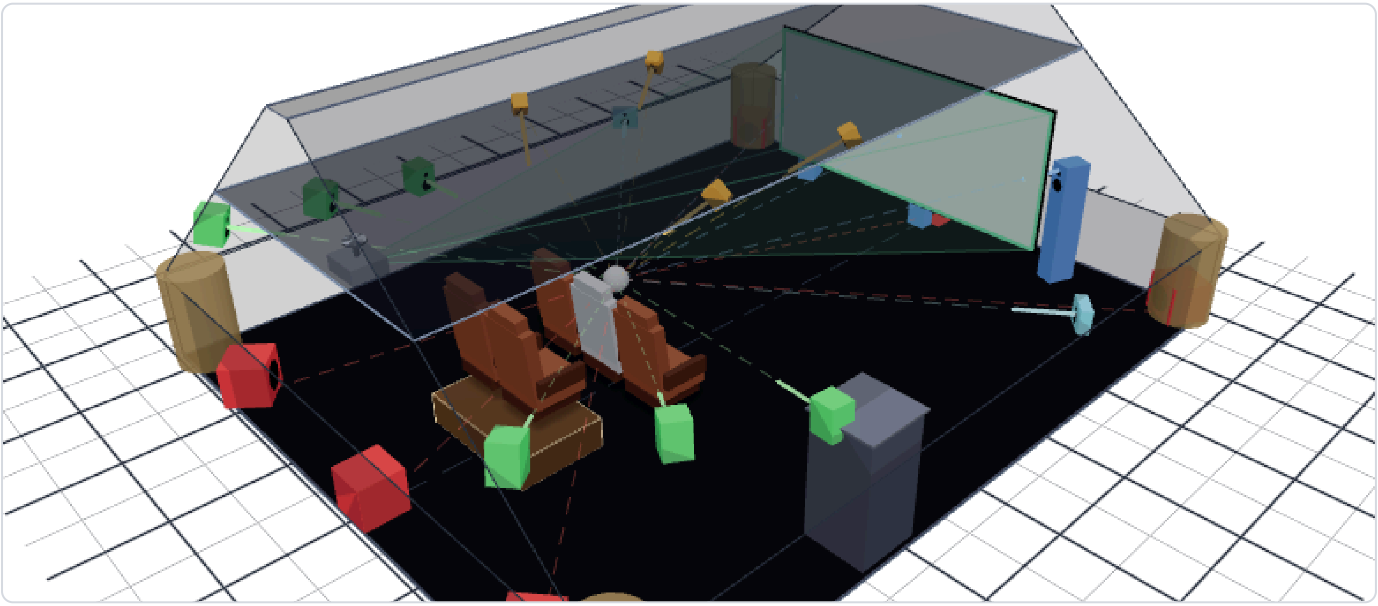
Full project recap

Showcase room

6.50 m × 7.90 m × 3.50 m · 11.6.4
8/8/2026

Sound & picture: placement, acoustics and video calibration

Each phase below summarises the data computed from the current room + layout. Open the dedicated page to drill into details or edit inputs.



3D model of the project, indicative preview (latest capture from the 3D Room view).

EXECUTIVE SUMMARY: SOUND & PICTURE

How the room will sound and how the picture is calibrated, at a glance.

Sound

- RT60: 0/6 bands within target as-is → 0/6 with the recommended treatment.
- Format conformity: best profile Mostly compliant (6/8 criteria).
- RP22 graded performance: room level Below L1.

Picture

- Calibration progress: 7/7 steps validated.
- Grayscale accuracy: ΔE 0.8 on average.
- Fitted gamma: 2.26.
- Gamut coverage: 95%.

A single deliverable covering placement, acoustics and video calibration. The detailed sections follow.

CONTENTS

PART A: ROOM & ACOUSTICS

1 · STUDY SCOPE

Context and target configuration of the project this study covers.

Project	Showcase room
Target configuration	11.6.4 · Dolby Atmos
Acoustic use case	Dedicated home cinema (RT60 0.30-0.40 s)
Listening positions	5 seats over 2 row(s)

2 · ROOM DESCRIPTION

Geometry and dominant material of each surface, the basis for the modal and RT60 predictions.

Dimensions 7.90 m × 6.50 m × 3.50 m, volume ≈ 180 m³ (length = front/screen wall to rear wall).

Surface	Area	Dominant material	Installed treatment
Front wall (behind screen)	22.8 m²	Drywall 13 mm	4 × Membrane bass trap tuned ~80 Hz (≈12 %) · 8 × Acoustic wool 10 cm (≈25 %)
Rear wall (behind seats)	22.8 m²	Drywall 13 mm	—
Left wall	27.7 m²	Drywall 13 mm	—
Right wall	27.7 m²	Drywall 13 mm	—
Ceiling	51.4 m²	Plaster / drywall ceiling	—
Floor	51.4 m²	Carpet over wood / OSB on joists	—

3 · ACOUSTIC OBJECTIVES

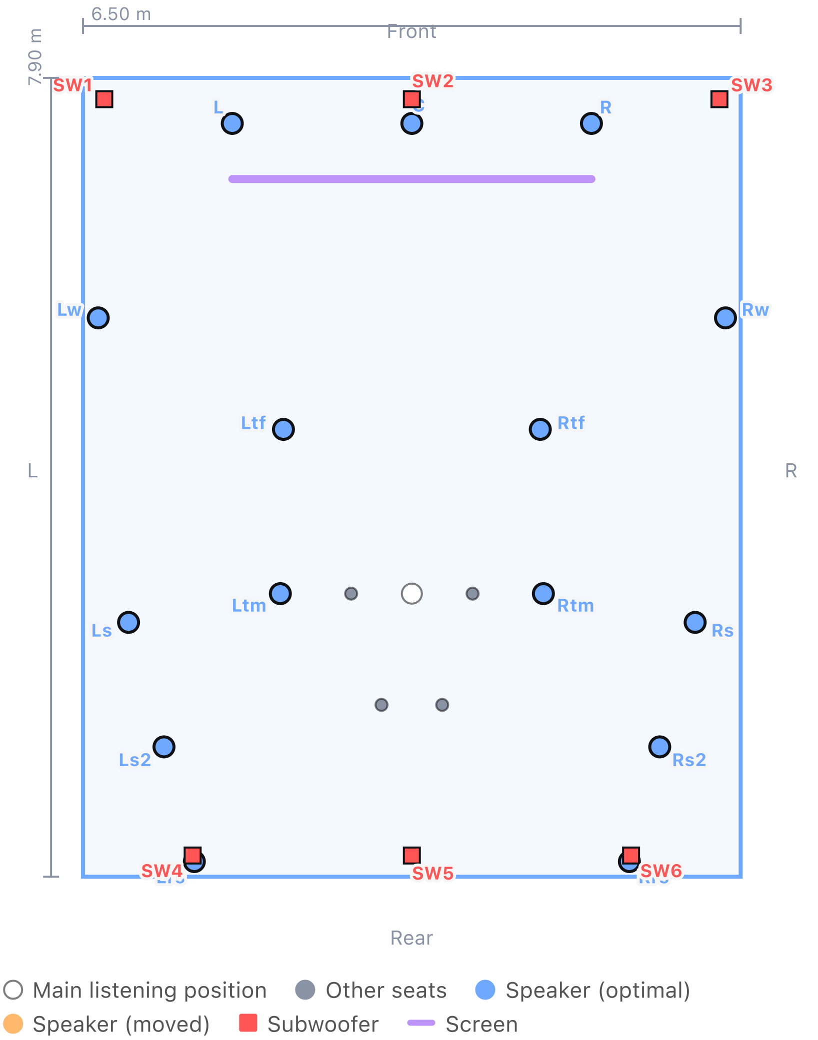
Targets used to judge the room, aligned with dedicated home-cinema practice.

- Target reverberation time (RT60): 0.30 to 0.40 s across the octave bands (dedicated cinema convention 0.2 to 0.4 s).
- Background noise: ≤ NC30 target (NC25 to NC30 recommended for a dedicated room).

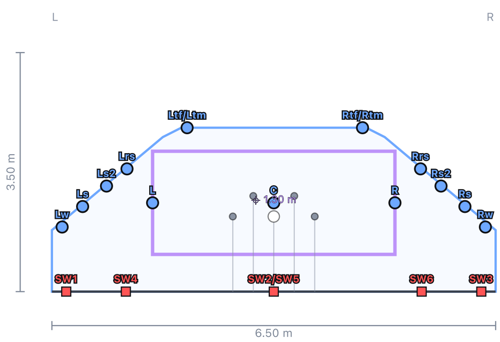
4 · ROOM PLAN & PREDICTED ACOUSTICS

2-D layout of speakers and seats, and the predicted RT60 per octave band against the target, with the simulated after-treatment value when recommendations apply.

