

Thursday, 10 January 2019

The School

30 Flower St

The Bush QLD 4006

Attention: The boss

Acoustic Design and Acoustic Treatment for the Multipurpose Hall.

The following is presented based on our discussions late last year and the addition of acoustic measurements in the completed hall.

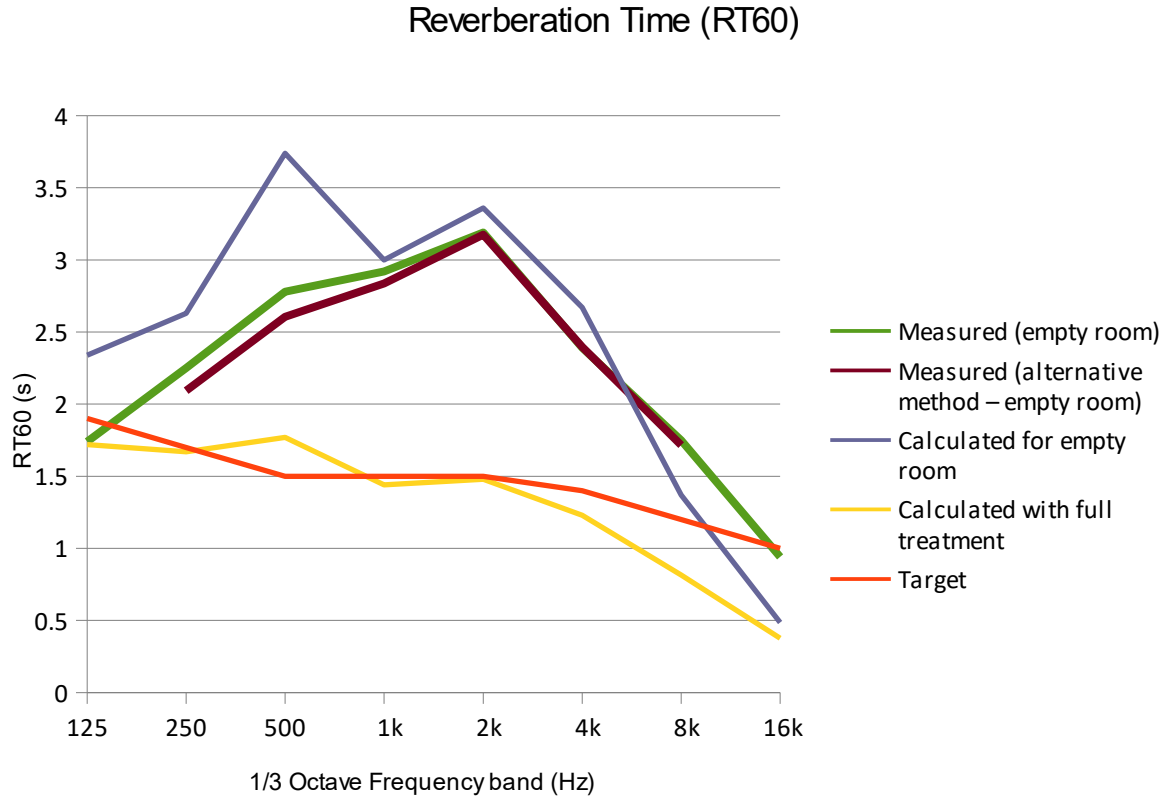
Regards,

A handwritten signature in black ink, appearing to read 'Andrew Steel', with a horizontal line extending to the right from the bottom of the signature.

