CUNDALL

EFA BASELINE DESIGNS
STRUCTURAL STRATEGY

Structural Design of Schools

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Contents

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1. Baseline Designs – Structural Strategy

There is no single structural solution for the baseline designs. The optimum, best value, solution will be decided by considering specific site constraints such as ground conditions, proximity of trees, site access and other, project specific, drivers such as speed of construction.

However, there are a number of key factors which affect the choice of structure and these are outlined below.

1.1 Thermal comfort

The baseline designs use exposed thermal mass as part of the occupant comfort strategy. This is most efficiently achieved by using concrete floor slabs with exposed soffits.

1.2 Ventilation and Daylight

The requirement to achieve good levels of daylight in the teaching spaces is best achieved by having no structural elements that protrude below the structural slab running parallel to the building facades. Any down-stand beams that are required should be perpendicular to the facade and to the corridor walls. These can be hidden within the partition head detail.

The lighting and ventilation strategy requires a number of penetrations through the floor slabs for natural ventilation in summer and to allow daylight to pass from one level to the next. These penetrations can in some cases have implications for the fire strategy (see Fire Strategy).

1.3 Cost and Efficiency

The structural grids need to be planned to avoid the need for any transfer structures thereby saving cost and minimising the overall building height.

Consideration should be given to utilising off-site fabrication in order to achieve a good quality of product and to shorten the on-site construction phase for the structure.

1.4 Future Proofing

The selection of the structural solution should take into account the possibility of future adaptation of the teaching spaces. For example, it may be desirable to be able to remove the dividing wall between two teaching spaces. The extent to which buildings are adaptable needs to be considered in the context of the overall cost of the structure.

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2. Baseline Design - Primary Type 2

The classroom block - 7.2m deep teaching rooms either side of a central circulation/ancillary zone - lends itself to pre-cast concrete floor slabs spanning between loadbearing perimeter and corridor walls (potentially pre-cast concrete wall panels). The section shows an exposed concrete slab soffit without any down-stand beams on the perimeter and allows for internal walls between the teaching spaces to be non-loadbearing.

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3. Baseline Design - Secondary School Types 2 and 3

One structural solution that would meet the requirements of the secondary baseline designs would be pre-cast concrete floor units, with an in-situ structural topping, spanning on to a steel frame. Where, as in the classrooms, there is the requirement to have glazing up to the floor soffit along the façade, the steel beam can be either integrated within the depth of the floor slab or the supporting steel floor beams can be positioned below the slab in the top of the partition walls. The use of steel beams to support the slabs gives flexibility for the structural grid, allowing column-free spaces to be achieved where required.

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