Room Design Guide

For Hangouts Meet hardware and Jamboard

June 2018

Google Cloud

DEVELOPED WITH CHARCOALBLUE THEATRICAL INNOVATION ESTD 2004

Contents

Resources

To complete the toolkit, we've also created some extra resources to help you along the way.

Room planner

Some working examples of our typical room setups and a guide for the maximum possible capacity for your room.

Key Hints

Look out for 'Key hints' for some extra tips and information.

Favorite Problems

Look out for the 'Star icon'; these are the items that we've found to be the most fundamental. Where your options are limited, these are the ones to aim for.

CAD & BIM Tools

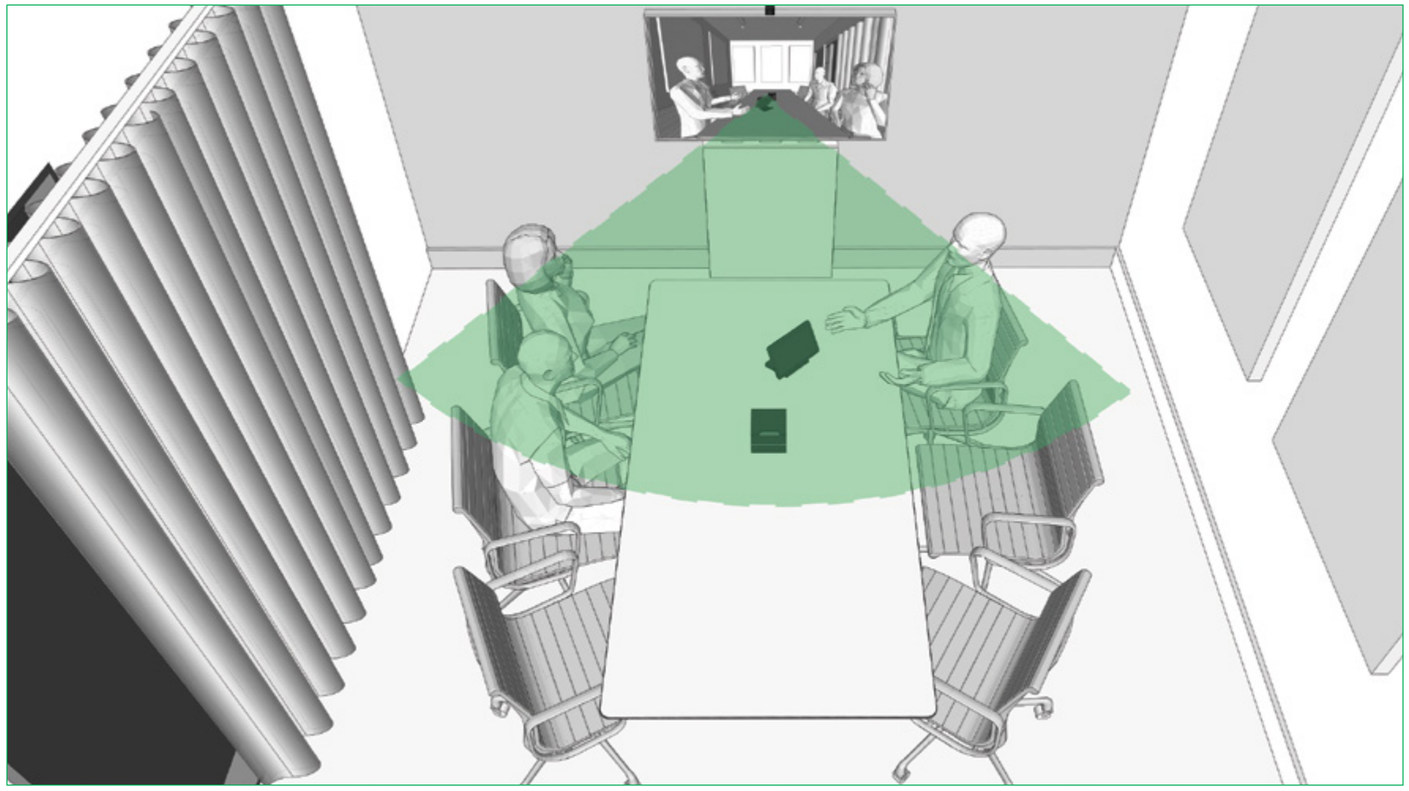
Working with architects? Be sure to utilise our intelligent drawings tools to automatically size rooms on the floor plan. If you aren't setup for 3D, the 2D CAD downloads are also available.

Room Layout

- Camera View
- Orientation
- Access
- Visibility

Following a few simple guidelines to best arrange the room makes a huge difference for remote and local participants.

Camera View



★ Table Position

The closest participants to the screen wall should be placed far enough away that they fit comfortably within the camera field of view.

Camera Field of View: Hangouts Meet Camera

Place the closest participants within a 120 degree horizontal field of view.

Camera Field of View: PTZ Cam

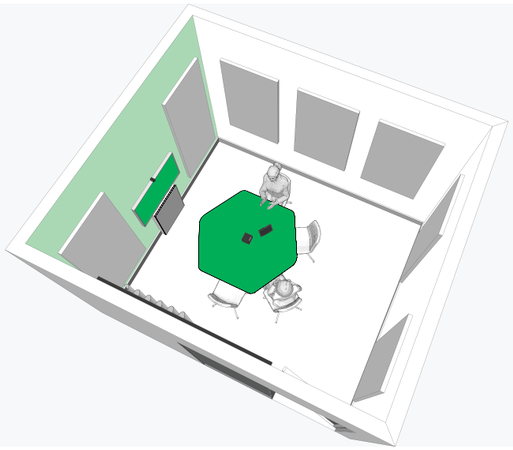
Place the closest participants within a 90 degree horizontal field of view.

Key Hint: Missing participants in the camera field of view is the most common downfall of small conferencing rooms. It's hard to make your point when you can't be seen!

Key Hint: Room sizes of 8 people or more are usually best suited to a PTZ Cam. Less than 8 people, the wide FOV of the huddly cam is generally the best option.

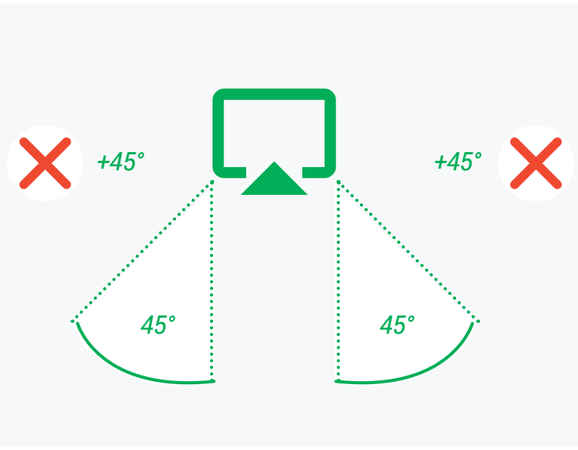
Orientation

Space Efficiency



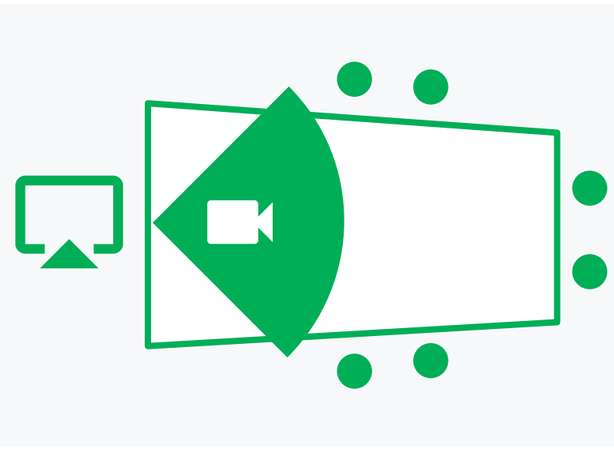
Typically the most efficient use of space is to orient the room ‘lengthways’ with the screen wall on the short side of the room. The screen wall is ideally a flat, even surface.

Screen Viewing Angle



Horizontal viewing angles to video displays should not exceed 45 degrees, measured from the perpendicular of the outer screen edge.

Table Shape

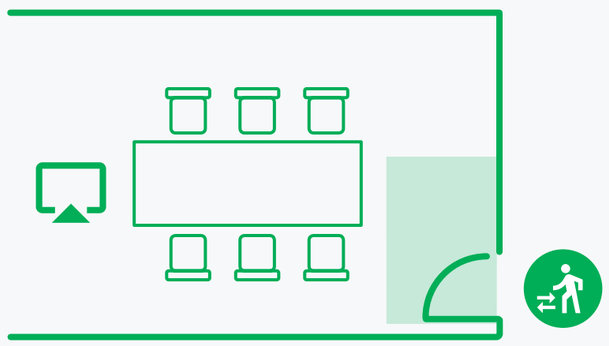


For more informal and workshop spaces, orienting participants around the screen and facing each other is key. For larger rooms and longer tables, a slanting table shape will ease sightlines for all users.

Key Hint: Take a look in the room planner section for some more examples of meeting room layouts and guidance on space allowance for different scenarios.

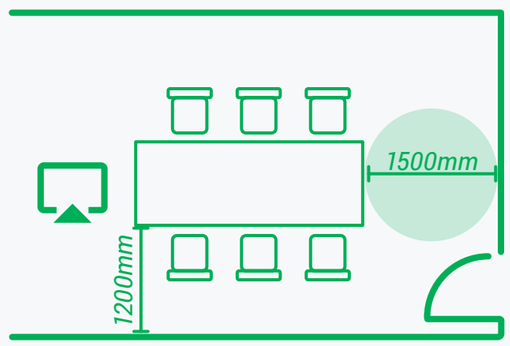
Access & Visibility

Entrance



Consider how you might arrive into the space before and during meetings. A well placed entry point opposite the screen wall and away from the table will minimise disruption. Maneuvering clearance is also required at the doorway as per local code and specified by architect.

★ Clearance Space



Ensure there is at least 1200mm clearance around fixed furniture for accessibility, this is greater than most local codes to provide good accessibility. A turning circle of at least 1500mm must also be provided between the table and the rear wall.

Visibility and Privacy

Provide a transparent section within the meeting room door or wall to let others see when the room is in use. To maintain privacy of participants and screen content, consider using obscured sections of glass. For full privacy, be sure to install blinds or drapes.

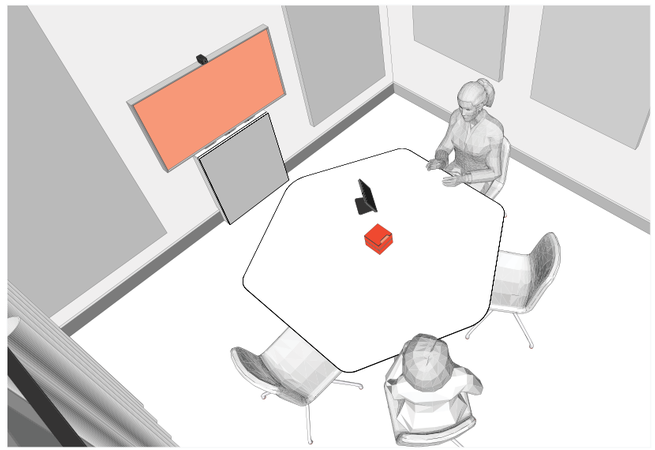
Equipment Locations

- Speaker-Mic Placement
- Screens
- Camera
- Joinery & Writing Surfaces
- Jamboard

We've tuned and tweaked the hardware. Now position it correctly to unlock the best performance.

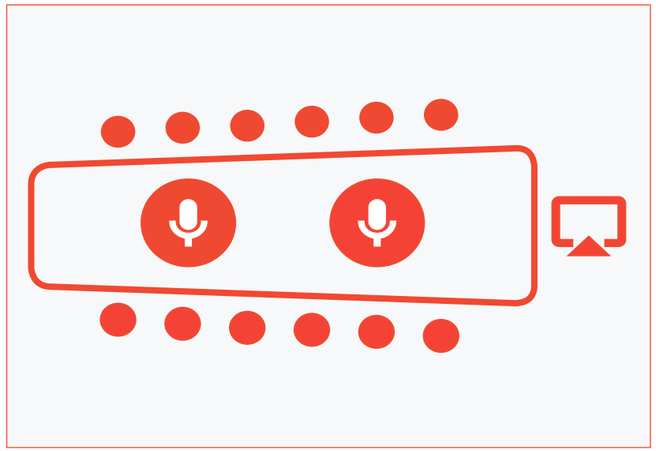
Speaker-Mic Placement

Even Coverage



The speaker-mic unit should be placed as evenly as possilbe amoungst seated participants. This is usually the center of the table.

★ Larger Rooms



A single speaker-mic functions correctly for up to 6 people. For rooms of more than 6 people additional speaker mics are required and should be spaced evenly amongst all participants.