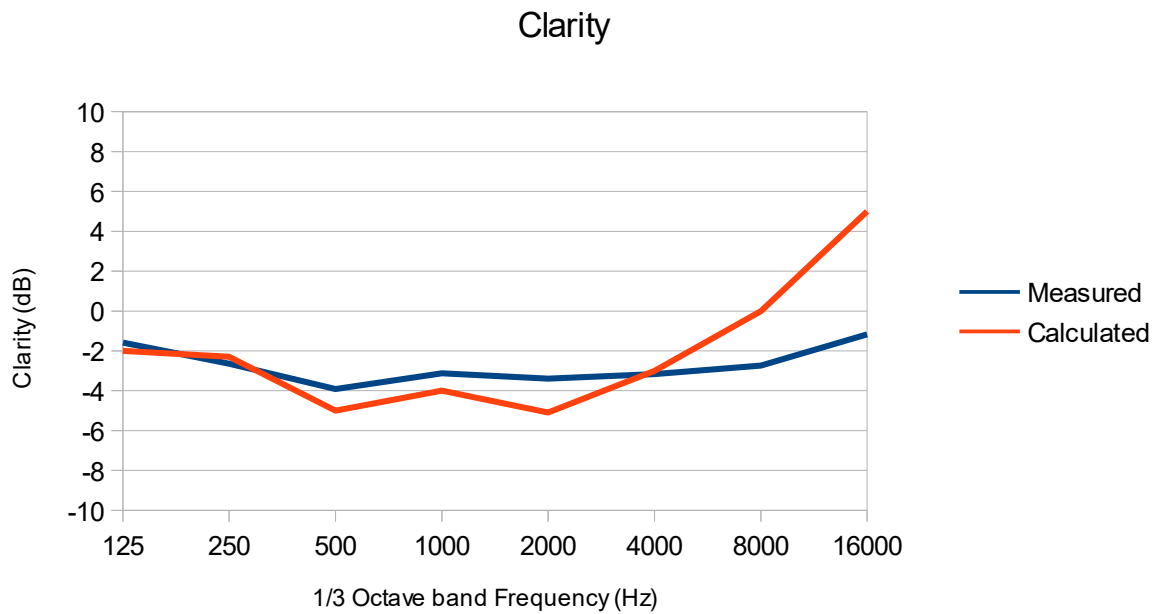
Andrew Steel,

Acoustic Design for the Multipurpose Hall

Reverberation Time;



Clarity;



Clarity , comparison of calculated versus measured.

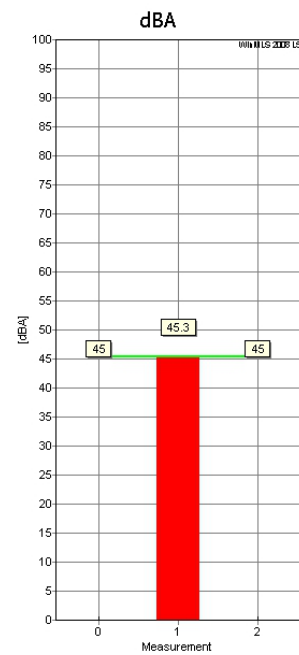
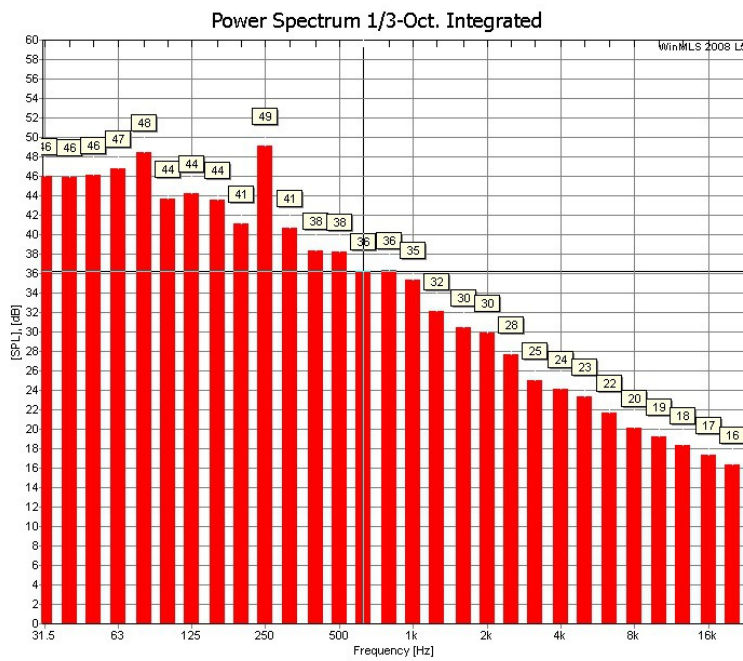
Speech Transmission Index;

Calculated Speech Transmission Index - average for all receiver positions with acoustic source on stage – 0.35

Measured Speech Transmission index – 0.4 (average of 12 measurements at different locations in the room).

