2015 Exhibition of School Planning and Architecture

West Spring Primary School
at Bukit Panjang, Singapore
Category: New Construction
The project challenge was to create spaces within the built environment that continually stimulate students’ curiosity in mathematics, arts and culture, linguistics and sports; to create FUN spaces to keep young minds captivated and to promote lifelong learning.

For the Ministry of Education of Singapore, the pilot project seeks to advance primary school education in Singapore in terms of Flexibility in Learning Spaces, Co-Sharing of Facilities, Optimising Land Use and Environmentally Sustainable Initiatives.
Main Site Plan

1. Block A : Administration Block (4 storey)
   1a Main Vehicular Drop-Off & Entrance Foyer
   1b General Office, P3-P6 Staffroom & Heads of Department & Media Resource Library
   1c Roof : Media Resource Library Deck

2. Block B : Primary 3 – Primary 6 Learning Cluster (6 storey)
   2a Dedicated P3-P6 Classrooms with Special Teaching Rooms
   2b Roof : Photovoltaic Panels

3. Block C : Primary 1 – Primary 2 Learning Cluster (4 storey)
   3a Dedicated P1-P2 Classrooms
   3b Dedicated P1-P2 Special Teaching Rooms & Reading Room

4. Block D : ‘White Cube’ Block (5 storey)
   Lower Ground : Parade Square & Basketball Court
   1st Storey : Canteen
   2nd Storey : Co-Curricular Activity Rooms, Dental Clinic, Health & Fitness Room
   3rd Storey : Indoor Sports Hall, Multi-Purpose Hall & Performance Centre
   4th Storey : Special Teaching Room & Learning Deck
   5th Storey : IT Hub
   Roof : 80 x 40m Open Play Field

5. Outdoor Learning Facilities
   5a Outdoor Experiential Learning Garden
   5b Scented Garden
   5c Chess Garden
   5d Kindergarten Playground
   5e Orchard Garden
   5f Primary Playground
   5g Poisonous, Carnivorous & Desert Circle Garden
   5h Lego Garden

6. Services Buildings
   6a Guard House with Parent Waiting Area
   6b Electrical Sub-Station
   6c Bin Centre

7. Future Expansion Land

8. Zhenghua Secondary School

9. Residential Apartments

10. Park Connector

11. Light Rail Transit (LRT)
Community

Age Focused Building Blocks

The younger students in Primary 1 & 2 experience a more ‘Hands On’ curriculum compared to Primary 3 to 6 students. Although the learning areas are flexible enough to work for both age groups, each age group functions within a customised dedicated building block planned according to the different curriculum needs.

The Primary 1 & 2 students are placed in a lower building block only 4 storeys high to facilitate ease of movement compared to Primary 3 to 6 students who travel vertically in a 6 storey high building block.

Each age focused block has its own centre of community; the internal corridors look down and open out to a customised outdoor learning courtyard.

For the Primary 1 & 2 students the orange – reddish tone colours of the block are brighter and more exciting with a Lego themed courtyard. A playful elliptical plan creates a landmark at the corner of the site whilst housing dedicated Primary 1 & 2 Programme for Active Learning (PAL) Rooms with PAL Deck and a Reading Room that opens out onto a Contemplation Deck.

A more subdued and mature blueish tone identify the Primary 3 to 6 building block with a Poisonous, Carnivorous & Desert Circle themed garden courtyard at its centre. The dedicated special teaching rooms are spread vertically, punctuated by bridges at the centre of the block on the 3rd and 5th storey that acts as elevated breakout areas.

This differentiation in building blocks provides identity; a strong sense of belong to a community.
Community

Vibrant Heart of the School

The Canteen is a vibrant double volume space with a mezzanine floor above. Student are free to spill over onto the amphitheater steps that connects to the large covered Parade Square & Basketball Court.

