☑	Audio Teleconferencing		Assistive Listening [x] Hearing Assist [x] Live Captioning
☑	Wifi Network Connectivity (by others)		Simultaneous Interpretation [x] Languages

User Experience

Operation experience

User shall bring their own laptop to the room or use the Room PC at the operators desk (to facilitate hybrid meetings).
User shall connect their laptop using one of the following methods:

- Wireless presentation USB dongle (requires execution of non-installed application)
- Wireless presentation through application installed on users laptop, tablet or phone. (requires execution of installed application on device)
- HDMI cable from table cubby (2 locations on table) HDMI connection plate)

Users shall control AV system from a touch panel located on the table and at the operators desk.
The system shall power off automatically upon after the room is unoccupied after a short delay.

Audio and Visual experience

The displays shall be UHD 3840x2160 resolution.
The audio from all sources shall playback via the ceiling loudspeakers for even room coverage.

Technology

Display

Two UHD displays, wall mounted on the front wall.
Two UHD displays, wall mounted on the side walls, one side will be an interactive display.

Presentation

A USB dongle based encrypted wireless presentation system with 4 USB dongles for presentation connectivity capable of supporting dual displays for two simultaneous laptop connections.

HDMI connections at table (2) , and one at operators' desk will provide cabled video/audio presentation sources.

A video matrix switching system will allow for any video source to present to any display in any combination.

Technology continued…

Video/UC Calling

Dual cameras will be used for in-room video capture positioned on the front wall. These cameras will provide video to:

- the Room PC via USB

A ceiling full room microphone system provide audio to:

- the Room PC via USB

Ceiling loudspeakers will reproduce audio from:

- any connected and selected PC/Laptop
- the ceiling microphone system for subtle in-room zoned voice-lift

Audio

The ceiling loudspeakers will provide in-room audio output.
The ceiling microphones will provide full in-room audio pickup and subtle in-room voice-lift.

Control

Table mounted touch control panels, on table and operators' desk will be used to control power, inputs, and audio.

A ceiling mounted occupancy sensor will trigger automatic power up and down based on room occupancy.

Equipment Storage

A credenza style equipment rack will be used to store the AV equipment within the existing millwork. The colour/finish to be coordinated with interior designer.