Additional

As a guide:

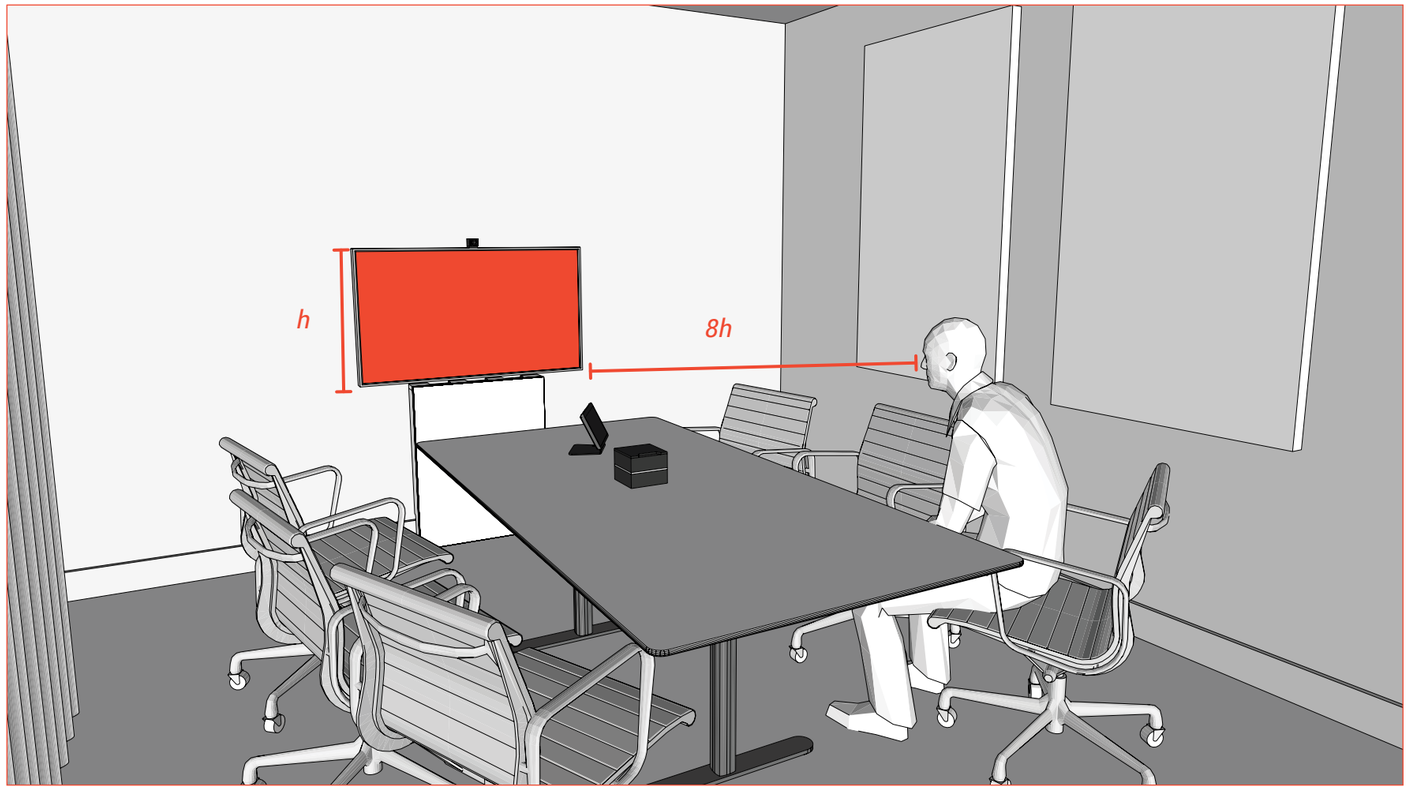
1 speaker-mic up to 6 people

2 speaker-mics up to 11 people

3 speaker-mic up to 16 people

Key Hint: Each room is different, the key is even coverage for all participants, try different speaker-mic positions to get the setup that works best for the room. Remember to check cable lengths, as you may need to order longer cables than those that arrive as standard with the hardware.

Screens



★ Screen Size

Distance from the screen to the furthest viewer. Should be no more than 8x the screen height, for viewing video content.

As a guide: *1 – 8 People 40 – 50"* | *8+ People 50"+*

Screen Location

Screens should be mounted centrally to the table.
The screen height should allow for comfortable viewing, as a guide keep the bottom of the screen less than 1100mm from the floor.

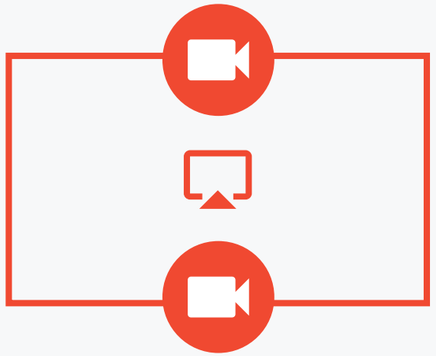
Dual vs Single Screens

Vs

Single screens are generally preferred in Google meeting rooms. As it provides the best all round sightlines. Dual screens can be useful in workshop environments where extra content space is needed.

Camera

Mounting Position

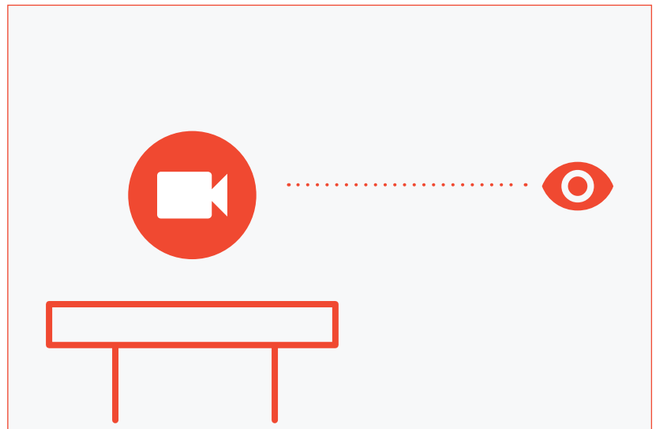


You can place the camera on top of the display. Or use a suitable bracket to mount it to the bottom of the display.

Dual Screens

In dual screen setups the camera is usually best mounted between the screens and kept central to the table.

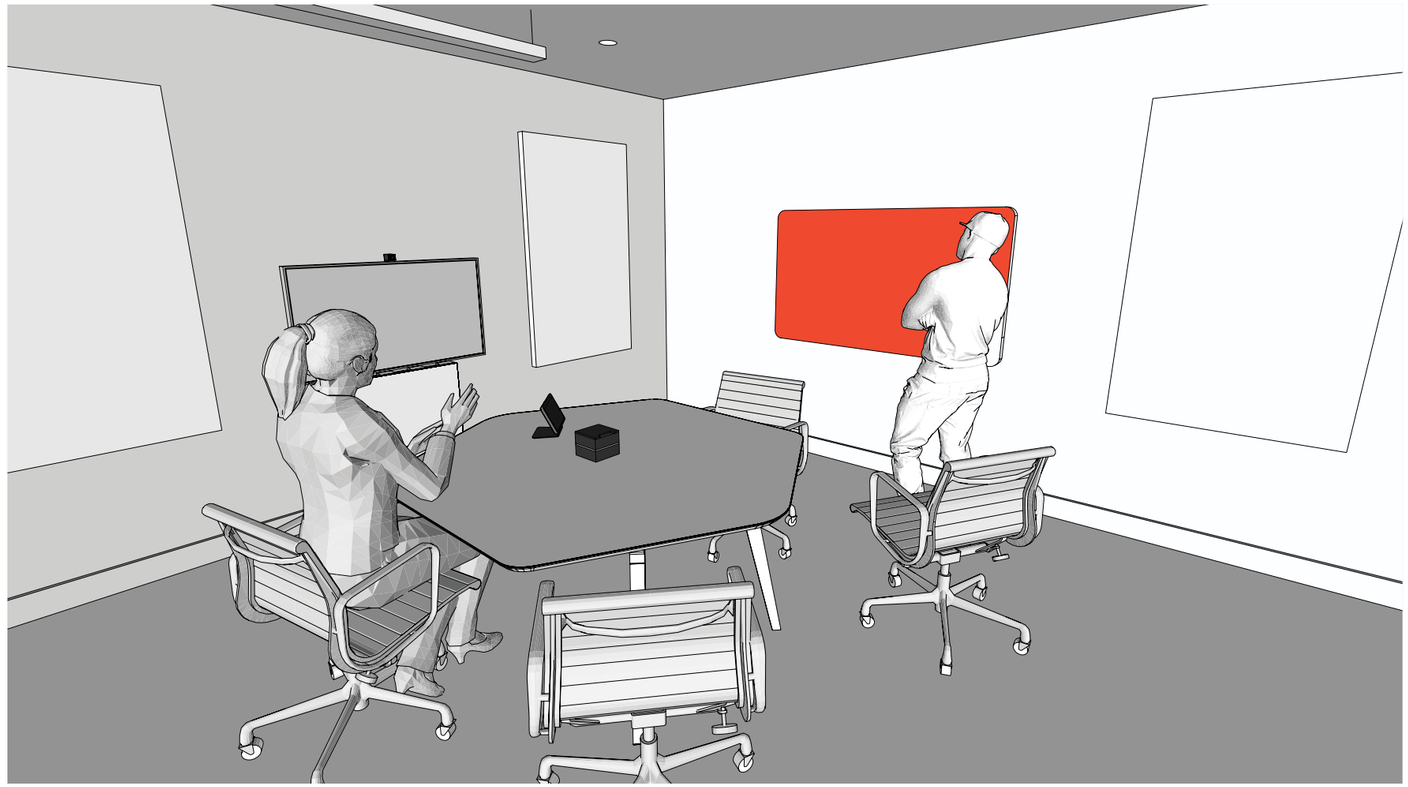
★ Mounting Height



Mount the camera as close to seated eye level as possible. With both screen and camera needing to be central, a compromise is inevitable. Where the camera is placed on top of the screen the bottom of the screen should be 800mm from the floor.

Key Hint: Camera's mounted at a high angle is a very common problem for conferencing and remote participants can be made to feel detached from discussion. It's better to have everyone looking straight into the camera.

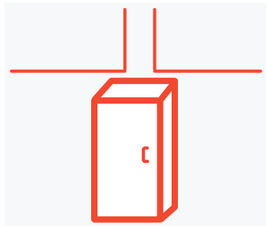
Joinery & Writing Surfaces



Writing Surface Placement

It is best to place a writing surface in the view of the camera. If using a sidewall, try to keep it within the camera field of view.

Cabinet



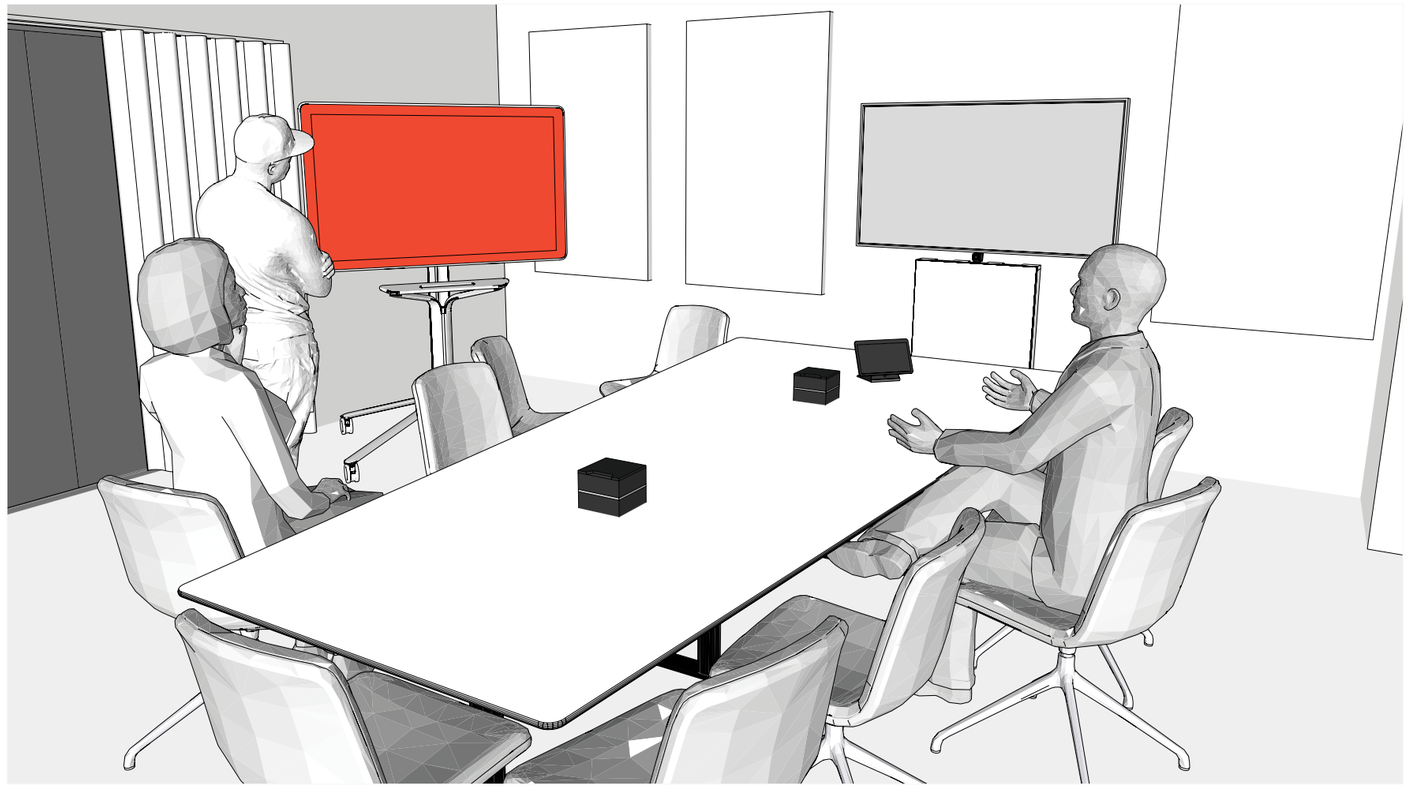
To keep cabling neat and mount equipment away from the table, a slim cabinet underneath the screens can be an ideal addition.