Apart from being a full school assembly area the Parade Square & Basketball Court are an all weather covered activity space supporting a 200m running path and netball court.
Community

Green Spine

A Green Spine; a 3.0m wide corridor and an 8.0 meter wide planted green learning activity spaces connect all the building blocks together. Students flow between these blocks and spill out onto the green spine for their collaborative learning activities.
Learning Environment

Flexibility In Learning Spaces

All learning spaces are designed for more than one function. For example in the Media Resource Library (MRL) the original Ministry of Education brief allows for the furniture to be pushed to one side and converted to a Performing Arts Studio. This concept has been expanded. The MRL now also opens out onto an outdoor learning deck. On the deck, the top of four solar tubes protrude within a green landscape providing light to the storey below, while similarly the MRL is brightly lit with solar tubes encouraging students to learn sustainability through the examples in their built environment.
Learning Environment

Outdoor Experiential Learning

The buildings and landscaping serve as an educational tool. Hands on learning through connection with outdoor landscaped spaces nurture an understanding of the ecological system. Sustainability can be further reinforced using the building as a model; the school being a tool for learning ‘green’ sustainable living.
The Multi-Purpose Hall and Indoor Sports Hall are divided by a folding sliding door for separation and simultaneous different usages of both spaces. When the folding sliding doors are pushed to the side, the single space offers greater flexibility to cater for larger functions, events and ceremonies.

The previously under utilised Multi-Purpose Hall Backstage is now shared with the Band Room and Dance Room providing another smaller space for more intimate plays and performances.
West Spring Primary School is one of four Ministry of Education schools to first achieve Green Mark Platinum, the highest sustainability award from the Singapore Building & Construction Authority.

The responsibility and stewardship for our planet is in everyone’s hands. Hence education should nurture understanding, commitment and continual development of future innovations to safeguard the ecological system which we know today.
Physical Environment

Environmentally Sustainable Initiatives

Some of the green features incorporated includes:

• **Good Building Orientation** - Planned to minimise west facing façades, with all the naturally ventilated classrooms in an east-west orientation.

• **Enhanced Envelop Thermal Transfer Value** - Using a combination of good u-values to roofs, sun-shading devices to air-conditioned areas & double glazing.

• **Reduced Heat Island Effect** – Through cool paints to external building envelop.

• **More Efficient & Sustainable Air Conditioning System** - As air-conditioned spaces only make up 13% of the GFA and the peak building cooling load is <500 RT, hence an efficient VRV system with 0.71 kW/RT is used.

• **Maximising Natural Ventilation** - Using wind simulations 74.5% of classrooms are able to achieve good natural ventilation of 0.6m/s for two opposite wind directions. This improves the classroom environment with less use of mechanical ventilation.

• **Maximising Daylight & Efficient Use of Artificial Lighting** - All spaces extensively use T5 lighting with high frequency ballasts. The classrooms also have photo sensors to assist with energy efficiency. Solar tubes reduce the need for artificial lighting.

• **Sustainable Products** – Through Green labeled products.

• **Sustainable Construction** - Use of green cement, washed copper slag (WCS) & recycled aggregate concrete (RCA).

• **Non-Chemical Termite Protection** - An anti-termite metallic barrier system that is non-chemical & non-poisonous is used throughout the project.

• **Photo-Voltaic Cells** - Sun casting simulations were carried out to ensure minimal shadow from neighbouring buildings and adjacent M&E services. The PV cells generate 58,400 kWh/yr.

• **Water Saving Water Fittings** - With highest possible water saving rating.

• **Green Wall & Planting** - A green wall shelters the main corridor and classroom block from west facing sun.
The buildings are planned with sufficient separation to maximise natural ventilation while still retaining the school identity.

An Education Corner showcases the cumulative green features that are evident in the building. Signage is also placed around green learning features further explaining the environmental concepts.
### Planning Process

**MOE** Procurement

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>MOE awards tender with kickoff meeting; providing site &amp; brief.</td>
</tr>
<tr>
<td>2010</td>
<td>MOE seeks project Consultants for new schools on green field sites. Each tender has two schools at different locations.</td>
</tr>
</tbody>
</table>