Desirable Speech Transmission Index > 0.6

Noise;



Full spectrum and single figure A weighted background noise.

Conclusion

- The long reverberation time will make sporting activities very loud.
- The room is borderline on being acoustically functional as built when using the PA system.
- The room is not acoustically functional when an unamplified source is used on stage.

AS/NZS 2107:2000; RECOMMENDED DESIGN SOUND LEVELS FOR DIFFERENT AREAS OF OCCUPANCY IN BUILDINGS, shows,

Type	Recommended Design Sound Level		Recommended Reverberation Time (T), s
	L _{Aeq} dB(A)		
Educational Buildings: Assembly Hall over 250 seats	30	35	0.6 to 0.8
Educational Buildings: Gymnasiums	45	55	1.2
Public Buildings: Con- ference and Conven- tion Centres, with sound reinforcement	35	45	1

The hall does not meet the recommendations set in the Australian Standard.

Similarly, the metrics of Clarity and Speech Transmission Index, show lower than suitable performance.

ultrafonic

The implications of this are;

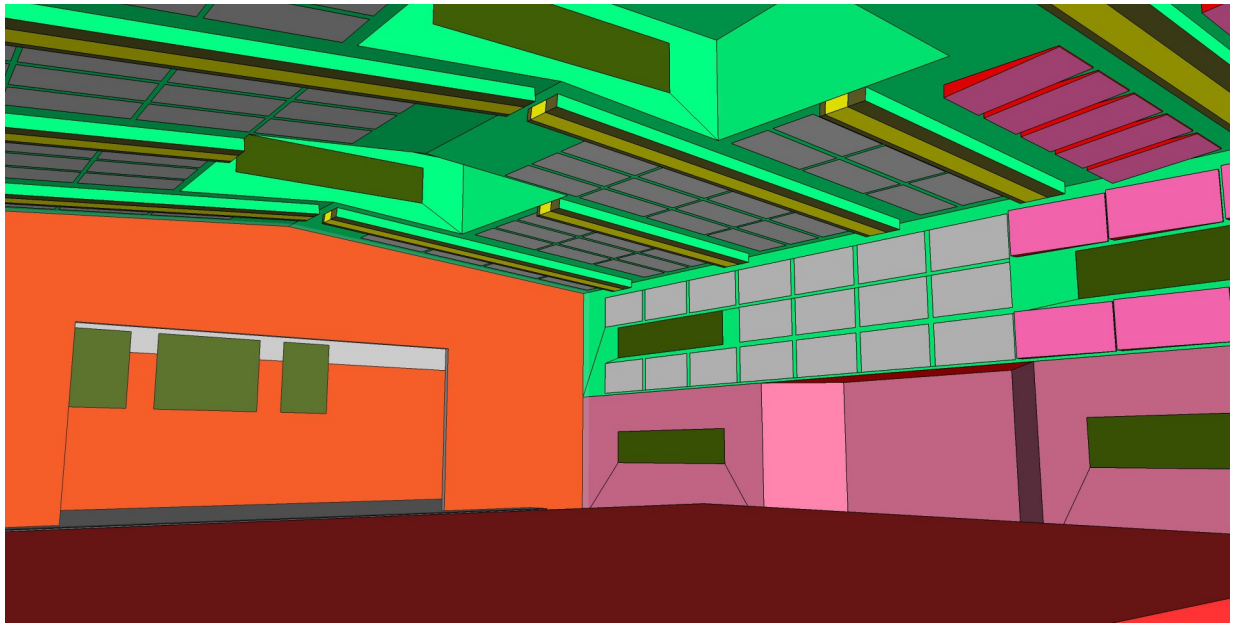
- Students/musicians will have difficulty playing music in an ensemble,
- Unamplified performance will be very quiet and hard to understand,
- Amplified performance or speech will be audible to those with good hearing, any hearing impaired people may have difficulty,
- Sport will be very loud and spoken communication within the hall will be difficult.