Chromebox

The Chromebox can be mounted on the rear side of the display screens, in a cabinet below the screens if you have one, or alternatively under the table.

Key Hint: Remember a network connection is required where you place the Chromebox. A wired network connection usually results in better performance than connecting to wireless.

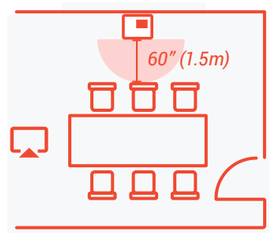
Jamboard



Location

The sides of the room are generally the best locations for a Jamboard, so that users in the Jamzone can interact well with VC participants as well as those in the room.

The Jamzone



This is the recommended space around the Jamboard to allow effective collaboration. The smallest recommended zone is a semi circle of radius 60" (1.5m) in front of the Jamboard.

Mounting

Jamboards can be wall mounted or on a floor standing frame to allow the jamboard to be moved.

Key Hint: Make use of asymmetry in a room when looking to feature a jamboard, to maximise space efficiency. In this case, only the jamboard side of the room needs to be accessible.

Furniture & Lighting

- Lighting
- Colour & Environment
- Window Coverings
- Furniture

Make your meeting room look and feel inviting with simple decorative and lighting tips. Appropriate lighting is especially important to ensure participants appear clearly on camera.

Lighting

★ Face to Background Ratio

A light ratio of 2:1 hitting participants' faces vs the background directly behind their face is desirable. Any bleaching or whitewashing the walls makes it hard to make people out on camera.

Face Light Level

Average vertical illumination on participants' faces should be around 400 lux. Avoid levels any higher than 500 lux on people's faces and ensure luminaries are low glare.

General Light Level

Good visual comfort and uniformity is paramount, below are some general guide parameters:

Target Uniformity
~0.6Uo

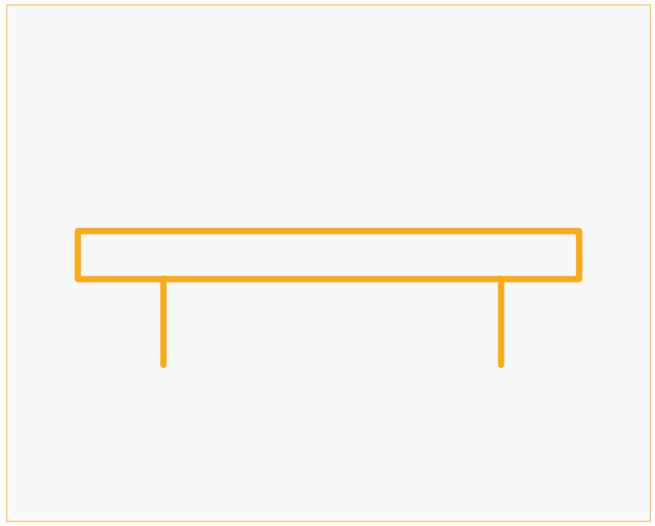
Colour Temperature
~4500 kelvin

Colour Rendering Index (CRI)
~80+

Key Hint: Lighting level on the working plane should still be within CIBSE guidelines.

Colour & Environment

★ Light Surfaces

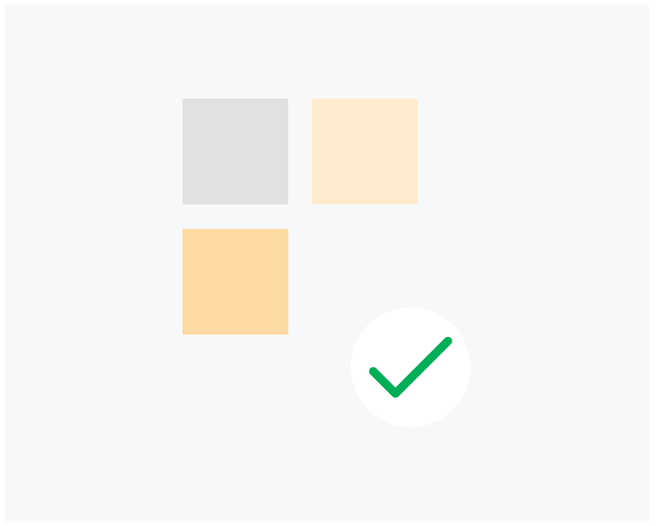


Tables with light-colored surfaces help illuminate participant faces and boost the face to background light ratio. Ideally table surface should be ~50% reflective.

Room Graphics

A personal touch to rooms shouldn't be discouraged, but avoid very bright surfaces or intricate patterns and especially any striped patterns falling in the camera shot. This overworks the video camera's processor and can distract remote participants.

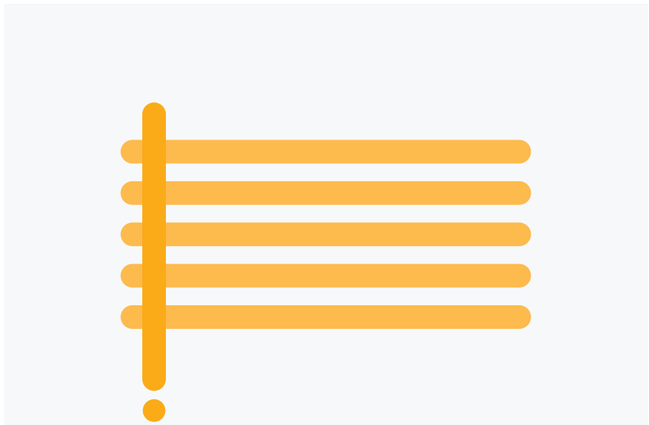
Wall Colour



Neutral and light subtle colours are the most effective for camera, but avoid white washed walls where possible, as it can reduce colour appearance on camera.

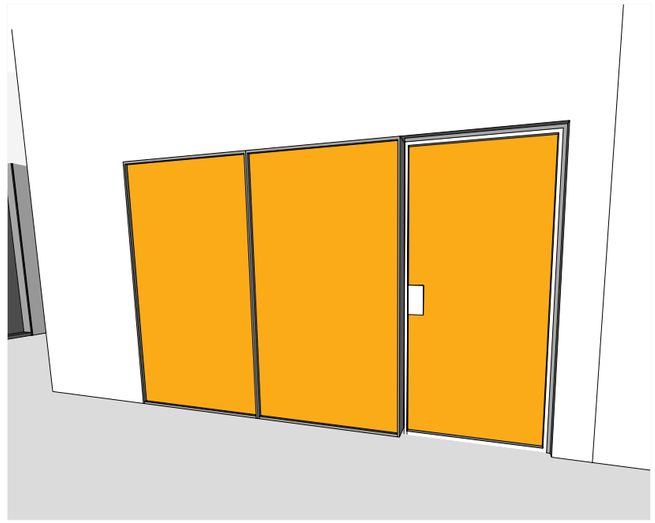
Window Coverings

External Windows



Blinds or curtains should be provided on all external windows to control the room light levels and prevent glare which can affect camera performance.

Internal Windows



Blinds or curtains should also be considered on all internal glass walls or windows. It ensures privacy can be achieved and improves acoustics.

Furniture

Table Legs

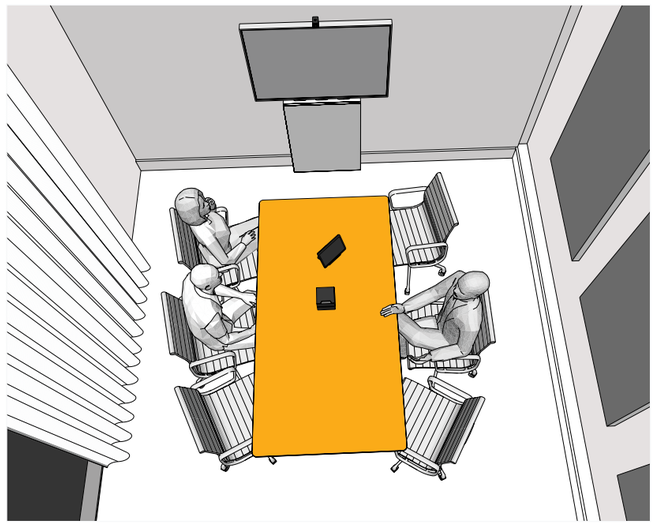
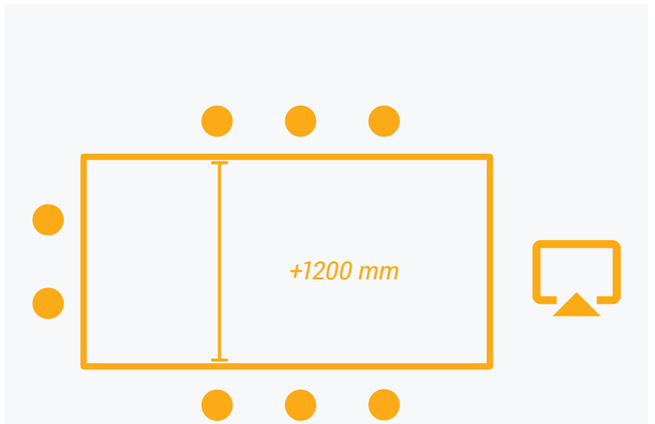


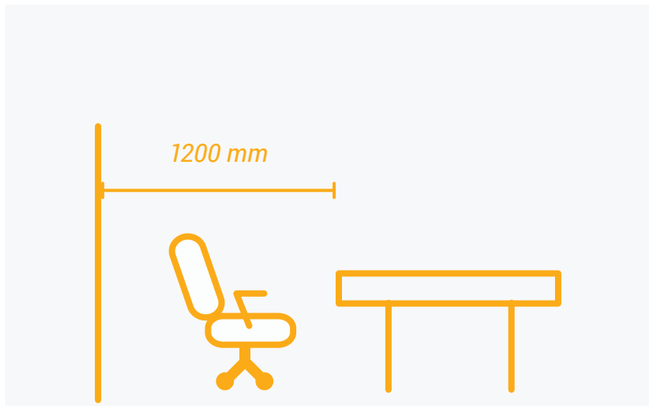
Table legs must not restrict seating or leg movement. Compartments for AV equipment and user-accessible cables can be incorporated into the tabletop to assist participants using small devices.

Table Size



Ensure your selected table is a good size for the number of people using it and well proportioned to the room. Generally tables any less than 1300mm wide are too narrow.

Chair Types



Chair features such as height and armrest adjustment will improve participant comfort. Take care to ensure there is 1200mm circulation space around fixed furniture for ease of access.