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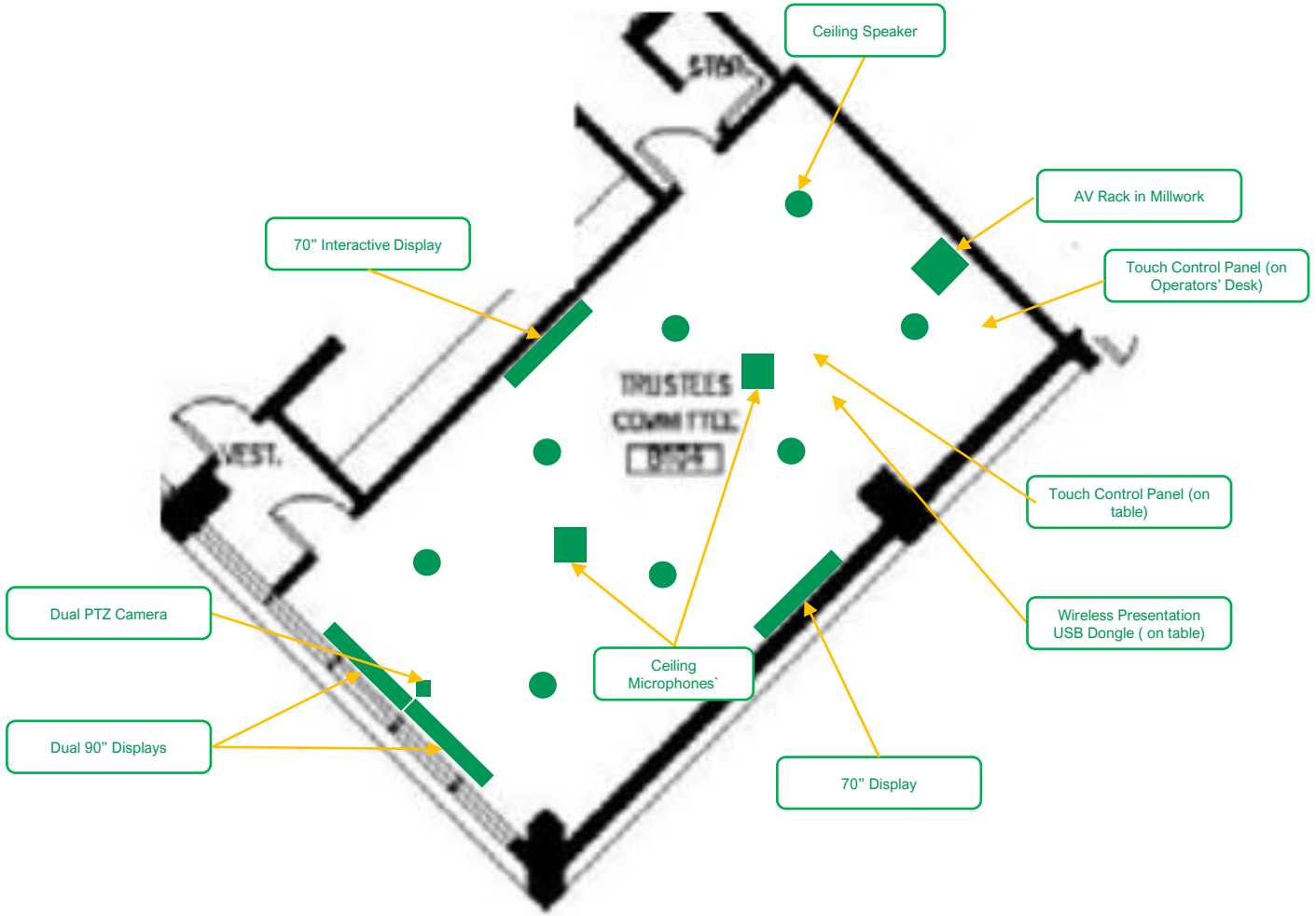
M-02 TRUSTEE MEETING ROOM



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M-03 BOARDROOM

Collaborative Room Functions

☑	Presentation from Laptops
☑	Multi-display Presentation from Laptops
☑	Wireless Presentation from Laptops
☑	Software calling from Laptops
☑	Google Meet/ Zoom Room Calling (w/o Laptop)
	Video Teleconferencing
☑	Audio Teleconferencing
☑	Wifi Network Connectivity (by others)

☑	Operator Controlled
	Audio Recording
	Video & Audio Recording
☑	Voice Lift (local mics >>> speakers)
☑	Streaming
☑	iMag (Local Camera to Display)
	Live TV Viewing
☑	Assistive Listening [☑] Hearing Assist [☑] Live Captioning
☑	Simultaneous Interpretation [2] Languages

User Experience

Operation experience

Multi-use room with connection points at strategic locations throughout the room to align with different configuration use cases.

User can bring their own laptop to the room.

User can connect their laptop using one of the following methods (to facilitate hybrid meetings):

- Wireless presentation USB dongle (requires execution of non-installed application)
- Wireless presentation through application installed on users laptop, tablet or phone. (requires execution of installed application on device)
- HDMI cable from HDMI connection plate at operators' desk and convenient locations around the room

Dedicated operators' desk to allow for input and full control of the room.

The displays input selection, and audio system shall be controlled via a touch control panel. Multiple locations for touch panel control.

Audio and Visual experience

Large format DLED video wall shall be UHD 3840x2160 resolution; primary viewing location.

Multiple Large wall mounted displays located around the room; support viewing locations.

The audio from all sources shall playback via the loudspeakers for even room coverage.

Technology

Display

Large format Direct LED (DLED) video wall on the front wall.

Two to four UHD displays, wall mounted on the side walls (quantity determined when final room layout option is chosen.

Four UHD medium size displays for use in main table inner circle.

