SCOTT BROWNRIGG

SHaW Futures Academy

Bromley, UK BR2 0TB

Design Research and Evaluation Report

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ABSTRACT

Delivered as part of the English Department for Education (DfE) schools programme, and Imagined as a landmark as part of the wider regeneration of the Bromley area, SHaW Futures Academy was designed to be a centre for Science, Health and Wellbeing educational excellence, offering 11- to 19-year-olds unrivalled access to skills and opportunities on their front doorstep.

Institution	Opened	Learners	Size
SHaW Futures Academy, Bromley, London Scott Brownrigg	Unbuilt (designed 2016-2017)	1150 students age 11-18	10 storey-9550 sqm GIA

SHaW Futures Academy was designed over a two year period from 2016-2017. Although currently unbuilt after planning permission was refused on appeal, it offers a useful example of how to resolve curriculum delivery and pupil management in a multi-storey school environment.

The methodology employed in the research included literature reviews, precedent studies, site visits, stakeholder consultation, drawing and other forms of visualisations.

Taylor's work has been disseminated through lectures and publications including the award winning RIBA book "Urban Schools: Designing for High Density" published in 2020 and co-edited with Dr Sharon Wright of The-Learning-Crowd.

SHaW Futures Academy

THE CONTEXT

Our cities are facing challenges in how they accommodate an increasing population. More school places are needed than ever before, but suitable land in required locations is in short supply and available funding is limited. Architects are facing challenges in determining how the city can continue to provide the best education and life experience for children when space is tight[1].

As high-rise schools are a relatively untested concept, educationalists and architects are having to work closely together to develop imaginative and visionary solutions that not only work as positive, flexible learning spaces, but also still create a sense of community within the school and a positive relationship with the surrounding urban fabric and the natural world.

When SHaW was designed, educating during a pandemic was not an anticipated scenario, and the terrible Grenfell fire had not taken place. It remains to be seen whether concerns about safety, health and hygiene will impact the design of schools in the long term and whether they will be a barrier to future multi-storey schools. If they are to be delivered, policymakers and funders need to understand where the system needs to change to successfully and sustainably accommodate this sort of innovative design solution.

Building up has long been the solution to providing schools in densely populated areas. The hundreds of London Board Schools[2] built at the end of the 19th century, many of which still operate, are examples. Seen through the fictional gaze of Sherlock Holmes, these were signals of a bright and better future:

> **"Look at those big, isolated clumps of building rising up above the slates, like brick islands in a lead-colored sea.**
>
> **The board-schools.**
>
> **Light-houses, my boy! Beacons of the future! Capsules with hundreds of bright little seeds in each, out of which will spring the wise, better England of the future...[3]**

What do we mean by "high-rise" schools? Four or five storeys is no longer unusual, so we are referring here to six storeys and above. A height of 18m, roughly six storeys, is historically linked with the reach capability of fire and rescue service equipment such as wheeled escape ladders. What we think of as high-rise in a school is dwarfed by the tall, super-tall and mega-tall structures emerging around the world. The tallest building currently recognised is the Burj Khalifa in UAE with 163 storeys, while the tallest education building is the Mode Gakuen Cocoon Tower, a university building in Tokyo, each of whose 50 floors contains rectangular classrooms with a student lounge on every third floor.[4] With residential apartments now located 85 storeys above ground in New York, and predictions of more pandemics, maybe all buildings above 30 storeys high should integrate educational provision? Or will anybody be building tall anymore?

KEY DESIGN ISSUES

The design drivers and vision for the SHaW Futures Academy accommodation were both aspirational and pragmatic:

- A tool for learning and excitement in daily school life
- Laboratory and specialist spaces on show and dispersed
- Flexibility to adapt the curriculum linked with industry
- Shared spaces at the heart
- An ‘active front’ to interact and integrate with the surroundings and encourage community use
- Creation of ‘learning neighbourhoods’
- Inclusive design throughout in terms of access, facilities and safe emergency evacuation

The site constraints demanded a pioneering, creative multi-storey solution folded into a pragmatic, compliant volume. At a strategic level, there is a close interrelationship between building design, operation, staffing, pupil numbers and group sizes. But detail also really matters. Children need an environment that is engaging and experiences that will spark their imaginations. The design response necessitated extensive research and design innovation in order to meet UK Government school standards.

RESEARCH QUESTIONS

- **How could flexibility and adaptability be incorporated for future changing space needs?**
- **How could concerns about safeguarding and safety not overwhelm the opportunity to innovate?**
- **How do you design a shared internal space that meets both school and community needs?**
- **How do you create a heart, a sense of community and aspiration across vertical levels?**
- **How do you create an appropriate architectural expression that meets civic and school expectations and available capital and operational funding?**

DfE school capital funding is based on a standardised approach to allowances for different types of space, and the funding and area schedule for the school had been set before the start of the design process through the development of a “control option” that illustrated the feasibility of fitting a school of the required size on the site. This control option had been based on significantly fewer pupil numbers. As the design developed it became apparent that a tall school requires a significantly greater proportion and area of circulation than a typical three- or four-storey school, so the provision of adequate teaching space without exceeding the total funded area was a critical challenge.

SHaW Futures Academy from the east: visualisation by Munro Studios courtesy of Wates Construction