Recommendations

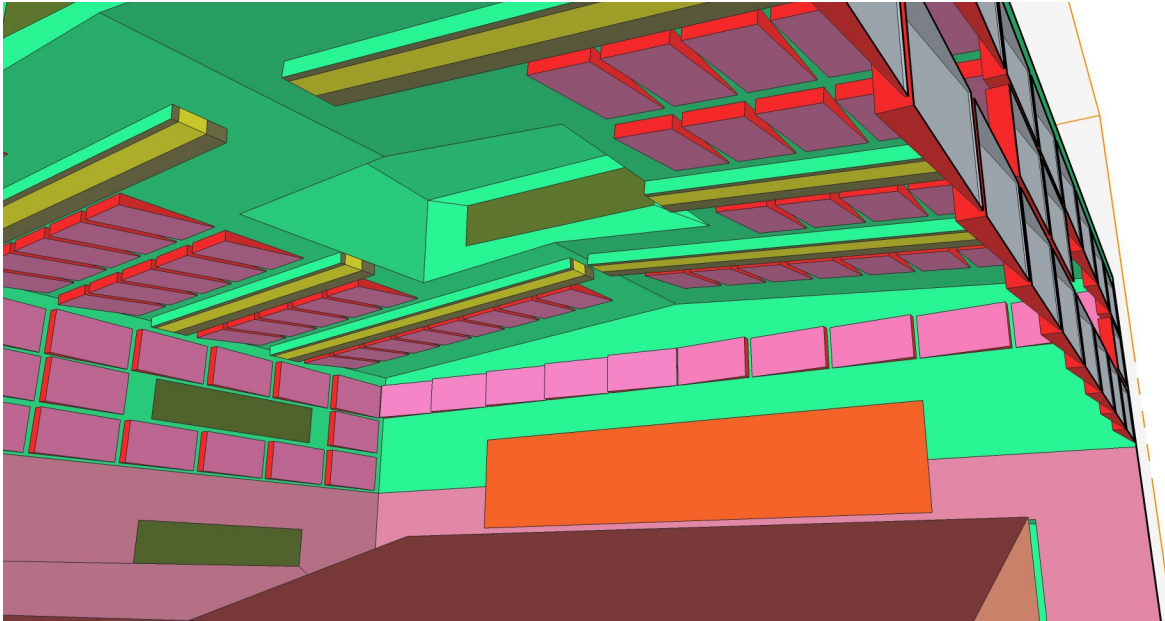
If the acoustic performance of the hall proves to be problematic over time, the measurements and calculations, along with the Australian Standard can be used to inform the improvement it.

Computer modelling shows that the following acoustic treatment would bring the hall into line with the recommended values of Reverberation Time, Clarity and Speech Transmission Index. It may not affect the background noise which is dependent on the construction of the building envelope.

- Porous absorber - 90 panels 2400 x 1200 x 50mm of broadband absorption
NRC approximately 0.9 – Grey panels on walls and ceiling



- Perforated absorber - 90 panels of 2400 x 1200 x 150mm of 9mm perforated ply (4mm holes on 25mm centres) with 50mm of 32kg/m³ insulation and 100mm airspace behind. Red/purple angled panels on walls and ceiling

