

schools for the
future



Exemplar Designs
concepts and ideas



department for

education and skills

creating opportunity, releasing potential, achieving excellence

Primary Exemplar Key

1	Nursery playroom
2	Class storage
3	Cloakrooms/lunch box storage
4	Nursery toilets/hygiene facilities
5	Reception class
6	Wet area
7	Class storage
8	Cloakrooms
9	Infant classbase (Year 1)
10	Small group room
11	Infant classbase (Year 2)
12	Specialist store (numeracy/literacy, etc.)
13	Junior classbase (Year 3)
14	Junior classbase (Year 4)
15	Junior classbase (Year 5)
16	Junior classbase (Year 6)
17	Library resource centre
18	ICT suite
19	ICT technician/server
20	Creative space (food/D&T/science/art)
21	Main hall
22	Chair store
23	Staging/appliance store
24	PE store
25	Studio (small hall)
26	Changing rooms
27	Kitchen/servery
28	Head's office
29	Meeting room
30	Senior management office
31	Staff room
32	Copier/reprographics
33	Central stock
34	Caretaker's office/maintenance store
35	Sick bay
36	General office
37	Entrance/reception
38	Interview/social services room
39	MI/therapist room
40	Small group room (SENco)
41	Parents/community room
42	Accessible toilet (visitors)
43	Staff toilets
44	Cleaners' stores
45	Lift
46	Plant
47	Bin store
48	Covered area
49	Enclosed bridge link
50	Open bridge link with roof over

Secondary Exemplar Key

51	English classroom
52	Walk-in store
53	Staff work room (shared)
54	Head of Year office
55	Modern Foreign Languages classroom
56	Seminar room
57	Small group room (foreign language assistant)
58	Humanities classroom
59	Small group room
60	Business Studies classroom
61	Information Technology room
62	ICT technician
63	Server
64	Mathematics classroom
65	Science laboratory
66	Science prep room
67	Chemical store
68	Office
69	Food room
70	Food prep room
71	Multi-materials workshop (including heat bay or CAD/CAM)
72	Multi-materials prep room
73	Electronics control technology
74	Constructional textiles
75	Graphics room
76	Design resource area
77	Textiles art room
78	3D art room
79	Kiln room
80	General art room
81	Darkroom
82	Music recital
83	Music classroom
84	Music group/practice rooms
85	Music ensemble room
86	Recording/control room
87	Drama studio
88	Instrument store
89	4-court sports hall
90	PE store
91	Activity studio
92	Pupil changing rooms and showers
93	PE staff changing and shower
94	Main hall
95	Chair store
96	Secure/exam/community stores
97	Library resource centre and careers
98	Sixth form study area
99	Central stock store
100	Librarian
101	Sixth form social
102	SEN therapy/MI room
103	SEN case conference/tutorial
104	SENco/wheelchair/appliances store
105	SENco office
106	Hygiene room
107	Head's office
108	Meeting room
109	General office
110	Sick bay
111	Entrance/reception
112	Accessible toilet and shower (visitors and staff)
113	Staff room (social)
114	Reprographics
115	Dining area
116	Kitchen (including staff and stores)
117	Caretaker's office
118	Maintenance store
119	Lockers for personal storage
120	Pupil toilets (including accessible cubicles)
121	Staff toilets
122	Visitors' toilets
123	Lift
124	Plant
125	Void
126	Cycle racks
127	Bin store/deliveries

foreword

schools for the future

Our new Building Schools for the Future programme gives us a unique opportunity to transform our secondary schools into innovative learning environments that will inspire pupils to achieve more. High quality, modern school buildings, with the latest integrated ICT systems, will help to raise standards and will play a crucial part in our ambitious programme of educational reform. Our challenge is to provide attractive, imaginative and stimulating environments, which are also safe and secure places for children to learn in. They should be inclusive, so that no child is left out and all can achieve their full potential, and be open to wider use, binding schools into their local communities. Overall, they must make a major contribution to radically improving educational opportunities.

In June 2003, as part of Building Schools for the Future, I announced that eleven design teams had been appointed to develop exemplar designs for schools fit for the twenty-first century. They examined both primary and secondary schools, including a 5 to 18 all-through school, on a range of sites. Now you can see many of their ideas set out in the pages of this book – a compendium of designs. These are not intended to be templates, but to act as springboards for developing imaginative and sustainable school buildings, tailored to local needs and aspirations. They can serve as advanced starting points in the design process and will help to deliver excellent value for money.

I hope that you will find many of the ideas here as exciting as I do, and that some of you will be able to develop these ideas into finished school buildings. Our common aim must be to create for children and for communities the schools they need and deserve.



David Miliband MP
Minister of State for School Standards,

acknowledgments

We would like to thank the following organisations that gave assistance to DfES and the design teams in development of the exemplar designs:

Secondary Heads Association (SHA)
Office for Standards in Education (Ofsted)
School Works
The Sorrell Foundation
British Educational Communications and Technology Agency (Becta)
Learning through Landscapes (LTL)
Zurich Municipal
Mtech Group Limited (Mtech)
Public Private Partnerships Programme (4ps)
Commission for Architecture and the Built Environment (CABE)
Royal Institute of British Architects (RIBA)
The Design Council
Partnerships for Schools (Pfs)

We record our thanks to the representatives of these organisations and the headteachers and bursars of the schools who helped us on page 120.

Our particular thanks to the following headteachers and their whole school community for agreeing to partner one particular design team and act as a client group with the Schools Briefing and Design Unit (SBDU) 'buddies' throughout the process.

Primary

Claire Axten	Brookside Community Primary School	Walters and Cohen (P1)
Vicky Morton	Temple Primary School	Cottrell + Vermeulen Architecture (P2)
Sue Roach	Victoria Dock Primary School	Marks Barfield (P3)
Amanda Dennison	Millennium Primary School	Building Design Partnership (P4)
Christine Smith (Acting head)	Walton Holymoorside School	Sarah Wigglesworth Architects (P5)

Secondary

Angela Armytage	Yewlands School (Technology College)	MACE Ltd (RTKL) (S1)
Peter Smith	Blyth Community College	Wilkinson Eyre Architects (S2)
Paul Kelly	Monkseaton Community High School	de Rijke Marsh Morgan (dRMM) (S3)
Sir Iain Hall	Parrs Wood Technology College	Alsop Architects (S4)
Wendy Parmley (Principal)	Archbishop Michael Ramsey Technology College	Penoyre and Prasad (S5)

All-through

Alison Banks	Chafford Hundred Campus Schools	Feilden Clegg Bradley
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The core team in SBDU included:

Mukund Patel – Head of SBDU
Andy Thompson – Project Manager
Russell Symes – Deputy Project Manager
Beech Williamson – Preparation of the brief and compendium publication
Chris Bissell – Liaison for publication design team

and the other SBDU 'buddies' and support staff who gave that extra bit to get this task complete.

We are very grateful for the patience and forbearance of Phil Thomas and Colin Williams and their team at Hieroglyphics Design and Communications, who had to put up with a lot to deliver this compendium and its related publications and DVDs as such timely and high quality products.

introduction

Context

School buildings have a crucial part to play in helping to raise educational standards. In recognition of this, the Government has made huge increases in capital investment in schools during the last five years – from under £700 million in 1996-97 to £3.8 billion this financial year, rising to £5.1 billion in 2005-06. Of necessity, a great deal of this funding has focused on catching up on a backlog of priority repairs or replacements, as well as on carrying out much needed improvements to accommodation. So far, it has not been possible to initiate a major new building programme. Now, this is set to change.

The increase in annual funding to £5.1 billion marks a leap forward in investment planning. It will enable strategic and radical changes to be made to the schools estate. Around £2 billion a year will be spent on Building Schools for the Future – a programme with the aim of rebuilding and renewing all secondary schools over the next ten to fifteen years. Over the same period, there will also be substantial new investment in primary school buildings.

The Challenge

This offers a rare opportunity to transform the educational built environment and must not be wasted. The legacy of the last major school building programme is still with us, and still being paid for. The many over-glazed, poorly insulated and often porous buildings of the sixties and seventies generally have high running costs and, unless well maintained, do not provide the learning and working environments needed today. We need to make sure that the same mistakes are not repeated now.

There are also many school buildings that, while functioning well, are not interesting places for children or adults to be in. Do they contribute to raising educational achievement? The designs of some other building types – offices, galleries and museums, research centres – have changed enormously in the last twenty years, but most schools built during the last 30 years could have been designed 60 years ago. We need to move forward and develop new ideas for school design that are exciting and really work.

To deliver the best and most effective education, exploiting all the possibilities of Information and Communications Technology (ICT), school buildings need to be designed so that they stimulate children's imaginations and reflect advances in technology. They need to provide high quality environments that are conducive to learning and functional, without being boring. They must be both flexible and adaptable, to cope with changes in a future that we cannot predict.

What can be predicted is what the major drivers of change in school building design are likely to be. For example:

- developments in education – such as changes to the curriculum like the emerging 14 to 19 agenda, spreading the expertise of the most able teachers more widely, greater numbers and a wider range of support staff who will bring a variety of skills to the classroom, and the need to accommodate a range of group sizes that could vary during the course of a lesson;
- the challenge of making schools inclusive, both for those with Special Education Needs (SEN) or disabilities, and, outside the school day, for the wider community;

- changes in school organisation – such as greater autonomy, more individualised learning, a different school day and year, all-through schools, perhaps fully integrating SEN provision, or schools within schools – where large schools are subdivided into smaller self-contained units with vertical structures (the 'house' model);
- structural changes – such as rural schools forming clusters or federations to overcome the problems of size and isolation, or the development of education parks where schools, colleges and other facilities share a campus;
- growth in the provision of extended schools and increased networking between them so that facilities are not unnecessarily duplicated;
- ICT already influences how accommodation is planned, but will its fast rate of evolution result in its impact on school building design decreasing over the next few years, while offering alternatives to traditional schooling for some?

While there will always be many unknowns, we have to look at new ways of developing designs that are deliverable and will help to create schools for the future. One way, and

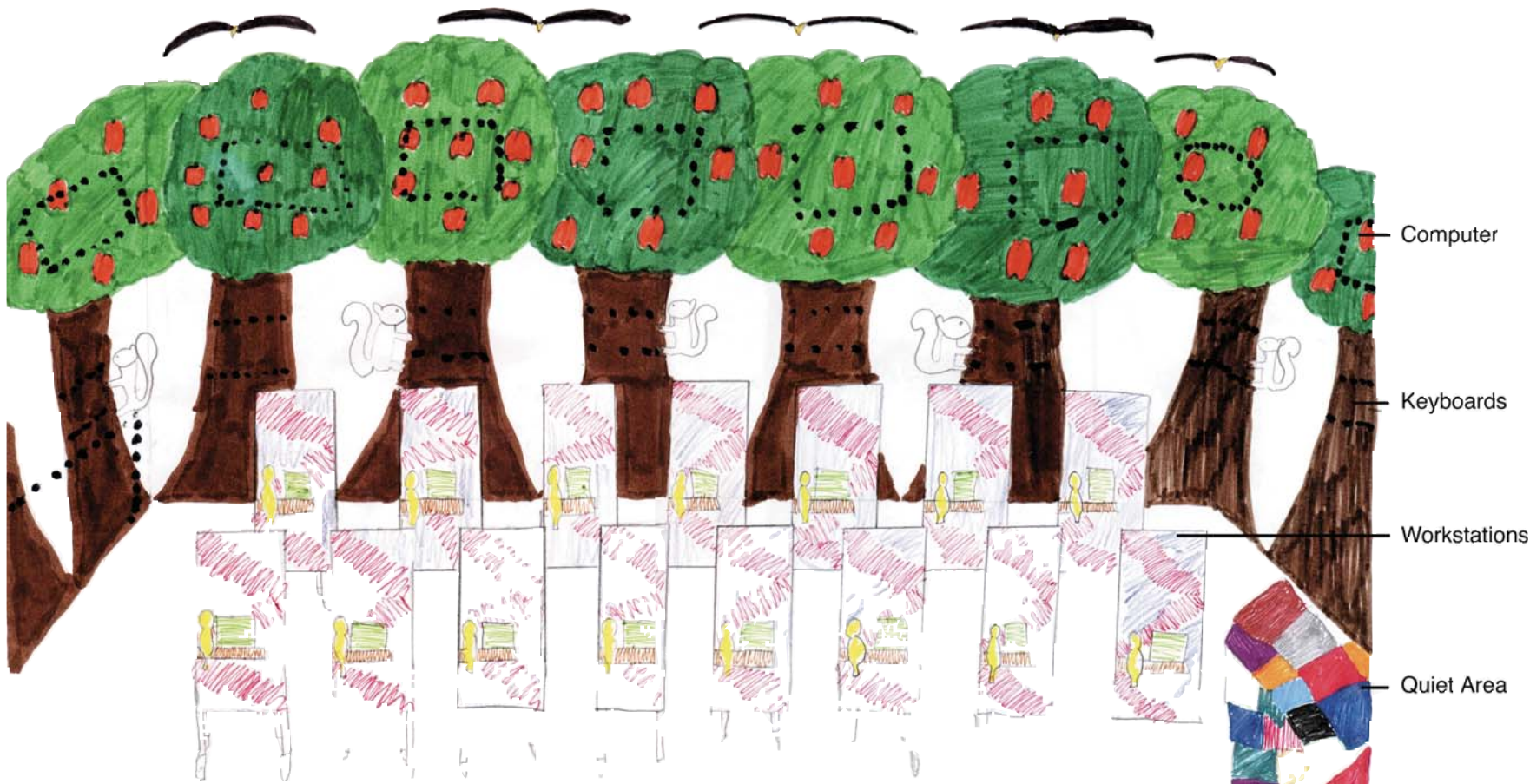
the focus of this book, is by the development of exemplar designs – concepts and ideas – that can be used as the starting point for developing high-quality school buildings.

Aims

The exemplar designs featured here are intended to demonstrate how high standards of school building design can be achieved within our area and cost guidelines, and to help streamline the development and procurement process.

In commissioning them, we set out to:

- develop a shared vision of Schools for the Future;
- create benchmarks for well-designed schools;
- push forward the boundaries of innovation and inspiration;
- support the delivery of Building Schools for the Future;
- encourage industry to develop new ways of delivering school buildings.



Drawing by: a pupil at Wrockwardine Junior School, Telford and Wrekin

By publishing the exemplar designs without copyright restrictions we hope to encourage other designers to use the ideas. However, while the exemplar designs could be built if developed further, they are not intended to be seen as single solutions to any school. Designers may wish to develop their own schemes using the best of the exemplar concepts. The Emerging Themes section aims to highlight the best ideas, and identify further work that may be required.

Scope

After a rigorous procurement exercise, we appointed eleven design teams to develop the exemplars. These comprised both large and small practices. Five worked on primary schools, five on secondary schools and one worked on an all-through primary and secondary school. We asked them to develop ideas to outline design stage – RIBA Plan of Work Stage C or D – and they were given a detailed ‘core’ brief that required:

- inspirational designs to stimulate both pupils and the school workforce;
- flexibility to allow short-term changes in teaching methods and the integration of ICT;
- adaptability to suit longer-term changes in the size or number of rooms, and to provide a ‘kit of parts’ that could suit a variety of sites and types of schools;
- inclusive designs for those with SEN or disabilities;
- community use, outside the school day;
- excellent environmental design, to at least meet standards of Building Bulletins (BB) 87 and 93;
- safe, secure and sustainable designs;
- suitability of designs for some off-site construction.

Each design team was given two real but unidentified sites. Each site had similar location characteristics (urban or rural) and various typical constraints, such as size, slope and noise. In addition, the design teams were required to show how their designs could be adapted to suit a number of variations on the core brief, covering different sizes of schools, different curriculum and organisational requirements and additional non-school support facilities. Full details of the brief are set out on pages 23-27.

The Design Process

Each design team was allocated a partner school and a ‘buddy’ within the Schools Building and Design Unit (SBDU) to act as a client. Buddies were intended to be their first points of contact within the DfES, to offer advice when needed and to monitor progress.

The main programme ran from June to October 2003, commencing with a two-day seminar encompassing workshops covering various aspects of school design. This was followed up by further sessions on issues such as ICT, off-site construction and landscaping, together with visits to notable schools – projects that are generally recognised for their design quality. Once design work was well under way, progress meetings were held where developing schemes were presented and reviewed. These enabled teams to network with each other and share ideas. There were also several milestone meetings.

The first of these meetings was held in September, where design teams presented their schemes to Focus Groups – one each for primary and secondary. These groups included headteachers (including some from the partner schools), bursars, education advisors and other architects experienced in school design. Each team received feedback on the views of the Focus Groups, together with comments made by group members who had been unable to attend the meetings, but had received sets of key drawings. They then had a limited time to respond to the comments before finalising their designs.

The majority of the design teams worked hard towards the end of the design period to ensure that the area was in line with the brief; with at least the net area required, but within the gross area assumed. This is a challenge in any design, but often a crucial issue to ensure the brief is fulfilled within budget.

While some teams took the decision to try to provide more area within the budget, most accepted that it was important to keep the gross area within limits, to ensure that the funding could provide a good specification at the highest allowable cost per m². This was particularly important as the requirements of BB87 and 93 are quite demanding.

At the beginning of December, after designs had been completed, the Commission for Architecture and the Built Environment (CABE) organised a Special Design Review Meeting where the teams were asked to present their

schemes to a committee of environment professionals. The committee had some background on the project brief beforehand and based the review on the key drawings, short presentations by the design teams, and a question and answer session. The full comments of the Special Design Review Meeting were passed on to the design teams and summaries of them are included in the case studies.

How to use the Compendium

This book draws together all eleven schemes in the form of case studies, highlighting the main elements of their designs. They represent diverse and different solutions that may suit a variety of sites, but the aim of this book is to highlight the best ideas and concepts that can be adapted to future school design. In the section before the case studies we take the opportunity to draw out emerging themes – innovative and/or notable design ideas that run through some or all of the exemplars, such as clusters of teaching spaces – of the brief as well as a summary that each of the design teams was asked to meet, with some commentary on how well they did. Following the case studies are schedules of accommodation, cost studies and an afterword indicating where we go from here.

The designs have been taken to RIBA Stage C, and we would anticipate that all of the schemes could be developed to the next stage with a real client and site. To support that process we are also publishing copies of each Design Team Report, which describe the background and applications for each design in a lot more detail. Equally, it would be perfectly valid for ideas from any number of the schemes to be used together in different contexts.

As the title suggests, the exemplars are not blueprints for how schools should be designed, but cover ideas and concepts that should help us to create Schools for the Future. Presented here as a stimulus to innovative, high quality design, they can be used to help create briefs, or as advanced starting points in the design process. They each need to be developed further for a specific client and site, and Local Education Authorities (LEAs) and individual schools will still need a full, high quality design team to design their own school projects. The exemplars must be seen in the context of other excellent, inspiring national and international school designs – built work which it is useful for clients commissioning new school buildings to study and visit.

emerging themes and the brief



Sarah Wigglesworth's primary school features over-sailing roofs and a pebble-like nursery



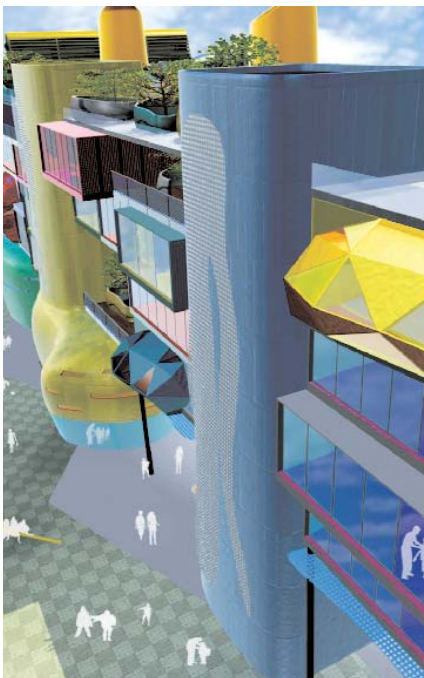
inspiration

The inspirational designs seen in these pages should positively influence the behaviour and enthusiasm of pupils and staff. A design should not in itself dictate a school's teaching methods or organisation. Instead, as these do, it should allow the schools' own ideas to be implemented, whether traditional or innovative

The aesthetics of some of the following schemes clearly capture the imagination as belonging to the twenty-first century. Other designs may appear more traditional from the outside, but offer interior spaces that can be the central heart of the school or give the school a distinctive character.

These designs offer a resource for school communities as they think about how they translate their visions for themselves into effective learning environments. Each design offers a unique view of what schools of the future could be like. They open up possibilities for schools to deliver a more

flexible curriculum, offer more facilities to the wider community, provide high quality working environments for staff, and create state-of-the-art learning spaces for pupils.



Alsop's 'test-bed' can include amorphous learning pods and stair towers



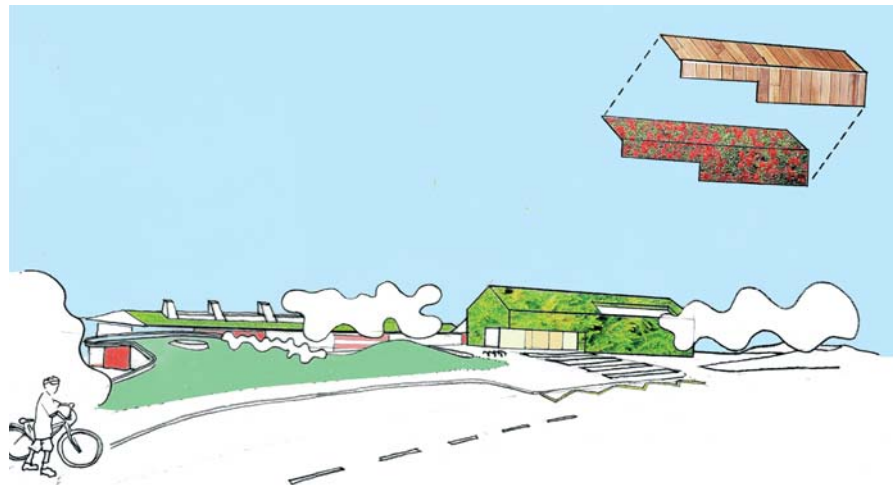
de Rijke Marsh Morgan's 'dura' will capture imaginations, but will clearly be appropriate only in certain settings



In their primary school design Walters and Cohen have a central 'heart space' accommodating a variety of activities

Bottom left:
de Rijke Marsh Morgan's classroom pods can be triangular or trapezoidal, offering configurations difficult to achieve with rectangular rooms. However, furniture and equipment layouts would need testing: rectangular rooms tend to offer the most flexible and efficient internal environment

Top right:
Cottrell + Vermeulen place the hall and a cyber café (also available to pupils as a supplement to the small ICT suite) at the front of the school. They envisage the building forming the street frontage in a variety of contexts. As such, it has a chameleon approach to façade options, taking on, for example, the claddings required by local planning regulations



innovation

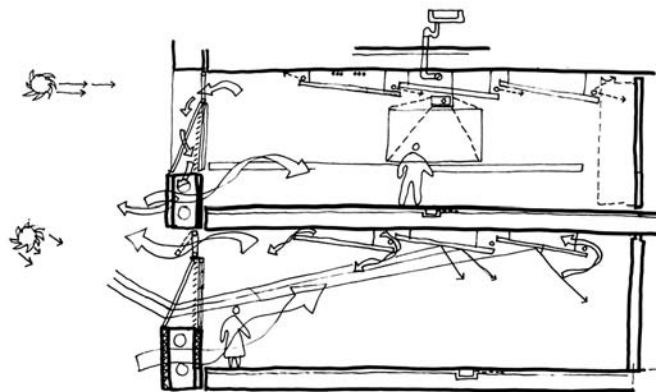
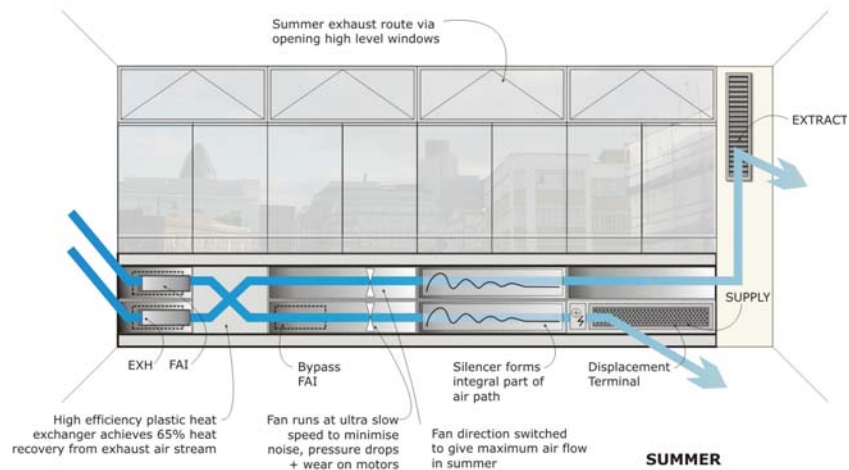
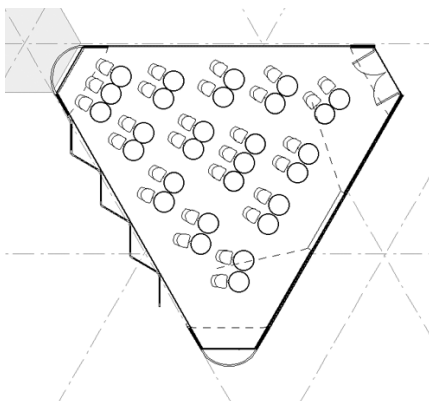
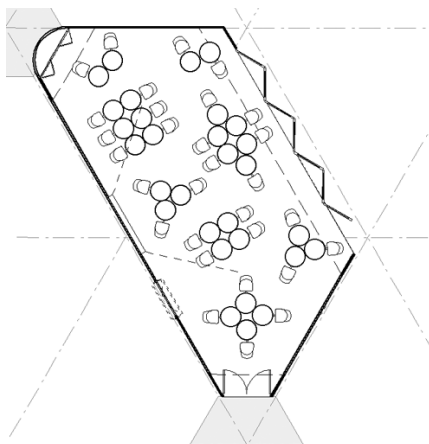
Design teams were encouraged to consider innovative solutions. The next few pages highlight concepts common to a number of teams, but developed in different ways to address the challenges of designing schools for the future

The design teams worked with their 'partner schools' to identify their needs and question some design traditions. Some teams proposed alternatives to rectangular classrooms, while others wrestled with the challenge to provide more area within the confines of the budget.

Many of the designs also involve innovative façades which can be altered to match the needs of the site or the school.

A modular approach has been investigated by many design teams, to make the most of

modern construction methods in any replication of the designs. Further work would need to be done to develop systems that would be cost effective, but off-site techniques could significantly reduce the time and cost involved in construction.



Penoyre and Prasad propose an innovative façade using glazing technology to enhance daylight and incorporating a sound-attenuated mechanical ventilation system, based on individual air handling and heat recovery units for each classroom within the wall space



The 'deck' level of de Rijke Marsh Morgan's secondary school includes open plan areas at the edge for social areas and individual learning. However, these may suffer acoustic conflicts with other open areas

Mace involved pupils in early workshops and tested their designs with 'scenario testing'



a school for us

The school community must be part of the design process, and it is beneficial to all to let pupils express their views. Pupils are an ever-changing group, but the teams have proposed ways to involve them in the continuing design process, and to give them their own space in social and study areas

At the beginning of the design process, many design teams organised user workshops with pupils and staff from their partner school. One drafted a user manual aimed at primary schools. Pupils had clear views about what would make their school better, often focusing on areas which are particularly important to them, including toilets and space to socialise, as well as the colour, shape and even sounds of the school environment.

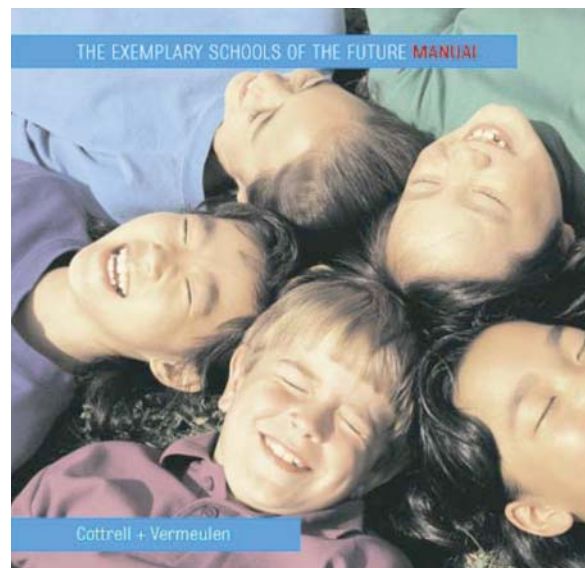
As discussed later, most schemes provide intimate or covered outdoor areas as a space to socialise during breaks, and some provide extra internal space for this. In line with the 14 to 19 agenda, many of the exemplar secondary school designs provide study areas for individual learning or informal ICT. The variety of settings, both within and beyond the requirements of the brief, ranges from large central resource areas to small

'break out' spaces. However, the need for shared ICT resources may be declining: in discussion with heads and educational advisors, the secondary exemplar brief is based on the option of large classrooms, to allow for an increasing amount of ICT in the class (as well as further inclusion of pupils with SEN or disabilities), and assumes IT rooms are only needed to teach IT as a subject.



Alsop's central atrium features bridge links from the main circulation, which is only on one

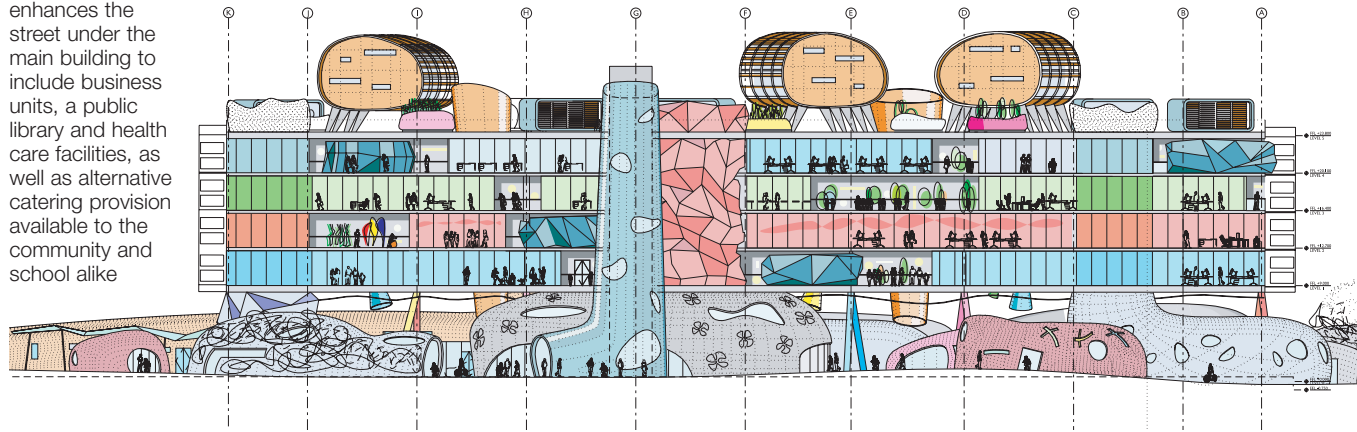
side but large enough for lockers, with social and study areas hung within the void



Cottrell + Vermeulen proposed a user manual aimed at helping primary

school pupils and staff to effectively set a good brief for new buildings

Alsop's inner city 'community campus' variation enhances the street under the main building to include business units, a public library and health care facilities, as well as alternative catering provision available to the community and school alike



in the community

All exemplar designs are inclusive, with features suitable for the pupils and, outside school hours, the wider community. Variations to the core brief include additional 'extended schools' facilities that can be used by the community during the school day, such as early years provision, a public library and a health centre

Many of the exemplar designs separate the buildings that can be used by the community from the main school buildings. Those with multi-storey solutions for confined sites have used this to allow the ground floor to be accessible to the community, with the facilities that might be shared, while remaining school areas are on the more secure upper levels.

The secondary school sports hall and primary school main activity hall were required to be designed to Sports England minimum

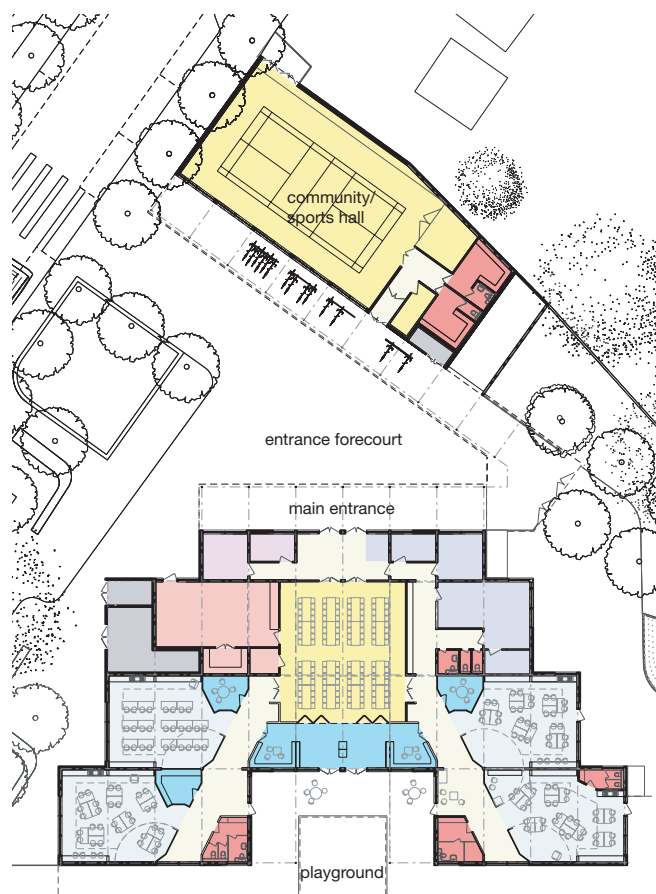
dimensions and specifications. Outdoor sports facilities include a multi-use games area on every site, as well as the option of a larger all-weather pitch on all but the most confined urban sites.

The brief for the exemplar primary school design included two supplementary spaces for community use during the school day – a parents'/community room and a social services/interview room.



Mace have allowed for further education facilities to be opposite the school, with a clear link between. These

could be in new buildings, or perhaps the original buildings where a school has been rebuilt on the same site



Marks Barfield's solution for rural primary schools allows the main hall to be available for the community during the school day: as the village hall in the smallest 1/2FE option (as shown here), or as an enhanced community provision in the 2FE 'extended school' variation. However, this can mean that the hall may be more difficult to access by pupils.

The studio space (which is supplementary area in the 1/2FE option) is enhanced by the circulation route to provide the dining area

Like all the primary school designs, Sarah Wigglesworth's scheme includes a large and airy main hall and an ICT suite – in this case linked to the library.

However, there may be limited options for the use of this space in the future, as computers become more common in the classbases and less necessary in a separate suite



schools for today

The brief required design teams to create schools that would respond to the demands of current teaching styles and organisation: suitable, safe and secure places for staff to work; stimulating and inclusive for all pupils to learn

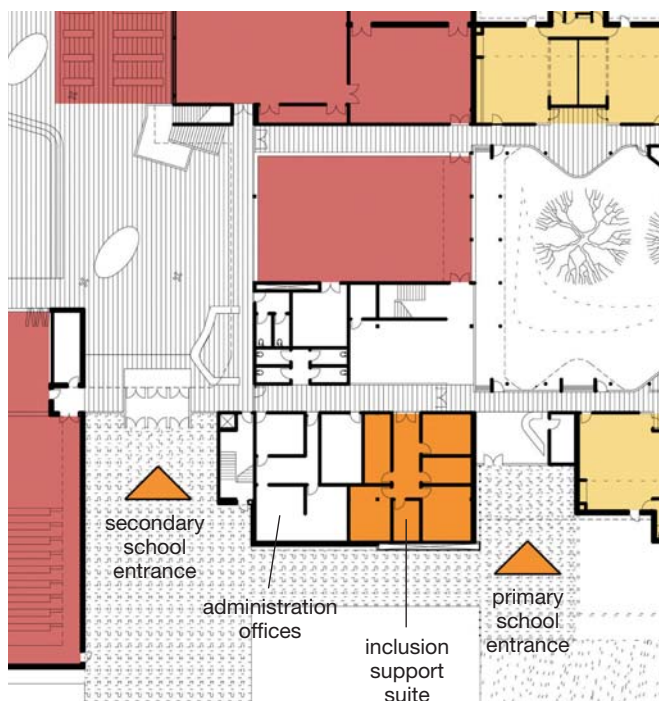
As discussed on page 23, the exemplar 'core' brief for both the primary and secondary schools is based on a typical curriculum and organisation, with other current models as variations. This is to ensure that any exemplar design will be completely suitable for contemporary teaching, while allowing alternative options in the future.

For instance, the 2FE primary school 'core' brief includes an ICT suite for current use, but this area would probably be used for other

purposes in the future as ICT becomes more common, smaller and more mobile: in theory, it could be used to enhance the size of all the classbases.

The brief includes areas to address the needs of the workforce reform agenda (see page 24). It also requires the designs to provide a suitable level of security, not just in terms of surveillance or supervised entrances, but also in an overall feeling of a secure, organised, safe environment, both inside and out.

The designs were required to show an understanding of equal opportunities in education for everyone. This includes appropriate provision for individual learning needs, enabling full participation in life at school and in activities outside the school day, and thus promoting a sense of being part of the community. A variation to both core briefs is an integrated complex needs resource for pupils with complex and severe SEN and disabilities that would require specialist facilities over and above those in the 'core' brief.



Feilden Clegg Bradley's 'all through' school has shared facilities for pupils with SEN and disabilities, which are central to the whole school and suitable for all ages. This allows the maximum specialisation of facilities, rather than replicating resources



As well as offering a secure design, Walters and Cohen's primary school design includes spaces which enable teachers to make the most of their time for planning, preparation and assessment - a key feature of the Government's

school workforce reform agenda. A staff room and terrace for relaxing and socialising are on the first floor above a 'quiet' workspace. However, the need for a lift to such a small amount of first floor space is not an economic solution

Penoyre and Prasad's multi-storey solution can be organised to provide most teaching areas for each year group on one floor, along

with related social and staff space. All the facilities that can be used by the community out of school hours are on the ground floor



ideas for tomorrow

The brief also required designs that could easily be adapted to new and innovative educational ideas in the next decade and beyond. We don't yet know what these ideas might be, but the design teams envisaged some possible scenarios

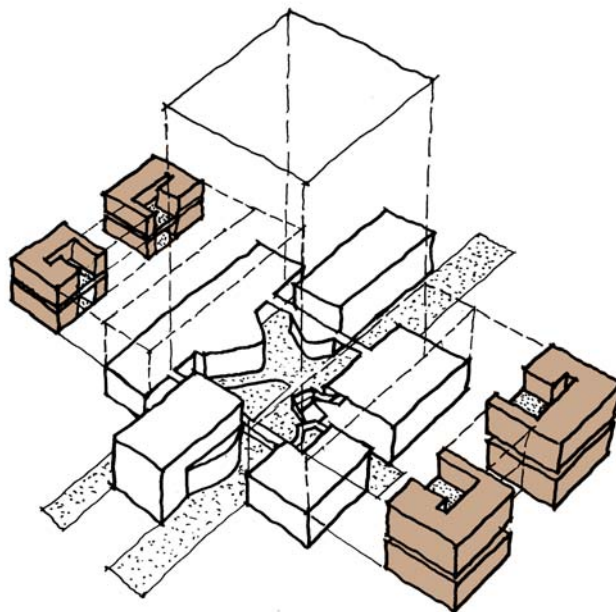


Most of the design teams explored ways that schools might develop in the future, as they are given more autonomy to change the length of school days, introduce vocational studies in and out of the school environment, and organise in federated or smaller units.

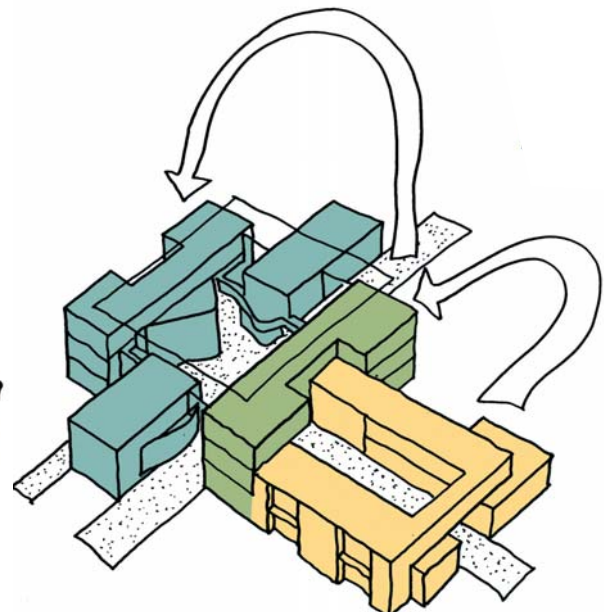
The 'all-through' school was based on a core brief of a 2FE primary and 6FE secondary school combined, with the option of 4FE in every year. However, this and other options need to be fully researched to gauge the educational, pastoral and transport implications.

Many of the teams developed opportunities for reorganising large schools into smaller pastoral groups, particularly in the secondary and 'all-through' schools. A common concept is the 'school within a school', where all the general and practical teaching spaces for one year group or house group can be provided in one distinct area, with only large and performance spaces being shared. This could help pupils to have a stronger sense of their own 'place', and also reduce the time used in and potential crowding related to circulating around the school.

Wilkinson Eyre's 'learning clusters' can provide 'a school within a school' in each one

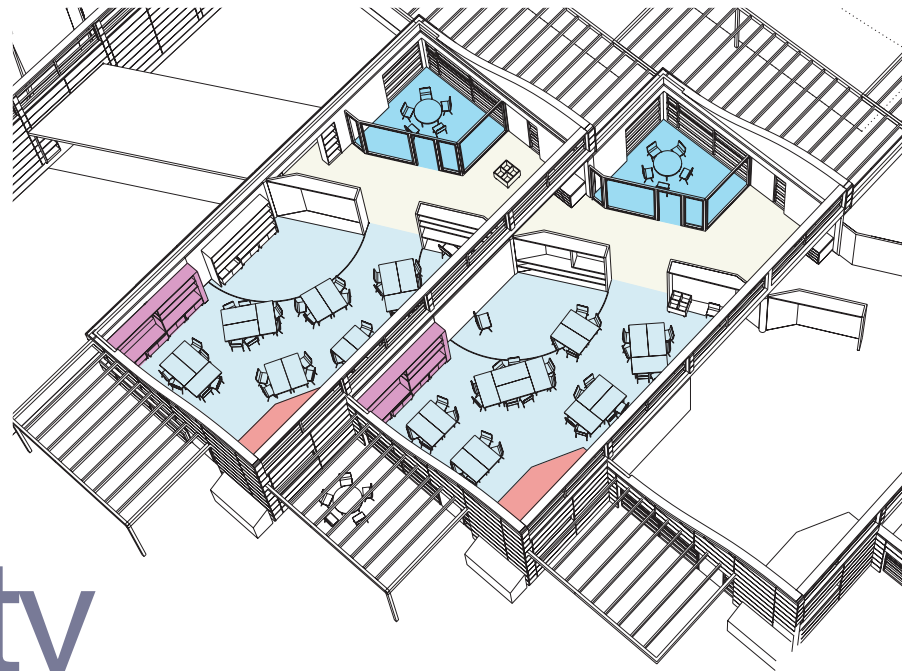


Feilden Clegg Bradley's 'all-through' school can be organised in various ways, including a middle school with year bases in each corner



Marks Barfield offers deliverable classrooms by using a simple replicable box as the basis of the primary school design, although this can have limitations. Within each box, they envisage classbases without

doors (computer modelling has shown the acoustics to be adequate). The internal walls in each box can be moved or removed to create larger spaces, or to use the ICT area as part of a classbase



flexibility

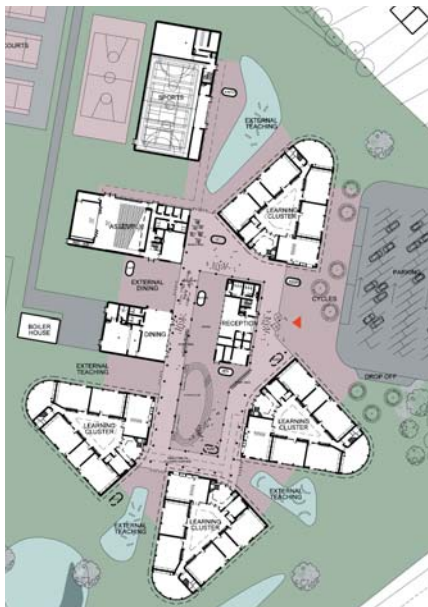
To allow for future change, flexibility and adaptability are key design requirements for any school. In the short term, flexibility is needed to rearrange the teaching environment to suit different activities. This may be as simple as moving furniture and equipment, but the size and shape of any room must suit a variety of layouts

Most design teams have showed a variety of indicative furniture layouts in teaching spaces, but some of these would need to be more thoroughly tested at the next design stage.

In some of the designs, the building provides flexibility through moving walls, although this

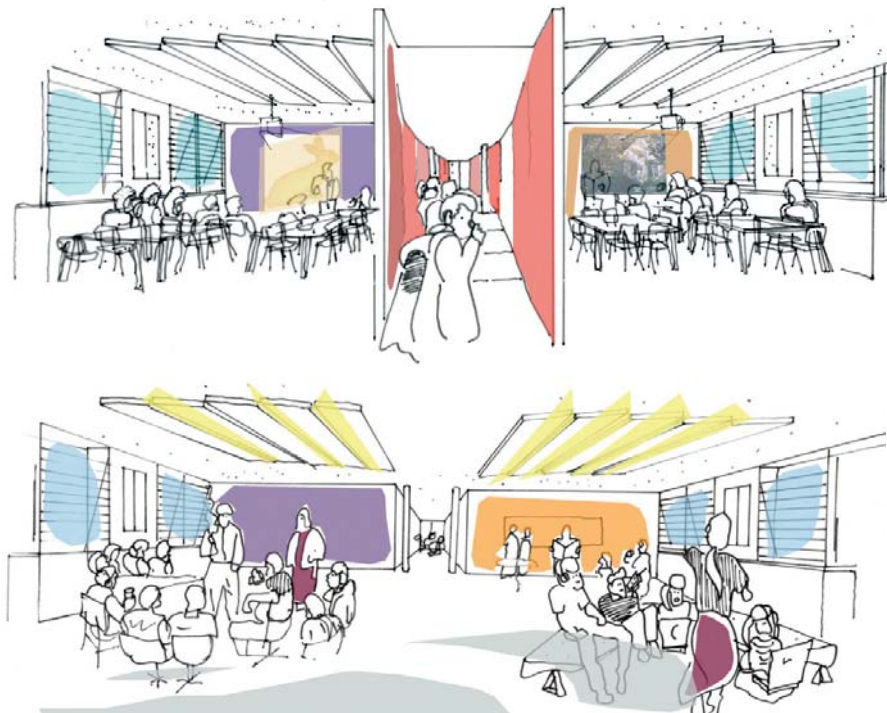
is often not as simple as it may sound; the acoustic insulation of a sliding/folding door is rarely sufficient in itself, so further acoustic design is needed to ensure compliance with the requirements of BB93. The option of merging spaces can be useful for examinations at some times of the year.

Other designs use relocatable 'pods' for small group rooms, stores or similar. This helps to address the need for small group rooms to have an acoustic separation for use by assistants or as 'break-out' spaces for pupils with behavioural difficulties.



Wilkinson Eyre's scheme uses relocatable pods within the central 'agora' for flexibility, and also offers adaptability through a collection of buildings which could be replicated in any

number around any shape of 'agora'. This may be particularly appropriate for schools that are modernising some existing buildings and replacing others

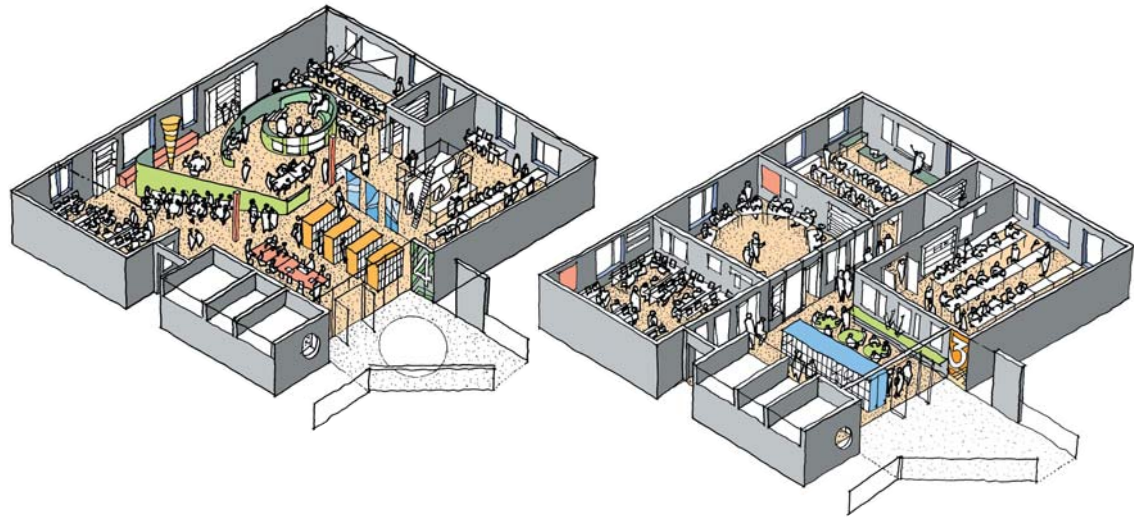


Penoyre and Prasad's clusters include a configuration of movable and fixed partition walls that

allow various options whilst providing adequate sound separation between teaching spaces. Each cluster can

provide various sizes of rooms, from standard classrooms to one space for open plan learning

Feilden Clegg Bradley have an adaptable four-room cluster in each corner of the secondary portion of their all-through school, with facilities in between offering the option of further rooms, but not as part of the group. One of each set is a larger room, offering an excellent group facility for a 4FE middle school, with four classes in each year, or for other arrangements of four groups, but offering limited options for other sizes of group



adaptability

In the longer term, adaptability is needed over the life of the school to allow internal walls to be moved to change the size or use of spaces or suites of spaces. The exemplar designs were also required to be able to be adapted from the start to suit different school sites, sizes and types

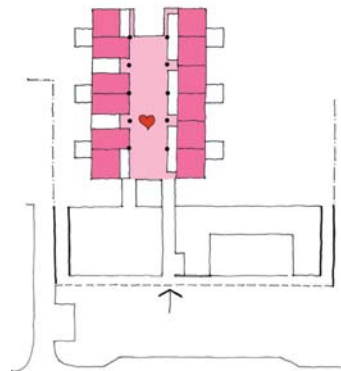
Walters and Cohen use movable pods for stores or small group rooms, as well as movable shelving units, to allow their central

heart space to be flexible. The primary school design also uses modular toilet blocks which may be manufactured off-site

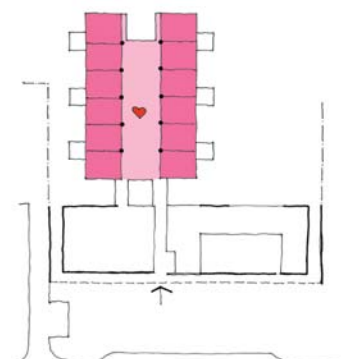
Perhaps the most common and frequent changes that schools are required to address are changing curriculum needs and the use of ICT. This can involve a relatively minor change of room use, but relocating a suite of computers for example, or ensuring that one more art room can be accommodated within the suite of art spaces, can often be very difficult in current school designs. The organisational and curriculum variations to the core brief demonstrate how each scheme has addressed this.

parts of the school rather than everywhere (for instance for GNVQ courses with a heavy use of ICT).