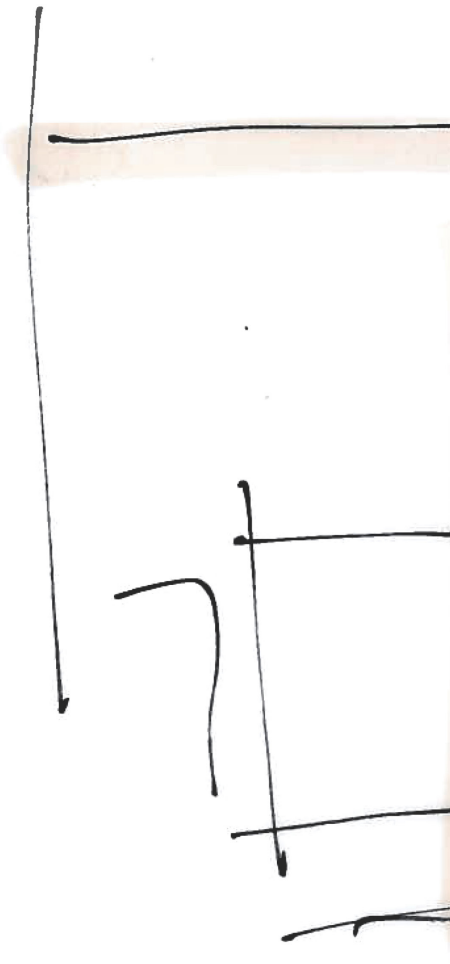
THE PRE-PROJECT KNOWLEDGE BASE

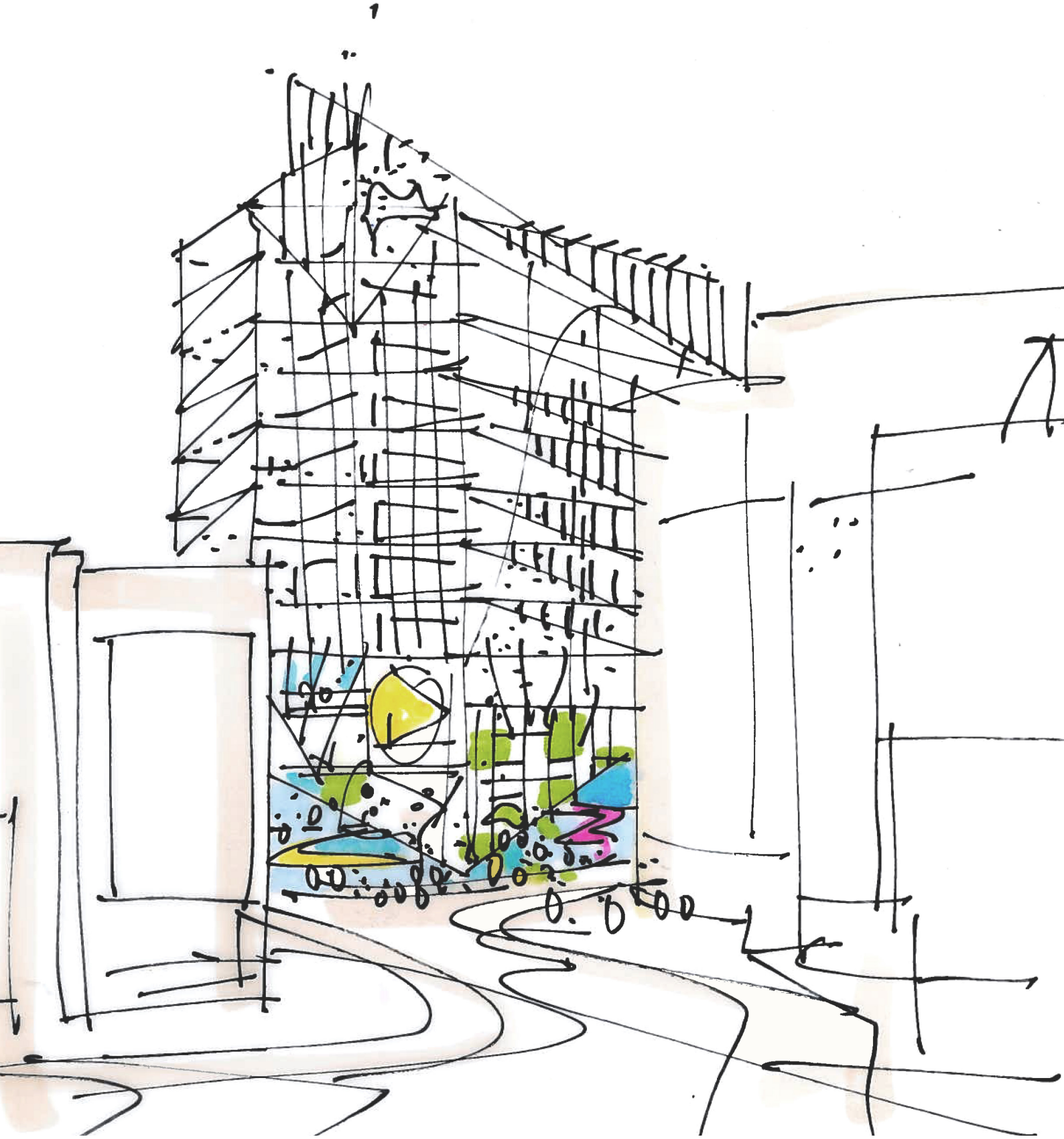
Scott Brownrigg work globally on projects for learners of all ages, encompassing a wide variety of providers, institutions, educational models, curricula and special needs. Practice expertise spans estate strategy development, campus masterplanning, urban design, new build development, re-use, adaptation and conservation of existing buildings.

Scott Brownrigg's portfolio includes over 100 projects for nurseries, kindergarten, junior and senior schools, colleges and universities. Taylor's individual experience has encompassed projects for more than 30 schools in the last 20 years. Taylor has contributed to all recent UK Government education building initiatives including the Priority Schools Building Programme, the Building Schools for the Future Programme, and the Free School programme including University Technical Colleges. Design experience has included a wide range of educational spaces including general learning and teaching accommodation, special needs accommodation, practical workshops and laboratories, facilities for the arts and sports, along with staff and student accommodation.

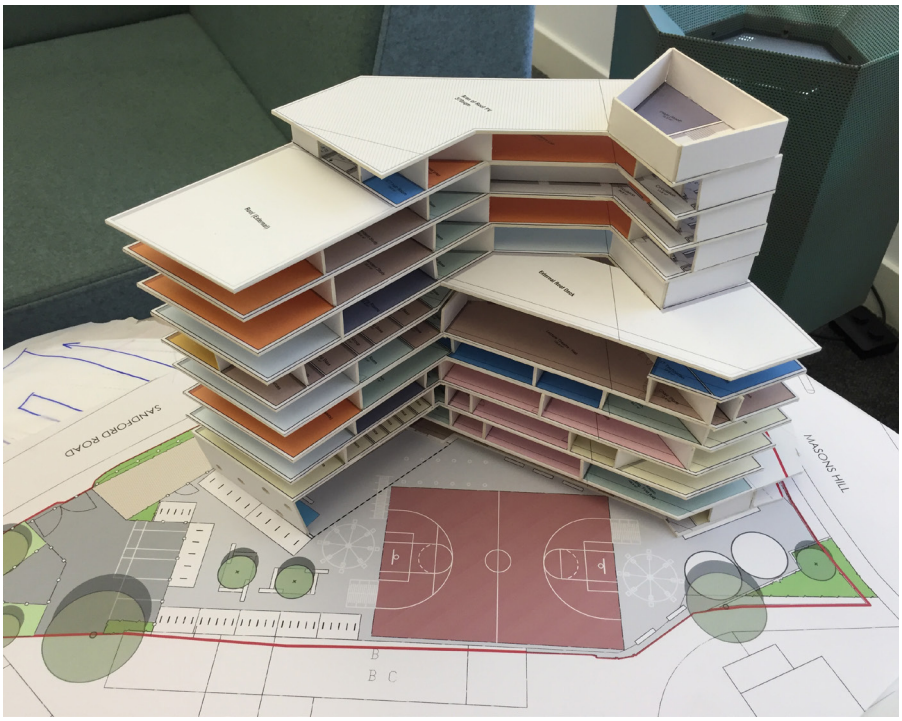
Alongside the recent RIBA publication *Urban Schools – Designing for High Density*[5], Taylor's work has led to the publication of collaborative open-source reports on child friendly cities[6], and how schools might be designed for health and wellbeing[7]. Taylor has also contributed a chapter on post-covid school design to a new RIBA book "ReThink 2025" due to be published in January 2021.

