Baseline Designs: Acoustics Strategy

Introduction

The Baseline Designs are generally in line with the Building Bulletin 93 (BB93), 'Acoustic design of schools: performance standards', 2014. BB93, 2014 supersedes the 2003 edition and the Acoustic Performance Standards for the Priority Schools Building Programme, 2013. The Baseline Design Solutions

1.1 Control of reverberation

The Baseline Designs demonstrate methods of reverberation control that work in harmony with other environmental control factors (e.g. daylighting, ventilation, thermal mass etc.). Approaches vary depending on the type of spaces. Types of spaces are discussed below.

1.1.1 Classbases

Reverberation in classbases is controlled predominantly by absorptive panels suspended horizontally from the soffit, interspersed between light fittings; panels are highly acoustically efficient and light reflective. In order to not compromise the thermal benefit of the exposed soffit, the area of suspended absorbers is approximately 40% of the floor area. Depending on the size of room, floor finish and age of pupils being taught, these absorbers are supplemented by Class A wall panels.

Furniture acts constructively to diffuse the sound that could otherwise reflect between parallel hard surfaces.

1.1.2 Dining/atrium and multi-storey circulation

Reverberation in these large-volume, high occupancy, spaces is controlled by a combination of perforated roof liner (Class C or better), absorbent finishes to the underside of walkways (Class A) and significant coverage of wall panels (absorption Class dependant on coverage area).

1.1.3 Main hall

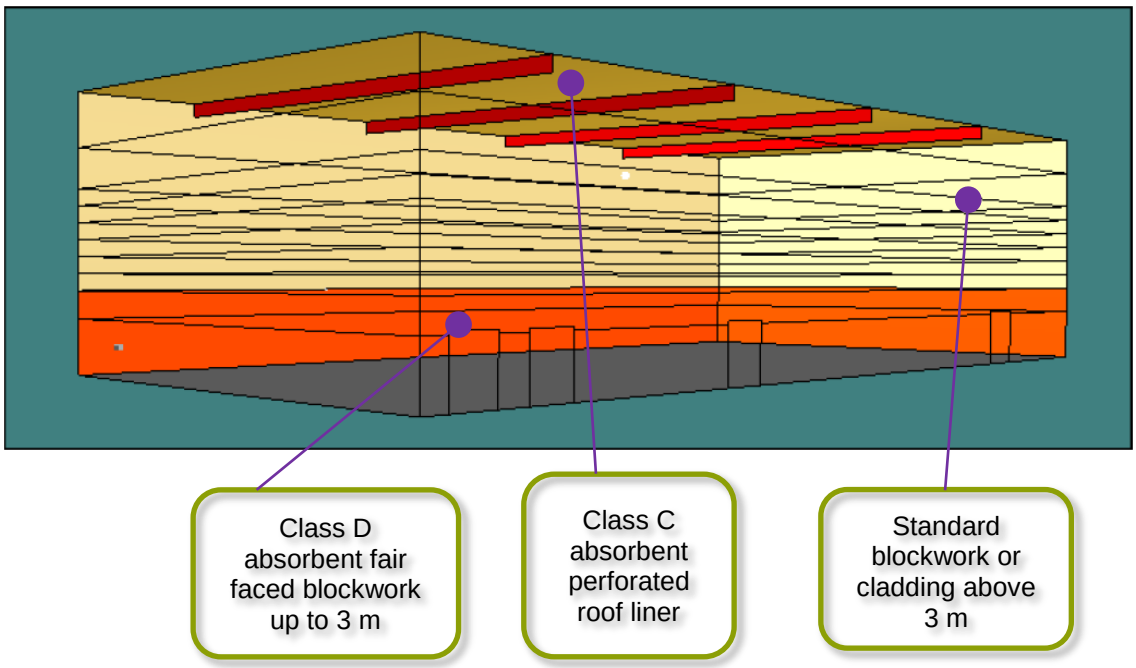
Unlike many other spaces, reverberation needs to be controlled to achieve a minimum, in addition to maximum, levels. This is to facilitate speech and support a variety of activities.

Reverberation is controlled by an absorbent liner (Class C or better), absorbent panels (Class C or better) to the rear wall and absorbent panels (Class C or better) to side walls. The coverage and type of panels/materials will vary according to their type, coverage and location. It may be advantageous to allow for a reflective section of ceiling towards the front and centre of the soffit or ceiling in order to facilitate reflection of speech to the rear section, although this may not always be practicable.

1.1.4 Sports halls (secondary schools)

It is important to provide both absorption and diffusion, not just at high level but in the listener plane. Due to the activities carried out in these spaces, all materials must be highly durable.

Absorption is provided by means of a perforated roof liner (Class C or better) and fair-faced, Class D absorptive blockwork from finished floor level to at least 3 m above. The fair-faced blockwork and profiles of the roof line also act to provide significant amounts of diffusion.



1.1.5 Single storey circulation space/corridors

Corridors and similar spaces will be installed with demountable ceilings having Class C sound absorption or better, to control sound and provide good access to services.

1.2 Environmental Noise and Ventilation

Double sided ventilation is used in the secondary school classrooms in order to maintain acceptable concentrations of carbon dioxide in spaces, wherever possible.

Air inlets are in the form of opening windows or louvres in the external façade, with high-level attenuated ventilators or chimneys to corridors and atria, allowing stack ventilation. Windows and non-acoustic louvres can be used where the external noise level does not exceed the required Indoor Ambient Noise Level by more than 13 dB(A); if external noise levels are higher, then attenuated forms of ventilation would be required.

Ventilators to corridors are attenuated such that they meet the requirements of the Output Specification and minimise cross-talk attenuation.

Where spaces are mechanically ventilated then appropriate controls of noise level and cross-talk are provided to maintain Indoor Ambient Noise Levels and sound insulation targets.

1.3 Sound Insulation

Sound insulation between classroom and office areas is provided by metal stud partitioning systems with gypsum board lining and insulation as appropriate to meet performance targets.

Where glazed screens are used then these meet composite performance requirements of the partition they are installed within. Similarly, door sets are acoustically rated to either meet single figure criteria for the type of room or composite values of the overall partition they are installed within.

Floors are of concrete construction to facilitate passive cooling via thermal mass. This provides levels of vertical sound insulation appropriate for most adjacencies, requiring additional attenuation in the form of floating floors or mass barrier ceilings where adjacencies demand additional attenuation. Impact sound insulation is controlled by floor finishes.

1.4 Rain Noise

Concrete roofs control noise generated by heavy rain in many areas. Lightweight roofs incorporate compressed mineral fibre insulation under the top liner sheet in order to suppress impact-generated noise.

1.5 Alternative Performance Standards (APS) and Refurbishment

Where it is not possible to comply with the new-build criteria of the Output Specification for operational or health & safety reasons, and this non-compliance is sanctioned by the EFA and their Technical Advisors, then a relaxation in performance targets is permissible, but only to the extent set out in performance tables for refurbishment standards.

Baseline Secondary school (superblock) – section through dining hall

Baseline Secondary school (finger block) – section through teaching spaces