As the exemplar designs are intended to be replicable in different sites and situations, most of the design teams have developed a 'kit of parts' that can be adapted in the initial design to accommodate schools of different sizes or age ranges, or with differing organisations or teaching methods. Again, variations to the core brief included other sizes and organisational systems to test how the schemes could be adapted, for instance as a phased approach to an increasing number on roll.



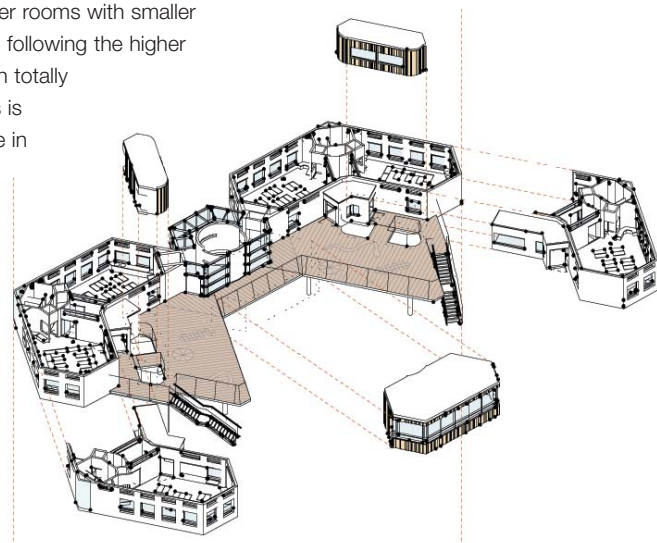
49m² classrooms



63m² classrooms

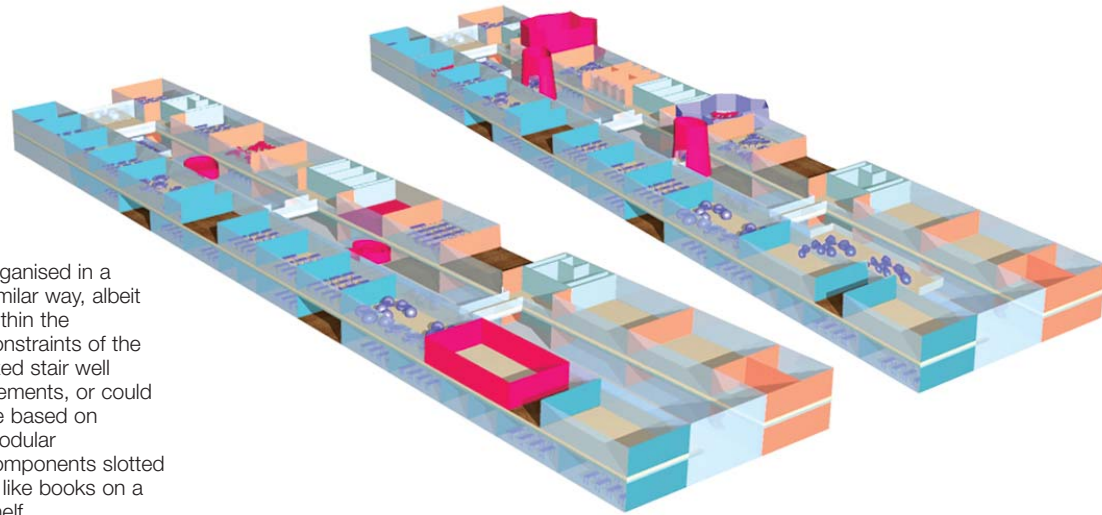
Many design teams foresee more open plan arrangements being more common in the future, and have developed learning areas that could provide a traditional arrangement, or could be used as larger rooms with smaller seminar rooms adjacent, following the higher education model, or even totally open plan. However, this is perhaps most likely to be in

Building Design Partnership use a modular approach in their multi-storey city primary school. The 2FE core brief can be extended to 3FE by the addition of further standard units



Also use a multi-storey, extendable 7.2m zone of general space on one side of an atrium. This space can be used to provide any range of spaces from classbases to open plan, with a 9m wide more heavily serviced zone on the atrium's other side. This could be

organised in a similar way, albeit within the constraints of the fixed stair well elements, or could be based on modular components slotted in like books on a shelf

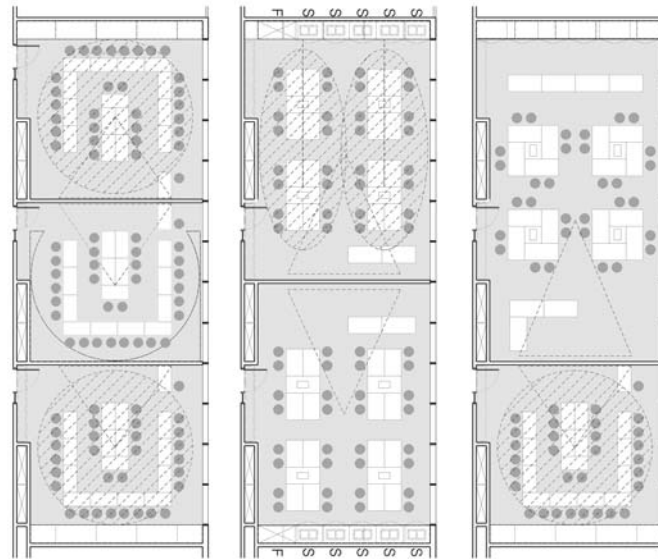


linear cloisters

Extendable linear forms have been used by many of the design teams to allow easy expansion of the school, or provide various sizes to be used on other sites. These forms offer the best solution to the ongoing adaptability requirements of changing room sizes or functions over the life of the school

In a long, uninterrupted space, any arrangement of rooms is possible and easily achievable over time. Six 57m² primary classbases and a 36m² ICT suite, for instance, could be adapted to become six 63m² classbases in the future. However, in a secondary school, this method may mean that departments or year groups can lack an identity.

A shorter space of 180m² offers a reasonable number of options, including three 60m² classrooms, two 90m² laboratories or practical spaces, or one large area with smaller group rooms adjacent. Secondary schemes with six classroom learning clusters include an area of about 100m² on each side of a corridor or resource area.



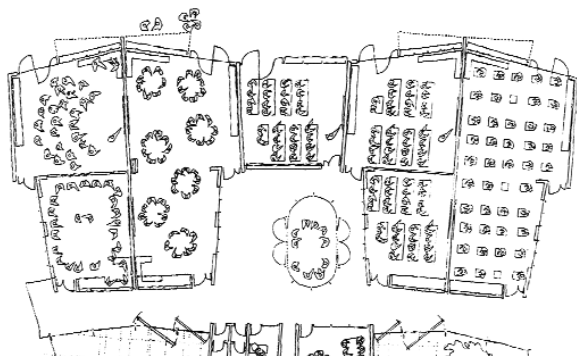
Wilkinson Eyre (like Penoyre and Prasad) provide six-room clusters with two sets of three rooms of about 60m² on either side of a circulation area. This 180m² area is proving to offer a wide variety of options for future adaptability.

The first floor terrace in each cluster block would be pleasant when south-facing, and this and the double height space at the other end can provide opportunities for extension



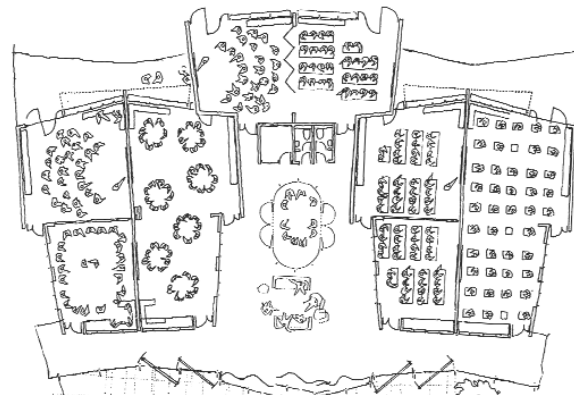
Cottrell + Vermeulen (like Sarah Wigglesworth) use a line of classbases off an extendable circulation route, although this can involve long travel distances in larger primary schools. The variety of classbase sizes required by the brief is achieved in both cases by

moving the wall between the classbase and the corridor, so the corridor can be used for shared teaching when there are smaller classrooms. However, moving the walls between classbases would allow still more options



Mace use a four-room cluster as the basis of their core secondary school scheme, although

they also suggest five- and six-room options as shown above. Each cluster also has a small



central resource area which can give the cluster a character and provide welcome additional

space, although this may be above the brief requirements and the budget

learning clusters

Clusters of classes, in various forms, are the common theme in almost all of the secondary schemes, as well as the all-through school. User focus groups saw the advantages of this layout, which clearly enhances a feeling of belonging for each class, whether as part of a year group, house group or department

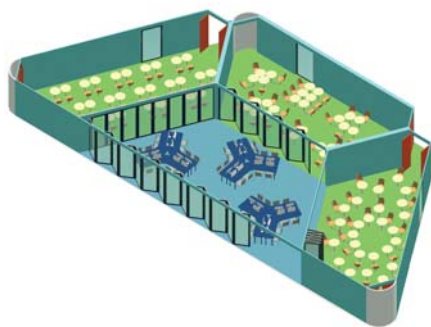
However, this option may not address a common need for adaptability in a secondary school: the varying sizes of departments and even year groups. Even in clusters of six, a seventh classroom is inevitably 'left out in the cold', with less links to the rest of the group than in a more traditional linear arrangement.

Four of the design teams have included four-room learning clusters, but four rooms are of limited use when the brief is for a 6FE school with six registration groups in each year, a varying number of rooms in each department (ranging from five to ten), and five year groups, if one chooses a house system.

Some offer six-room clusters, which can be more appropriate. Some also have larger central resource areas which may be more able to be used, for instance, for timetabled IT spaces for a group of up to 30, and can also be used for practical spaces like Design and Technology or art.

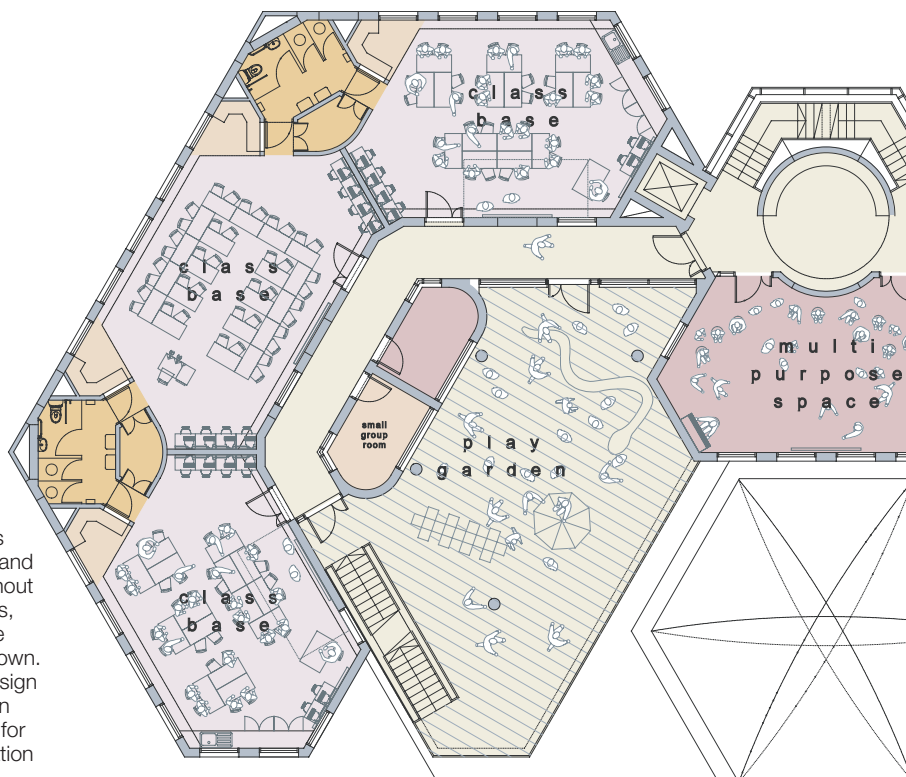
de Rijke Marsh Morgan's trapezoidal classrooms can form clusters around ICT rooms or social

areas, although these central spaces could be hard to use for timetabled teaching groups



Building Design Partnership's 'beehive' school uses a hexagonal module as the basis of its multi-storey primary school design. Like dRMM, this offers a configuration which

usefully encloses the central area and 'play decks' without unusable corners, particularly in the 3FE variation shown. However, the design grid imposed can limit the options for internal organisation



Feilden Clegg Bradley provide a very large atrium, considerably in excess of the requirements of the brief. The scheme shown is above the budget, but the central space could be reduced in size at the next design stage and still fulfil its functions and provide a heart to the school



indoor courtyards

Many of the design teams have included area or volume that is extra to the brief but within budget, by exploring the opportunities of merging the line between outside and inside space; from the covered external 'agora', through covered courtyard, street, light link and atrium, to the 'dura' – enclosing the entire school in a weatherproof 'bubble'

Extending the envelope in this way is a concept worth pursuing. Central covered courtyards of various kinds can provide a useful heart to a school, a social area and much sought-after covered play area. However, particularly if this is above the budget, it can be at the expense of other facilities that may be wished for, but that need more enclosed accommodation.



Walters and Cohen's primary school has a high central 'heart' space accommodating many functions. However, the acoustic implications of some of these functions only being separated by stores or screens have yet to be fully tested

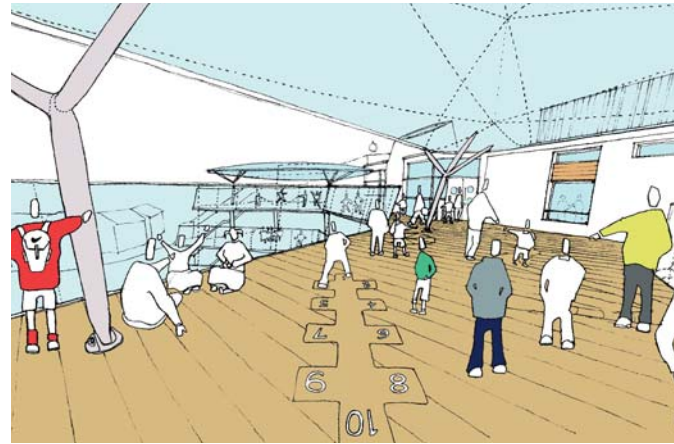
Wilkinson Eyre's scheme centres around an 'agora', which can provide a covered area for visitors and parents, as well as the link between school buildings, depending on the level of security chosen. It provides significantly more covered area within the budget than could be built as enclosed space, and has no heating costs





Left: Penoyre and Prasad provide double height 'sky-gardens' in their multi-storey design

Right: Building Design Partnership use play decks at upper levels to provide informal and social areas outside all classbases. The central space may be covered to offer further additional space at ground floor level



outdoor classrooms

Landscaping is often vulnerable when funding has to be reduced, but many of the design teams have considered it as a key part of the overall design and proposed ambitious options as the basis of future development

Sarah Wigglesworth's landscape architect included intimate

play gardens for each ground floor classroom, as well as other features



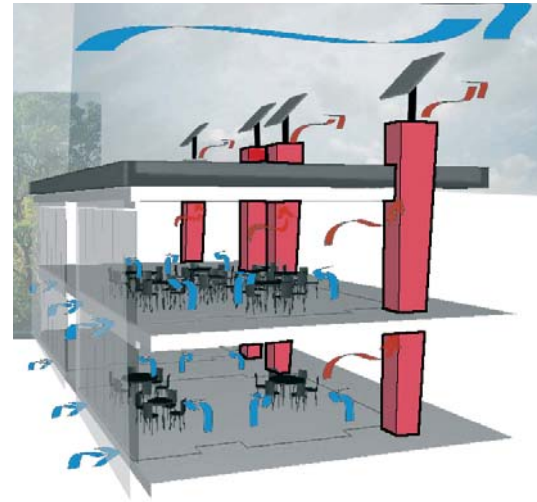
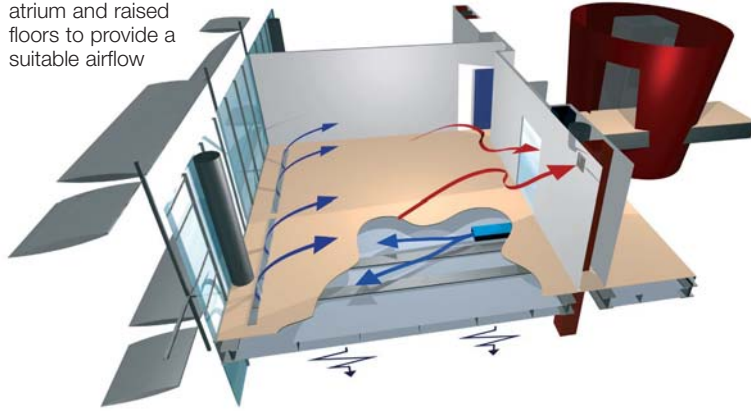
Learning through the landscape is already a growing trend, particularly in the primary sector. With the encouragement of the Learning through Landscape Trust, many of the primary and secondary design teams considered how the grounds could enhance learning and links with the community, through allotments, gardens and social areas as well as sports facilities.

Those design teams that were given confined urban sites considered 'sky gardens', 'play decks' and terraces at upper levels to make up for the lack of external informal and social areas on the ground. All such sites were required to have a multi-use games area on the site, so that some formal games could be played without the transport and timetabling problems of accessing off-site facilities.



Marks Barfield envisage access to the playing fields being through natural pathways in the meadowland in the centre of the school

Alsop's classroom design uses the atrium and raised floors to provide a suitable airflow



Sarah Wigglesworth's design uses two natural ventilation solutions depending on site context: opening windows in

a double façade, or underfloor displacement supply and extract through chimneys using the passive stack effect

comfort

Comfort is important for effective teaching and learning. Although the details which allow pupils and staff simply to be comfortable may not be instantly noticeable in the school of the future, they are perhaps the most important attributes of any school design

Vision is enhanced by indirect lighting, the absence of glare and clear sight lines. Hearing is enhanced by good room acoustics and sound insulation from noise sources. Efficient heating, ventilation and humidity control, together with the choice of environmentally friendly materials, produce fresh unpolluted air and a comfortable internal environment.

Clerestory windows, north lights and roof lights are used in many exemplar designs to achieve substantially day-lit spaces which are free from glare. The positioning of whiteboards and electronic screens on walls perpendicular to glazed external elevations effectively prevents disabling glare. And solar shading devices fine-tune the lighting through the day and the seasons.

The Mace design uses hybrid ventilation with mechanical supply and natural extract. An underfloor labyrinth plenum tempers the supply air temperature, and a borehole provides additional heating and cooling when required.

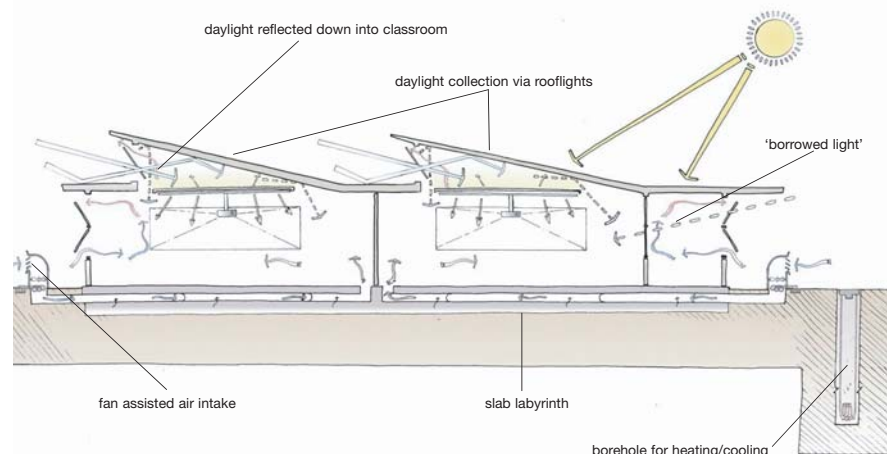
Similarly, Walters and Cohen (see page 34) provide forced ventilation to the central heart space and its movable pods through ducts in the floor, together with natural extract through high level windows. Their single storey classrooms are naturally ventilated

With the new generation of fluorescent lights, or luminaires, it is important to control the brightness of the light sources. The design teams have done this by using luminaires with a good component of uplight, or by using indirect lighting.

The introduction of fresh air without drafts in winter and overheating in summer has been a priority for the designers. The solutions range from natural ventilation, through hybrid ventilation using fan power to assist the natural 'stack' effect of hot air rising, through to mechanical ventilation systems with heat recovery.

Solar shading and the use of thermal mass and night cooling have been the most popular strategies to avoid summertime overheating. Night cooling often relies on windows being open overnight, which can be a security issue. Some designers have incorporated the thermal mass as hollow core floors, which avoids the need to open windows at night.

Mechanical or hybrid ventilation is a common feature throughout the exemplar designs. As many of the environmental engineers have pointed out, fan assisted air flow, through ducting or underfloor plenums, can ensure sufficient air changes without excessive running costs.



Wilkinson Eyre's teaching blocks use chimneys to provide natural ventilation to suit different times of the day and year.

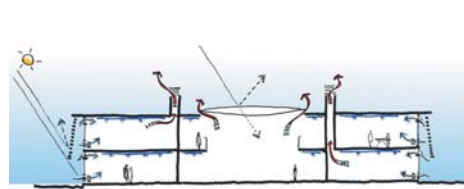
In summer:

- all windows and vents open for maximum cross-flow ventilation and night cooling (vents must be secure and weather tight);
- tall spaces provide warm air reservoir;
- exposed concrete soffit cooled down overnight provides passive cooling by absorbing heat from people, lights and equipment;
- external shading reduces solar gain;

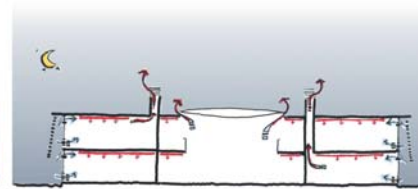
- vegetation reduces ground reflectance and provides shading.

In winter:

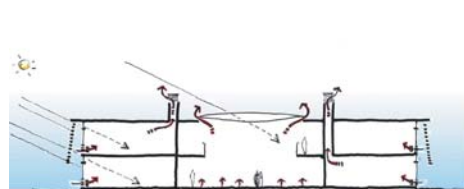
- chimney vents open only in the day, to provide adequate fresh air;
- fresh air through perimeter vents is warmed by radiators to avoid draughts;
- windows and vents closed overnight and building well sealed and insulated to preserve heat;
- carbon dioxide indicator shows teacher if levels are high



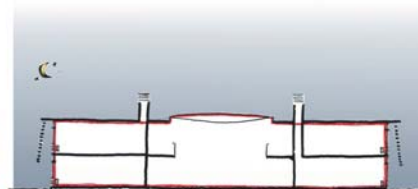
summer day



summer night



winter day



winter night

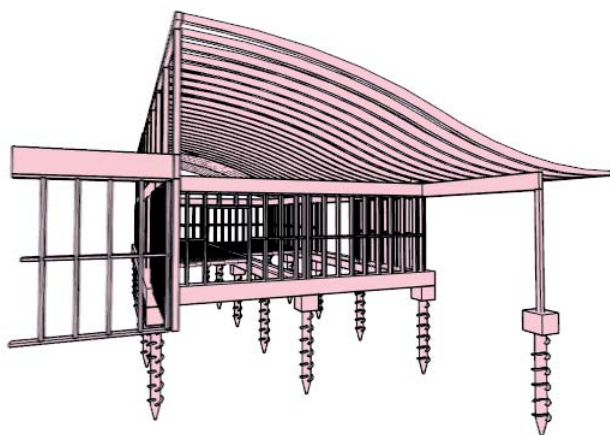
sustainability

To ensure maximum sustainability, a wide range of factors, including site security, community use and access and inclusion, should be considered alongside better-known environmental factors such as energy efficiency and waste minimisation

Sustainable materials feature in a number of the designs. Some use timber, though others have used concrete, particularly in floors and roofs, to provide the thermal mass for night cooling and avoidance of summertime overheating, using the building as a 'heat sink'. Concrete can be costly in terms of embodied energy, although this can be reduced somewhat through recycled local aggregates. A number of designs have sedum roofs.

Boreholes, earth tubes and heat storage in both the building structure and the ground have been used by a number of the design teams to reduce energy loads. Some designs offer the possibility of using combined heat and power, wood fuel boilers or solar energy for heating of hot water. Most designs include further options for using renewable energy to reduce the carbon emissions. By the inclusion of renewable energy sources such as wind, photovoltaics and wood-fired boilers burning locally coppiced wood, the zero carbon school is achievable.

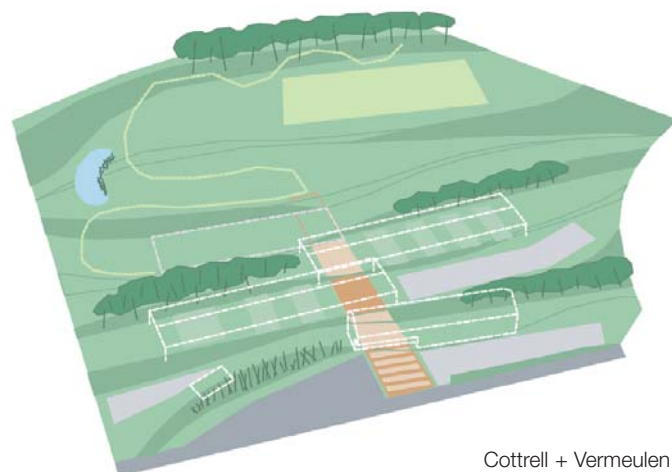
To be sustainable, the economic assessment of the designs needs to be based on Whole Life Costs and Environmental Costs. All the teams have carried out whole life cycle costs, as required by the brief. The life cycle of buildings and components is a variable which needs further detailed discussion. A further development which could be pursued in the later stages of the designs would be to assess different options using environmental cost tools, such as 'ENVEST'.



The Marks Barfield design, with its screwed piles and timber structure and panelling, touches the earth lightly and

uses sustainable materials. The standard section allows a flow of air from a window on the south side to

clerestory glazing on the north side, above the roof line of the adjacent block



Cottrell + Vermeulen considered the site implications and sought to find alternative forms of thermal mass such as rammed earth



the brief

This section summarises the requirements of the exemplar design brief for both the primary and secondary schools, and highlights how the design teams have generally responded to these demands

The design briefs for the exemplar primary and secondary school designs are available in full on the web site, and summarised in this section. The brief for the all-through school, for 3 to 18 year olds, is a combination of the two. The briefs both comprise five sections:

- Section 1: Common Aspirations – the Vision for the School;
- Section 2: Specific Design Requirements;
- Section 3: Core Brief and Variations;
- Section 4: Schedules of Accommodation;
- Section 5: Implementation (including off-site construction opportunities).

Sections 1, 2 and 5 identify the common issues that needed to be addressed by all the design teams. These issues are discussed below, with some discussion as to how the designs have addressed them.

Section 3 identifies the 'core' brief and the variations that both the primary and secondary designs needed to achieve. Flexibility and adaptability were the key requirements of the briefs, and the variations were identified to demonstrate the adaptability of the designs.

The core exemplar primary school designs are based on a brief for a 420-place 5 to 11 school with a 26-place nursery – two 'forms of entry' (2FE). The core secondary designs are based on a 1150-place 11 to 18 school – six forms of entry (6FE), with a sixth form of around 250. Each core brief was based on a typical curriculum and organisation. However, the adaptability of each design was required to allow it to be varied to suit the following:

- **Alternative sites:** each design team was asked to base their design on one of six real but anonymous primary or secondary school sites, but also asked to show how the design could be adapted to suit one or two others. Each site differed in context, characteristics and constraints. Two in each sector were urban, and of these, one

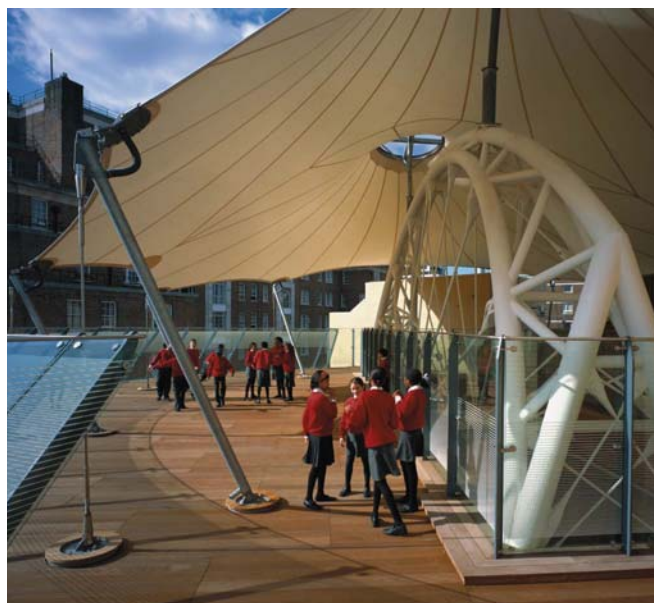
was confined and required a multi-storey solution and perhaps external play-decks.

- **A range of sizes:** the primary school alternatives were for 1FE or 3FE, with $\frac{1}{2}$ FE as an option in the rural site only (P3). The secondary school was required to be built in phases, starting at 600 with no sixth form, rising to 850 including a sixth form, and eventually expanding to 1600 11 to 18 places.
- **Alternatives for management and organisation:** the primary school variations required infants and juniors to have their own local resources, or alternatively the nursery and reception classes to be organised as a separate foundation stage unit. The core secondary brief was based on departments with staff workrooms, while variations required a lower and upper school split with separate sixth form accommodation, or a faculty-based structure across all years with no specialist sixth form spaces.
- **Curriculum delivery options:** the primary core brief was based on 57m² classbases, an ICT suite and a creative space. Variations within the same basic teaching

area assumed most activities to take place in 63m² classrooms, or 49m² classbases with all practical activities in shared teaching areas. In practice most designs allow a mix of these. The secondary variations altered the schedule of teaching spaces to emphasise different parts of the curriculum, for instance to suit different specialisms – again within the same overall teaching area.

- **Supplementary facilities:** although all the exemplar designs are inclusive and allow for community use outside the school day, each design was required to allow for the possible addition of a Children's Centre **or** extended school facilities **or** a special educational needs (SEN) support centre for complex needs **or** community facilities: sports in the primary school and a public library in the secondary school.

There is, in theory, an infinite number of possible variations, but the design teams were particularly asked to consider ten only in the primary brief and twelve only in the secondary school, to be representative of the possibilities.



Illustrations in this section are of existing schools and precedent schemes, both in this country and abroad

Building Design Partnership's primary school design for Hampden Gurney School includes 'play decks' to provide external informal and social area on a very confined inner-city site

Each of the variations had to be tested only against a design where all other criteria remain as defined for the core so, for instance, the alternative sites were to be tested only against the core size, organisation and curriculum, with no supplementary spaces.

Some discussion about how the designs accomplish these onerous requirements has been set out in the previous pages.

Section 4 of the brief lists the schedule of accommodation for the core brief, as shown in pages 114 to 117 of this book, with a comparison of the 'as designed' areas of each scheme. Relevant legislation and guidance was also given to the design teams during the process, as well as detailed requirements for each room in the schedule of accommodation, in the form of comprehensive 'room data sheets'.

Section 1: Common Aspirations – the Vision for the School

Every school will have individual aspirations for the identity, ethos and culture of its environment. Section 1 of the design briefs used the collective views of those involved in

the Project Steering Group and representative school heads to set out common issues that all school designs should address.

Educational Performance

As a prime concern, the design should enhance opportunities to raise standards by providing appropriate, adaptable accommodation offering a stimulating learning environment.

An Inspirational Environment

All designs should ideally signal an inspirational culture and ethos: from the external façade, through the entrance foyer, to the internal arrangement of spaces. The nature of the exemplar designs means that they should be able to be replicable whilst offering any school a unique identity.

As discussed earlier, the exemplar designs offer a wide variety of inspiring environments. While some have revisited the traditional shape of the classroom, many have offered the opportunity for more flexible and open teaching facilities. Some have proposed unconventional shapes and materials while others have used simpler forms to allow bonus area of atrium space to be provided.

Staff Satisfaction and the School Workforce

The quality of the working environment is essential for the whole of the workforce – support staff as well as teachers and headteachers. There are of course issues of self-esteem and motivation (and therefore links with recruitment and retention). But school design needs to reflect the implications of the workforce reform agenda and the contractual elements of the National Agreement 'Raising Standards and Tackling Workload', which will impact on all schools.

The core of this agenda is creating capacity for teachers to focus on teaching – helping schools to deliver more effectively the personalised teaching and learning that pupils and parents are entitled to expect. The central element is more support staff undertaking activities that free teachers to concentrate on their core professional responsibilities. Accommodation will increasingly need to reflect the implications of more adults in schools. But it must also provide teaching spaces that can be adapted to different models of curriculum delivery, and space that enables teachers to get the most out of the time they will be guaranteed for preparation, planning and assessment.

The demands of workforce reform are implicitly addressed in the flexible solutions that all the teams identify. They are more explicitly brought out by a number of the designs in terms of the needs of support staff, the implications of more adults working in schools and team teaching.

Pupil Satisfaction

Pupils' satisfaction with their environment can affect behaviour and self-esteem, and ultimately willingness and ability to learn. All pupils, including those with SEN and disabilities, should feel that their needs are respected – not only in teaching areas, but in toilets, circulation and playgrounds.

The design teams collated input and feedback from pupils and students at their partner schools, and some got further advice, for instance from School Works and the Sorrell Foundation.

Community Involvement

Involving and benefiting the community is a key role of the School for the Future. All exemplar designs should be able to offer sports and other facilities to others out of school hours, and may be linked to local regeneration.



Design quality is a feature of recent school projects, such as Bexley Business Academy. CABI 'enablers' are involved in many others

Extended School provision, over and above community access to school facilities outside the school day (and the parents'/community room and social services/interview room in the primary school brief) was included in a variation to the brief as further area that could be added to the building. The primary school variations incorporated the early years provision, along with community hall and changing room enhancements appropriate for a Sure Start scheme.

Design Quality

Quality of design can be difficult to measure, but is clearly the prime aspiration for exemplar designs. The Commission for Architecture and the Built Environment (CABE) have identified good design as a mix of the following attributes:

- functionality in use, or fitness for purpose, which in this case can be checked against the criteria in this brief;
- build quality, including the need for whole life cost principles to be used (as discussed in Section 5 of the brief);
- efficiency and sustainability, ensuring the design allows buildings to be on time and on cost, with environmental standards as described in Section 2 of the brief;
- designing in context, including the site and existing building, but also the need for the total design to be seen as a homogeneous whole;
- aesthetic quality, and the need for a non-institutional, individual character.

Section 1 of the brief concentrates on the last of these issues, as the others are covered elsewhere.

Opportunities for Innovation

As discussed earlier, the brief emphasised the importance of the exemplar designs offering opportunities for schools to be innovative in the future. As an example of this, it highlighted the aspiration for social areas and appropriate dining facilities to be achievable within the overall area or budget, as so much of the school is empty at lunch breaks but does not currently offer these social options. Although some related innovative ideas were proposed, the dining issue was not thoroughly addressed.

Section 2: Specific Design Requirements

All exemplar designs were required to satisfy basic design criteria, at least to the recommended standards described in Section 2 of the brief.

A glazed street in Stadtische Gesamtschule Barmen in Germany provides an attractive place for socialising and recreation within the circulation area



Flexibility and Adaptability

As discussed above, short term flexibility and longer term adaptability are the key design requirements: from the ongoing adaptability of being able to change the type or size of teaching rooms in the future, to the overarching adaptability of creating alternative designs from the original 'kit of parts' to suit different sites or sizes of school. Section 2 of the brief set the minimum criteria for flexibility and adaptability.

Examples in the previous pages show how the design teams addressed this critical issue. All the teams took on the need for an overarching adaptability to change the design from the start to suit different sites or types of school. However, the issue of ongoing adaptability – for minor changes over the life of the school – was not as universally understood.

The particular problem for primary schools is whether to have small classbases and shared facilities such as ICT suites and creative spaces, or to have all activities except those in the hall or studio in larger classbases, within the same overall basic teaching area. Most primary designs do not allow this choice to be easily changed once the school is built, so the lesson appears to be to ensure this is right before you build. The core brief of 57m² classbases and some shared facilities offers a reasonable middle way.

Safety and Security

The safety and security of pupils, staff and other users of school buildings was a paramount requirement of the brief, with the

protection of buildings being a secondary issue. However, proactive design strategies and use of appropriate security measures can help to protect both users and property.

All schools should consider what access control measures they need, but the exemplar brief included the following requirements:

- Site boundaries need to be clearly defined, using suitable fencing where necessary, so that the difference between public and private space is obvious. Access points should be restricted to the practical minimum, with any remote entrances being open only at the start and end of the school day.
- The location of the main entrance to the school building should be obvious and visible to any visitor approaching from the front gate, which will also help ensure that visitors are visible to school staff.
- Reception areas need to be welcoming, while also acting as 'air locks' so that no one can penetrate further into the school until permitted.
- Beyond reception, facilities are best zoned, so that those intended for added community use are easily reached without accessing other parts of the school. This enables heating and lighting services to be zoned, as well as simplifying security systems.

Most of the designs have achieved good zoning of accommodation, but only five have receptions planned on the 'air lock' principle. A few designs rely on the use of smart cards at entrances for reception areas to work. Others are less well planned in this respect.

General security is a concern: more than half the designs include alcoves and concealed areas where people can hide; a similar number permit easy access to roofs, from where people could reach upper windows, rooflights and inner courtyards. Zurich Municipal (ZM) surveyors reviewed the designs and were concerned about large areas of glazing in a number of the designs, and their vulnerability to vandalism. However, that must be balanced against daylighting requirements and the need for pupils to have views out of their classrooms.

In case of fire, the means of escape are generally satisfactory in all schemes. Because these are not final designs, there is generally insufficient information on compartmentation and construction to enable detailed comment on other aspects of fire safety. Three designs incorporated atria that would preclude limiting compartments to under 800m², and fire engineering would be needed. Others used ETFE for roofs or rooflights. This material vapourises at 250°C and is self-extinguishing. It should therefore be safe in a fire, but ZM queried what the replacement costs would be.

Using the limited information available at that stage, ZM gave provisional insurance assessments for each design. All of this information was fed back to the teams, who have addressed many of the issues in their Design Team Reports.

Access and Inclusion

As well as being accessible to all, exemplar designs were required to satisfy all current

legislation and best practice guidance for inclusion of pupils with SEN and disabilities in mainstream schools.

Access for all was required in every part of every scheme. This involves strategic planning at the outset for fire, security and circulation, including the use of lifts. Although sloping sites usually required extra ramps, one has been used in one design to allow the first floor to link to the ground level at one end of the building, so one lift is sufficient. In other examples, a lift to a small amount of accommodation on an upper floor, or a lift in a number of separate buildings, is not likely to offer an economic solution.

As well as setting out aspirations and broad principles in relation to the current DfES policies for inclusion, the brief included specific facilities allowing access and inclusion for all except those pupils with the most complex or severe SEN or disabilities. For the latter, a resourced provision could be added as a variation to the core brief. Generally, it is encouraged that learning support facilities for pupils who have SEN are sited centrally, to allow easy access to other spaces and be considered a part of the whole school.

Small group rooms are a vital part of both briefs, providing opportunities for focused learning, for individuals or small groups with learning support assistants. They can also be used flexibly as a place for peripatetic group work, or as a quiet space for calming down, retreat or a 'chill-out'. The best schemes have been able to provide facilities throughout the

school, with small group rooms accessed from both the corridor and an adjacent classroom. Some schemes, however, rely on open plan areas, which potentially could have acoustic problems affecting their viability in practice.

Specialist facilities for pupils with more severe or complex needs were included as a variation to both the primary and secondary brief. Unlike other additional accommodation, these needed to be fully integrated into the overall design. These specially resourced areas were only required to be shown at a preliminary level of detail, and the brief for these facilities was indicative only. Significant further work would be needed if this variation was required in practice.

Sustainability and Environmental Performance

The environmental performance of all exemplar designs were required to fully comply with the Building Regulations and the new Building Bulletins 87 and 93, which give the performance requirements for lighting, heating and thermal insulation, ventilation, hot and cold water supplies, energy conservation and acoustics.

Some of the most innovative environmental engineering firms have been involved and issues like ventilation and acoustics, which are so often overlooked in school design, have been very well considered.

Acoustics for good speech intelligibility are essential for teaching and learning. The main acoustic requirements – façade insulation to exclude external noise, sound insulation of walls and floors to separate teaching activities, and provision of acoustic absorption within spaces to reduce reverberation time – have posed significant problems for the design teams. In some cases details critical to the success of the designs still require further development.

The two contradictory requirements of providing enough thermal mass to prevent summertime overheating and of providing sufficient acoustic absorption to reduce reverberation times have been tackled by many of the designers.

The desire for flexibility and adaptability has led to a thorough investigation of possibilities for moving walls between classrooms and between classrooms and corridors. Operable walls have been included in many designs, and are a vast improvement over the use of screens and furniture to divide up open plan areas.



Many of the design teams have proposed open plan options, following the model used in Walsall Academy (pictured) and Telford City Technology College. However, this brings acoustic problems of speech intelligibility that have to be carefully addressed

Fresh air has been provided in a variety of ways, and most of the designs produced innovative and low-energy solutions, as discussed on page 21.

All designs have chosen to supply 100% fresh air without any recirculation, whilst avoiding cold drafts in winter. Most designers have specified eight litres per second per person of fresh air, which is good practice even though the current minimum requirement is only three litres. Most of the designs favour a displacement ventilation system with introduction of fresh air at low level into the space and exhaust of stale air at high level, making use of the natural 'stack' or buoyancy effect.

Various strategies to avoid summertime overheating without the use of mechanical cooling are of particular interest, and will be studied by design engineers seeking to provide simple low-energy sustainable design solutions for new school buildings.

Natural ventilation through windows alone may seem the obvious solution to be sustainable and economic in the long-term. However, very careful window design is needed to avoid cold drafts near the windows in winter. In addition, the new requirements for acoustic separation, both between teaching spaces and from external noise, impose sound insulation requirements on opening vents in facades and on vents between classrooms and atria. Natural ventilation is still possible, but its acoustic performance must be considered and simple opening windows are only suitable on quieter sites.

Heating methods have been carefully considered and underfloor heating has generally been avoided, as it responds too slowly to react to the fast changes of utilisation in a school and therefore requires a supplementary form of heating.

Environmental performance has been assessed using a specially adapted version of the Building Research Establishment Environmental Assessment Method (BREEAM). All exemplar school design projects were expected to achieve a minimum BREEAM rating of 'very good', which aims to reflect industry best practice.

The Building Research Establishment (BRE) have commented on the designs and provided each design team with a preliminary BREEAM assessment. This indicates the possible range of BREEAM ratings that BRE

consider are possible for each design. Most designs at this early stage of design seem to be capable of achieving a very good or excellent BREEAM rating, but this will require more work on site context, environmental systems and construction details.

Some designers have already taken the consideration of sustainable materials a long way, whilst others have left this to the later stages of design. Some interesting strategies in the choice of materials and systems such as use of timber construction, sedum roofs and wood-fired boilers point the way for designers who want to build highly sustainable schools.

Further work by BRE and the design teams will narrow the range for each design, and the resulting predicted range of BREEAM ratings for each design will be available on the web site.

Section 4: Schedules of Accommodation

Section 4 of the brief listed the schedules of accommodation for the core schemes and the variations, with some limited discussion of the additional variations. The core scheme schedules are shown on pages 114 to 117, with a comparison of the 'as designed' areas of each scheme.

As discussed on page 115, the allowance for non-net area in both briefs (and consequently the budget) was increased during the design process to allow for the plant area and internal wall thicknesses that are needed to

address the acoustic and sustainability requirements, and to allow adequate area for toilets and circulation.

Section 5: Implementation

Section 5 of the brief highlighted that each design should be able to be built economically and efficiently, taking into account the following issues:

- cost planning, including the need for the likely costs of exemplar designs to be calculated on a life-cycle cost basis;
- buildability and off-site construction opportunities;
- the need for the timing and phasing of construction to be in line with exams and holiday periods, and allow different activities to be accommodated;
- issues involved in using exemplar designs in other situations.

Cost is discussed on page 119, with a breakdown of each design compared. Many of the schemes had to include abnormal costs to respond appropriately to some of the site constraints they were given. Three design teams had to design for a constrained urban site, involving extra costs to build multi-storey (above three storeys), or to provide a ventilation system that ensured clean air without air conditioning or without acoustic problems. Two teams were asked to respond to sloping sites, and their schemes include extra circulation space to allow ramps and level changes between buildings, which would not be needed on a level site.

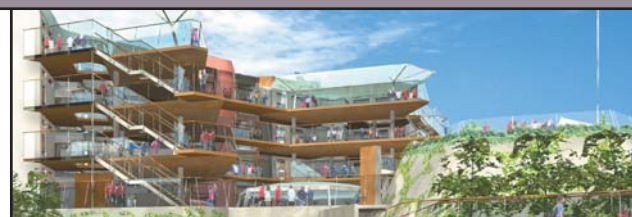


Herman Hertzberger's Montessori College in Amsterdam is a multi-storey solution to a confined urban site

primary schools



Exemplar Designs
concepts and ideas



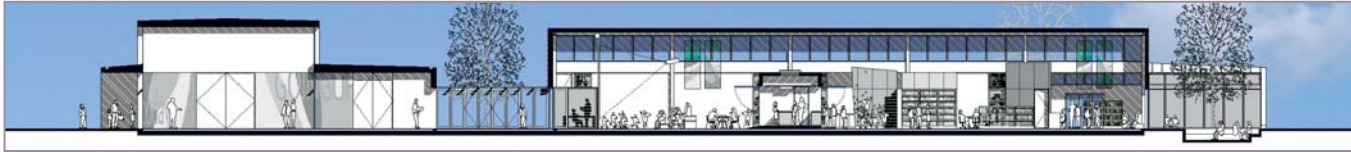
Cross-section (top)
and views of core
2FE design



Outdoor classrooms



Library in the heart of the school



exemplar primary school design

suburban site

Classrooms open off a generous, flexible 'heart' space, where the school can create its own identity. A linked block houses community facilities and the foundation stage and administration areas

Walters & Cohen Architects (P1)

Cost Consultants
Davis Langdon & Everest

Structural Engineers
Adams Kara Taylor

Environmental Engineers
Max Fordham LLP

Educational Advisor
Jenny Adey

Landscape Architects
Edward Hutchison

Contractor Advisor
Exterior

Sites
Primary site B (core)
Sites D and E (variations)

Introduction

The driving force behind our design for an exemplar primary school is the desire to create a wonderful learning environment – inspirational, exciting and welcoming while at the same time safe and secure.

In the absence of a real client or final site, this school is designed from the inside out. During the past months we have visited many different primary schools and had constant communication with our partner school. Through this process we have developed some fundamental design criteria.

Given the suburban nature of the site our building is essentially single storey, which is ideal for primary school children. The whole building has been designed to allow full accessibility for disabled users, pupils, teachers and visitors. This is vital for a fully inclusive school.

The school is designed around three main elements – the community zone, an administration block (which also houses a nursery and reception class), and the main teaching wing and heart of the school.

Design Philosophy

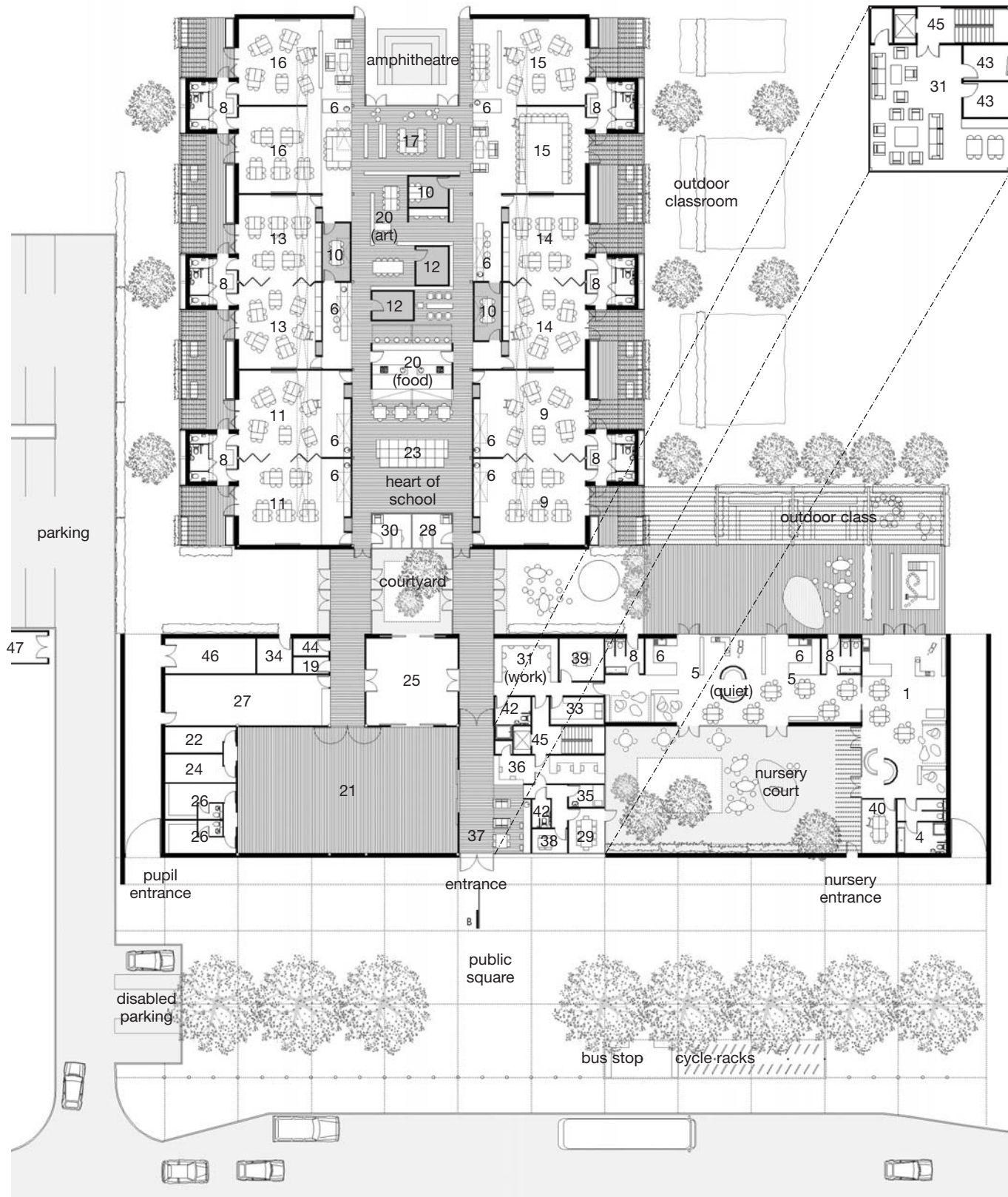
The heart

The central space, the heart of the school, is key to the philosophy and flexibility of the design. This generous, dynamic space can be tailored to the individual needs of any school and is a space where almost any school activity can take place. It is here that the school can really create its own identity. It provides a flexible area for the library and for small group rooms and specialist stores, but it can also be used for performances and film viewings, as an exhibition space, for creative spaces and wet play areas and as a café and social hub to the school.