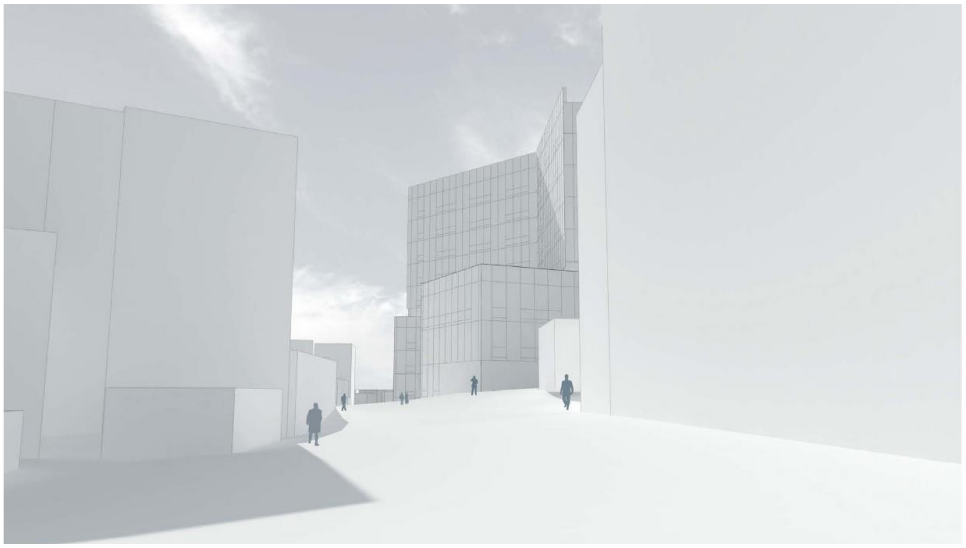
"Effective places of learning must be aspirational and engaging. Engagement begins during the design process with all project stakeholders.

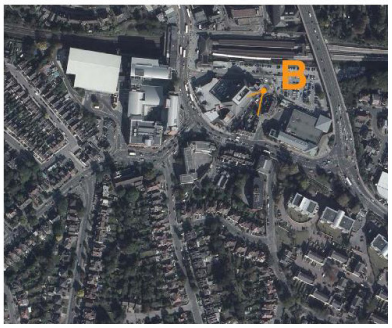




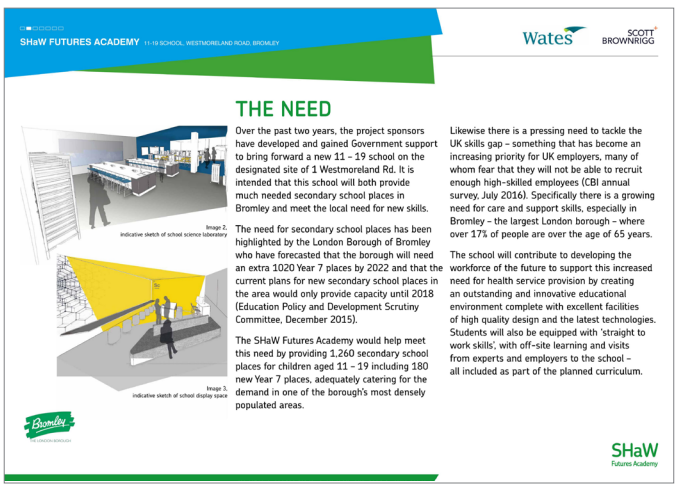
Scott Brownrigg, SHaW Futures Academy, Bromley – Concept sketch street view

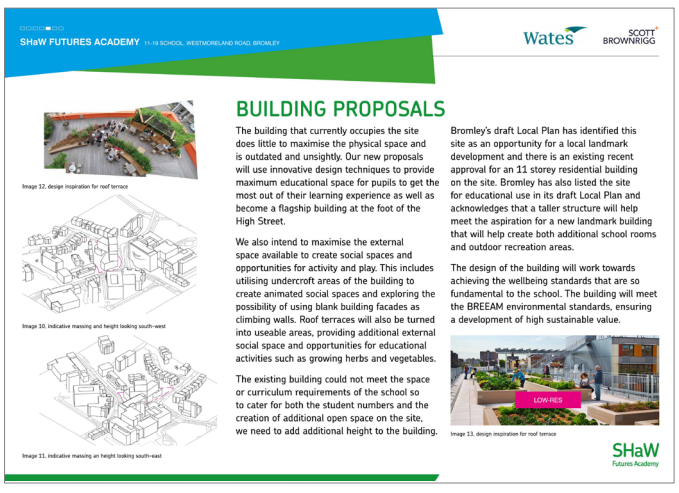






SHaW Futures Academy, Bromley – client engagement meeting material





SHaW Futures Academy, Bromley – public exhibition boards

METHODOLOGY

The methodology employed in the research included literature reviews, precedent studies, site visits, stakeholder consultation, drawing and other forms of visualisations.

The design and research process commenced in June 2016 with investigations of a "control option" produced by a client-side architect to demonstrate what would fit on the site in order to generate a funding model. This was followed by an analysis of the brief- both the area, space and operational requirements and the aspirations. Seven in-depth half day client engagement meetings were held prior to the planning submission of the proposed design. These engagement meetings were attended by the design team, contractors, and a number of client representatives and educational specialists who were presented with research information and interrogated the design proposals as they developed. Sketches, physical models, diagrams and 3D modelling were vital to explore and illustrate the research questions particularly in terms of how to deliver flexibility, adaptability, safety, safeguarding, sense of community and aspiration, and meeting the capital and operational budget. Options were presented and examined at the outset and narrowed down through discussion at the engagement meetings and viability investigations between meetings including meeting buildability, cost and technical specification requirements.