Presentation

A USB dongle based encrypted wireless presentation system with 4 USB dongles for presentation connectivity capable of supporting dual displays for two simultaneous laptop connections.

Multiple HDMI connections will provide cabled video/audio presentation sources (Location TBD based on final layout option chosen).

A video matrix switching system will allow for any video source to present to any display in any combination.

A separate audio connection(s) for press / media use. Allows clean line out audio for recording purposes.

Technology continued…

Video/UC Calling

Four PTZ cameras will be used for in-room video capture positioned on the columns. These cameras will provide video to:

- a user laptop via USB at the wall connection
- any display for in-room image magnification

The wired / wireless microphone system will provide audio to:

- a user laptop via USB at the wall connection
- loudspeakers for in-room voice-lift

Loudspeakers will reproduce audio from:

- any connected and selected PC/Laptop
- Bluetooth audio connection
- any microphone for in-room voice-lift

Audio

The loudspeakers will provide in-room audio output.

The wired addressable microphones will provide in-room audio pickup and in-room voice-lift at predefined input locations.

The wireless microphones will provide in-room audio pickup and in-room voice-lift.

Control

Touch control panels will be used to control power, inputs, and audio. One touch panel shall be located at the operators' desk and one will be available for use on the table.

Users shall have control over lighting in room. Lighting system shall have presets that can be called from the touch panel.

Connections

Multiple HDMI connections available at tables (final quantity to be determined based on layout chosen)

Four AV network connections at the operator connection point for connecting additional equipment.

One Bluetooth audio and aux audio input connection.

Four wall XLR microphone connections.

One auxiliary audio output and three audio inputs for connection to rental interpretation system(Option to be reviewed).

8 XLR press audio outputs via a mobile press box for press / media audio system connection.

Accessibility

A digital IR based wireless audio system with mobile receivers and earphone will be used to offer personal amplification of the in-room audio system. This system will also provide the multichannel audio from a rental interpretation system.

Equipment Storage

An equipment rack will be used to store the AV equipment and will be located in the adjacent storage room.

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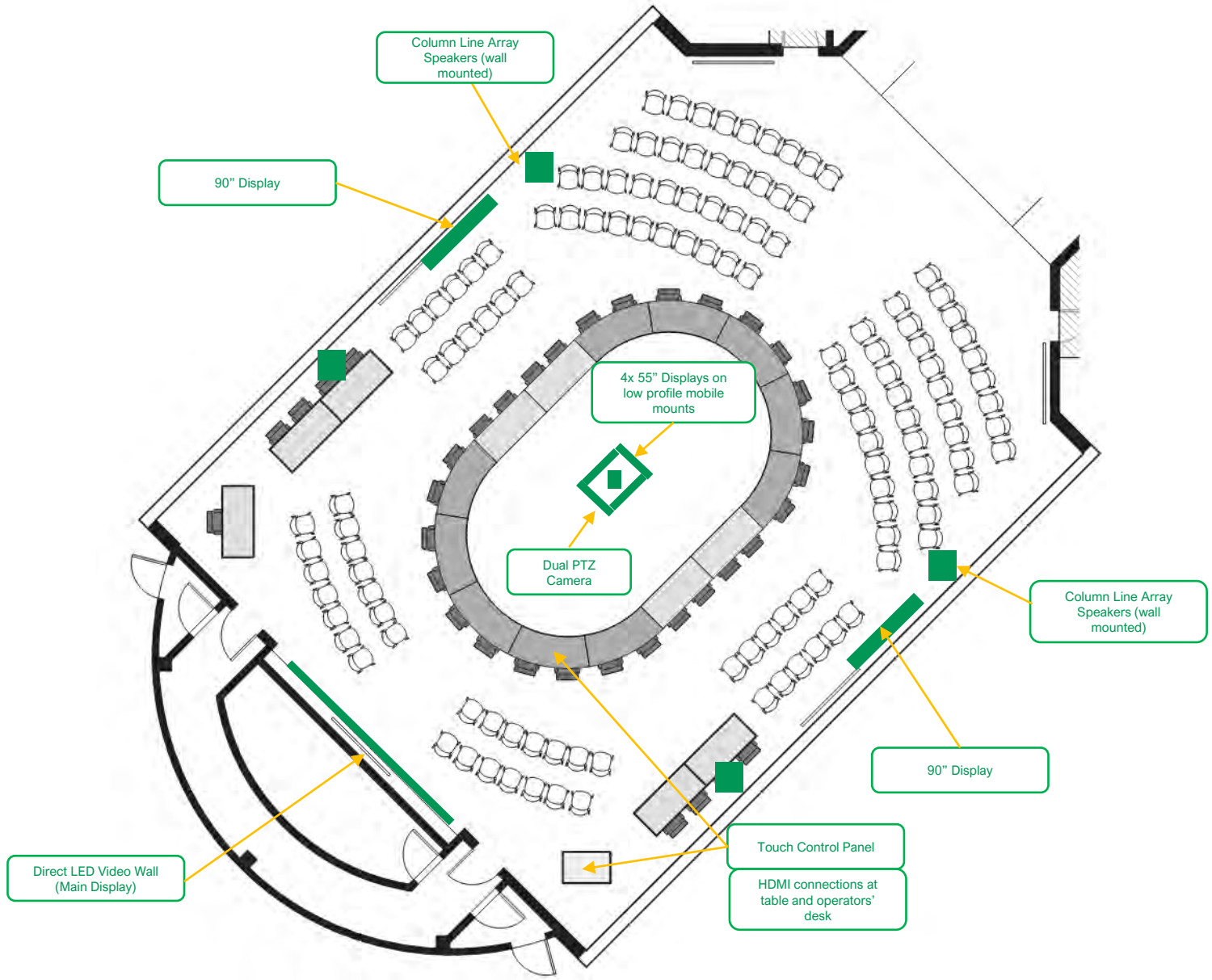
M-03 BOARDROOM