Individual areas within the heart of the school can be created in two ways. Carefully positioned shelving units and desks can be used to divide space to offer individual work stations and storage. Where there is a need for complete acoustic and visual separation, independent naturally ventilated 'pods' can be inserted into the heart. They can be any shape; be with or without ceilings; be lockable or open; and have full or limited access.

Ground floor plan of core 2FE design

First floor plan



For key to plans see inside front cover



Classrooms

The classroom layout is very flexible. Arranged in rows on either side of the heart, any number of classrooms can be linked together, like carriages on a train. Their volumes can expand and contract into the heart of the school.

All classrooms follow the same module to allow total flexibility and inclusion. They are rectilinear in shape so that they are easy to furnish and supervise. They have high ceilings to be bright and airy and each pair of classrooms opens out onto an external classroom for outside teaching.

Optional sliding/folding doors between every other classroom provide the opportunity to link two classes so that teachers can brief children in larger groups before returning to their individual classbases. There is also the option of having a sliding door between the classroom and the heart of the school.

Given that the majority of bullying in schools occurs in toilets, we have sought to minimise this risk by providing each pair of classrooms with a smaller shared toilet pod, accessed directly from the classroom, or via the playground during break time.

Corridors have been minimised in our school and completely omitted from the teaching area. Where possible circulation has been incorporated into the heart of the school so that moving around the school becomes part of the learning experience.

It has been our aim to fully integrate pupils with SEN and disabilities into the mainstream of the school. A priority therefore is to allow seamless SEN facilities within the main school accommodation. These areas are placed at the centre of the school, with quiet areas and sensory spaces located in the heart of the school which can be accessed by all pupils.

A common concern is that teachers seldom have anywhere quiet to prepare for lessons. A dedicated workspace has been provided on the ground floor of the administration block. Directly above on the first floor is a staff room for relaxation and socialising, which includes a shower. A wonderful staff room is important for the recruitment and retention of any school's most important resource.

ICT

The potential role of ICT in schools is clearly one that can affect learning and teaching, school management, assessment, curriculum development and planning. Emerging evidence of links between high standards across the curriculum and good ICT provision within a school reminds us of the importance of ICT when designing exemplar schools. It should be integral to the design of a school and not part of the 'after build' infrastructure.

Rather than being a classroom-resident tool for the delivery of the curriculum, ICT lends itself to a more holistic approach to education and should be fully integrated into the teachers' and pupils' day. ICT does not offer all the answers to the challenge of learning in the twenty-first century but it does offer huge possibilities. It is our duty as designers to allow for these and not stymie any future developments. To meet these needs our school has a raised floor for flexible power and cabled ICT distribution with remote servers. Wireless ICT technology will become more prevalent in the future.

Adaptability and Flexibility

Flexibility is fundamental to the design philosophy of our school. The school design is flexible enough to allow for short-term changes on a daily basis, such as different classroom layouts to suit different teaching styles and subjects. The design also allows a level of adaptability which encompasses any long-term changes such as developments in ICT or changes to the curriculum.

The simple structural system of the building encourages this flexibility. A steel frame means that none of the classroom walls are load bearing. This allows partitions to be moved to change the size of teaching areas or adapt them for other uses, or ultimately to make the school more open plan. Our design works equally well as a series of closed classroom 'boxes' opening onto the heart, or as an entirely open plan school. Rooflights fixed at specific positions within the structural grid ensure that each classroom has plenty of natural light.

The building can easily be adapted to a sloping site by stepping or ramping down

within the central space. On narrower sites the classrooms could also be stacked above each other adjacent to the double volume heart.

Management and Organisation

The form of the school follows the hierarchy of the main spaces, which have been carefully designed in collaboration with the project environmental engineers to ensure good light and ventilation to each space. The heart of the school has a floor to ceiling height of 6m to emphasise the importance of this space. The height of the spaces then steps down through the classrooms to the toilet blocks on the outside, allowing clerestory windows to flood each space with light and maintain good cross-ventilation.

Community

This exemplar school is designed to be embraced by the local community and become a sustainable part of any neighbourhood. To ensure this, the school facilitates community use of the building in many different ways, both during and after school hours.

The public forecourt in front of the building is designed to encourage people onto the site, providing a pleasant and relaxed gathering space for parents and other members of the community. The forecourt includes a large bus stop and covered cycle rack.

An internet café within the entrance foyer of the school offers a place where parents and carers can get a coffee, access the internet and meet other parents.

Doors from the main entrance foyer allow the main hall to be easily used by the community during or after the school day without affecting the main teaching block. Toilets are provided within the changing rooms so that the hall can be self-contained. The large hall and the small studio can be linked together by opening large doors to create a larger space. The option of direct access from the hall to the public piazza means it can be used for community events such as fêtes, jumble sales or external performances.

How the classroom volume can expand and contract

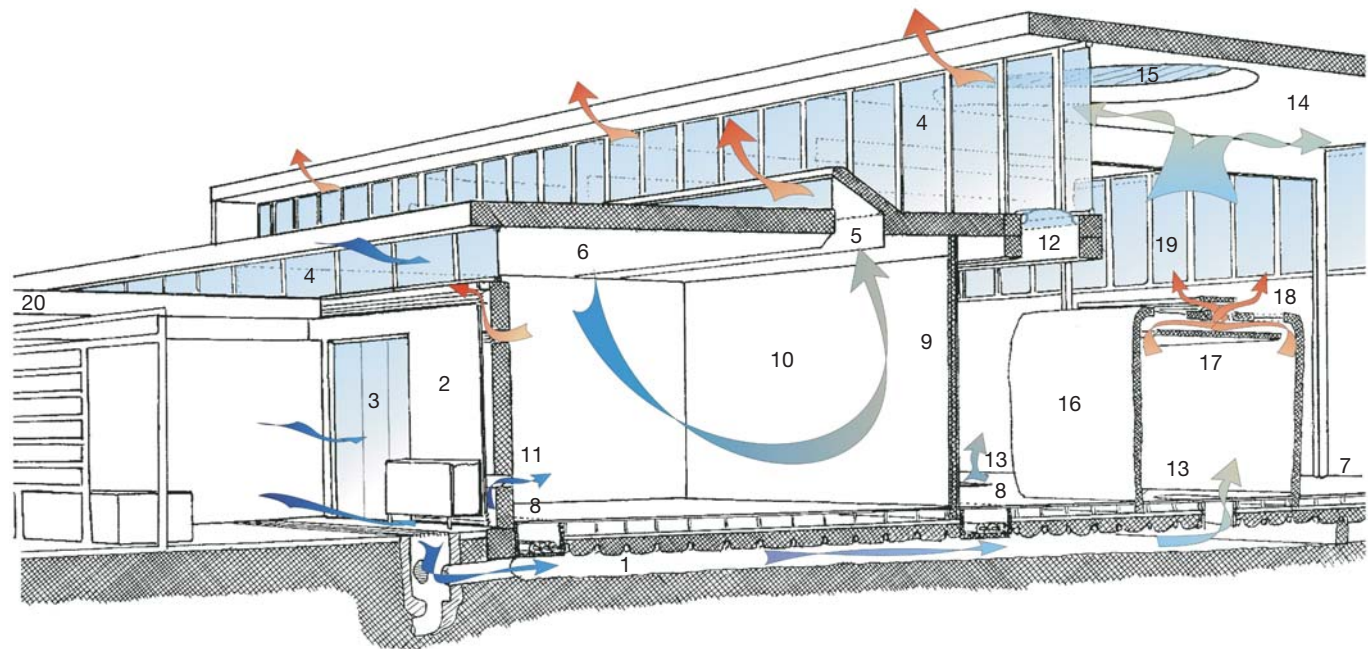
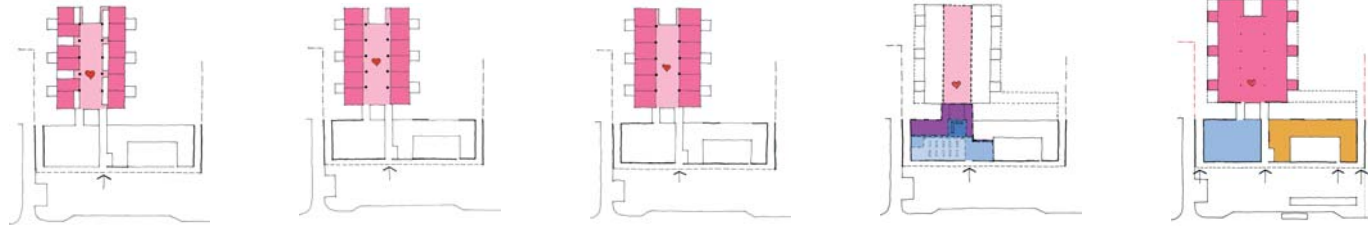
Community use – showing various degrees of access control

Organisation strategy of the school

49m² classrooms

57m² classrooms

63m² classrooms



Environmental performance

1. 300mm high ground coupled supply air plenum beneath beam and block floor
2. Pressure equalised rainscreen cladding system with integrated trickle vent
3. Glazed doors for access, views and air movement on hot days
4. Secure high level operable lights for good daylight distribution and night venting
5. Operable rooflights for improved daylight distribution and night venting
6. High ceilings with exposed concrete soffits for improved daylight and cooling
7. Raised access floor for flexible services distribution throughout building
8. Main horizontal services trenching acting as major services arteries
9. Acoustic partitioning between spaces with 50dB SRI with 38dB doors
10. Acoustic absorption on classroom walls (notice boards)
11. Wall mounted convection heater in front of trickle ventilator
12. Rooflight for flexible partitioning of intermediate zone
13. Penetrations through beam and block floor for ventilation grille and convection heater
14. Acoustic ceiling to reduce general reverberation time of central space
15. Fixed rooflights
16. Optional enclosed pod within central zone
17. Acoustic baffles and insulation on ceiling
18. Rooflights provide daylight penetration around edge of acoustic baffle
19. Natural or mechanical extract vents, depending on occupation density
20. Rainwater is collected from all of the roofs and stored at the back of toilet pods



The extent to which the community is invited into the building is a decision for each school: the further one moves inside the building the more private it becomes. Visitors might be invited in as far as the heart of the school for lunch, film viewings or performances. Mobile pods and furniture in the heart can allow staff to welcome larger community groups for certain occasions.

Security

The issue of security is essential to the design of any school. However, too often in the past efforts to address the issue of security have produced ‘fortress’ schools with little or no interface with the local community. We have sought to redress this issue without compromising children’s safety.

There are four main points of entry to the school. Pupils arrive through the two gates on either side of the building and enter their classrooms via the playground. Nursery children enter through a door directly into the nursery garden. During the day the two school gates are locked and visitors to the school come to the main entrance where they are welcomed into an airy double height foyer. Visitors can only enter the core of the school under supervision of reception staff. If the school desires all students to come through the main entrance then this can also be accommodated.

By positioning the more public elements of the school on the street we have ensured that there are no direct views of the children from outside. The public components of the building along the street form a natural security buffer for the school’s private heart. The remainder of the perimeter is fenced and heavily planted to form a secure green border to the school.

Access

The busiest times of day at any school are when pupils arrive and leave, and considerable thought has been given to this in our design.

Schools are part of a neighbourhood community and most of the pupils will be local. Therefore walking and cycling to and from school will be encouraged. We recognise that some teachers and visitors

come to school by car. As a principle the car park is discreetly positioned to the side of the building, well hidden by planting. A cantilevered roof over the front of the school provides shelter for anyone arriving at the school before it opens.

Environmental Performance

The following considerations have been identified as being essential to a flexible and sustainable school of the future and are incorporated in our exemplar design:

- Good daylighting is paramount. Artificial lighting contributes to 25% of the energy costs of a typical school. Anecdotal evidence suggests that the provision of good levels of natural light enhances a learning environment.
- The external envelope is designed to reduce fabric heat loss. Over half the energy consumption of schools is spent on heating, a proportion of this is fabric heat loss.
- An efficient ventilation strategy has been developed. The high occupancy density in classrooms means that maintaining the minimum fresh air ventilation rate only when it is required is important for keeping ventilation losses low throughout the 24 hour cycle. The design also maximises the use of passive solar energy and ground-coupled heat and ‘coolth’ to benefit from free energy gains.
- High casual heat gains are common in classrooms as they have a high density occupancy. The design works to limit overheating, for instance by avoiding solar gain in the summer whenever possible.
- Water saving and collecting strategies have been included to minimise water use.
- The design uses efficient building services and controls.
- A flexible and adaptable form has been adopted in order to optimise the life cycle and costs of key structural materials. The building form is flexible enough to stand the test of time.
- Wherever possible sustainable materials and renewable forms of energy have been used.

Cost

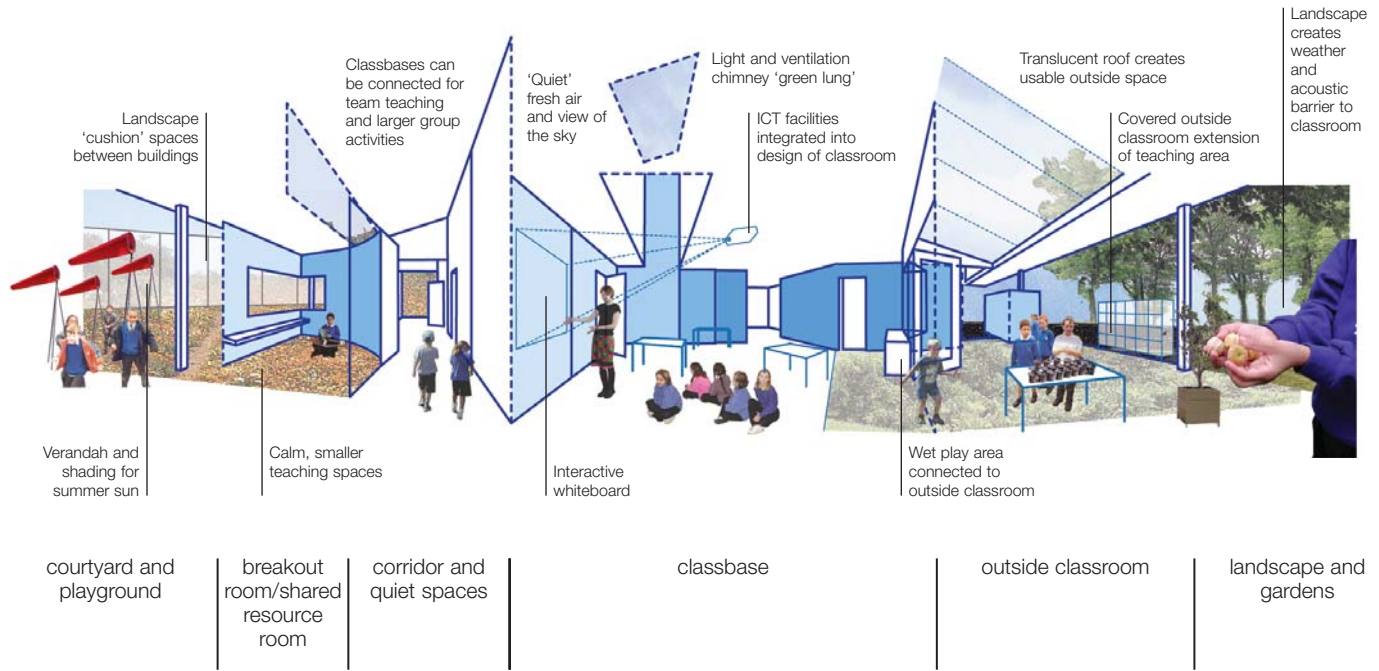
The site for this scheme is relatively large at over 2ha (21,000m²). For this reason the costs are presented including a base landscape scheme, with optional further landscape areas shown separately to add increased utility, value and delight. The base scheme includes the minimum area of landscape (5,700m²) and hard play to operate the school (such as car parking), while the optional landscape areas include sports pitches, additional recreational areas (such as nature ponds) which enhance the overall scheme making up the balance of site area. The scheme’s abnormal costs are approximately 7% of the Gross Capital Cost (excluding loose furniture and equipment).

CABE Design Review Committee

The CABE design review committee felt this was an elegant solution. They acknowledged it was dependent on the quality of how detailing and use of materials were executed when built. It was felt that it was very credible as a generic solution that can be extended if the site allows, although it does depend upon the site used being relatively wide to maintain logic of the cross-section in the main learning block. The importance of the open space to the front of the school was acknowledged, but it was felt that to be successful, some type of boundary distinction will be necessary. Overall it was felt that the scheme was well considered. The central space offers innovation and inspiration and has the potential to produce a good, effective learning environment.

Cost Comment

The design team’s cost estimate of this scheme excluding abnormal costs is in line with the DfES Net Building Cost guide. Pressure will need to be maintained on costs as the design is developed and details are finalised. This scheme has had a significant locational factor adjustment to normalise its costs, which could influence the affordability of certain materials or components.





exemplar primary school design

sloping site

Within a landscape for learning, this school can expand or contract and allow an easy transition from enclosed to open spaces

Cottrell + Vermeulen Architecture (P2)

Cost Consultants
Stockdale Consulting

Structural Engineers
Haskins Robinson Waters

Environmental Engineers
Max Fordham LLP

Educational Advisor
Jenny Davies

Animation
Neutral

Participation Manual Design
Carl Middleton

BREEAM Advisor
Buro Happold

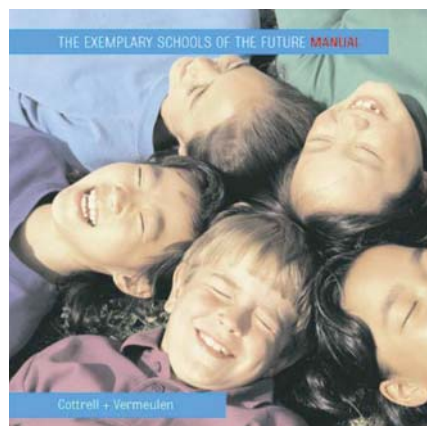
Sites
Primary site D (core)
Sites A and B (variations)

Introduction

What is the school of the future?

We feel that the school of the future should be an inspirational landscape for learning, teaching and play that can respond to the evolving needs of a specific community and context. The school of the future ought to be a sustainable and inclusive project, developed by a community using environmentally responsible materials and processes.

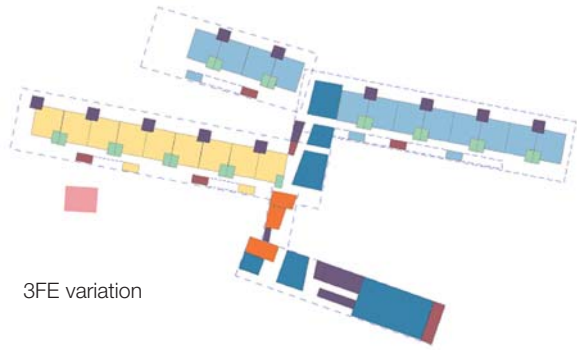
With this vision in mind, our goal was to create a flexible school design that allowed governors and teachers to decide on the layout and extent of their design, and also introduce to the project a way of working in collaboration with the school and community.



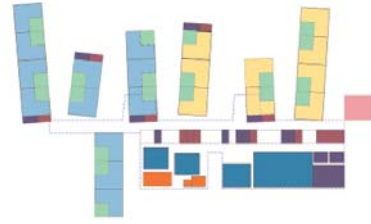
To this end we created a participation manual. Our design can accommodate classrooms of various sizes ranging from 49m² to 63m², along with dual school and community use. Our particular site was a large suburban setting constrained by a steep slope, within an area undergoing regeneration.

Design Approach

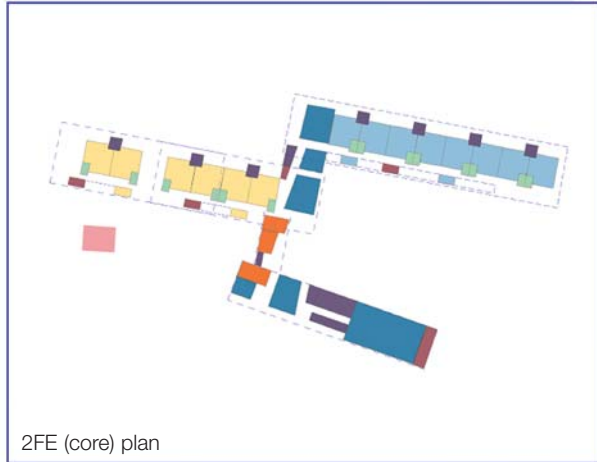
Our approach to this project is to combine an integrated vision of school and landscape and modern construction technologies with the potential of community participation and collaboration. It is our belief that for school design to flourish the school and community must participate actively in design and decision-making. We have therefore conceived the project as a manual for school design and created a process that can be applied generally whilst also providing tailored solutions. This process is described in our Participation Manual (left), which we have introduced to the project. This document explains ways in which the client can participate and coordinates the way the client can collaborate within the design process. It covers the key first stages of the project; defining the vision and setting the brief. From this starting point, we believe the client can become empowered, responsible and easily engage with the design of the school.



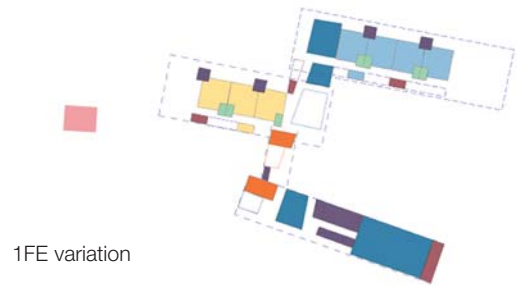
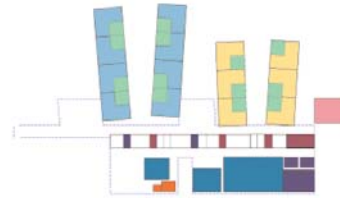
3FE variation



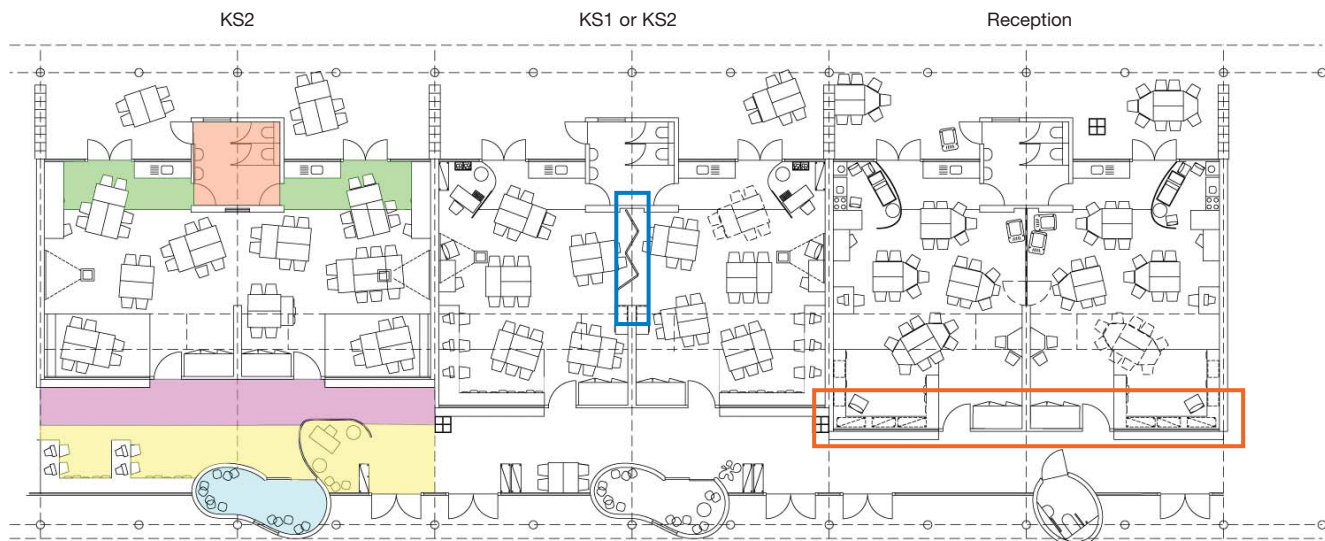
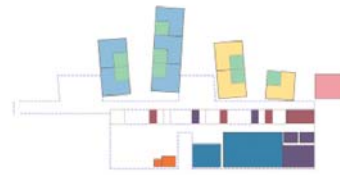
Alternative site variations for 1, 2 and 3FE



2FE (core) plan



1FE variation



49m²

57m²

63m²



Shared teaching/corridor



Toilets



Shared teaching/quiet area



Wet area



'Break out' area

Acoustic partition

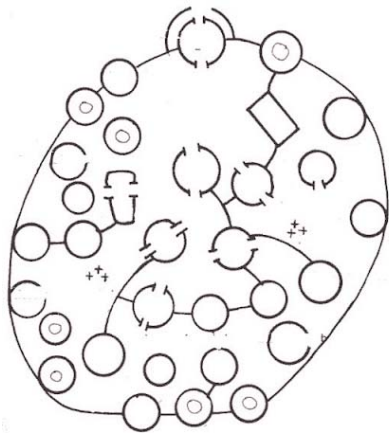
Movable wall allowing different sizes of classroom

0 7m





Our concept is to create a landscape for learning. Drawing inspiration from African vernacular settlements that create communities within a safe boundary, making a place within a landscape, our concept allows the school to imagine the extent of its boundary and will provide a foundation for all development. Within a particular setting, we will grow a school that can expand and contract. We are proposing to enclose space using canopies that create secure zones but allow easy transition from enclosed to open space.



Above: plan of an African palace

Our idea is to structure the design process into stages. The landscape strategy will define building zones and landscape buffer zones (gardens, playgrounds, planting etc). Areas of the landscape can be identified for different uses (community, education, recreation etc) as well as entry points, movement and connections. Within this framework the building components can be introduced. Our building blocks are simple; they are classrooms, halls, staff rooms, etc. During our research we have investigated how the blocks can be organised into different typologies. We have thought of this as a type of dance, each move influencing another, and we have created examples of how schools could be organised. We hope that schools themselves will play this game and create their own examples.

Adaptability and Flexibility

We have established a wide range of different typologies or building layouts to demonstrate the flexibility of the model. Each typology is generated by the size of the school (or FE), along with the challenges and opportunities presented by a particular site. The typologies are made up of different component parts that allow adjustment at a macro and micro scale. This flexible kit of components can create a variety of educational spaces. Our aim is to create a bespoke standardisation: this is not the creation of standard designs but the use of standard elements to create bespoke designs for school communities.

The community zone forms the entrance and façade, and accommodates the areas of community use, along with the public and administrative elements of the school. This building could involve a larger element of 'one-off' design to account for specific school and community functions and also use materials and forms appropriate to the local context, providing a planning buffer to the street. As interface between school and community, this building can facilitate the expansion of the school's public role within the community.

The canopies define the education zones; these include classbases, shared spaces, external classrooms etc. The canopies can be extended to house different numbers of classes, and can be simply linked to the community building and other canopies. They can be placed on the site in different arrangements (for example, creating a large continuous canopy; wings and courtyards), to suit the particular site strategy. The overlap of the canopies creates a central shared zone which links the entrance and community block to the classrooms and landscape and houses shared resources and dedicated subject-teaching areas. The canopy form defines a framework within which the school can grow and adapt to new ways of learning. The spaces under the canopy can be designed to meet the requirements of each school, whilst the basic canopy structure remains consistent.

Different classbases will be constructed from the same basic elements. It is intended that a 'kit of parts' can be created which can be arranged differently to form different layouts. We have looked at different classroom sizes and associated shared spaces that provide a wide range of educational arrangements. The principle of the design is that under the canopy each school can decide whether to have open plan, 49m², 57m² or 63m² classrooms. The classroom is still the heart of the primary school and is situated within an educational zone that combines ideas of primary bases with primary departments. Our ambition is to create spaces both inside and out, shared and individual, which allow all types of the curriculum to flourish.

Management and Organisation

Visibility is the key. The intention is for the school to be accessible and welcoming whilst at the same time able to manage and monitor the flow of children, parents and general public into the school. The design must facilitate a security diagram that can be tailored to suit each school. Therefore, the design conceives security in terms of a series of layered security lines which can be opened or closed at different times of the day. For example, the internet café at the front of the school may be in use by elderly people from the local day centre. At some point, the children may interact with this group. Alternatively, a security line may be drawn, enabling them to access the main hall without coming into contact with those using the café. Another example is the way in which the design provides the school with alternatives in how it wishes to receive parents dropping off and picking up children. They can either come through the main body of the school, or go directly to the classroom entrance in the education wings.

The future school is conceived as an inclusive school, one that can accommodate all sections of the community. The intention is that the school is totally accessible and easily adapted with the addition of specialist space to become a specialist provision.



For key to plan see inside front cover



Environmental Performance

The school of the future should aspire to principles of low energy design and sustainable building practice. Where possible, the design uses natural lighting and ventilation and local or renewable materials in order to conserve energy. The design aims to arrive at a balanced service arrangement that would be financially realistic, with long-term cost savings through the use of passive rather than mechanical solutions where appropriate.

As a learning environment, the design of the school aims to encourage engagement with the natural landscape. To this end, the layout of the plan reaches out to bring the landscape into the building. Each classroom has direct access to the outside in the form of covered and protected outdoor classrooms. Green 'lungs', which may take the form of hydroponic walls, or mobile gardens, bring activities such as planting seeds into the classroom. Each classroom is to be naturally ventilated utilising a temperature and pressure driven stack effect system. A series of underground vitrified clay pipes supply each classroom with fresh air and stale air is expelled via a central ventilation chimney. The building orientation optimises the daylight conditions within the school. Daylight enters the classroom via glazing on both the southwest and northeastern façades and via a natural daylighting chimney. Mechanical ventilation is only required in the toilets, main hall and kitchen.

We were concerned that our flexible teaching space would not compromise acoustic performance. While shared teaching space can be stimulating, quiet, acoustically controlled classbases and specialist space are essential. Our design addresses the key acoustic performance criteria set out in BB93.

The scheme utilises a wet under-floor heating system as the primary source of space heating. Modelling of our typical classroom unit has confirmed that the internal temperature does not exceed 28°C for more than 80 occupied hours in a normal year.

Buildability

We have produced a design that is both efficient and flexible. There is no wasted space, in the sense that even corridors can become places for learning. As a result of this, we have been able to create a generous design within the guidelines set by the DfES brief. Our design meets the area requirements exactly and is therefore cost-efficient.

We have provided a set of flexible components that can be assembled in a variety of ways. The design can be subdivided into two basic building types – the community building and the classroom blocks. The community building has a uniform cross-section and structural form that could be prefabricated as portal frames. The design is conceived as a lightweight timber-framed building built upon rammed earth foundations. The timber frame and uniform shape allow for speed and economy of structure as well as being a sustainable material choice.

The classroom block sits in the landscape under an expansive lightweight canopy. The 'oversizing' of the canopy means that the basic roof structure can be prefabricated and used in different locations and designs, whilst the specific spaces of the classroom can be constructed underneath, irrespective of the size of the canopy. The construction of the classroom is essentially timber and lightweight, affording the same benefits as the community building.

However there will be a requirement for mass in critical areas to allow for both acoustic insulation and thermal mass. This is achieved by using 'lightweight' panel products to create cavities and using on-site fill (preferably from excavated materials). This avoids the need to transport heavy materials to the site. The elements are designed to fit together – with an adjustable or bespoke element to negotiate the junction or site conditions.

Cost

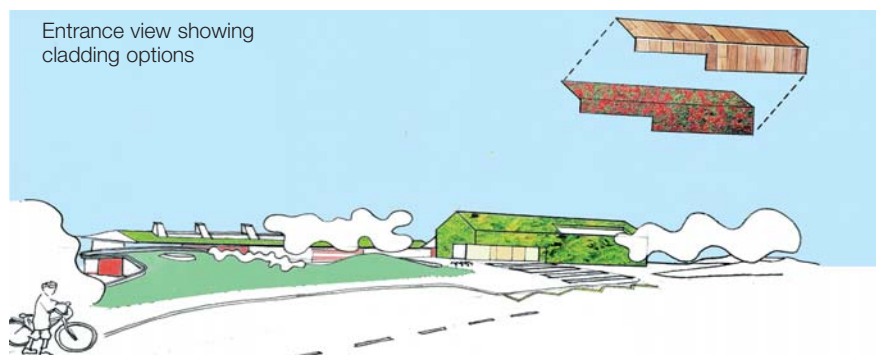
This is a sloping site; the abnormalities relate to this and have been estimated as 10% of Gross Capital Cost (excluding loose furniture and equipment). This covers the cost of ramps and terracing.

CABE Design Review Committee

The CABE design review committee considered this solution to be sophisticated and flexible, and that it would provide an intelligent and cost effective prototype. They felt that a lot of thought had gone into the actual process of developing the design and process manual. The committee were impressed by the simplicity of the 'shed' form and the ability to adapt the cladding to give it a distinctive site-specific appearance. Overall, the scheme was considered to offer inspiration out of relative straightforwardness.

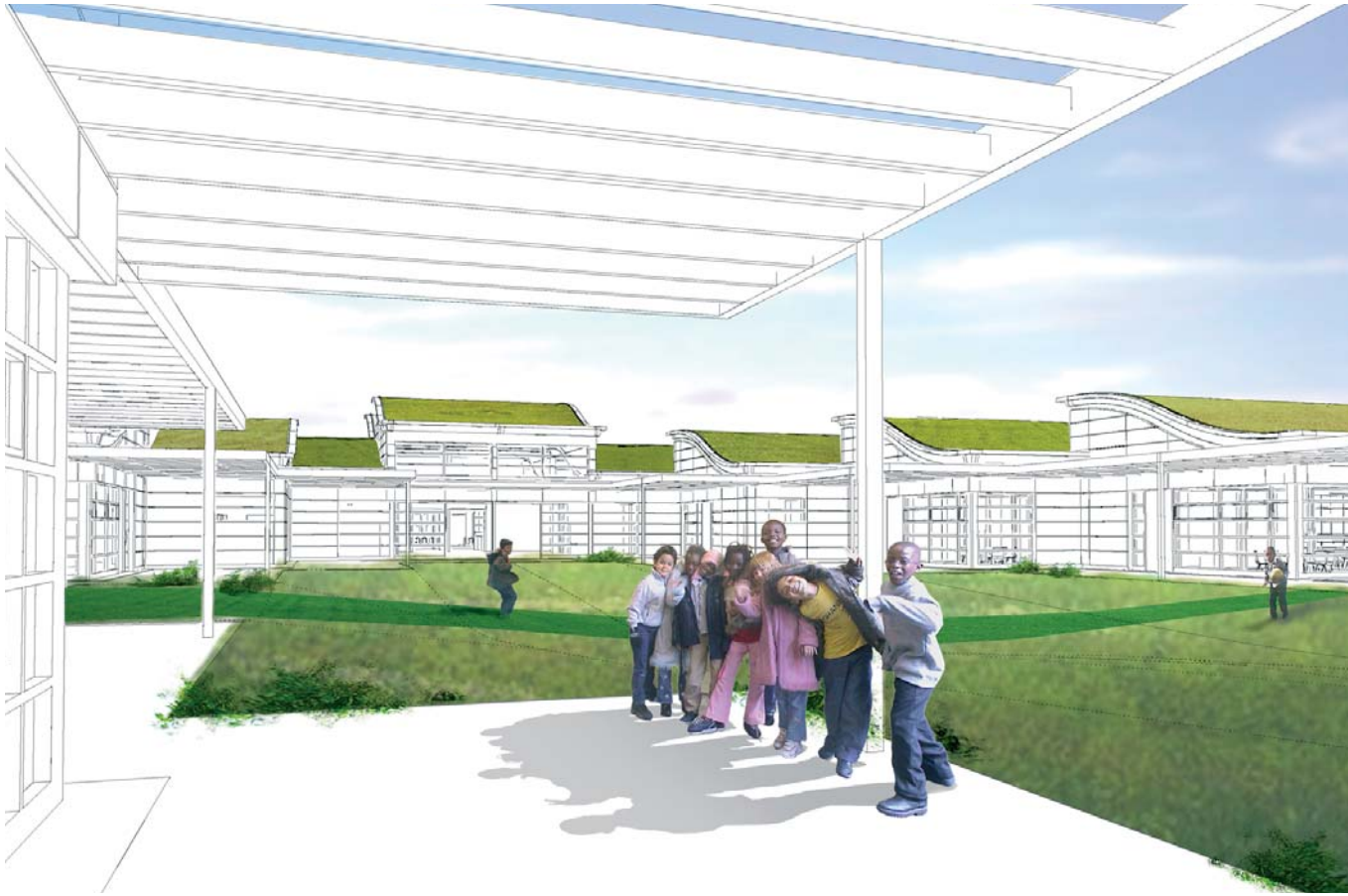
Cost Comment

The design team's cost estimate of this scheme excluding abnormalities is within the DfES Building Cost guide. As the design develops, the need for the relatively small first floor with its attendant costs should be investigated, along with the allowances for the engineering elements. This scheme has had a marginal locational adjustment factor to normalise its costs, which may influence the affordability of certain materials or components.

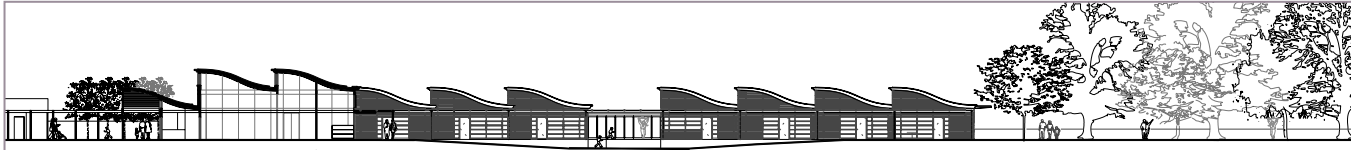


Entrance view showing cladding options

View from covered
teaching area,
looking north across
the central meadow
towards the
entrance hall



View of foundation
stage classrooms
and playground



exemplar primary school design

rural site

A sustainable single-storey solution that uses off-site modular construction that can be assembled in a variety of layouts to provide a unique, distinctive response to many different sites, clients and briefs

Marks Barfield Architects (P3)

Cost Consultants
Gardiner and Theobald

Structural Engineers
Alan Conisbee and Associates

Environmental Engineers
Max Fordham LLP

Landscape Architects
Watkins:Dally

Sites
Primary site A (core)
Larger site A and site B (variations)

Introduction

The design team were asked to consider a design proposal for rural and suburban settings. Our brief included:

- rural schools, which are often small: half form entry, as well as 1FE and 2FE;
- consideration of greenfield and green belt site constraints and sensitive planning issues;
- the integration of community facilities, particularly within a rural environment;
- a split site condition.

Design Approach

The proposal stems from a detailed brief analysis, out of which emerged six integrated key design components:

- off-site fabrication;
- adaptability and flexibility;
- social and community facilities;
- a welcoming, comfortable and safe environment;
- distinctive design, integrated within the landscape;
- sustainability.

Off-site fabrication

A flexible and adaptable design solution is proposed using a viable, cost effective off-site timber frame construction. Transportable pannellised modules can be configured into a large variety of arrangements. This system offers particular advantages, which include waste reduction, factory-controlled quality construction, minimum disruption on and around the site, and significant reductions in procurement and construction times – less than half the time of traditional site-based construction.

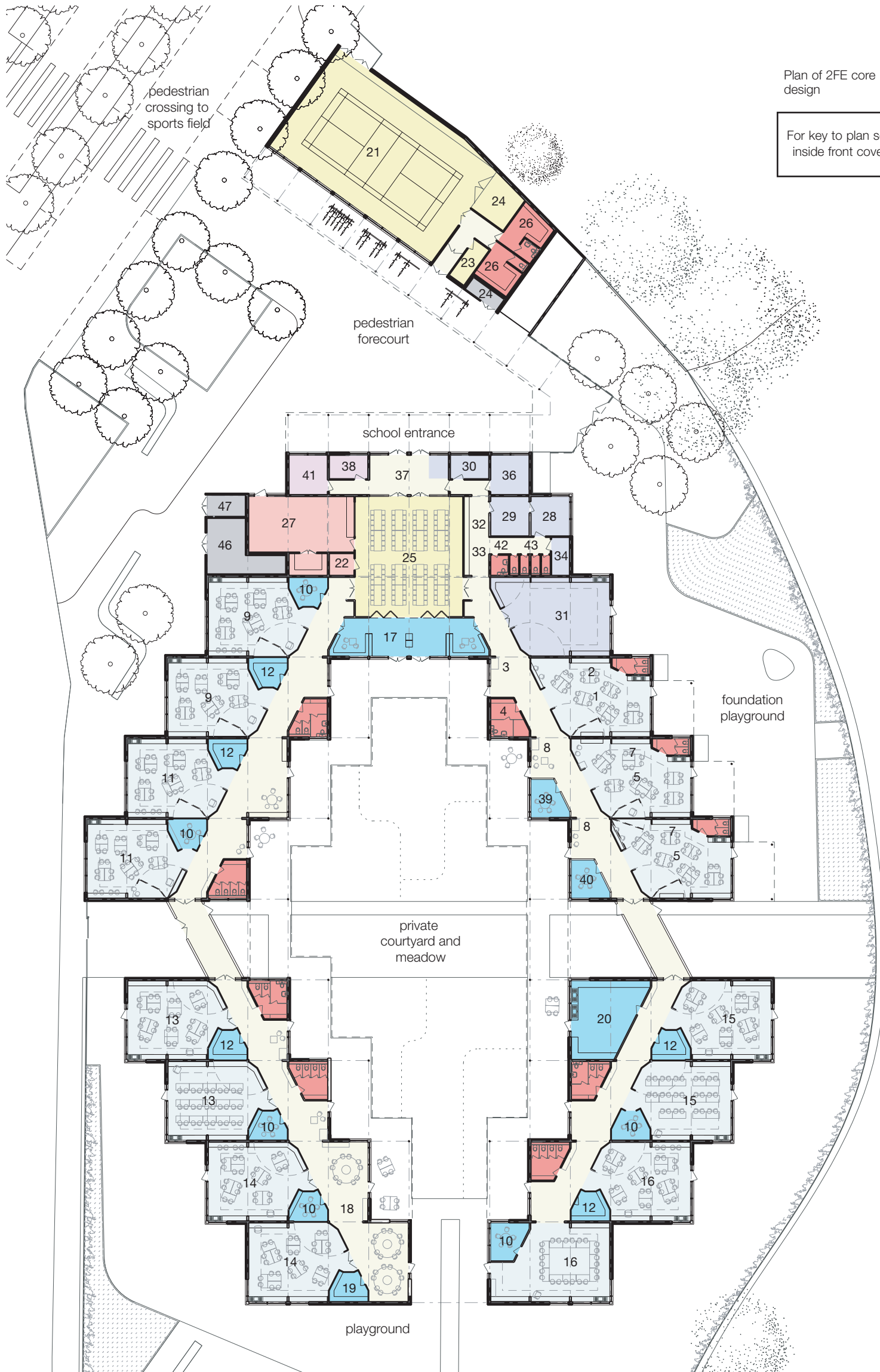
Adaptability and Flexibility

The modular design has been developed to optimise environmental conditions, with timber construction and flexibility in classroom arrangement and layouts. Functional design, ensuring that all spaces and components



Plan of 2FE core design

For key to plan see inside front cover





'work hard', is fundamental. The basic teaching building block consists of a structurally efficient classroom and support spaces planned around a generous diagonal circulation spine. The classroom is typically located on one side of the circulation with support spaces, additional breakout areas, cloakrooms, toilets and displays occupying the remaining area on the other side and providing access to an outdoor teaching area. The foundation years have an alternative arrangement, with toilets within their classroom easily accessible from their dedicated playground.

The design offers a wide range of classroom sizes and layouts from completely cellular, through semi-open plan, to fully open plan. Standardised acoustic lightweight partitions can be removed or installed to respond to

long-term changes, but can also be rotated to offer a more immediate opportunity to allow for differences in teaching methods and pupil numbers from class to class. Sound transmission analysis carried out in accordance with DfES testing methods shows that the building design and materials used ensure that these semi-open plan arrangements easily achieve the required acoustic standard for primary schools.

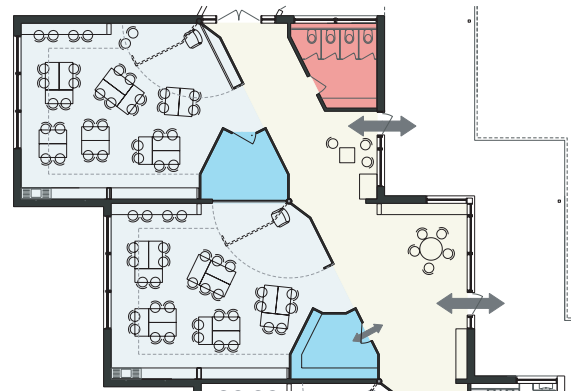
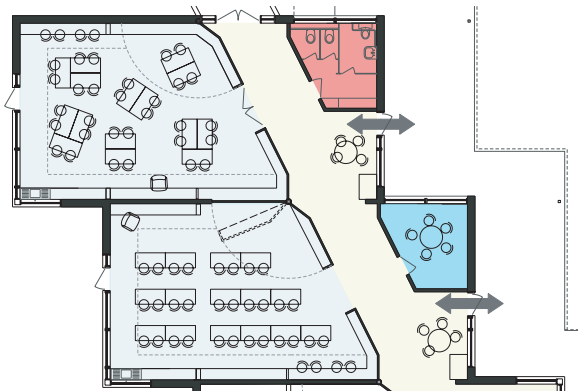
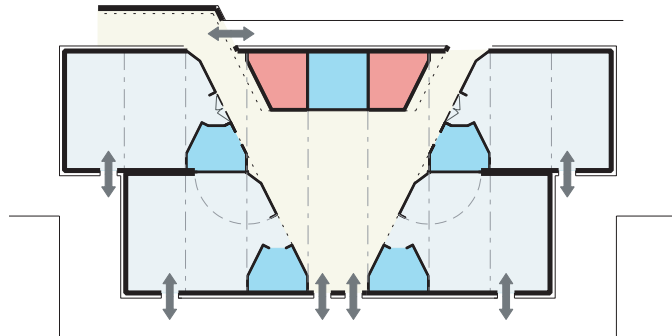
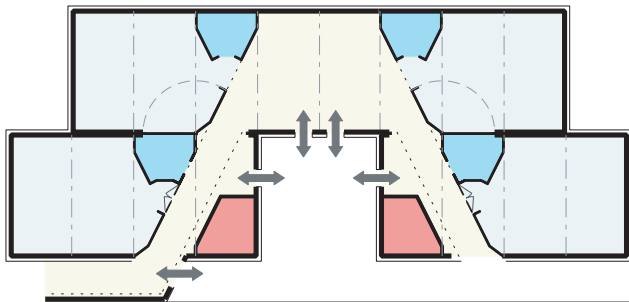
At the design stage, the teaching modules can be arranged in a variety of linear or centrally accessed clusters. These, together with the hall and central resources, comprise the whole school, and can be configured and tailored to each school size, brief, client, and site context.

Management and Organisation

Social and Community Facilities

The entrance to the school and its relationship to the wider community are central to the overall composition and sequencing of public and school spaces. A generous public forecourt provides a pivotal point, around which additional community facilities can be built and linked to the school where appropriate. Fundamental to the split site condition and of value to all sites, the scheme includes a clear arrival and roadside parking strategy utilising tree planting, road widening and defined road and pedestrian areas to ensure child safety and provide an additional community resource.

The scheme explores the viability of separating the large sports hall from the main



Top: alternative classroom clusters, arranged around the generous common room and circulation area.

At left, the south-facing common room opens onto an outdoor covered teaching area.

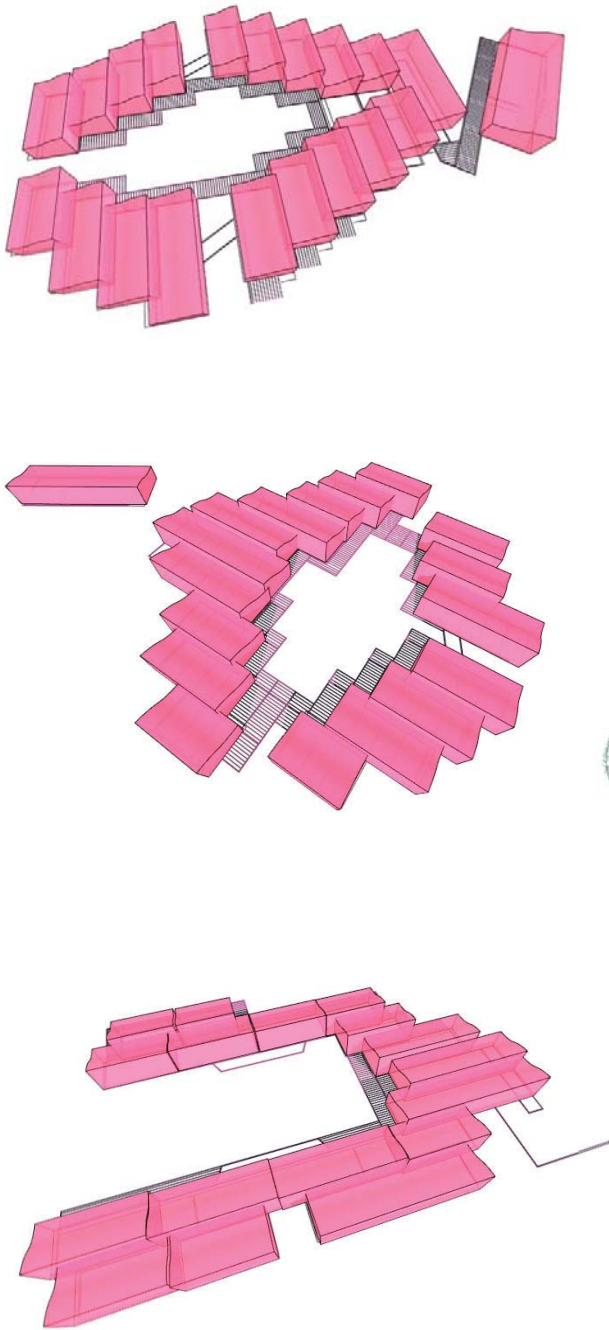
As shown at right, all classrooms have direct access to south-facing outdoor play areas

Bottom: Each classroom includes flexible integrated storage and display units, a soft corner defined by the arc

of one rotating partition, and an optional adjacent store and small group room. The partitions can be

removed or rotated to respond to different teaching methods

Site arrangement for 2FE core site, showing typical sequencing of spaces for the split site condition



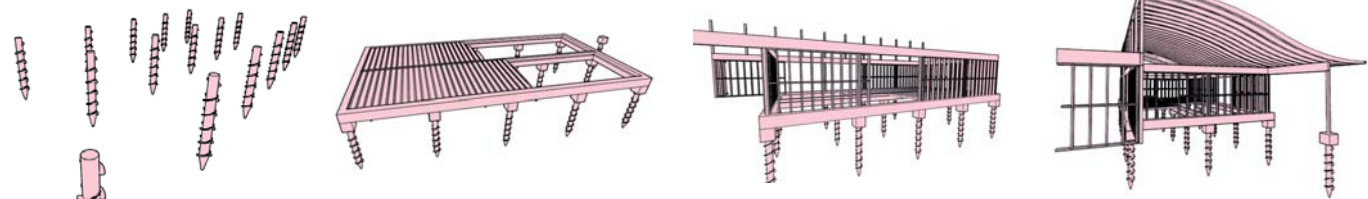
Flexible modular components can be assembled in a variety of layouts, as shown above

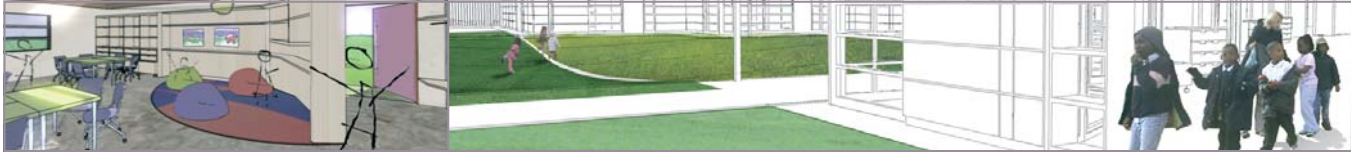
Top: 2FE main core design

Middle: a separate sports hall is retained, the central hall relocated and foundation and infant years separated from the junior school

Bottom: this arrangement incorporates east-west orientated teaching clusters, based around common rooms, and an integrated main hall

Below: construction sequence





school, as a joint community facility, and providing a second smaller hall that is both the heart and shop window of the school. This approach may be particularly appropriate for smaller schools.