A public exhibition was held in September 2016 both on site and online to gather feedback and comments from local people. This was particular important to investigate how the building could meet community needs and whether the architectural expression met civic expectations. Images gathered from research were important to help exhibition visitors and other stakeholders visualise what the spaces might look and feel like, as well as how they might work.

There were very few built precedents of "tall" schools (above 6 storeys) available for research during the design period, and those available were all outside the UK. This was frustrating to the client team who hoped to gather experience from a peer client already operating a similar school. This lack of precedent required innovative, collaborative thinking by the design team, along with detailed exploration of timetabling and curriculum options from the client, to generate a suitable design solution. There was no funding or time available for site visits, other than to the project site itself, so, outside the stakeholder engagement meetings, investigation relied on desktop web-based research and interviews. Comparing precedents of tall schools around the world is challenging. The majority of city centre multi-storey schools are operated privately, with funding and organisation varying between each.

Two particular relevant precedents were identified and explored in detail:

WILLIAM JONES COLLEGE PREPARATORY HIGH SCHOOL, CHICAGO

OCCUPIED 2013
PUPILS- NUMBERS 1200
8 STOREYS

Research based on information provided by Perkins + Will Architects including a telephone interview with design lead Bryan Schnabel in Chicago. William Jones had been open for a few years so there was evidence of how the design assumptions had worked in practice.

Whilst not an unusually tall building in its urban context, William Jones College is still an unusual school for Chicago. The design solution, based on a "standardised" typically low level template design, illustrated the value of a strong relationship between the client and the architect and the importance of education design experience in creating a successful, innovative design solution.

The design manages a balance between delivering the curriculum and space requirements and accommodating structural drivers and constraints inherent in a multi-storey structure. Classrooms are placed in the middle storeys with shared resources above and below that minimise day to day circulation and create a horizontal span that ties everything together. Access to private outside space is not possible at ground level but instead provided at numerous levels above ground.

Visual and physical connections to the city are embedded- including access to a park and playing field and the world class cultural institutions of the Chicago museum campus nearby. In return, the school offers civic amenities. It also has a civic presence with extensive transparency that supports a sense of safety inside and out and a strong relationship to the city. A threshold space within the building is vital, providing a transition between the city and school, and reinforcing a sense of place

Students walk up and down all 7 storeys, not typically using lifts, so the teaching schedule had to be adjusted to accommodate extended travel time between spaces.

ARTHUR PHILLIP HIGH SCHOOL (APHS) PARRAMATTA, SYDNEY, AUSTRALIA

OCCUPIED 2019
PUPILS- NUMBERS 2000
14 STOREY- 28,000 SQM

Research based on information provided by Grimshaw Architects, architectural publications, and an interview with Darren Atkinson of Workspacelogic who was part of the design team. APHS was still in the design phase at the time so the design solution was still emerging but offered a useful comparison to the

Rising to 14 storeys, APHS8 was the closest comparable design solution researched during the design development of SHaW Futures Academy. A new state school in a developing suburb of Sydney- the multi storey accommodation is divided into six double height "home bases" each accommodating 330 students across all age groups, and interspersed by floors of specialist accommodation. This approach is intended to reduce pupil movement but also supports pedagogical innovation9 through a "schools within schools" model in combination with an adjacent new primary school and kindergarten.

The building has very simple, flexible floor plates and pushed the large number of lifts to the edge of the plan to maintain the transparency and flexibility across each floor plate.

The high rise approach was driven by a desire to secure and protect space at ground level for sport and play as well as to maximise student numbers.

Precedent studies also included a review of other similar projects designed by Taylor and her colleagues at Scott Brownrigg. These provided a knowledge base from designing or working with multi-storey education buildings on tight urban sites including:

Institution	Opened	Learners	Size
Harris Invictus Academy, Croydon, London Scott Brownrigg	2018	1150 students age 11-18	4 storey- 9250 sqm
Mulberry University Technical College (UTC) in Tower Hamlets, London Scott Brownrigg	2017	600 students age 14-19	6 storey- 6400 sqm
London Design Engineering (LDE) UTC in Newham, London Scott Brownrigg	2017	600 students and 150 apprentices age 14-19	6 storey- 5406 sqm
Heathrow UTC, London Bam Design	2015	Pupils- 600 students age 14-19	3 storey- 4600 sqm
Crest Girls and Boys Academies, Brent Capita	2015	900 place girls academy, 750 place boys academy and 400 place joint post 16	4 storey above ground and 2 storeys below housing sports
Argyle Primary School, London WC1- rooftop extension Curl la Tourelle Head Architects	Original school 1880 Extension 2002	350 age 3-11	4 storeys plus mezzanines

These examples demonstrated how a school building can balance the vibrancy needs of a city street with the safeguarding and privacy needs of a secondary school. It also demonstrated the importance of integrating educational and community needs to generate support, overcome barriers in the process, and provide a sustainable facility that can meet a whole range of needs and aspirations.

A building that potentially dwarfs its neighbours can be manipulated to break down its mass and offer a positive addition to the public realm at street level. They also evidenced the importance of a vertical heart space, connecting the multiple storeys, as an alternative to the ground level heart space that many schools benefit from. The technical challenges of providing large, highly serviced, high occupancy spaces in a multi-storey environment can be resolved successfully.

Urban Schools, even if not located in a high density environment, can have the feel of a public building by sitting within a truly public space while maintaining a safe and exciting environment for young people. They also demonstrated how valuable rooftop outside space is- both for social and educational uses and to create a strong visual connection to the city context.