Mobile Equipment

4x55" Displays & mobile mounts
4x Wireless Beltpack & Lapel Mics
4x Wireless Handheld Mics
2x Handheld Mic Stands
1x Press Audio Connection Box
2x HDMI Input Encoders
2x Wireless Presentation USB Transmitters

Not Shown

HDMI connections on wall for adhoc presentation (location TBD)
HDMI connections at table (quantity and locations TBD).

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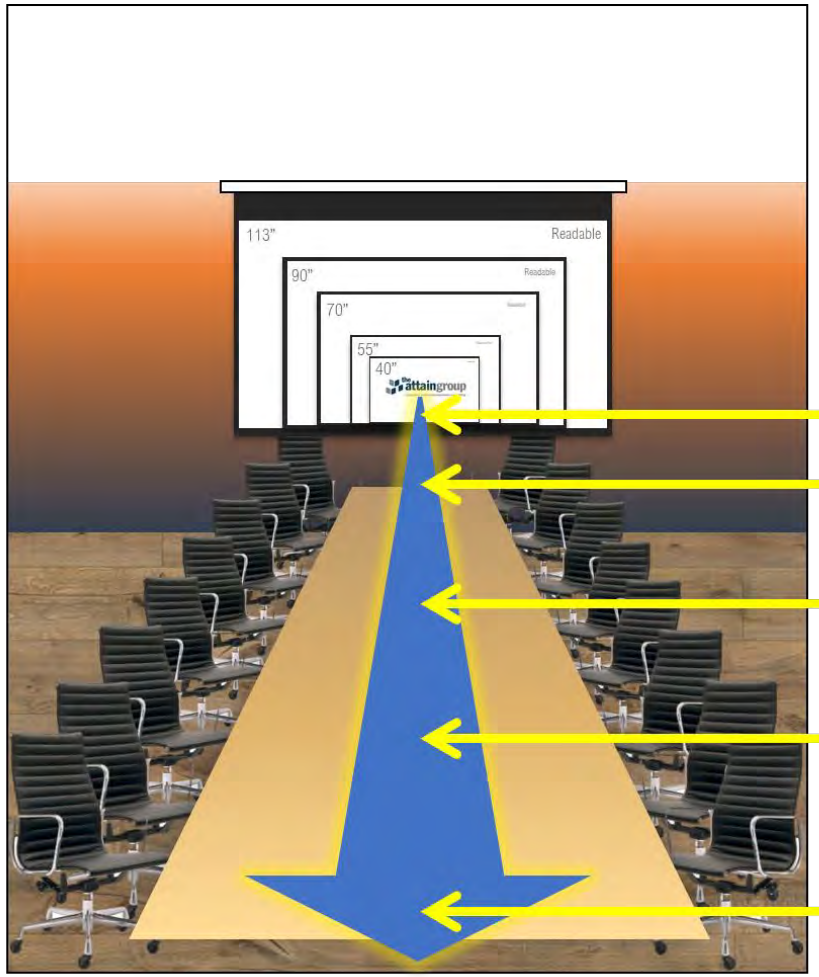
APPENDIX

