IMPACT ACOUSTIC®

ACOUSTIC SERVICES

Sample Project

ROOM ACOUSTIC ASSESSMENT

Document No.: TMR306.2507.4.057
7/21/2025

Commissioned by:
Client

Prepared by:
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IMPACT ACOUSTIC®

A. IMPACT ACOUSTIC

IMPACT ACOUSTIC is a Swiss company, specialized in providing high-performance acoustic solutions made from recycled PET bottles. Our products offer high-quality acoustic treatments to various spaces ensuring a comfortable and aesthetically pleasing design.

B. ARCHISONIC

ARCHISONIC® is our flagship lineup of product solutions in the market. Our high-performance acoustic absorbers and textiles are developed with a focus on dematerialization, upcycling, and life cycle management.

ARCHISONIC® Felt and ARCHISONIC® Textile do not rely on the extraction of new materials; they are made from upcycled single-used plastics, resulting in a positive carbon footprint. Additionally, unlike conventional acoustic materials, ARCHISONIC® Cotton does not use synthetic binders, which are difficult to recycle. This design allows our absorbers to be fully reintegrated into the production process, promoting sustainability and efficiency.

Our ARCHISONIC® acoustic absorbers are a direct response to ecological sustainability and environmental quality requirements facing contemporary interior design and fit out. The complete ARCHISONIC® product range has been LEED accredited and Cradle to Cradle Certified™. Due to its flexibility in application, it offers the design community limitless possibilities to address acoustical challenges.

C. CONTACT INFORMATION

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D. DOCUMENT CONTROL

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1 OVERVIEW

1.1 PROJECT BACKGROUND

Impact Acoustic has been commissioned by Client to conduct an acoustic assessment of the proposed Client Office Space. The office layout already includes a preliminary interior design and acoustic treatment concept, and Impact Acoustic has been tasked with providing treatment recommendations based on this proposed design. This objective forms the core focus of the current assessment.

The primary goal of this evaluation is to determine and recommend the optimal amount of ceiling treatment, along with any necessary wall treatments, to achieve the required reduction in reverberation time and ensure compliance with relevant acoustic standards across key areas of the space. To objectively assess the acoustic environment and support the proposed recommendations, room acoustic simulations were conducted using Treble software.

The recommendations outlined in this report are based on the guidelines of DIN 18041:2016-03 and ISO 22955, which provide standards and methodologies for ensuring appropriate acoustic quality, particularly within open-plan office environments.

For this analysis, the office space has been divided into four distinct zones. The meeting room is classified as Room Type A3, which requires low reverberation times to ensure good speech intelligibility. The open-plan area is classified as Room Type B5, suitable for spaces with multiple simultaneous conversations. The cafeteria is classified as Room Type B3, a category that includes spaces used for various activities and events and therefore requires controlled reverberation times.

This report presents a recommended acoustic treatment strategy, detailing the necessary products and installation locations to meet the prescribed acoustic targets. With the implementation of these measures, the proposed office space is expected not only to comply with DIN 18041:2016-03 but also to provide a comfortable and acoustically balanced environment for its users.

1.2 DOCUMENTS

The following documents were provided by the client and contain the necessary information to proceed with the assessment.

Table 1 Provided Documents

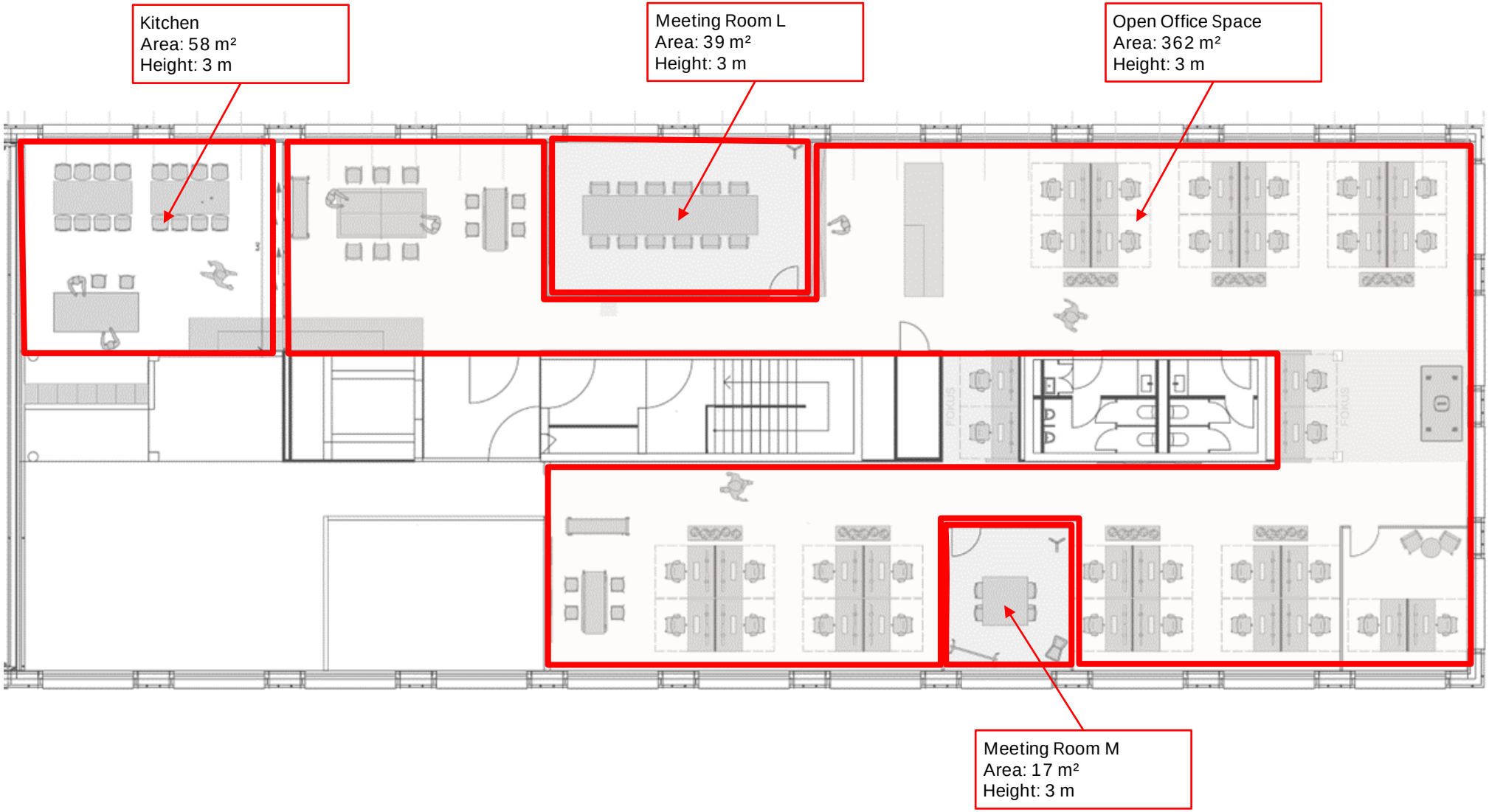
Partition & Door Key Plan Part 2 of 2 (As Built).pdf
Floor Finishes Layout Part 2 of 2 (As Built)_.pdf
Reflected Ceiling Plan Part 2 of 2 (As Built).pdf

1.3 ROOMS UNDER ASSESSMENT

The rooms listed below have been assessed in response to the submitted request to Impact Acoustic. Each space underwent a comprehensive acoustic evaluation to verify compliance with the specified acoustic criteria and relevant standards. The assessed spaces are highlighted in the floor plan provided in Section 2 of this report.

Table 2 Room Information

Room	Base Area	Room Height
Open Office Space	362 m²	3.0 m
Meeting Room M	17 m²	3.0 m
Meeting Room L	39 m²	3.0 m
Kitchen	58 m²	3.0 m


Kitchen
Area: 58 m²
Height: 3 m
Meeting Room L
Area: 39 m²
Height: 3 m
Open Office Space
Area: 362 m²
Height: 3 m
Meeting Room M
Area: 17 m²
Height: 3 m

3 STANDARD AND GUIDELINES

3.1 ROOM ACOUSTIC REQUIREMENT PER DIN 18041

ROOM CATEGORY A

The key physical parameter that defines the acoustic quality of a room is its reverberation time. The optimal reverberation time depends on both the room's size and its intended use.

According to DIN 18041:2016-03 – Acoustics in Rooms: Requirements, Recommendations, and Planning Guidelines, rooms classified under Room Category A typically have medium to large volumes. These spaces prioritize effective noise level reduction and the appropriate distribution of sound energy to ensure clear audibility for occupants. The types of rooms included in this category are:

- Classrooms
- Common rooms in kindergartens
- Conference and seminar room

Within Room Category A, there are five specific room usage types, designated as A1 through A5. These usage types are defined as follows:

- Usage Type A1 – "Music"
- Usage Type A2 – "Speech/Presentation"
- Usage Type A3 – "Education/Communication"
- Usage Type A4 – "Education/Communication Inclusive"
- Usage Type A5 – "Sport"

The target values (T_{Target}) for reverberation time, within the frequency range of 250 Hz to 2000 Hz, must be adhered to with an accuracy of ±20%. These target values vary depending on the room usage type and are detailed in Table 3. The criteria relevant to the rooms assessed in this report are highlighted in red.

Table 3 Requirements On The Reverberation Time In Dependence On The Usage Types

Room Group	Usage Types	Requirement
A1	Music	$T_{Target} = (0.45 \log \frac{V}{m^3} + 0.07)$ s 30 m³ ≤ V < 1000 m³
A2	Speech/Lecture	$T_{Target} = (0.37 \log \frac{V}{m^3} - 0.14)$ s 50 m³ ≤ V < 5000 m³
A3	Lessons/communication (up to 1000 m3) as well as speech/lecture (up to 5000 m3) inclusive	$T_{Target} = (0.32 \log \frac{V}{m^3} - 0.17)$ s 30 m³ ≤ V < 5000 m³
A4	Lessons/communication inclusive	$T_{Target} = (0.26 \log \frac{V}{m^3} - 0.14)$ s 30 m³ ≤ V < 500 m³
A5	Sport	$T_{Target} = (0.75 \log \frac{V}{m^3} - 1.00)$ s 200 m³ ≤ V < 10000 m³ T_{Target} = 2.0 s V ≥ 10000 m³

3.2 ROOM ACOUSTIC REQUIREMENT PER DIN 18041

ROOM CATEGORY B

According to DIN 18041:2016-03 – Acoustics in Rooms: Requirements, Recommendations, and Planning Guidelines, rooms that demand the highest possible reduction in noise levels and acoustic liveliness are classified under Room Category B.. This category includes:

- Areas with frequent foot traffic and occasional lingering
- Dining areas and canteens
- Exhibition halls
- Foyers
- Offices

Within Room Category B, there are five specific room usage types, designated as B1 through B5. These usage types are defined as follows:

- Usage Type B1 – "Rooms without occupancy quality"
- Usage Type B2 – "Rooms where you briefly linger"
- Usage Type B3 – "Rooms where you remain for longer"
- Usage Type B4 – "Rooms with requirements for noise reduction and room comfort"
- Usage Type B5 – "Rooms with special requirements for noise reduction and room comfort"

The target A/V ratios, depending on the room usage types, are detailed in Table 4. The applicable requirements for the rooms assessed in this report are highlighted in red.

Table 4 Reverberation Time Criteria

Room Group	Mode of Operation	Requirement
B1	Rooms without occupancy quality	No Requirement
B2	Rooms where you briefly linger	$A/V = \frac{1}{4.8 + 4.69 \log(\frac{h}{1m})}$
B3	Rooms where you remain for longer	$A/V = \frac{1}{3.13 + 4.69 \log(\frac{h}{1m})}$
B4	Rooms with requirement for noise reduction and room comfort	$A/V = \frac{1}{2.13 + 4.69 \log(\frac{h}{1m})}$
B5	Rooms with special requirement for noise reduction and room comfort	$A/V = \frac{1}{1.47 + 4.69 \log(\frac{h}{1m})}$

3.3 ROOM ACOUSTIC REQUIREMENT PER ISO 22955

ACOUSTIC SEPARATION BETWQEEN MULTI-FUNCTIONAL SPACES

ISO 22955 introduces an acoustic parameter for open plan offices where there are no full structural separations between functionally distinct areas such as workstations, corridors, traffic zones, and cafeterias. This parameter is referred to as the local acoustic attenuation of speech, denoted as DA,S (in situ acoustic attenuation of speech), and is defined as follows:

DA,S [dB] is the difference between the speech sound pressure level measured 1 meter from an omnidirectional source in a free field and the speech sound pressure level measured at a specific reception point within the office.

In simpler terms, DA,S represents the reduction in sound level between two points in the space. It quantifies how much speech diminishes as it travels, helping assess whether speech from one area could be heard and potentially distract users in another zone.

To ensure acoustic comfort and minimize disturbance between adjacent zones, ISO 22955 provides recommended DA,S values based on the intended activity and use of each area. These values should be considered as minimum targets, especially in spaces with lower background noise levels, where higher DA,S may be necessary to maintain speech privacy and reduce distractions.