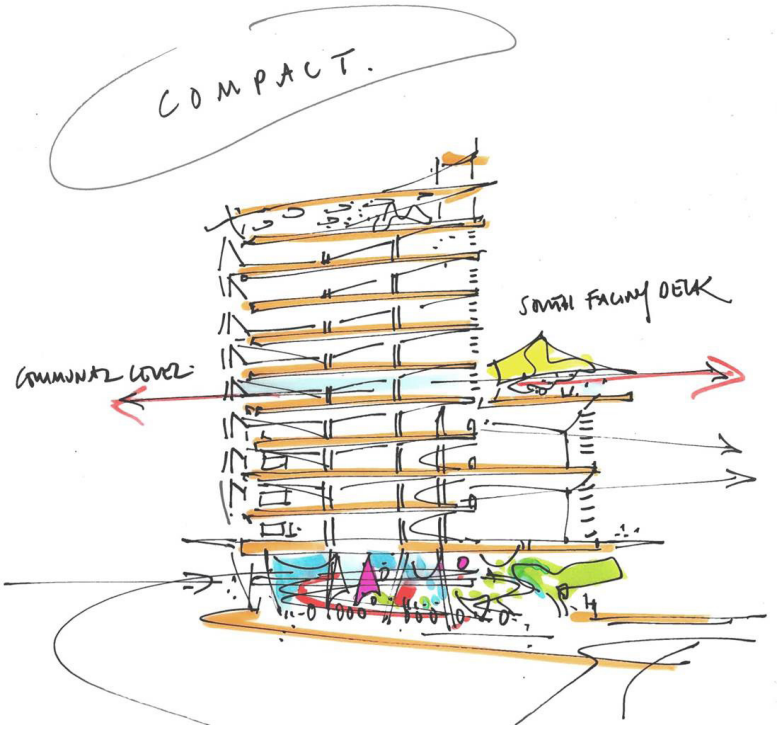
Balancing the employer aspirations with the usual pupil management, safeguarding and timetabling issues of a secondary school requires close stakeholder consultation and commitment from the education client to operate differently from a “typical” secondary school. In addition, a steeply sloping site provides a challenge but also an important opportunity- the main entrance can arrive above the lowest floor, reducing vertical pupil movement but also allowing a fantastic view from the entrance into a central vertical heart space, looking both up and down, that celebrates the specialism and connects all floors of the building.

These design precedents also evidenced solutions for dealing with pupil movement and suitable access to communal facilities such as toilets, and the importance of addressing the additional pressure on both horizontal and vertical circulation, in a multi storey environment. They provided useful experience of the technical challenges of building habitable accommodation below ground- in terms of meeting the required standards and providing safe access and egress for large numbers of pupils.

Even small projects provided valuable insight into the challenges of creating inclusive access in a multi-storey school environment. The value of outdoor roofspace is strengthened and improved by adjacent, connected indoor space. Schools struggle with the management of “isolated” rooftop play spaces due to the practicalities of managing pupil movement and supervision. A rooftop play space with an adjacent occupied space is significantly more useable.

SHAW FUTURES: BUILDING DESCRIPTION

Apart from the limited site area, potential solutions were significantly constrained by site conditions, many of which were invisible: an unbridgeable culvert under the site; local height, massing and building line restrictions; protected views; and the site's position at the junction between high-rise commercial and low-rise suburban residential development. With no similar UK precedents in operation to assess during the design process in 2016, the client team carried out detailed timetabling exercises to ensure efficiency and flexibility in the circulation and accommodation and allow for any unanticipated future needs of the school.



SHaW Futures Academy, Bromley – Concept sketch section

The lower floors plans encompass a relatively deep-plan 'podium' (four storeys from lower and upper ground to Level 2) accommodating larger-volume spaces such as the main hall and activity studio, or fully enclosed spaces such as changing rooms and stores. Teaching spaces were kept to the perimeter for daylight and views, while internal rooms are limited to circulation, some staff bases and small group rooms where staff and students would spend less lengthy periods. The upper block (six storeys from Levels 3 to 8) is more "rational", with a narrower orthogonal floorplate designed to permit direct access to daylight throughout a space that allowed more flexible, adaptable layouts. A central void in the slab for an accommodation stair brought borrowed light deep into the heart of the plan. Corridors were avoided, and all circulation and social spaces benefited from natural daylight and views.

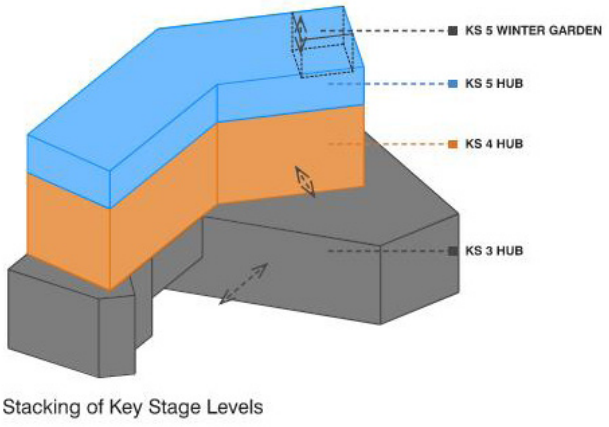
The use of a concrete frame structure with flat slabs and minimal load-bearing partitions allowed for potential internal re-planning. A variety of room sizes and shapes was provided on every floor to encourage alternative classroom layouts and a natural diversity of teaching spaces. To meet timetabling requirements, the specialist spaces required diverse curriculum usage which in turn generated a more standardised Furniture, Fittings and Equipment (FFE) installation that could be used in different ways. This approach also allowed for the curriculum to develop, and for the timetabling of facilities to start on the lower floors and expand up the building as the school population grew over time.

To minimise excessive travel distances during the school day the vertical layout effectively created three stacked schools (one for each Key Stage), each with its own dining and social space, learning resource centre, and external space.