Supplementary General Information
Provided for Reference Purposes

VIEWING DISTANCE // IMAGE SIZING



32" > 40" Display Size
1 > 2 People (Booth)

48" > 55" Display Size
2 > 4 People (Huddle)

60" > 65" Display Size
6 > 10 People (Medium)

85" > 100" Display Size
12 > 16 People (Large)

110"+ Display Size
18 > 24 People (Extra Large / Training)

Important Considerations

- Qty of Displays / Content
- Split Screen
- Content type
- PowerPoint | Word | Excel | Video | Photos | VC
- Ceiling Height

ROOM ACOUSTICS - REVERBERATION

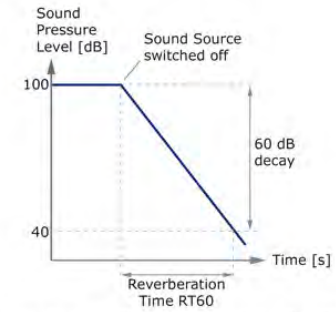
RT60 RATING

Reverberation time (RT60) for typical conference rooms should be RT60 < 0.6 seconds in the 125 - 4000 Hz octave bands. RT60 is a measurement of acoustic reverberation time within the space. Excessive reverberation leads to poor audio quality, poor speech intelligibility, and the perception of a “loud” room. Careful consideration of the room surfaces should be taken to reduce acoustic reflectivity in the space to ensure an acceptable RT60 measurement.

How is Reverberation Time defined?

The Reverberation Time (RT) is the time the sound pressure level takes to decrease by 60 dB, after a sound source is abruptly switched off. **RT60 is thus a commonly-used abbreviation** for Reverberation Time.

RT60 values vary in different positions within a room. Therefore, an average reading is most often taken across the space being measured.



Visualization of the basic principle of an RT60 measurement.

Rooms with an RT60 of < 0.3 seconds are called acoustically "dead".

Rooms with an RT60 of > 2 seconds are considered to be "echoic".

What is Reverberation Time?

Sound produced in a room will repeatedly bounce off reflective surfaces such as the floor, walls, ceiling, windows or tables while gradually losing energy. When these reflections mix with each other, the phenomena known as reverberation is created. **Reverberation is** thus **a collection of many reflections of sound**.

Reverberation time is a measure of the time required for reflecting sound **to "fade away"** in an enclosed area after the source of the sound has stopped.

Reverberation time is important in defining how a room will respond to acoustic sound.

Reverberation time reduces when the reflections hit absorbent surfaces such as curtains, padded chairs and even people, or exit the room through the walls, drop ceilings, doors, window glass, etc.

Here we show you how to get a feeling for reverberation times in various rooms, just by clapping your hands.

Why is reverberation important?

Too much reverberation has a negative impact on the **intelligibility of speech**. This can, for example, make it hard to hear what a class teacher is saying.

Reverberation is also particularly noticeable in a place of worship where the sound may be heard for several seconds while it fades away. The main reason religious leaders pronounce their words clearly and talk slowly, leaving small gaps between sentences, is to overcome this reverberation and make their speech clear (such a manner of speaking also has a beneficial side-effect of sounding reverent).