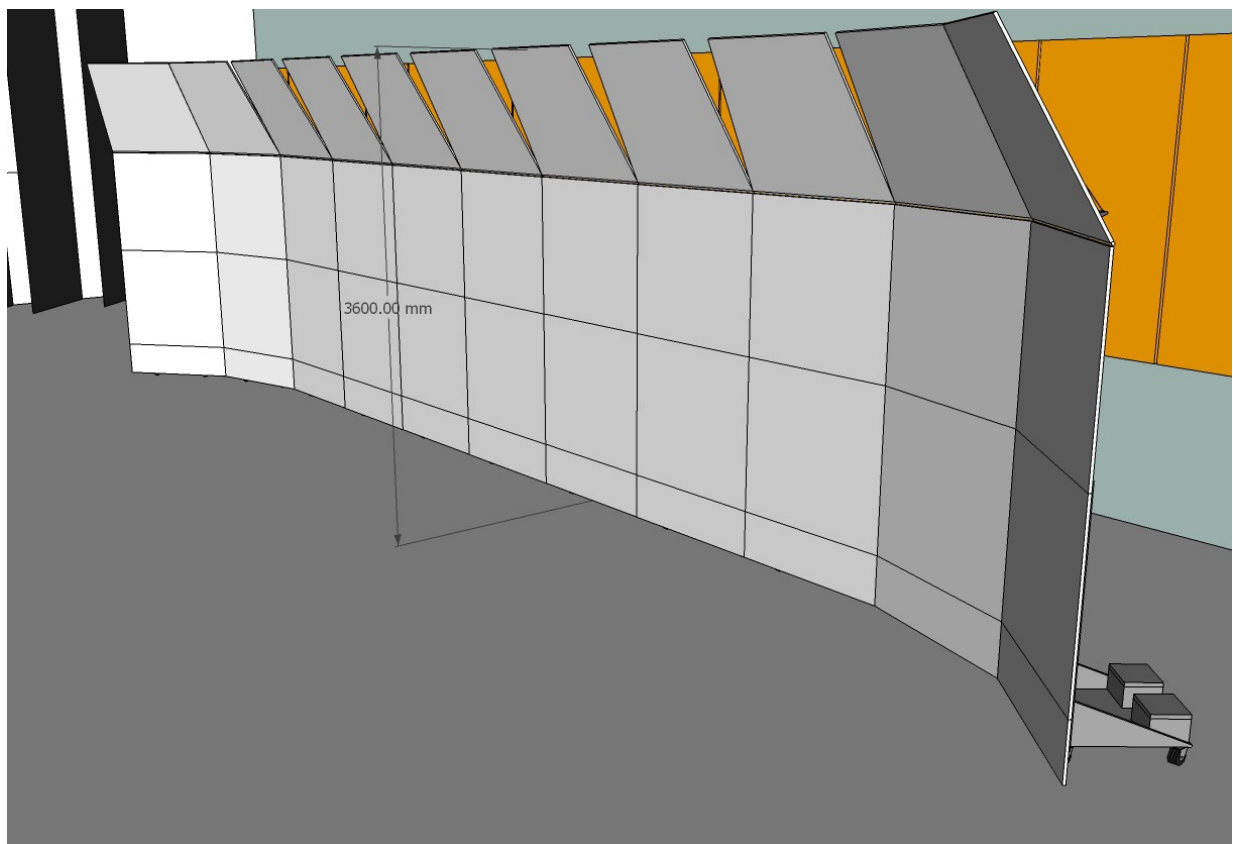


A small amount of diffusion may be required to the rear wall. This is a final adjustment to be done if necessary.

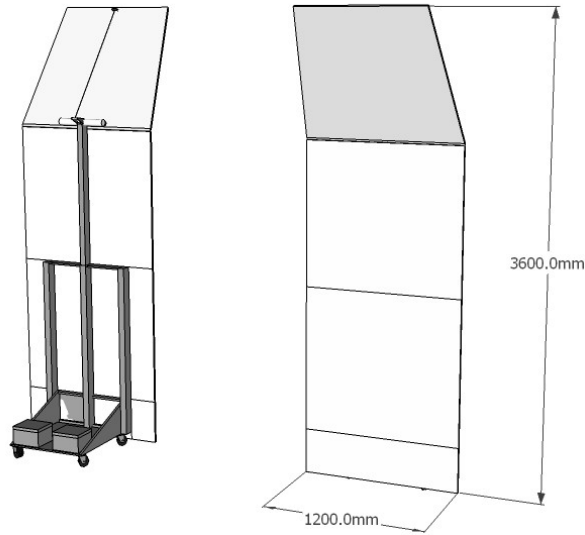
An orchestra shell would be advisable to assist musicians playing on stage.



Typical placement



Typical arrangement



Typical construction

Ideally some diffusion would be on the front of the orchestra shell and some absorption would be in the stage house.