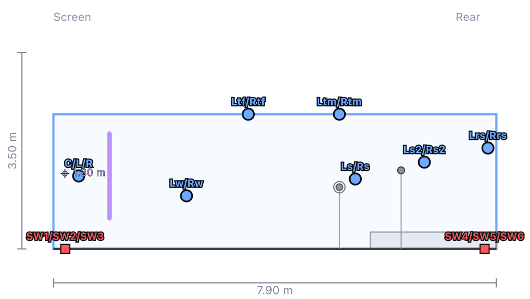
FLOOR PLAN (TOP VIEW)



CROSS-SECTION: FACING THE SCREEN (WIDTH × HEIGHT)



CROSS-SECTION: SIDE PROFILE (DEPTH × HEIGHT)



Band	Predicted RT60	After treatment	Target
125 Hz	0.20 s	0.22 s	0.30 to 0.40 s
250 Hz	0.27 s	0.23 s	0.30 to 0.40 s
500 Hz	0.27 s	0.20 s	0.30 to 0.40 s

Band	Predicted RT60	After treatment	Target
1k Hz	0.23 s	0.17 s	0.30 to 0.40 s
2k Hz	0.20 s	0.15 s	0.30 to 0.40 s
4k Hz	0.21 s	0.16 s	0.30 to 0.40 s

Predicted (Sabine/Eyring). Below the Schroeder frequency the modal regime dominates; treat the bass with the bass traps in the action plan.

5 · ROOM MODES

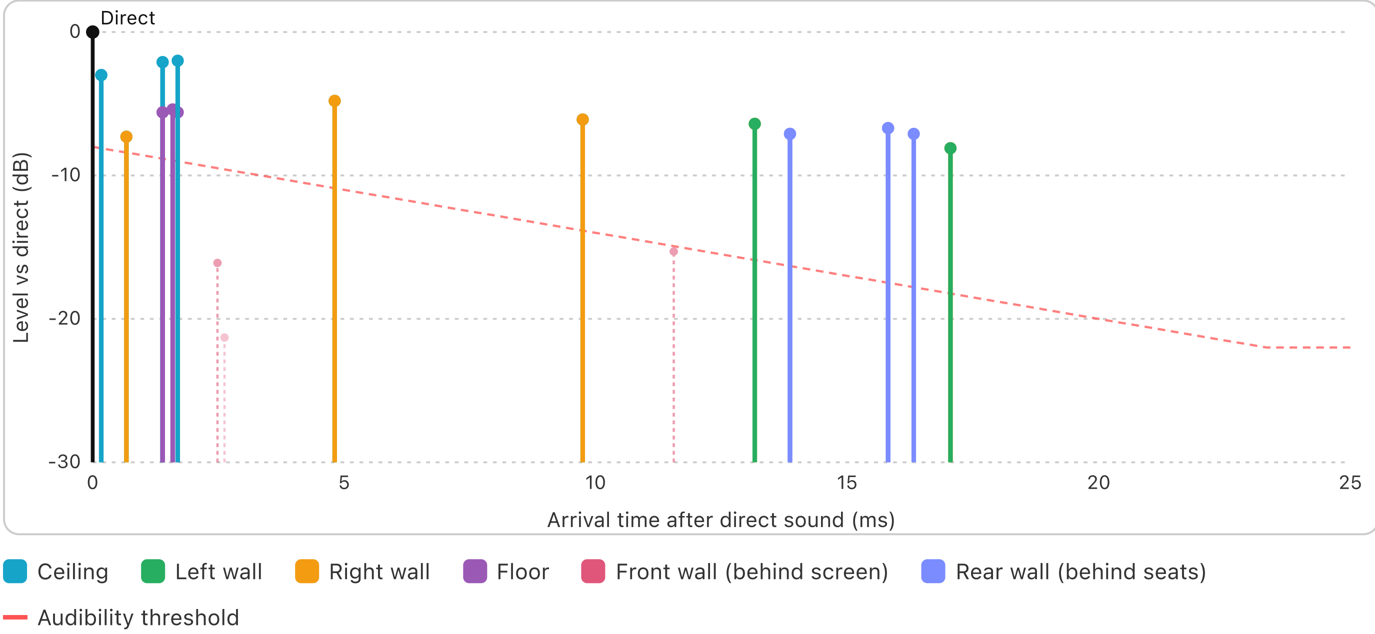
21 axial of 335 modes. Schroeder frequency ≈ 98 Hz. Below it, individual standing waves dominate the bass; an even distribution is what matters.

Frequency	Type	Orders L·W·H
21.7 Hz	axial (L)	L1·W0·H0
26.4 Hz	axial (W)	L0·W1·H0
34.2 Hz	tangential	L1·W1·H0
43.4 Hz	axial (L)	L2·W0·H0
49.0 Hz	axial (H)	L0·W0·H1
50.8 Hz	tangential	L2·W1·H0
52.8 Hz	axial (W)	L0·W2·H0
53.6 Hz	tangential	L1·W0·H1
55.7 Hz	tangential	L0·W1·H1
57.1 Hz	tangential	L1·W2·H0
59.7 Hz	oblique	L1·W1·H1
65.1 Hz	axial (L)	L3·W0·H0
65.5 Hz	tangential	L2·W0·H1
68.3 Hz	tangential	L2·W2·H0
70.3 Hz	tangential	L3·W1·H0
70.6 Hz	oblique	L2·W1·H1

6 · ECHOGRAM (ENERGY-TIME) AT THE REFERENCE SEAT

Level vs arrival time of the early reflections reaching the reference seat, relative to the direct sound, the "energy-time curve" a room-acoustics tool draws. Each stem is one early reflection, coloured by the surface it bounces off; reflections above the indicative audibility threshold (solid) are the ones worth treating.

Initial time-delay gap (ITDG) : 0.2 ms · Audible reflections : 25/30



7 · PREDICTED PER-SEAT METRICS

Clarity, intelligibility and decay predicted at each seat from a synthetic impulse response. Most reliable below ~150 Hz.

Seat	RT60	C50	C80	STI	ITDG
Seat 1	0.11 s	26.4 dB	38.4 dB	0.93	0.5 ms
Seat 2 · MLP	0.10 s	28.1 dB	41.2 dB	0.91	0.6 ms
Seat 3	0.11 s	26.4 dB	38.4 dB	0.93	0.5 ms
Seat 4	0.12 s	26.6 dB	37.6 dB	0.90	0.3 ms
Seat 5	0.12 s	26.6 dB	37.6 dB	0.90	0.3 ms

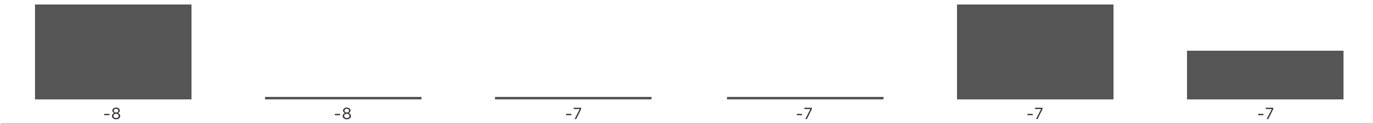
Image width (IACC, at MLP): 0.50, lower = wider / more enveloping.

C50/C80 = clarity (early/late energy), STI = speech intelligibility (0 to 1), ITDG = initial time-delay gap, RT60 = broadband decay. These are predictions at a single point per seat: a prediction is a spatial average, so comparing it with a measurement means averaging several microphone positions.

8 · SEAT-TO-SEAT COVERAGE UNIFORMITY

How consistent each predicted metric is across all seats, not just the reference seat. Mean ± standard deviation, spread (worst – best) and the share of seats within a tolerance window.

Metric	Mean ± σ	Spread	Seats within tolerance	Seat-to-seat variation
Bass level (20 to 200 Hz)	-7.3 dB ± 0.3	0.8 dB	100% ±3.0 · 100% ±6.0	Imperceptible
Clarity C50	26.8 dB ± 0.6	1.7 dB	100% ±3.0 · 100% ±6.0	Subtle
Speech intelligibility (STI)	0.91 ± 0.01	0.03	100% ±0.03 · 100% ±0.05	Subtle



Predicted, not measured: most reliable below the Schroeder frequency (bass). Interpolation between seats adds no precision. A spread smaller than roughly one perceptual step (≈ 2 to 3 dB bass, ≈ 1 dB C50, ≈ 0.03 STI) is inaudible in practice.

9 · PASSIVE TREATMENTS ALREADY INSTALLED

13 treatment(s) marked as installed in the room. The full plan below (bill of materials) includes them.