In particular, a DA,S of at least 6 dB is strongly recommended between workstation islands to ensure that conversational speech does not cause disruption to neighboring work areas.

Table 5 DA,S Recommendaiton per usea

Source/ Receiver Space Type	Informal Meetings (Open plan)	Outside of the room communicatio n (phone)	Collaborative	Non - collaborative	Focused Phone	Focused Individual Work
Social and welfare	15	15	18	24	27	32
Informal meetings Oopen plan)	15	12	15	21	24	29
Outside of the room communicatio n (phone)			12	18	21	29
Collaborative				18	21	26
Non - collaborative					18	23
Focused Phone					21	26

4 ACOUSTIC SIMULATION IN TREBLE

4.1 TREBLE

Treble is a simulation software designed to evaluate and measure the acoustic performance of various spaces. This software enables accurate modeling of spatial acoustics, allowing users to assess key acoustic parameters essential for analysis, as well as to evaluate improvements when acoustic treatments are applied in new or even under-construction buildings.

Treble is suitable for modeling spaces of all sizes, from small rooms to expansive areas, including gymnasiums, auditoriums, offices, meeting rooms, classrooms, concert halls, airport terminals, sports halls, and industrial facilities. It captures complex acoustic phenomena such as diffraction, phase differences, and interference, making it versatile for diverse architectural and industrial applications.

To compute the necessary acoustic parameters for each space, Treble combines wave-based and pressure-based geometrical acoustics methods. This dual approach ensures enhanced accuracy across a wide frequency range, from low to high frequencies, resulting in a reliable representation of acoustic conditions and their impact on space functionality.

4.2 ACOUSTIC SIMULATION

4.2.1 ROOM ACOUSTIC MODELLING

A 3D model of the space under investigation was developed, incorporating geometric simplifications in line with established acoustic simulation practices. Initially, the model represented the room in its current state. The acoustic properties of the room's boundary surfaces were defined using information provided by the client, enabling accurate simulation of the existing untreated acoustic environment.

Using the 3D model of the space in its current state, optimization measures incorporating Archisonic materials were implemented and simulated to predict the room's acoustic performance post-treatment.

4.2.2 SOURCE AND RECEIVER POSITIONS

The source (red dot) and receiver (blue dot) positions are illustrated in the figure below. Sound source locations were defined to simulate potential noise generated by human activities or human speech, or an equipment. Receiver positions were identified in areas where individuals are expected to remain either for extended periods or intermittently. Sound sources were placed at a height of 1.5 meters above the floor, while all receiver positions were set at 1.2 meters to reflect the typical height of a seated person. Acoustic performance was evaluated across octave band frequencies ranging from 125 Hz to 4 kHz.

Figure 1 Source (Red Dots) and Receiver (Blue Dots) Positions

5 ACOUSTIC SIMULATION RESULT

5.1 REVERBERATION TIME

5.1.1 Open Office Space - Preferred Treatment

Figure 2 Proposed Treatment Location

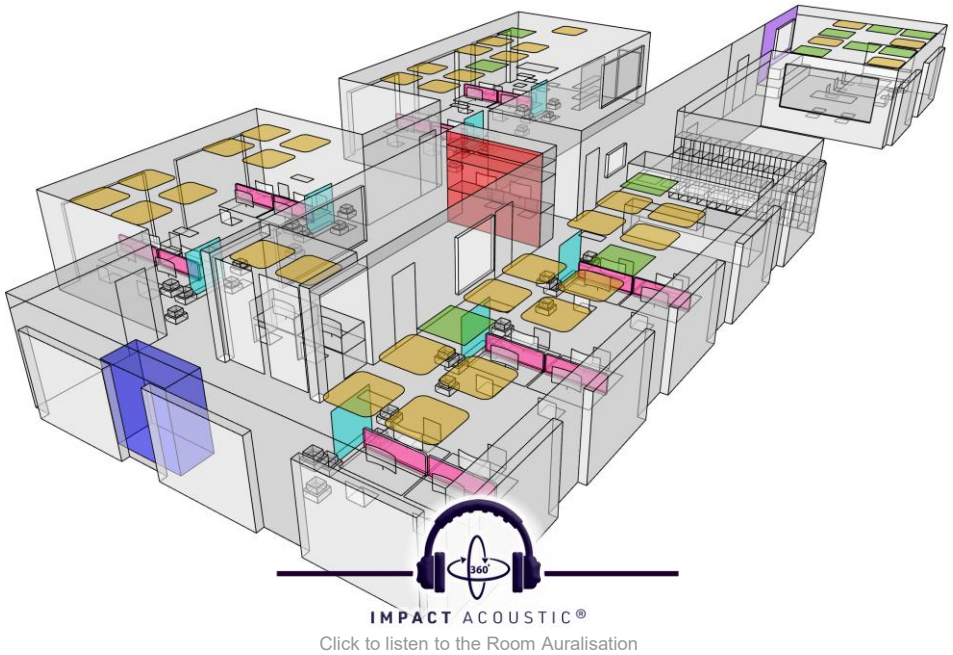


Table 6 Recommended Acoustic Treatment

Product	Area
24mm Wall Panel (Direct Attachment)	6.6 m²
12mm Wall Panel (Direct Attachment)	10.4 m²
24mm Ceiling Panel Custom	15.9 m²
24mm Square Ceiling Panel	35 pieces
24mm Desk Divider Supra, 1600x550x24mm	14 pieces
24mm Room Divider Custom	10.9 m²
Chatpod 350	1 unit

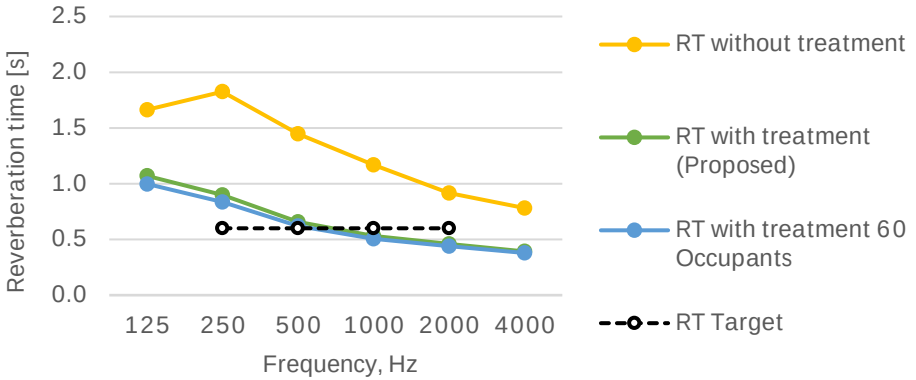


Table 7 Reverberation Time Comparison

Legend	Frequency, Hz					
	125	250	500	1000	2000	4000
	1.7	1.8	1.4	1.2	0.9	0.8
	1.1	0.9	0.7	0.5	0.5	0.4
	1.0	0.8	0.6	0.5	0.4	0.4

The reverberation time requirement for the open-plan office is based on DIN 18041 (Room Type B5) and ISO 22955, both of which recommend a target of 0.6 seconds to ensure optimal acoustic performance across the space.

The proposed acoustic treatment includes square ceiling panels suspended 200–300 mm below the soffit, complemented by desk dividers, custom-sized room dividers, and wall-mounted panels. This combination is expected to reduce the reverberation time within the speech frequency range to approximately 0.6 seconds in each area, effectively achieving the specified acoustic criteria.

5.1 REVERBERATION TIME

5.1.2 Open Office Space - Treatment Option A

Figure 3 Proposed Treatment Location

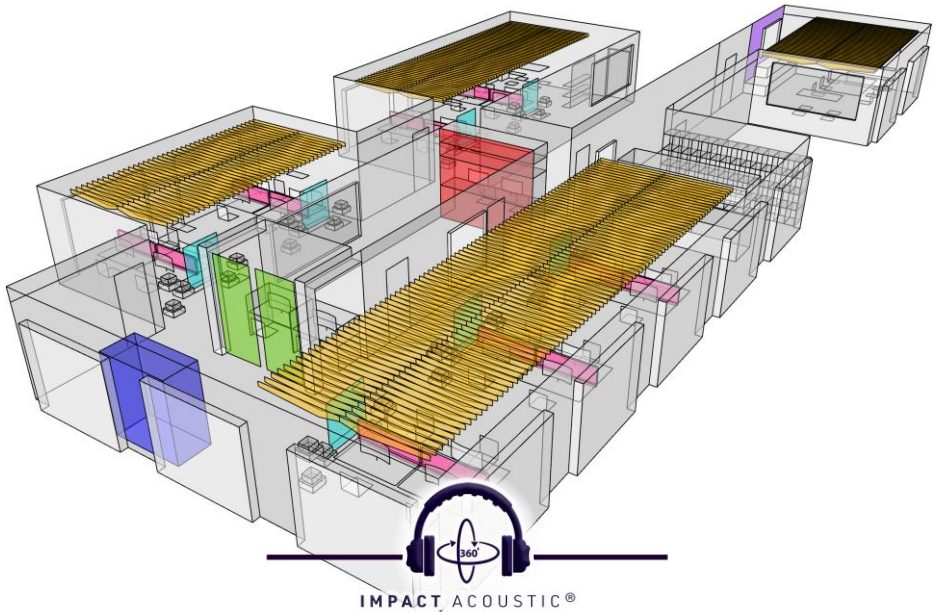


Table 8 Recommended Acoustic Treatment

Product	Area
24mm Wall Panel (Direct Attachment)	6.6 m²
12mm Wall Panel (Direct Attachment)	10.4 m²
24mm Edge Ceiling Baffle, 200mm Spacing	158.1 m²
24mm Desk Divider Supra, 1600x550x24mm	14 pieces
Chatpod 350	1 unit
24mm Room Divider Custom	10.9 m²
12mm Perforated Hanging Divider	2 pieces

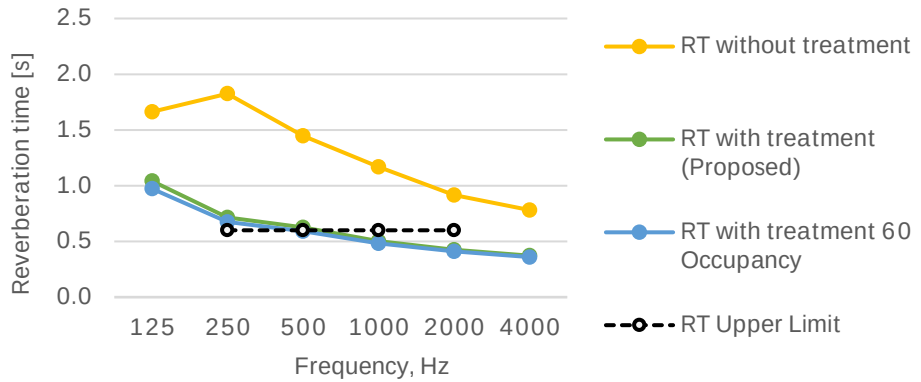


Table 9 Reverberation Time Comparison

Legend	Frequency, Hz					
	125	250	500	1000	2000	4000
	1.7	1.8	1.4	1.2	0.9	0.8
	1.0	0.7	0.6	0.5	0.4	0.4
	1.0	0.7	0.6	0.5	0.4	0.4

An alternative treatment option has been proposed to offer the client a design variation that achieves the same acoustic target for the space.

Option A features Edge ceiling baffles suspended 200–300 mm below the soffit, supported by desk dividers, custom-sized room dividers, and wall-mounted panels. This configuration is expected to reduce the reverberation time within the speech frequency range to approximately 0.6 seconds in each area, effectively meeting the required acoustic performance.

5.1 REVERBERATION TIME

5.1.3 Open Office Space - Treatment Option B

Figure 4 Proposed Treatment Location

Table 10 Recommended Acoustic Treatment

Product	Area
24mm Wall Panel (Direct Attachment)	6.6 m²
12mm Wall Panel (Direct Attachment)	10.4 m²
24mm Ceiling Baffle Grid Bespoke, 600x600mm (45% Infill)	96.1 m²
24mm Desk Divider Supra, 1600x550x24mm	14 pieces
Chatpod 350	1 unit
24mm Room Divider Custom	10.9 m²
12mm Perforated Hanging Divider	2 pieces

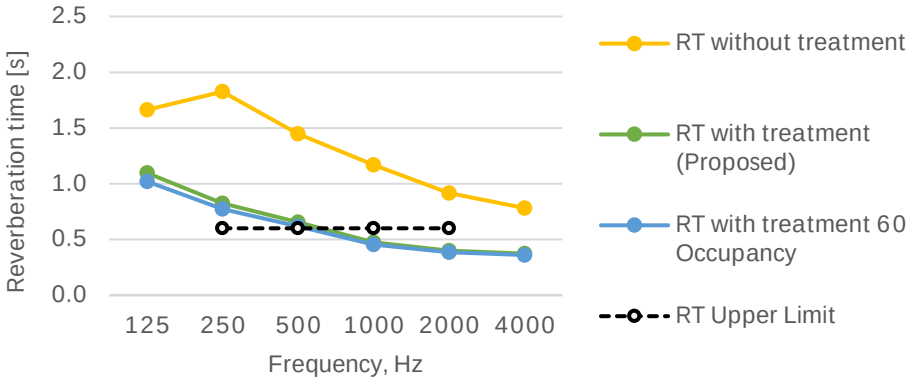


Table 11 Reverberation Time Comparison

Legend	Frequency, Hz					
	125	250	500	1000	2000	4000
	1.7	1.8	1.4	1.2	0.9	0.8
	1.1	0.8	0.7	0.5	0.4	0.4
	1.0	0.8	0.6	0.5	0.4	0.4

Option B is also recommended and involves the use of a ceiling grid system with acoustic infill panels, designed to accommodate integrated lighting fixtures. This ceiling solution is supported by additional acoustic elements, including desk dividers, custom-sized room dividers, and wall-mounted panels, all aimed at minimizing noise transfer between workstation islands and surrounding zones.