Comfort and Safety

The school building is designed for health and comfort and is developed on the premise of inclusive and accessible design. The small hall is at the heart of the school: a welcoming space that the school can customise to provide a variety of facilities such as internet access, café, dining hall, exhibition space, or media resources – with the library and staff and administration close by.

The building and landscape define a simple progression of public to private space. Access, security and fire separation lines are defined by the design.

Integration within the Landscape

The distinctive flowing form of the design brings the natural environment into the centre of the school. This means that the building embraces its surroundings and every classroom has a sheltered outdoor teaching area that leads directly into the landscape. The noise-generating, multi-use games area is deliberately sited away from the building, so that the natural landscape can be enjoyed from the central hall and from every classroom. A sedum covered roof helps to retain biodiversity and improves ecological value.

Environmental Performance

The design is environmentally, socially, and economically sustainable. It has passive heating/cooling and ventilation systems and reduces the impact of emissions, effluent and waste. It is built from low impact materials (the frame and cladding are made of timber from renewable sources) that are durable and carefully selected to provide thermal mass, fire resistance, light reflectance and acoustic attenuation. Resources are used efficiently, thus reducing whole life costs. It is energy-efficient, integrating good daylighting, natural ventilation, high insulation and efficient heating and lighting to minimise energy use and solar gain. At its core lies the health and wellbeing of the children and staff.

Cost

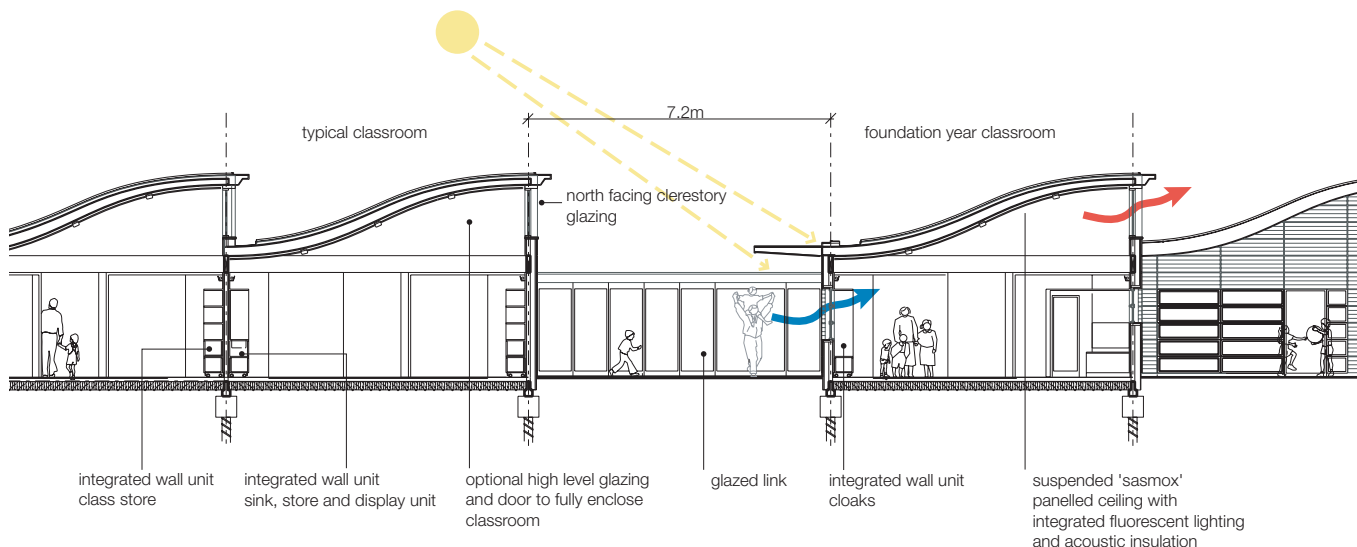
This site has very limited abnormalities, which equate to less than 1% of the gross capital cost (excluding loose furniture and equipment). The design team not only produced a cost for a traditional approach but also worked with a manufacturer/contractor who specialises in timber-frame panellised off-site fabrication, and estimated that a one-off project using this type of construction would cost 18% more. However, repetition and subsequent panellised construction lend themselves to economies of scale. With a commitment to procure a number of schools, a dedicated production unit would become economical to set up, generating savings.

CABE Design Review Committee

The CABE design review committee acknowledged that this scheme had a clear proposition that addresses significant issues outlined by the brief. They recognised the enthusiasm for reaping the potential benefits of off-site fabrication. This is achieved through a universal section, fast and economical construction and standard materials. They had some concerns about detailing of parts of the elements of the design, but these can be addressed by further development. They felt that some of the internal planning will require more thinking through when this design is developed further. Although the layout is potentially simple, the design rules by which it is arrived at are not clear, and it might benefit from further consideration of the circulation routes within the building.

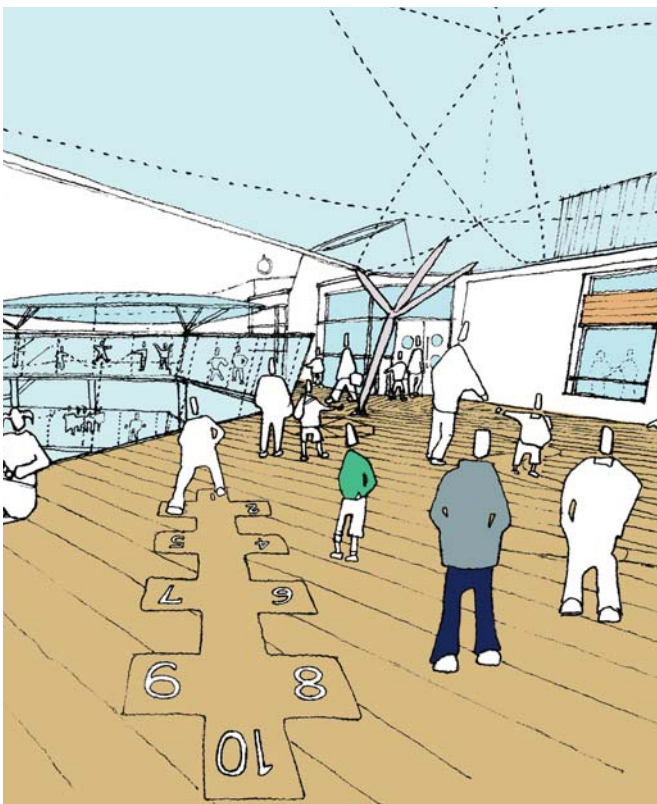
Cost Comment

The design team's cost estimate of this scheme excluding abnormalities is within the DfES Net Building cost guide using a traditional approach. There are a number of interesting multi-functional elements in this scheme which will need careful detailing to avoid upward pressures on costs. This scheme has had a significant locational factor adjustment to normalise its costs, which could influence the affordability of certain materials or components.



Typical section detail through the teaching modules

The school entrance



Typical upper level play deck



Aerial view from the south east



exemplar primary school design

tight urban site

In a Beehive School the classrooms are shaped like pieces of honeycomb, so they can interlock, wrap and enclose

Building Design Partnership (P4)

Cost Consultants
Claruspcm

Structural Engineers
Building Design Partnership

Environmental Engineers
Building Design Partnership

Educational Advisors
Bryanston Square

Pre-fabrication/Buildability Advisors
Mowlem

Sites
Reduced primary site F (core)
Sites E and B (variations)

Introduction

The Exemplar Schools project has presented something of a dilemma for us as a design team. Our architecture is bespoke. It's unique. It's about the individual. Individual places, individual people and communities. And their needs, physical, intellectual, social, emotional and spiritual.

Reconciling this with the demands of the brief for a high volume, repeatable, modular, pre-fabricated, non-site specific, 'flat packed' school was never going to be easy.

So what did we do? We went back to fundamentals, back to the two key components of designing any building, anywhere – people and place.

We determined to design a building which would create its own context; which would create its own territories, and places; which would create its own identity; which would capture its own light, space, air and sun; and which would create a truly inspirational learning environment for all building users, regardless of its location and setting. Then, and only then, would we 'flat pack' it.

We have called our design 'The Beehive School'. For good reason. Due to the demands of a tight inner city site ours is a

vertical school. We couldn't build outwards, so we've built upwards.

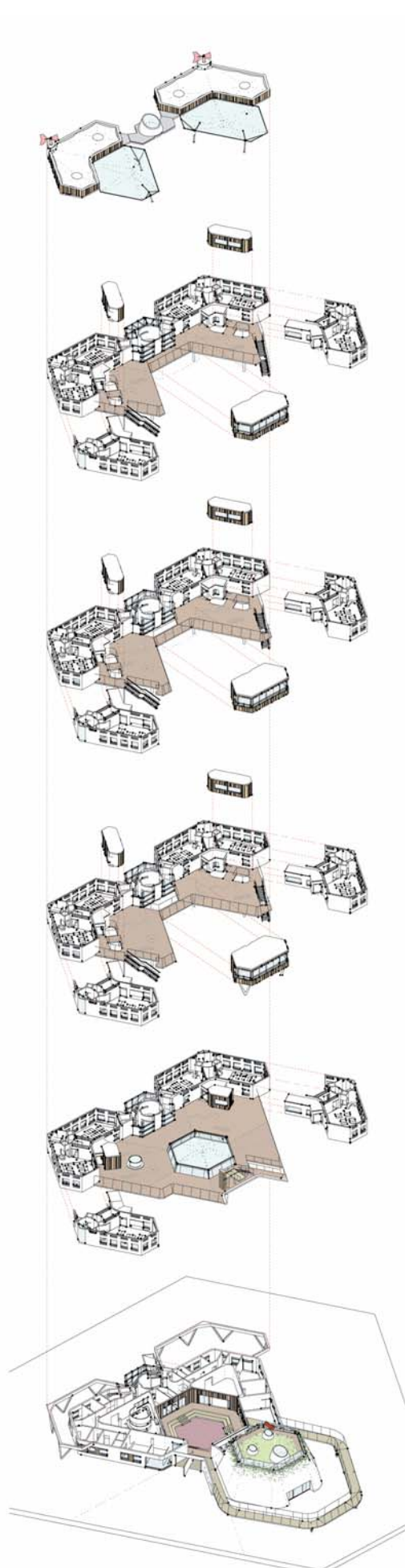
Design Approach

In a Beehive School the classrooms are shaped like pieces of honeycomb, so they can interlock, wrap and enclose. They wrap around their own individual play decks, which provide play space for the children, away from the dirt, noise and fumes of the street.

The honeycomb classrooms combine into 'learning houses', which, with their individual play decks, form the basic component of the school.

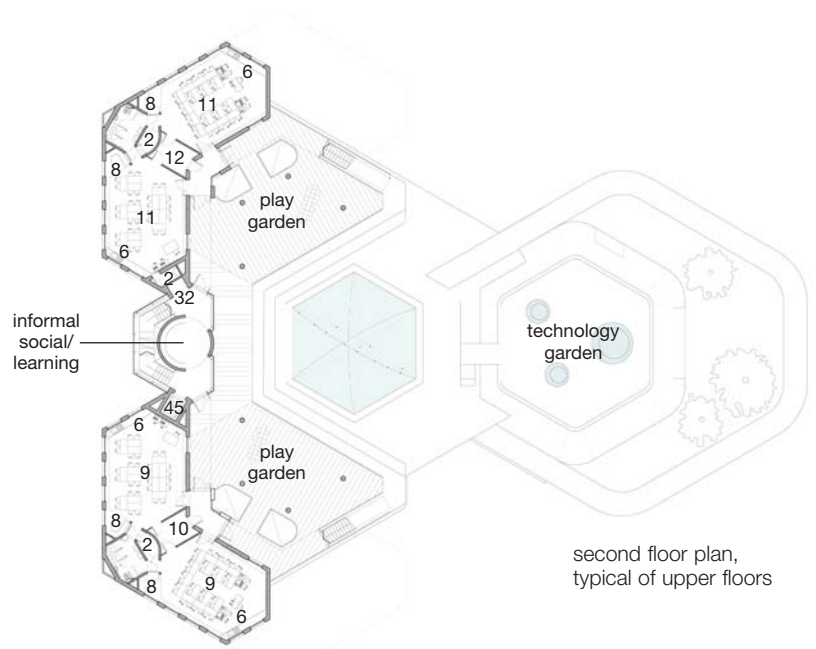
The learning houses are adaptable. They can be configured and reconfigured to suit any site. They can be added to, or subtracted from. Learning pods and weather screens can be added or taken away. Classbases can be organised and re-organised to suit any teaching style or technology.

In our preferred core scheme, the ground floor is different. It roots the learning houses to the ground. It's bespoke, unique. It's organised around a heart-space, a social hub, like a giant conservatory where people can gather and meet, chat and hang out. It's right in the centre of the school next to the library,

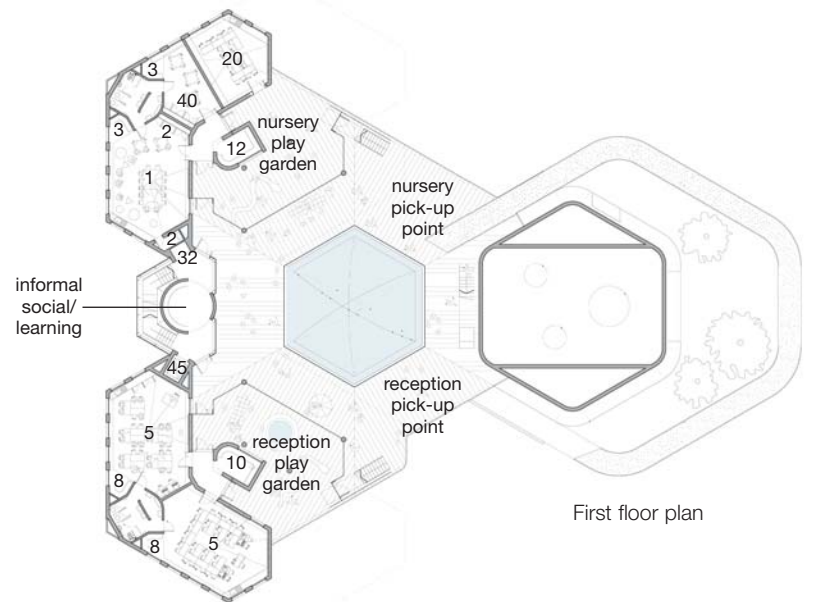


The Beehive School: modularity and adaptability can be seen in the options

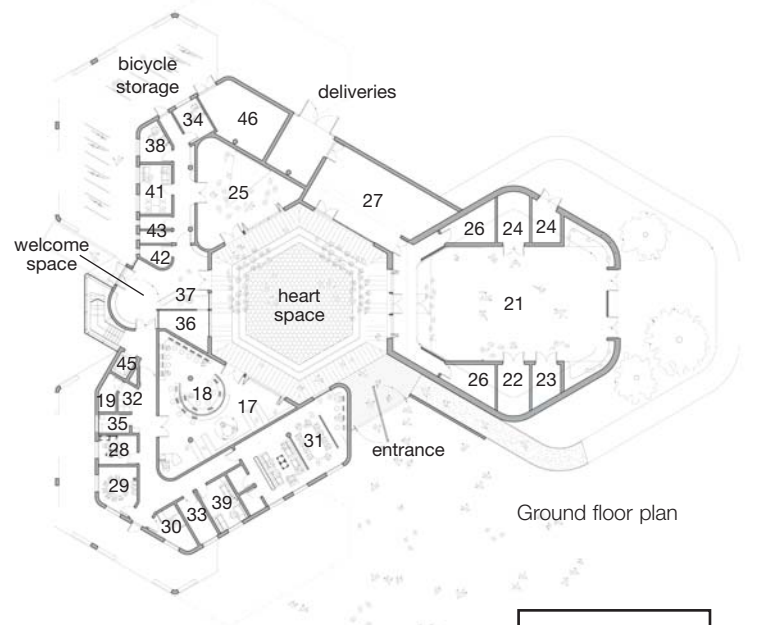
for future expansion to 3FE or to include an extended schools brief



second floor plan, typical of upper floors



First floor plan



Ground floor plan

For key to plans see inside front cover



studio and hall, where children can use it during the day, and the community can use it at night.

Our Beehive School is designed to delight and excite. In our school the children are connected to the outdoors, to the weather, to the elements. It's a fresh air school, environmentally friendly, with light, space and air in abundance. With views too. Up, across, and down. To the neighbourhood, and back. There are spaces to discover, things to perch on, corners to inhabit, gardens to run around in, and places to play. Colours to see, textures to enjoy, a vertical world to experience.

It's not a school like any other, it's a Beehive School.

Adaptability and Flexibility

Our design specifically addresses the requirement for modularity, adaptability and flexibility.

The learning houses have been designed as a series of modular components, which lend themselves to prefabrication and mass production. The modular approach facilitates future extension from 2FE to 3FE by adding an additional learning house and service pod assembly. This modular approach has also been applied to the development of the 'special space' and group learning pods. These 'plug-on' pods allow the design to cater for a huge variety of different design options.

The Beehive School has also been developed with adaptability and flexibility in mind.

The ground floor plan of any Beehive School will be site- and brief-specific. It can therefore accommodate a wide range of different functions and uses. Generally, the ground floor will contain the semi-public/central functions suited to its location, with classbases contained in the 'standard' learning houses above. However, it is also possible to locate nursery and reception classes at ground level.

The intrinsic flexibility of the design allows spaces which might normally be considered to be ground floor uses to be distributed throughout the building, in either adapted classbases or the 'special space'. This provides for a wide variety of combinations of functions and locations.

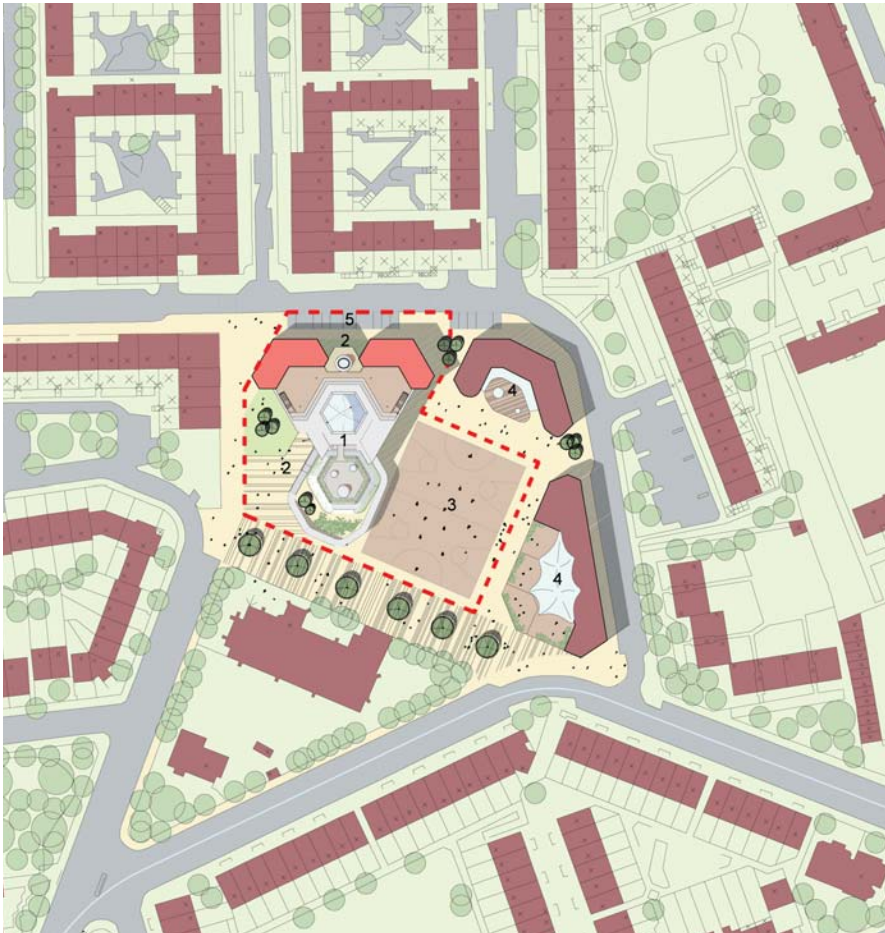
Flexibility has been addressed in the configuration of the classbases, which allows them to be reconfigured and enlarged to suit different teaching styles, as well as permitting the enclosure of parts of the playdecks to form weather-protected corridors, should this be required.

Management and Organisation

Strategically the basic organisation of the plan and section offers a number of benefits in terms of security, fire prevention and inclusion. Due to the stratified nature of the core scheme's section, all the building's semi-public functions are located on the ground floor, where they offer easy access to the community, but are physically separate from the learning houses above.

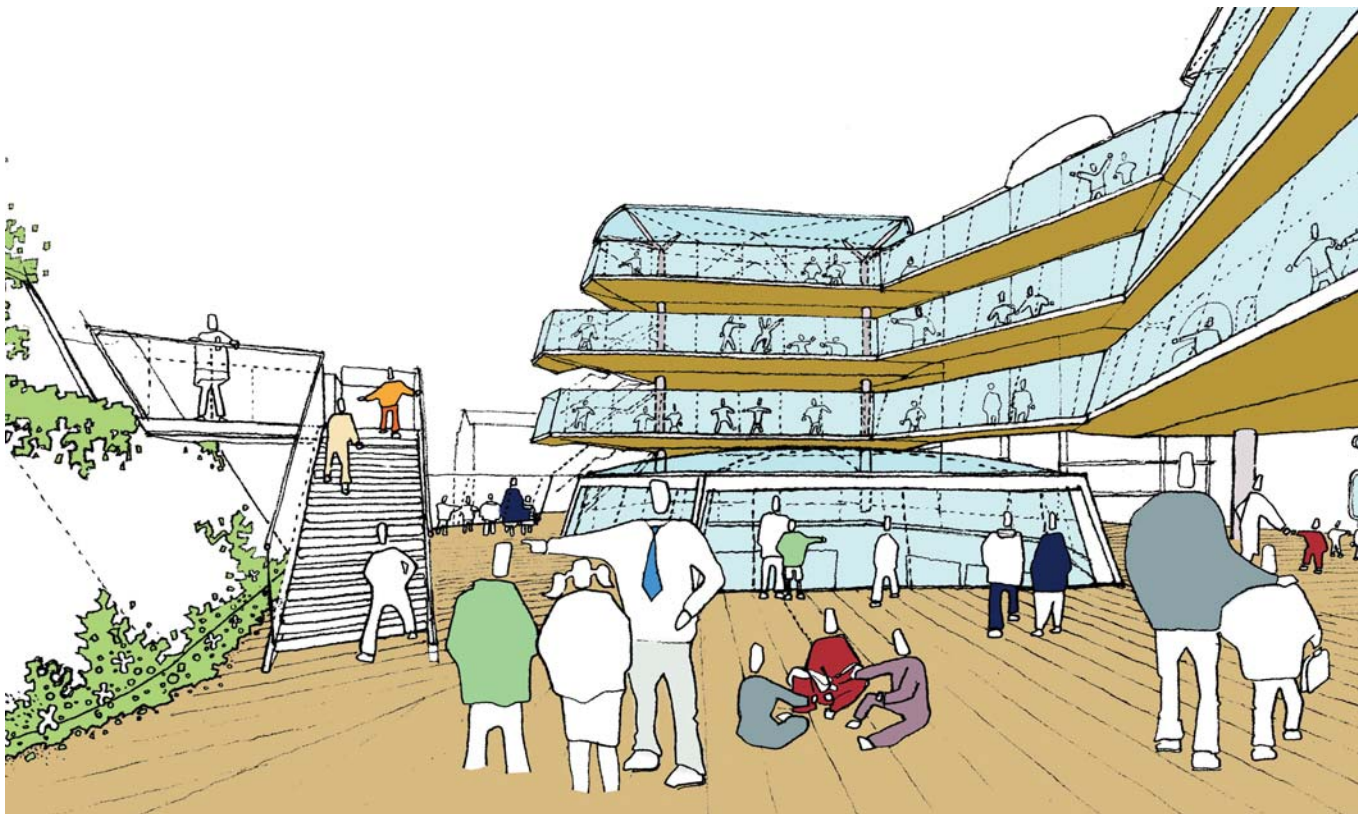
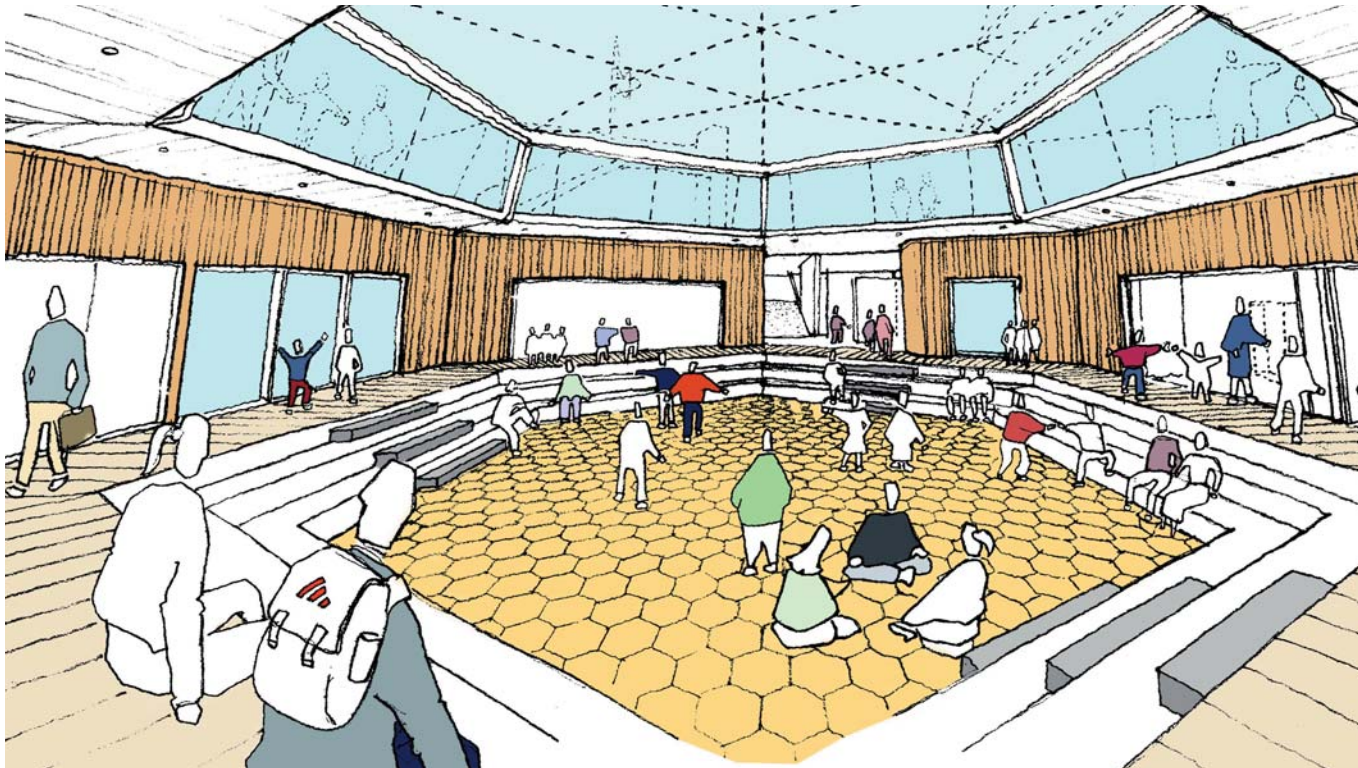
This separation also aids 'natural' security where (in the core scheme) areas for the children are elevated to first floor level or above. Furthermore, the way in which access to the first floor is configured means that it can be readily controlled at all times of day, to prevent unwanted visitors gaining access to the school. However, the school has been designed to be fully inclusive and accessible for all users of the building.

The Beehive School has been designed to meet or exceed all Statutory Requirements



Core site plan – broken line shows the school site

Heart space



First floor play garden



applicable to a building of this type and size. Balustrades and guarding to the playdecks will be designed to provide a safe and secure environment for the children, while not limiting their access to light and air. However, given the design's radical multi-storey approach, it is accepted that further development work will be required to verify some aspects of the design.

Environmental Performance

The Beehive School has been designed to deliver the highest standards of sustainability and environmental performance, combined with the flexibility to enable the design to cater for a wide variety of site conditions without any loss in performance.

The school has been designed to achieve its optimum environmental performance when oriented in a north/south direction. This can be achieved on the majority of sites by the configuration of the learning houses, which can be combined in a number of different ways (the core scheme being but one of these).

In its optimum configuration the classbases benefit from controlled daylight from the north, with the playdecks benefiting from the southerly sunpath, with sunny edges and warm shade. The wrapping form of the classbases also helps to shelter the playdecks from prevailing westerly winds.

The building's heavyweight construction provides thermal mass to capture and retain heat in the winter, and radiate 'coolth' in the summer, which, combined with a highly insulated external envelope, makes the building very energy efficient.

The ventilation strategy has been designed to capitalise on the basic stability of the school's environmental conditions. Opening windows are provided to permit full natural ventilation when appropriate, along with 'mixed-mode' ventilation plant with heat recovery, which allows the building to operate in a full mechanical mode when prevailing conditions preclude natural ventilation.

As well as these components of the building's environmental strategy, sustainability has been given further consideration in the choice of building materials and in energy conservation and resource management measures.

Cost

The site is very restricted, necessitating a multi-storey solution with limited site works. The use of the playdecks as horizontal circulation, in lieu of more traditional enclosed corridor spaces, means that the building is very efficient in its use of internal space, the core scheme being almost exactly 'on area'.

However building vertically self-evidently brings with it a number of costs which would not be present in a more traditional school.

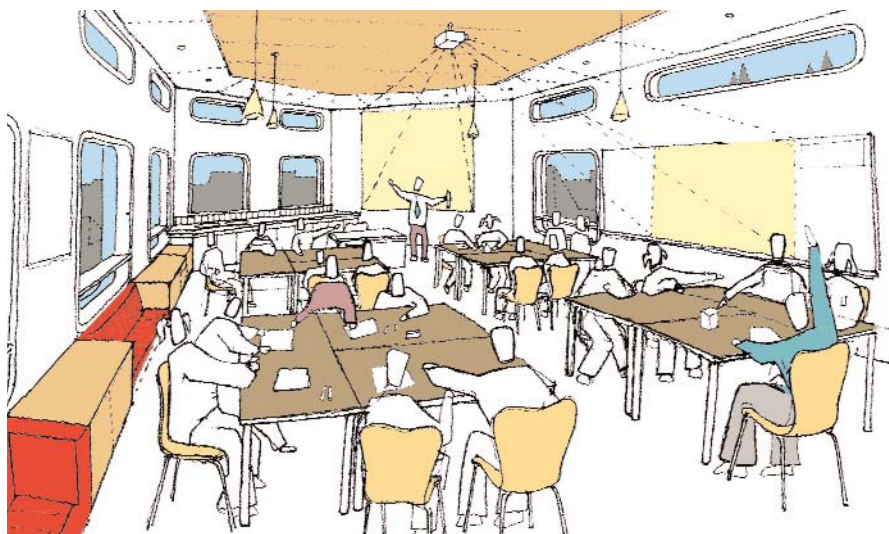
Abnormals inclusive of associated fees have been estimated at 17% of Gross Capital Cost (excluding loose furniture and equipment). Several factors contribute to this, including the intrinsic cost of building vertically, the cost of building in future flexibility, and the cost of creating playdecks.

CABE Design Review Committee

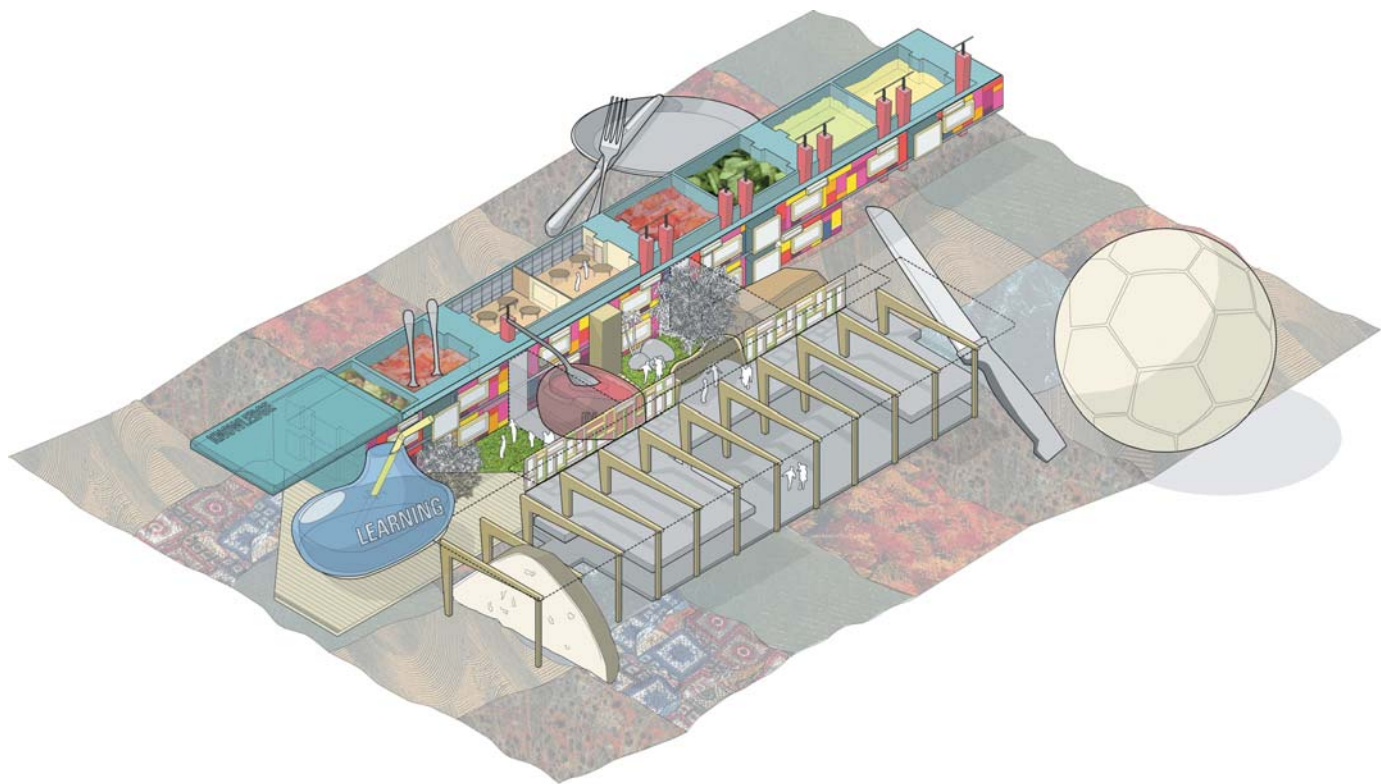
The CABE design review committee felt that this scheme was an interesting development from the Hampden Gurney Primary School. They felt that the reversal of the section to bring the play decks to face into the site results in the front façade not being as animated as the example built at Hampden Gurney, and that there were other ways to deal with accessibility of the first floor deck to parents and buggies than the ramp proposed in the scheme, which they felt was too long for compulsory use. As a result, the location and treatment of the hall was less successful than the main body of the school, and had a negative impact on the entry sequence. This was possibly exaggerated because the core site appeared too large for this solution. Overall they did believe that the proposal was inspirational. If detailed well the playgrounds in the sky could be successful, and the constructional form could lend itself for prefabrication.

Cost Comment

The design team's cost estimate of this scheme excluding abnormals is within the DfES Building Cost guide. However, one of the assumptions is a well-coordinated materials delivery and installation process within very limited site storage. The abnormals on this site are unusual in that the design is based around the play decks, which are a response to the extremely restricted site. This high level of abnormals should be offset against the minimal amount of land required. This scheme's costs did not require any locational factor adjustment.



Internal view of a typical classroom





exemplar primary school design

larger urban site

The 'Big Rug School' is based on a richly woven textile that integrates pupils, staff, community and landscape

Sarah Wigglesworth Architects (P5)

Cost Consultants
Dobson White Boulcott

Structural Engineers
Techniker

Environmental Engineers
Fulcrum Consulting

Landscape Architects
Jennifer Coe Landscape Architecture

Timber Fabrications
Cowley Structural Timberwork Ltd

Curriculum Consultant
Dr Geoff Mawson

Sites
Primary site F (core)
Sites E and B (variations)

Introduction

Our brief was to design a new exemplar primary school of 2FE. The site was chosen by the DfES because it presented characteristics often found in existing primary school sites. Its precise location was not disclosed to us and we were given site surveys, photos and other tabular data on which to base our work. Classed as an inner city location, the site lay on the edge of a conurbation and suffered from noise problems due to its proximity to an urban trunk road.

The brief asked us to develop a form that a future primary school could take if it were to be located on this site. Key objectives behind educational drivers were:

- inclusivity;
- flexibility in teaching formats and spatial/furniture arrangements;
- involving the entire community in the life of the school;
- encouraging lifelong learning;
- integrating ICT provision.

Our Interpretation

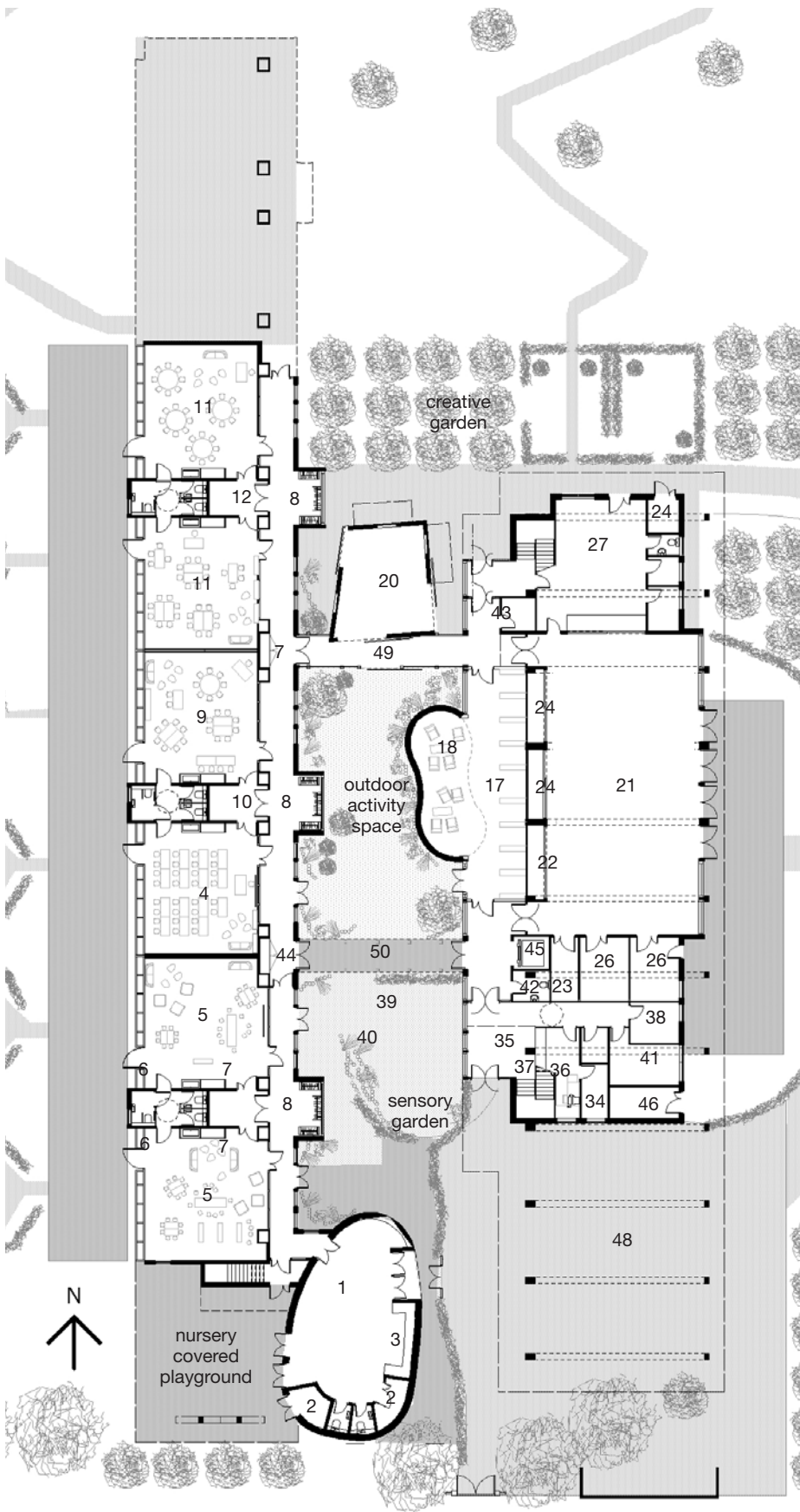
The approach we adopted starts from the following premises. We want to make our school:

- a non-institutional school;
- a school that is sustainable for the community and for resources;
- an environment that is a thing of excitement, wonder and delight;
- a place whose external and internal environments are beautifully integrated;
- a place where all people, not just children, want to come and learn.

Design Philosophy

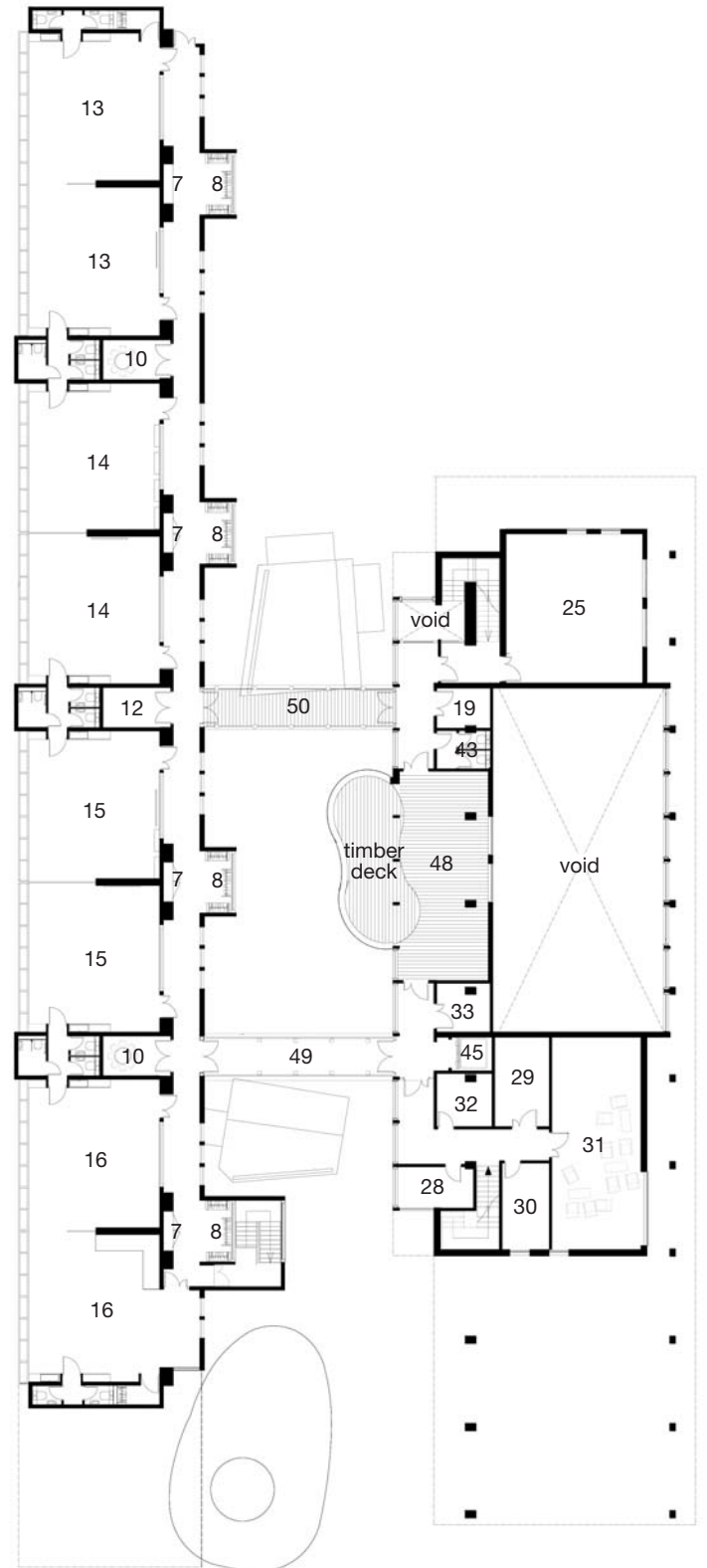
We have called our school the 'Big Rug School'. It is a richly woven textile that integrates the pupils, their community and the staff with the landscape, local conditions and collective aspirations. It finds novel solutions to the brief, offering flexible spaces for individually-directed learning throughout the school, for children and adults alike. In this way it inscribes the notion of everyone as lifelong learners into the very fabric of the building.

Ground floor plan



First floor plan

For key to plans see inside front cover





The school we have designed is welcoming and accessible to all yet safe and secure for those youngsters most at risk. The design permits a wide range of ways for the head to manage the school. It encourages social interaction, seeing the education of children 'for life' as of equal importance to their need to acquire knowledge and skills. It encourages adults to use its facilities in different ways at different times. Our school design answers – indeed, exceeds – many of the requirements of the brief, anticipating future educational trends as well as building regulations provisions. In this sense it is already the future.

Adaptability and Flexibility

The Big Rug School has been designed to accommodate increasing or falling rolls without compromising the working of the school. At a micro scale, the classrooms can expand to allow for different teaching arrangements and class sizes. Circulation spaces are as generous as possible; they can contain equipment, storage and additional teaching space, and may be colonised according to requirements.

Where classes for large numbers of children are needed, two adjacent classrooms can be united by sliding back the doors between them.

Flexibility is at the heart of our strategy for ICT provision at The Big Rug School, which helps to provide a technology-rich environment. In addition to a dedicated computer room, places for using ICT are dispersed throughout the school. Networks of cabling are provided to suit any teaching scenario, including group electronic conversations using interactive white boards and video conferencing to distant locations. By adopting this strategy the school addresses the needs of all age groups, and anticipates curriculum development and changes in technology.

Management and Organisation

The Big Rug School is a place where kids feel safe and well-cared for, adults feel respected and secure, and the community has the freedom to build its collective identity through controlled participation in the life of the school.

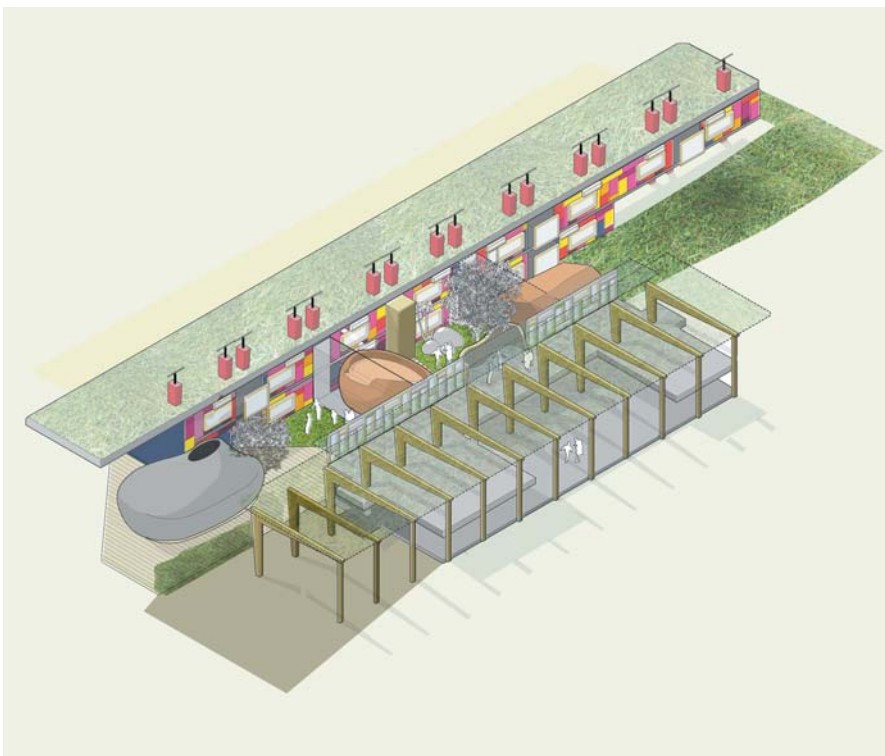
Freedom of access is always balanced against the overarching need to ensure the safety of children. Managing potential conflicts between user groups is handled through close attention to timetabling. This is reinforced by the design of the building, which allows for the possibility of segregating sections of the building so that they can be used exclusively by one group of people at a particular time of day or evening.

As a rule the public can access anywhere within the community and Learning Forum zones on both floors. The classroom zone of the building is reserved for pupils and their teachers. We imagine that parents may enter this area at specific times by invitation.

Environmental Performance

The environmental strategy at the Big Rug School was developed as a direct response to the characteristics of the site and its landscape, which is located in an urban area on the coast. The proposal makes use of site characteristics to maintain comfort while using as little energy as possible. This means using natural light, passive solar heating and wind-driven extract ventilation, which can be operated using simple, easy-to-use controls. Our strategy has been to use the natural capacity of the building fabric to modify prevailing conditions in order to provide a comfortable and appropriate environment relying on a minimal use of energy.