Type	Priority	Treatment	Where	Installed material
Thick absorber (10-15 cm)	Critical	SBIR null near Lrs	Near speaker Lrs	Acoustic wool 10 cm
Thick absorber (10-15 cm)	Critical	SBIR null near Ltf	Near speaker Ltf	Acoustic wool 10 cm
Thick absorber (10-15 cm)	Critical	SBIR null near Ltm	Near speaker Ltm	Acoustic wool 10 cm
Thick absorber (10-15 cm)	Critical	SBIR null near Rtm	Near speaker Rtm	Acoustic wool 10 cm
Thick absorber (10-15 cm)	Critical	SBIR null near Rtf	Near speaker Rtf	Acoustic wool 10 cm
Thick absorber (10-15 cm)	Critical	SBIR null near Rw	Near speaker Rw	Acoustic wool 10 cm
Thick absorber (10-15 cm)	Critical	SBIR null near Rw	Near speaker Rw	Acoustic wool 10 cm
Thick absorber (10-15 cm)	Critical	SBIR null near Rrs	Near speaker Rrs	Acoustic wool 10 cm
Bass trap (porous or membrane)	Critical	Add bass-trap absorption at 125 Hz	4 room corners	Thick acoustic wool 15 cm
Bass trap (porous or membrane)	High	SBIR null near L	Near speaker L	Membrane bass trap tuned ~80 Hz
Bass trap (porous or membrane)	High	SBIR null near R	Near speaker R	Membrane bass trap tuned ~80 Hz
Bass trap (porous or membrane)	High	SBIR null near C	Near speaker C	Membrane bass trap tuned ~80 Hz
Bass trap (porous or membrane)	High	SBIR null near Rs	Near speaker Rs	Membrane bass trap tuned ~80 Hz

10 · ACTION PLAN: CONSOLIDATED BILL OF MATERIALS

Acoustic treatments grouped by type and material, a generic shopping list to take to your supplier (no brands, no prices).

Type	Priority	Items	Generic material / thickness	Where
Thick absorber (10-15 cm)	Critical	8×	Rock wool 50 to 80 kg/m³ framed in acoustic fabric (a 2 to 5 cm rear air gap is a bonus). 7-10 cm	• Option 1: move the Ls speaker away from the Ceiling (≥ 0.5 m if possible). Option 2: if moving is impossible, place a porous trap ≥ 15 cm thick on the Ceiling, right in front of the speaker (≈ 1.2 × 0.6 m). If the position is imposed by the format (surround on its wall) or by design (speaker behind an acoustically transparent screen), option 2 IS the intended fix: treat, don't relocate. • Option 1: move the Lw speaker away from the Ceiling (≥ 0.5 m if possible). Option 2: if moving is impossible, place a porous trap ≥ 15 cm thick on the Ceiling, right in front of the speaker (≈ 1.2 × 0.6 m). If the position is imposed by the format (surround on its wall) or by design (speaker behind an acoustically transparent screen), option 2 IS the intended fix: treat, don't relocate. • Option 1: move the Ltf speaker away from the Ceiling (≥ 0.5 m if possible). Option 2: if moving is impossible, place a porous trap ≥ 15 cm thick on the Ceiling, right in front of the speaker (≈ 1.2 × 0.6 m). If the position is imposed by the format (surround on its wall) or by design (speaker behind an acoustically transparent screen), option 2 IS the intended fix: treat, don't relocate. • Option 1: move the Ltm speaker away from the Ceiling (≥ 0.5 m if possible). Option 2: if moving is impossible, place a porous trap ≥ 15 cm thick on the Ceiling, right in front of the speaker (≈ 1.2 × 0.6 m). If the position is imposed by the format (surround on its wall) or by design (speaker behind an acoustically transparent screen), option 2 IS the intended fix: treat, don't relocate. • Option 1: move the Rtm speaker away from the Ceiling (≥ 0.5 m if possible). Option 2: if moving is impossible, place a porous trap ≥ 15 cm thick on the Ceiling, right in front of the speaker (≈ 1.2 × 0.6 m). If the position is imposed by the format (surround on its wall) or by design (speaker behind an acoustically transparent screen), option 2 IS the intended fix: treat, don't relocate. • Option 1: move the Rtf speaker away from the Ceiling (≥ 0.5 m if possible). Option 2: if moving is impossible, place a porous trap ≥ 15 cm thick on the Ceiling, right in front of the speaker (≈ 1.2 × 0.6 m). If the position is imposed by the format (surround on its wall) or by design (speaker behind an acoustically transparent screen), option 2 IS the intended fix: treat, don't relocate. • Option 1: move the Rw speaker away from the Ceiling (≥ 0.5 m if possible). Option 2: if moving is impossible, place a porous trap ≥ 15 cm thick on the Ceiling, right in front of the speaker (≈ 1.2 × 0.6 m). If the position is imposed by the format (surround on its wall) or by design (speaker behind an acoustically transparent screen), option 2 IS the intended fix: treat, don't relocate. • Option 1: move the Rs speaker away from the Ceiling (≥ 0.5 m if possible). Option 2: if moving is impossible, place a porous trap ≥ 15 cm thick on the Ceiling, right in front of the speaker (≈ 1.2 × 0.6 m). If the position is imposed by the format (surround on its wall) or by design (speaker behind an acoustically transparent screen), option 2 IS the intended fix: treat, don't relocate. ≈ 0.7 m²

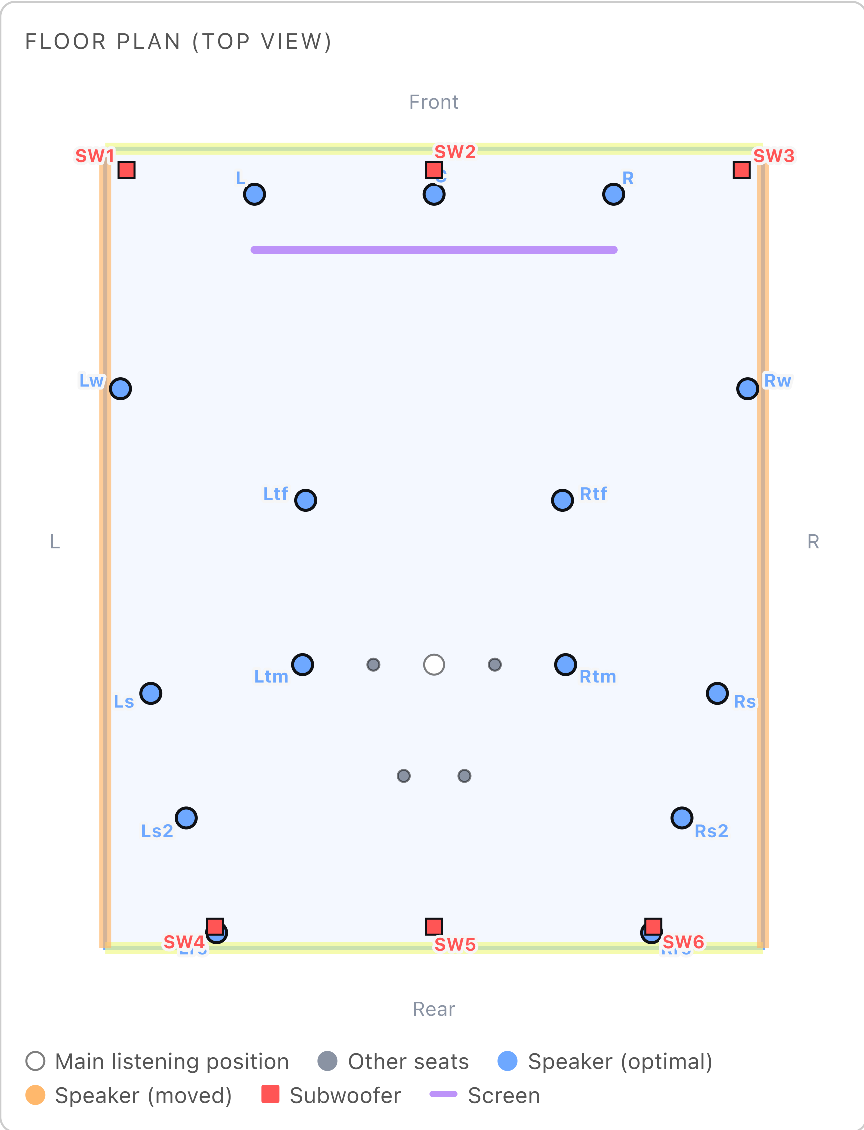
Type	Priority	Items	Generic material / thickness	Where
Thick absorber (10-15 cm)	Critical	4×	Rock wool 50 to 80 kg/m³ framed in acoustic fabric (a 2 to 5 cm rear air gap is a bonus). 5 cm	• Option 1: move the Ls2 speaker away from the Ceiling (≥ 0.5 m if possible). Option 2: if moving is impossible, place a porous trap ≥ 15 cm thick on the Ceiling, right in front of the speaker (≈ 1.2 × 0.6 m). If the position is imposed by the format (surround on its wall) or by design (speaker behind an acoustically transparent screen), option 2 IS the intended fix: treat, don't relocate. • Option 1: move the Lrs speaker away from the Ceiling (≥ 0.5 m if possible). Option 2: if moving is impossible, place a porous trap ≥ 15 cm thick on the Ceiling, right in front of the speaker (≈ 1.2 × 0.6 m). If the position is imposed by the format (surround on its wall) or by design (speaker behind an acoustically transparent screen), option 2 IS the intended fix: treat, don't relocate. • Option 1: move the Rrs speaker away from the Ceiling (≥ 0.5 m if possible). Option 2: if moving is impossible, place a porous trap ≥ 15 cm thick on the Ceiling, right in front of the speaker (≈ 1.2 × 0.6 m). If the position is imposed by the format (surround on its wall) or by design (speaker behind an acoustically transparent screen), option 2 IS the intended fix: treat, don't relocate. • Option 1: move the Rs2 speaker away from the Ceiling (≥ 0.5 m if possible). Option 2: if moving is impossible, place a porous trap ≥ 15 cm thick on the Ceiling, right in front of the speaker (≈ 1.2 × 0.6 m). If the position is imposed by the format (surround on its wall) or by design (speaker behind an acoustically transparent screen), option 2 IS the intended fix: treat, don't relocate. ≈ 0.7 m²
Thick absorber (10-15 cm)	Critical	4×	Rock wool 50 to 80 kg/m³ framed in acoustic fabric (a 2 to 5 cm rear air gap is a bonus). 10-15 cm	• Option 1: move the Lrs speaker away from the Rear wall (behind seats) (≥ 0.5 m if possible). Option 2: if moving is impossible, place a porous trap ≥ 15 cm thick on the Rear wall (behind seats), right in front of the speaker (≈ 1.2 × 0.6 m). If the position is imposed by the format (surround on its wall) or by design (speaker behind an acoustically transparent screen), option 2 IS the intended fix: treat, don't relocate. • Option 1: move the Lw speaker away from the Left wall (≥ 0.5 m if possible). Option 2: if moving is impossible, place a porous trap ≥ 15 cm thick on the Left wall, right in front of the speaker (≈ 1.2 × 0.6 m). If the position is imposed by the format (surround on its wall) or by design (speaker behind an acoustically transparent screen), option 2 IS the intended fix: treat, don't relocate. • Option 1: move the Rw speaker away from the Right wall (≥ 0.5 m if possible). Option 2: if moving is impossible, place a porous trap ≥ 15 cm thick on the Right wall, right in front of the speaker (≈ 1.2 × 0.6 m). If the position is imposed by the format (surround on its wall) or by design (speaker behind an acoustically transparent screen), option 2 IS the intended fix: treat, don't relocate. • Option 1: move the Rrs speaker away from the Rear wall (behind seats) (≥ 0.5 m if possible). Option 2: if moving is impossible, place a porous trap ≥ 15 cm thick on the Rear wall (behind seats), right in front of the speaker (≈ 1.2 × 0.6 m). If the position is imposed by the format (surround on its wall) or by design (speaker behind an acoustically transparent screen), option 2 IS the intended fix: treat, don't relocate. ≈ 0.7 m²