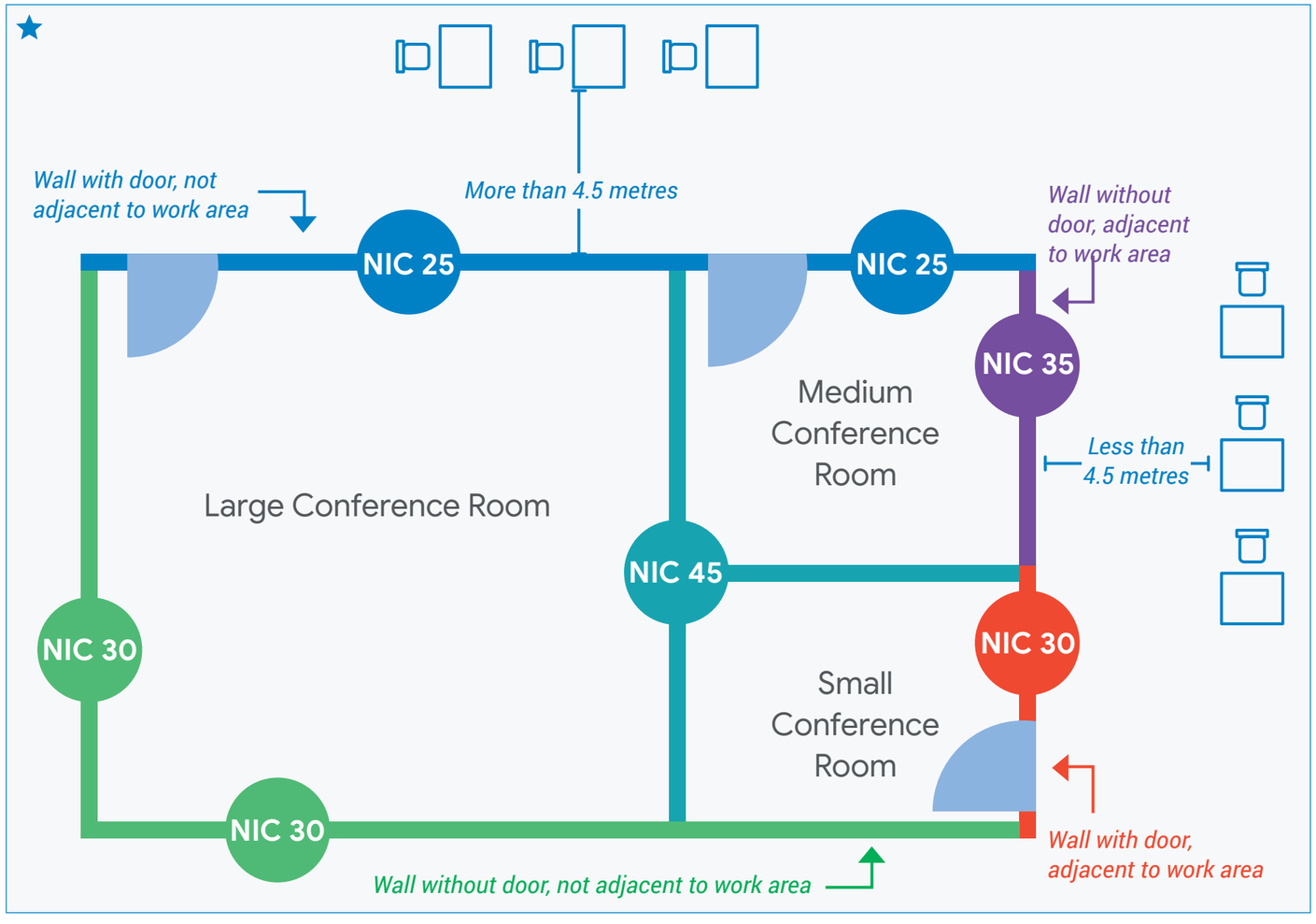
Key Hint: Bigger chairs, especially with larger backs may required a little more clearance space for circulation.

Acoustics

- Acoustic Separation
- Adjacencies
- Reverberation Time
- Acoustic Finishes
- Background Noise
- Room Shape

Poor acoustics is a common downfall of video conferencing spaces. The right allowance of acoustic finishes is needed to make sure speech is clear and audible, and adequate isolation is required to avoid interruptions.

Acoustic Separation



Target Acoustic Isolation Recommendations

The STC/NIC ratings for the partitions are dependent on the adjacent space. A higher STC/NIC rating is needed for a partition next to a noisy space.

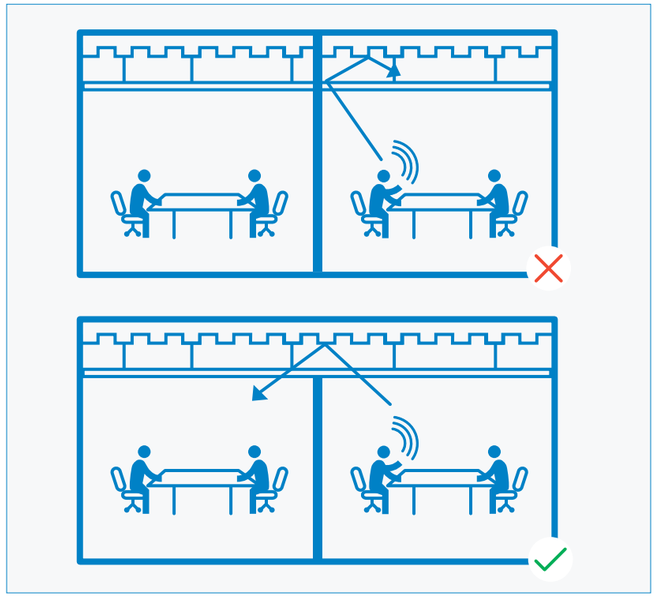
Wall Types

The partition type will be dependent on the recommended STC rating. An acoustician should always be consulted for accurate specification of partitions.

Key Hint: The Sound Transmission Class (STC) rating is a single-number rating that describes the degree of airborne sound separation between two adjacent spaces afforded by a partition, door, and window or floor-ceiling assembly. We use the Noise Isolation Class (NIC), which is the measured field rating for airborne sound transmission and is typically 5 points lower that the lab STC rating.

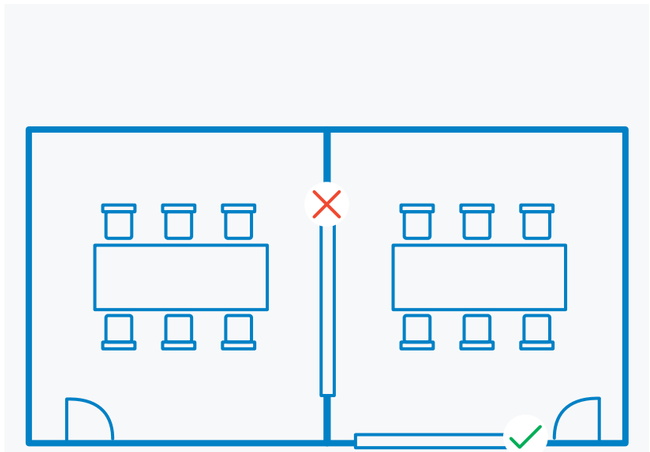
Acoustic Separation

★ Wall Height



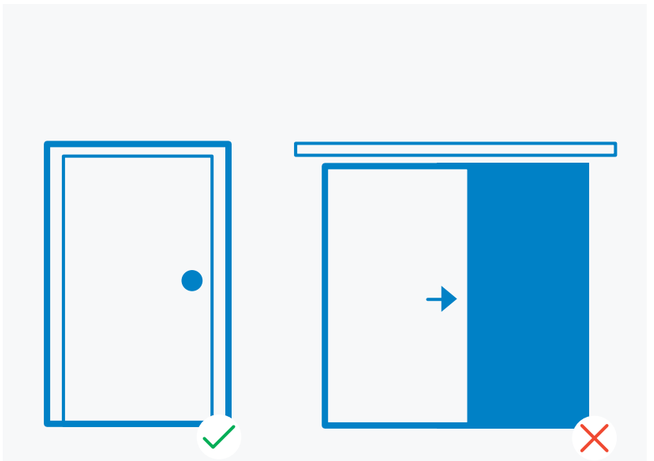
Partitions should be full height. Half height partitions allow for sound to transfer over the wall and limit sound isolation.

Glazing



Use of glazing is great for open plan office spaces, but be warned of its inferior acoustic compared to plasterboard walls. Aim to limit glazing to the wall with the entry door, and avoid placing glazings between meeting rooms.

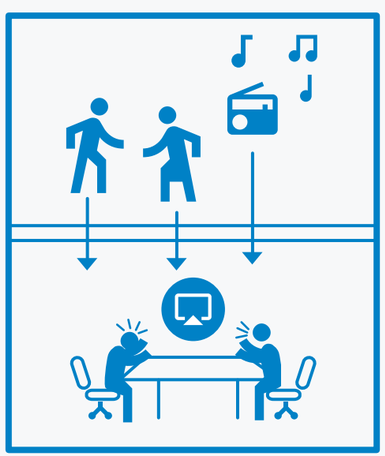
Doors



Doors are generally the acoustic weak link as sound is able to go through and flank around the door through the gaps in the doorway. Insulated metal doors are preferred, followed by solid wood doors. Generally swing doors perform better than sliding doors. Perimeter acoustic seals will aid the sound separation performance and should be considered for any meeting room.

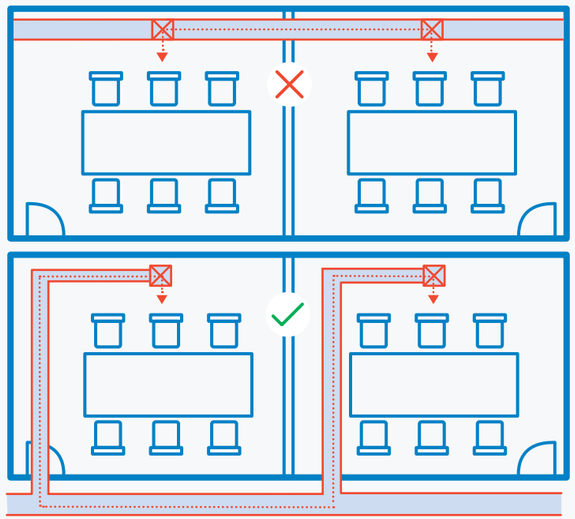
Adjacencies

What is That Noise?



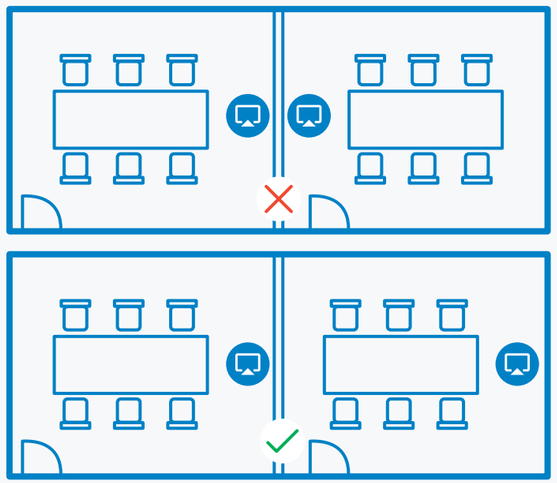
Be strategic about adjacencies, think about where meeting rooms are in relation to predictably noisy and other noise sensitive spaces. Including vertically! Noisy spaces above and below meeting rooms are a common problem.

Duct Routing



Short ductwork between spaces are a common cause of unwanted sound transmission. When designing new spaces consider duct routing to minimise this concern.

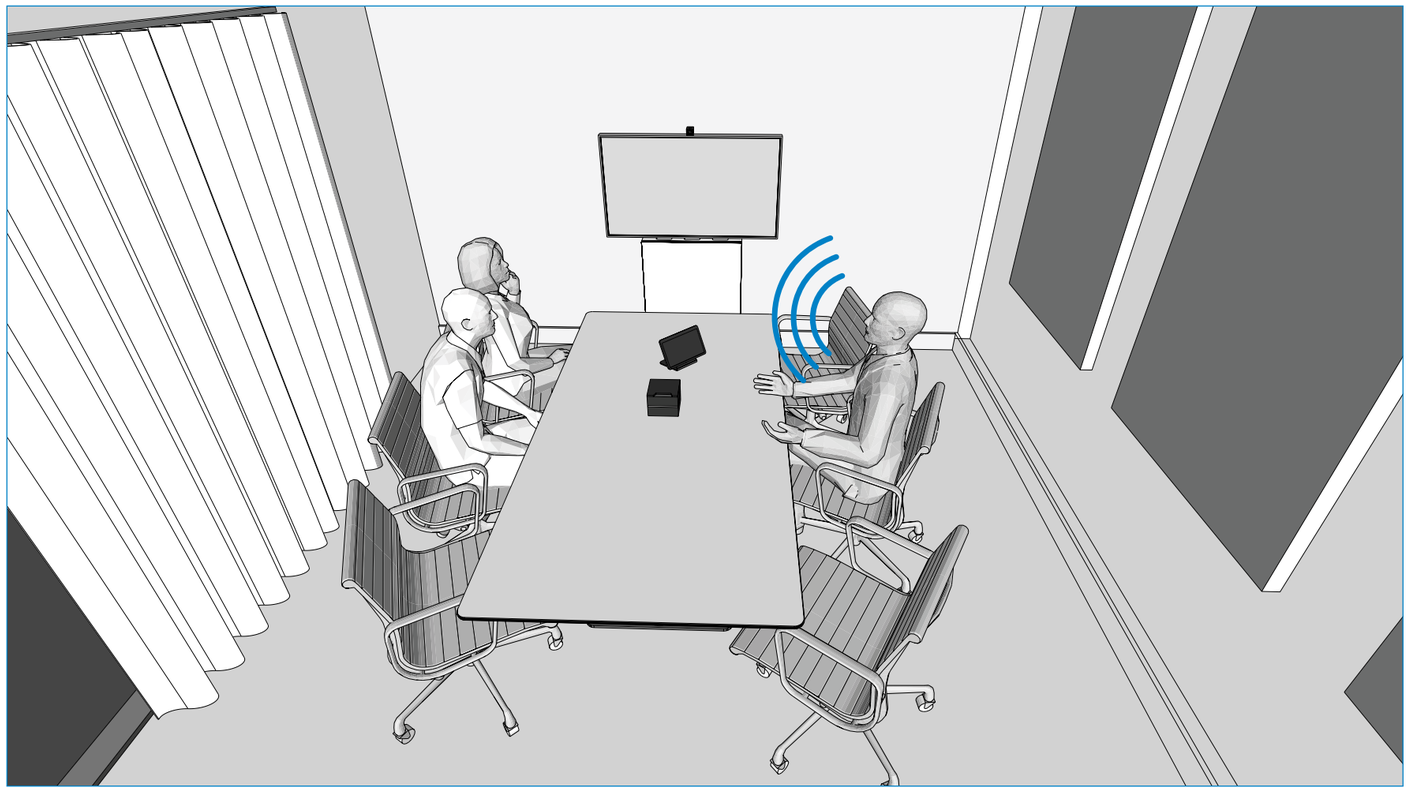
Back to Back Equipment



Avoid orienting adjacent meeting rooms ‘back to back’ (screen wall to screen wall). This presents more risk for noise paths between meeting rooms.