The close integration of gardens with the building creates small micro-climates which modulate site conditions, providing shade and cooling and attenuating noise from the trunk road nearby.



Whole building:
concept diagram



Top
 Perspective of
 entrance and
 nursery

Middle
 Montage through the
 classrooms at upper
 and lower levels

Bottom
 Perspective of early
 design of 'Learning
 Forum' and hall



Landscape and Nature

The landscape directly around the school is a large open space available to the whole community. Together with children's own gardens, this space provides a secure place where connections to the natural world and the environment can be made in a learning environment. As an exciting and stimulating place, the landscape around the school can become a rich environment for child exploration.

At the Big Rug School the landscape design:

- conveys the sense of place;
- creates clearly characterised spaces (gardens) and sets the building within its context;
- demonstrates sustainability and biodiversity and is an educational tool for all ages;
- provides a sense of arcadia, greenness, a contrast to town centres and public parks;
- becomes part of a palette of rich, communal open spaces within a town or village, just like churchyards, village greens and allotments;
- creates a pattern of landscape on the site and makes connections that draw all places together;

- creates a sequence and hierarchy of different spaces, inviting passage between them;
- makes a large site comprehensible;
- provides different scales to relate to children's perceptions and for their feelings of ease and connectedness.

Cost

This site has limited abnormalities, which equate to 4% of the Gross Capital Cost (excluding loose furniture and equipment) and relate to noise.

CABE Design Review Committee

The CABE design review committee felt the initial metaphor of the 'weave' is strong, intriguing and worth pursuing. It was suggested, however, that this should have been pursued further, strengthening the links between the accommodation in the 'warp' strips and activities in the 'weft' elements. There are generosity of space conflicts at several points in the plan. The scaling of the canopy, for example, could be embodied in the treatment of the entrance space. In addition to this, it was felt that the nature strip could be a generous and celebratory space which would need to be exploited by maximising access to it from the rest of the school.

Cost Comment

The design team's cost estimate of this scheme excluding abnormalities is in line with the DfES Net Building Cost guide. Pressure will need to be maintained on costs as the design is developed, especially in relation to the areas outside the two main building blocks. This scheme has had a significant locational factor adjustment to normalise its costs, which could influence the affordability of certain materials or components.



Axonometric of the school in landscape

secondary schools



Exemplar Designs
concepts and ideas





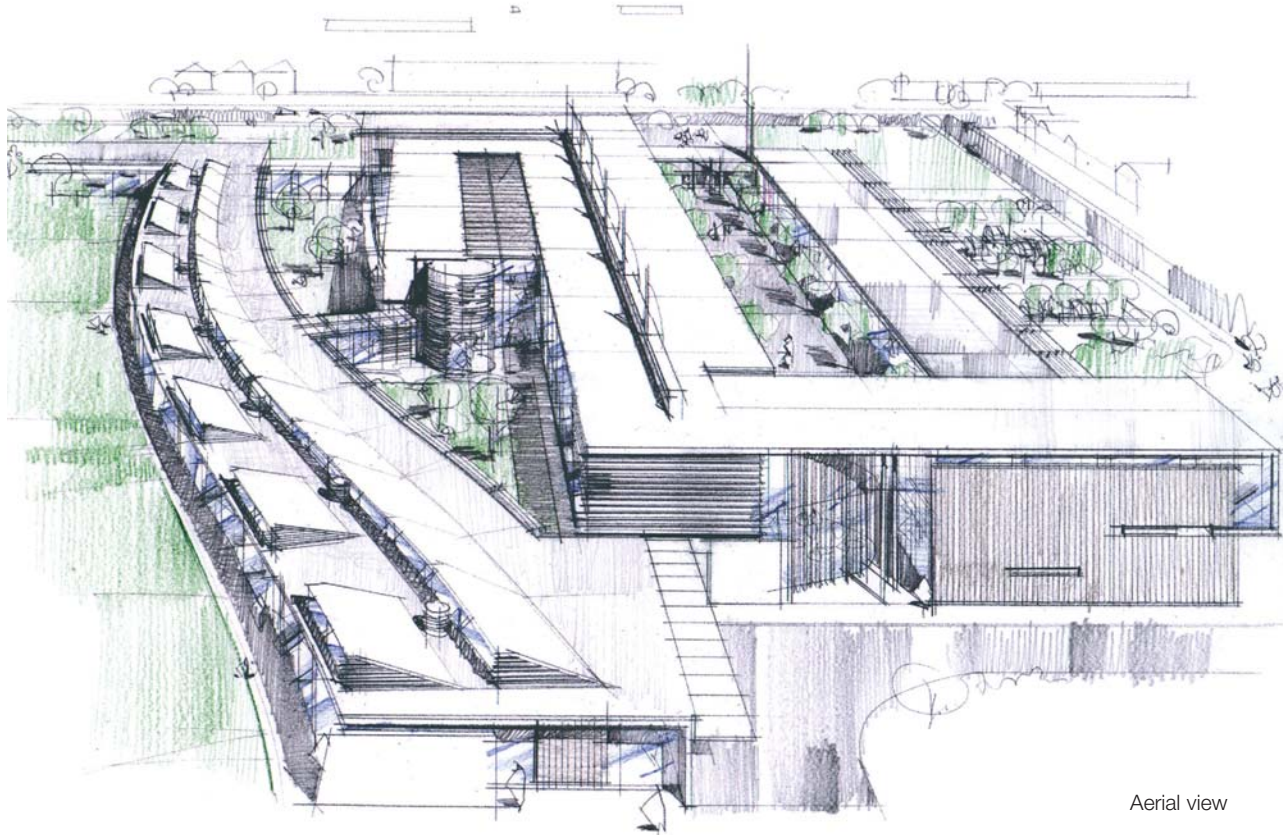
Classroom cluster



Learning resource area



Learning resource area, looking towards courtyard



Aerial view

Staff social and 'touchdown'



Staff social and teamwork area



Dining hall





exemplar secondary school design

suburban site

Defensible space and flexible classroom clusters that look to the outside landscape to create a positive and open learning environment

MACE (RTKL Architects) (S1)

Cost Consultants
Gardiner and Theobald

Structural Engineer
Battle McCarthy

Environmental Engineer
Battle McCarthy

Education Consultants
Place Group

Project Management
Mace

Sites
Secondary site B (core)
Sites D and E (variations)

Introduction

We believe that twenty-first century schools must be designed to raise standards of pupil attainment and positively influence behaviour. They should also provide environments that inspire teaching and learning and contribute to raising the morale of school staff.

In producing a design for a 900 pupil (6FE) plus sixth form secondary school core brief, the design team have endeavoured to address all of the above.

Design Philosophy

The design philosophy for this exemplar is driven from the chalk face. It finds its roots in the current and future curriculum requirements that will dictate whether this exemplar works in the real world. It looks towards the flexibility and adaptability that are integral to the 14 to 19 agenda and integrates inclusion as a critical design factor.

The aspirations for any school are to deliver improved educational performance in the context of a nurturing and caring environment that integrates with the community it serves.



View of first floor corridor



The vision of this exemplar is to achieve this through the creation of defensible space and flexible classroom clusters that look to the outside landscape to create a positive and open learning environment.

Our motivation came from the users, the teachers and the pupils who have to work in the environment that we design. Our extensive educational engagement and scenario testing gave a voice to these users in the design process; it established critical educational design factors and designed the exemplar from the inside out. Form and function have driven the creation of a flexible and inspirational learning environment for all users, including the extended community.

We have designed our exemplar in line with expected curriculum and policy reform, including the 14 to 19 agenda and workload assessment and the need to address new ways of working for all staff.

Adaptability and Flexibility

The flexibility offered through the design extends beyond teaching and learning styles in the classroom to address flexible teacher administration, meeting and planning space requirements.

This is integrated with a need to address inclusion and create differentiated learning opportunities for pupils.

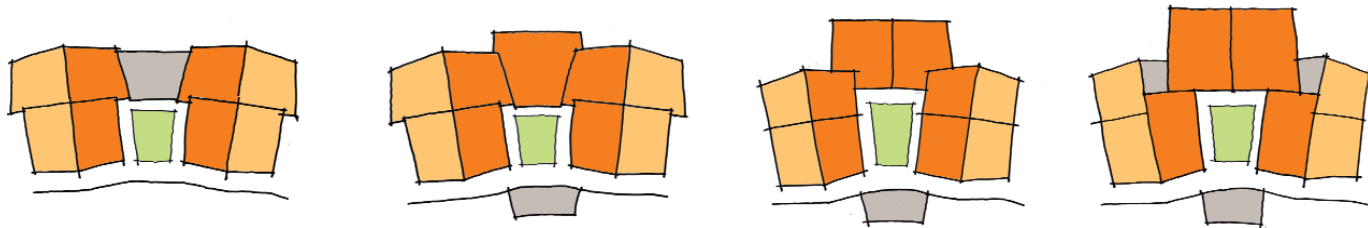
Our design has tackled these issues through the creation of flexible 'break out' spaces and multi-use office/meeting rooms adjacent to classroom clusters. It must be able to deliver a vocational and academic curriculum whilst having common areas for larger class size delivery.

There is also a need for adaptability to meet pupil needs. Our design provides this. It creates social spaces for pupils to meet and

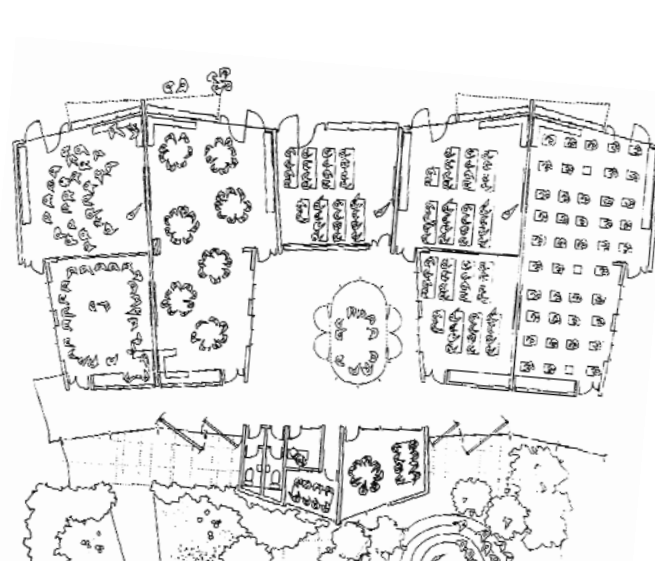
interact, both internally and externally. The lack of social space in schools is often a key driver in deteriorating the behaviour of pupils, especially at scheduled break times and lunch times. This often has negative implications for facilities management. The use of external spaces and stairs as seating areas addresses these issues in a sympathetic yet practical manner.

Management and Organisation

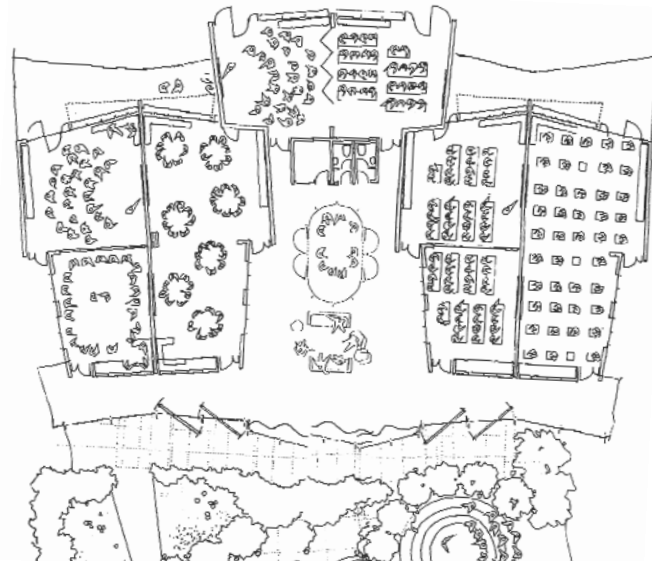
Access and Inclusion are now key aspects of all schools and classroom teaching. With mixed ability teaching now common and the need to provide differentiated learning opportunities, classroom design must reflect the diverse requirements of teachers for both formal delivery and breakaway group work spaces in the same area. Such integration must also provide for students with SEN or disabilities, who have their own specific



Possible variations of the cluster: from left to right, four, five and six classrooms, and four light practical spaces



A five classroom cluster



A six classroom cluster



View from south east



Site plan



South west entrance



Main entrance



needs. This understanding has been a key factor for the whole scheme, which has been designed to enable full participation in school life and promote a sense of belonging. The exemplar has also endeavoured to create a sense of community internally within the school, allowing for certain areas to become pastoral bases, curriculum bases or vocational bases as appropriate.

Security is an increasingly problematic issue for schools, especially given increasing community use. There is a need for pupil and teacher security whilst in school.

The cross-over with ICT based administration systems will offer opportunities for 'smart technology' to be embedded into future schools. Our exemplar assumes that access will be controlled and monitored through the use of contactless smartcards and, in time, facial recognition solutions. These in turn will register users within the school, even directing them to chosen lessons.

This electronic solution is imprinted on our internal defensible space and allows students to have an outside space that is fully secure.

Environmental Performance

The intention of this study was to create a building system that can be flexibly applied to school developments across the country. In this respect it needs to perform without compromise for any urban residential location and for any orientation and geographic location within the UK. Because of the

variations in climate and context we determined the primary elements will be the slab and roof, with the façade considered as a secondary component that can be adapted to specific site conditions and orientations. This leaves us with the predictable common elements of the floorslab and roof to perform the role of interacting between the external and internal environments.

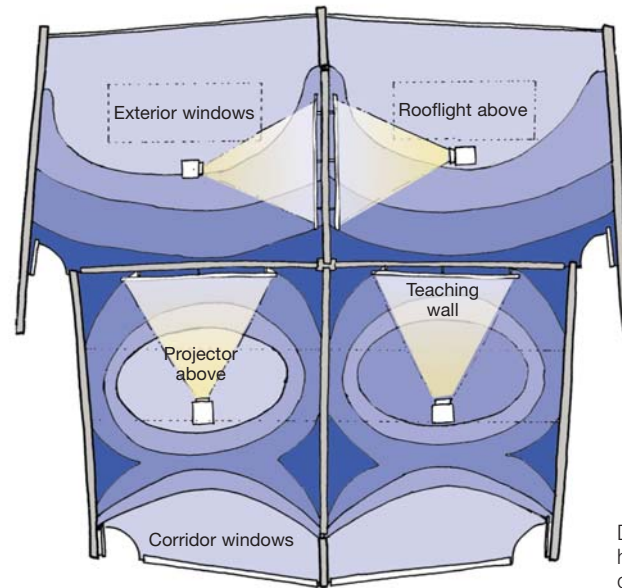
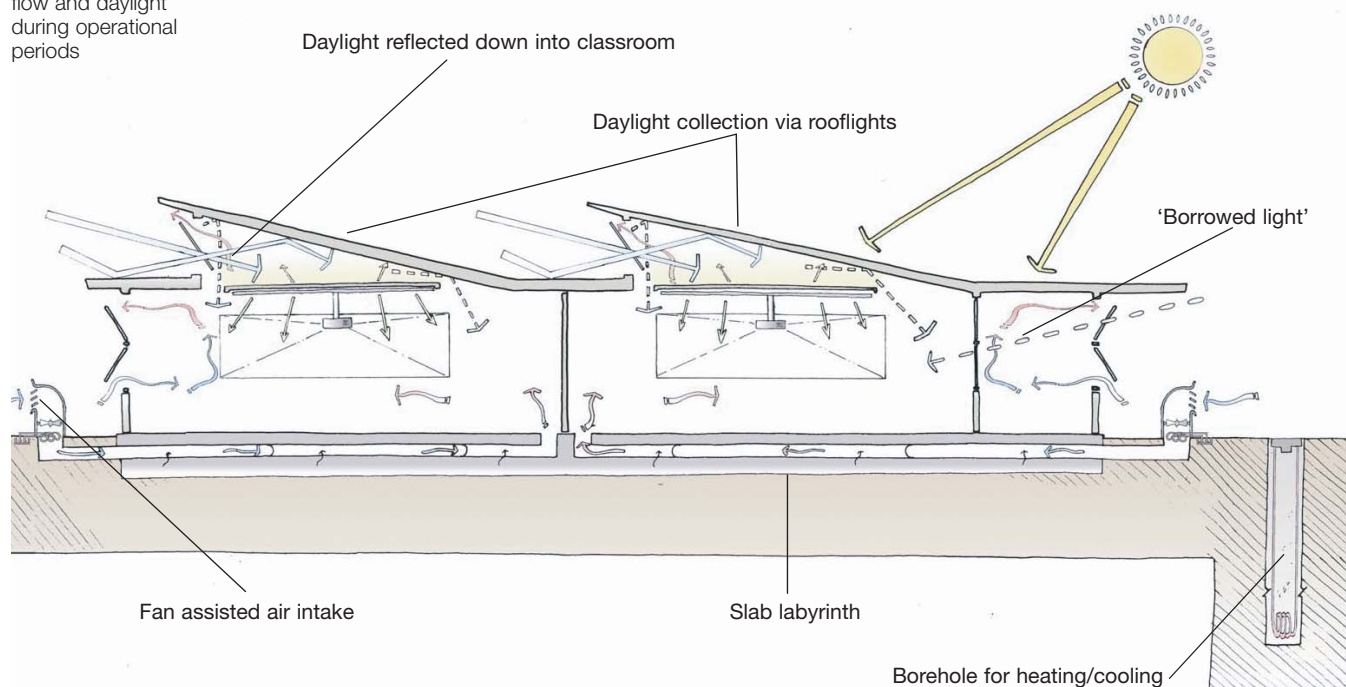


Diagram showing how balanced daylight is achieved

Section showing air flow and daylight during operational periods

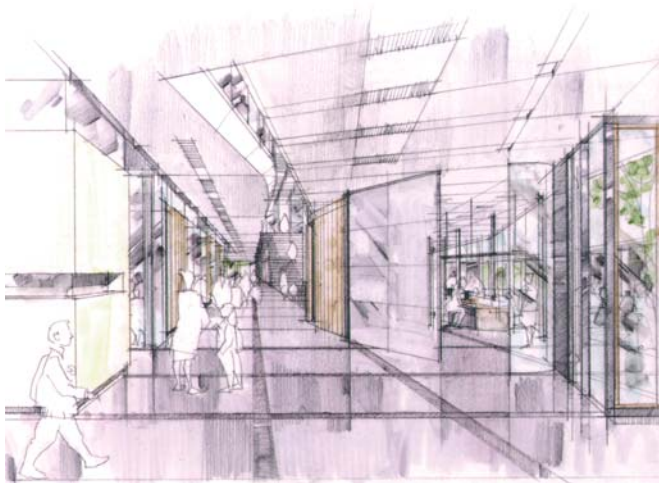




External terraces



Cluster street



View of corridor from entrance



Courtyard



North/south section through two-storey block



North/south section through outdoor dining block



Construction and Delivery

Through our design-led process, we have determined that the optimal form for an educative environment is a cluster of classrooms in a single storey block along with associated ancillary spaces. This creates a single node that can be repeated with ease and adapted for specific teaching roles. The classroom pod will take the form of a lightweight, demountable steel-framed structure and roof on a mass concrete slab. This allows the flexibility to form the required variations of classroom types whilst allowing for adaptability in terms of structure, materials choice and modularisation and prefabrication of building components.

The construction industry tends to underplay the many very positive talents that it brings to problem solving and delivery, but there is still room for significant improvement. Mace believe that we must have a clear idea of what the future looks like, so that we improve incrementally in a planned way rather than lurch from one initiative to another. The Building Schools for the Future programme is a great opportunity to drive the industry in terms of a new supply base.

We have taken the processes and logic from production engineering and we are now using them to improve techniques on our construction projects. These range from simple organisational improvements through sophisticated logistic and delivery systems, and eventually we will bring the factory to site. The exemplar schools will benefit from these delivery efficiencies. The schools do not need to be linear or appear overly repetitive to adopt production systems. The key is to understand the logic and design systems that fit together well.

One of the key principles of the scheme is to create a series of served and servant spaces. This means that the servant spaces, such as toilets and kitchens, can be manufactured and assembled off site. The components that will form the larger volumes will come as fully finished panels that have been designed to fit together easily. The over-riding consideration of this approach is that the system has to be flexible enough to produce a range of solutions appropriate for each and every school's requirements.

We believe that the design outlined above meets the requirements set out in the brief for a school for the future and today. The

component parts of the design allow the concept to adapt to site constraints as well as to educational and curriculum change.

The design also lends itself to having substantial elements built off site and could help towards achieving the demanding targets set for the industry in the Egan Report.

Cost

We believe that this site does not have any abnormalities.

CABE Design Review Committee

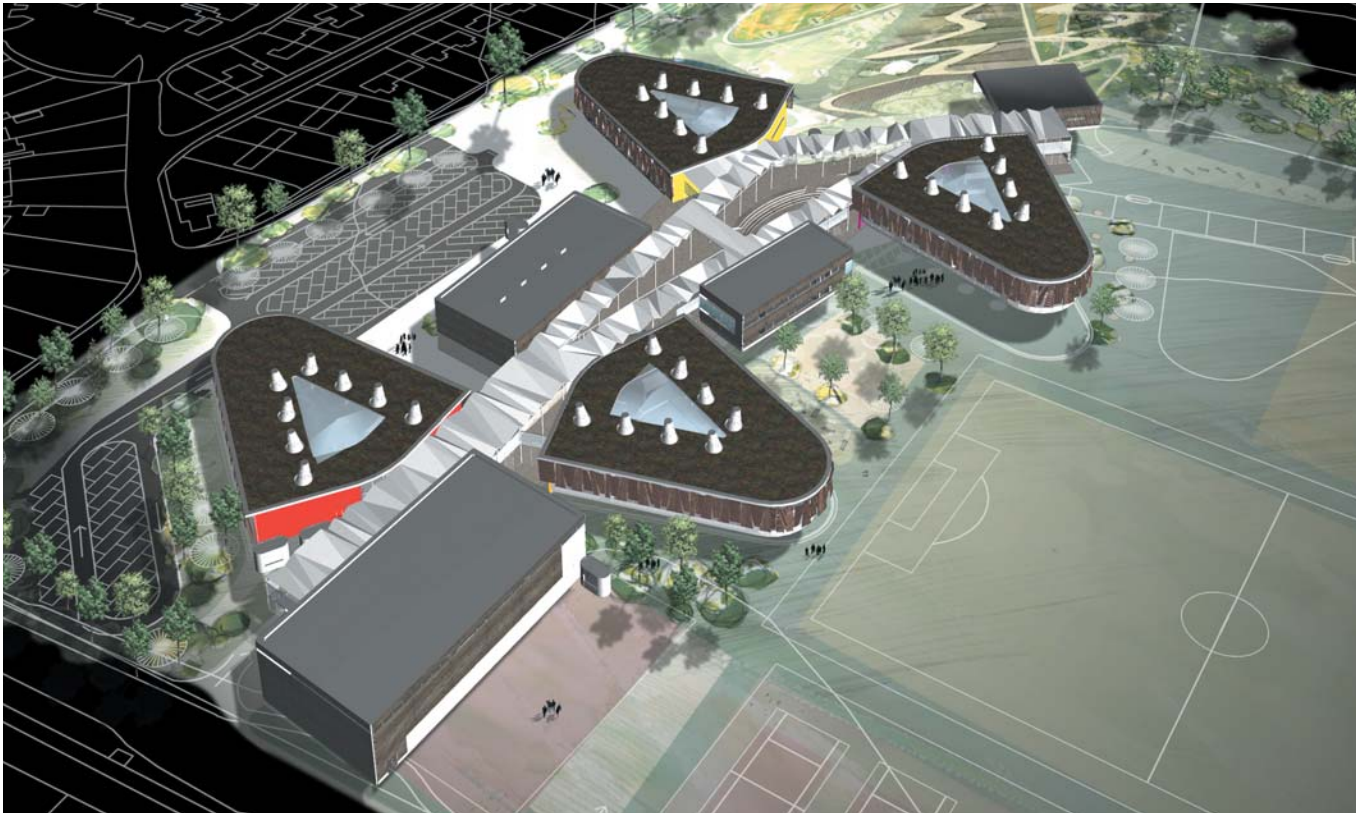
The CABE design review committee welcomed the approach of 'scenario testing' to assess how pupils and staff would use and respond to this school. They welcomed the clustering of classrooms for future flexibility, and thought that circulation internally and externally worked well. A successful civic nature had been created for the main pupil entrance, which would be a lively gathering space during the day. They had some reservations about acoustic separation between classrooms in the cluster, and about the quality of the space for external views out from the internal pair of cluster rooms, and thought these could do with further development. The number of classrooms in a cluster, and the way the space between clusters works, will need further resolution. They would like to see the scheme more fully embrace the potential strength of the courtyard as the heart of the school.

Cost Comment

The design team's cost estimate for this scheme, which has no abnormalities, exceeds the DfES Net Building Cost guide by approximately 2% as a result of its over-provision of floor area. Some of this is inherent in the cluster design, which involves a high proportion of circulation area. All of this will need to be designed out, as there appears to be limited opportunity for reducing the cost per m². The allowance for site works is lower than normally expected, due to proposed limited land take. This scheme has had a marginal locational adjustment factor to normalise its costs, which may influence the affordability of certain materials or components (see also page 118).



East/west section





exemplar secondary school design

sloping site

Learning clusters and central facilities are linked by a covered street to suit regional variations of climate and topography

Wilkinson Eyre Architects (S2)

Cost Consultants
Davis Langdon and Everest

Structural Engineers
ARUP

Environmental Engineers
ARUP

Educational advisors
Dept. Ltd

Sites
Secondary site D (core)
Sites A and B (variations)

Introduction

The Design Team were asked to develop an exemplar secondary school design for the example site (site D) in a suburban edge-of-town setting. It occupies a footprint of 8.52ha and is sloped from east to west, the maximum fall totalling almost 30 metres. Main access into the site is from the road to the north. The site is on a main bus route (the nearest bus stop is on the western edge of the site).

Our scheme has a linear layout that is perpendicular to the slope for its westernmost portion, with the sports building at the foot of

the hill. As the slope gets steeper towards the east, the school curves round to traverse the slope. This maximises views over playing fields to the south and presents a more protective shell to the north-facing public side of the site. The main entrance is off the car park halfway along the central spine of the school. A separate student entrance, for use at the beginning and end of the day only, is located at the west end close to the bus stop.

As a consequence of the sloping site, ramps, steps and level changes create a rich variety of



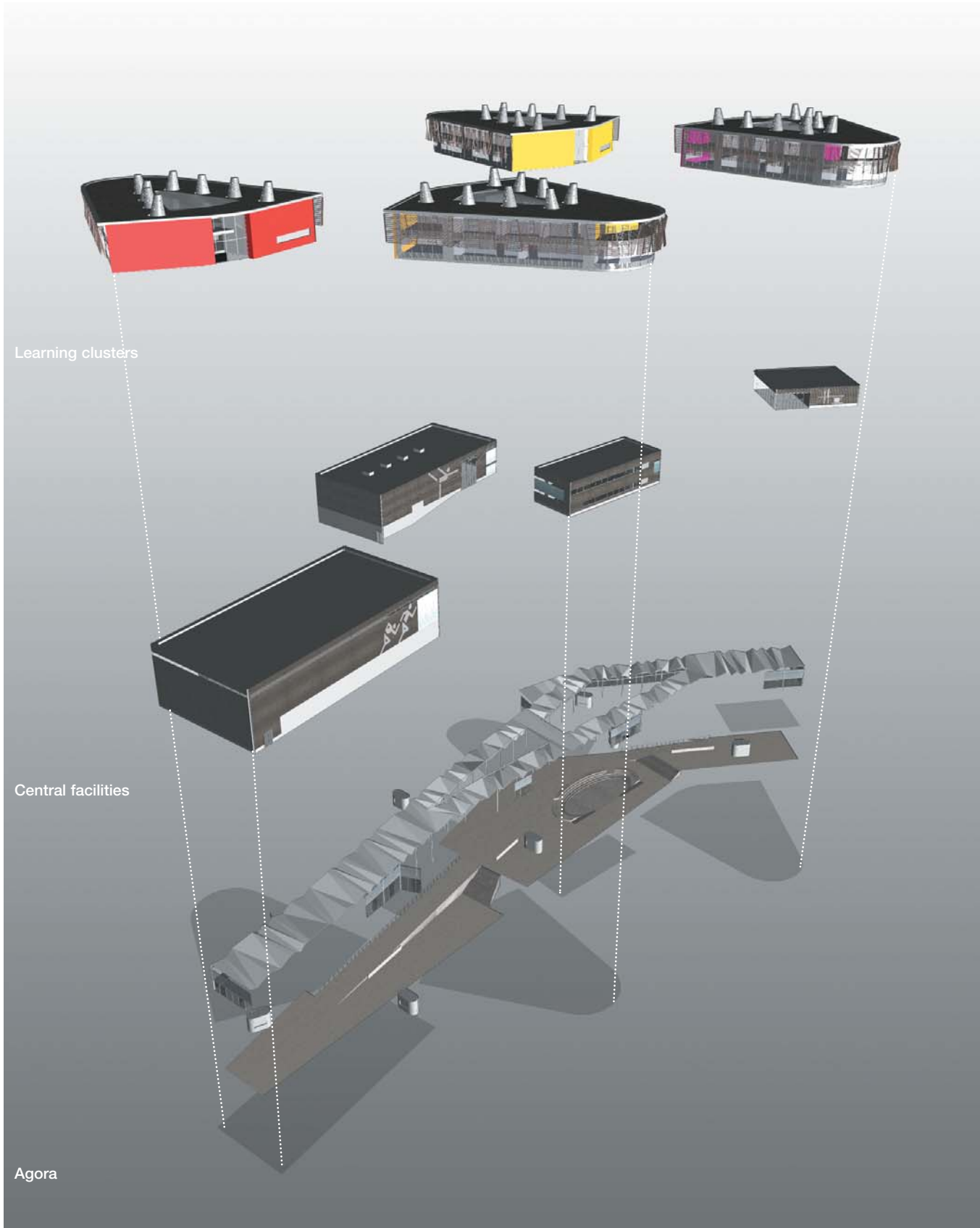
Opposite top: Aerial view of core site

Opposite middle: View from playing fields

Opposite bottom: View of the main entrance

Right: View of typical 'cluster' interior

Exploded aerial view





dynamic internal spaces. As this also has the effect of spreading out the school buildings, we have illustrated how the scheme could be more tightly planned on flat sites (sites A & B).

Design Approach

The objective of the exemplar design exercise is to offer an architecture that supports innovative solutions in the delivery of teaching, as well as providing a stimulating physical educational environment that is forward-looking and design-led, adopting best practice from other building types nationally and internationally. Conscious of the ever-present need for adaptability, our team has looked at a 'kit-of-parts' approach that separates general teaching spaces from those that have specific servicing or technical requirements. The 'parts' can be modified to suit particular regional variations of climate and topography (materials, orientation and degree of enclosure) as well as a particular LEA's or head teacher's style (by varying the organisation of the parts and the proximity of the various functions).

We have identified two types of building; learning clusters or 'villages' and central facilities (containing assembly, sport, dining and general office-type space as well as the acoustically specific dance, drama and music spaces). These are linked by a covered environmentally protected street or 'agora'. The kit-of-parts approach lends itself easily to providing solutions for different sites and could be expanded incrementally as a school grows, or could be added in phases to an existing school.

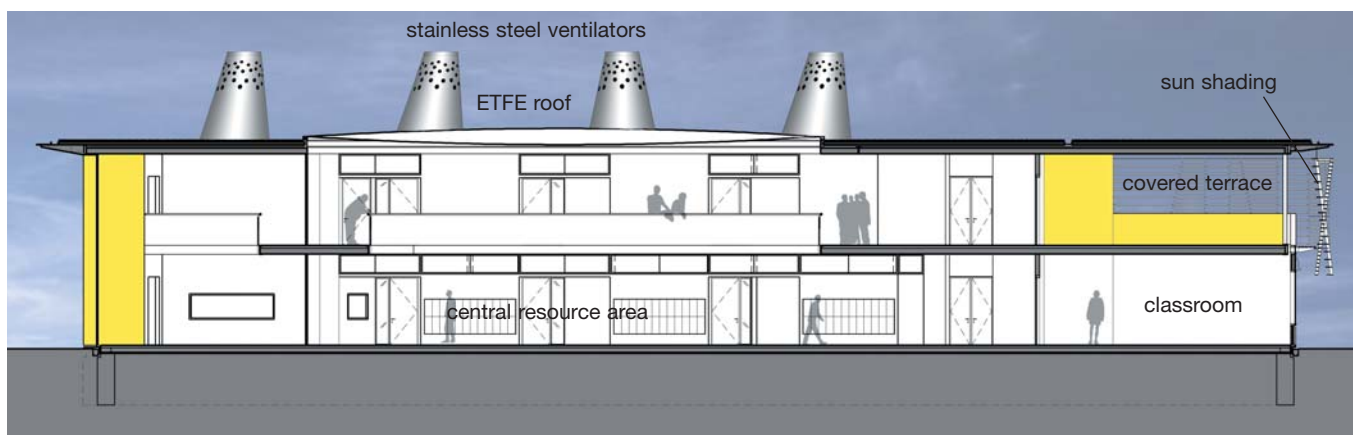
Four emerging themes have informed our design:

- ICT and new technologies – wireless laptops, interactive whiteboards and smartcards offer great freedoms for the way the building is managed and the way ICT is used as a learning tool;
- educational change – the rate of educational change is increasing with the introduction of alternative management structures, such as 'schools within schools', or half-day working models that group or overlap complementary subjects. These models could significantly reduce movement patterns between classrooms (typically at 45 minute intervals);
- extended use of schools – the occupancy of schools is largely under capacity over the span of a year (evenings, summertime, etc). Facilities that can also be used for the extended community would significantly improve the latent potential of schools as community centres;
- sense of place/pastoral care – young people need a sense of security, a sense of community, visual stimulus and direct contact with nature. The exemplary learning environment should be safe, attractive, stimulating and exciting as well as efficiently organised. A strong connection with the outdoors is desirable, as are external teaching spaces. Strong patterns of pastoral care should be readily available for the younger child in particular.

Adaptability and Flexibility

A key part of our design work has been to establish the optimum size of a 'learning cluster'. In our model, central library facilities, ICT and learning resources are distributed throughout the clusters, as are staff work bases, toilets and lifts. We have established that four learning clusters will support the core brief of 1150 students and also provide flexibility for different arrangements – departmental, 'learning village' house groups, year groups or five-day working models can be accommodated with ease, allowing a school to choose its own method of working. Each cluster could provide a base for between 220 to 300 students as a 'school within a school', supported by a staff base. This flexibility extends to further accommodate variations of school size, as additional clusters can be added to increase pupil numbers. The clustered arrangement also helps to break down an otherwise large building scale, often intimidating and alienating to the 11 year old newcomer arriving from primary school.

The plan form of the cluster has been developed so that a run of three 60m² classrooms in a row can be adapted to offer different sizes (for instance 90m² or 120m²) and therefore long-term adaptability. Water, drainage and gas services are grouped at either end of the run to allow a variety of functions in the rooms in between. Two linear runs of classrooms are split either side of a central double-height ICT/learning resources area, which is accessed via a lobby directly from the agora. The staff work base is

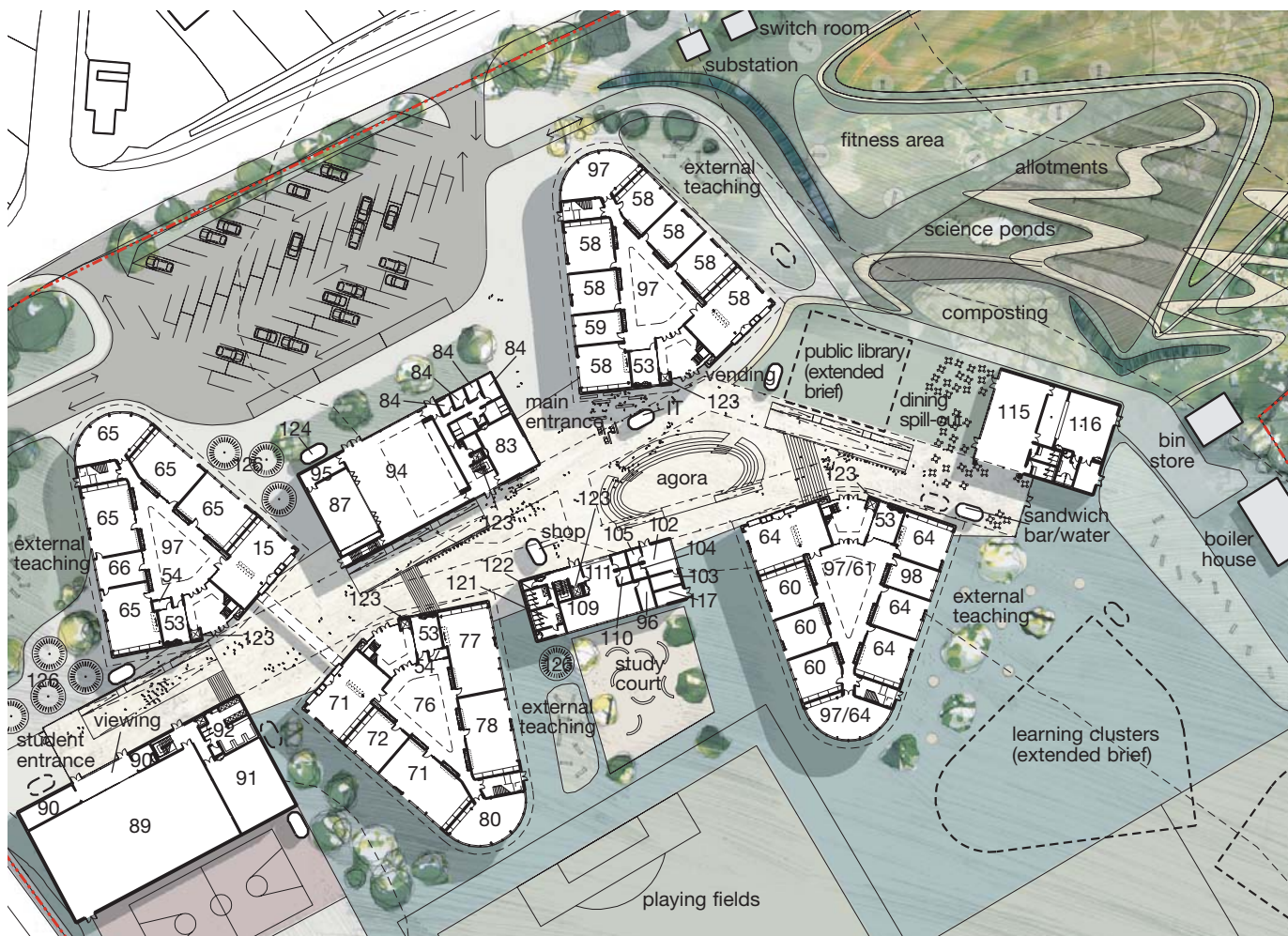


Section through a learning cluster

For key to plans
see inside front
cover



First floor plan



Ground floor plan and surrounding site



positioned to overlook both the entry to the cluster and the central resource area, therefore providing passive supervision of these areas. Toilets and the lift are also positioned in this location. Rooms that have specific servicing requirements such as science laboratories and design and technology and art rooms are on the ground floor, with generic classrooms on the first floor. In the curved 'nose' of the learning cluster is a library area, which can also be used for quiet study or as a timetabled space. Upstairs in the same position is an outdoor covered teaching/recreational space with views over the landscape.

Central Resources

The central facilities are in five distinct buildings that vary in size but have all been planned on a common structural grid of 5.4m for economy: sport, assembly, dining, reception and an optional public library (extended brief). A common planning grid of 1.8m means that roof and wall panel systems will be common to all. The material of the solid cladding panel could be modified to suit a particular region using locally-available vernacular materials – stained timber, tiles, stone, render - all as rain-screen cladding

panels above a solid durable plinth of engineering brick or reinforced concrete.

The assembly building has a double height drama studio adjacent to the main hall. Separated by a removable screen, the drama space can function as a stage for theatre performances. Music recital and practice rooms on two floors at the opposite end of the building could also function as 'green rooms', as changing areas and as control rooms for audio/visual equipment in the main hall.

The sport building has stores along the long side of the sports hall for ease of access, and provides an area for public viewing behind a waist-height screen.

The reception building has a counter facing into the agora. The inclusion support suite is next to the main reception desk but with separate access. Upstairs is an open plan staff resource and social area – a central resource to complement the dispersed staff work bases – with bookable rooms for meetings or quiet study.

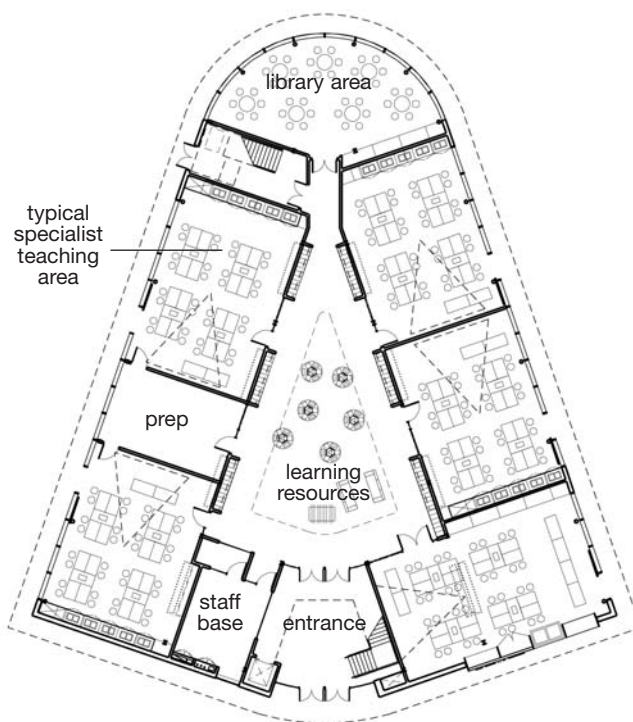
The eating area is divided between the dining hall and the agora, where different food would

be available. The servery is arranged so that it can be shut off and the dining hall used for other activities – the kitchen could also expand into the servery area should the building be enlarged in future.

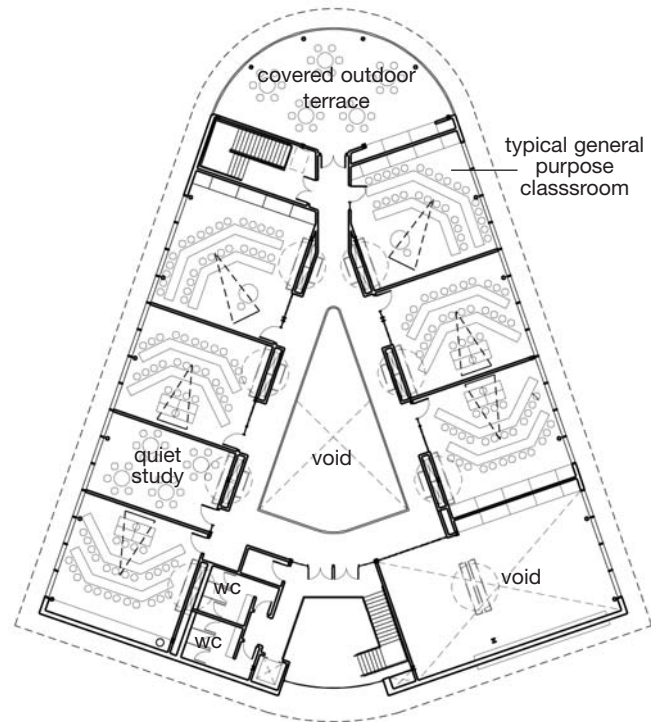
Management and Organisation

Our design promotes extended community use as well as extended timetabling of both school day and school year. The agora has a number of opportunities for use by the community for events such as fairs, and the assembly building could also be used by the community in the evening, with independent access from the car park and main entrance. The sports building could also be accessed independently from the rest of the school by a sports club during evenings, weekends or school holiday periods. A learning cluster can remain open for evening classes, without compromising the security of the rest of the school.

The demand for 'inclusive' schools is growing significantly. In support of this, our design underlines the importance of good access throughout the buildings; building heights are restricted to two floors, circulation spaces are



Plans of a typical 'learning cluster': ground floor

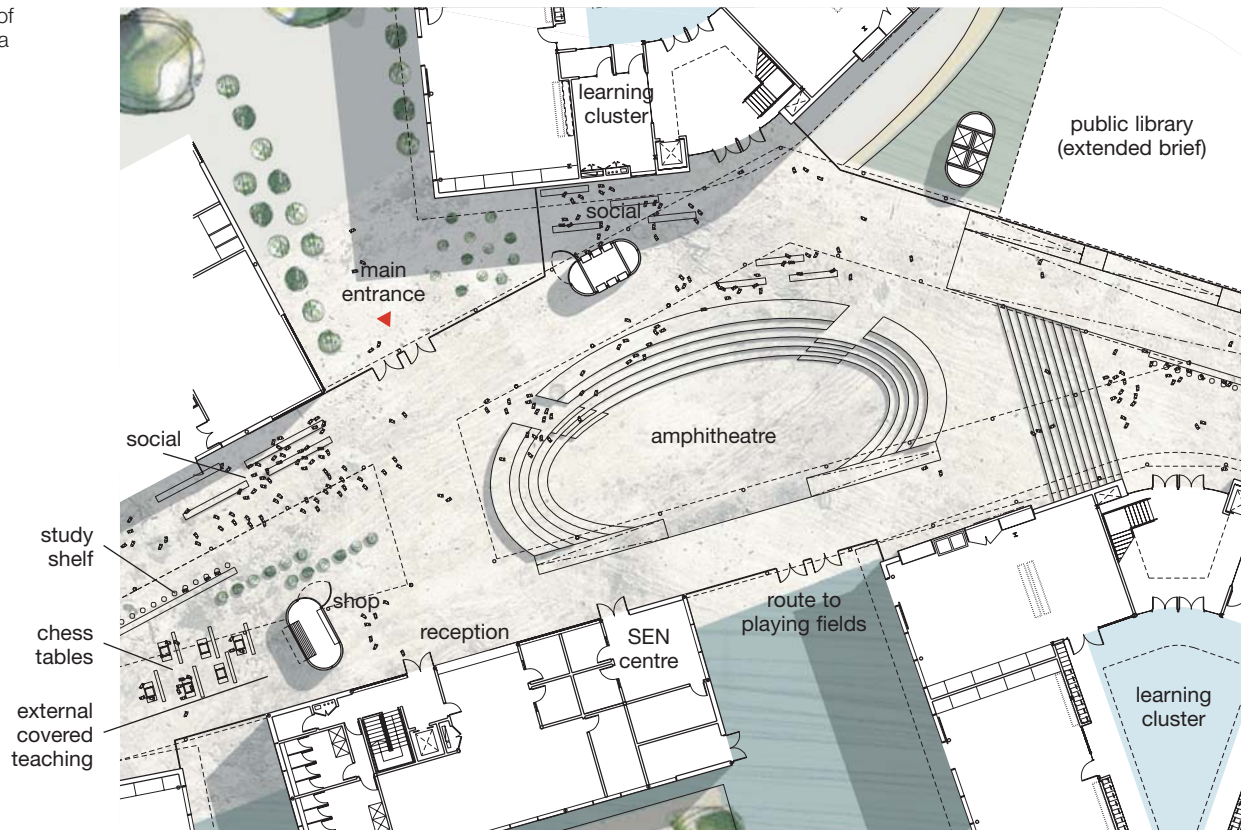


first floor

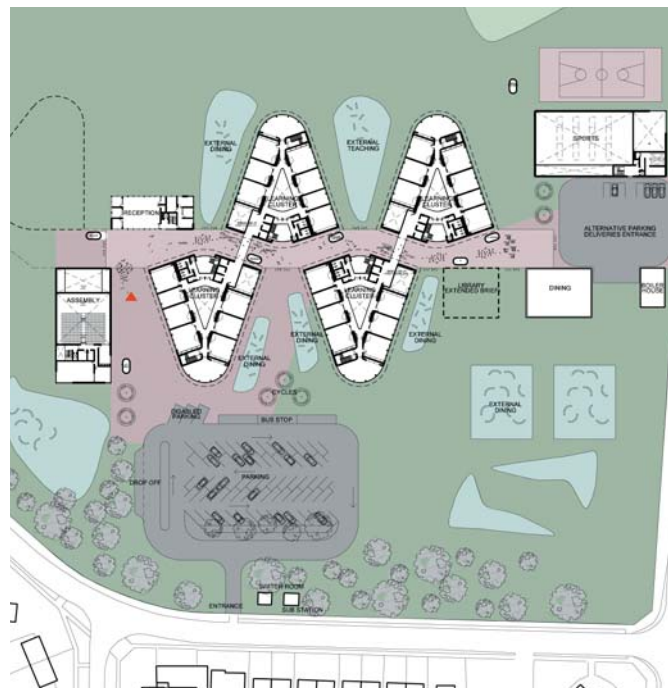
View of agora



Partial plan of central agora



Alternative layout for site A



Alternative layout for site B, with a smaller agora which may be enclosed



generous, lifts are frequent (in each building) and conveniently located, and all teaching spaces are fully accessible. SEN support facilities can be located in each cluster as well as a central facility. Toilet facilities for the disabled are provided in each cluster, alongside the standard toilets.

Security

Our ideal is for the site to be secure at its perimeter and for the agora to be open-access to the public with access control via smart card readers located at the entrance to each building, creating a confident expression of the school engaging with the community. We recognise that this may not be appropriate in all situations, and it would also be possible to install gate line ticket readers for smart cards in the agora, that could restrict access to some zones of the school to pupils and staff only.

A consistent aspiration of our design approach has been to establish as many links as possible with landscape and covered outdoor spaces around the school. We have sought to design a school that, while secure, is appealing to parents and the community at large, encouraging their continued involvement in the school. It is not monumental but has a scale that is intimate, supports the fragile learner, and has strong links with designed outdoor areas.

Stainless steel 'support pods' populate the agora, providing containment to various auxiliary functions such as drinking fountains, cleaners' stores, telephone and intranet access points, a shop, vending machines and plant areas.

Alternative layouts have been developed for different sites. Site A shows the various buildings grouped around a central agora, in this case with a large central open courtyard or quadrangle. Three of the learning clusters are linked at first floor with a bridge. The layout for Site B illustrates a minimum agora, which could be a heated space. There is a main entrance at one end and a student entrance at the other, and all learning clusters could be linked at first floor level with bridges.

Environmental Performance

The team has innovated to ensure a good environmental performance, allowing natural ventilation to work without loss of acoustic control (in accordance with the new BB93 requirements). The learning clusters contain tall spaces (3.3m clear in classrooms) and rooftop ventilators provide each classroom with good ventilation without noise transfer.

The design has passive cooling (apart from ICT server rooms), efficient lighting, a wood-fired boiler to minimise carbon emissions and solar water heating. Simple controls operate the building systems and there is a minimum of plant requiring maintenance. Photo-voltatics and rainwater collection are optional extras (with additional funding).