Conference rooms are an especially challenging acoustic environment. Collaborative white boards, stylish glass walls and the obligatory large table are all highly-reflective surfaces for sound. This tends to increase the reverberation time of the room which impacts speech intelligibility.

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ROOM ACOUSTICS – NOISE CRITERIA

NC RATING

Noise Criteria (NC) is a measurement of how quiet a space is while the HVAC system is operating with no people in the room. Ideally, a Meeting Room should have an NC rating of 35 dBa or less. This measurement must include any typical ambient noise originating outside the room as well as noise from the air handling system and all equipment located within the room. Ambient noise levels above this specification may degrade speech intelligibility for local and remote conference participants.

Overview

Noise curves are used to measure and specify background noise in unoccupied buildings and spaces.

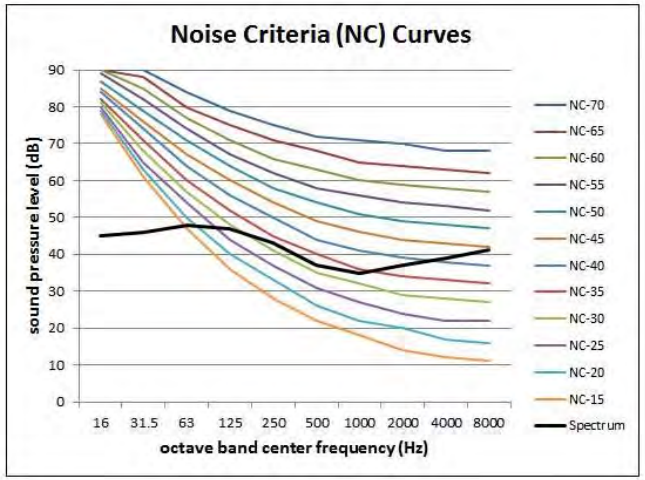
In most cases, the goal is that background noise should not interfere with the purpose of the room, e.g. the noise of an office air-conditioning system and consistent noise of traffic outside the building should not interfere with telephone calls or conversations.

Background noise that is annoying creates fatigue and can negatively affect productivity and safety. Too much noise also affects the ability to communicate. Therefore standard methodologies for quantifying such noise have been developed.

Different rooms, locations, regulations and applications may allow different acceptable noise ratings.

Methods and Standards

For all ambient noise measurement methods, a measured noise spectrum is superimposed on a family of contours (or curves).

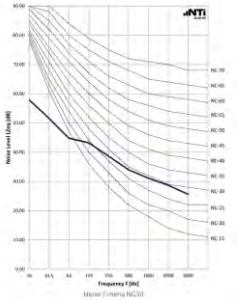


Result: NC45

Noise Criteria NC

(in accordance with ANSI S12.2-2008 and -1995)

The American National Standards Institute (ANSI) defines the NC rating to describe the noise in a space by examining a range of frequencies. The NC rating of a spectrum is designated as the value of the lowest NC curve above the measured octave-band spectrum. The measured noise criteria, e.g. NC30, informs that the room performs better than that. The designating number for any NC curve is, approximately, its Speech Interference Level (SIL): the average of the levels in the 500, 1000, 2000 and 4000 Hz octave bands. SIL is a simple metric, which measures the effects of noise on speech intelligibility. The XL2 Analyzer includes the tangency method adaptation in accordance with the standard.



LIGHTING LEVELS

LIGHTING LEVELS

For videoconferencing / video collaboration applications, appropriate lighting levels are important. Lighting levels on the faces of the participants should be between 40 to 50 foot candles. Lighting levels should be even throughout the camera's field of view, including the background.

SUNLIGHT CONTROL

Some spaces may require control of the natural sunlight entering the room via windows or skylights. Sunlight is tends to be much brighter than artificial light within a room and thus causes areas of extreme brightness alongside areas of low/medium brightness. This high range of brightness within the room can degrade video camera image quality for video conference / collaboration and reduce the image quality of displays or projected images.

Good

Good example of uniform lighting levels throughout the room..

Not Ideal

No sunlight control leads to a dark camera image.