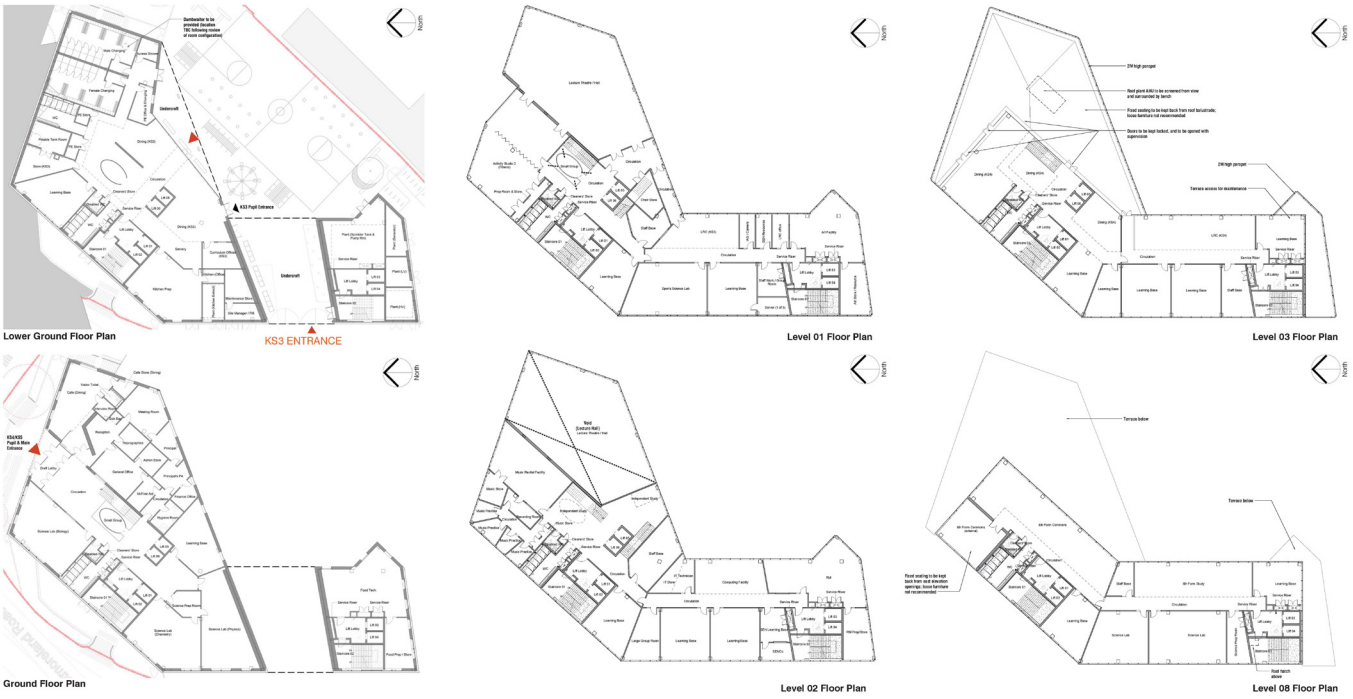
Key Stage 3 students (Years 7 and 8 – ages 11 to 13) arrive at the Lower Ground Floor, under the 'bridge' into the external play area, where their dining area creates a social space. They take the stairs to their Learning Bases on the Upper Ground Floor, Level 1 and Level 2 where a series of general classrooms, Science Labs, Music, Activity Studio, Food and Resistant Material spaces allow for the delivery of a broad and balanced curriculum. A Sports Science Lab and Computing Base ensure the younger students can also experience the high-quality specialist spaces on offer in the school and see older students learning on a daily basis.

Key Stage 4 students (Years 9, 10 and 11 – ages 13 to 16) arrive by the main entrance at the Upper Ground Floor and take the central stairs or lifts to their Hub at Level 3. Levels 4, 5, 6 and 7 contain a range of specialist and general teaching spaces to deliver the three learning pathways on offer. These pupils share some of these spaces with students aged over 16, allowing collaboration across the phases and for older students to act as role models. Flexible areas for skills development and independent study, as well as the highly specialist spaces for Health, Biomedical and Sports, Computing and Electronics, allow for practice-based education for all learners to develop problem-solving abilities and communication skills.

Key Stage 5 students (Years 12 and 13 – ages 16 to 19) also arrive via the Upper Ground Floor entrance and take the north core lifts to their social space at Level 8. In the Sixth Form, highly specialist pathways will be established with employers focused on Science, Health and Wellbeing.



SHaW Futures Academy, Bromley – Diagrammatic arrangement

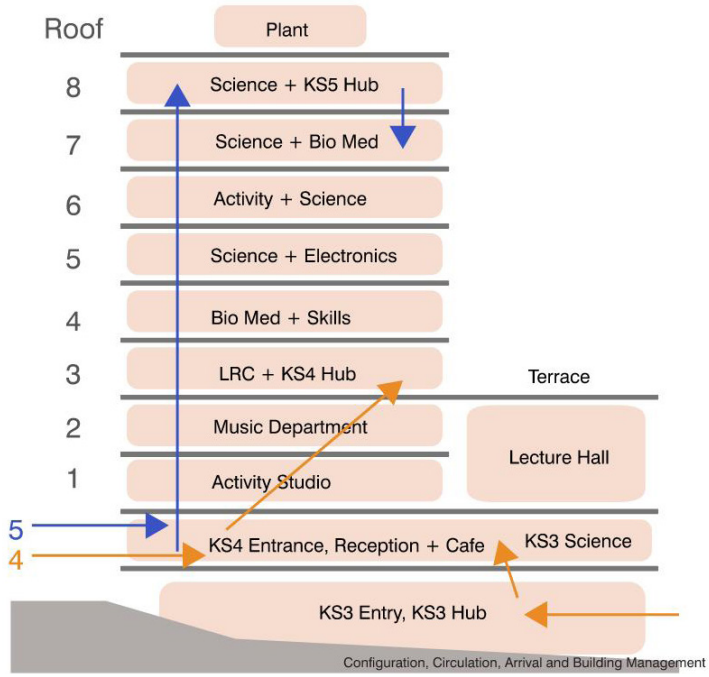


SHaW Futures Academy, Bromley – Upper ground main entrance level + podium floor plans

These Key Stage Learning Bases create a sense of identity, community and progression as students move through the school. They also allow for each curriculum area to have a core cluster of learning spaces within the building, enabling them to form a clear identity, showcase career opportunities, display student work and allow staff to share practice.

Circulation was designed to provide comfortable vertical and horizontal flow, but also opportunities for informal group work and connectivity. In order that students felt safe and secure at all times, staff spaces were placed for maximum passive supervision and pupil- and staff-accessible toilets were evenly distributed on every floor for ease of access.

Key spaces such as the main entrances from the high street and through the bridge, the café at the entrance, the main hall and science labs would be on show, ensuring the school would be visibly at the heart of the neighbourhood – a beacon of learning.



SHaW Futures Academy, Bromley – Stacked Key Stage hubs

SHaW Futures Academy, Bromley – facilities on show to the street


FUTURES

DESIGN AND OPERATIONAL LESSONS LEARNT FOR NEW-BUILD MULTISTOREY SCHOOLS

Every single school is different, but in cities there is an even greater need for a site-specific approach from the outset. This starts from the need for an extended team of specialists and extensive site investigations. Stakeholder engagement is vital where the requirements and drivers of a local development authority, the school, the funder and of course the neighbours may be in conflict.

Many inner-city schools are located where air pollution exceeds the legal limit of nitrogen dioxide, primarily due to vehicle traffic. The noise and vibration from traffic, and also from rail or aircraft, also has an impact. A mechanically ventilated building may be the obvious choice[10], but entails both additional capital cost and running cost for the school. It also limits occupant control. There is evidence that air quality and temperature control within sealed environments is no better than outside (and is sometimes worse)[11]. Noise generated by activities and service installations on the school itself must also be managed. This can drive design strategies that add cost to the project and constrain use of the facilities.[12]

Although one of the great benefits of a city-centre school is access to public transport, the issue of traffic also generates significant discussion. The age and number of pupils, plus local cultural norms, make an enormous difference to how this challenge is dealt with in cities around the world. Even in a car-free development there is likely to be some ongoing vehicle access depending on the age range and mobility of pupils, as well as for servicing needs and for transporting pupils to off-site sports facilities or school trips. Red routes, bus routes, parking restrictions, one-way access, pavements, pedestrian crossings, barriers and road markings all become part of the school's area of concern.