Key Hint: Bad adjacencies or inadequate acoustic separation risks a lack of privacy, and frequent noise interruptions. Even small distracting noises can be enough to throw attention away from the task at hand!

Reverberation Time



★ Sorry, What Was That?

To make sure participants on each side of the call be clearly heard, the room needs to provide a good level of speech intelligibility. The key is to control reverberation time and eliminate any unwanted reflections.

Target Reverberation Time

The following is our suggested target RT60 times for meeting rooms:

RT60 of 0.45s
Small meeting rooms (up to 5 people)

RT60 of 0.6s
Medium rooms (6–9 people)

RT60 of 0.7s
Larger rooms (10–15 people)

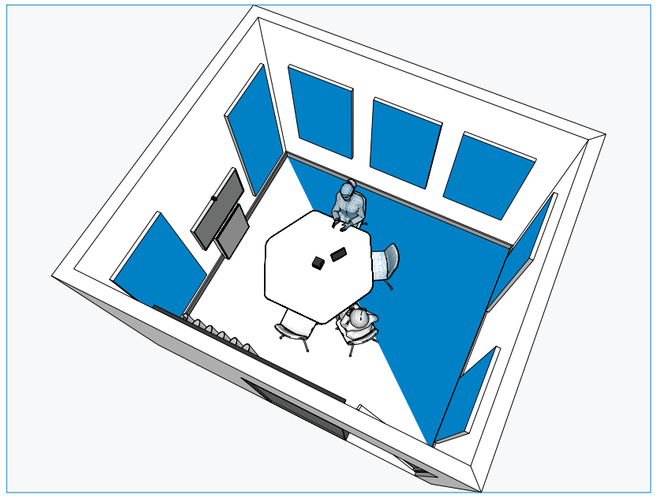
Solutions

To achieve these targets, acoustic treatment in the room will be required. In existing spaces this might be limited to adapting the walls and floor finish.

Key Hint: Reverberation Time (RT) is a measure of the rate of decay of sound, helping us quantify how lively or reverberant a room is. RT60 - is the time in seconds for a sound to decay by 60dB. A too larger RT time, will hinder speech communication between occupants in the room and for remote participants.

Acoustic Finishes

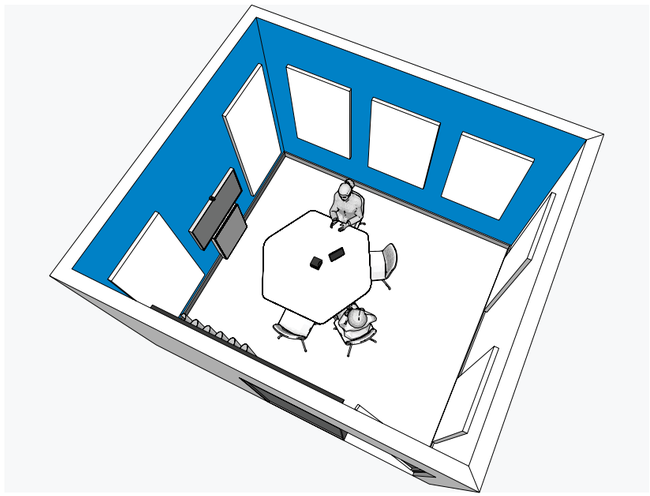
★ Wall Treatment



The total area of acoustic wall treatment needed should at minimum be equal to 50% of the total floor area of the room, plus an additional 5m^2 using treatment with an NRC of at least 0.7.

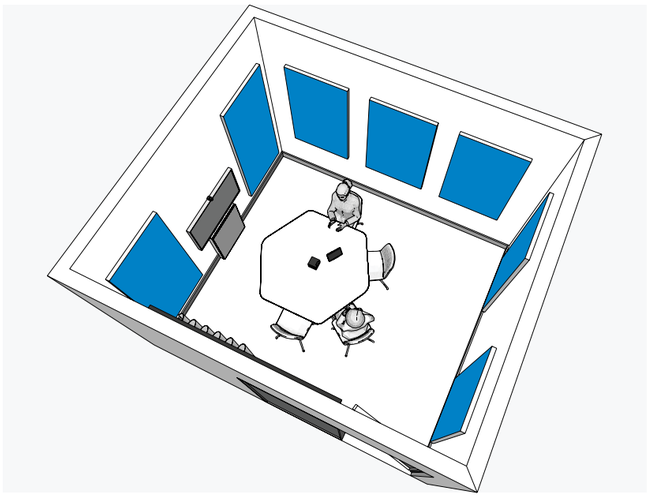
Key Hint: NRC (Noise reduction coefficient) is a measure of how much sound energy is absorbed when striking a surface. Measured from 0-1. A good benchmark is to allow for at least 50mm (2” thick) treatment for the walls to achieve NRC 0.7.

Adjacent Walls



Acoustic treatment on wall areas should ideally feature on two adjacent walls to reduce the risk of parallel reflections forming between two opposite reflective surfaces.

Treatment location

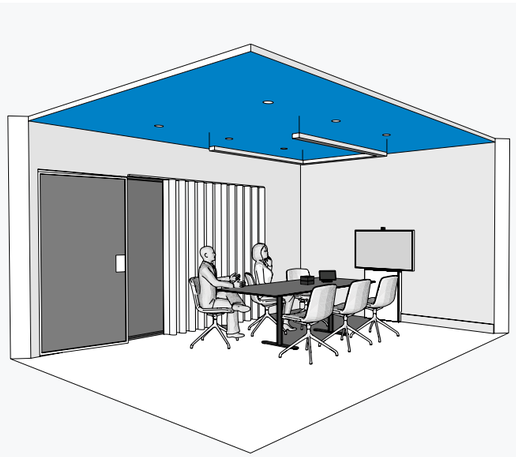


Wall treatment should ideally be placed at seating head height approximately 1m from the floor, up to the ceiling.

Key Hint: Multiple treatment options exist for walls that should be considered. Some options include felt, fabric wrapped panels, pinnable soft treatments, stretched fabric systems with concealed absorption. This will all depend on the desired look and feel for the room!

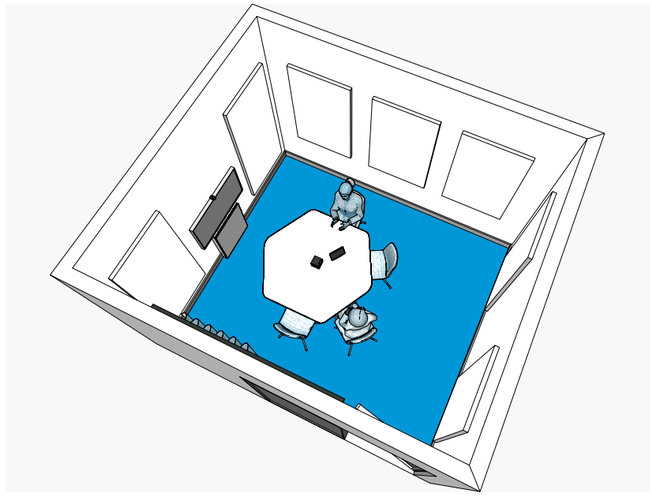
Acoustic Finishes

Ceiling Treatment



Ideally the entire ceiling should feature acoustic treatment to at least NRC 0.7. Suspended ceilings (ACT), are the most common solution, but other solutions such as suspended fabric wrapped panels or an acoustic spray treatment could also be considered.

Floor Treatment



Soft flooring, such as carpet or carpet tile, is the preferred floor finish for all meeting rooms. Hard floor finishes are a common culprit for poor acoustics in meeting spaces. Area rugs and soft furnishings should be considered in rooms where carpet is not feasible.

Background Noise & Room Shape

Room Shaping

You can look to take advantage of unusually shaped spaces—angled, or non parallel walls can provide acoustic benefits. However this is purely secondary gain and not a design requirement.

Background noise

NC 30 rating
for small and medium sized rooms

NC-25
for larger meeting rooms

Keeping a low background noise is key for video conferencing rooms, even more so than normal working rooms. We recommend: an NC 30 rating for small and medium sized rooms, and an NC-25 for larger meeting rooms. Refer to the Services Section for more info.

Key Hint: Background noise is measured by using single number rating (In this case NC rating) that describes the steady state background noise levels within a space due to mechanical, electrical and plumbing systems. The lower the rating the quieter the room. This criteria will most directly inform the design of the mechanical services system.

Services

- Ducts & Air Handling
- Power & Cabling

A low background noise level is important, to ensure good speech intelligibility and avoid unwanted noise on microphones. The main culprit is often poor attention to mechanical services.

Ducts & Air Handling

Mechanical Equipment

Variable air volume systems
4.5m from VAV unit to first diffuser

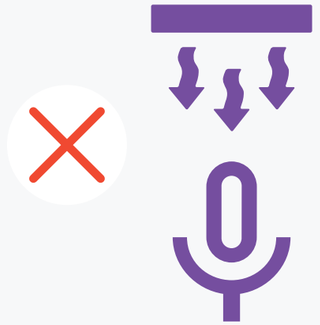
Fan Coil unit systems
6m from FCU to first diffuser

While dependent on the size of the equipment and individual constraints, for space planning purposes, allow for the above recommended distances from HVAC units to diffusers in the meeting room.

Air Velocity

Consider air velocities and diffuser selection to minimise noise from HVAC systems to ensure background noise requirements can be met.

Diffuser Locations



Avoid locating intake or extract (supply/return) ductwork above or near sensitive GVC equipment such as microphones. Unwanted noise from air flow on microphones can cause disruptive noise on the video call.

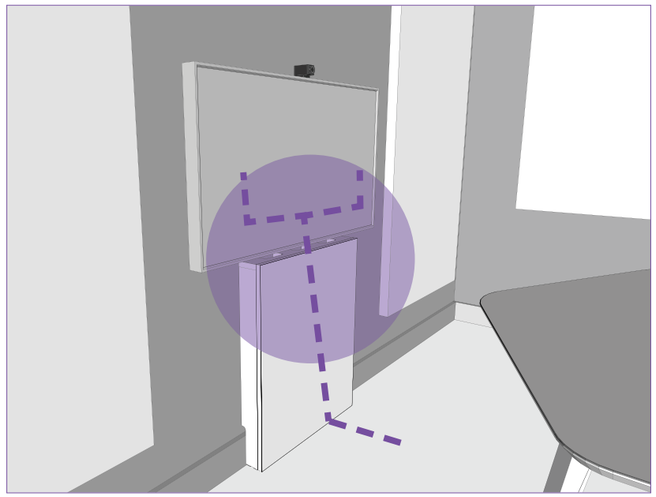
Power & Cabling

M&E Load

Typical maximum equipment load for dual screen rooms:
0.5kW 1705 BTU/h

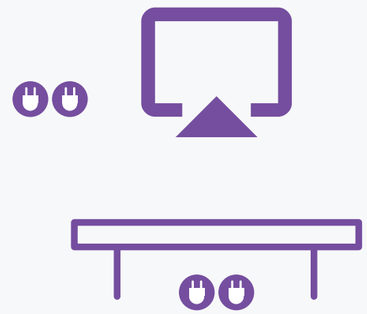
Note: This estimate does not account for occupancy heat load, and peak heat load may be greater than this for short periods of time.

★ Cable Routes



Don’t forget to consider cable routes, especially where they might be visible or cause a trip hazard. A conduit or concealed cable route behind the wall to feed the screens will help keep the install neat.If the table doesn’t stretch to the wall, then don’t forget a route over, or even better under, the floor will be needed.

Power



Power is required to feed the display screens.
This can be located in a cabinet directly below if possible or directly behind the screens. A second power socket is required under the table.

Key Hint: Google Meet hardware can run on a wireless network, but a wired network connection usually gets better speed and performance. So aim to get a network drop where you place the Chromebox.

Room Planner

- Where to Start
- Room Sizing Guide
- Small Rooms
- Jamboard Room
- Medium Rooms
- Larger Rooms

This section displays some example room layouts put to use in Google buildings. We've also created a starting guide for the minimum space needed per number of occupants.