Cost

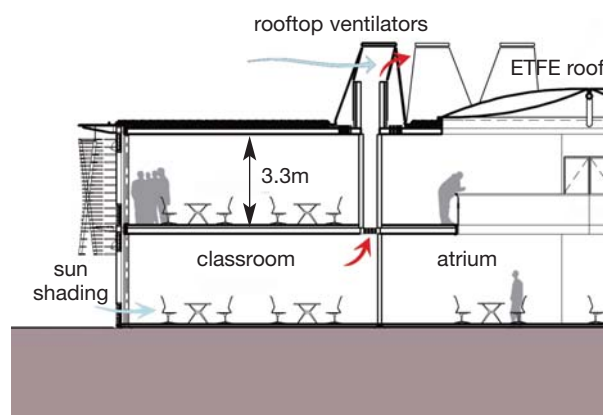
The scheme as shown has a dispersed layout due to the sloping nature of the site. This has resulted in a relatively high level of abnormalities, at approximately 16% of the Gross Capital Cost (excluding loose furniture and equipment).

CABE Design Review Committee

CABE felt this was a strong proposal with a clear identity and ideals for an exemplar of secondary school design. They thought that the scheme displayed a positive approach to relationship of landscape to the built form, with stimulating spaces being created, reinforced by the idea of a covered and partially enclosed agora. The form of the learning clusters gave the proposals great clarity. This was not felt to have been carried through to the central facilities, such as the administration and public buildings, which would benefit from more civic character. Overall, they felt this design would be inspiring for pupils and community alike. Issues of security around the site, with buildings that could be spread out, would need to be addressed in developing the design for a particular site. This would be helped by extending the clear set of rules or principles in the design of the clusters, the importance of the agora and the utilisation of the landscape in the scheme to all other aspects.

Cost Comment

The design team's cost estimate for this scheme excluding abnormalities is well below the DfES Net Building Cost guide, due to the use of external building circulation, i.e. the agora. However, the building does have a high wall to floor ratio and therefore careful cost consideration is needed for the external envelope. This scheme also has a high number of lifts. The relatively high level of abnormalities needs further analysis, and to be fully demonstrated against an interconnected building approach made possible by a level site. This scheme has had a significant locational factor adjustment to normalise its costs, which could influence the affordability of certain materials or components.



Cross section of learning cluster showing ventilation strategy

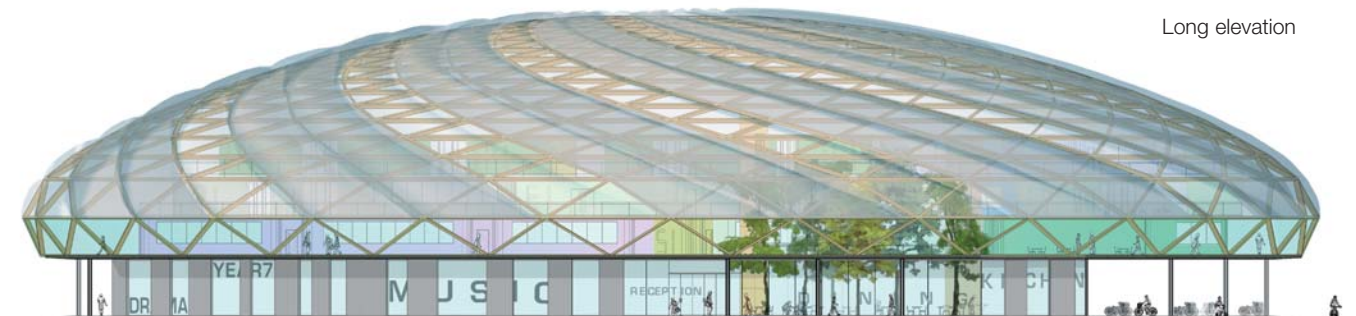
Long view



View of the 'forest' –
for dining, library and
open access
learning



Long section



Long elevation



exemplar secondary school design

rural site

A domed roof forms the 'dura', a place that is spatially grand but which has intimate sub-places that people can make their own; where they can meet, talk and work

de Rijke Marsh Morgan Architects (S3)

Cost Consultants
Appleyard and Trew

Structural Engineers
Michael Hadi Associates

Environmental Engineers
Fulcrum Consulting

Fire Engineers
Warrington Fire Research

Sites
Secondary site A (core)
Sites C and D (variations)

Introduction

The design team developed a radical but practical school design for the twenty-first century, with the deliberate intent of creating individualised places of learning, empowerment and variety. The core site is in a green belt on the edge of a rural town.

Design Philosophy

Our approach can be described by the motto 'light TOUCH'. This refers to the following intentions, in equal priority:

- a school which is light on its feet, that arrives, and adapts, quickly;
- a school which touches the earth lightly, in that it is responsible with natural resources;
- a school which celebrates natural light, and its connection to outside;
- a school which encourages sensorial experience;
- a school which can inspire, i.e. touch the users and community in which it is positioned;
- a school which has a light, spirited atmosphere;
- a school construction approach which explores lightweight materials and systems;
- a school whose construction impacts lightly on the users and community.

Our hyper-modern school is user friendly. We have prioritised space, daylight and views, offering the 'dura' an enormous volume beneath a mainly transparent ETFE (ethylene tetrafluoroethylene) skin, in which a variety of modular classroom types can be extensively (re)configured. Classrooms have adjacent spaces to colonise and the school can extend economically. This spectacular inside/outside open space creates a generous social collective, and gives every school the right to plan and change their own departmental layouts according to pedagogy, phasing or ambition.

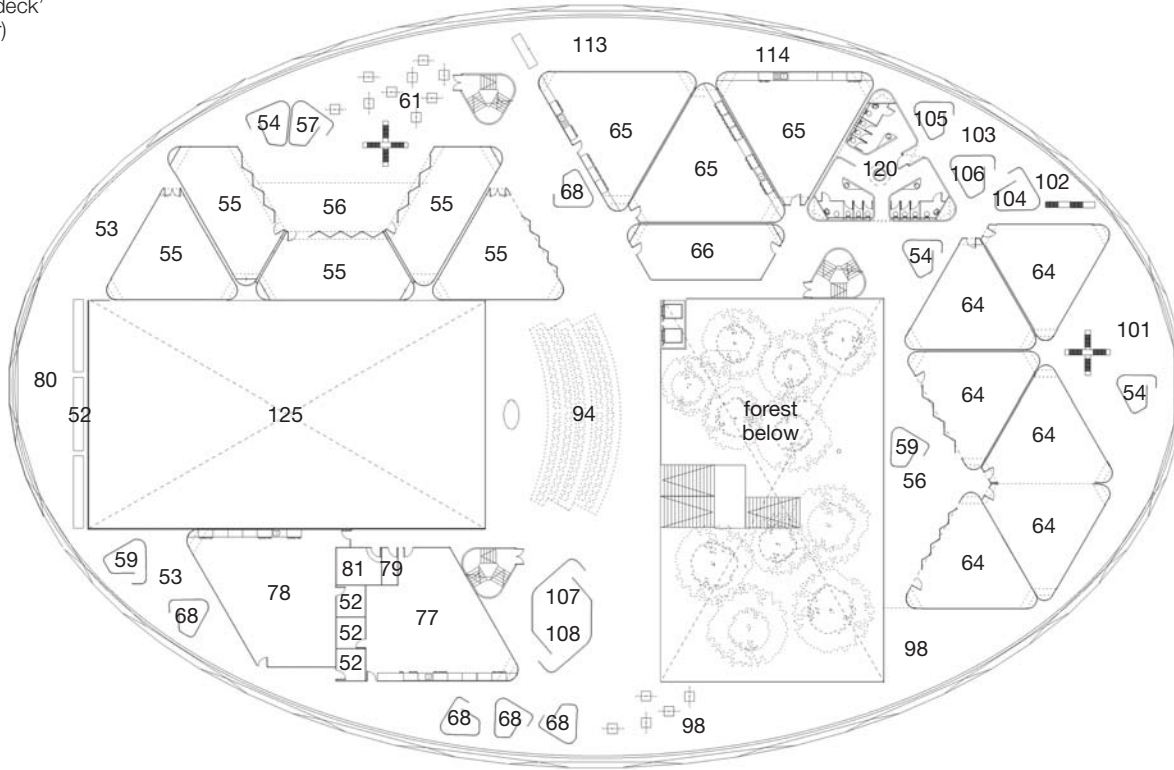
The Socle

The 'socle' is the enclosed base of the school, where the building decisively meets the landscape and offers solidity and security, both metaphorically and literally. It is elliptical in shape, anchoring the translucent dura above and generating the geometry of its dynamic yet efficient form. An overhang all around the building provides shelter and bicycle storage.

The socle:

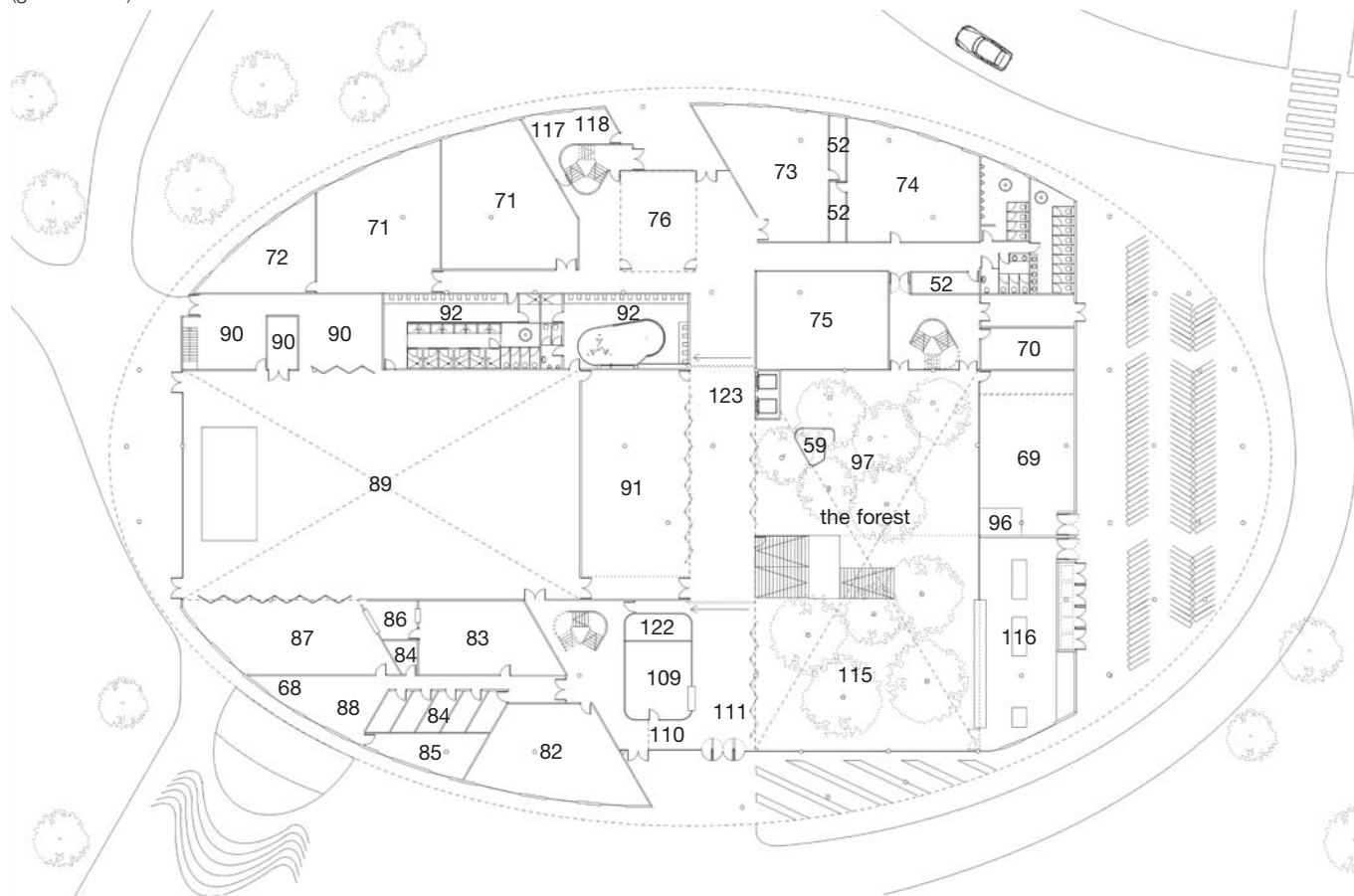
- contains the main entry, service entries, sport and storage;
- provides visual connectivity and passive surveillance through two large 'open volume' halls which bring natural light deep into the plan;

Plan of 'deck'
(first floor)



For key to plans
see inside front
cover

Plan of 'socle'
(ground floor)





- orientates users with a simple cross-passage layout and connects the halls;
- incorporates doubling-up and connecting of activities such as the entrance, dining, stairs and library;
- provides a solid lockable base with vulnerable materials out of reach above;
- allows parts of the building at ground level to be used out of hours independently;
- accommodates highly serviced activities (e.g. workshops) and those activities requiring additional sound insulation such as music and drama.

The socle can be freely planned, with its structure of columns that support the flat slab plateau ('deck') above. It offers long-term flexibility, the grid structure allowing block walls to be removed or changed.

The socle has two halls. The first of these, the 'forest', is the heart of the school, an atrium space for learning and social interaction that organises the subsequent circulation and continues to orientate and familiarise new students and visitors as they move through the dura above. The second is the activity hall, a four-court sports hall, measuring 19m x 33m with adjoining activity studio, performance, drama and music spaces as well as storage and changing facilities. Both spaces extend to the dura above, helping to ensure that natural daylight and views are offered to all parts of the building and enabling overlooking of events from above.

The Dura

The dura is the spectacular main space of the school, where the classroom clusters can be perceived as a hilltop town, arranged around the upper parts of the halls. Stacking class modules on the first floor deck and above produce a staggered section below the roofline and a roofscape of classrooms that

can be adapted as terraces. Colour, variety and warmth predominate here, along with many viewpoints, trees and the enveloping presence of the sky.

The dura roof is an ellipsoidal dome in form, with a part translucent, part transparent ETFE skin encapsulating a timber structure. The size and shape of the dura can be adjusted to meet local site conditions, and to maximise ambition within the limits of available resources. Separating the dura roof from the deck slab is a perimeter window of toughened glass, offering a panoramic view and strong connection to the external context.

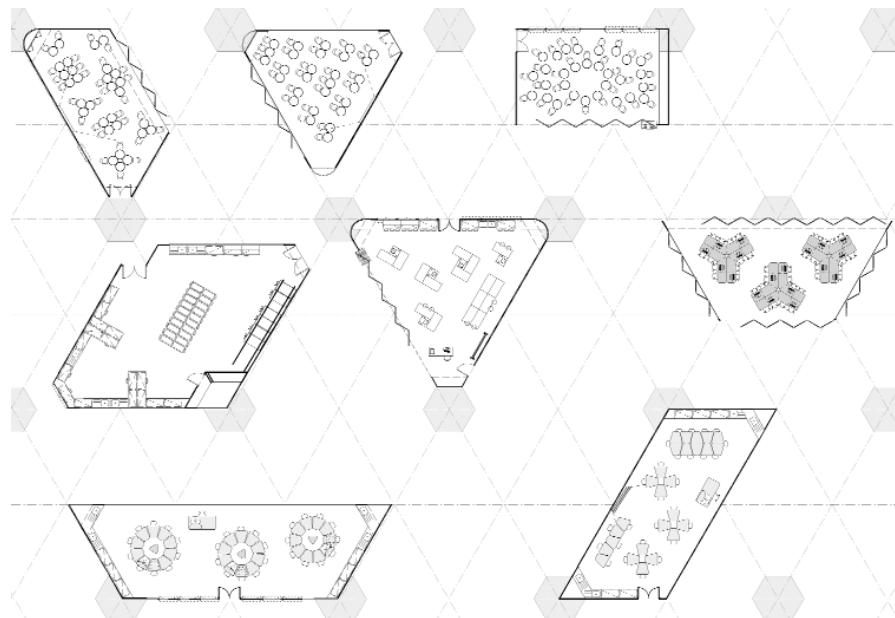
The dura space can be freely planned, providing both short- and long-term flexibility. The flat slab deck of the first floor is a table which can be laid with modular classrooms in many ways. Moving the walls between

classrooms can connect and/or create new spaces. The modular flatpack class construction allows endless variations.

In essence, the dura:

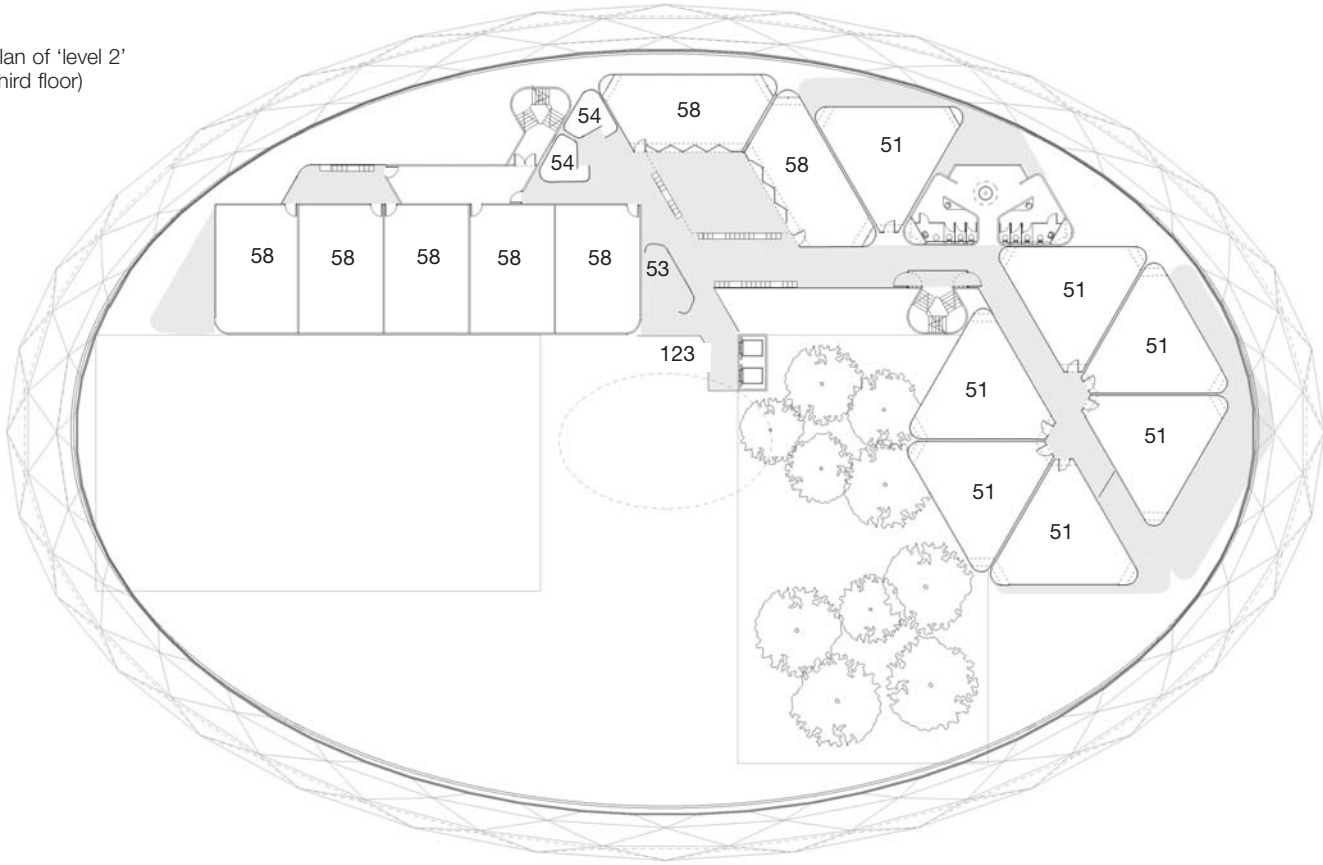
- provides a vast volume of space to be colonised as the school sees fit;
- transfers a special quality of controllable daylight into the whole plan via a 66% transparent variable skin ETFE roof;
- is a climatic envelope creating a macro-climate of Mediterranean character, a home for mature trees;
- has panoramic views with wraparound 250m continuous ribbon windows;
- allows everybody to see everybody else most of the time, providing visual connectivity and passive surveillance through open plan circulation.

Options for types, shapes and areas of teaching spaces



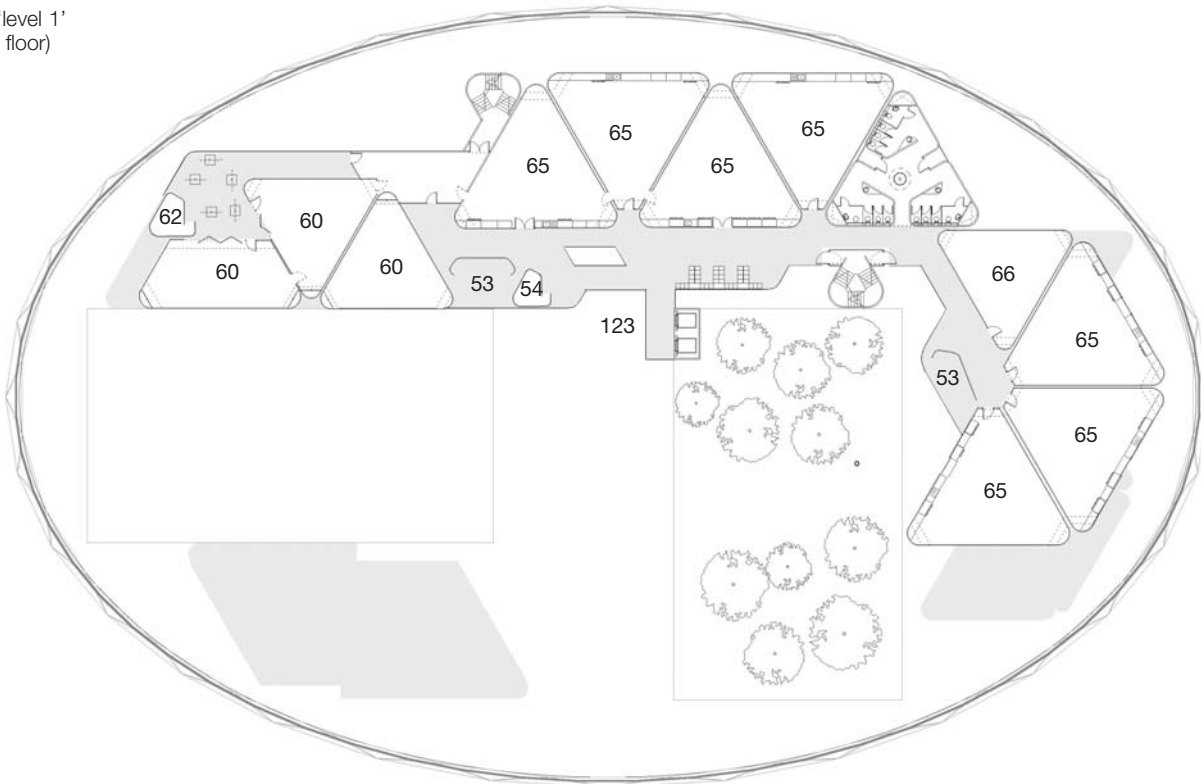
Options for clusters of teaching spaces

Plan of 'level 2'
(third floor)



For key to plans
see inside front
cover

Plan of 'level 1'
(second floor)





Structural Strategy

The design intent has been to produce an economical and exciting structure, in harmony with the architectural and environmental strategy. The structure facilitates a degree of flexibility and adaptability that sometimes exceeds the requirements of the brief. The construction techniques employed are in accordance with industry best practice and are the result of the design team's research and construction at Kingsdale Secondary School (a major refurbishment project in Southwark). Off-site prefabrication is used where appropriate, not only to achieve the highest quality and speed of construction, but also to circumvent industry-wide skills shortages. The selection of materials has been informed by environmental and sustainability considerations.

The design has been developed in consultation with specialist manufacturers, with whom the team has collaborated successfully in the past, and who have the resources to form strong links in a supply chain.

The base of the building is formed from a single storey in-situ concrete frame. This serves to support the multi-storey laminated timber classrooms and ETFE/timber gridshell dome roof, a lightweight envelope on a robust base.

Sustainability

The design team has worked together as an integrated team to deliver a sustainable design solution. Construction utilises ecologically sound, durable materials prefabricated offsite, enabling a short and dry site period. Passive services provide fresh cooled/heated air direct to all classrooms at little or no energy cost, without expensive plant or maintenance (see Environmental Performance below).

Adaptability and Flexibility

The socle and dura interiors both offer planning flexibility, their size and shape able to be adjusted to meet local site conditions. The design should be tailored at the outset to meet the needs and desires of the individual school and LEA.

The design can adjust to accommodate schools of varying student population sizes, organisation arrangements, curriculum specialisation and supplementary facilities. The principles behind this flexibility are as follows:

- a flexible grid with diverse permutations and combinations;
- a secure undercroft adjacent to the 'forest', which may be recruited as additional buildable area at low capital cost;

- the capacity for departments to move into the dura and thereby free-up the ground floor for expansion of community facilities;
- the inherent adaptability of the dura itself, which offers the freedom for class modules to multiply, or be demounted and reassembled elsewhere, for deck space to be occupied, and for new walkways to colonise open space; and
- the possibility of simple and economical extension using the tops of existing classrooms.

The form of the building gives great flexibility in terms of 'future fit': the building may be configured to suit not only a wide range of educational uses, but also recreational, commercial or healthcare uses.

Management and Organisation

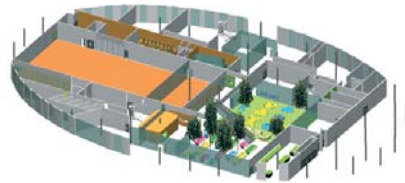
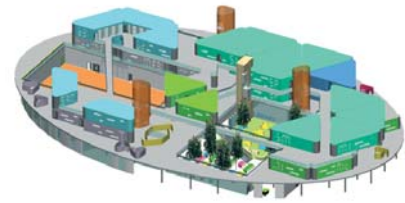
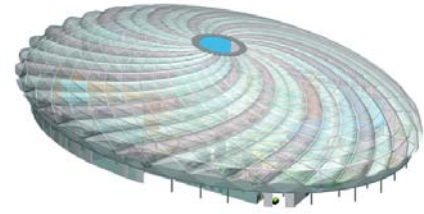
As society shifts towards a new culture of life-long learning, schools become a valuable resource for adult and family learning. The socle design offers the potential for an out-of-hours library and access to resources such as media, design and technology and music. The correctly-proportioned sports hall is a key feature within the school. It constitutes a valuable, unique spatial and light resource during out-of-class and at any time of the year.



Interior to exterior



School build up, based on extended school variations



Top
View of the sports hall – with optional seating and classroom clusters beyond

Middle
View from classroom to classroom terrace

Bottom
Primary routes are also social spaces, with lockers and power poles



Access and transparency are both literal and phenomenal. This is an inclusive school as literally defined by a welcoming ‘open door policy’, linked with the idea of a community school being a local resource.

The use of identity and ‘smart’ cards, linked to entries with reception control facilities, will be the key to these extended usage possibilities, with general layout and circulation transparency providing the passive security. These smart cards would also be used for the security of lockers for both students and staff, providing secure personal space for basic items required for their daily schedule.

The provision of personal space around the building is imperative for reinforcing the students’ general feeling of belonging to the school. This is achieved through a deck circulation characterised by spatial delight, with its interplay of level, direct access to many destinations, oblique views across large voids and vistas to the sky, and play of light through trees. It is here most strongly perceived that the dura is about desirable spaces that enlighten, stimulate, and inform, in contrast to the institutional qualities that many people, both inside and outside education, associate with schools. This is emphatically not a system of corridors to boxes, but a place; spatially grand but with intimate sub-places that people can make their own and where they can meet, talk and work.

Fire Safety

Warrington Fire Research have prepared a report to document the principles of the fire strategy for the dura. This strategy has been based on a fire engineering approach, designed to ensure that the building is safe for the occupants and for the fire brigade dealing with a fire.

Environmental Performance

The school fabric and form are considered as an integral part of the environmental engineering solution. Where a change in form, such as height or orientation or site location, would benefit the internal environmental conditions this has been done. Modelling, both physically in the Heliodon and through computer simulation, was used continuously to enable this.

The school will deliver a fully ventilated building designed to achieve 8l/s per person within all occupied rooms, with the necessary conformity to the acoustic requirements in BB93. It achieves this by utilising the ability of the ground beneath the building to store heat over a long period, along with a hybrid ventilation system, passively assisted by the wind forces passing over the building, that delivers individually ducted tempered air to each classroom.

The source of heating and cooling is largely non-carbon based, utilising the lay surfaces to collect solar heat and reject heat to the sky as conditions allow. Heat at the appropriate temperatures for heating and cooling is then stored inter-seasonally for use when needed in the aquifer or earth beneath the building. A heat pump shifts heat between the hot and cold stores as required. Heat is delivered directly to the incoming air supply.

The triple layer variable transmission ETFE skin enables control of direct solar gains and delivery of appropriate daylight levels deep within the building.

Cost

The elliptical plan form used here provides a very economical perimeter to area ratio, second only to a circle. The roof has the triple function of providing walls, windows and weatherproofing. The majority of circulation areas are multifunctional, providing alternative teaching or social space. Flexibility within the core proposal enables the provision of significant additional area in the future, without increasing the cost of the enclosure, at less than half base cost/m². Much of the technology proposed is a direct result of the Kingsdale School project, and scheme costs are calculated accordingly.

The result is a flexible economic solution, using tried and tested technology, which would benefit from further design development and ongoing value engineering.

The scheme has relatively high abnormal costs at approximately 12% of the Gross Capital Cost (excluding loose furniture and equipment) of which about 75% relates to site works.

CABE Design Review Committee

The CABE design review committee viewed this as the most radical proposal, offering both opportunities and limitations. They saw potential for the school, its construction and servicing to become a strong learning device in itself, and for the form of the Dura to become an emblem for the school. The large volume enclosure concept offers a valuable loose-fit principal which would be liberating from a traditional school model. However, more work is required for internal planning and organisation of spaces to be convincing. The committee had reservations about the acoustic consequences of the sports hall being within the ‘open volume’ and conflicting with quiet study and other activities. Overall, the scheme had strong ideas and it would create a strong local landmark. More work needs to be done on areas like the functionality of triangular classrooms, the form of the dome in relationship to the landscape around and the quality of the environment inside the Dura. This will be an enclosed environment users will either love or hate.

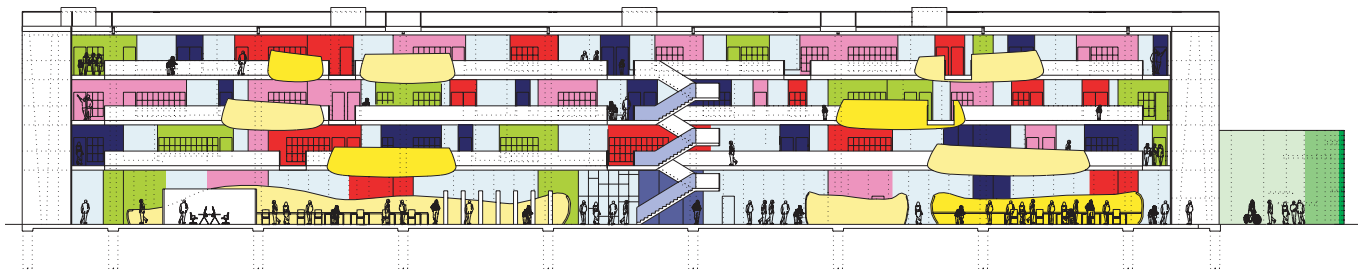
Cost Comment

The design team’s cost estimate of this scheme, excluding abnormal costs, is within the DfES Net Building Cost guide. This scheme uses a range of new material technologies which, relative to the other schemes, has a limited cost database. The scheme also has a number of design challenges to overcome, all with the potential to increase cost. This scheme has had a significant locational factor adjustment for the traditional elements but only a minor adjustment for the specialist elements to normalise its costs, which could influence the affordability of certain materials or components.

The atrium is populated with a series of alternative learning environments that provide informal learning and social spaces



The central atrium forms a street and a heart to the school



Long section through Model 1 design



exemplar secondary school design

tight urban site

Two different types of extendable, adaptable learning environments on either side of a central atrium: capable on very tight sites of being raised above the ground on columns, with the landscape of the street flowing beneath

ALSOP Architects (S4)

Cost Consultants
Davis Langdon and Everest

Structural Engineers
Buro Happold

Environmental Engineers
Buro Happold

Education Advisor
Mark Dudek

Construction Advisor
Miller Construction

Facilitation
Architecture FAB

Sites
Secondary site E (reduced)
Site F

Introduction

Every school has its own individual aspirations and identity. If our design was repeated, it would require adaptation to fit each site and community. We are committed to community architecture of the broadest sense, involving a full spectrum of users and eliciting their aspirations for the school environment they are to inhabit. To take this design forward, an integrated and inclusive design process is necessary to create an effective learning environment. Ownership of the design and participation in the process is essential to the final outcome.

We have worked with the headteacher, staff and pupils of our 'partner school', as the community and stakeholders for the development of our design. The partner school has acted as our surrogate client and provided the stimulus to look beyond the brief and incorporate their aspirations and needs.

We passionately believe that the school should embrace the needs of all users and there should be a positive relationship between the school and the local community. Our 'community campus' proposals, we believe, present a clear picture of how an extended school in an inner city location should develop to respond to the needs of the local community.

Site

We were asked to look initially at a confined site in an inner city location: site F. A number of proposals have been prepared for site F based on the core brief and variations, including a 'community campus'.

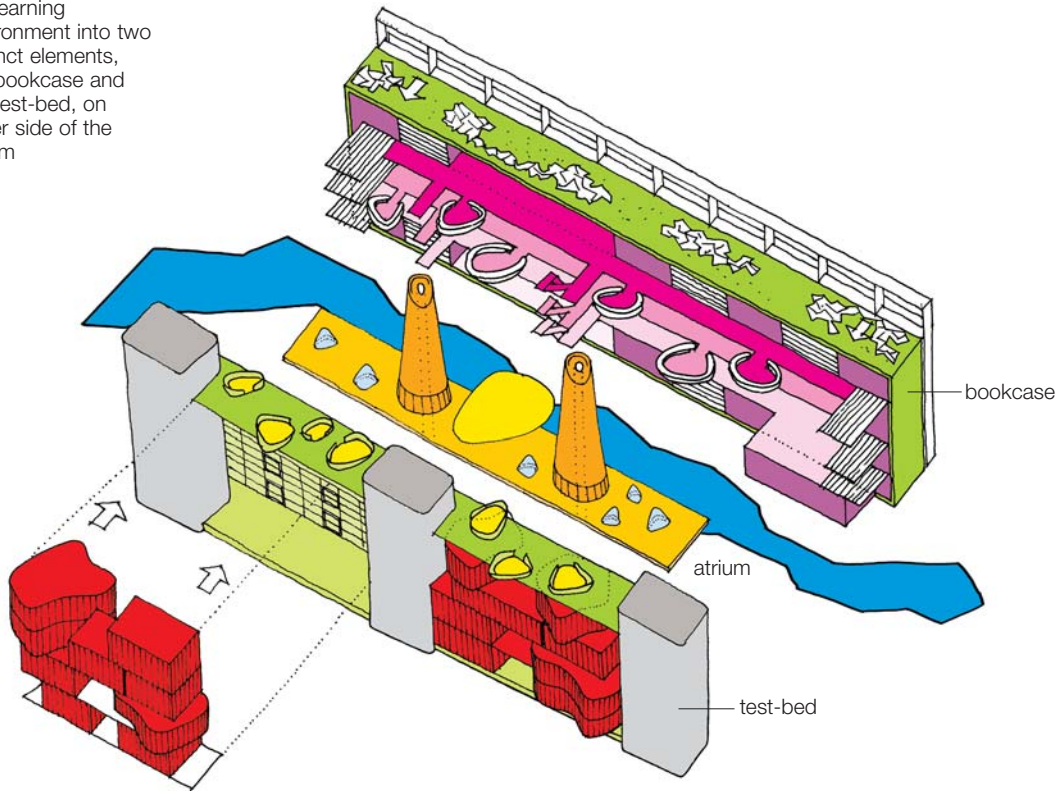
In parallel with these developments, the design team has considered how the generic elements of the scheme can be applied on other sites; demonstrating adaptability at the macro scale by examining a number of alternative arrangements on a less confined urban site. The multi-storey solution has allowed a large part of site E to be used for non-school community uses. The school has been designed on the remaining smaller site area of 1.8ha.

The variations possible with the multi-storey design that has evolved represent a number of possible models for a school for the future. Each can respond to different site conditions and environments:

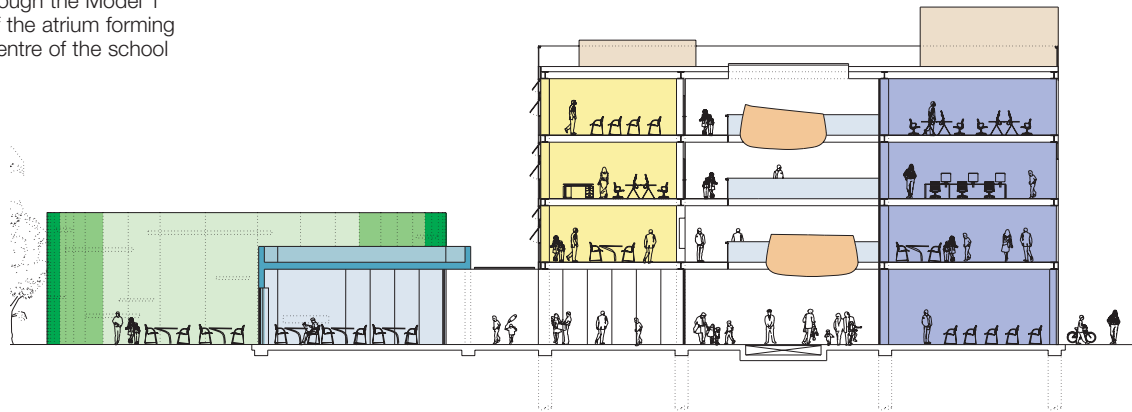
Model 1: Medium rise, confined site

This represents the simplest of the school models. It assumes a four-storey building with single sided ventilation on a site of at least 1.8ha with little external noise or air pollution. Many of the larger school functions are integrated into the landscape as free-standing

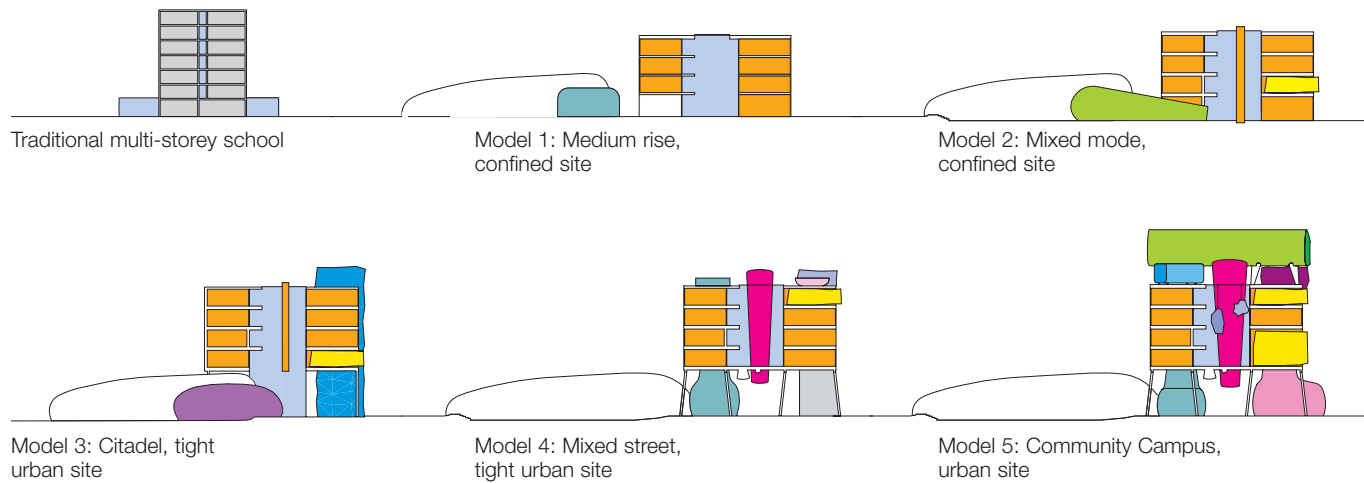
We have separated the learning environment into two distinct elements, the bookcase and the test-bed, on either side of the atrium



Typical short section through the Model 1 design, with the base of the atrium forming the street through the centre of the school



The design allows a number of possible models using the same kit of parts, depending on the site constraints and the extended brief





pavilions. Plans of this model are shown in this case study.

Model 2: Mixed mode, confined site

In a similar site where the external environment is more polluted or noisy, fresh air ducts bring air into the general teaching areas and chimneys ventilate the atrium and study areas.

Model 3: Citadel, tight urban site

Where the site is limited in its size and access, the functions previously in the landscape as pavilions can be tucked beneath the mass of school to reduce the overall footprint of the building.

Model 4: Mixed street, tight urban site

On an inner city site with good access and permeability but a very limited site area, a new street beneath the school stitches the building back into the urban fabric. The street is programmed with school activities shared with the local community outside of school hours. This is the original core design.

Model 5: Community Campus, urban site

This incorporates an extended school brief and integrates the school into the heart of its urban context by making it the centre for learning in the community. The street is now fully developed with school and community activity. Key worker housing is incorporated at roof level to create a thriving mixed use development.

Design Philosophy

Four distinct learning environments have emerged as a kit of parts: the ‘bookcase’, ‘test-bed’, atrium and ‘pebbles’. The bookcase anticipates the general teaching areas changing in response to developments in the curriculum, ICT innovation and pastoral care. The test-bed allows the school to adjust its mix and priorities in practical learning over time.

The test-bed also contains the school’s vertical circulation, connected to a series of bridges suspended within the atrium. The atrium is the vibrant heart of the school, full of social and learning activity, and in the Model 1 and 2 designs incorporates a street forming a

route through the building at ground level. Large pebble-like structures accommodate the school’s main hall, dining and sports facilities.

Bookcase

Our initial concept for a vertically stacked school arranged either side of a central atrium has been strengthened by dedicating one side of the atrium to flexible learning and classrooms. This we have called the bookcase.

The bookcase is a continuous uninterrupted learning zone spread over four floors of the building. It can be subdivided into cellular spaces to meet the demands of the current curriculum delivery and class sizes. The floor to ceiling height is a generous 3m, to increase daylight penetration and assist natural ventilation.

As the impact of ICT begins to change the school’s learning environment, we have anticipated room sizes varying and becoming more open plan, with a variety of learning activities taking pace within a single area. By opening up the bookcase into the atrium and widening the circulation locally, the classroom can become ever larger and increasingly open plan.

Test-bed

The test-bed has evolved through the team’s desire to embrace off-site construction and explore it as the driver for an evolving programme of practical learning activities. It is

vertically stacked as a four-storey series of layers containing different types of practical learning activity that can be expressed in different materials and forms.

The test-bed has been designed to offer flexibility in the arrangement and layout of the practical learning areas. By their nature they require larger room sizes (with a 9m depth) than the bookcase.

Atrium

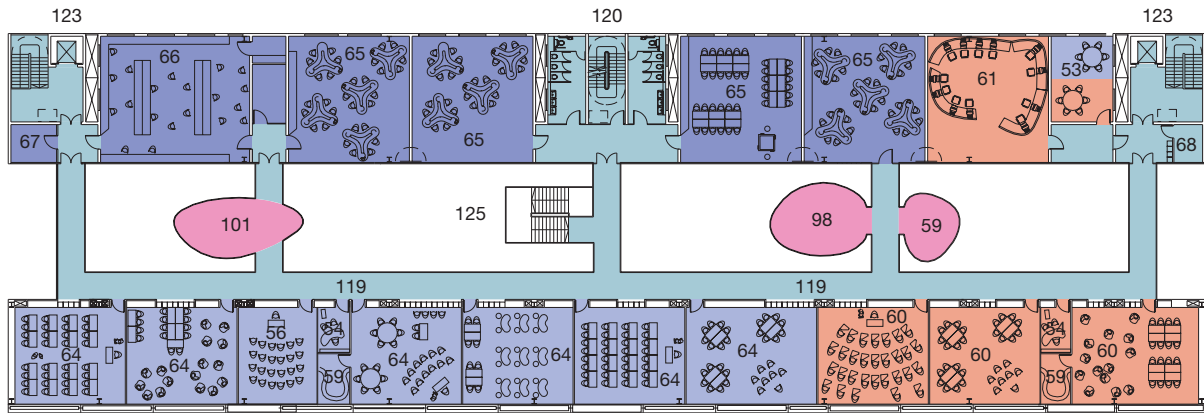
The atrium is the soft centre of the school where the school opens up into a village of activities coming together and legible within the excitement of larger volume.

Our atrium contains the school’s reception, doubling as an exhibition space to display the student’s artwork, designs and projects, impressing the confidence of the school upon students, staff and visitors. Sixth form study areas and opportunities for social gathering and informal learning areas are interspersed at different levels within the atrium, serviced with ICT links in the transition to a wireless system of laptops or tablets.

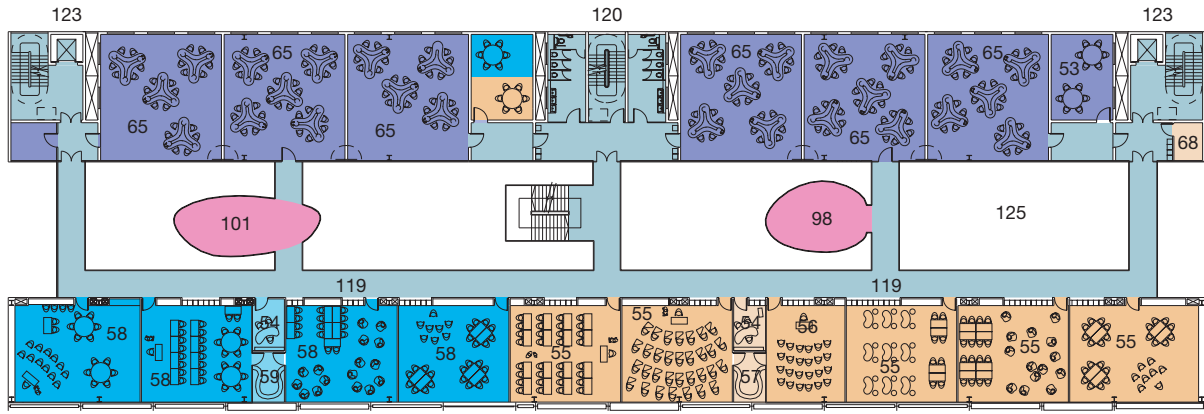
Our workshops with the partner school identified early on a need for social spaces or ‘chill out spaces’ for pupils to meet between lessons outside of the formal classroom structure. Our perception was that a variety of semi-private and private learning areas, set aside from the primary circulation routes, could more successfully utilise the atrium as an alternative learning environment.



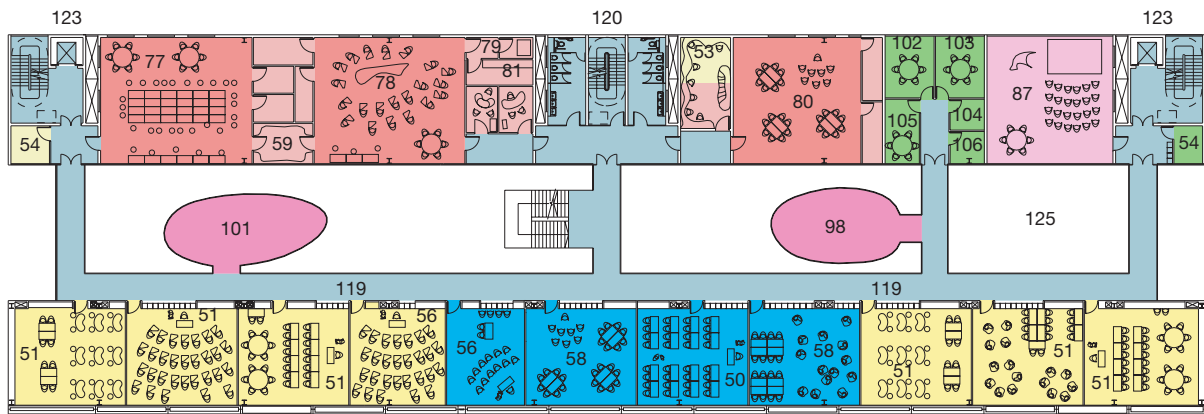
In the ‘test-bed’, different prefabricated practical learning spaces can be ‘plugged in’ between the stair towers, to suit the requirements of the school (model 4 design illustrated)



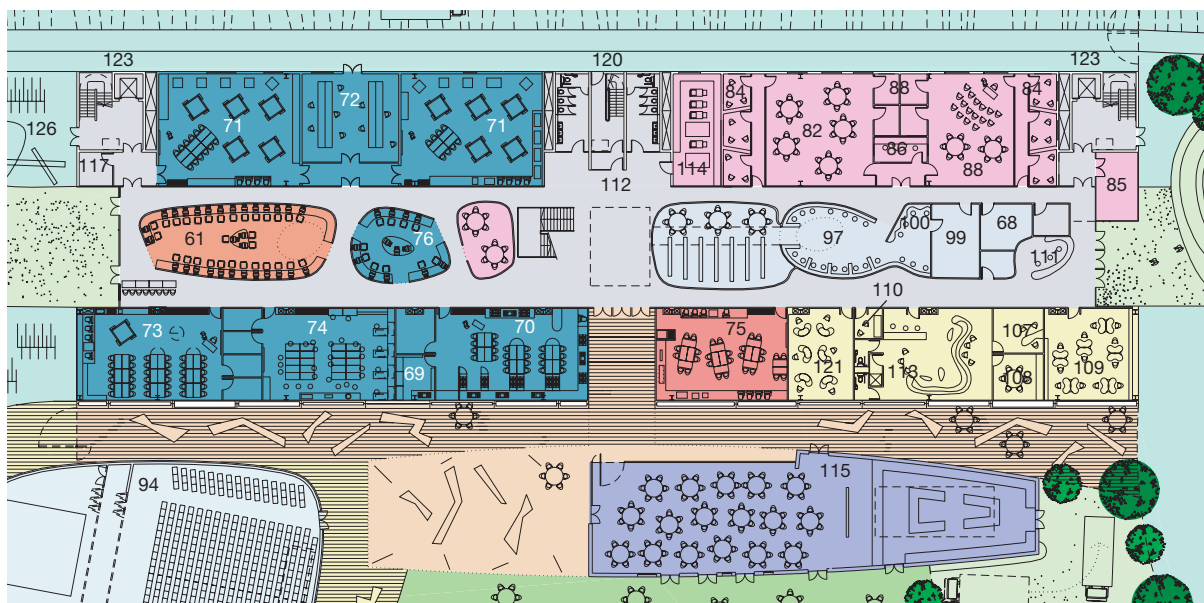
Third floor plan



Second floor plan



First floor plan



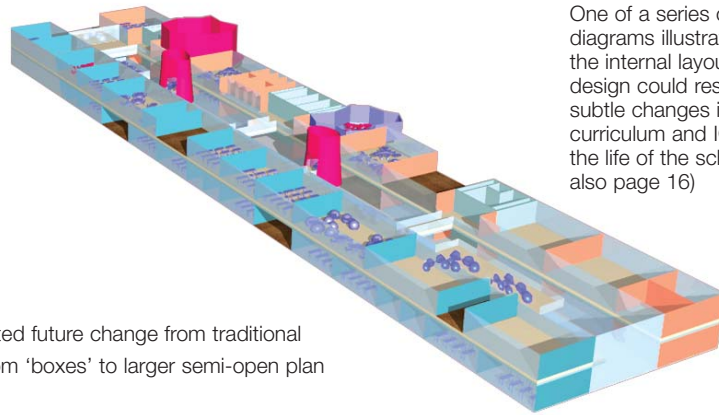
Ground floor plan of Model 1 design (main building)

Opposite page:
partial site plan showing hall, dining and sports hall



Pebbles

Large spaces used by the community outside the school day are accommodated in pebble-like structures that are arranged as pavilions in the landscape in the Model 1 and 2 designs. In the Model 3, 4 and 5 designs, on a tight inner city site, these are tucked under the raised building, arranged in a secure cluster on the south side of the site linked by a flowing landscape of dining decks and outdoor learning and garden spaces.