Type	Priority	Items	Generic material / thickness	Where
Bass trap (porous or membrane)	High	7×	Rock wool 60 to 100 kg/m³, framed, on the corner or wall with an air gap. 20-30 cm (dense porous panel, or a saturated corner)	• Option 1: move the L speaker away from the Ceiling (≥ 0.5 m if possible). Option 2: if moving is impossible, place a porous trap ≥ 30 cm thick on the Ceiling, right in front of the speaker (≈ 1.2 × 0.6 m). If the position is imposed by the format (surround on its wall) or by design (speaker behind an acoustically transparent screen), option 2 IS the intended fix: treat, don't relocate. • Option 1: move the L speaker away from the Front wall (behind screen) (≥ 0.5 m if possible). Option 2: if moving is impossible, place a porous trap ≥ 30 cm thick on the Front wall (behind screen), right in front of the speaker (≈ 1.2 × 0.6 m). If the position is imposed by the format (surround on its wall) or by design (speaker behind an acoustically transparent screen), option 2 IS the intended fix: treat, don't relocate. • Option 1: move the R speaker away from the Ceiling (≥ 0.5 m if possible). Option 2: if moving is impossible, place a porous trap ≥ 30 cm thick on the Ceiling, right in front of the speaker (≈ 1.2 × 0.6 m). If the position is imposed by the format (surround on its wall) or by design (speaker behind an acoustically transparent screen), option 2 IS the intended fix: treat, don't relocate. • Option 1: move the R speaker away from the Front wall (behind screen) (≥ 0.5 m if possible). Option 2: if moving is impossible, place a porous trap ≥ 30 cm thick on the Front wall (behind screen), right in front of the speaker (≈ 1.2 × 0.6 m). If the position is imposed by the format (surround on its wall) or by design (speaker behind an acoustically transparent screen), option 2 IS the intended fix: treat, don't relocate. • Option 1: move the C speaker away from the Front wall (behind screen) (≥ 0.5 m if possible). Option 2: if moving is impossible, place a porous trap ≥ 30 cm thick on the Front wall (behind screen), right in front of the speaker (≈ 1.2 × 0.6 m). If the position is imposed by the format (surround on its wall) or by design (speaker behind an acoustically transparent screen), option 2 IS the intended fix: treat, don't relocate. • Option 1: move the Ls speaker away from the Left wall (≥ 0.5 m if possible). Option 2: if moving is impossible, place a porous trap ≥ 30 cm thick on the Left wall, right in front of the speaker (≈ 1.2 × 0.6 m). If the position is imposed by the format (surround on its wall) or by design (speaker behind an acoustically transparent screen), option 2 IS the intended fix: treat, don't relocate. • Option 1: move the Rs speaker away from the Right wall (≥ 0.5 m if possible). Option 2: if moving is impossible, place a porous trap ≥ 30 cm thick on the Right wall, right in front of the speaker (≈ 1.2 × 0.6 m). If the position is imposed by the format (surround on its wall) or by design (speaker behind an acoustically transparent screen), option 2 IS the intended fix: treat, don't relocate. ≈ 0.7 m²

Type	Priority	Items	Generic material / thickness	Where
Bass trap (porous or membrane)	High	4×	Dense rock wool (60 to 100 kg/m³, ≥ 30 cm thick) filling the corner, OR a tuned membrane trap (4 to 6 mm wood membrane + 5 to 10 cm air gap). ≥ 30-40 cm in the corner (dense porous trap) OR a resonator tuned to the band	• Option 1: move the Ls2 speaker away from the Left wall (≥ 0.5 m if possible). Option 2: if moving is impossible, place a porous trap ≥ 30 cm thick on the Left wall, right in front of the speaker (≈ 1.2 × 0.6 m). If the position is imposed by the format (surround on its wall) or by design (speaker behind an acoustically transparent screen), option 2 IS the intended fix: treat, don't relocate. • Option 1: move the Lw speaker away from the Floor (≥ 0.5 m if possible). Option 2: if moving is impossible, place a porous trap ≥ 30 cm thick on the Floor, right in front of the speaker (≈ 1.2 × 0.6 m). If the position is imposed by the format (surround on its wall) or by design (speaker behind an acoustically transparent screen), option 2 IS the intended fix: treat, don't relocate. • Option 1: move the Rw speaker away from the Floor (≥ 0.5 m if possible). Option 2: if moving is impossible, place a porous trap ≥ 30 cm thick on the Floor, right in front of the speaker (≈ 1.2 × 0.6 m). If the position is imposed by the format (surround on its wall) or by design (speaker behind an acoustically transparent screen), option 2 IS the intended fix: treat, don't relocate. • Option 1: move the Rs2 speaker away from the Right wall (≥ 0.5 m if possible). Option 2: if moving is impossible, place a porous trap ≥ 30 cm thick on the Right wall, right in front of the speaker (≈ 1.2 × 0.6 m). If the position is imposed by the format (surround on its wall) or by design (speaker behind an acoustically transparent screen), option 2 IS the intended fix: treat, don't relocate. ≈ 0.7 m²
Absorption (2-5 cm panel)	High	19×	Rock wool 50 kg/m³ framed in stretched acoustic fabric, or acoustic foam 30 kg/m³. 5-10 cm (a reflection point covers mids/highs, not the bass)	• Left wall: mirror points for L · C · Lw, panel centre ≈ 2.18 m to 4.00 m from the speaker. • Floor: mirror points for L · R · C · Lw · Rw, panel centre ≈ 2.30 m to 2.76 m from the speaker. • Ceiling: mirror points for L · R · C · Lw · Rw, panel centre ≈ 2.09 m to 2.73 m from the speaker. • Right wall: mirror points for R · C · Rw, panel centre ≈ 2.18 m to 4.00 m from the speaker. • Front wall (behind screen): mirror points for L · R · C, panel centre ≈ 2.78 m to 2.92 m from the speaker. Mark each mirror point with a laser (or the mirror trick) before mounting. 60 × 60 cm minimum (90 × 60 cm preferred)
Diffuser (QRD / polycylindrical)	Medium	6×	1D QRD or 2D skyline diffuser (depth ≥ 8 cm, design frequency ≥ 500 Hz). ≥ 8-15 cm (well depth, set by the lowest frequency to diffuse)	• Rear wall, centred behind the MLP, ≥ 2 m × 1 m useful for the targeted band. • Rear wall, centred behind the MLP, ≥ 2 m × 1 m useful for the targeted band. • Rear wall, centred behind the MLP, ≥ 2 m × 1 m useful for the targeted band. • Rear wall, centred behind the MLP, ≥ 2 m × 1 m useful for the targeted band. • Rear wall, centred behind the MLP, ≥ 2 m × 1 m useful for the targeted band. • Rear wall, centred behind the MLP, ≥ 2 m × 1 m useful for the targeted band.