Where to Start

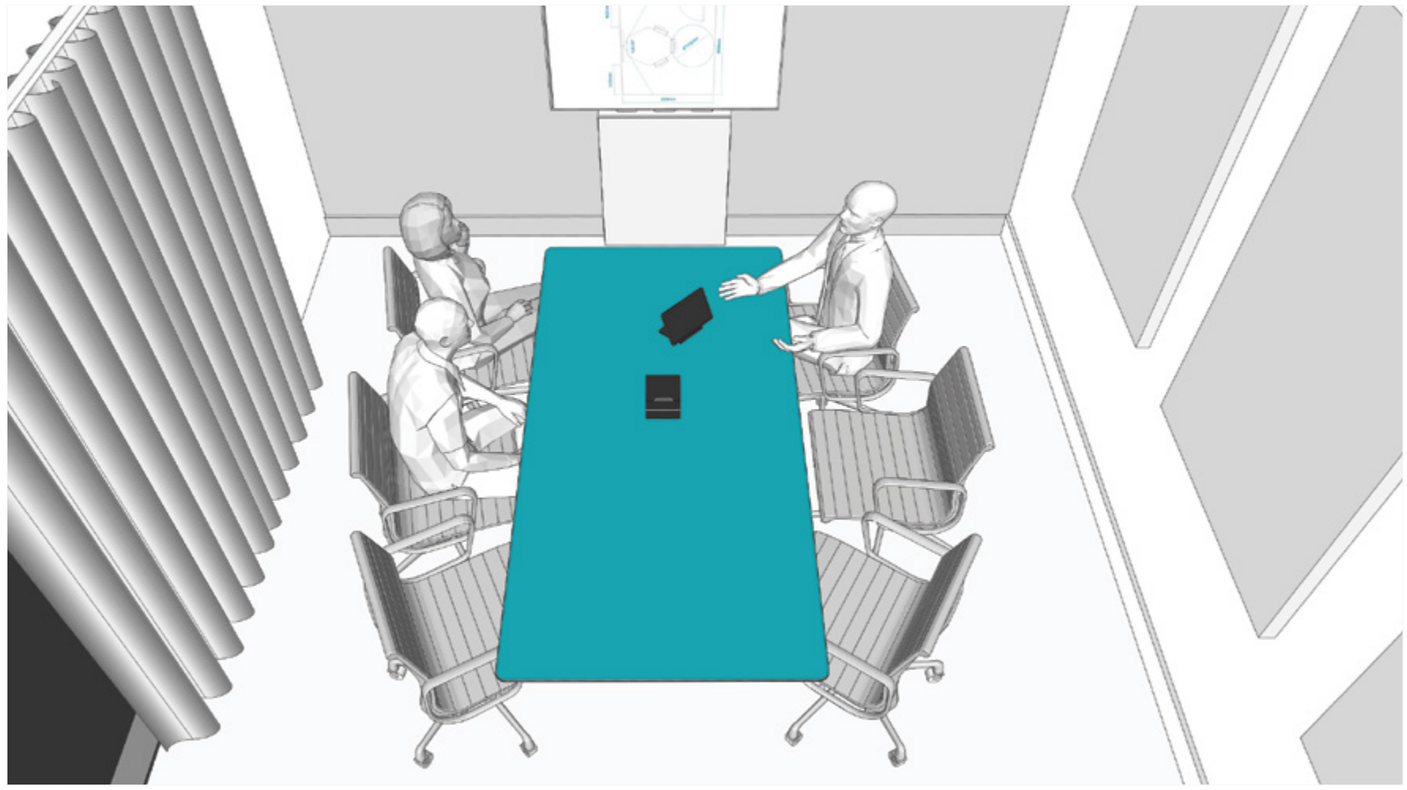
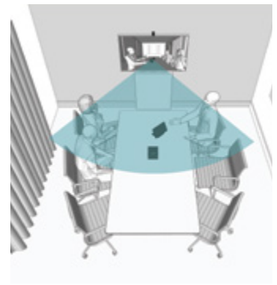


Table Choice

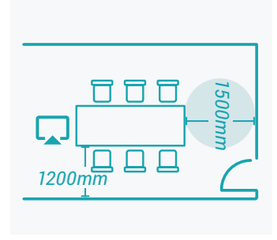
Selecting a table is the first stage to putting together a good meeting room, generally rectangular tables suit more formal spaces, ‘huddle’ shapes tend to work better for informal and workshop environments.

Recap: Camera FOV



To be seen on video, the closest participants to the camera need to be placed comfortably within the camera field of view. Don’t fall into the trap of overcrowding the room!

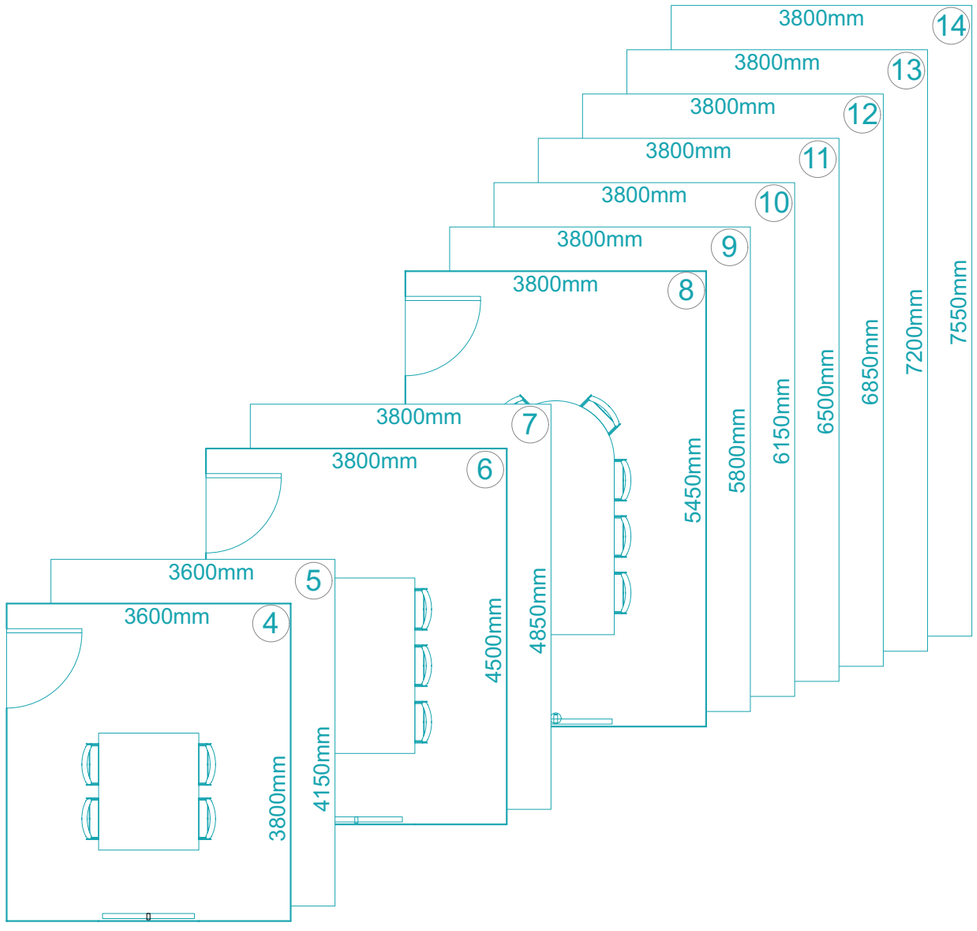
Recap: Clearance



Don’t forget the clearance needed between the walls and the furniture for access and wheelchair turning space.

Key Hint: Working on a new floor plan? Be sure to utilise our Revit drawings tools and CAD downloads to help layout the meeting room space accurately.

Room Sizing Guide



Occupants Vs Minimum Room Size

This table shows a recommended minimum room size against occupant count, as a starting guide for space planning.

Each Space is Different

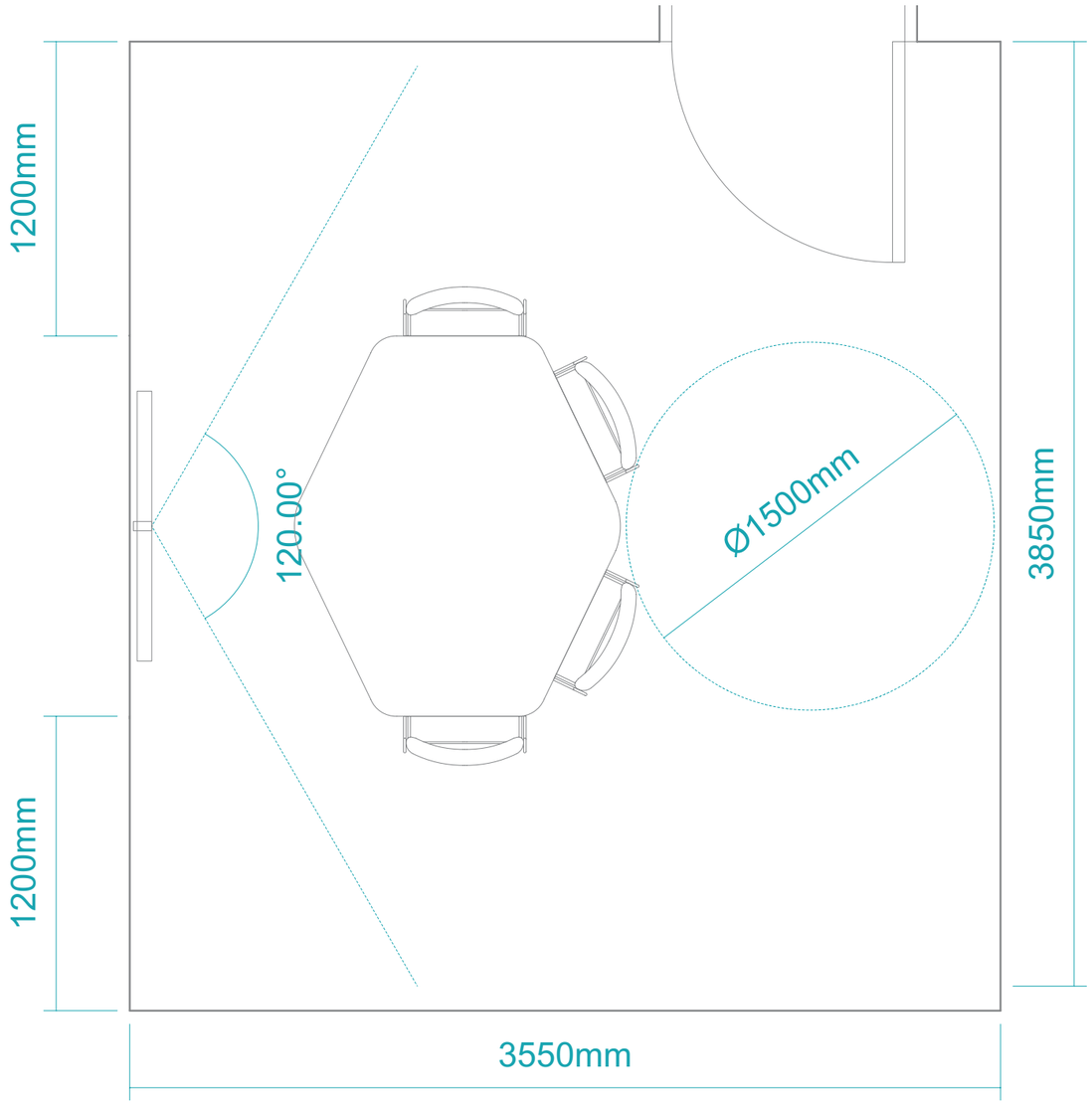
Individual rooms course differ and present unique challenges and efficiencies. Which affect maximum occupancy. This information is intended as a basis only and useful to include as early as possible when planning new spaces.

Note that due to the table design, ‘Huddle’ tables will require slightly greater room width of at least 3750mm for rooms of 4 people or more.

Key Hint: Note that these same parameters are followed in the Revit tool which will automatically generate maximum capacity based on available length.