With this configuration in place, the reverberation time is expected to be reduced to below 0.6 seconds within speech frequency range, thereby achieving the target acoustic performance for the space.

5.1 REVERBERATION TIME

5.1.4 Meeting Room M - Preferred Treatment

Figure 5 Proposed Treatment Location

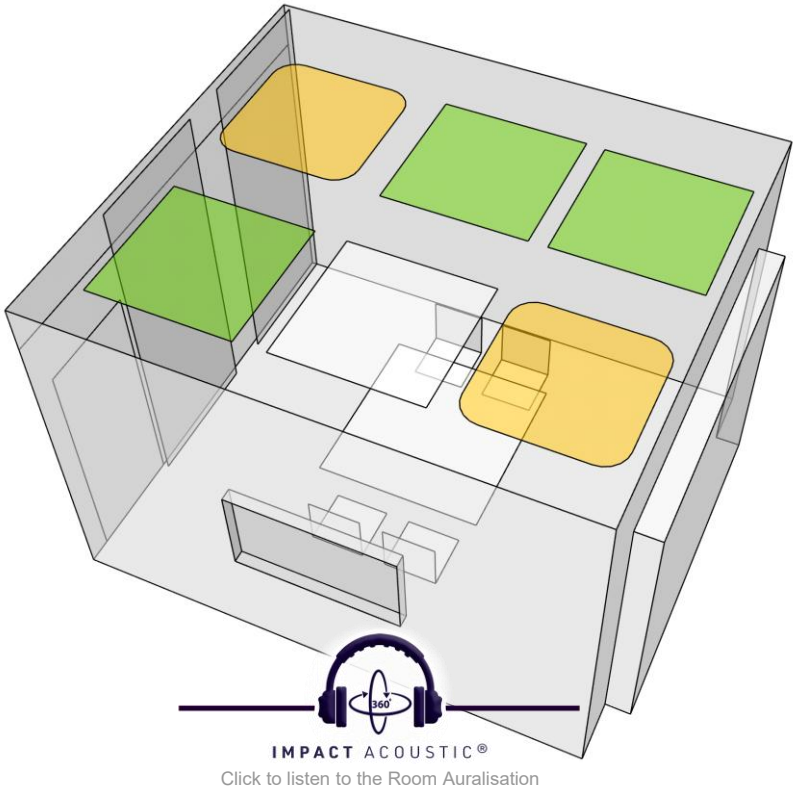


Table 12 Recommended Acoustic Treatment

Product	Area
24mm Square Ceiling Panel, 120cm x 120cm	2 units
24mm Custom Ceiling Panel , 120cm x 120cm	4.4 m²

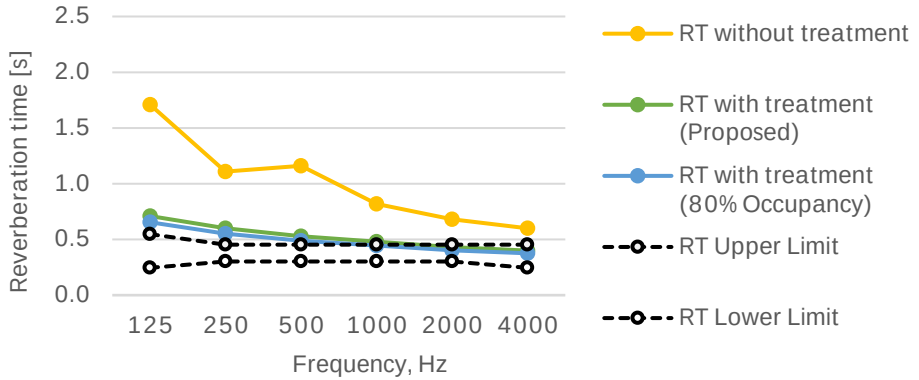


Table 13 Reverberation Time Comparison

Legend	Frequency, Hz					
	125	250	500	1000	2000	4000
	1.7	1.1	1.2	0.8	0.7	0.6
	0.7	0.6	0.5	0.5	0.4	0.4
	0.7	0.6	0.5	0.4	0.4	0.4

The reverberation time requirement for the meeting room is based on DIN 18041, Room Type A3. For a room of this size, the target reverberation time ranges between 0.30 and 0.45 seconds.

The client's preferred ceiling acoustic treatment consists of panels with varying designs, primarily sized at 1200 mm × 1200 mm. By installing five ceiling panels, which can accommodate integrated lighting, together with the existing curtain system (medium velour curtain), the resulting reverberation time within the speech frequency range is estimated at 0.47 seconds, effectively meeting the target requirement for the space. The existng curtain plays a crucial role in minimizing sound reflections from the reflective walls and glazed partitions, which could otherwise result in undesirable acoustic effects within the room.

5 ACOUSTIC SIMULATION RESULT

5.1 REVERBERATION TIME

5.1.5 Meeting Room M - Treatment Option A

Figure 6 Proposed Treatment Location

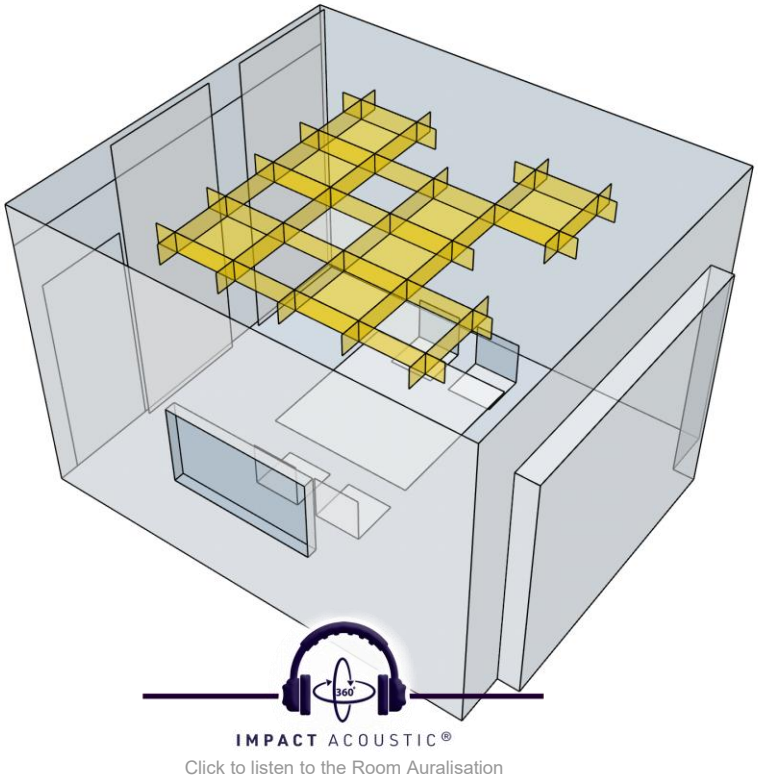


Table 14 Recommended Acoustic Treatment

Product	Area
24mm Ceiling Baffle Grid Bespoke, 600x600mm (75% Infill)	4.3 m²

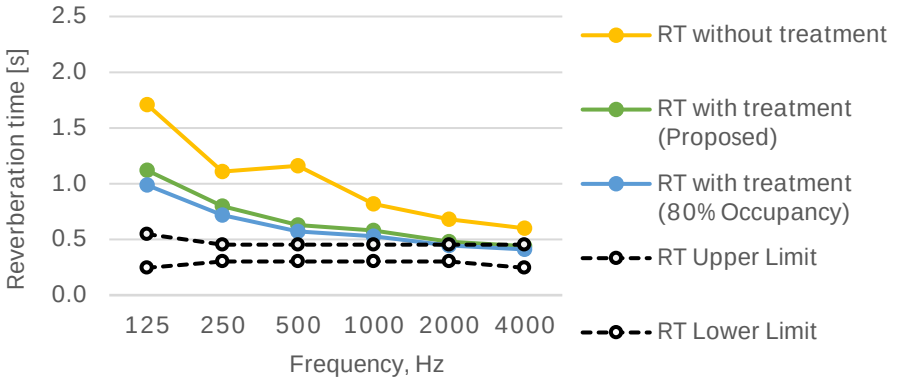


Table 15 Reverberation Time Comparison

Legend	Frequency, Hz					
	125	250	500	1000	2000	4000
	1.7	1.1	1.2	0.8	0.7	0.6
	1.1	0.8	0.6	0.6	0.5	0.4
	1.0	0.7	0.6	0.5	0.4	0.4

An additional treatment option for the meeting room has been recommended to provide the client with an alternative aesthetic solution while maintaining comparable acoustic performance.

This option features a ceiling grid system with 75% infill coverage, which can also accommodate integrated lighting, combined with a medium velour curtain system. With this configuration, the average reverberation time within the speech frequency range is estimated at 0.48 seconds, remaining within the acceptable target range for the meeting room as defined by DIN 18041.

5 ACOUSTIC SIMULATION RESULT

5.1 REVERBERATION TIME

5.1.6 Meeting Room L - Treatment Option A

Figure 7 Proposed Treatment Location

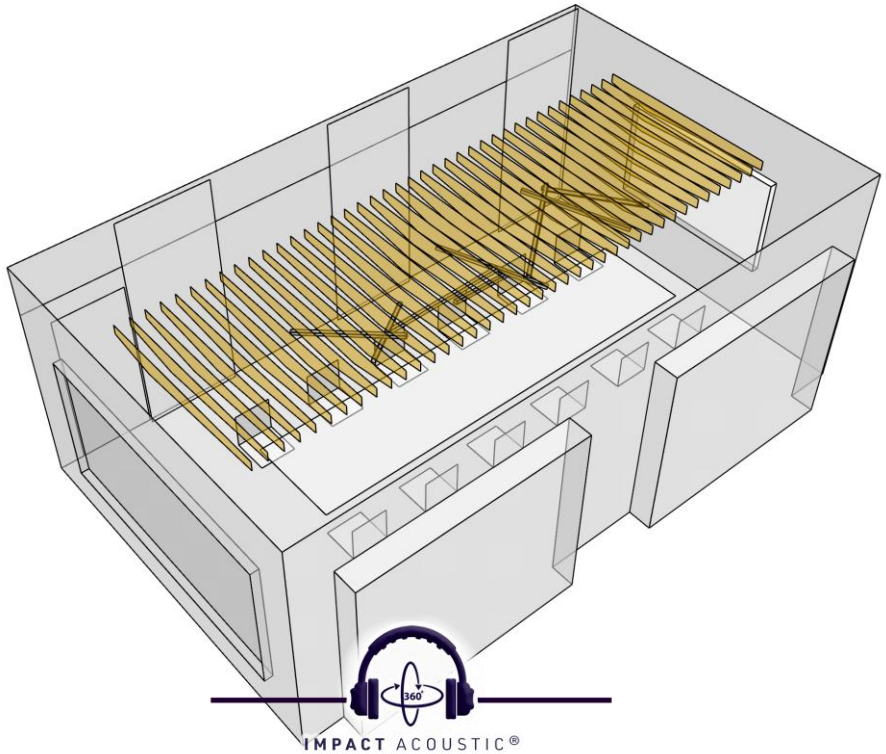


Table 16 Recommended Acoustic Treatment

Product	Area
24mm Edge Ceiling Baffle (200mm Spacing)	17 m²

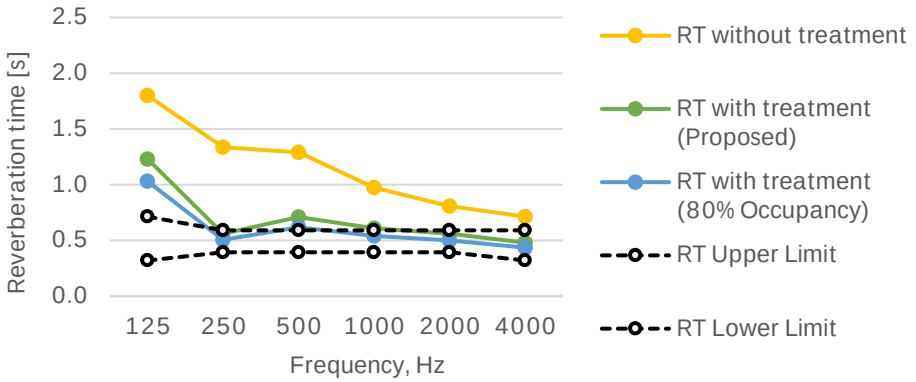


Table 17 Reverberation Time Comparison

Legend	Frequency, Hz					
	125	250	500	1000	2000	4000
	1.8	1.3	1.3	1.0	0.8	0.7
	1.2	0.6	0.7	0.6	0.6	0.5
	1.0	0.5	0.6	0.5	0.5	0.4

The reverberation time target for this space is based on DIN 18041, Room Type A3, which requires a low reverberation time in meeting spaces to ensure good speech clarity. According to the standard, the acceptable reverberation time for this room type ranges between 0.40 and 0.60 seconds.