Predicted from the 3D model. Quantities are indicative. Confirm surfaces on site; validate with a measurement after install.

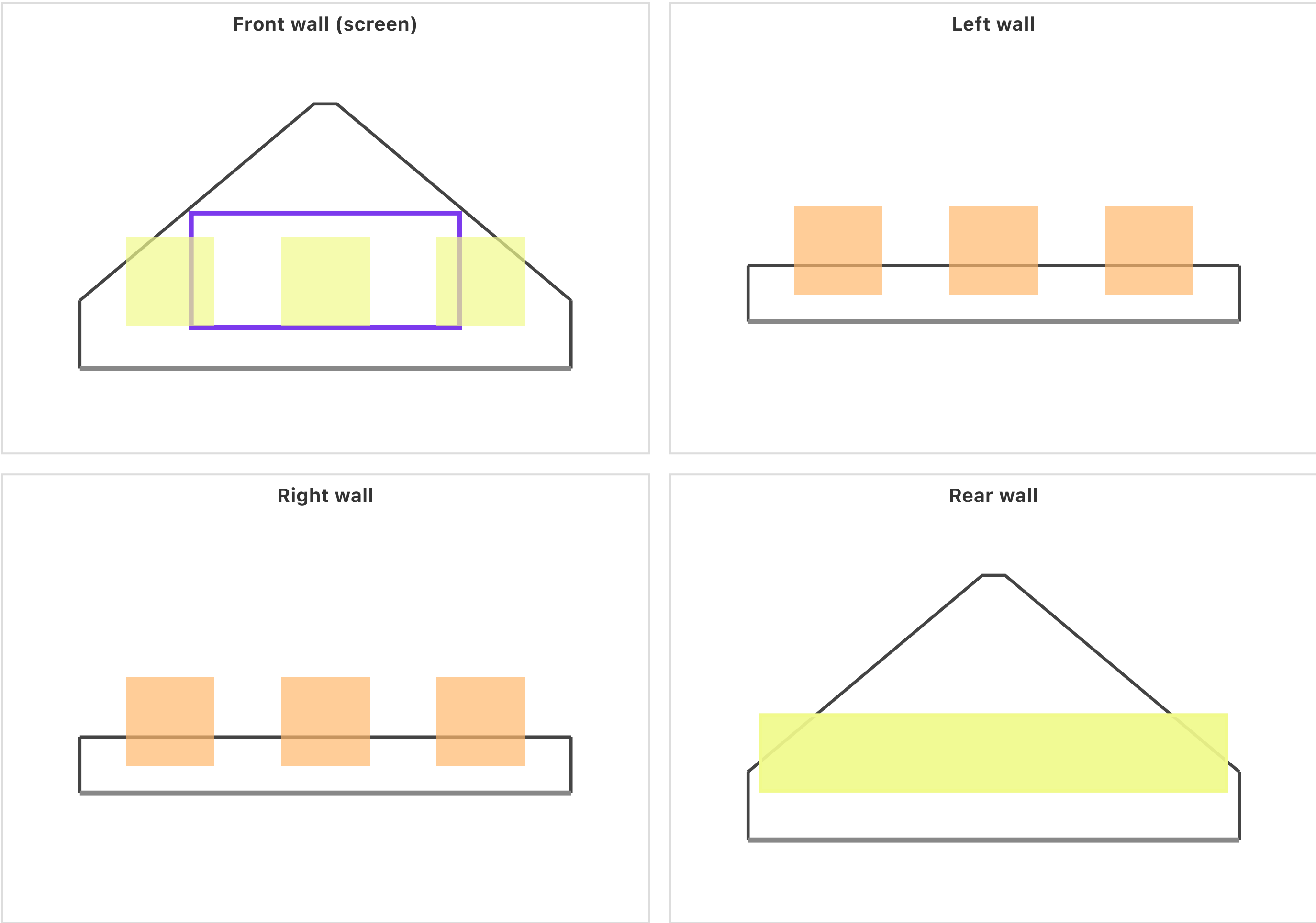
Treatment zones: top view



High Medium

Ceiling / floor treatments are listed in the bill of materials (not shown on the top view).

Wall elevations: panel placement



High Medium

11 · PREDICTED BEFORE / AFTER TREATMENT

Best-case projection once the recommended passive treatment is installed.

Metric	Before	After
Mean RT60 (octave bands)	0.23 s	0.19 s
Bands within target	0/6	0/6

12 · COMPLIANCE: IMMERSIVE AUDIO PROFILES

Self-assessment against the public Dolby / DTS / Auro recommendations. Per profile: verdict, score, and the non-compliant criteria (observed vs target).

Dolby Atmos Home Theater · Mostly compliant (8/11)

State	Criterion	Observed	Target
⚠	Rectangular room shape	attic	rectangular
⚠	Front L/R azimuth	±20.9°	±22°...±30°
⚠	MLP distance from screen	65%	66-70%

Dolby Atmos Music · Mostly compliant (6/8)

State	Criterion	Observed	Target
⚠	Rectangular room shape	attic	rectangular
⚠	Front L/R azimuth	±20.9°	±22°…±30°

DTS:X Home Theater · Mostly compliant (6/9)

State	Criterion	Observed	Target
⚠	Rectangular room shape	attic	rectangular
⚠	Front L/R azimuth	±20.9°	±22°…±30°
⚠	MLP distance from screen	65%	66-70%

Auro-3D Home · Mostly compliant (4/7)

State	Criterion	Observed	Target
⚠	Rectangular room shape	attic	rectangular
⚠	Front L/R azimuth	±20.9°	±22°…±30°
⚠	MLP distance from screen	65%	66-70%

Predicted from the 3D model. Self-assessment against published specs, not an official certification (only the format owners can certify).

13 · CEDIA/CTA-RP22 PERFORMANCE LEVEL

Graded assessment (Level 1-4) across the RP22 parameters, evaluated per seat. The room level is the highest level reached at the reference seat and at least one adjacent seat.

Room level : Below L1

Spatial resolution

#	Parameter	Level	Predicted	RP22 target
P1	Min. distance listening area ↔ walls	Level 4	min 1.70 m	L1≥0.5 L2≥0.8 L3≥1.2 L4≥1.5 m
P2	Discretely rendered speaker feeds (excl. subs)	Level 4	15 feeds	L1≥5 L2≥11 L3≥15 L4≥15 speakers
P3	Screen speakers outside recommended zones	Level 4	0	L1≤0 L2≤0 L3≤0 L4≤0 speakers
P4	Max. SPL difference between screen speakers	Level 4	max 0.9 dB	L1≤6 L2≤5 L3≤4 L4≤2 dB
P5	Max. horizontal angle between adjacent surrounds	Level 1	max 108°	L2≤80 L3≤60 L4≤50 °
P6	Max. SPL difference between surrounds	Level 2	max 4.8 dB	L1≤10 L2≤6 L3≤4 L4≤2 dB
P7	Wide speakers deviation from median angle	Level 3	±2.3°	L1≤10 L2≤7 L3≤5 L4≤2 °
P9	Max. vertical angle between adjacent upper rows	Level 4	max 26°	L2≤80 L3≤60 L4≤50 °
P10	Max. SPL difference between upper speakers	Level 2	max 5.5 dB	L1≤12 L2≤8 L3≤5 L4≤2 dB
P11	Surround/wide/upper outside recommended zones	Level 4	0	L2≤0 L3≤0 L4≤0 speakers

Timbre

#	Parameter	Level	Predicted	RP22 target
P19	Bass FR at RSP vs target: “The Result”	Below L1	±5.5 dB	L1≤5 L2≤4 L3≤3 L4≤2 ±dB
P20	Seat-to-seat bass FR: “The Consistency”	Level 1	±7.6 dB	L2≤4 L3≤3 L4≤2 ±dB
P21	Early reflections vs direct (0-15 ms, 1-8 kHz)	Level 1	-1.9 dB	L2≤-8 L3≤-10 L4≤-12 dB

🎯 *Targets per CEDIA/CTA-RP22. Observed values predicted from the 3D model + placement. Parameters needing data not yet entered (SPL specs, background noise) or beyond HTM's model are omitted.*

14 · SPEAKER IMPLANTATION

Per-channel azimuth, elevation and distance from the main listening position (predicted optimal placement). Convention: REAL per-speaker angles seen from the MLP, asymmetric when the MLP is off-centre. Conformity criteria evaluate the worst deviation of each pair instead (± value), so the two figures may differ.