Small Rooms

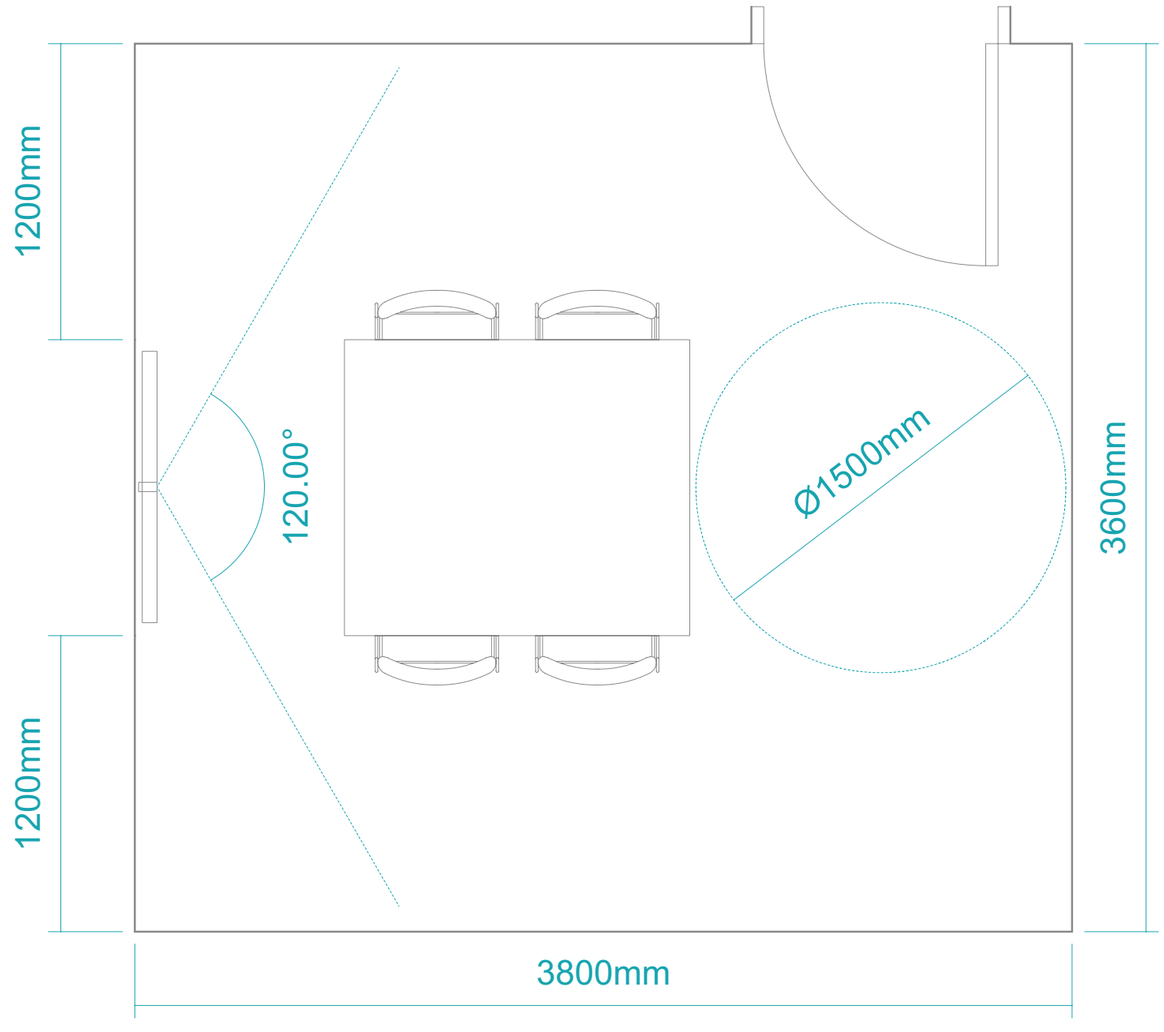
4 Person Huddle



Key Hint: Clear access and wheelchair turning space are just as much needed in the smallest rooms as they are in the larger spaces.

Small Rooms

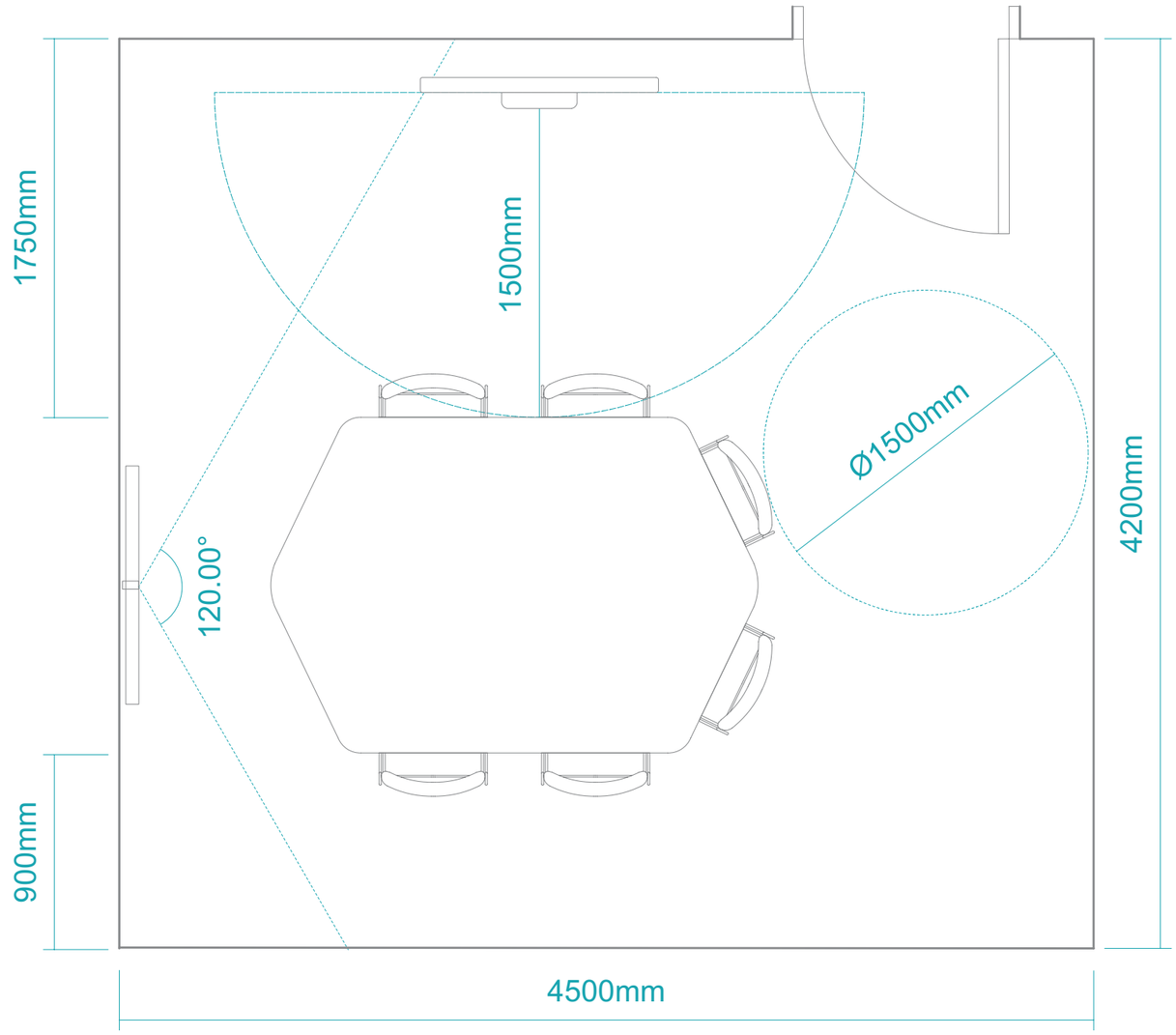
4 Person Rectangular



Key Hint: Clear access and wheelchair turning space are just as much needed in the smallest rooms as they are in the larger spaces.

Jamboard Room

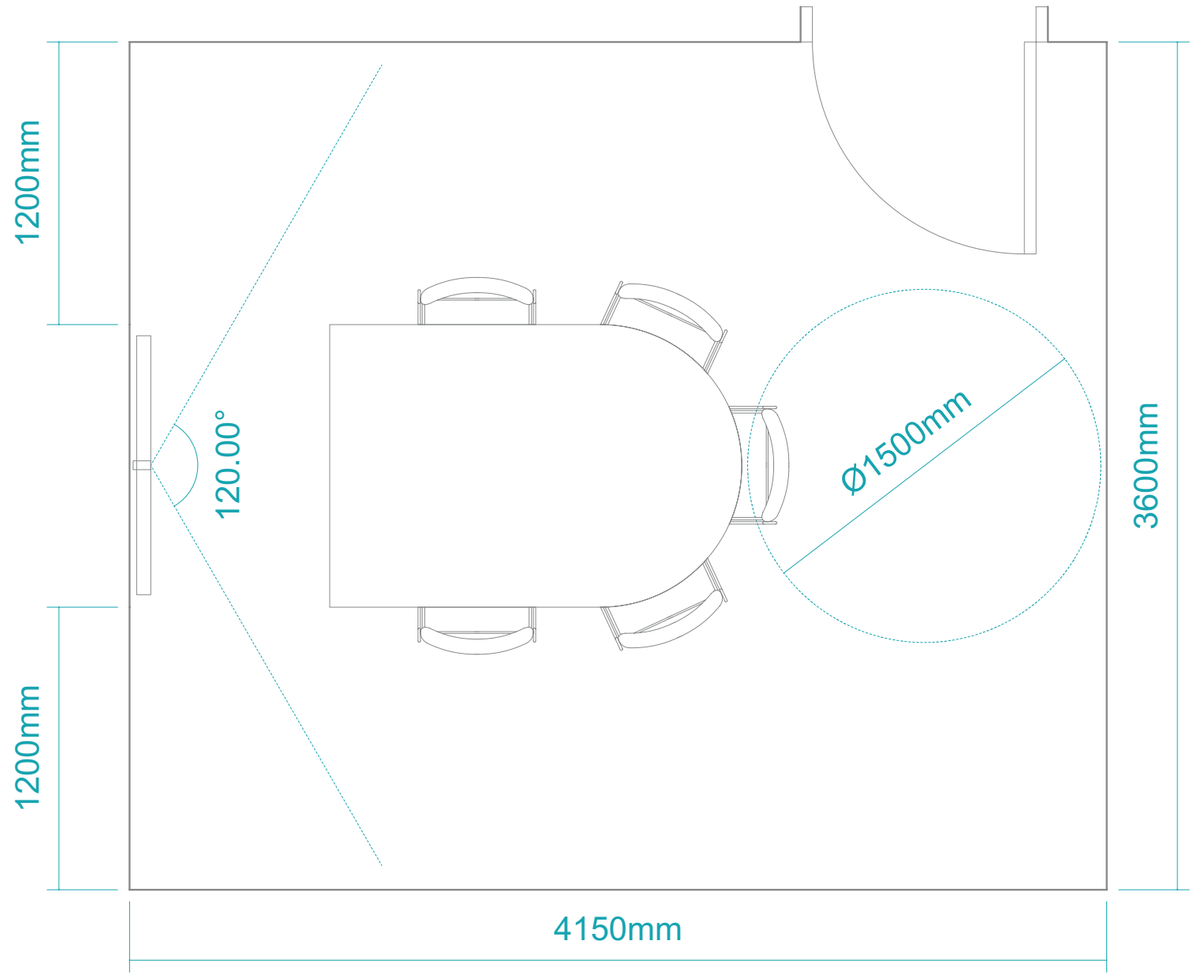
6 Person Huddle Jam



Key Hint: Make use of asymmetry in a room when looking to feature a jamboard, to maximise space efficiency. In this case, only the jamboard side of the room needs to be accessible.

Medium Rooms

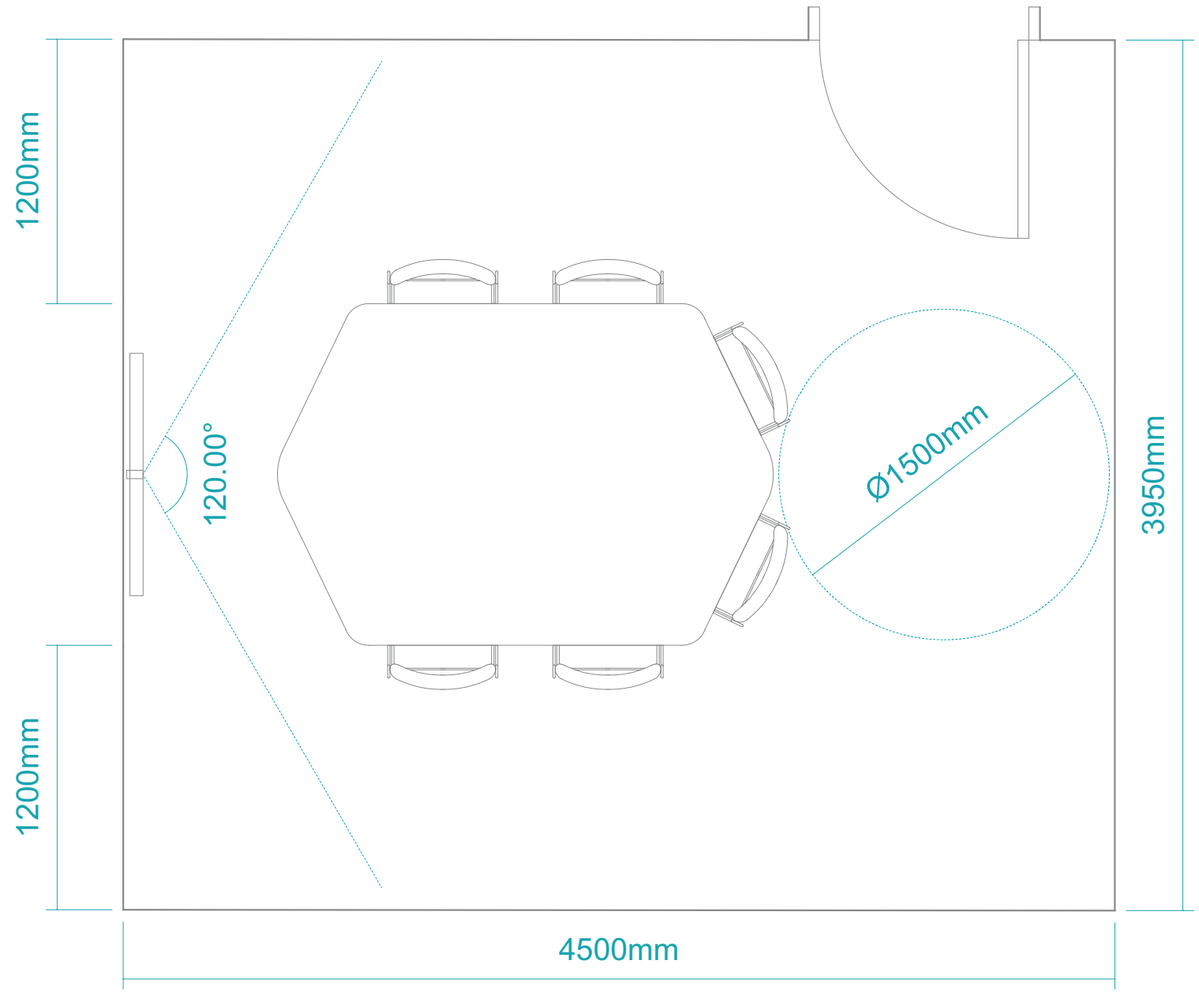
5 Person Round



Key Hint: Remember to keep the camera and screen central to the table for the best sightlines.