The proposed treatment for the space includes Edge ceiling baffles installed with 180 mm spacing and varying heights. Combined with the client's preferred curtain system, which helps reduce sound reflections between hard wall surfaces and glazed partitions, this setup results in a reverberation time of approximately 0.556 seconds within the speech frequency range, which is within the required target for the space.

5.1 REVERBERATION TIME

5.1.7 Meeting Room L - Treatment Option B

Figure 8 Proposed Treatment Location

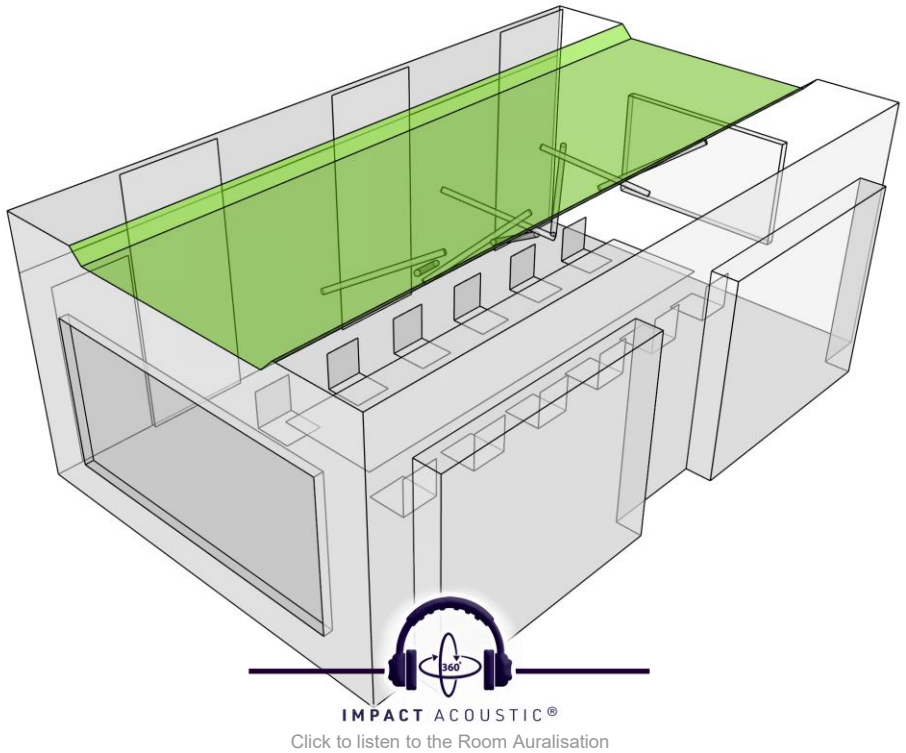


Table 18 Recommended Acoustic Treatment

Product	Area
12mm Alto (150mm Air Cavity)	22.6 m²

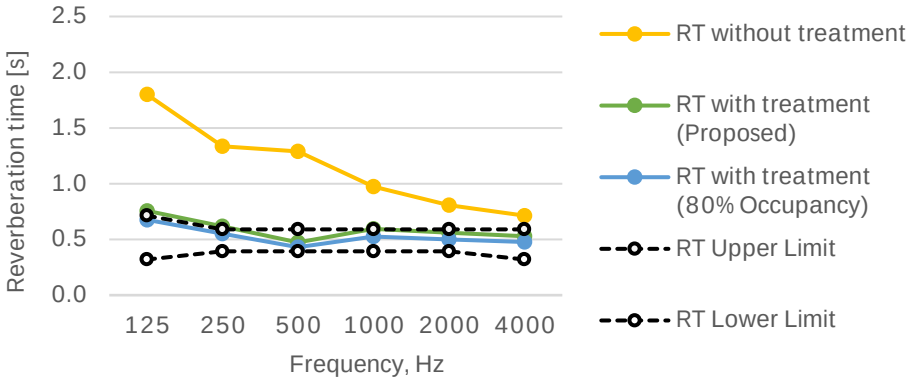


Table 19 Reverberation Time Comparison

Legend	Frequency, Hz					
	125	250	500	1000	2000	4000
	1.8	1.3	1.3	1.0	0.8	0.7
	0.8	0.6	0.5	0.6	0.6	0.5
	0.7	0.6	0.4	0.5	0.5	0.5

Another option has been proposed to offer a secondary ceiling design while still achieving the target reverberation time for the space.

This recommendation includes suspended ceiling panels installed 200 mm below the structural ceiling, with the panel edges extending wall to wall. The longer edge of the panel is framed with 12 mm wall panels to enhance acoustic effectiveness. To further improve aesthetics, groove designs such as Loop, Cottage, or Vertigo can be applied to the main ceiling panel, complementing the meeting room's lighting design.Combined with the existing curtain system, which helps reduce sound reflections between hard wall surfaces and glazed partitions, this ceiling treatment can achieve a reverberation time of approximately 0.38 seconds within the speech frequency range, effectively meeting the target requirement for the space.

5.1 REVERBERATION TIME

5.1.8 Kitchen - Preferred Treatment

Figure 9 Proposed Treatment Location

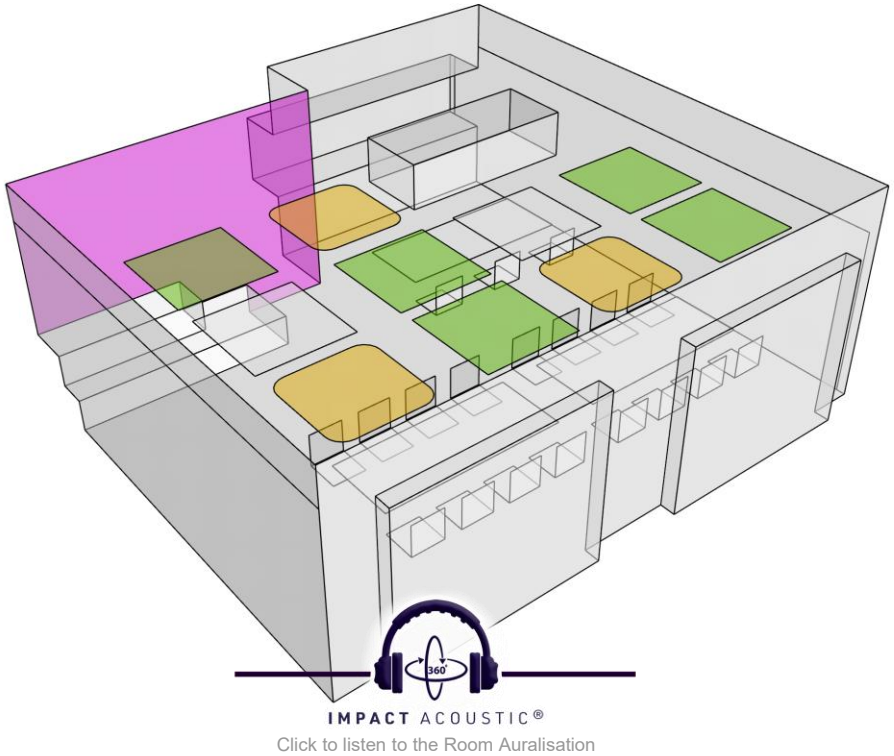


Table 20 Recommended Acoustic Treatment

Product	Area
24mm Wall Panel (Direct Attachment)	10.5 m²
24mm Square Ceiling Panel, 120cm x 120cm	3 units
24mm Custom Ceiling Panel , 120cm x 120cm	10.2 m²

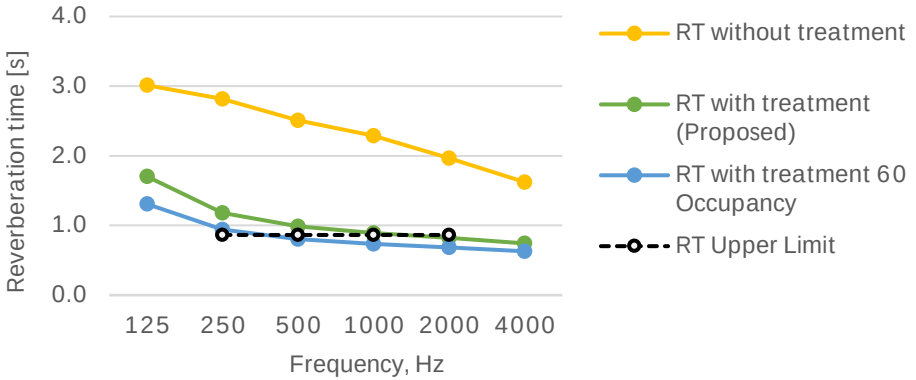


Table 21 Reverberation Time Comparison

Legend	Frequency, Hz					
	125	250	500	1000	2000	4000
	3.0	2.8	2.5	2.3	2.0	1.6
	1.7	1.2	1.0	0.9	0.8	0.7
	1.3	0.9	0.8	0.7	0.7	0.6

The reverberation time target for the cafeteria is based on DIN 18041, Room Type B3, which recommends a reverberation time of 0.86 seconds to support effective noise reduction in the space.

The proposed treatment includes three standard square ceiling panels and three custom square ceiling panels designed to allow for integrated lighting, along with 24 mm wall panels that are recommended to be directly mounted to the wall surfaces. This treatment is expected to reduce the average reverberation time to approximately 0.79 seconds within the relevant frequency range. Additionally, a noise reduction of 5–6 dB is anticipated, which would result in a noticeable improvement in the internal noise level.

5.1 REVERBERATION TIME

5.1.9 Kitchen - Treatment Option A

Figure 10 Proposed Treatment Location

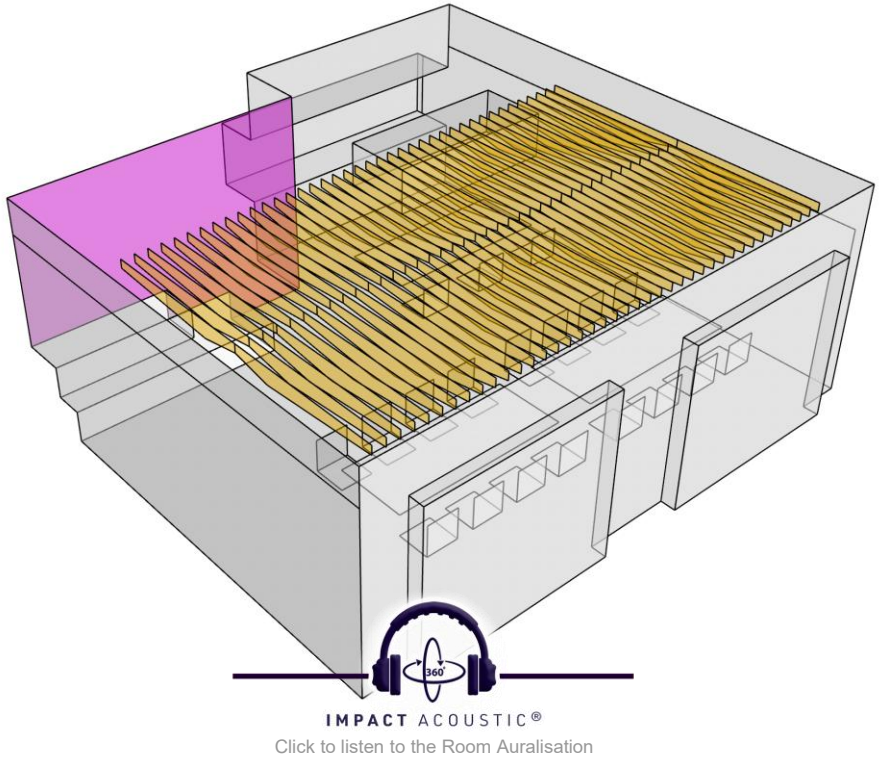


Table 22 Recommended Acoustic Treatment

Product	Area
24mm Wall Panel (Direct Attachment)	10.5 m²
24mm Edge Ceiling Baffle (200mm Spacing)	30.7 m²

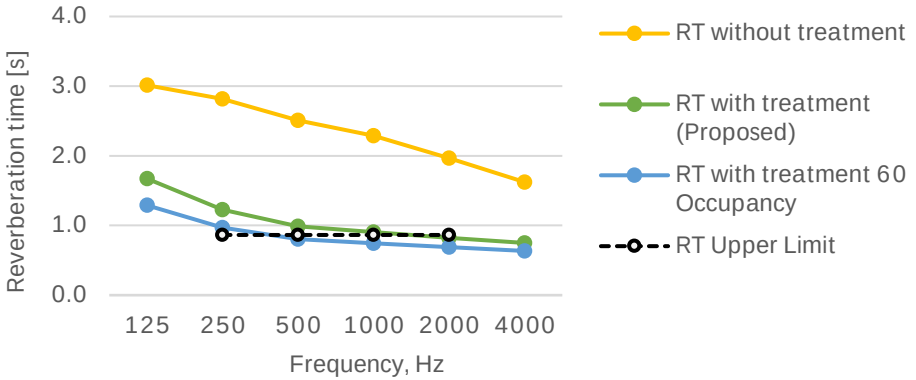


Table 23 Reverberation Time Comparison

Legend	Frequency, Hz					
	125	250	500	1000	2000	4000
	3.0	2.8	2.5	2.3	2.0	1.6
	1.7	1.2	1.0	0.9	0.8	0.8
	1.3	1.0	0.8	0.7	0.7	0.6

Another treatment option has been recommended to provide the client with an alternative design for the cafeteria while still achieving the target reverberation time.