Channel	Azimuth	Elevation	Distance (MLP)	AV delay
L	-21°	+2°	4.98 m	2.6 ms
R	+21°	+2°	4.98 m	2.6 ms
C	+0°	+2°	4.65 m	3.5 ms
Ls	-96°	+3°	2.82 m	8.9 ms
Ls2	-122°	+9°	2.92 m	8.6 ms
Lrs	-141°	+12°	3.48 m	6.9 ms
Lw	-50°	+0°	4.13 m	5.0 ms
Ltf	-38°	+32°	2.44 m	10.0 ms
Ltm	-90°	+45°	1.84 m	11.7 ms
Rtm	+90°	+45°	1.84 m	11.7 ms
Rtf	+38°	+32°	2.44 m	10.0 ms
Rw	+50°	+0°	4.13 m	5.0 ms
Rrs	+141°	+12°	3.48 m	6.9 ms
Rs2	+122°	+9°	2.92 m	8.6 ms
Rs	+96°	+3°	2.82 m	8.9 ms
SW1	-32°	-11°	5.86 m	0.0 ms
SW2	+0°	-13°	5.01 m	2.5 ms
SW3	+32°	-11°	5.86 m	0.0 ms
SW4	-140°	-18°	3.55 m	6.7 ms
SW5	+180°	-23°	2.81 m	8.9 ms
SW6	+140°	-18°	3.55 m	6.7 ms

15 · INSTALLER SETTING-OUT SHEET

Exact mounting coordinates for each speaker: position (X/Y/Z from the front-left-floor corner), aim, and, for in-ceiling units, the cutout coordinates on the ceiling plane. Brand-neutral: dimensions only.

Channel	X	Y	Z	Azimuth	Elevation	Mounting
L	1.48 m	1.30 m	0.45 m	-21°	+2°	Tower / floorstanding
R	5.03 m	1.30 m	0.45 m	+21°	+2°	Tower / floorstanding
C	3.25 m	1.30 m	0.45 m	+0°	+2°	Tower / floorstanding
Ls	0.45 m	1.25 m	5.38 m	-96°	+3°	Bookshelf
Ls2	0.80 m	1.55 m	6.62 m	-122°	+9°	Bookshelf
Lrs	1.10 m	1.80 m	7.75 m	-141°	+12°	Bookshelf
Lw	0.15 m	0.95 m	2.37 m	-50°	+0°	On-wall
Ltf	1.98 m	2.40 m	3.48 m	-38°	+32°	Satellite
Ltm	1.95 m	2.40 m	5.10 m	-90°	+45°	Satellite
Rtm	4.55 m	2.40 m	5.10 m	+90°	+45°	Satellite
Rtf	4.52 m	2.40 m	3.48 m	+38°	+32°	Satellite
Rw	6.35 m	0.95 m	2.37 m	+50°	+0°	On-wall
Rrs	5.40 m	1.80 m	7.75 m	+141°	+12°	Bookshelf
Rs2	5.70 m	1.55 m	6.62 m	+122°	+9°	Bookshelf
Rs	6.05 m	1.25 m	5.38 m	+96°	+3°	Bookshelf
SW1	0.21 m	0.00 m	0.21 m	-32°	-11°	Subwoofer (floor)
SW2	3.25 m	0.00 m	0.21 m	+0°	-13°	Subwoofer (floor)
SW3	6.29 m	0.00 m	0.21 m	+32°	-11°	Subwoofer (floor)
SW4	1.08 m	0.00 m	7.69 m	-140°	-18°	Subwoofer (floor)
SW5	3.25 m	0.00 m	7.69 m	+180°	-23°	Subwoofer (floor)
SW6	5.42 m	0.00 m	7.69 m	+140°	-18°	Subwoofer (floor)

16 · CABLING SCHEDULE (PREDICTED)

Approximate cable length per speaker (from the AV equipment) plus the HDMI run to the display. Routing: Baseboard (perimeter), +20% slack for bends and terminations. Approximate: the real conduit path varies; keep margin. Brand-neutral.

Note: no AV rack was placed, so lengths are measured from a default position (a console under the screen). Place your equipment in the room for exact figures.

Cable	Route	Length (~)	Recommended section
L	Baseboard (perimeter)	14.90 m	14 AWG (2.1 mm²)
R	Baseboard (perimeter)	10.60 m	14 AWG (2.1 mm²)
C	Baseboard (perimeter)	12.70 m	14 AWG (2.1 mm²)
Ls	Wall + ceiling (enclosed)	9.50 m	14 AWG (2.1 mm²)
Ls2	Wall + ceiling (enclosed)	10.40 m	14 AWG (2.1 mm²)
Lrs	Baseboard (perimeter)	13.30 m	14 AWG (2.1 mm²)
Lw	Baseboard (perimeter)	19.20 m	12 AWG (3.3 mm²)
Ltf	Wall + ceiling (enclosed)	8.80 m	14 AWG (2.1 mm²)
Ltm	Wall + ceiling (enclosed)	6.90 m	16 AWG (1.3 mm²)
Rtm	Wall + ceiling (enclosed)	3.80 m	16 AWG (1.3 mm²)
Rtf	Wall + ceiling (enclosed)	5.70 m	16 AWG (1.3 mm²)
Rw	Baseboard (perimeter)	5.70 m	16 AWG (1.3 mm²)
Rrs	Baseboard (perimeter)	8.20 m	14 AWG (2.1 mm²)
Rs2	Wall + ceiling (enclosed)	3.90 m	16 AWG (1.3 mm²)
Rs	Wall + ceiling (enclosed)	1.80 m	16 AWG (1.3 mm²)
SW1	Baseboard (perimeter)	15.10 m	12 AWG (3.3 mm²)
SW2	Baseboard (perimeter)	11.40 m	14 AWG (2.1 mm²)
SW3	Baseboard (perimeter)	7.30 m	16 AWG (1.3 mm²)
SW4	Baseboard (perimeter)	11.30 m	14 AWG (2.1 mm²)
SW5	Baseboard (perimeter)	8.70 m	14 AWG (2.1 mm²)
SW6	Baseboard (perimeter)	6.10 m	16 AWG (1.3 mm²)
HDMI	Wall + ceiling (enclosed)	8.40 m	Passive HDMI OK
Total speaker cable		195.30 m	

17 · SYSTEM BILL OF MATERIALS (AV & CABLING)

Installer shopping list, aggregated from the cabling plan. Quantities are approximate. Round up, allow for routing detours. Brand- and price-neutral.

Item	Quantity
Speaker cable 12 AWG (3.3 mm²), 2 run(s)	buy ≈ 35.00 m (laid 34.30 m)
Speaker cable 14 AWG (2.1 mm²), 11 run(s)	buy ≈ 120.00 m (laid 119.80 m)
Speaker cable 16 AWG (1.3 mm²), 8 run(s)	buy ≈ 45.00 m (laid 41.20 m)
Terminations (2 per run)	42
HDMI cable (passive OK)	8.40 m
AV equipment: Rack (vertical), 0.60 m × 1.20 m × 0.60 m	1
Total speaker cable to buy	200.00 m

Speaker cable grouped by gauge; buy length is rounded up to the next 5 m. Connector type and cable brand are left to your preference (HTM stays neutral).

18 · PER-SEAT VALIDATION (REW MEASUREMENTS)

Agreement between HTM's prediction and your REW measurements, seat by seat (bass shape, 20-300 Hz).

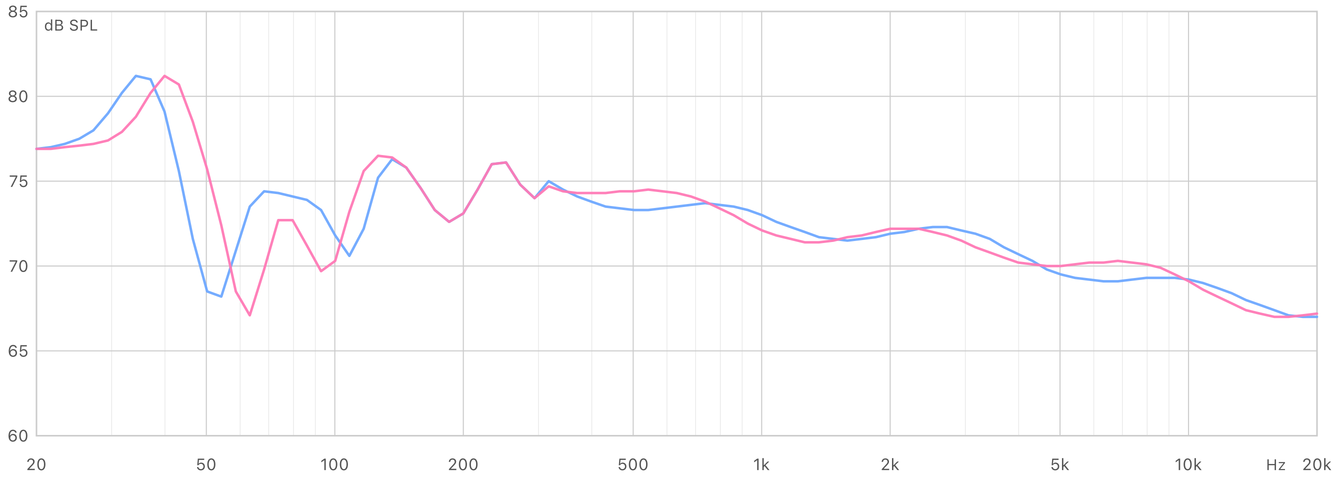
Seat	Mean Δ	Max Δ	Agreement
R1·P2 (MLP)	±3.6 dB	±9.6 dB	fair match
R2·P1	±4.2 dB	±8.5 dB	fair match

Measured bass conformity: The Result (P19): Below L1 (±5.8 dB) · The Consistency (P20): Level 1 (±6.1 dB)

Measured from REW. Shapes normalised; reliable below the room transition frequency. P20 assumes consistent measurement gain across seats.