Medium Rooms

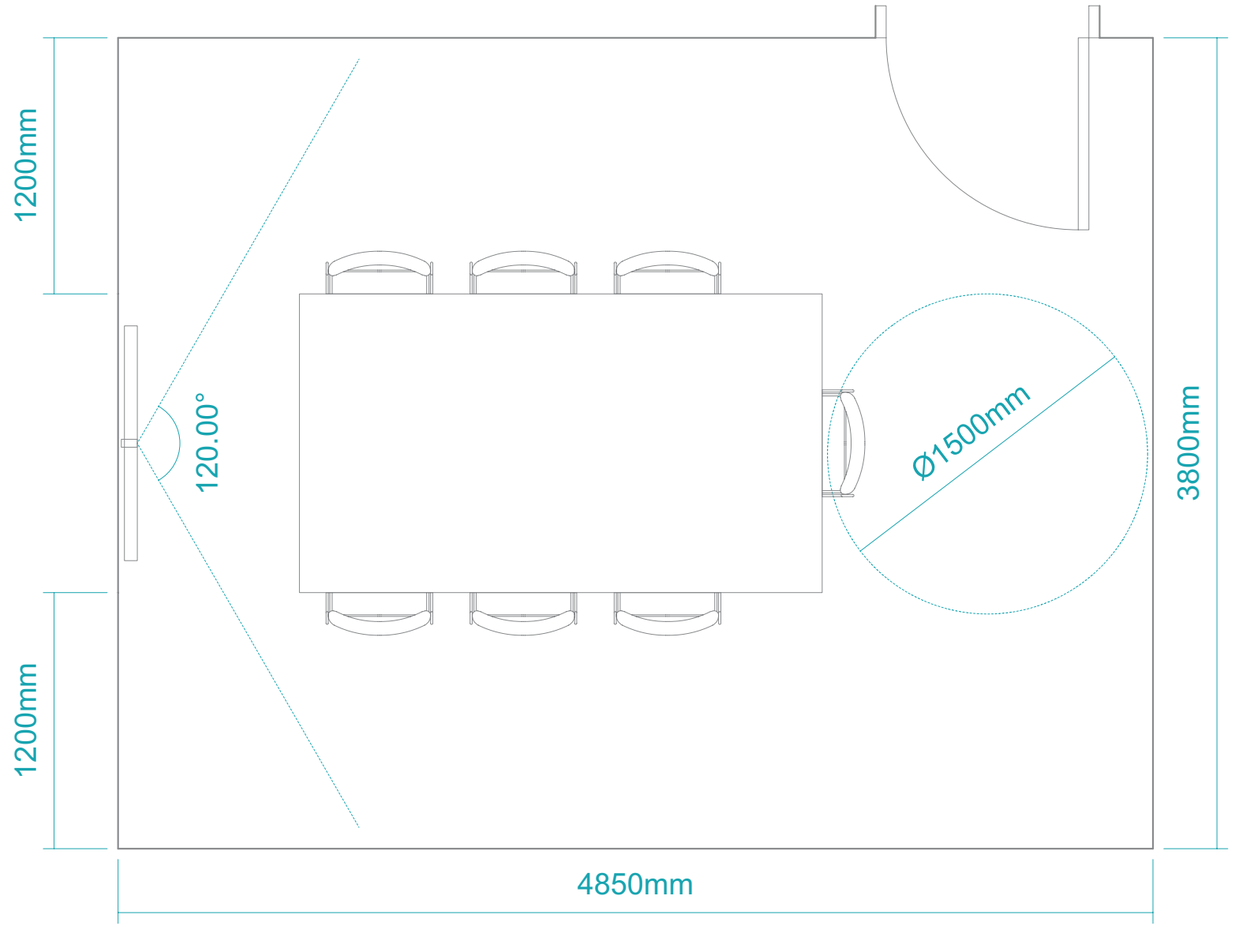
6 Person huddle



Key Hint: Remember to keep the camera and screen central to the table for the best sightlines.

Medium Rooms

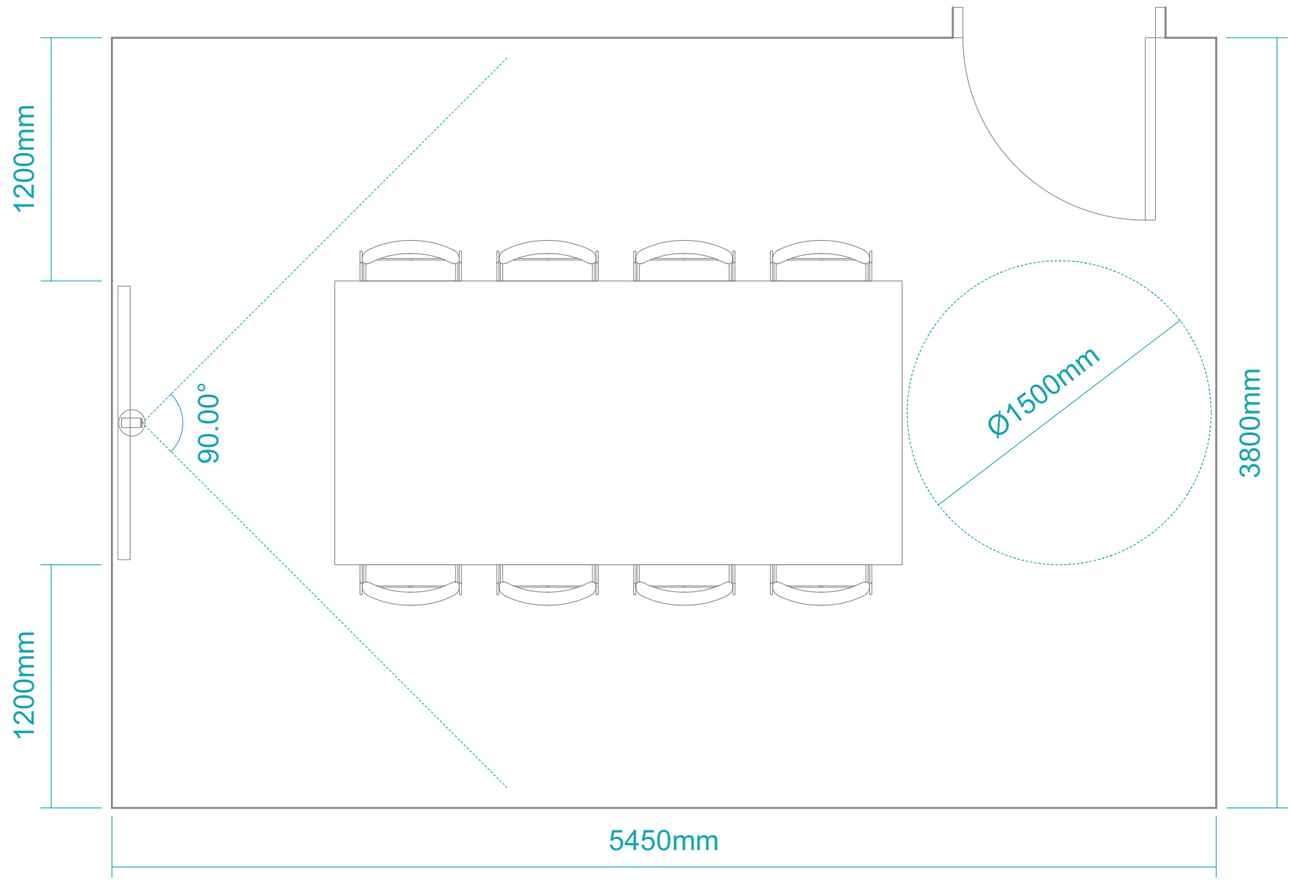
7 Person Rectangular



Key Hint: Remember to keep the camera and screen central to the table for the best sightlines.

Larger Rooms

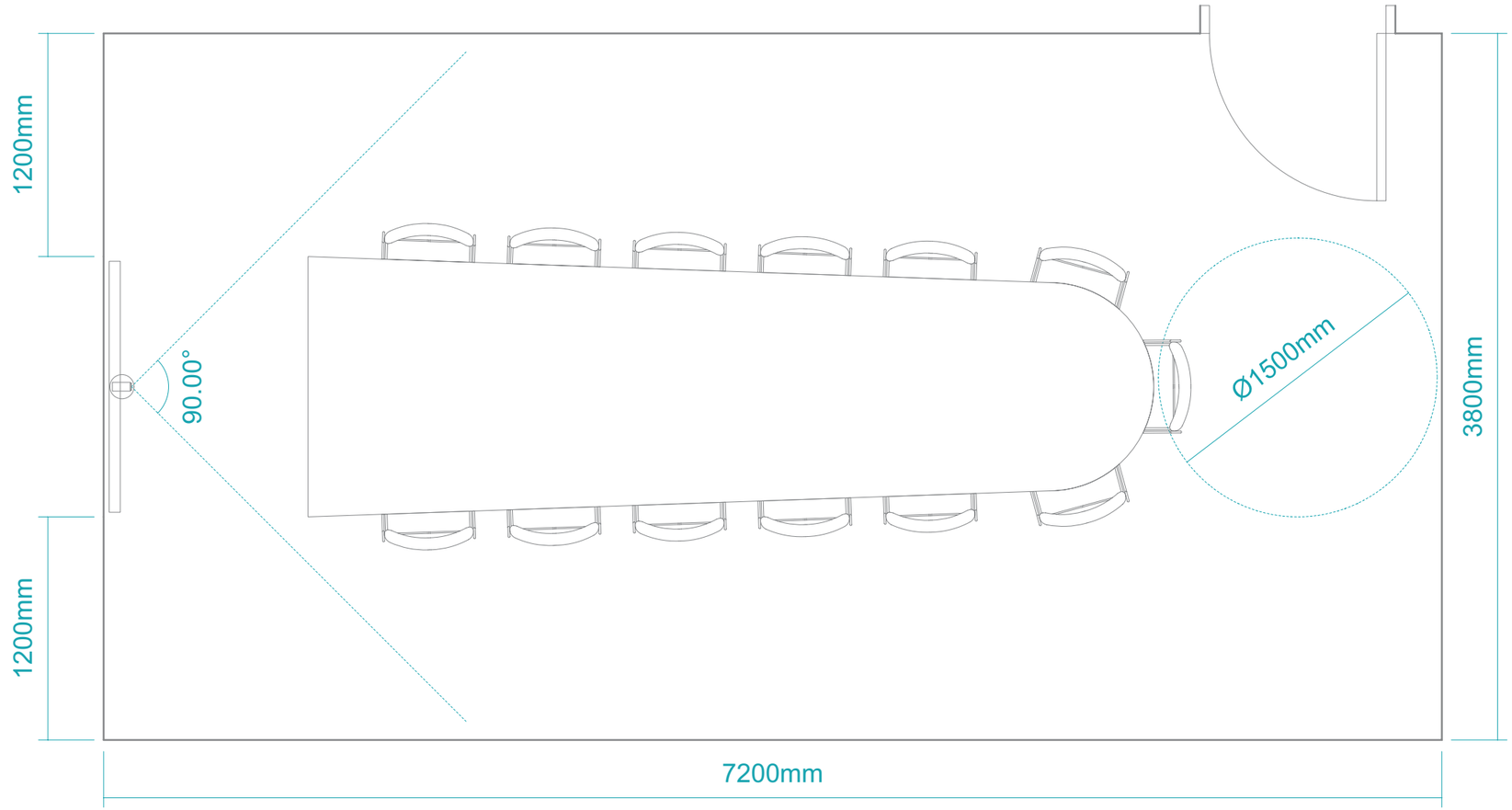
8 Person Rectangular



Key Hint: Don't forget to include the additional speaker-mics for the larger tables.

Larger Rooms

8 Person Rectangular



Key Hint: Don't forget to include the additional speaker-mics for the larger tables.