This alternative solution includes bespoke edge ceiling baffles, combined with 24 mm wall panels that are recommended to be directly mounted onto the wall surfaces. With this treatment, the reverberation time is expected to be reduced to approximately 0.8 seconds, effectively meeting the acoustic target for the space. Additionally, a noise reduction of 5–6 dB is anticipated, resulting in a noticeable improvement in the internal noise level.

5.1 REVERBERATION TIME

5.1.10 Kitchen - Treatment Option B

Figure 11 Proposed Treatment Location

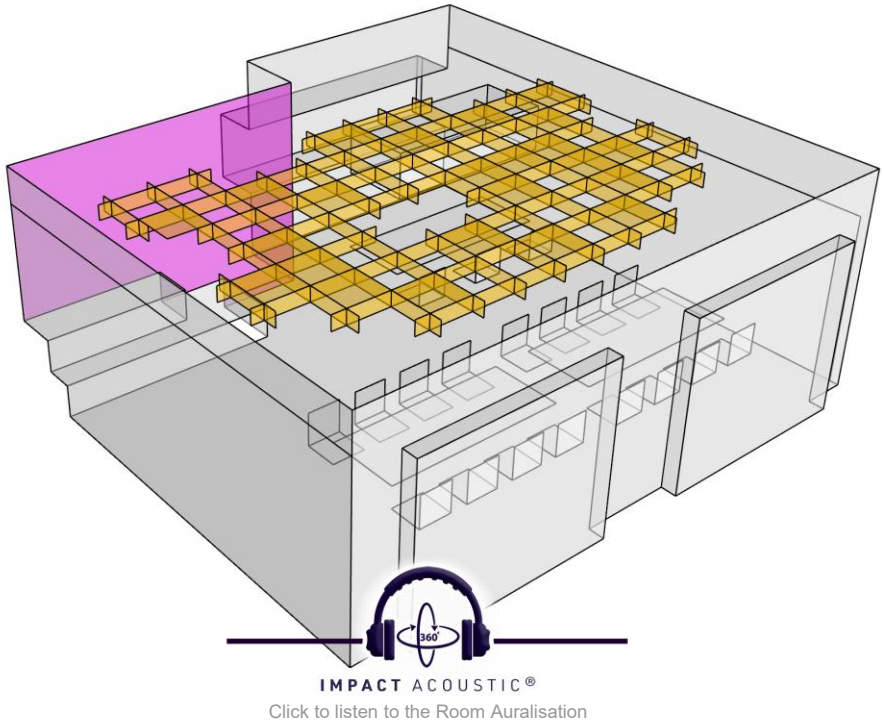


Table 24 Recommended Acoustic Treatment

Product	Area
24mm Wall Panel (Direct Attachment)	10.5 m²
24mm Ceiling Baffle Grid Bespoke, 600x600mm (45% Infill)	19.4 m²

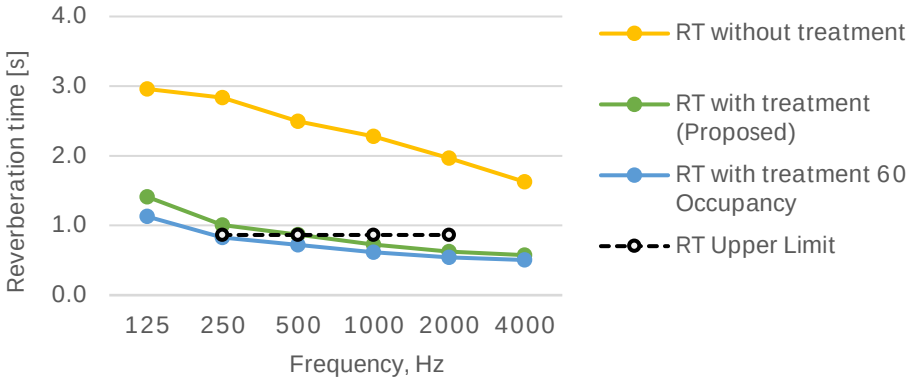


Table 25 Reverberation Time Comparison

Legend	Frequency, Hz					
	125	250	500	1000	2000	4000
	3.0	2.8	2.5	2.3	2.0	1.6
	1.4	1.0	0.9	0.7	0.6	0.6
	1.1	0.8	0.7	0.6	0.5	0.5

Treatment Option B is also proposed to offer an alternative aesthetic design for the space, incorporating the use of a ceiling grid system intended to help reduce internal noise levels.

Combined with the proposed 24 mm wall treatment, which is recommended to be directly mounted to the wall surfaces, this option is expected to achieve an average reverberation time of approximately 0.68 seconds within the speech frequency range, thereby meeting the target set by DIN 18041.

5.2 SPEECH INTELLIGIBILITY

5.2.1 Meeting Room M

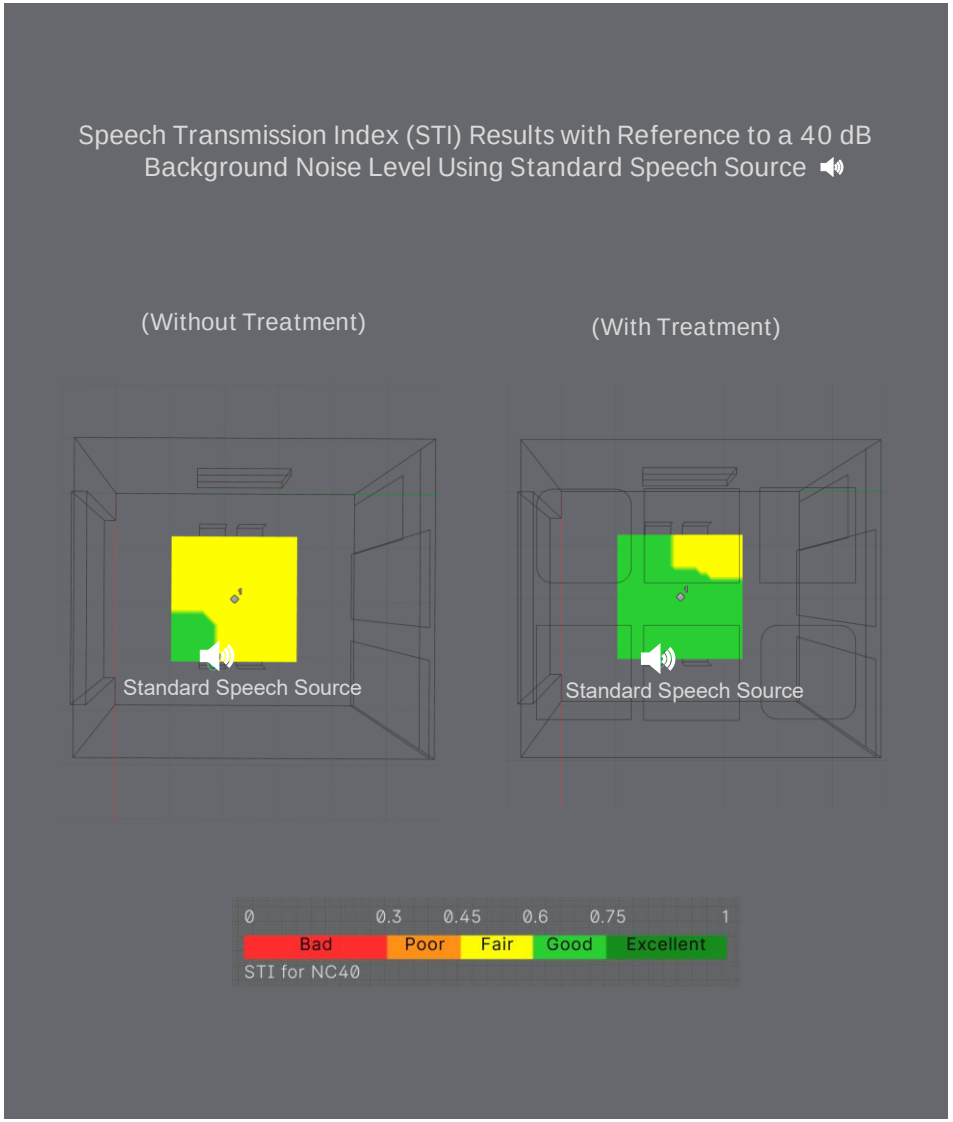
The Speech Transmission Index (STI) is a numerical measure used to assess the clarity and intelligibility of speech within a given environment. The table below provides the classification of STI values, indicating the corresponding levels of speech intelligibility.

Table 26 STI Classification

STI Value	Quality Classification According to IEC 60268-16
0 -0.3	Bad
0.3 - 0.45	Weak
0.45 - 0.6	Appropriate
0.6 - 0.75	Good
0.75 - 1	Excellent

The standard background noise level in meeting rooms typically falls within the range of 40 to 45 dB, in accordance with guidelines such as AS/NZS 2107 and other relevant standards. This internal noise level serves as the basis for evaluating the Speech Transmission Index (STI), which is commonly referenced against the NC 40 curve.

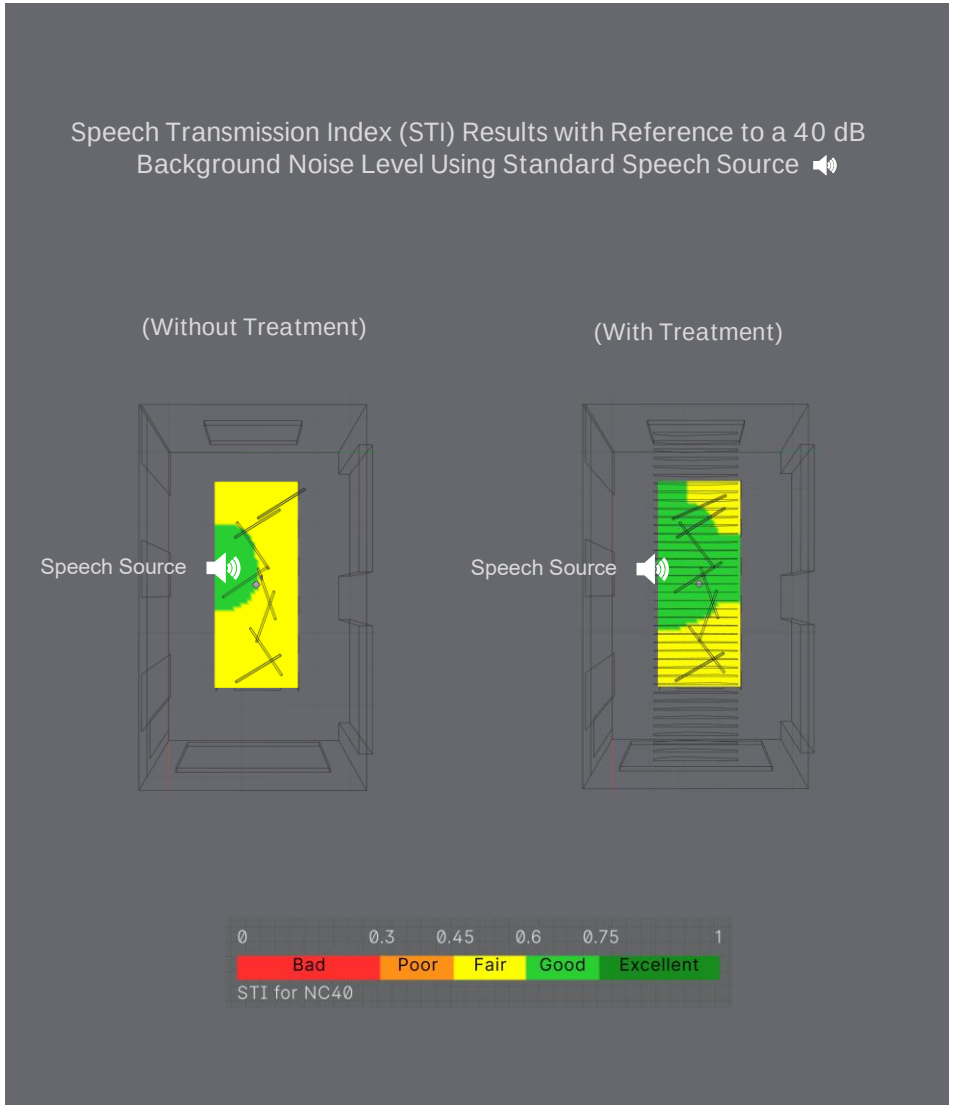
For the smaller meeting room, assuming a background noise level of approximately 40 dB, simulation results indicate an STI of 0.54 without any acoustic treatment. This corresponds to acceptable speech intelligibility, though it may not be sufficient for consistent clarity across the space. With the proposed acoustic treatment, the STI improves to 0.62, achieving good speech intelligibility, even at normal speaking volumes.