### Timeline

**The inception to completion of the project spanned over a challenging but rewarding 4 year period.**

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feb 2010</td>
<td>MOE awards tender with kickoff meeting; providing site &amp; brief.</td>
</tr>
<tr>
<td>Apr 2010</td>
<td>Consultants advise the site provided is not suitable due to the steep topography. Other sites are investigated. Project selected as one of two MOE schools for Pilot Project.</td>
</tr>
<tr>
<td>Oct 2010</td>
<td>2nd Workshop with MOE to test new ideas applied to site context.</td>
</tr>
<tr>
<td>Dec 2010</td>
<td>Presentation to MOE for review &amp; approval of new ideas in Pilot Project.</td>
</tr>
<tr>
<td>May 2012</td>
<td>Tender Awarded</td>
</tr>
<tr>
<td>Oct 2011</td>
<td>Planning Approval process commences</td>
</tr>
<tr>
<td>Aug 2010</td>
<td>Concept Design &amp; Cost Proposal Presentation to MOE for approval</td>
</tr>
<tr>
<td>Sep 2010</td>
<td>1st Workshop with MOE working group to shape &amp; agree on the new directions for Pilot Project.</td>
</tr>
<tr>
<td>Apr 2011</td>
<td>Presentation to Ministry of Finance and Development Projects Advisory Panel to seek design, value management review &amp; funding approval.</td>
</tr>
<tr>
<td>Oct 2011</td>
<td>Planning Approval process commences</td>
</tr>
<tr>
<td>Feb 2012</td>
<td>Building Plan Approval process commences</td>
</tr>
<tr>
<td>Sep 2010</td>
<td>Concept Design &amp; Cost Proposal Presentation to MOE for approval</td>
</tr>
<tr>
<td>Jan 2012</td>
<td>Project tendered with 17 tenders received. Tenders evaluated based on price submitted and track record of the builders.</td>
</tr>
<tr>
<td>Aug 2010</td>
<td>Concept Design &amp; Cost Proposal Presentation to MOE for approval</td>
</tr>
<tr>
<td>Jan 2014</td>
<td>School Commences</td>
</tr>
<tr>
<td>Dec 2013</td>
<td>School moves in</td>
</tr>
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*Ministry of Education of Singapore*
Planning Process

Design Feedback
Throughout the Feasibility Study varying ideas were investigated and developed. Each variation would be explained with pros and cons requiring the working group to voice their opinions and preferences before agreeing to move forward.

Site Planning
4 options were applied to the site to investigate the various permutations to the new directions:

- OPTION 1
- OPTION 2
- OPTION 3
- OPTION 4

White Cube
Various configurations were investigated for the ‘White Cube’:

Rethinking the Multi-Purpose Hall
The backstage is used as a smaller stage, an informal gallery and critique space. The backstage was later developed to open into the Band Room to allow even greater flexibility.

Community Within A Cluster
Planning ideas were bettered for natural ventilation, daylight and noise whilst still retaining the conceptual ideas.

Initial Approach:
- 2 cluster blocks required for 6 storey block
- Limited cross ventilation for rooms 1, 3, 4 & 5
- Limited daylight to corridor

Improved Approach:
- 2 cluster blocks required for 6 storey block
- Cluster with separation for natural ventilation, daylight and noise separation
LEGEND

1 Entrance Foyer
2 General Office
3 Student Care Centre
4 Classroom
5 P1-P2 Programme for Active Learning (PAL)
6 PAL Deck
7 Break-Out Area
8 Void Space for Future Expansion
9 Canteen
10 Parade Square
11 Covered Basket Ball Court

1st Storey Plan
Floor Plans

2nd Storey Plan

LEGEND
1 Heads of Departments Office
2 Conference Room
3 Classroom
4 Break-Out Area
5 Void Space for Future Expansion
6 Reading Room
7 Contemplation Deck
8 Co-curricular Activity Room
9 Pastoral Care Room
10 Counselling Room
11 Dental Care Room
12 Health & Fitness Room

3rd Storey Plan

LEGEND
1 P3-P6 Staff Room
2 Classroom
3 Break-Out Area
4 Void Space for Future Expansion
5 Modular Chinese Language Room
6 Teaching Laboratory
7 P1-P2 Staff Room
8 Music Room
9 Dance Studio
10 Band Room
11 Multi-Purpose Hall (MPH)
12 Indoor Sports Hall (ISH)
Floor Plans

4th Storey Plan

1. Media Resource Library (MRL)
2. MRL Deck
3. Classroom
4. Break-Out Area
5. Subject Based Banding Room
6. Learning & Behavioural Support Intervention Room
7. Science Room
8. Science Deck
9. Mother Tongue Room
10. Learning Support Programme Room
11. Art & Craft Room
12. Drying Deck
13. Mathematics Room
14. Furniture Store
15. MPH Control Room