SHaW Futures Academy, Bromley – High street view visualisation


BROMLEY
High Street
Westmoreland Road
Masons Hill
Police Station
WT15 GUX

SHaW Futures Academy, Bromley – Site section

Schools can struggle to access adequate resources to operate and maintain elements such as rooftop plant or play terraces. This influences roof access, maintenance, perimeter protection and both interior and exterior cleaning strategies. The funder and operator may not be involved in the building at the same time. Schools may have to take on the operation of buildings they had little say in designing.

The balance between an urban street frontage that engages with its surroundings, typically glazed to provide transparency and passive supervision, and the safeguarding and privacy of pupils, requires consideration. Additional space may be required internally to replace the usual safe 'buffer zone' of a playground. The population of a school is not always able to move fast or unaided, and inclusive access and escape need to be fully considered so all pupils can access the entire curriculum. Fire safety, means of escape, refuges, compartmentation, sprinklers, evacuation strategies, muster points and firefighting access may drive the design solution and must remain key drivers from inception to completion and into operation.

Schools may have to rethink timetables, providing longer lessons with less movement or having teachers move instead of students- something that is being seen as a solution to education continuity during the current covid pandemic. More storeys increases travel time and requires greater allocation of 'non-net' areas such as circulation, toilets and plant rooms or risers. There is a danger that the smaller the footprint, the greater the percentage of each floorplate given over to these non-net areas, making it difficult to organise the learning accommodation in an effective way. The usage, number and type of lifts may be a challenging subject but the brief for stairs should be simple: they are vertical corridors, important spaces used for a large proportion of the day that need to be part of the learning environment and that offer a great opportunity to orientate and regularly connect pupils with their city surroundings through natural light and views.

Certain ‘natural’ adjacencies may not be possible with restricted floorplates. This impacts the extent of space required for services, storage and support. For example, if laboratories are on different floors, it may require an additional Science Prep room with a secure holding area allowing science technicians to safely transport and store chemicals and equipment between lessons. Deliveries, kitchens and dining provision have the same challenge. Core support provision such as staff bases and accessible toilets need to be replicated on every floor, and access to the outside becomes something needed on more than just the street level. All these challenges require duplicated or additional spaces.

Competition for the ground floor, fierce in every school, is compounded where space is tight. In multi-storey urban schools, competition for the roof space is similarly fierce: a battle between plant space and external teaching or social space, hard usable surfaces and green roofs. Priorities need to be established and maintained to ensure that the learning environment takes priority, particularly where ground-level space may be taken up with provisions that cannot be designed out – for example a new substation, fire vehicle access, or underground infrastructure protections.

The potential form, materials and construction method are restricted in a tight site. Tight urban sites may lend themselves to increased modular or off-site modern methods of construction, although modules still need to fit through urban streets to be installed. Partial possession to meet curriculum dates and contractor’s site accommodation are all challenged by space restrictions.

Schools have to stretch the usual resources to manage unusual facilities. The curriculum needs of schools change over time, but the constraints of multi-storey buildings can force a change in ways of working and expectations of behaviour. The desire for functional adjacencies to manage timetabling may be at odds with a layout that supports the building’s energy efficiency or technical performance.

EVALUATION

The unusual site gave us the opportunity to innovate with a non-traditional learning environment that was more reflective of a work place or office environment and fit with the vocational and work related aspirations of our students. After working through the designs with our architects we became more convinced that the practical flow, space and utilisation constraints and concerns were easily overcome with innovative design features that have created an education space more akin to an adult working environment and this really fits with the ethos of the school.

– Sam Parrett OBE, Group Principal & CEO, London and South East Education Group

Although the design proposal was recommended for approval, supported by the Commission for Architecture and the Built Environment (CABE), the proposal was turned down at planning appeal. While the site was allocated for a tall building and educational use in the local plan, there was neighbourhood concern about pupil management, safety and means of escape, in a climate of concern particularly heightened by the recent Grenfell Tower fire. Delivering a locally acceptable building form that managed the necessary transition from a ten-storey structure to the neighbouring two-storey residential buildings required more flexibility in the procurement process and design parameters than the team had available.

A hint at the perception of the project was contained in an article in the local newspaper, which noted of the proposed school:

'It would have been slightly shorter than the great pyramid at Giza and the Washington Monument.'[13]

What was clear from the outset of the development of SHaW's innovative design, and is evident in the other case studies, is the importance of the commitment of the school trust to flexing the education delivery to meet the parameters of the building. Architecturally, these schools also share the same clear priorities for success:

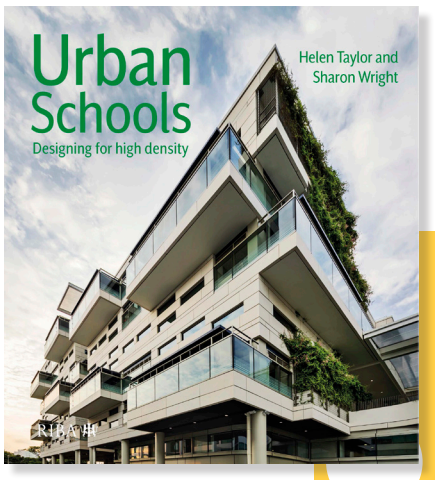
- Generous, attractive and safe horizontal and vertical circulation and arrival space
- Transparency and good passive supervision
- A building frontage on the street with a pedestrian-friendly public realm, and gathering spaces to encourage social interaction
- Optimised opportunities for outside space within the site and building, both on and above ground, and visual links to the city around them
- Secure and guaranteed access arrangements for shared community and sports facilities
- A strong architectural identity making a positive contribution to its urban context

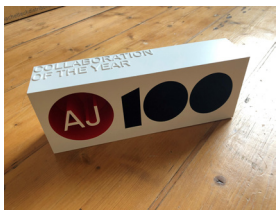
Any school regardless of shape and size would benefit from these principles.