5.2 SPEECH INTELLIGIBILITY

5.2.2 Meeting Room L

Similarly, for the larger meeting room, the same background noise level of 40 dB is assumed, reflecting typical conditions in meeting environments. Without treatment, the STI is 0.53, indicating adequate speech intelligibility. However, once the proposed acoustic measures are applied, the STI increases to 0.64, ensuring good speech intelligibility and supporting effective communication throughout the room.



5.3 $D_{A,S}$ VALUES (dB) : MEASUREMENT OF THE SOUND REDUCTION IN PERCEIVED NOISE BETWEEN WORKSTATIONS

ISO 22955 provides guidelines for achieving appropriate acoustic quality in open plan office environments. It classifies spaces based on their intended use and typical activities, with each category assigned specific acoustic performance targets. One of the key parameters is the Distance Attenuation of Speech (DA,S), which quantifies how much speech is reduced between workstations as a result of distance, sound absorption, and physical obstructions.

To assess the DA,S values, multiple source and receiver positions were defined in the simulation. This setup allows the measurement of sound pressure levels between zones and between workstation islands to determine whether the simulated conditions meet the target DA,S values defined in ISO 22955.

The assessed open plan area is assumed be used for telecommunication, video conferencing, and occasional collaboration. For this type of use, the required DA,S value between workstation islands is ≥ 6 dB.

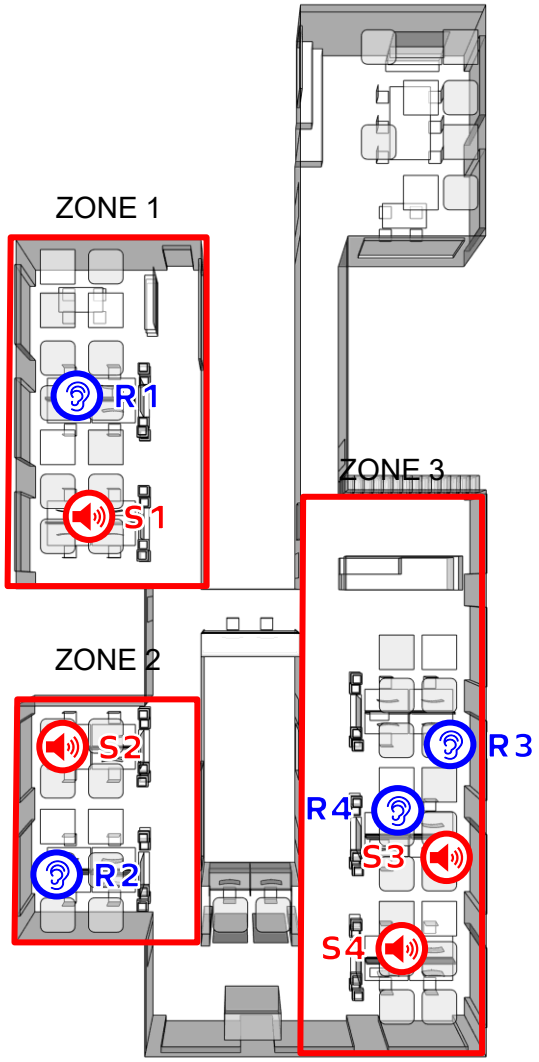
In addition, three distinct workspace zones have been identified:

Zone 1 where S1 and R1 is located

Zone 2 where S2 and R2 is located

Zone 3 which includes the rest of the source and receivers

To ensure controlled noise transfer between these zones, particularly during phone calls and collaborative tasks, a DA,S target of ≥ 21 dB has been set.



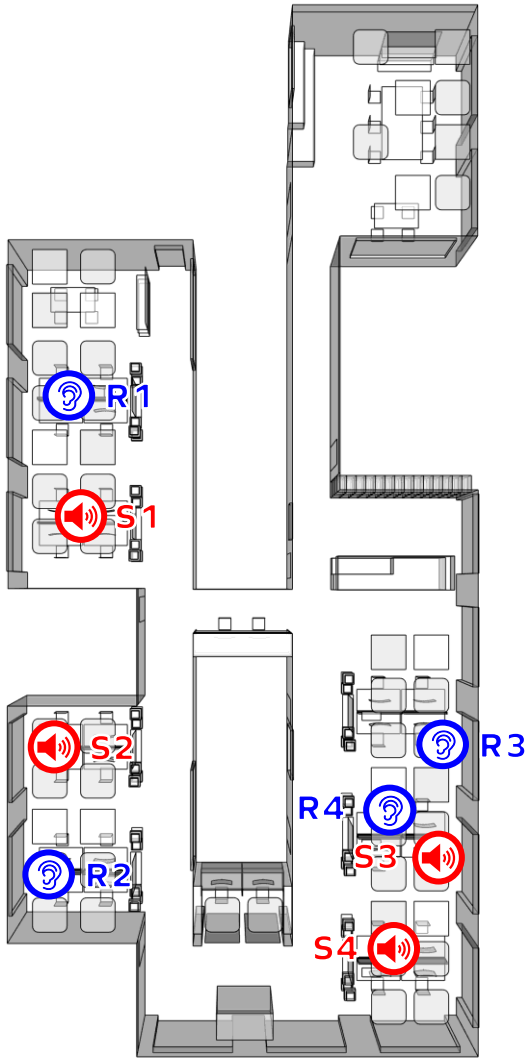
5.3 $D_{A,S}$ VALUES (dB) : MEASUREMENT OF THE SOUND REDUCTION IN PERCEIVED NOISE BETWEEN WORKSTATIONS

5.3.1 Open Workstation Area - Preferred Treatment

Table 27 Determined Attenuation of Speech Between Adjacent Workstation area

Source	Receiver	$D_{A,S}$ (averaged)	Recommendation (ISO 22955)	Pass/Fail
S1	R1	6.2 dB	≥ 6 dB	Pass
S2	R2	7.0 dB	≥ 6 dB	Pass
S3	R3	6.2 dB	≥ 6 dB	Pass
S4	R4	8.0 dB	≥ 6 dB	Pass
S1	R2	22.5 dB	≥ 21 dB	Pass
S1	R3	22.0 dB	≥ 21 dB	Pass
S2	R1	21.0 dB	≥ 21 dB	Pass
S2	R3	21.8 dB	≥ 21 dB	Pass
S3	R1	27.4 dB	≥ 21 dB	Pass

Based on the results, the required DA,S values between zones and between workstation islands have been achieved through the use of the preferred ceiling treatment, along with the recommended desk dividers and room partitions for the space.



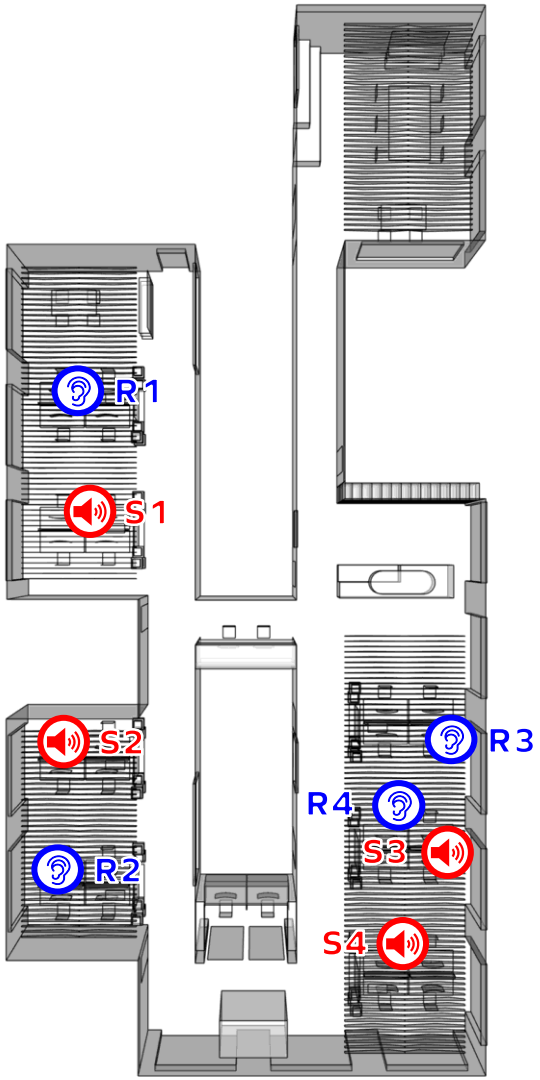
5.3 $D_{A,S}$ VALUES (dB) : MEASUREMENT OF THE SOUND REDUCTION IN PERCEIVED NOISE BETWEEN WORKSTATIONS

5.3.2 Open Office Space - Treatment Option A

Table 28 Determined Attenuation of Speech Between Adjacent Workstation area

Source	Receiver	$D_{A,S}$ (averaged)	Recommendation (ISO 22955)	Pass/Fail
S1	R1	9.3 dB	≥ 6 dB	Pass
S2	R2	6.4 dB	≥ 6 dB	Pass
S3	R3	9.0 dB	≥ 6 dB	Pass
S4	R4	10.2 dB	≥ 6 dB	Pass
S1	R2	24.1 dB	≥ 21 dB	Pass
S1	R3	25.8 dB	≥ 21 dB	Pass
S2	R1	22.3 dB	≥ 21 dB	Pass
S2	R3	22.8 dB	≥ 21 dB	Pass
S3	R1	30.0 dB	≥ 21 dB	Pass

The results indicate that the required DA,S values between functional zones and workstation islands have been successfully achieved through the implementation of the preferred ceiling treatment, supported by the recommended desk dividers and room partitions.



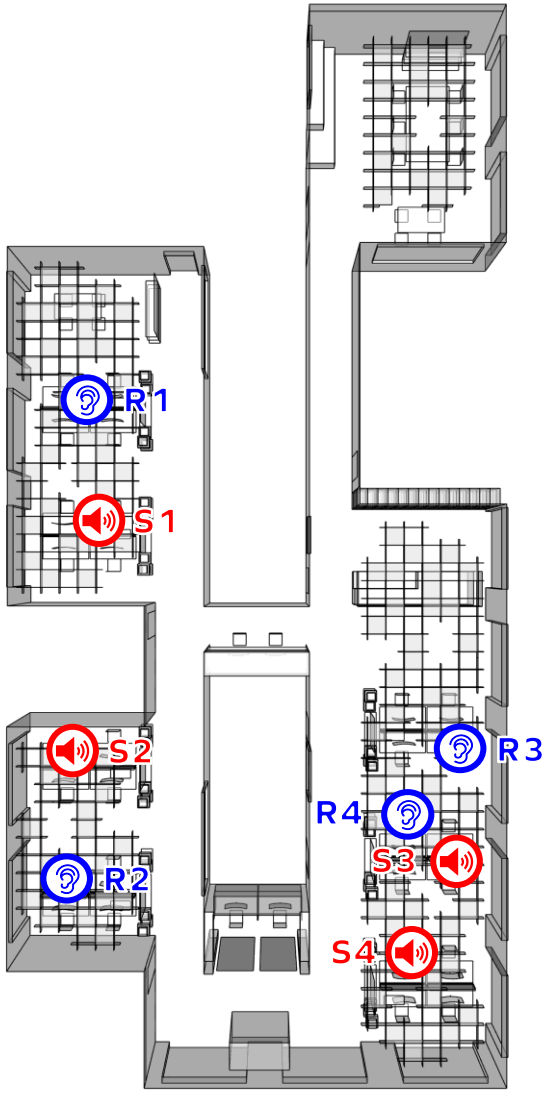
5.3 $D_{A,S}$ VALUES (dB) : MEASUREMENT OF THE SOUND REDUCTION IN PERCEIVED NOISE BETWEEN WORKSTATIONS

5.3.3 Open Office Space - Treatment Option B

Table 29 Determined Attenuation of Speech Between Adjacent Workstation area

Source	Receiver	$D_{A,S}$ (averaged)	Recommendation (ISO 22955)	Pass/Fail
S1	R1	8.6 dB	≥ 6 dB	Pass
S2	R2	6.0 dB	≥ 6 dB	Pass
S3	R3	8.0 dB	≥ 6 dB	Pass
S4	R4	8.1 dB	≥ 6 dB	Pass
S1	R2	23.5 dB	≥ 21 dB	Pass
S1	R3	23.9 dB	≥ 21 dB	Pass
S2	R1	21.7 dB	≥ 21 dB	Pass
S2	R3	21.1 dB	≥ 21 dB	Pass
S3	R1	28.9 dB	≥ 21 dB	Pass

The achieved results confirm that the required DA,S values between zones and workstation islands have been met through the application of the selected ceiling treatment, along with the use of recommended desk dividers and room partitions.



6 SUMMARY

This assessment focuses on evaluating the acoustic performance of a proposed office space composed of several key areas: a large meeting room, a medium-sized meeting room, a cafeteria, a playroom, and an open-plan office. These spaces require low reverberation times to ensure clear speech intelligibility and effective noise control throughout the environment.