One of a series of diagrams illustrating how the internal layout of the design could respond to subtle changes in the curriculum and ICT during the life of the school (see also page 16)

anticipated future change from traditional classroom 'boxes' to larger semi-open plan areas.

Adaptability and Flexibility

The layout and construction of many new school buildings are unable to respond to simple changes in the curriculum and the use of evolving new ICT, often resulting in a school having to make unsatisfactory compromises in order to make changes. Our proposals demonstrate how a school can respond to this critical need for adaptability at a 'micro' and 'macro' scale.

We have set out the school with flexibility as a key design driver. The layout delivers the optimum widths for general teaching and practical learning in two linear floor plates either side of the atrium. Any size of general teaching or practical learning space can be delivered within these areas by moving and relocating partitions. This allows for the

When applied to a tight urban site, the provision of 'play decks' within the school builds in additional flexibility by creating outdoor breakout and teaching space that can be enclosed to provide additional accommodation in the future without having to extend the school.

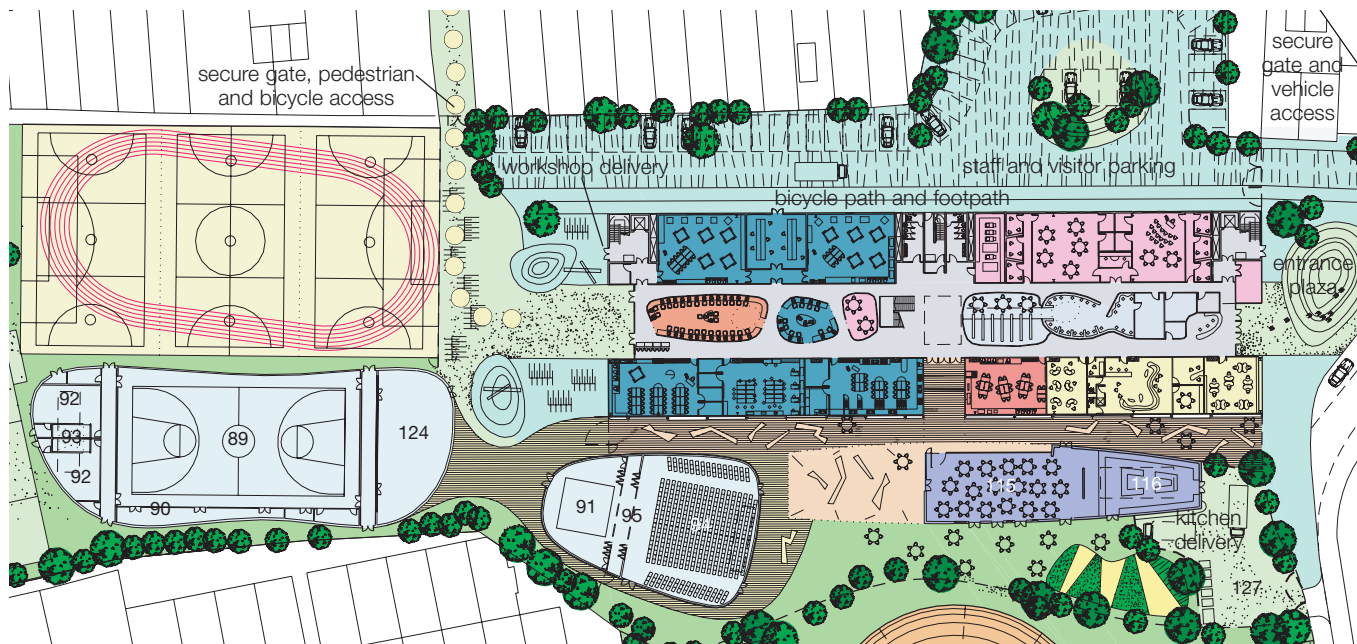
Site F: Tight inner city site

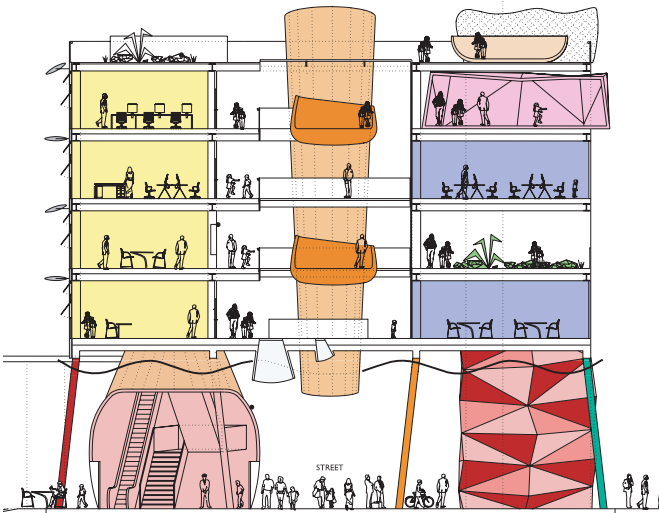
The school on a tight inner city site is formed from the same kit of parts: the test-bed and bookcase with an atrium between. Site F is only 0.9ha and must include a multi-use games area to reduce the need to access off-site playing fields, so the building is raised above the ground on columns with the larger elements of the brief tucked beneath the building. 'Play decks' are required to make up for the lack of space for informal and social

area in the site landscape. As a consequence the building is longer and five storeys overall.

The school is raised up to form a new public realm at ground level: a street that is a living part of the community. Lifting the school separates the dedicated teaching areas away from those functions shared with the community, and creates a secure school environment at high level.

The landscape of the street is layered across the site and beyond so that new connections are formed with existing green spaces and the rest of the site is opened up and made accessible. The school entrance is directly off the street with an entrance foyer and security point before an escalator and stair rise up to the school reception level.





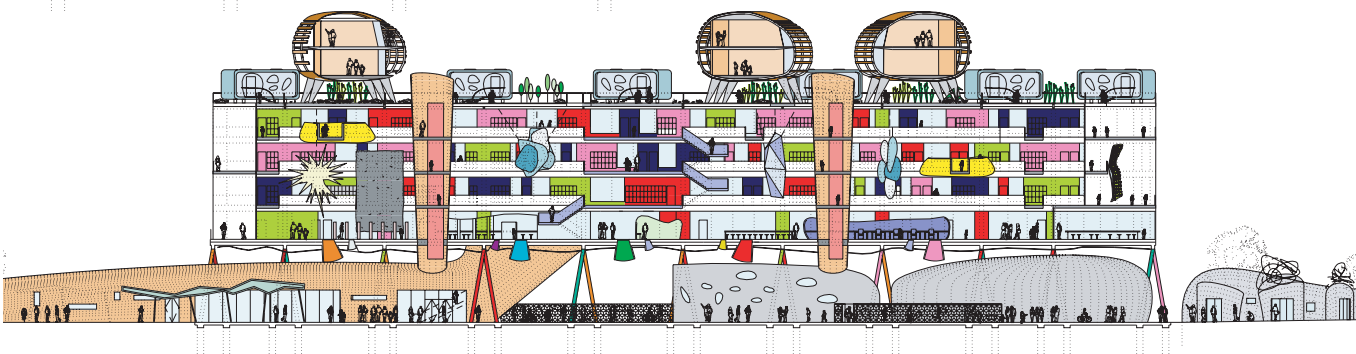
Top: The design team anticipates room sizes varying and becoming more open plan, with a variety of activities taking place within a single area

Left: Typical short section through the Model 4 design, showing the school raised above the ground plane with a street beneath

Above: Model 4 on site F is a multi-storey solution layered over a landscape of learning, which can include extended schools facilities as shown

Below: In the 'community campus' variation, the street is the centre of the design and is populated with new functions and uses. Some school accommodation is at ground level and

also serves the community, and vocational subjects taught within the street aim to relate education directly to the social and commercial activities of the world all around





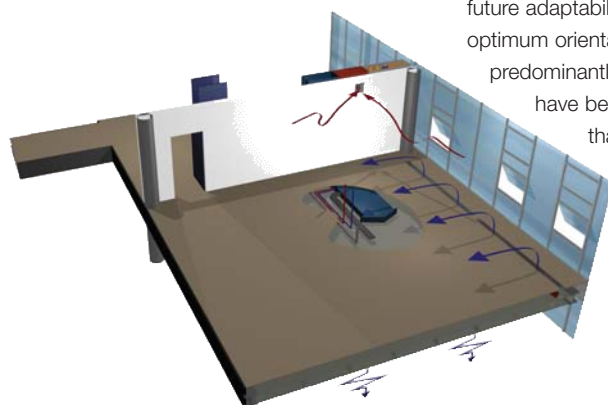
Community Campus

The concept at the heart of the livable community is the integration of learning into every aspect of contemporary living. The 'community campus' would provide a secure, seamless environment which nurtures many different, co-existent activities, blending to enrich the educational curriculum and simultaneously foster an enduring community ethos for future generations.

From our discussions with Mark Dudek and Wendy Parmley, the Principal of an existing inner city school, we believe the school of the future should establish social, educational and commercial links with the community, both locally and further afield. These links will benefit the school educationally and culturally, and generate additional income for the school. The Community Campus is primarily intended to establish the secondary school as a physical and virtual centre for people living locally. It would also encourage adults back into an educational environment where by a process of retraining and re-skilling they are enabled to make a positive contribution back into the community.

Environmental Performance

A school building must not be frozen in time and must be able to adapt to changes in the curriculum to reflect the wide range of users and activities. The engineering systems are designed to allow flexibility within the learning environment to suit the future needs of the staff and students. At a larger scale, the design represents a building solution capable of being adapted to any site, including those with poor noise and air pollution, brownfield sites and sites with restricted access in urban environments.



Cut-away section through deep practical learning space in the test-bed, showing mixed mode air flow

The building location, orientation and form respond to the external environment to gain benefit from daylight, the solar path and prevailing winds, whilst minimising the impact of external noise and air pollution.

A mixed mode solution for the environmental strategy has been adopted for the learning areas in all the design models. Fresh clean air is drawn in at low level and distributed around the building through the raised floor voids.

The strategy for the internal environment of the learning spaces relies on the following elements:

- minimising solar and internal heat gains;
- maximising the thermal mass of the building;
- ensuring effective ventilation throughout the year – controlled ventilation in peak winter and summer;
- large openable areas providing a naturally ventilated solution when the external air temperatures match the internal requirements for both ventilation and temperature;
- in the summer the mixed mode ventilation operates over night to provide a secure way of cooling the exposed concrete slabs ready for slow release of the 'coolth' the following day;
- the mechanical ventilation system has been designed to achieve low fan power consumption with a simple control strategy;
- acoustic separation is achieved to the requirements of BB93.

The whole-life energy consumption of the school is enhanced by the construction methods and use of materials, the energy efficient environmental strategies and the future adaptability of the building. The optimum orientation of the building is on a predominantly east-west axis. Great efforts have been made to opt for a solution that only uses the mechanical ventilation when required by

the occupants. Free thermal storage has been optimised to the benefit of the energy profile of the school.

The use of energy has been taken a stage further by considering a variation that has zero fossil fuel energy in use. This option considers the use of alternative technologies such as combined heat and power, ground source heat pumps, photo-voltaics and solar collectors.

Cost

The scheme has relatively few abnormalities, which amount to approximately 4% of the Gross Capital Cost (excluding loose furniture and equipment).

CABE Design Review Committee

The CABE design review committee commented chiefly on the tight urban context of site F but believed this proposal would produce an inspirational and exciting school environment. The generic approach of an atrium building raised above a collection of specific self-contained buildings was one that offered a good model for an inner-city school. They believed further development could address concerns over the practicality of the intense separation of the main school level from the ground plane, and any tendency towards an 'undercroft' feel when the 'street' was not in use. The concept allows for further community buildings to be added when funds or needs demand, providing a realistic and sensible approach to growth.

Cost Comment

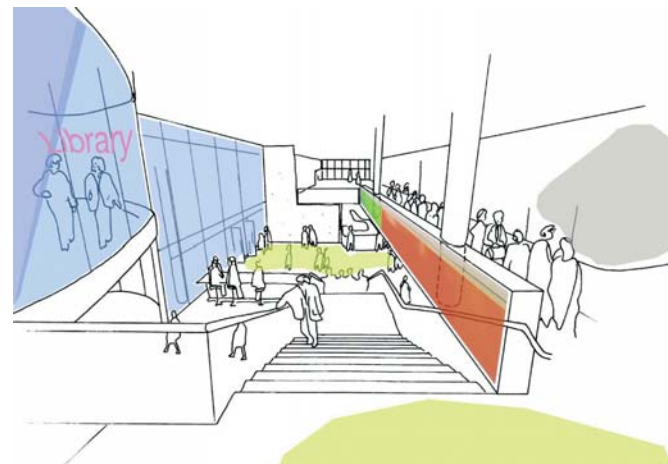
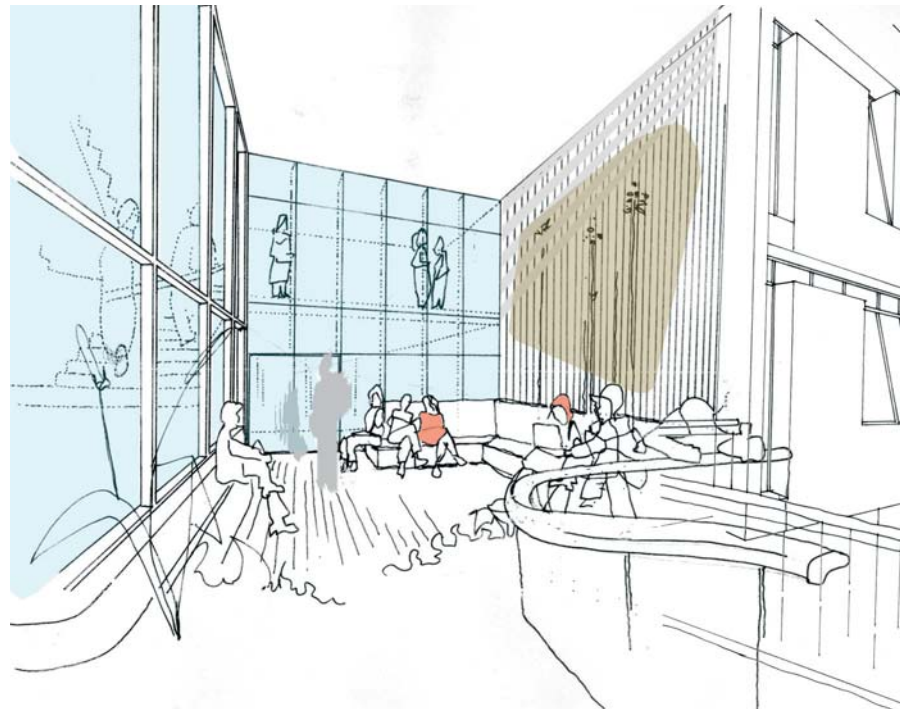
The design team's cost estimate for this scheme, excluding abnormalities, is in line with the DfES Net Building Cost guide. Even though the abnormalities are relatively low, these require further consideration. A number of main elements have economic cost targets which will drive the design parameters. This scheme has had a significant locational factor adjustment to normalise its costs, which could influence the affordability of certain materials or components.

Top right: library terrace – first floor sheltered terrace or 'sky garden'

Middle right: sixth form social space in first floor internal 'sky garden'

Bottom right: view down through the foyer from the first floor

Bottom left: view of 'sky gardens' in a light link





exemplar secondary school design

larger urban site

Three adaptable multi-storey learning platforms are connected by 'light links' which combine stairs, 'sky gardens', views and social spaces

Penoyre & Prasad Architects (S5)

Cost Consultants
Dobson White Boulcott

Structural Engineers
Alan Conisbee and Associates

Services Engineers
Atelier 10

Landscape Architects
Grant Associates

Acoustic Consultants
Fleming and Barron

Fire Engineers
Buro Happold FEDRA

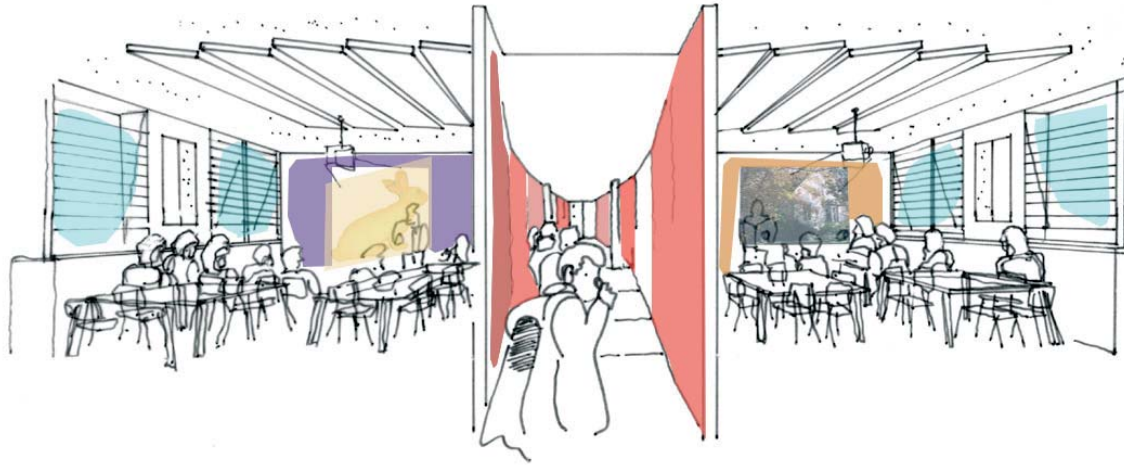
Sites
Secondary site E
Site F (variation)

Introduction

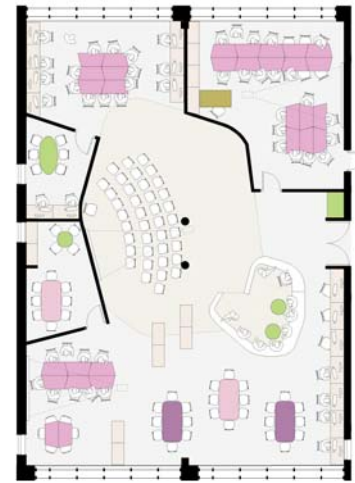
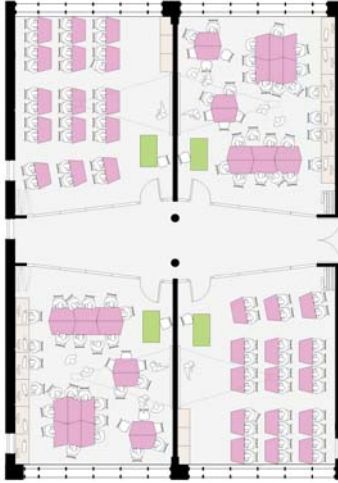
This design is for a six-storey school on a restricted urban site. The design team aimed to accommodate the current, conventional brief and also open up future possibilities for school environments. The main body of the school building is a 'rig' – a framework for a variety of learning environments. The rig consists on each floor of three learning platforms, with sets of flexible and adaptable spaces. The platforms are connected by 'light links' which combine stairs, 'sky gardens', city views and social spaces.

Clothing the rig is a technologically sophisticated skin, prefabricated in aluminium with triple glazing. This provides the best possible internal conditions for learning and for controlling daylight, heat, ventilation and acoustics. Its external appearance, with subtle use of colour and pattern, expresses variety and optimism. The rig is lifted one floor off the ground, enabling the ground floor to be planned with a freer geometry to suit the particular site, community facilities and routes to and from the immediate neighbourhood.





Options within adaptable clusters: from enclosed classrooms . . . (from left on plans below)



. . . to open plan learning (at right on plans above)





Design Philosophy

We are in the middle of a revolution in how young people are taught – or rather how they learn – a shift from teaching environments to learning environments. ICT, particularly wireless networking, is also changing the way children learn. There is every sign that this process of transformation will continue, and learning will be less based around classrooms of up to 30 students. Learning could take place in open plan schools and in the community, and multimedia will be the way children and staff express and present their work. Our design's aim is to allow for future educational changes while meeting the areas in the brief's more orthodox accommodation schedules with standard classrooms.

Arranging these standard classrooms across a corridor in clusters of four or six can give very useful, flexible and adaptable spaces for the future. When you remove the classroom partitions the rig makes four spaces of 15 x 20m and eight spaces that are 20 x 20m. In the two end clusters there is no requirement for a through route, so there is complete freedom to change these spaces to open plan learning areas.

Double height spaces are distributed around the school in the light links, like mini atria. This allows the creation of many centres and can support school organisation in subject areas, age based groups or the 'school within school' concept. From inside the light links, timber lined external terraces and 'sky gardens' are visible, with storey-high glazed balustrades for safety, city views and a sense of the outdoors. The light links contain service cores, WCs, drinking water fountains, lockers and lifts. They also incorporate social areas and staff rooms for discreet supervision, and twin stairs, one enclosed, one open. The top floor of the 'rig' would be another special place with safe external terraces, staff and sixth form rooms and roof-lit spaces for the art studios.

The rig is arranged on the site so the classrooms face north and south, avoiding low angle sun at the beginning and end of the day. There is no reason why all the schools should look the same, and with our various possible layouts of the rig, each school can create its own unique identity and response to its site. We have concentrated on a 'straight' rig, but we also have developed one of these alternative layouts, a 'flexy' rig.

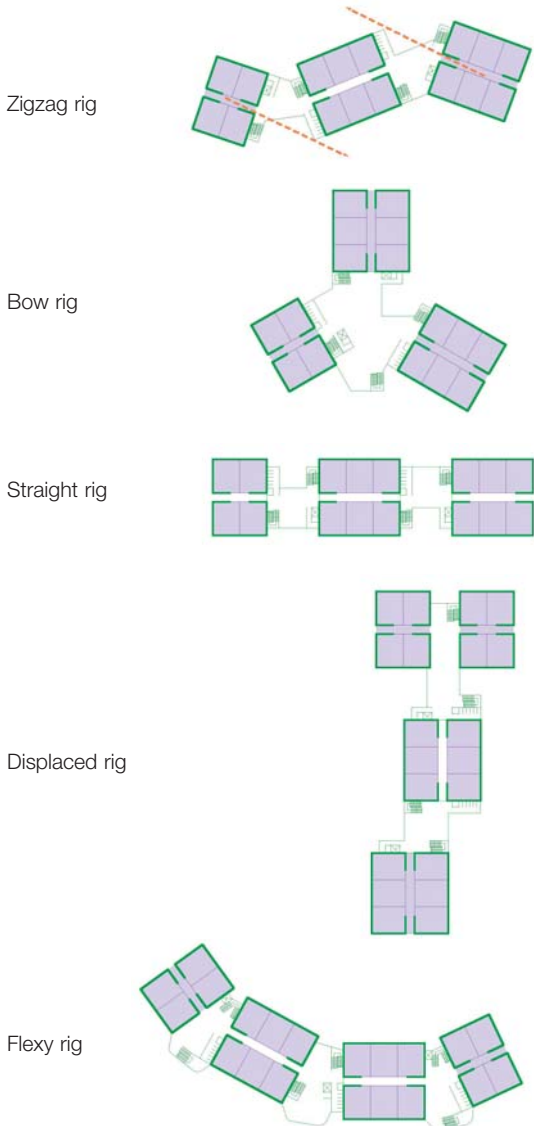
Adaptability and Flexibility

In the four bay cluster, 59m² classrooms open to the corridor with folding screens. Acoustic compliance to BB93 is achieved because the corridor acts as an acoustic lobby. Opening a pair of screens creates a space of 137m², suitable for a teacher to present to a group of up to 90 students. The students can then distribute throughout the cluster for self-directed learning. The acoustic performance in this arrangement will be less than the standard classrooms can achieve, but schools may nevertheless decide that a range of additional flexible spaces that are not to BB93 are still worth having. When all four screens are open, these linked spaces could be used for exams, allowing the hall or sports hall to continue in use by school and community without being taken over by exams periodically through the year. Alternatively, the entire platform can be used for multiple-foci open learning sessions. If required, all areas can become large open plan spaces, with small seminar and group rooms.

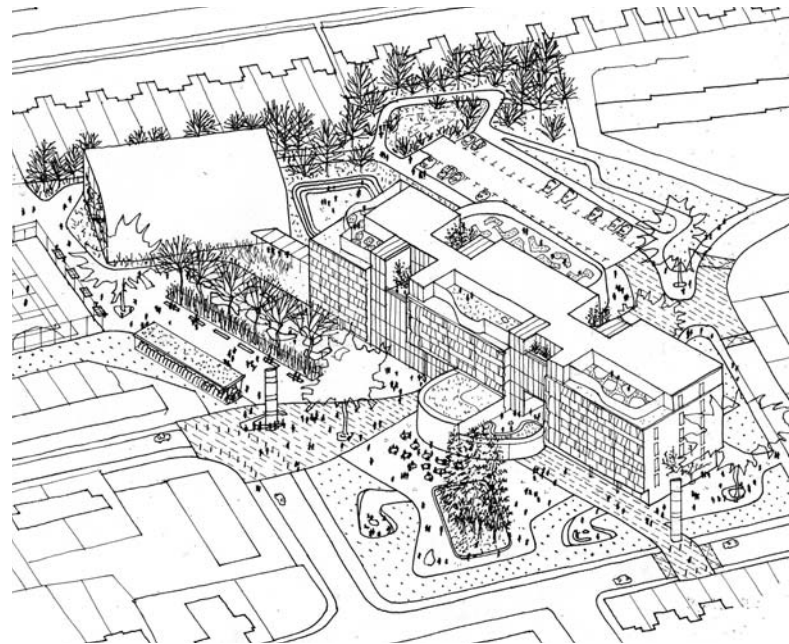
Two science rooms of at least 85m² can fit into the same space as three classrooms of



Looking towards entrance of the 'flexy' rig option



Left: Alternative 'rig' layouts
 Top: short section through light link
 Below: aerial view of school on core site E



Bottom: long section through foyer and light links

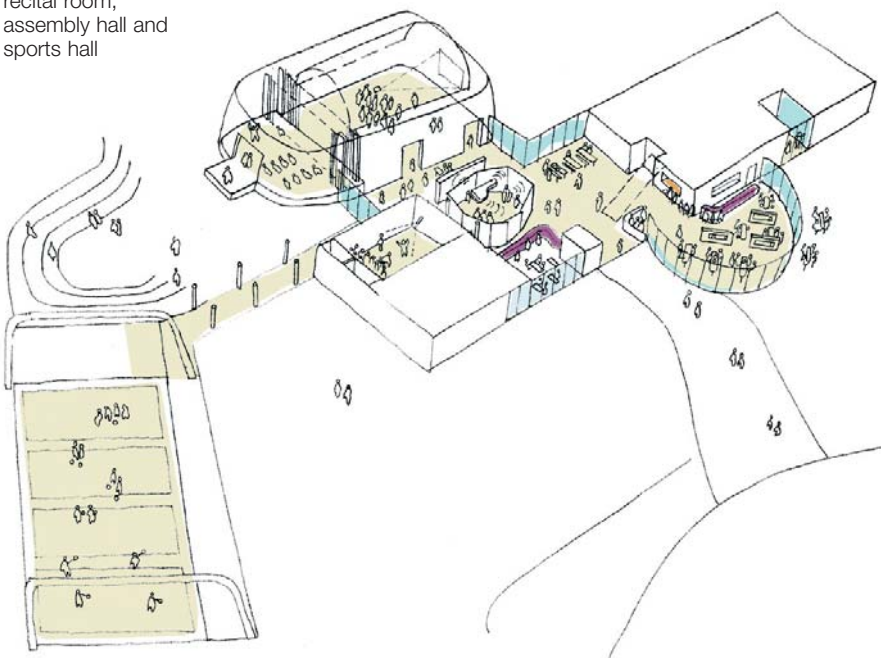


59m². This means that science laboratories, larger light practical rooms and general teaching rooms can easily be interchanged when planning different school options, or in future adaptations.

The teaching rig can be rotated, for example to suit site F as a variation we were asked to consider. On this very restricted 0.9ha site, the required informal and social areas are provided by including roofs as usable landscaped spaces. Further playing fields are off-site. This variation also illustrates how the large community spaces on the ground floor can be rearranged to suit a different site.

This exemplar design allows for the school to be built in phases for 600, expanding to 850 and up to 1600 as illustrated in other variations. By simply expanding the free-form dining/library space more community facilities, such as a large public library, can be included. The design allows each school management team to lay out their school as they wish, whether organised as upper and lower schools, managed with a faculty structure, or delivering various specialist curricula.

Ground floor foyer area with shared community spaces such as dining room, recital room, assembly hall and sports hall



Management and Organisation

Entrance

Students, staff and visitors arrive in the double height foyer. From here they can see and reach the main hall, activity studio, dining room, breakfast club area, sports hall, library and design and technology areas. This is 'the civic ground' and the local community can have access to these areas for adult learning and sports, music and drama or community meetings. Both the north entrance from the car park and the main pedestrian south entrance bring people into this entrance foyer, surveyed by the reception desk. At evenings or weekends access can be limited to the public spaces and the sports hall can be a self-contained community facility.

Stairs, Circulation and Fire Strategy

A wide stair coming up from the entrance reaches the first-floor part of the foyer, opposite the library. A light box runs along this space, shown red and green, to display students' work. From here an extra-wide circulation area meets the two light links and staircases to upper floors, which can be closed off if required to limit after-hours use. The everyday vertical circulation of most pupils and staff is by the stairs. The movement of pupils around the building can be reduced by arranging an upper school on the third and fourth floors and a lower school

on the first and second floors; pupils can be in one place for longer periods and the teachers move around more. Our fire strategy allows the light links to work as means of escape. As the route is just below 18m on the fifth floor the escape issues are straightforward and firefighting shafts are not needed. The light links are protected shafts, each with one open stair and one enclosed, giving two means of escape for every location. Sprinklers can be installed for additional protection, but they are not a requirement for our scheme to work.

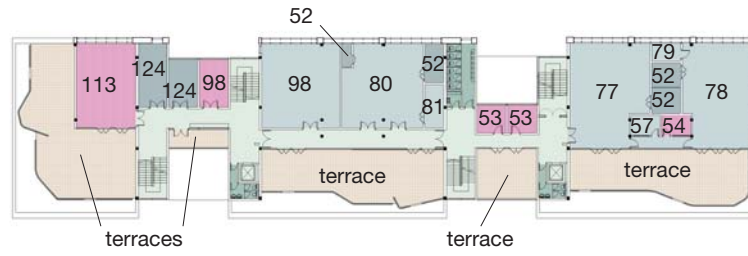
Access, Security and Safety

The design of the landscape around the school provides a secure boundary as well as enclosing and defining the site. Car parking is to the north side, with deliveries. Pedestrian access is from the south, with cycle park, linking to routes to nearby bus and train transport links and the main playing fields. A perimeter security fence can be 'lost' within tree planting. Access control technology such as swipe cards can allow more than one site entrance to work safely, with all entrance doors controlled. Access to the car park can be similarly controlled. Views between internal spaces encourage a sense of openness between students and staff and prevent unsupervised areas providing opportunities for bullying. Staff rooms are grouped centrally along with resource or social areas, stairs and toilets in the light links, offering discreet supervision. Fully glazed doors allow views into classrooms, and small group rooms are highly glazed.

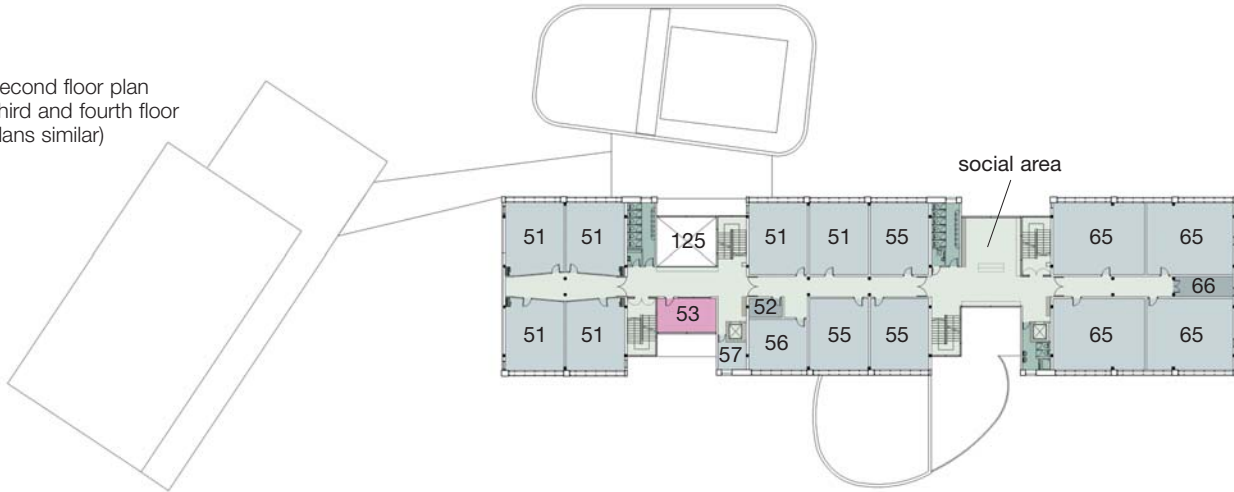
The inclusion support suite is in a central location, opposite the library on the first floor in the core scheme. A group room is provided in the same central location on each floor. Low-pitch stairs and evacuation lifts improve circulation and safety for disabled users. A further variation includes a specialist educational needs support centre integrated into the design. Another provides community integration and gives children on-site opportunities beyond the classroom. There are healthcare facilities, a crèche, a job centre, business and retail units, and training opportunities with the businesses that share the site. Key worker and school accommodation can be on top of the rig or included on-site.

Top (fifth) floor plan

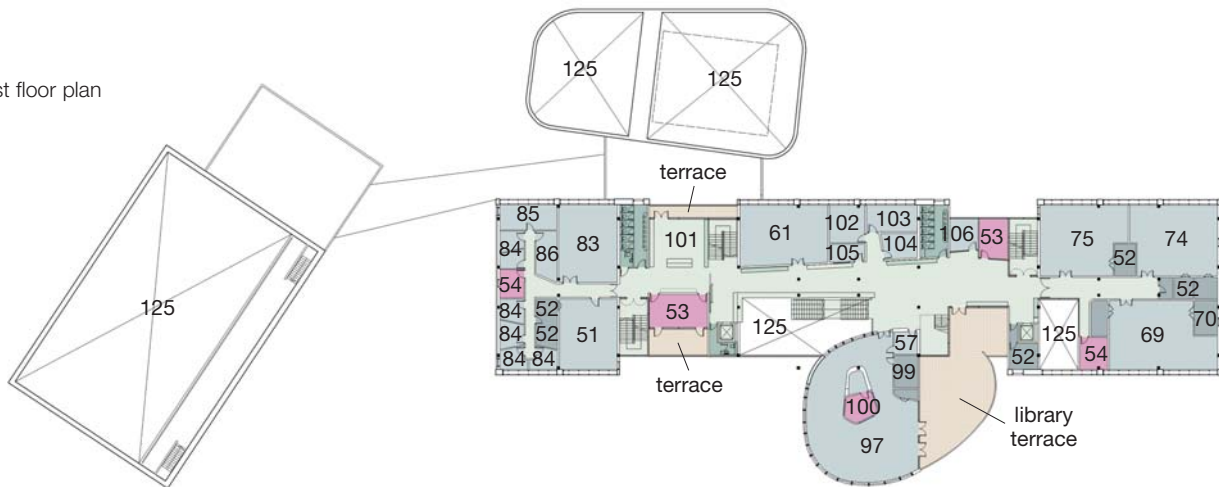
For key to plans see inside front cover



Second floor plan (third and fourth floor plans similar)



First floor plan



Ground floor plan





Site Context

The core site, site E, is in a large urban area surrounded by residential buildings of two to four storeys. Flight paths from a nearby airport contribute to high external noise levels. The site is split by a residential road into 4.3ha for playing fields and an area of 2.5ha, of which only 1.1ha is suitable for building. Our alternative site F is only 0.9ha. Both sites require a multi-storey solution.

Landscape design

The scheme promotes low maintenance sustainable landscapes for both learning and well-being. You look down onto sedum roofs on the library and halls which help reduce sound from the noisy air traffic around this site. Brown roofs also reduce jet sound and allow local plants to self-seed, supporting local flora and fauna. Both kinds of roof are part of a sustainable urban drainage system, including permeable paving. With the outdoor teaching gardens, habitat areas and planting for shade and wildlife, an important educational resource is created that enhances the ecological value of the site. The entrances to the site and key routes to school are marked with totems with display screens, so schools are able to showcase children's work to their community and provide other useful information about services and events.

Environmental Performance

The main environmental problems in existing schools are overheating in summer, lack of fresh air in winter, and, particularly on our site, external noise interference while using natural ventilation. We have addressed these key issues by developing a prototype façade system. This clads and insulates the building and contains local mechanical ventilation systems with sound attenuation to ensure sufficient fresh air at the right temperature directly to each classroom.

The energy required to heat incoming ventilation air is much more significant than the conduction heat losses from the room. Heat gains in a school from the occupants are around three times as great as the conduction heat losses. A 60% efficient heat exchanger to the ventilation

system will be sufficient to reduce the overall heating load to zero, apart from ten minutes warm-up on winter mornings. In the summer, the ventilation system cools the building during the daytime, with night cooling of the thermal mass through high-level windows. We predict that the energy running costs will be lower than for a naturally ventilated system.

With lower than average build costs, our scheme can include venetian blinds within the triple glazing to cut out heat and glare, yet reflect sunlight and daylight up to the ceiling by using light bending technology (such as 'Serraglaze' or reflective venetian blinds). In this way the common occurrence of large areas of glazing with blinds down and the lights on is avoided. Other energy-saving options such as rainwater recycling and solar heating can be provided.

Construction

The rig has a modular grid, and the frame can be constructed economically in a number of ways to suit local market conditions and the preferences of the constructor. A 'fast frame' hybrid concrete and steel solution is likely to provide the best combination of speed and factory quality. The large span community spaces are independently structured and could be in different forms and materials to suit the design intent or local market conditions.

Non-load bearing partitions, cladding and roofing can be produced as cassettes or panels. The external façade to the classrooms incorporates ventilation, heating and special glazing components. These can be made off site as storey-height, classroom-width units that fix to the edge of the structural frame, reducing time consuming and costly site installation and coordination of services. Toilets are standardised as modules, supported and slotted into the frame.

Cost

The site is a restricted urban site under a flight path, resulting in abnormalities of some 10% of the Gross Capital Cost (excluding loose furniture and equipment).

Generally the scheme is very efficient and economic in comparison with costs expected for this type of accommodation. The approach to the mechanical and electrical services design has contributed to keeping the capital costs to a reasonable level.

CABE Design Review Committee

The CABE design review committee believe this scheme faces the challenge of finding a new urban form for a school. It has similarities with the old board schools, but improves their amenity, introduces double height day-lit circulation and achieves daylight into the classroom, coupled with providing a flexible plan. It was felt that the scheme recognised the challenge of moving pupils around in high-rise solutions, in creating break-out and social spaces in the 'light links'. However, more consideration needs to be given to the nature of the return ends and how they relate to the 'light links', and to how the entrance might be made stronger, to become the 'special space' it should be. Overall this scheme was thought to be modest in expression but systematic and flexible in its approach, with a sensible attitude to construction. The committee supported the proposition for a tall school building in an urban context.

Cost Comment

The design team's cost estimate for this scheme excluding abnormalities is within the DfES Net Building Cost guide. The abnormalities for this scheme are inter-related and therefore site specific. The design and costs implications, should these abnormalities be avoided, will need to be tested. The novel approach to the mechanical and some of the electrical services distribution will need to be carefully considered and costed in its detailing. This scheme has had a large locational factor adjustment to normalise its costs, which could influence the affordability of certain materials or components.

all through school



Exemplar Designs
concepts and ideas



Top
View between
primary and
secondary
courtyards

Middle
The central
covered courtyard

Bottom
Covered courtyard
in use as a
performance space





exemplar all through school design

larger urban site

An 'All Age Community School' that interlocks primary and secondary provision, with a central space that could provide a unique identity and an outstanding facility for both school and community

Feilden Clegg Bradley Architects

Cost Consultants
Davis Langdon and Everest

Structural Engineers
Buro Happold

Environmental Engineers
Buro Happold

Landscape Architects
Plincke Landscape

Facilities Management
Gardiner and Theobald

Construction Advice
Kajima Construction

Sites
Primary and Secondary Site C (core)
Secondary Sites A and B (variations)

Introduction

The design team has developed a design that physically integrates a primary and secondary school, with shared facilities as appropriate.

We have called our scheme the All Age Community School, but this type of school is also known as an 'all through school'. This is a pattern that is common in some other countries, including those in Scandinavia, but unusual in Britain. Having explored the concept, we believe there are many potential advantages and that there are growing reasons for this model to become adopted in the British education system. However, we have also sought to produce a design that would provide a viable model for a stand-alone secondary school.

New Organisations, New Pedagogies

We are in a time of change, when the current mode of delivering education is increasingly being questioned and structures for that delivery are being rethought. Some key issues are as follows:

- the pattern of primary schools being relatively small (to serve a local catchment area) and secondary schools being relatively large (in order to carry a range of specialisations and provide viable sixth forms) is being challenged;

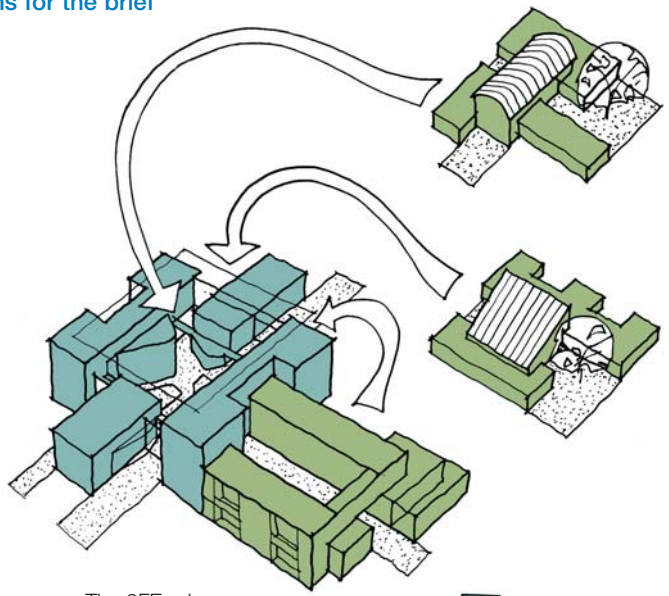
- the structure of teaching and learning is also being rethought, with a shift towards individual learning programmes and space requirements that vary from large group gatherings, through traditional classroom teaching, to individual study;
- schools are fulfilling increasingly important roles in the social life of pupils, who often come from fragmented backgrounds and may be at the school for extended periods;
- schools are also becoming increasingly important in local communities, staying open for longer hours and providing a wide range of community facilities.

The overriding message that comes from these issues is the need for schools to offer high levels of adaptability – we simply do not know how they will be used in the next ten years, let alone across the whole of their lifespans.

All Age Schools in the Education System

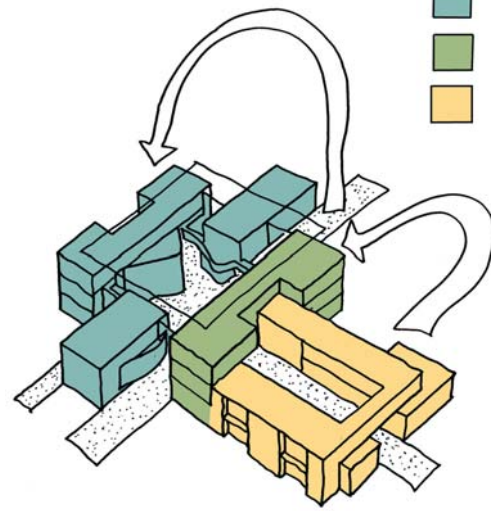
All Age Schools need to be seen in the context of the wider education system. The scheme that we have developed is highly adaptable to accommodate different circumstances. The principal core scheme is for a 2FE nursery and primary school with a 6FE secondary school, with a sixth form; effectively the primary and secondary core briefs added together.

Options for the brief



The 2FE primary, 6FE secondary option, with two federated primary schools

Secondary school
Primary school



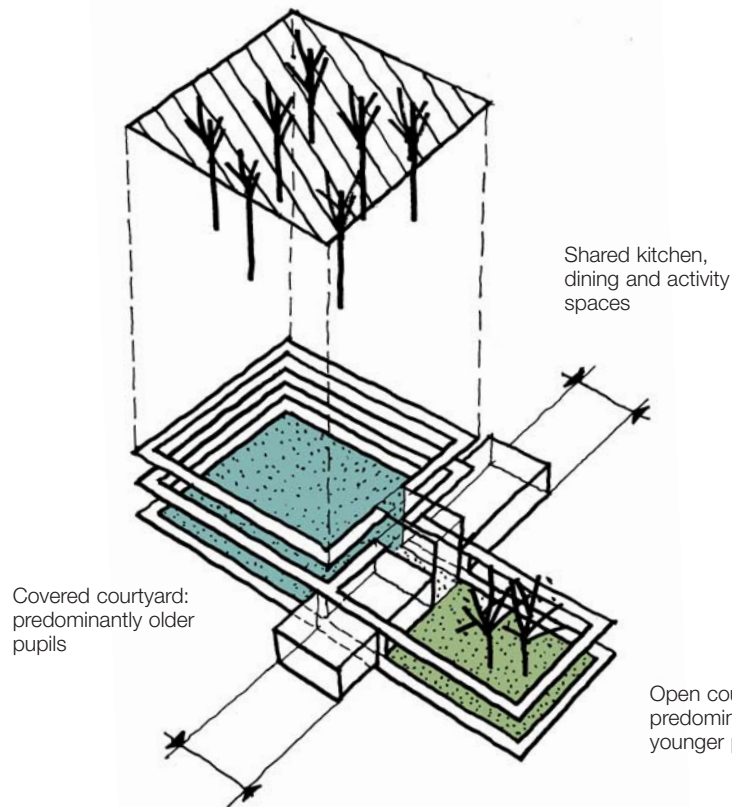
A 4FE all through school

Upper school
Middle school
Lower school

The concept

The building concept

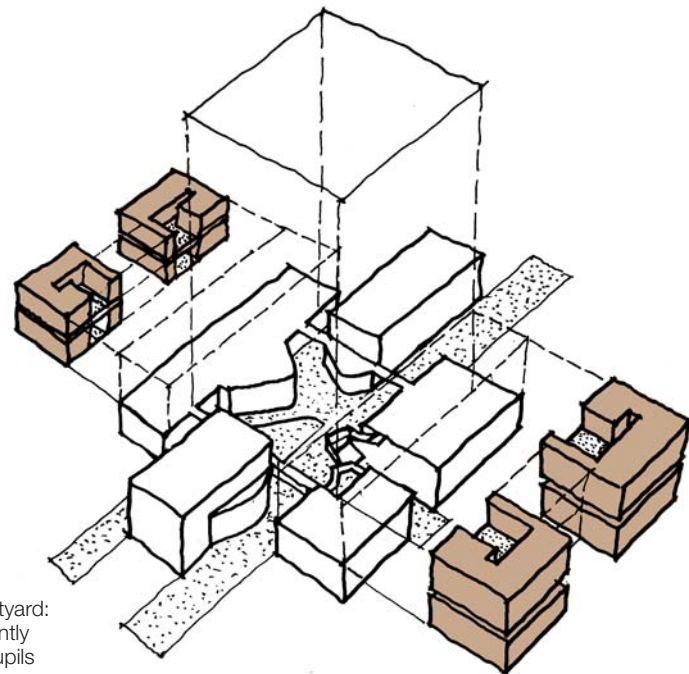
Much of the secondary educational space is organised as 'clusters' at each corner of the central space



Covered courtyard: predominantly older pupils

Shared kitchen, dining and activity spaces

Open courtyard: predominantly younger pupils





We would suggest that this school could be federated to two additional primary schools in order to realise the benefits of the through school model.

We have also developed a 4FE 'All Through School', with 4FE at both primary and secondary level, which we believe opens up a range of educational opportunities worth exploring.

Finally, it should be said that the exemplar design that has been developed could be used in a wide range of other configurations while retaining the basic concept. In particular, the model developed could be used as a stand-alone secondary school from 4FE upwards.

Potential Benefits of Through Schools

There is a range of potential advantages to through schools, including:

- the ability to break out of year group organisation – with particular benefits for more able pupils;
- placing the school at the heart of the community, offering educational activities for all ages;
- continuity of 'knowledge' of pupils;
- avoidance of performance set-backs on entering a new school;
- greater opportunities for staff within a larger (and integrated) staff community;
- enhanced governance;
- operational efficiencies and benefits through integration;
- building efficiencies through optimising utilisation;
- the scope for developing a continuum of pedagogies from primary through to the sixth form.

Design Approach

Our proposals have been developed with the aim of achieving the following key objectives:

- creation of a true community building: 'deep community = deep learning';
- a compact scheme with secondary and primary schools appropriately interlocked;
- maximum adaptability of teaching and learning spaces;

- a scheme with exciting architectural quality;
- creation of a genuinely 'social' environment;
- all this ... and value for money.

A building concept has been developed that is based around two courtyards. Firstly, there is a large covered courtyard, which is predominantly for older children and for community use, but also has more limited use for younger children. Secondly, there is an open courtyard, which is predominantly used by the younger children but has some use by older children. The two schools are linked visually through the primary hall, which is glazed at both ends, and physically by two connections at each level, although there would be clear security arrangements to control movements. A number of shared facilities are placed between the two schools; these include reception, staff room, inclusion support suite, administration and kitchen and dining.

The Central Space

The central covered space is key to the identity of this project. At more than 40m square and three storeys high, it is an impressive heart to the scheme, naturally lit through north lights. On a day to day basis the space provides for dining, overspill from the library, circulation and social space. On the upper levels there are no corridors – circulation occurs on balconies into the main space and these frequently widen out to provide additional social/study space. The space also offers a wide range of opportunities for displaying the work of the school on banners via plasma screens and projection.