DISSEMINATION

The project was disseminated in a wide range of ways including:

- October 2017 “School = Community + Commerce” article in iA – Scott Brownrigg’s research publication
- January 2018 “High Density Schools- a new typology of schools in the city” article on Scott Brownrigg website
- March 2018 “The city as education- Learning from schools” presentation to University of Cambridge Learning seminar
- May 2018 “Reach for the skies with stacked city schooling” Education Building Journal article
- October 2018 “High Density Schools” presentation to Education Estates conference
- March 2019 “Designing the next generation of school buildings” presentation to Westminster Education Forum
- May 2019 Poster Presentation on “Urban Schools: Designing for High Density- Child in the City conference Antwerp
- June 2019 “High Density Schools” for RIBA Products in Practice (PIP) Seminar
- July 2019 “Urban Schools: Designing for High Density” Education Design + Build magazine article
- October 2019 “High Density Schools” presentation to Education Estates conference
- October 2019 “High Density Schools” presentation to Education Building Forum
- November 2019 “Urban Schools” webinar by Scott Brownrigg
- January 2020 “Urban Schools: Designing for High Density” book by Helen Taylor and Sharon Wright published by RIBA Publishing. Awarded AJ Collaboration of the Year Award 2020.





KEY QUALITY INDICATORS

These new multi-storey schools, such as SHaW Futures Academy, may have been designed to respond to physical and economic constraints, and local need, but they also offer a fantastic opportunity to integrate education into the heart of a city and to implement and progress new ways of learning. While the principle of creating sustainable cities with a social infrastructure that accommodates children and families is becoming an accepted requirement worldwide, there is still resistance to educating children in multi-storey environments.

High-rise schools need to be developed in the context of an integrated policy approach to a child-friendly urban infrastructure that ensures access to suitable housing, parks and the natural world- particularly evident during the current pandemic. Funding and procurement that accommodate a non-standard approach and elements like wide stairs and roof terraces must be considered from the outset, while a more holistic approach could address common local community concerns.

The school becomes a part of the city, and the relationship between the school and the public realm is a key element of success. The typical external envelope, material finishes, fenestration and transparency needs to adjust – sometimes radically – to the needs of the city surroundings. These are not just design and construction challenges, but operational and maintenance challenges (and costs) to be borne for the life of the school. In a time when children's health and wellbeing is a cause for concern throughout the world, meeting these technical challenges is vital to create positive, healthy, integrated spaces for education in the city.

Accommodating children in spaces visible to the street or above ground demands particular attention. Play, circulation and safe escape are the common concerns. The typical conversation about the quality of the internal space for education can become lost when focus shifts to the practical functionality and architectural form.

A city-centre multi-storey school should not be a poor choice for children. William Jones College in Chicago consistently ranks among the top high schools in the city, state and country, based on multiple measures of student success. With a history stretching back 150 years, the school and its facilities have evolved over time to meet changing educational needs.
The school is both for the city and of the city.

PROJECT DATA

Project web page	https://www.scottbrownrigg.com/work/projects/shaw-futures-academy/
Project number	16696
Project Sector	Education
Project Value	Undisclosed
Building Size	9741sqm GIA , site area 3385sqm
Storeys/ height	10 storeys
Client	Wates Construction/Department for Education
Project start date	July 2016- planning appeal dismissed February 2019
Construction start date	N/A
Occupancy date	N/A- originally due to open September 2019
Procurement Route	DfE Contractors Framework
Services	Architecture
Site Features	Bromley regeneration area site designated for landmark building at bottom of high street, edge of residential area, brownfield site, underground culvert, protected views, sloping tight site
Building Features	First “high-rise” secondary school in UK- science, health and wellbeing specialisms Dual entrance at two levels- street frontage “public” entrance Concrete flat slab frame Podium and tower Roof terraces Exposed concrete soffits and night cooling to reduce temp swings
Environmental Data [14] (Design Stage)	Annual CO2 emissions 15.4kg/m^2 On-site energy generation 1.9kW peak PV system 140m2 roof mounted solar PV panels Air source heat pumps powering cooling and heating to rooms with high heat gain, internal spaces. AHUs serving specialist areas. Cooling via VRF system. Airtightness at 50pa 5m^3/h.m^2 Overall u-value Average 0.49W/m^2k Energy consumption by end use 56 kWh/ m^2 Design life sanitary + catering 20 years, 60-year structure + substructure, services to CIBSE Guide M (appendix 13)
Certification/ standards	BREEAM (new construction 2014) target Very Good- potential Excellent [15]
Design Team	Structural Engineers: Aecom Service Engineers: CSD (Leeds) Landscape: Ares (Sheffield) Cost consultant: Wates Construction Main contractor: Wates Construction FFE consultant: Space Zero Technical Advisor: Mott McDonald Fire Consultant: Trenton Fire BREEAM Assessor: Method Consulting Educationalist: The-Learning-Crowd

REFERENCES

1. https://www.citiesforplay.com/

2. http://www.victorianweb.org/art/architecture/robson/index.html

3. A.C. Doyle, 'The Adventure of the Naval Treaty' in The Memoirs of Sherlock Holmes, London, Harmondsworth, 1950 (1893), p 215.

4. 'The Tallest Academic Buildings in the World', https://www.worldatlas.com/articles/the-tallest-educational-buildings-in-the-world.html, (accessed 16 June 2019).

5. https://www.scottbrownrigg.com/company/news/urban-schools-and-how-to-design-for-high-density/

6. https://www.scottbrownrigg.com/company/news/ia-intelligent-architecture-issue-9/

7. https://www.scottbrownrigg.com/company/news/report-what-if-schools-were-designed-for-wellbeing/

8. https://architectureau.com/articles/grimshaw-bvn-design-nsws-first-high-rise-public-school/

9. https://www.dezeen.com/2016/02/03/grimshaw-architects-high-rise-school-complex-parramatta-sydney-australia/

10. D. Mumovic et al., 'Indoor Air Quality in London's Schools', Greater London Authority, May 2018, https://www.london.gov.uk/sites/default/files/gla_iaq_report_with_nts.pdf, accessed 16 June 2019).

11. 'How pollution affects indoor air quality in buildings', CIBSE Journal, June 2018, https://www.cibsejournal.com/technical/learning-the-limits-how-outdoor-pollution-affects-indoor-air-quality-in-buildings, (accessed 16 June 2019).

12. Dianne Western, the Landscape Partnership, conversation with the author.

13. Bromley Times, 20 February 2019, https://www.bromleytimes.co.uk/news/plan-for-10-storey-school-in-bromley-refused-1-5898048, (accessed 16 June 2019).

14. Bromley Times, 20 February 2019, https://www.bromleytimes.co.uk/news/plan-for-10-storey-school-in-bromley-refused-1-5898048, (accessed 16 June 2019).

15. CSD Energy Statement ref CSD1084/MR/rev-B dated 7th Dec 2016-Planning submission stage

16. Method Consultants BREEAM Design Stage Pre-Assessment Revision P1, 18 August 2016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