Three acoustic treatment options were assessed: the client's preferred design and two alternative solutions proposed by Impact Acoustic, incorporating a range of acoustic products tailored to align with the design intent.

The ceiling design options evaluated include square ceiling panels, edge ceiling baffles, and a ceiling grid system. Each of these is complemented by desk dividers, custom room dividers placed between workstation areas, and additional wall-mounted treatments in selected locations.

All proposed treatment configurations successfully achieved the target reverberation times for each space, meeting the acoustic criteria defined by DIN 18041 and ISO 22955 for open-plan offices, meeting rooms, and cafeteria settings.

It is therefore recommended to implement the proposed treatments, or use them as a basis for finalizing the acoustic design of the space to ensure both compliance and comfort.

MARK-UP PLAN

Kite Loft Project (Client's Preferred Treatment)

KEY PLAN:

PRODUCT LEGEND:

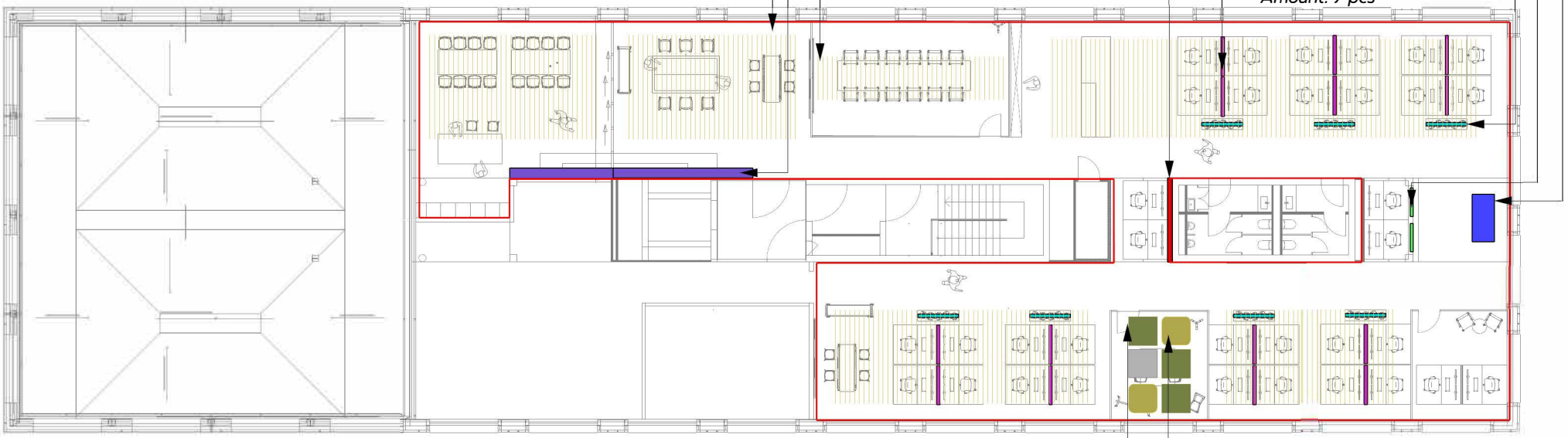
- Archisonic 24mm **Custom Design Ceiling Panels**
- Archisonic 24mm **"Square"Ceiling Panel**
- Archisonic 24mm **"Supra" Desk Dividers**
- Archisonic 24mm **"Alto"** Custom Beveled Design **Ceiling Panel**
- Archisonic 24mm **Custom Design Room Dividers**
- Archisonic 12mm **"Plain" Wall Covering**
- Archisonic 24mm **Custom Design Wall Covering**
- **Chatpod 350**

Note: This Mark-Up Plan is the initial design provision for better visualization of the acoustic treatments in the room/space. Design may change depending on client preference, onsite condition and restrictions, and/or progressive revisions throughout the course of project engagement.

MARK-UP PLAN

Kite Loft Project (Option A)

KEY PLAN:



PRODUCT LEGEND:

- Archisonic 24mm **Custom Design Ceiling Panels**
- Archisonic 24mm **"Square"Ceiling Panel**
- Archisonic 24mm **"Edge" Ceiling Baffles**
- Archisonic 24mm **"Supra" Desk Dividers**
- Archisonic 24mm **Custom Design Room Dividers**
- Archisonic 12mm **"Plain" Wall Covering**
- Archisonic 24mm **Custom Design Wall Covering**
- Archisonic 24mm **"Matrix"** Hanging Division
- **Chatpod 350**

Note: This Mark-Up Plan is the initial design provision for better visualization of the acoustic treatments in the room/space. Design may change depending on client preference, onsite condition and restrictions, and/or progressive revisions throughout the course of project engagement.

MARK-UP PLAN

Kite Loft Project (Option B)

KEY PLAN:

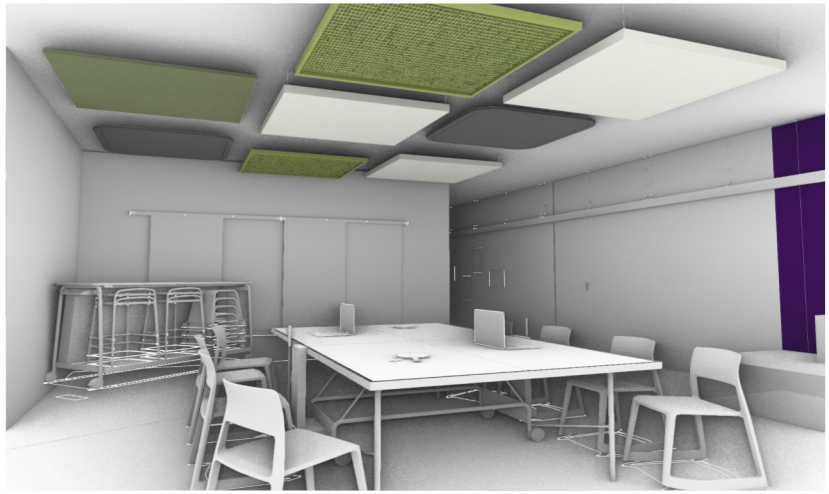
PRODUCT LEGEND:

- Archisonic 24mm **Custom Grid with 12mm Infills Ceiling Baffle**
- Archisonic 24mm **"Alto"** Custom Beveled Design **Ceiling Panel**
- Archisonic 24mm **"Supra" Desk Dividers**
- **Chatpod 350**
- Archisonic 24mm **Custom Design Room Dividers**
- Archisonic 12mm **"Plain" Wall Covering**
- Archisonic 24mm **Custom Design Wall Covering**
- Archisonic 24mm **"Matrix"** Hanging Division

Note: This Mark-Up Plan is the initial design provision for better visualization of the acoustic treatments in the room/space. Design may change depending on client preference, onsite condition and restrictions, and/or progressive revisions throughout the course of project engagement.

ACOUSTIC TREATMENTS PERSPECTIVE RENDERS

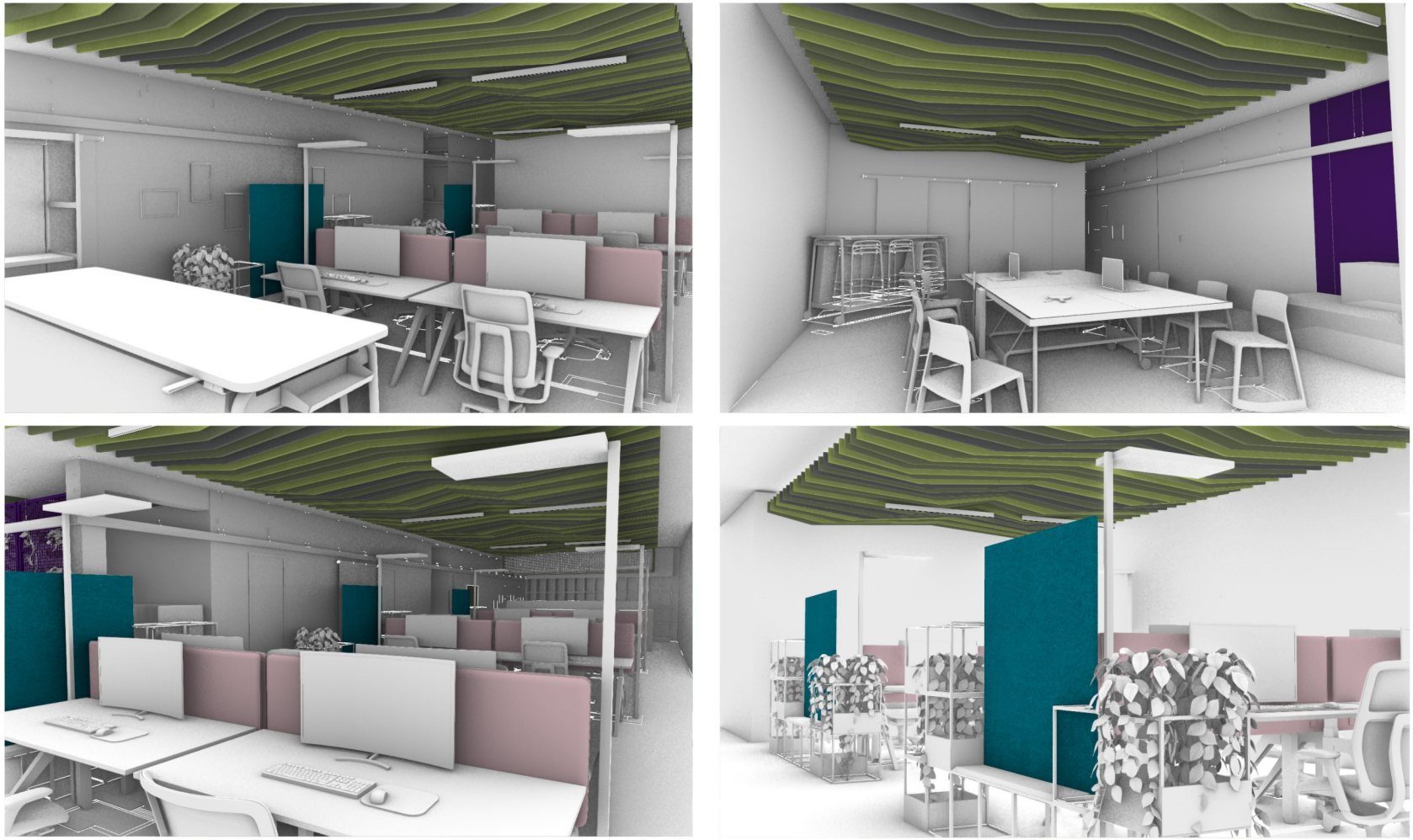
Open Space (Client's Preferred Treatment)



Note: These acoustic treatments perspective render are the initial design provision for better visualization of the acoustic treatments in the room/space. Design may change depending on client preference, onsite condition and restrictions, and/or progressive revisions throughout the course of project engagement.
The colors in these renderings indicate the locations of acoustic treatments, ***not their actual colors***. For details on the specific treatments used, please refer to Appendix A.

ACOUSTIC TREATMENTS PERSPECTIVE RENDERS

Open Space (Option A)



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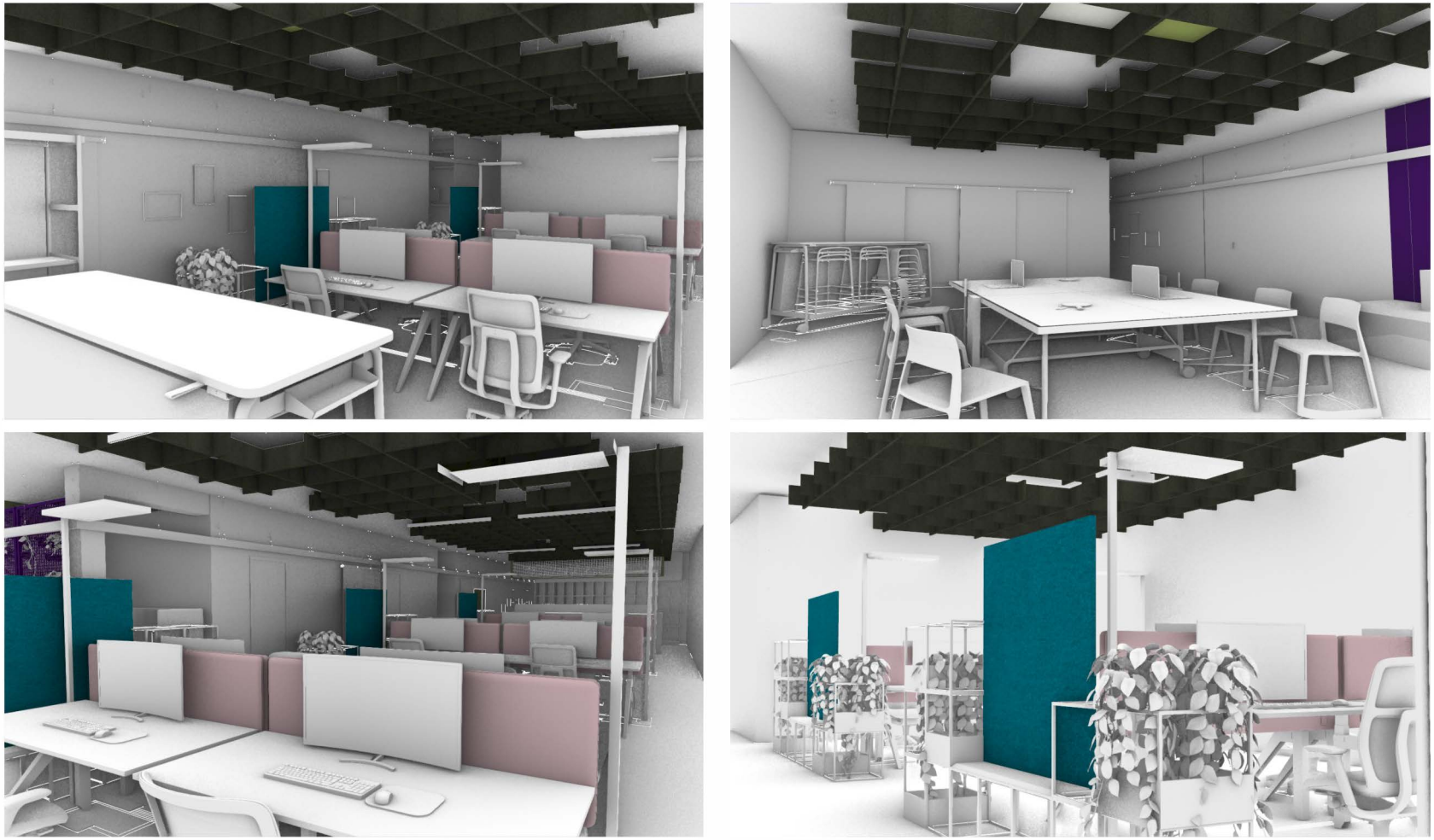
ACOUSTIC TREATMENTS PERSPECTIVE RENDERS