Good

Window shades are used to control sunlight when appropriate.

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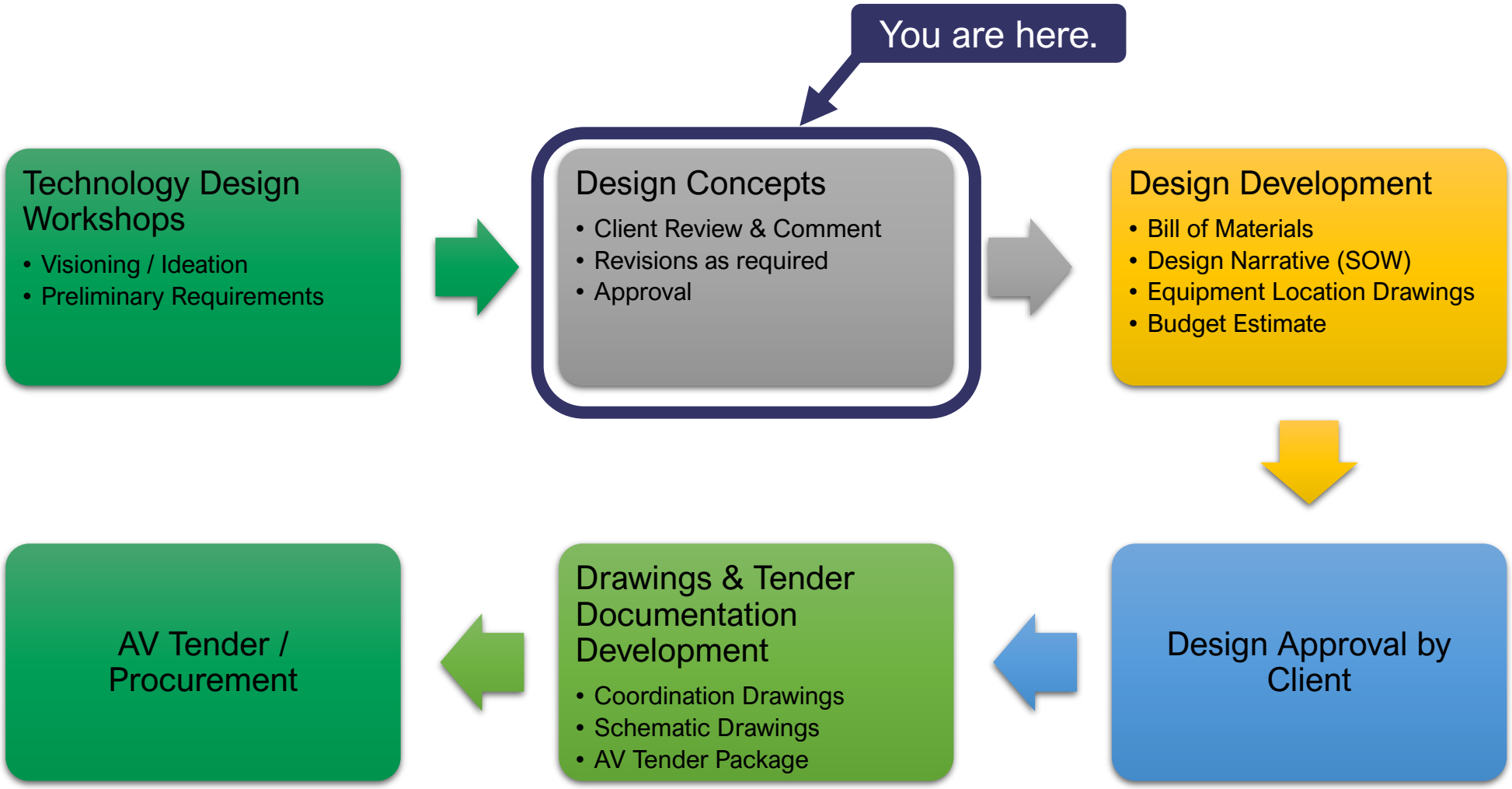
NEXT STEPS



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