19 · MEASURED RESPONSE PER SPEAKER (REW)

Each imported REW measurement (one per speaker / position) overlaid, with the level per octave band. Measured data, brand-neutral.



Front Left (MLP) Front Right

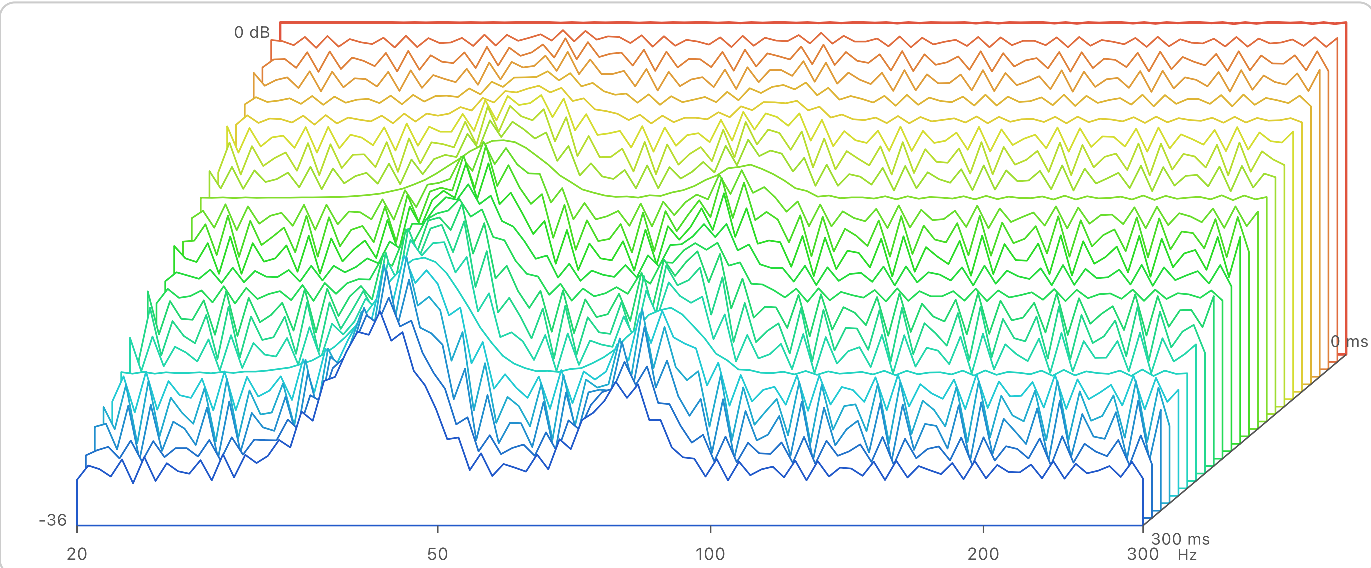
Speaker	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz	8k Hz	16k Hz
Front Left (MLP)	80.1	72.9	74.6	75.6	73.3	73.0	71.9	70.7	69.3	67.4
Front Right	78.0	68.5	76.2	75.6	74.4	72.1	72.1	70.3	70.1	67.1

SPL averaged per octave band (half-octave window), “—” when no measured point falls in the band.

L/R symmetry :

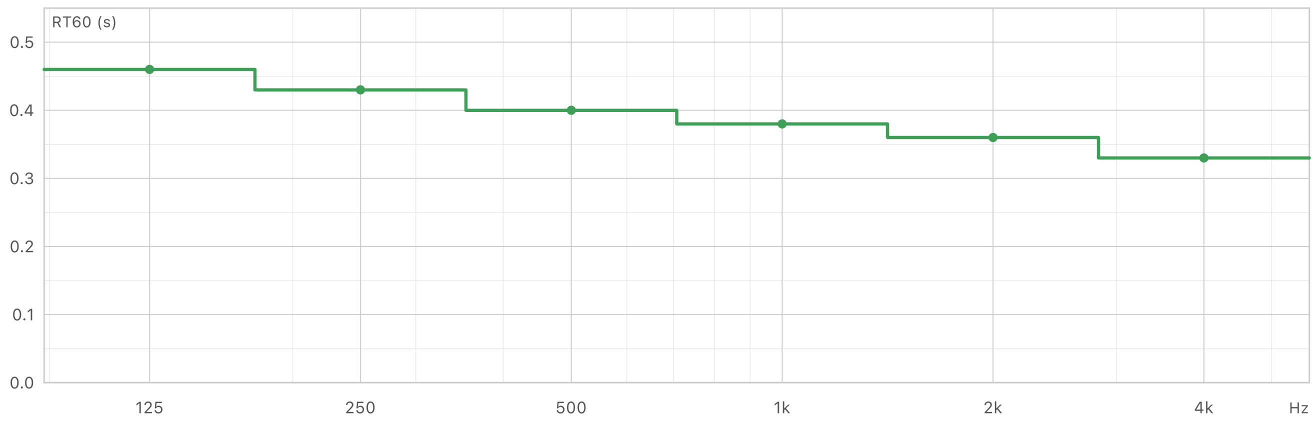
✓ front L/R: well matched (≤ 1.6 dB between left and right).

Measured decay (waterfall + RT60) · Front Left (MLP)



Frequency × time decay over ~300 ms (blue = floor, red = peak). Long ridges = ringing room modes.

Measured RT60 per octave band:



125 Hz **0.46 s** EDT 0.44 s   250 Hz **0.43 s** EDT 0.41 s   500 Hz **0.40 s** EDT 0.39 s   1k Hz **0.38 s** EDT 0.37 s
2k Hz **0.36 s** EDT 0.35 s   4k Hz **0.33 s** EDT 0.32 s

Decay evenness : Even decay (EDT ≈ RT60): a clean, single-slope decay.

20 · ELECTRONIC CALIBRATION (POST-TREATMENT)

Separate from the passive acoustic treatment above. Once the room is built and treated, electronic calibration finishes the job, generically, without any device brand.

- Bass management: set the crossover (≈ 80 Hz common), route low frequencies to the subwoofer(s), align sub level and phase to the mains.
- Distances, delays & levels: enter each speaker distance so arrival times align at the MLP, then match levels (pink noise reference, e.g. 75 dB SPL).
- Equalisation: correct the modal region (below the Schroeder frequency) where the room dominates; stay light above it. Target a smooth, gently down-tilted in-room curve.

HTM Phase 3 imports real measurements (REW) to drive this step; predictions above tell you what to expect before you measure.

PART B: VIDEO CALIBRATION

21 · CALIBRATION REPORT

Room projector, memory “Cinema SDR”
7 of 7 steps validated

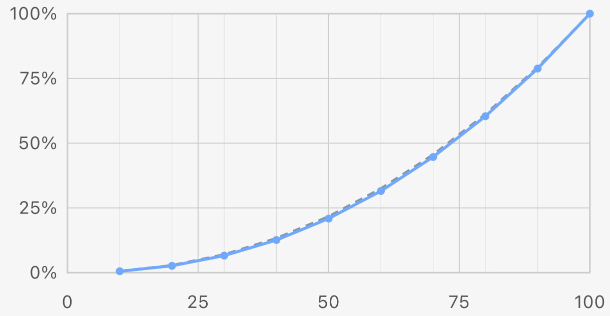
Calibration quality

Average gamma	2.26
Grayscale ΔE (avg / max)	0.7 / 1.2
Average colour temperature	6,397 K
Native contrast	1,533:1
Peak white luminance	92 cd/m²
Black luminance	0.0600 cd/m²
Primaries / gamut ΔE (avg)	0.7
Saturations ΔE (avg)	0.5

#	STEP	STATUS	KEY RESULT
1	Numeric range alignment (0-255 vs 16-235)	✓ Validated	`checklist done`
2	Measurement setup (ColorHCFR)	✓ Validated	`checklist done`
3	Baseline: residual, peak luminance, contrast	✓ Validated	`peak 92 nits · contrast 1,533:1`
4	Color space: REC709 / BT709	✓ Validated	`avg ΔE 0.7`
5	Gamma SDR: flat 2.2 (or 2.4)	✓ Validated	`γ 2.26`
6	White balance SDR: 6500 K (D65)	✓ Validated	`avg ΔE 0.8`
7	RGBCMY saturations SDR	✓ Validated	`avg ΔE 0.5`