Open Space (Option B)



Note: These acoustic treatments perspective render are the initial design provision for better visualization of the acoustic treatments in the room/space. Design may change depending on client preference, onsite condition and restrictions, and/or progressive revisions throughout the course of project engagement.
The colors in these renderings indicate the locations of acoustic treatments, ***not their actual colors.*** For details on the specific treatments used, please refer to Appendix A.

ACOUSTIC TREATMENTS PERSPECTIVE RENDERS

Kitchen / Cafeteria Options

Kitchen - Client's Preferred Treatment

Kitchen - Option A

Kitchen - Option B

Note: These acoustic treatments perspective render are the initial design provision for better visualization of the acoustic treatments in the room/space. Design may change depending on client preference, onsite condition and restrictions, and/or progressive revisions throughout the course of project engagement.
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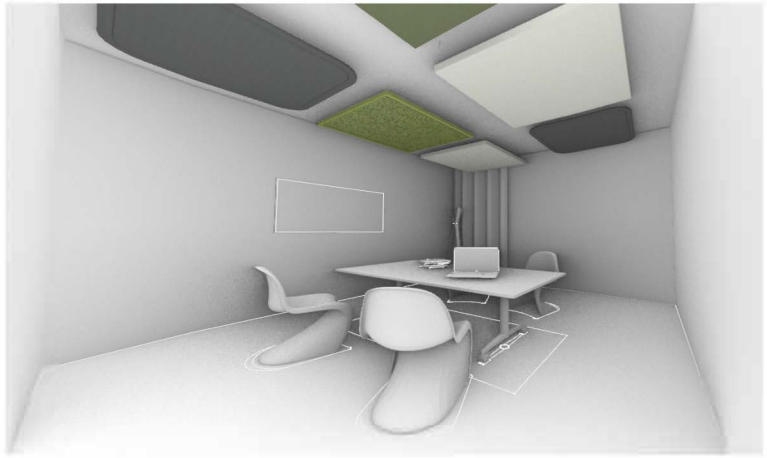
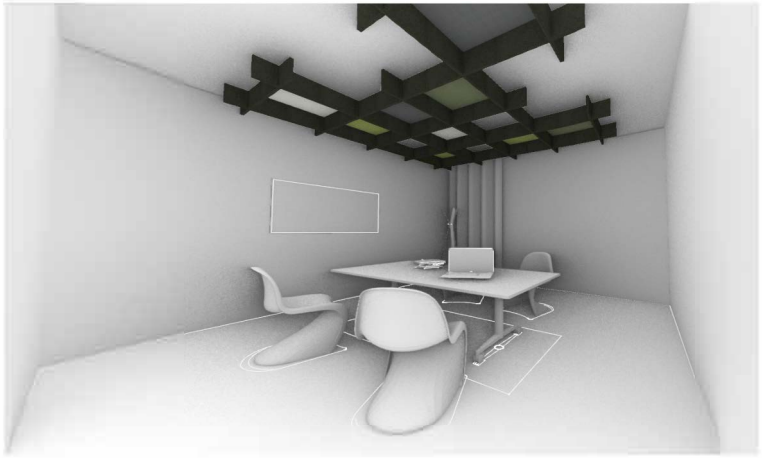
ACOUSTIC TREATMENTS PERSPECTIVE RENDERS

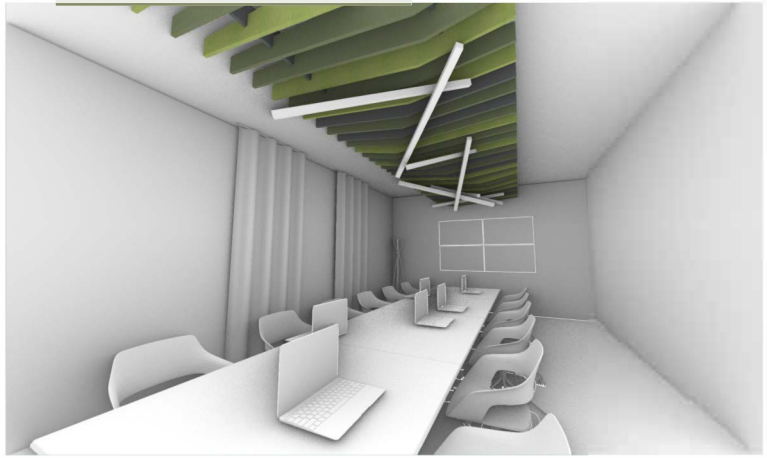
Meeting Room M & L Options



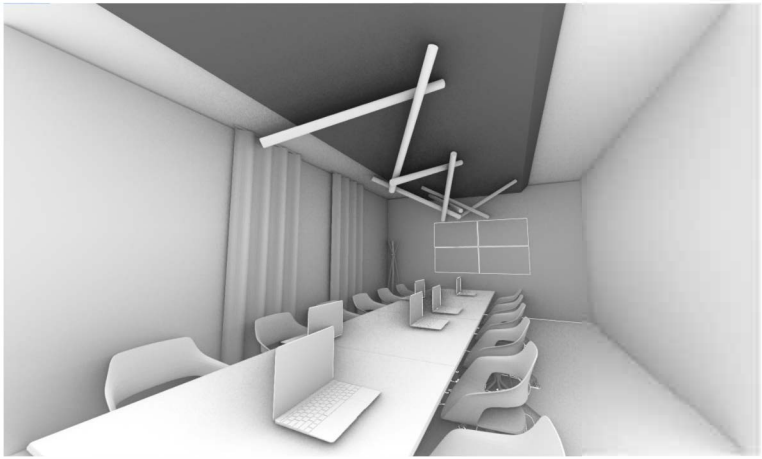
Meeting Room M Client's Preffered Treatment



Meeting Room M Option B



Meeting Room L Option A



Meeting Room L Option B

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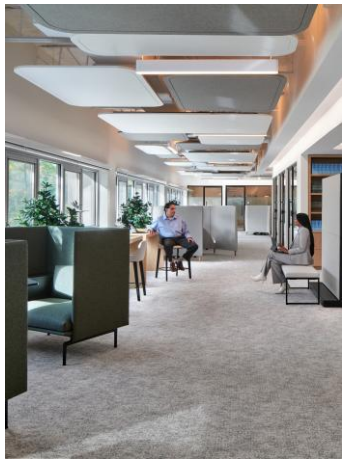
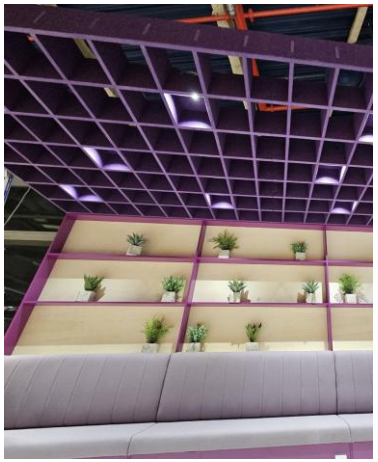
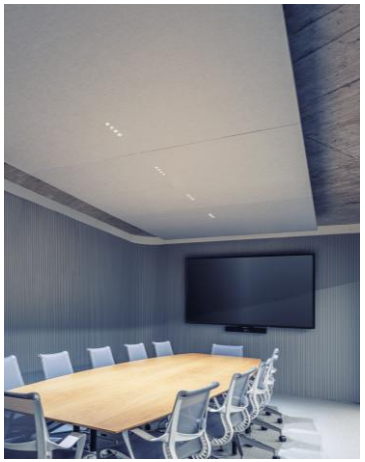
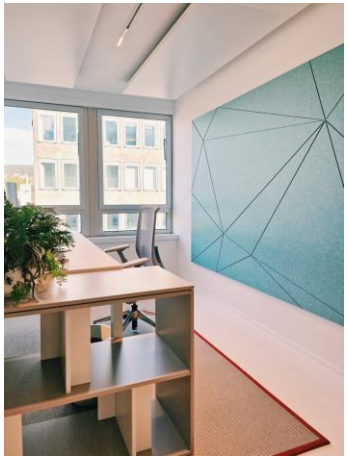
The colors in these renderings indicate the locations of acoustic treatments, ***not their actual colors.*** For details on the specific treatments used, please refer to Appendix A.

PROPOSED ARCHISONIC PRODUCT TREATMENT



Acoustic Performance of ARCHISONIC® Product Treatments

Composition			Sound Absorption Coefficient					
			125	250	500	1000	2000	4000
Surface	Material		α	α	α	α	α	α
Ceiling	24mm Ceiling Panel (200mm Suspension)	α_s	0.07	0.43	0.86	0.99	1.13	1.17
Ceiling	24mm Ceiling Baffle Edge 200mm Spacing	α_s	0.17	0.44	0.72	1.12	1.58	1.73
Ceiling	Ceiling Baffle Grid 600x600mm	α_s	0.09	0.31	0.45	0.82	1.12	1.18
Ceiling	Ceiling Baffle Grid 600x600mm (with infill)	α_s	0.36	0.85	0.93	1.07	1.29	1.32
Ceiling	12mm Ceiling Panel (150mm Air Cavity)	α_s	0.07	0.24	0.55	0.92	1.00	1.00
Wall	12mm Wall Panel (Direct Attachment)	α_s	0.05	0.05	0.25	0.55	0.85	1.00
Wall	24mm Wall Panel (Direct Attachment)	α_s	0.07	0.24	0.55	0.92	1.00	1.00
Divider	12mm Hanging Division (Perforated), 2800x1200mm	αObject	0.40	0.90	1.70	2.70	3.60	4.00
Divider	24mm Room Divider (Custom)	α_s	0.21	0.37	0.47	0.66	0.77	0.80
Divider	24mm Desk Divider Supra	α_s	0.40	0.70	0.80	1.20	1.40	1.40

ACOUSTIC TERMINOLOGY

Attenuation
The reduction of sound energy as a function of distance traveled.

Decibel
The decibel (dB) is a logarithmic scale that allows a wide range of values to be compressed into a more comprehensible range, typically 0 dB to 120 dB. The average decibel level of human speech is between 55 and 65 decibels.

Human Response to Noise Level Changes
- Less than 3dBA = No perceivable difference
- 3dBA = Barely perceptible difference
- 5dBA = Readily perceptible difference
- 10dBA = 'Doubling' (or 'halving') of performance

Flutter Echo
Flutter echo is a rapid, repetitive sound reflection that occurs when sound waves are continuously bounced between two parallel, reflective surfaces, creating a distinct, often ringing effect.

Frequency Reverberation Time (Tmf)
The average reverberation time at 500Hz, 1000Hz, and 2000Hz in octave band.

Noise Reduction Coefficient (NRC)
Single number quantification of acoustic absorptivity for a specific material and mounting condition. This rating ranges between 0 and 1, where 0 is fully reflective and 1 is a perfect absorber.

Reverberation Time (T60)
The time in seconds, after a sound signal has ceased, for the sound level inside a room to decay by 60 dB.

Reverberation Time (T30)
The decay time for the sound level inside a room to decay by 30dB. The result is doubled to determine the T60.

Speech Intelligibility
The ability of a listener to hear and correctly interpret verbal messages.

Spatial Decay Rate of Speech D2,S
The rate of spatial decay of A-weighted sound pressure level of speech per doubling distance

A-Weighted Sound Pressure Level of Speech at 4m Lp,A,S,4 m
The nominal A-weighted sound pressure level of normal speech at a distance of 4.0 meters from the sound source.

#We MakeAn Impact