5th Storey Plan

1. Classroom
2. Break-Out Area
3. IT Learning Resource Room
4. Computer Room
5. Computer Deck
6. Games Equipment Room

LEGEND

0 5 10 15 meters
6th Storey Plan

LEGEND

1  Classroom
2  Break-Out Area
3  80mx40m Play Field
<table>
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<tr>
<td><strong>Submitting Firm:</strong> CPG Consultants Pte Ltd</td>
</tr>
<tr>
<td><strong>Project Role:</strong> Architectural, Mechanical &amp; Electrical and Quantity Surveying Consultants</td>
</tr>
<tr>
<td><strong>Project Contact:</strong> Yong Fen Bok</td>
</tr>
<tr>
<td><strong>Title:</strong> Senior Principal Architect</td>
</tr>
<tr>
<td><strong>Address:</strong> 238B Thomson Road, Novena Square, Tower B, #12-00, Singapore 307685</td>
</tr>
<tr>
<td><strong>City, State or Province, Country:</strong> Singapore, Singapore</td>
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<td><strong>Phone:</strong> +65 6357 4743</td>
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| **Joint Partner Firm:** Beca Carter Hollings & Ferner (S.E Asia) Pte Ltd |
| **Project Role:** Civil & Structural Consultants |
| **Project Contact:** Koh Kok Keang |
| **Title:** Technical Director |
| **Address:** 1 Gateway Drive, #12-01 Westgate Tower, Singapore 608531 |
| **City, State or Province, Country:** Singapore, Singapore |
| **Phone:** +65 62207588 |

| **Other Firm:** Project Innovations Pte Ltd |
| **Project Role:** Project Manager |
| **Project Contact:** Lim Weng Kien |
| **Title:** Director |
| **Address:** 510 Thomson Road, #11-00 SLF Building, Singapore 298135 |
| **City, State or Province, Country:** Singapore, Singapore |
| **Phone:** +65 62598648 |

<p>| <strong>Construction Firm:</strong> Hytech Builders Pte Ltd |
| <strong>Project Role:</strong> Builder |
| <strong>Project Contact:</strong> Guo Shu Ting |
| <strong>Title:</strong> Project Manager |
| <strong>Address:</strong> Blk 165 Bukit Merah Central, #05-3685/7 |
| <strong>City, State or Province, Country:</strong> Singapore, Singapore |
| <strong>Phone:</strong> +65 6395 6333 |</p>
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<td>City</td>
<td>Singapore</td>
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<td>State</td>
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<tr>
<td>District Name</td>
<td>Bukit Panjang</td>
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<tr>
<td>Supt/President</td>
<td>Ms Jacintha Lim</td>
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<td>Occupancy Date</td>
<td>December 2013</td>
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<td>Grades Housed</td>
<td>Primary 1 – Primary 6</td>
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<td>Capacity</td>
<td>1380 students</td>
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<td>Site Size</td>
<td>4.520 acres (1.829 Ha)</td>
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<td>Gross Area</td>
<td>285330 sq. ft. (26,508 sq. meter)</td>
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<tr>
<td>Per Occupant</td>
<td>207 sq.ft per pupil (19.2 sq. meter per pupil)</td>
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<td>IT Equipment SGD $723,500</td>
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Optimising Land Use

As land becomes scarcer in Singapore due to an increasing population, competition from industrial & commercial sectors and the need to balance our ecological system the Ministry of Education is ready to adopt new strategies that will optimise land use. Landed facilities are prioritised based on importance and function; this includes spaces like the reception, general office and spaces serving lower primary students. The large size Play Field, Parade Square and Basketball Court not previously covered are placed into a mega ‘White Cube’ block freeing up land on the 1st storey. This planning initiative frees up precious land for future expansion.
Co-Sharing of Facilities

The stakeholders of a school are not just the Ministry of Education, principal, teachers, students and parents. Stakeholders can be expanded to include other schools, adjacent residents and the greater community. The school keeps to the current status quo of Ministry Of Education’s policy to allow the Play Field and Indoor Sports Hall to be used by the public. As both areas are elevated, planning strategies are put in place to segregate and secure the school while these spaces are used. Through synergy with the neighbouring Zhenghua Secondary School the younger students can be aspired by their older siblings and have a clear visible direction from primary to secondary schooling. Also to be the centre of community, the school is connected by covered link-ways to the main road, bus stop, park connector and Light Rail Transit system (LRT).