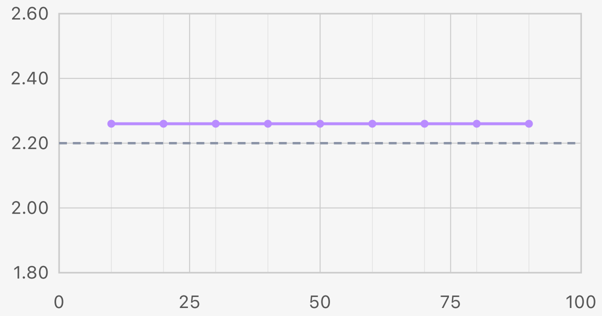
Detailed charts

Luminance vs input



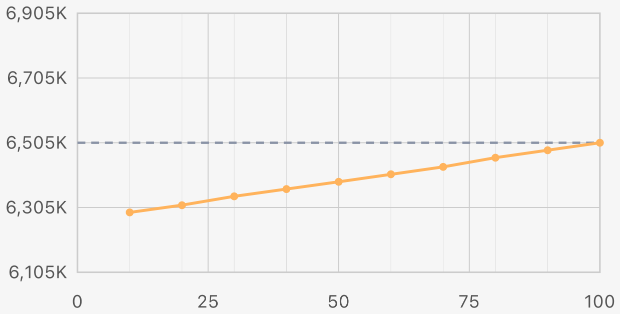
Measured luminance per step (% of peak white) vs the target curve.

Gamma per step



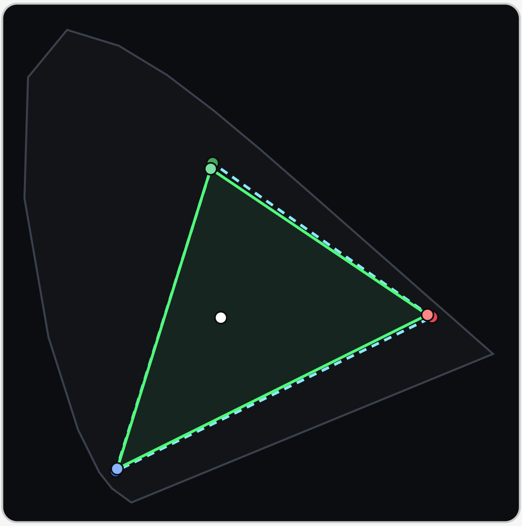
Local gamma at each level vs the target line. A flat line on target = even tracking.

Colour temperature



Correlated colour temperature per step vs the target white (dashed). Flat on target = neutral greys.

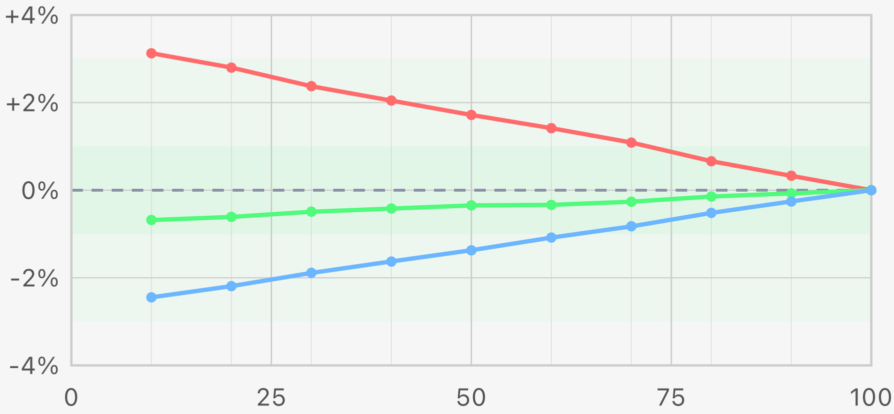
CIE diagram (gamut)



Measured primaries vs the reference gamut triangle and white point.

RGB balance

γR 2.24 γV 2.26 γB 2.27 Max deviation 3.1 %



IRE	R	V	B
10	+3.1	-0.7	-2.4
20	+2.8	-0.6	-2.2
30	+2.4	-0.5	-1.9
40	+2.0	-0.4	-1.6
50	+1.7	-0.3	-1.4
60	+1.4	-0.3	-1.1
70	+1.1	-0.3	-0.8
80	+0.7	-0.1	-0.5
90	+0.3	-0.1	-0.3
100	+0.0	+0.0	-0.0

Per-level deviation of each channel from a neutral grey (R=V=B). Bars right = excess, left = deficit. This is what the RGB high (top) / low (bottom) controls move.

Values recomputed from the guided calibration measurements. Re-measure after any change to the display settings.

22 · CONCLUSION & SYNTHESIS

Validation against the objectives and prioritised next steps.

- RT60: 0/6 bands within target as-is → 0/6 once the recommended passive treatment is applied.
- Format conformity: best profile Mostly compliant (6/8 criteria).
- RP22 graded performance: room level Below L1.
- Priority works: 16 critical, 27 high-priority item(s). Start there.
- Video calibration: 7/7 steps validated, grayscale ΔE 0.8 on average.

Prioritised by acoustic impact and effort, not cost (HTM stays brand- and price-neutral). Quantities are in the consolidated bill of materials above.

APPENDICES

23 · ACOUSTIC METHODOLOGIES: HOW HTM COMPUTES ITS NUMBERS

HTM combines several public-domain acoustic models and industry standards to predict and diagnose your room. Here is a quick layperson tour of what runs under the hood.

RT60: reverberation time

How long sound takes to drop 60 dB after a source stops. HTM applies the classic Sabine formula (1900) for moderately absorptive rooms, then switches to Eyring (1930) when the average absorption coefficient passes ~0.20. Sabine over-predicts in dead rooms. The room target band depends on use case: 0.30 to 0.40 s for a dedicated cinema, 0.40 to 0.55 s for a multi-use room.

Sabine 1900 · Eyring 1930 · ISO 3382

Bonello criterion: modal distribution

Counts how many room eigenmodes fall in each third-octave below the Schroeder frequency. The rule: each band must have ≥ as many modes as the previous. A failed band signals a "modal hole" in the bass that bass-traps can mitigate but not fully fix. The geometry itself is suboptimal. Proposed by Oscar Bonello in 1981.

Bonello 1981 · third-octave bands · Schroeder cutoff

Bolt ratio: room proportions

Tests whether the room's length × width × height ratios fall in the Bolt area, a region of the LWH chart where modes are statistically well-distributed. A "golden ratio" like 1 : 1.4 : 1.9 puts you safely inside. Cubic rooms (1 : 1 : 1) fall far outside: axial modes overlap, creating massive bass peaks.

Bolt 1946 · room ratios

First Reflection Points (FRP)

Image-source method to locate the "mirror points" on each wall where the first reflection of every speaker bounces toward the MLP. The treatment of these points is one of the most debated topics in modern acoustics. (1) Classic LEDE school: absorb the first reflections < 10 ms that blur the stereo image (Haas / precedence effect). (2) "Reflection-friendly" school (Floyd Toole, Sean Olive, BBC, EBU Tech 3276): with constant-directivity speakers that radiate uniformly smooth power both on-axis and off-axis, early lateral reflections (10-80 ms) remain spectrally coherent with the direct sound and significantly improve spaciousness (ASW) and envelopment (LEV) without degrading localisation. HTM shows the points and can suggest a properly-sized absorber, but the choice is yours, based on your speakers (constant directivity?), your gear (audiophile vs cinema), and your listening taste.

image-source method · Haas effect (1949) · ITU-R BS.1116

SBIR: Speaker-Boundary Interference Response

Predicts the cancellation frequency caused by a speaker close to a wall: the direct sound interferes with its own reflection. The null falls at $f = c / (4 \times \text{distance})$. HTM warns when this null lands inside a critical band (40 to 250 Hz) and recommends either moving the speaker or adding a dense bass-trap on the offending surface.

quarter-wavelength cancellation · F. Toole

Schroeder frequency

The frequency above which modal density is high enough to treat the room statistically. Below, individual modes are resolved and you hear them as peaks. Approximated by $2000 \times \sqrt{(RT60 / \text{volume})}$. HTM uses it as the upper bound of the Bonello test: modal problems matter mostly below this cutoff.

Schroeder 1962 · statistical room acoustics

Speaker placement: Dolby Atmos / DTS:X / Auro-3D

Each speaker channel has a recommended azimuth and elevation range published by the format owner (Dolby, DTS, Auro Technologies). HTM stores these specs in a JSON registry, picks the "ideal" position per channel given your room geometry, then flags out-of-spec deviations when you reposition manually. The reference angles are public standards, no vendor lock-in.

Dolby Atmos · DTS:X Pro · Auro-3D · ITU-R BS.775

Sources: public-domain academic publications, ISO/ITU-R standards, and public audio-format documentation. No commercial brand name appears in our computations or recommendations.