The central space has a range of other potential uses, including performance, whole school gatherings, music and parent evenings.

Communal Spaces

The principal communal spaces, including sports hall, main school hall, library and primary hall, are arranged around the central courtyard to provide easy access both to the school(s) and the community.

Primary/Lower School

The primary school in the 2FE/6FE model, or the lower school in the 4FE model, are

arranged as a two-storey building around a courtyard, with the younger years on the lower level and older years on the first storey. The design that has been developed is based around class teaching, and two classrooms can be amalgamated where appropriate.

Secondary Teaching Accommodation

Specialist teaching facilities, including art, music, drama, design and technology and graphics, are located on the ground floor. Other teaching accommodation is mostly arranged in 'clusters' at each corner of the main space.

Flexibility and Adaptability

The scheme that has been developed is highly versatile and can provide for a wide range of different school configurations. The design is also extremely adaptable and spaces provided can be used in a wide variety of different arrangements.

The flexibility of the primary/lower school configuration can accommodate a large number of different layouts. The clusters in the secondary school may be used either as enclosed classrooms or for more open plan arrangements.

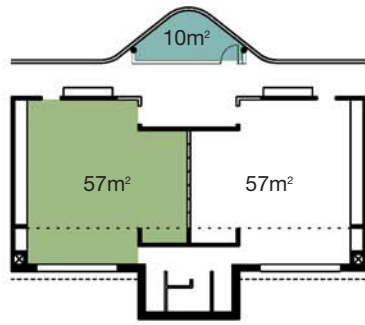
Management and Organisation

Access Control

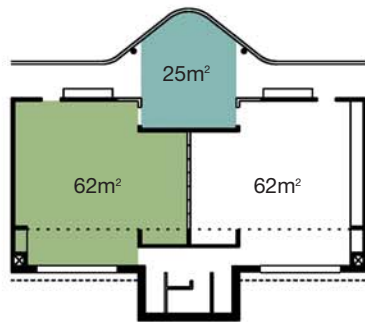
The All Age Community School has been designed to operate in a wide variety of ways, reflecting the complexity of the brief. Four particular aspects of management control should be noted:

- Younger children are clustered around a two-storey courtyard which is gated at one end. On arrival, parents can either deliver to a separate reception and into the gated courtyard, or directly to the classroom. Play occurs both in the gated courtyard and in the separate gardens to each of the infants' classrooms and nursery.
- Older children will arrive at the school and gain access to the central space either via the front entrance, or via a rear entrance which will normally lead towards the car parking area. Additional entrances may be

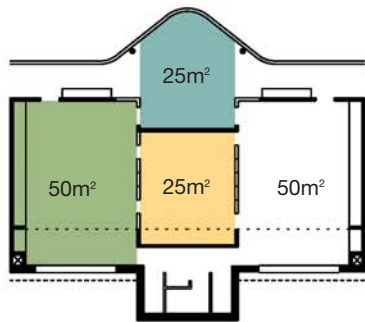
Adaptability: options for infants' classrooms



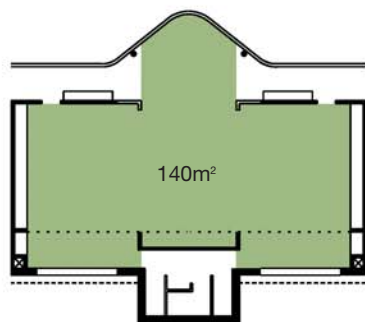
Two 57m² classrooms with 6m² storage and 10m² small group room



Two 62m² classrooms with mobile storage

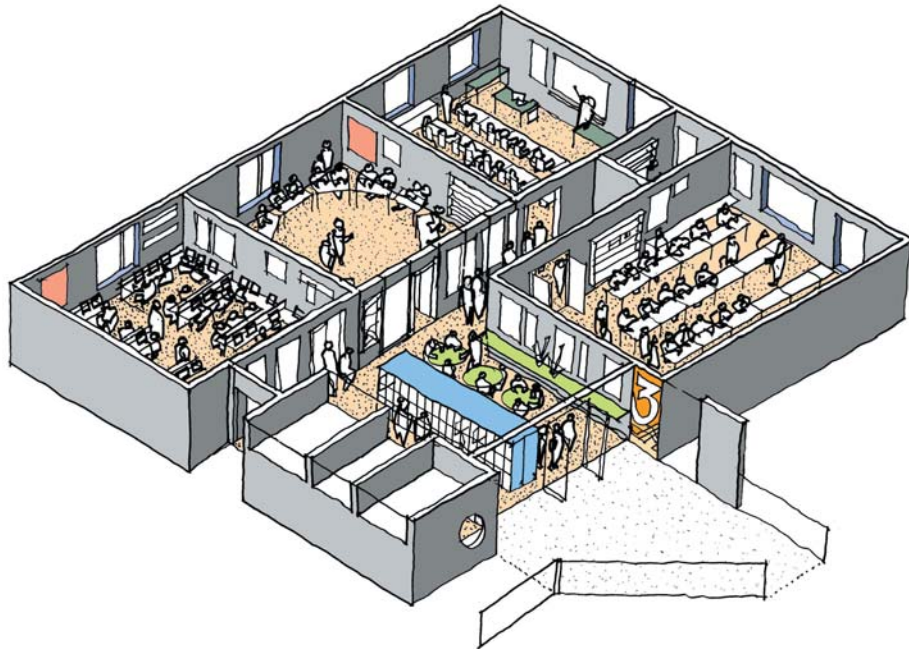
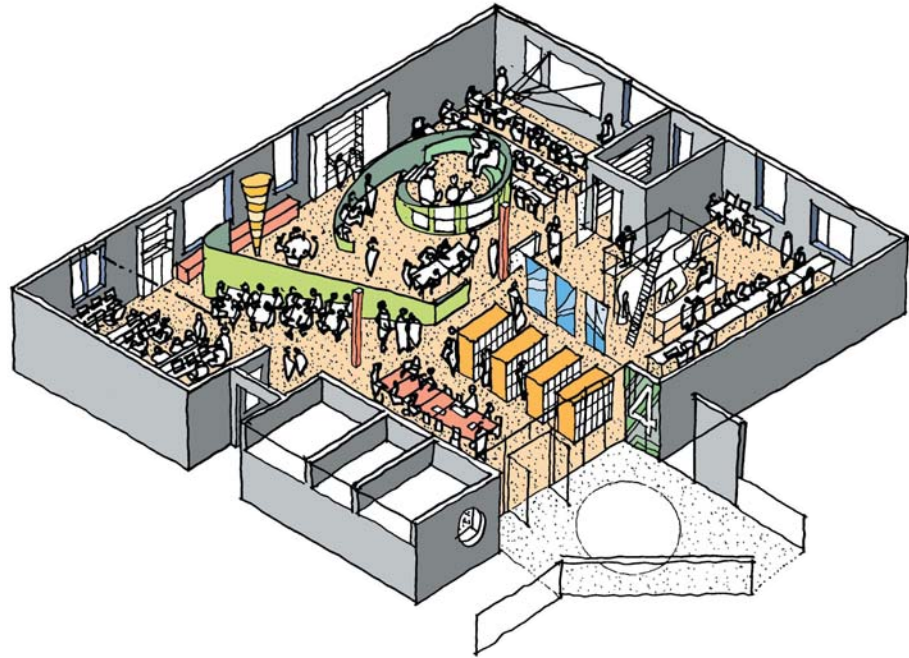


Two 50m² classrooms with two 25m² shared teaching areas



One 140m² shared open plan pair of classrooms capable of subdivision by screens and furniture

A typical secondary school cluster in an open plan arrangement with a variety of partially screened and enclosed spaces



The same secondary school cluster subdivided into three 55m² enclosed classrooms and one 85m² practical area



obtained at the base of fire stairs if required. The concentrated form of the school provides a very secure environment where it is easy to control access.

- The interface between younger and older children occurs either through the primary hall, or through two security controlled links on both ground and first floor. Both older and younger children may move between these spaces in appropriate circumstances.
- Community access will predominantly be to facilities that are on the ground floor of the central space. Access is controlled via the reception desk, and other facilities can be selectively secured with relatively limited effort.

Fire Engineering

The scheme has been designed to ensure safety in the event of fire, and the central space is vented to prevent the build-up of smoke in a primary area of circulation. Staircases are located at each corner, providing direct discharge to the outside air and evacuation within appropriate time limits.

Inclusion

The scheme has been designed to provide good accessibility throughout the accommodation. The main communal facilities and the shared inclusion support suite are located on the ground floor, together with many of the specialist teaching spaces, and upper levels are reached by two lifts within the main central space and a third lift serving the primary space. Relatively short travel distances are achieved by the compact plan form. In the 4FE 'all through' model this will be assisted by the relatively limited amount of movement around the school.

Environmental Performance

The school has been designed with a strong emphasis on environmental responsibility. Energy consumption would be minimised by providing good levels of natural lighting, a highly insulated shell and an extremely efficient ventilation system. This ventilation system would use a 'labyrinth' below the structure to provide pre-heating in winter and cooling in summer as well as high standards of fresh air provision. Apart from a pre-heat in the mornings, the school generally operates

without any additional heating and the lack of pipework contributes to the overall flexibility.

The scheme has been designed to have acoustic performance in compliance with BB93. The provision of an artificial ventilation system means that the design is appropriate to be used in areas where there is high ambient noise.

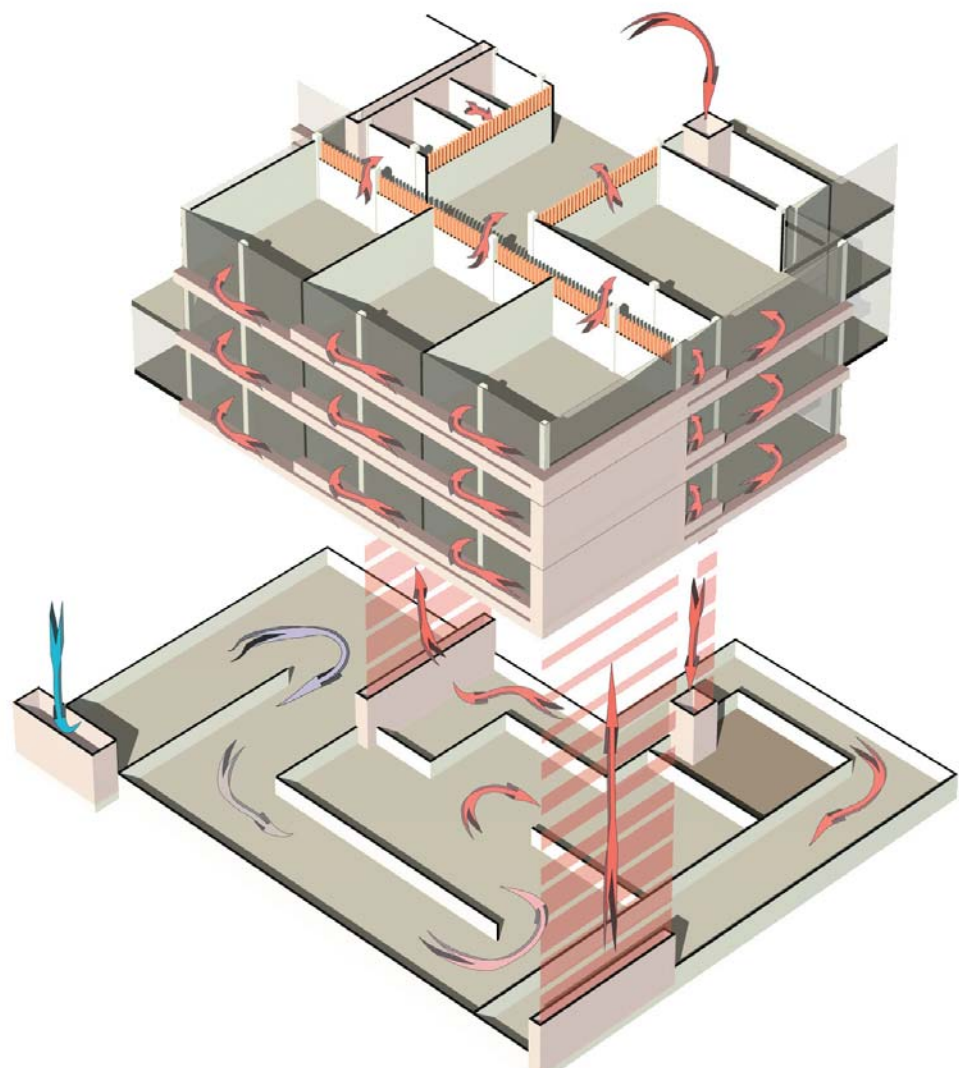
Construction

The structure is extremely straightforward and the main academic areas could be either a combination of steel and precast planks or in-situ flat slabs, depending on comparative economics at tender.

There is also a range of options for the roof over the central space. One attractive option would be timber columns and a 'Lamellar' roof structure, and this has been illustrated on page 104. Alternatives include steel and more simple timber structures.

The project offers considerable opportunities for off-site manufacture and modern methods of construction. It is believed that construction time could be significantly reduced by an experienced contractor.

Isometric diagram of air path within a typical cluster



Ground floor plan (2FE/6FE scheme)



First floor plan





Second floor plan



Cost

Indicative costs per square metre align closely with those proposed by the DfES. Excluding the central space and balconies, the gross area of the scheme is approximately 1200m² below that required in the brief; this reduction in space is achieved by excluding circulation and some dining, staff and library area within the covered courtyard. When all the space in the central area is measured the scheme is approximately 900m² above the gross area allowed in the brief.

The scheme has very few abnormalities. These total about 1% of the Gross Capital Cost (excluding loose furniture and equipment), and are due to the slightly sloping site.

CABE Design Review Committee

The CABE design review committee acknowledged that the all-through school was a challenge different to the others, as it is relatively new and attracts debate over educational planning and policy. They felt that the proposal has a clear concept and a relatively simple plan form, making a good generic model adaptable for other sites or client briefs, and capable of development by other architects into a high quality and effective learning environment. The 'heart' of the school was recognised as a central covered area which had potential as a dynamic and impressive space. Some areas that the review committee thought should be further developed included the linkages between the primary and secondary parts, and the way the scale of the different buildings worked for younger pupils.

Cost Comment

The design team's cost estimate of the 2FE/6FE scheme excluding abnormalities is just above the DfES Net Building Cost guide. This is due to the additional area included for the central space. The gross area of the scheme proposed is significantly above that assumed in the brief; some of the cost of this has been allowed for within the Net Building Cost, but it has not been fully compensated for by the lower cost per m². In addition to this, it has been notionally assessed that 12.5% of this over-provision will be funded by alternative sources. Unless this area is reduced, which will be difficult, further additional sources of funding will be needed. This scheme has had a significant locational factor adjustment to normalise its costs, which could influence the affordability of certain materials or components (see also page 118).

SBDU buddies

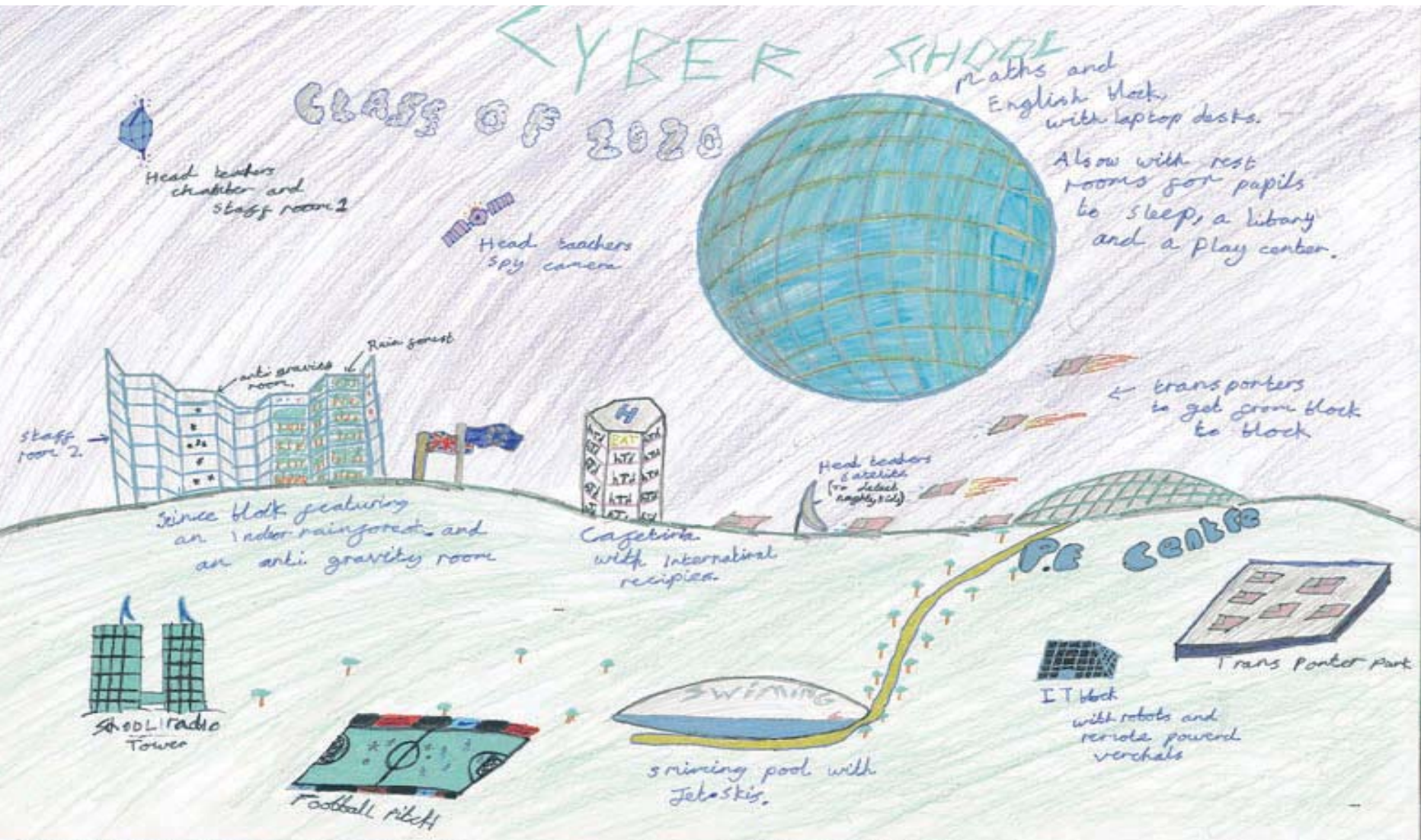
To join in design meetings, act as first point of contact and assist in clarifying the brief with the project team, the following SBDU buddies were linked to design teams:

Alex Freemantle	Walters & Cohen (P1)
Alan Jones	Cottrell + Vermeulen (P2)
Alison Wadsworth	Marks Barfield (P3)
Richard Daniels	Building Design Partnership (P4)
Chris Bissell	Sarah Wigglesworth Architects (P5)

Gill Hawkins and Ken Matthews	MACE (RTKL) (S1)
Tamasin Dale	Wilkinson Eyre Architects (S2)
Lucy Watson	de Rijke Marsh Morgan (S3)
Beech Williamson	Alsop Architects (S4)
Russell Symes	Penoyre & Prasad Architects (S5)

Tony Butler	Feilden Clegg Bradley (all-through)
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Drawing by Kryston Martin,
St Francis of Assisi RC Primary School,
Kensington and Chelsea



afterword

Next steps

The exemplar designs were launched in February 2004, when Wave 1 of the Building Schools for the Future programme was announced. Further publicity will occur as future waves are announced and other milestones achieved.

Use of the exemplar designs is free to LEAs and other promoters of schools, since copyright of all the designs rests with the DfES. We hope that many of the ideas will be taken up and developed into finished school buildings. As the designs are developed further, it is important that we exchange thoughts on any emerging issues and problems, and we will be looking at how we can publicise the exemplars during this time. An important communications tool will be our website – www.teachernet.gov.uk/exemplars – which will detail progress with the designs. It will also cover feedback on post-occupancy evaluations.

Of course thinking on design does not and should not stand still. As we said in the introduction, the exemplars are part of a wealth of existing inspiring school design work. The exemplars are not universal solutions and need to be adapted and developed to suit a school's specific ethos and site. In a few years' time we may need to create a new wave of exemplars to build on feedback from built versions of the original designs.

The users

Perhaps we should let children have the last word. Not surprisingly, surveys have found that they are very interested in how schools are designed. For example, these extracts from the Children's Manifesto list some of the features they would like, and which we hope to help them achieve.

The school we'd like is:

A beautiful school

with glass dome roofs to let in the light, uncluttered classrooms and brightly coloured walls.

A comfortable school

with sofas and beanbags, cushions on the floors, tables that don't scrape our knees, blinds that keep out the sun, and quiet rooms where we can chill out.

A safe school

with swipe cards for the school gates, anti-bully alarms, first aid classes and someone to talk to about our problems.

A school without walls

so that we can go outside to learn, with animals to look after and wild gardens to explore.

At the school we'd like, we'd have:

Drinking water in every classroom; clean toilets that lock; large lockers to store our things; and a swimming pool.

The Children's Manifesto was first published in the Guardian on 5 June 2001.

It is a distillation of the views of 15,000 children taken in a survey called 'The School I'd Like'.

Primary Exemplar Core Room Schedules Compared

	Schedule of accommodation required in core brief			Exemplar design areas					
	average area (m ²)	total brief area (m ²)	number of rooms	Walters and Cohen (P1)	Cottrell + Vermeulen (P2)	Marks Barfield (P3)	BDP (P4)	Sarah Wigglesworth (P5)	Feilden Clegg Bradley (primary areas)
Nursery									
Nursery playroom (supplementary)	63	63	1	67	63	60	61	66	69
Class storage (supplementary)	4	8	2	8	8	6	8	8	4
Small group room (SENco)	12	12	1	12	12	10	22	13	10
cloakrooms/lunch box storage (supp.)	4	4	1	4	3	2	5	*	4
Nursery toilets/hygiene facilities (supp.)	5	15	3	21	14	14	15	13	14
Reception									
Reception class	63	126	2	124	126	118	124	122	124
Class storage	3	6	2	4	6	6	8	6	*
cloakrooms/lunchbox storage	3	6	2	6	5	3	7	6	7
Reception toilets	4	12	3	13	14	9	12	11	10
Infant Y1 and Y2									
Infant classbase	57	228	4	224	228	230	228	228	226
Class storage	2	6	4	6	6	6	6	6	6
Small group room	8	8	1	8	8	16	8	8	10
specialist store: numeracy	8	8	1	8	8	18	8	8	20
cloakrooms/lunchbox storage	3	12	4	12	10	12	12	12	14
Pupil toilets	3	20	6	18	24	20	22	20	20
Junior Y3 and Y4									
Junior classbase	57	228	4	224	228	224	228	227	228
Class storage	2	6	4	6	6	6	6	6	6
Small group room	8	8	1	8	8	16	8	8	10
specialist store: literacy	8	8	1	8	8	16	8	8	20
lockers/cloakrooms/lunchbox storage	3	12	4	12	10	12	12	12	14
Pupil toilets	3	20	6	18	24	20	22	20	34
Junior Y5 and Y6									
Junior classbase	57	228	4	124	128	124	128	128	128
Class storage	2	6	4	6	6	6	6	6	6
Small group room	8	8	1	8	8	16	8	8	10
specialist store: art/science	8	8	1	8	8	8	8	5	20
lockers/cloakrooms/lunchbox storage	3	12	4	12	10	12	12	12	14
Pupil toilets	3	20	6	18	24	20	22	20	39
Central Resources									
Library resource centre	42	42	1	42	56	43	52	78	42
ICT suite	38	38	1	-	24	37	31	*	13
ICT technician/server	5	5	1	4	5	8	5	6	4
Creative space (food/D&T/science/art)	38	38	1	25	38	39	36	38	42
Main hall (also used for dining)	180	180	1	185	180	188	188	185	185
Chair store (off hall)	12	12	1	11	10	4	12	12	12
Staging/appliance store (off hall)	8	8	1	12	7	5	8	7	8
PE store (off hall)	12	12	1	11	10	8	12	11	12
PE store (external)	4	4	1	4	4	6	4	4	**
Studio (small hall)	54	54	1	54	54	103	54	54	54
Changing rooms (supplementary)	12	24	2	29	24	26	24	24	28
Kitchen/servery	56	56	7	55	57	53	63	59	**
Staff and Administration									
Head's office	8	8	1	8	20	12	9	8	16
Meeting room	12	12	1	12	*	12	12	12	**
Senior management office	8	8	1	8	8	7	9	7	8
Staff room	57	57	1	59	57	58	58	56	**
Copier/reprographics	4	8	2	10	8	8	9	9	**
Central stock	8	8	1	2	9	6	8	8	8
Caretaker's office/maintenance store	8	8	1	8	12	5	8	6	**
Sick bay	5	5	1	5	*	5	5	*	5
General office	12	12	1	20	17	12	11	12	12
Entrance/reception	5	5	1	29	*	20	6	20	9
Interview/social services	8	8	1	6	8	7	8	8	14
MI/therapist room	12	12	1	12	17	10	12	12	14
Parents/community room (supp.)	12	12	1	14	12	12	12	13	14
Accessible toilet (visitors)	5	5	1	4	6	3	5	4	**
Staff toilets	3	12	4	14	16	6	12	12	**
Other									
Cleaners' stores	2	8	4	179	7		7	4	**
Circulation		376		279	371	365	294	360	376
Plant		39		22	16	34	31	18	**
Partitions		78		35	104	79	75	107	78
Area Subtotals									
basic teaching		886		821	872	872	875	843	861
halls		234		239	234	291	242	239	239
learning resources		78		78	92	99	97	115	82
storage		150		143	137	139	153	139	167
staff and administration		139		172	139	158	143	150	81
supplementary net area		111		301	110	105	109	111	119
non-net		653		497	666	621	573	646	571
net area		1598		1753	1584	1664	1619	1597	1549
gross area		2250		2249	2250	2285	2192	2244	2120
net area as a percentage of gross area		71%		78%	70%	73%	74%	71%	73%

* included in other area
** shared with secondary

area comparison

These pages set out the schedule of accommodation in the primary and secondary briefs, and compare the 'as designed' areas of each space with the core brief for each scheme. The core brief for the 'all-through' school was simply the primary and secondary schedules together on the same site, although economies could be made in areas such as administration and caretaking facilities.

Areas can be hard to measure precisely in designs at this stage, but the comparative schedules listed here show that the area of individual rooms required in the core brief has been satisfied by all the designs in most respects. Storage is the only area under-provided by most design teams, so this shortfall would need to be addressed in later design stages.

The schedules also help to identify where some of the designs would need further work, and where they have gained extra space within the budget.

Figures in italics are 'non-net' and are more variable as, except for kitchens, there is no minimum requirement for them in the brief. For net areas, figures in red indicate areas that are more than 10% below that required in the brief, and figures in blue those at least 10% above. In the 'number of rooms' column, the timetabled rooms in the secondary school brief are highlighted in bold.

Gross Area

The overall area of both core schedules was based on the guidance in the draft revision of Building Bulletin 82: Area Guidelines for Schools (BB82), available on the web at the time. This was broadly equivalent to the guidance gross area originally published in BB82 in 1996, plus a further 10% in the 11 to 18 secondary brief and 15% in the primary brief.

In practice, the 'constant' required in any school for the core facilities, such as the hall, office and head's office, is more than BB82 + 10%, while the area required for each pupil, particularly the sixth form, is somewhat less.

The original schedules, in line with the revision of BB82 current at the time, were based on the net area being up to 73% of the gross area. As the designs progressed, the exemplar projects and other evidence suggested that a higher level of non-net area would be required to allow suitable provision for:

- toilets suitable for the disabled, with an accessible cubicle in any set of pupils' toilets;
- circulation, including corridors and lifts appropriate to an inclusive school;
- plant and similar area that may increase to allow sustainable solutions such as chimneys;
- internal walls that may need to be wider to suit the requirements of BB93, or to provide thermal mass.

The allowance for non-net area was therefore increased such that net area was assumed to be around 70% of gross. This has increased the guidance gross area and is reflected in the latest revision of the Area Guidelines for Schools, in the form of Building Bulletins 98 and 99, available on the web and due to be published later in 2004.

BB98 and 99 also include a further increase in the total net areas recommended, for example to accommodate slightly larger practical areas for inclusive schools and ICT in teaching spaces such as laboratories.

Primary School Areas

The brief included 111m² of supplementary area, over and above the guidelines, to accommodate the nursery, changing rooms and parents/community room – although some of the latter spaces might be achieved within the recent enhancements to the guideline gross area.

In the knowledge that demand for ICT suites may recede in the future, most primary design teams have not provided enough area for this space, as it is difficult to accommodate 15 computers in less than 38m². Walters and Cohen have not included this space, but provide an extra 190m² of supplementary area.

Marks Barfield have enhanced their studio space to provide a space large enough to be a permanent dining area, and to make up for the main hall being separate. The area of Building Design Partnership's circulation is low as much of this is on the external play-decks, although an enclosed option is available (see page 17).

Secondary School Areas

Storage for subjects such as Design and Technology and music is important, and has been under-provided by some secondary design teams.

The main hall is replaced by a smaller central open plan area in de Rijke Marsh Morgan's scheme, but could be augmented by adjacent circulation area. The area of their partitions is also low, because each cluster within the 'dura' effectively has external walls.

The dining area in Wilkinson Eyre's design is smaller than required, but much more area is provided in the adjacent 'agora'. Similarly, the circulation is low in this design as so much of this is in the external 'agora'.

All Through School Areas

The schedule of the all through school is compared to both the primary and secondary brief. However it should be noted that many primary non-teaching elements are shared with the secondary school, so the totals are not comparable in all respects.

The final net area related to the brief is lower than the sum of the primary and secondary schools by around 280m², since economies have been made through sharing some core facilities. However this is made up for by 1181m² within the central covered courtyard being additional to those areas used for circulation, dining, library or staff social space. About an eighth of this supplementary area is identified in the cost plan as a 'delight'.

Secondary Exemplar Core Room Schedules Compared

	Schedule of accommodation required in core brief			Exemplar design areas					
	average area (m ²)	total brief area (m ²)	number of rooms	Mace (S1)	Wilkinson Eyre (S2)	dRMM (S3)	Alsop (Model 4: Site E) (S4)	Penoyre and Prasad (S5)	Feilden Clegg Bradley (secondary areas)
English									
Classrooms	59	413	7	413	410	420	420	413	413
Storage general teaching	3	5	2	5	31	18	10	5	5
Staff work room (shared)	28	14	0.5	14	13	14	14	14	14
Head of Year office	8	8	1	8	*	8	8	8	8
Modern Foreign Languages									
Classrooms	59	295	5	295	365	300	300	295	295
Seminar room	42	42	1	42	45	42	43	42	42
Small group room (foreign lang. asst)	9	9	1	9	11	9	9	10	9
Storage general teaching	3	5	2	5	31	13	10	5	5
Staff work room (shared)	28	14	0.5	14	8	14	14	14	14
Head of Year office	8	8	1	8	*	8	9	8	8
Humanities									
Classrooms	59	413	7	413	486	420	420	413	413
Seminar room	42	42	1	42	84	42	42	42	42
Small group room	9	9	1	9	11	9	9	10	9
Storage general teaching	3	5	2	5	27	5	10	5	5
Staff work room (shared)	28	14	0.5	14	13	14	14	14	14
Head of Year office	8	8	1	8	*	8	9	8	8
Information Technology/Business Studies									
Classrooms	59	177	3	177	178	180	180	177	177
IT Rooms	76	152	2	124	152	152	161	152	152
ICT technician	8	8	1	8	5	8	8	8	8
Server	6	6	1	6	5	6	8	6	6
Storage general teaching/IT	3	5	2	11	14	5	3	5	5
Staff work room (shared)	28	14	0.5	14	8	14	14	14	14
Head of Year office	8	8	1	7	*	8	0	9	8
Maths									
Classrooms	59	354	6	354	386	360	360	354	354
Seminar room	42	42	1	42	0	42	43	42	42
Small group room	9	9	1	14	11	9	9	10	9
Storage general teaching	3	5	2	12	14	5	10	5	5
Staff work room (shared)	28	14	0.5	15	8	14	14	14	14
Head of Year office	8	8	1	9	*	8	9	10	8
Science									
Science Laboratories	85	845	10	843	934	850	850	845	845
Science prep room	127	127	1	123	148	120	124	127	127
Chemical store	3	3	1	3	*	3	5	3	3
Staff work room (shared)	28	14	0.5	15	25	14	14	14	14
Office	8	8	1	9	*	8	10	8	8
Design and Technology									
Food room	100	100	1	91	112	100	97	100	82
Food prep room	12	12	1	13	*	12	12	13	12
Multi-materials workshop (incl heat bay or CAD/CAM)	111	222	2	217	218	222	222	234	222
Multi-materials prep room	50	50	1	47	45	50	76	50	55
Electronics control technology	90	90	1	80	100	90	88	90	81
Constructional textiles	85	85	1	91	88	85	84	85	83
Graphics room	85	85	1	80	90	85	84	85	81
Design resource area	52	52	1	52	42	52	43	57	49
Storage practical	6	54	9	53	27	54	36	54	32
Staff work room (shared)	28	14	0.5	14	13	14	14	14	14
Office	8	8	1	8	*	8	8	14	8
Art									
Textiles art room	106	106	1	106	123	106	106	109	106
3D art room	106	106	1	113	120	106	105	103	106
Kiln room	4	4	1	4	*	4	8	7	4
General art room	90	90	1	92	84	90	89	92	83
Darkroom	12	12	1	7	*	12	9	12	10
Small group room	9	9	1	9	11	9	13	8	0
Storage practical	6	36	6	44	31	36	42	36	32
Staff work room (shared)	28	14	0.5	14	13	14	13	14	14
Office	8	8	1	7	*	8	8	8	8
Music and Drama									
Music recital	85	85	1	85	90	85	86	85	79
Music classroom	68	68	1	67	73	65	68	68	71
Music group/practice rooms	7	42	6	35	56	42	42	43	42
Music ensemble room	20	20	1	20	29	20	20	21	20
Recording/control room	12	12	1	12	29	12	12	15	12
Drama studio	90	90	1	90	108	90	89	92	91
Instrument store	10	10	1	10	*	10	10	10	6
Storage music/drama	6	18	3	17	*	18	12	17	19
Staff work room (shared)	28	14	0.5	14	*	14	14	14	10
Office	8	8	1	8	*	8	8	10	8

Secondary Exemplar Core Room Schedules Compared

	Schedule of accommodation required in core brief			Exemplar design areas					
	average area (m ²)	total brief area (m ²)	number of rooms	Mace (S1)	Wilkinson Eyre (S2)	dRMM (S3)	Alsop (Model 4: Site E) (S4)	Penoyre and Prasad (S5)	Feilden Clegg Bradley (secondary areas)
Physical Education									
Four-court sports hall	594	594	1	594	613	623	598	594	594
PE store	72	72	1	72	91	72	72	72	72
Activity studio	144	144	1	144	124	177	130	144	143
PE store	15	15	1	15	*	33	15	15	14
External store	10	10	1	10	*	10	10	10	8
Staff work room (shared)	28	14	0.5	14	*	14	17	14	13
Office	8	8	1	8	*	8	8	11	12
Pupil changing rooms and showers	78	156	2	145	124	156	154	156	134
PE staff or accessible shower/toilet	6	12	2	12	*	12	12	12	14
Central Resources									
Main hall	294	294	1	294	301	225	310	294	300
Chair store	21	21	1	21	23	28	24	20	*
Secure/exam/community stores	12	24	2	24	15	24	24	22	17
Library resource centre and careers	162	162	1	162	325	162	162	184	162
Sixth form study area	111	111	1	111	105	111	111	111	119
Small group room	9	9	1	9	7	9	9	9	9
Storage library	3	3	1	3	*	3	7	3	3
Central stock store	12	12	1	12	*	12	3	12	12
Librarian	12	12	1	12	*	12	16	12	12
Sixth form social	122	122	1	123	120	122	121	125	145
Head of Year office	8	8	1	8	*	8	8	8	9
Inclusion Support Suite									
SEN therapy/MI room	20	20	1	20	36	20	17	20	19
SEN case conference/tutorial	18	18	1	18	7	18	17	18	16
SENco/wheelchair/appliances	12	12	1	12	8	12	12	12	13
SENco office	8	8	1	8	7	8	6	8	9
Hygiene room	12	12	1	12	*	12	6	13	8
Administration and Catering									
Head's office	12	12	1	12	19	12	15	12	19
Meeting room	15	15	1	27	13	14	16	15	12
Senior management offices	8	24	3	24	58	24	41	24	24
Other offices	8	24	3	24	*	8	*	24	24
General office	56	56	1	56	249	56	56	56	74
Sick bay	6	6	1	6	7	6	6	6	22
Entrance/reception	12	12	1	12	*	12	14	12	14
Accessible toilet and shower (visitors)	12	12	1	13	58	12	9	12	13
Staff room (social)	69	69	1	69	*	69	72	69	126
Reprographics	34	34	1	34	*	34	38	34	42
Dining Area	288	288	1	289	184	288	289	288	288
Kitchen (incl staff and stores)	129	129	1	129	114	129	130	123	157
Other									
Caretaker's office	8	8	1	9	15	8	6	7	8
Maintenance store	13	13	1	15	*	13	*	14	12
Cleaners' stores	2	12	8	12	28	12	*	14	*
Lockers for personal storage		81	varies	50	90	*	55	92	81
Pupil toilets (incl. accessible cubicles)	3	176	varies	175	212	247	147	172	266
Staff toilets	4	46	varies	*	*	56	*	47	*
Circulation		1948	-	2125	1463	1712	1699	2103	1944
Plant		172	-	234	166	150	208	92	24
Partitions		318	-	447		191	362	387	272
Area Subtotals									
basic teaching halls		3900		3856	4246	3931	3936	3916	3888
learning resources		1032		1032	1038	1025	1038	1032	1037
storage		498		491	680	498	490	535	489
staff and administration		610		592	620	567	581	621	535
dining and social		514		532	473	497	521	528	620
		410		411	304	410	410	413	433
supplementary net area non-net		0		0	0	0	0	0	1181
		2987		3298	2142	2683	2735	3123	2838
net area		6963		6914	7361	6927	6976	7044	8154
gross area		9950		10211	9503	9609	9711	10167	10992
net area as a percentage of gross area		70%		68%	77%	72%	72%	69%	74%

207 is
abnormals

* included in other area

Primary Schools

Design Teams

2FE Primary School with 26 FTE Nursery	Revised Standards* Exemplar Design Brief June 2003	Walters and Cohen (P1)	Cottrell + Vermeulen (P2)	Marks Barfield (P3)	BDP (P4)	Sarah Wigglesworth (P5)
Area – Gross Floor Area	2250	2,249 99.96%	2,250 100.00%	2,285 101.56%	2,192 97.42%	2,244 99.73%
Cost/m ² at 4th QTR 2003	1205	1,205 100.00%	1,167 96.85%	1,134 94.07%	1,294 107.39%	1,199 99.50%
Net Building Cost	2,711,250	2,710,045	2,625,750	2,591,190	2,836,448	2,690,556
		Deviation -1,205	-85,500	-120,060	125,198	-20,694
		% Deviation 0	-3	-4	5	-1
Site Works/m ²	217	215	139	221	96	218
Building Cost	3,199,275	3,193,580	2,938,500	3,096,175	3,046,880	3,179,748
		Deviation -5,695	-260,775	-103,100	-152,395	-19,527
		% Deviation 0	-8	-3	-5	-1
Fees/m ²	213	213	195	203	209	213
Capital Cost Subtotal	3,679,166	3,672,617	3,377,250	3,560,030	3,505,008	3,657,720
		Deviation -6,549	-301,916	-119,136	-174,158	-21,446
		% Deviation 0	-8	-3	-5	-1
Loose Furniture and Equipment/m ²	156	156	170	77	172	176
Total Capital Cost	4,029,806	4,023,461	3,759,750	3,735,975	3,882,032	4,052,664
		Deviation -6,345	-270,056	-293,831	-147,774	22,858
		% Deviation 0	-7	-7	-4	1
Abnormals allowance for core design site locations	Site Specific	113	170	17	338	63
Total Capital Cost plus abnormals	4,029,806	4,277,598	4,142,250	3,774,820	4,622,928	4,194,036
		Deviation 247,792	112,444	-254,986	593,122	164,230

Secondary Schools

Design Teams

1150 pupil Secondary School (6FE + 250 sixth form)	Revised Standards* Exemplar Design Brief June 2003	Mace (S1)	Wilkinson Eyre (S2)	dRMM (S3)	Alsop (Model 4: Site E) (S4)	Penoyre and Prasad (S5)
Area – Gross Floor Area	9950	10,211 102.62%	9,503 95.51%	9,609 96.57%	9,711 97.60%	9,960 100.10%
Cost/m ² at 4th QTR 2003	1215	1,211 99.67%	1,187 97.70%	1,201 98.85%	1,234 101.56%	1,165 95.88%
Net Building Cost	12,089,250	12,365,521	11,280,061	11,540,409	11,983,374	11,603,400
		Deviation 276,271	-809,189	-548,841	-105,876	-485,850
		% Deviation 2	-7	-5	-1	-4
Site Works/m ²	158	84	169	180	124	153
Building Cost	13,660,853	13,223,245	12,886,068	13,270,029	13,187,538	13,127,280
		Deviation -437,608	-774,785	-390,824	-473,315	-533,573
		% Deviation -3	-6	-3	-3	-4
Fees/m ²	178	168	176	180	177	171
Capital Cost Subtotal	15,436,763	14,938,693	14,558,596	14,999,649	14,906,385	14,830,440
		Deviation -498,070	-878,167	-437,114	-530,378	-606,323
		% Deviation -3	-6	-3	-3	-4
Loose Furniture and Equipment/m ²	177	170	158	161	163	174
Total Capital Cost	17,197,913	16,674,563	16,060,070	16,546,698	16,489,278	16,563,480
		Deviation -523,350	-1,137,843	-651,215	-708,635	-634,433
		% Deviation -3	-7	-4	-4	-4
Abnormals allowance for core design site locations	Site Specific	0	247	141	53	169
Total Capital Cost plus abnormals	17,197,913	16,674,563	18,407,311	17,901,567	17,003,961	18,246,720
		Deviation -523,350	1,209,398	703,654	-193,952	1,048,807

All Through School

Design Team

2FE Primary School with 26 FTE Nursery and 1150 pupil Secondary School (6FE + 250 sixth form)	Revised Standards* Exemplar Design Brief June 2003	Feilden Clegg Bradley (A1)
Area – Gross Floor Area	12,200	13,112 107.48%
Cost/m ² at 4th QTR 2003	1215	1,145 94.24%
Net Building Cost	14,823,000	15,013,240
		Deviation 190,240
		% Deviation 1
Site Works/m ²	158	137
Building Cost	16,749,990	16,809,584
		Deviation 59,594
		% Deviation 0
Fees/m ²	178	167
Capital Cost Subtotal	18,927,489	18,999,288
		Deviation 71,799
		% Deviation 0
Loose Furniture and Equipment/m ²	173	146
Total Capital Cost	21,038,089	20,913,640
		Deviation -124,449
		% Deviation -1
Abnormals allowance for core design site locations	Site Specific	20
Total Capital Cost plus abnormals	21,038,089	21,175,880
		Deviation 137,791

Note:

* Some figures vary due to rounding

A limited number of copies of the design team reports have been published along with CD versions. Details of how these can be obtained are on the website www.teachernet.gov.uk/exemplars

cost comparison

Design Team Estimates

The costs provided by the design teams are based upon schemes which have been taken to RIBA (Royal Institute of British Architects) Stage C, Outline Proposals. The costs provided are therefore budget estimates, based on the teams' previous projects using generic components or material types.

In arriving at these estimates the teams have assumed a single lump sum contract. However, some other assumptions and exclusions have been made, and these are shown in the Design Team Reports.

The next stage of design development is the detailed stage, when site implications are further identified and components and material specifics decided upon, aiming to maintain the original concept as best as possible. During this detailed design stage, in order to keep the scheme within the original budget estimate clients will need to make decisions, some of which may be difficult, on the prioritisation of design issues and selection of materials.

In arriving at a location factor of 1 (as discussed later), the design teams had to adjust their cost figures to differing degrees. This adjustment is made to the whole scheme, rather than to individual components or materials. These individual items will in practice be affected to different extents, and in some cases alternatives may need to be considered.

Comparative Tables

The cost comparison tables opposite show how each of the design teams has balanced the Net Building Cost by varying the mix between cost per m² and Gross Floor Area.

The comparison tables showing the design team estimates are divided into a number of headings so that the build-up of each scheme's estimated costs can be compared to the DfES cost guidelines. To allow comparison, the design teams were provided with a base date of 4th Quarter 2003 and a location factor of 1, using the DfES location

factors for financial year 2003-2004. These location factors are based upon figures produced by the Building Cost Information Service (BCIS) and issued by the Royal Institution of Chartered Surveyors.

The Net Building Cost is the estimated cost for the building net of external influences considered to be beyond the designer's control, such as a restricted site or noise pollution.

Site works are areas outside the building envelope, such as access roads, car parking and landscaping. These are directly affected by the site area onto which the school is to be placed.

Fees are assumed to be 13% for secondary and all-through schools, in accordance with the DfES Practice Note Information on Costs and Performance Data (ref. DfES/0288/2003), and 15% for primary schools.

Loose furniture and equipment is the balance of £1800 per secondary pupil (see DfES Practice Note DfES/0288/2003) and £1000 per primary pupil. This has not been added to the fixed furniture and fittings allowance within the Net Building Cost (see Adjustments to Practice Note). The £1800 per pupil includes an allowance for start-up items, estimated at £400, but different LEAs will have different thresholds for start-up items and capital.

Abnormals are estimated costs of the impact on the scheme of external influences not allowed for within the Net Building Cost or within normal site works allowances.

Within the main reports for each of the schemes the design teams have included a list of 'delights'. These are items beyond the exemplar brief which the designers believe would further enhance their schemes if funding was available.

Adjustments to Practice Note DfES/0288/2003 (Secondary Schools)

The cost per m² referred to in the tables has been updated to reflect more recently published DTI PUBSEC indices, of which the

4th Quarter 2003 index is still indicative.

In response to issues which became apparent during the exemplar design process, a number of adjustments were made to the Net Building Cost that had previously been stated as excluded in the Practice Note and the Primary School benchmark.

ICT infrastructure cabling is now included within the Net Building Cost. However, ICT equipment is still excluded.

Within the Practice Note the allowance for fixed and loose furniture, fittings and equipment (excluding ICT) was indicated as £1800 per pupil, whilst the Primary School benchmark assumed £1000 per pupil. From this total an allowance was included within the Net Building Cost under a heading of fittings and furnishings, with a corresponding reduction in the loose furniture and equipment allowance to balance the figures. After discussion with design teams, the amount allowed within the Net Building Cost for fittings and furnishings was increased marginally.

An increase of 1% was made to the previous allowance for BB93 to reflect current ongoing research.

Where Area Impacts on Costs

Two of the design teams attempted to provide extra area within the allowable costs, but ended up exceeding the budget to some extent. Although many users of the designs may be prepared to pay this excess and reap the benefit of the additional area, there may be other supplementary areas, also requiring increased funding, that the extra area in these designs could not accommodate.

The central courtyard shown in Feilden Clegg Bradley's scheme could be reduced in size, and the cost of this 2% excess is currently identified as a 'delight'. The concept would still stand but this would still leave a 1% overspend on the Net Building Cost. Similarly, Mace's design has a 2% excess which will be difficult to design out.

acknowledgments to individuals

Our thanks to the many from the organisations listed on page two and others who supported the Exemplar Designs process. We would like to thank the following individuals who served in a range of capacities on a number of groups that helped progress the Exemplar Designs along the way.

The project progress was overseen by a Working Group that met five times through the programme and supported various areas of work during the procurement and contract stages:

Andy Beard ¹	Andrew Beard Architect Ltd
Andy Gates	DfES – ICT in Schools
Andy Thompson ¹	DfES – SBDU
Caroline Fraser ²	CABE – Enabling Directorate
David Johnson ³	Fair Oak High School (SHA)
David Welch ⁴	Lewisham County Council
Deryn Harvey ⁴	DfES – Innovations Unit
Esther Kurland	Greater London Authority
Hilary Cottam	Design Council
Mark Barry	Zurich Municipal
Martin Goss	Mtech
Martin Lipson	4ps
Max Galla	DfES – Schools Workforce Unit
Mike Thirkell ⁴	Ofsted
Mukund Patel ¹	DfES – SBDU
Paul Hyett	Ryders HKS – as RIBA President
Peter Stanton-Ife	DfES – BSF Director
Peter Wain	Becta
Richard Brown	Greater London Authority
Richard Ogden	Procurement Specialist Consultant
Richard Pietrasik	Becta
Robert Osborne ²	PfS
Sharon Wright ²	School Works
Shelagh Wright ²	Sorrell Foundation
Toby Salt ⁴	DfES – Innovations Unit

KEY

1. Also in Evaluation Panel, Forum, Primary and Secondary Focus Groups
2. Also in Evaluation Panel and Forum
3. Also in Evaluation Panel, Forum and Secondary Focus Groups
4. Also in Primary and Secondary Focus Groups
5. Also in Secondary Focus Group

The Evaluation Panel carried out short listing, final evaluation and selection for teams to enter into contract. In addition to those drawn from the Working Group, procurement advice was given by Neil Oxley of DfES – Procurement Advisor and Charles McSweeney of Cyril Sweet – Technical Advisor. A ‘Forum’ was created from this group, with the additions of Paul Hyett of RIBA and Russell Symes of SBDU, that reviewed progress at three interim and one final progress meeting, where the schemes were presented by the teams.

The Primary Focus Group, drawn from the Working Group and others, helped develop the brief. They also reviewed the designs and commented at completion of the project. Some of the headteachers also received the teams at their school for visits. Others who joined this group included:

Amanda Dennison	Millennium Primary School
Chris French ⁵	Essex County Council
Christine Smith	Walton Holymoorside Primary School
Claire Axten	Brookside Community Primary School
Frances McGregor	Kings Avenue Primary School
Jan Horne	Jubilee Primary School
Jane Nicholson	Head Teacher – St Chad’s Primary School
John Procter ⁵	Herts County Council
John Waldron ⁵	Architecture PLB
Peter Candlin ⁵	DfES – Education Advisor
Shirley Turner ⁵	Hants County Council
Stuart Hayter	Alfred Salter Primary School
Sue Roach	Victoria Dock Primary School
Sue Simcock	Bursar – St Chad’s Primary School
Valerie Bragg ⁵	RIBA – Client Forum
Vicky Morton	Temple Primary School

The Secondary Focus Group was joined by others including:

Alison Banks	Chafford Hundred Campus Schools
Angela Armytage	Yewlands School
Chris Tweedale	DfES – Schools Workforce Unit
Hugh Howe	Fir Vale School
Sir Iain Hall	Parrs Wood Technology College
Ian Johncock	Greenwich Council
Paul Kelly	Monkseaton Community High School
Peter Smith	Blyth Community College
Roger Conibear	Denbigh School
Dame Ruth Robins	Jews Free School
Steve Morrison	Kingsdale School
Wendy Parmley	Archbishop Michael Ramsey Technology College

