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Counting the cost of vertical schools

Prahran High School, Victoria
Image courtesy of Gray Puksand

Counting the costs of vertical schools:

An insight into the cost drivers associated with vertical schools

Australia's population is expanding, our cities are densifying and land is more expensive than ever before. Growth in our inner-city suburbs is placing pressure on every part of our cities, but especially our schools. In this environment, the only way is up.

Consider these statistics. By 2020 Victorian schools will need to accommodate a record one million students. In New South Wales, an additional 164,000 public school places need to be found by 2031 – a 21 per cent increase.

In other parts of the world, vertical schools have been the norm for decades. However, Australia's first multi-storey schools are just starting to take off. Melbourne CBD's first vertical school, Haileybury College's city campus, opened its doors in January 2017. Meanwhile, the Victorian Government has started building its \$37 million multi-storey high school on the site of Swinburne University's old campus in Prahran.

In Sydney, the NSW Government is transforming Parramatta's Arthur Phillip High School into a 17-storey tower, and another high-rise high school in Surry Hills, Inner Sydney High School, is in design.

Several multi-storey schools are also on the cards in Perth, with the first, St George's Anglican Grammar school, taking its first students in 2015.

As the centre of learning for our next generation, a school is arguably one of the most important buildings for project teams to get right. After all, a positive school environment allows children to thrive and sets the foundations for future learning and development. A good school space enables teaching flexibility and inclusivity while supporting different learning styles.

However, building a vertical school poses different budget challenges to the traditional single-storey solution. So, what are the cost drivers for education providers as they deliver quality vertical facilities without compromising on design that enhance learning?

Slattery has analysed the following cost drivers:

1. Planning efficiency
2. External areas
3. Building elements
4. Builder's preliminaries
5. Other development costs.

1. Planning efficiency: Getting around the building

Quick and safe movement around a school maximises valuable education and important break times. In a vertical school, the big challenge is to incorporate efficient circulation methods that create a sense of cohesion and belonging.

Through clever design, stairs, lifts, ramps and atrium spaces can double as meeting places. However, these circulation methods require more built area, which effectively increases the cost of the school, or in commercial lingo, the "net-to-gross ratio".



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Some of the best solutions we have seen incorporate toilets, staff spaces and outdoor areas on intermediate floors. This reduces travel times as students and staff can access the common areas and essential services without needing to traverse the whole building. Other solutions include large central staircases with lots of natural light that encourage students to walk between classes rather than using lifts, as well as elevated entries with common areas so staff and students can move up and down to reach learning areas.

Smart operations also play a role in reducing mayhem at peak travel times, such as staggered start, finish and break times. Operational efficiencies are equally important when considering student drop offs and pick-ups, staff car parking and waste collection.

Our research has found that a typical single-storey school has approximately five per cent of the floor area in internal circulation. This can increase to almost 30 per cent in a vertical school, with the

addition of stairs, ramps and lift cores over and above corridor circulation to reach learning spaces. This could cost up to an extra \$5 million dollars for a typical 650 student school – a figure more in line with tertiary projects, where the TEFMA (Tertiary Education Facilities Management Association) benchmark for circulation is 30-40 per cent, depending on the function.

2. External areas: Outdoor learning, sensory and play spaces

One of the great design conundrums of small sites is how to incorporate outdoor play, learning and relaxation areas. The value of these areas is indisputable, both in terms of learning outcomes and physiological benefits. The challenge with vertical schools is to create these spaces 'up in the air', despite being located on concrete slabs with significant infrastructure requirements.

Some successful solutions include winter gardens for outside learning, roof-top playgrounds with basketball courts and cricket nets, and sensory garden terraces.

The cost drivers with these outdoor spaces include:

- structural solutions that deal with the spans that such functions demand
- waterproofing
- acoustic treatment to minimise noise transfer into learning spaces
- fencing to satisfy safety and security concerns
- the ability to supervise students easily.

Another major consideration is maintenance required during the life of the building, which may include irrigation to green terrace spaces.

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The design of these spaces must accommodate easily resurfacing of sports courts, for example, and also factor in the disruption that such maintenance causes.

3. Building elements: Structure, skin, fitout, finishes and services

Structure

A single-storey school structure generally comprises a ground floor concrete slab, steel columns and a light-weight metal deck roof. Building vertically generally requires a concrete frame with reinforced suspended concrete slabs at each level, concrete core walls and more complex foundation systems.

We estimate that a multi-storey structure would incur additional costs in the order of \$300 per square metre of floor area.

Skin

A building's façade changes as a building gets higher. The façade of a single-storey school is often 'domestic' in nature, and made from either masonry, cement sheet or light-weight cladding. Vertical schools, however, demand commercial-type façades because of the structural requirements, wind loads, access and safety issues. This means budgets must allow for more expensive façade solutions as well as hoardings, gantries, fencing and protection during construction.

Added to this, vertical schools are often planned on constricted sites in inner city areas. This often means floor plates are inefficient and the wall-to-floor ratio is high.

We estimate that façades for multi-storey buildings add around \$150 per square metre to the rate per square metre of floor area.

Fitout and finishes

The fitout for a vertical school incurs increased costs due to acoustic (generally in noisier areas) and fire protection requirements. This increases the make-up of walls and ceilings, with additional layers of plasterboard and insulation to that of a traditional school. Finishes are also generally of a higher quality due to atrium and circulation spaces demanding higher quality and durable floor and wall finishes.

We estimate that fitout and finishes for multi-storey buildings add around \$300 per square metre to the rate per square metre of floor area.

Services

Building services, which must be reticulated both horizontally and vertically, are more expensive on multi-storey construction projects. Fire protection and safety systems are considerably more complex in vertical schools. Security and access controls also require careful planning in a vertical school, and passenger lifts are also essential.

We estimate the services component in a vertical school is around \$500 per square metre more expensive than in a traditional single-storey school.

4. Builder's preliminaries

Building vertically involves different construction methodologies. Often single-storey school buildings are relatively simple to construct and similar in nature to residential construction.

As schools go up, its structure becomes more substantial and façades more complex. It becomes a commercial building project requiring the use of tower cranes, and man and material hoists.



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In addition, projects in the inner city require considerable construction management planning with consideration to traffic management, loading and unloading materials, site accommodation, scaffolding, overhead protection – and more.

The construction of a multi-storey school in the inner city also requires subcontractors who are familiar with this type of construction. It is likely that the head contractor will be different to those normally used in the construction of single-storey suburban schools.

On average, an inner city vertical school is around \$200 per square metre more than a traditional single-storey school.

5. Other development costs

The likelihood of encountering contaminated sites in the inner city is higher than in greenfield sites, and this can add significant additional costs to the project. Site-specific risks should be identified early in the design process so

that any cost impacts are incorporated into the cost plan. Otherwise, important design elements may be compromised or eliminated to accommodate this additional cost later in the project.

Consultants' fees will likely exceed those on a single-storey school due to the additional complexities of the design and the possible need for additional specialist consultants. The town planning approval is likely to be more protracted on vertical inner-city schools.

Authority and headworks should be reviewed as these will differ from those applicable on suburban locations.

Planning permission for inner-city sites often carry conditions that require the school to have specific shared community facilities. This may mean that classification of the building may change – with potential implications on the cost of construction. This may include fire engineered solutions, access and egress to public areas, and smoke extraction systems, for example.

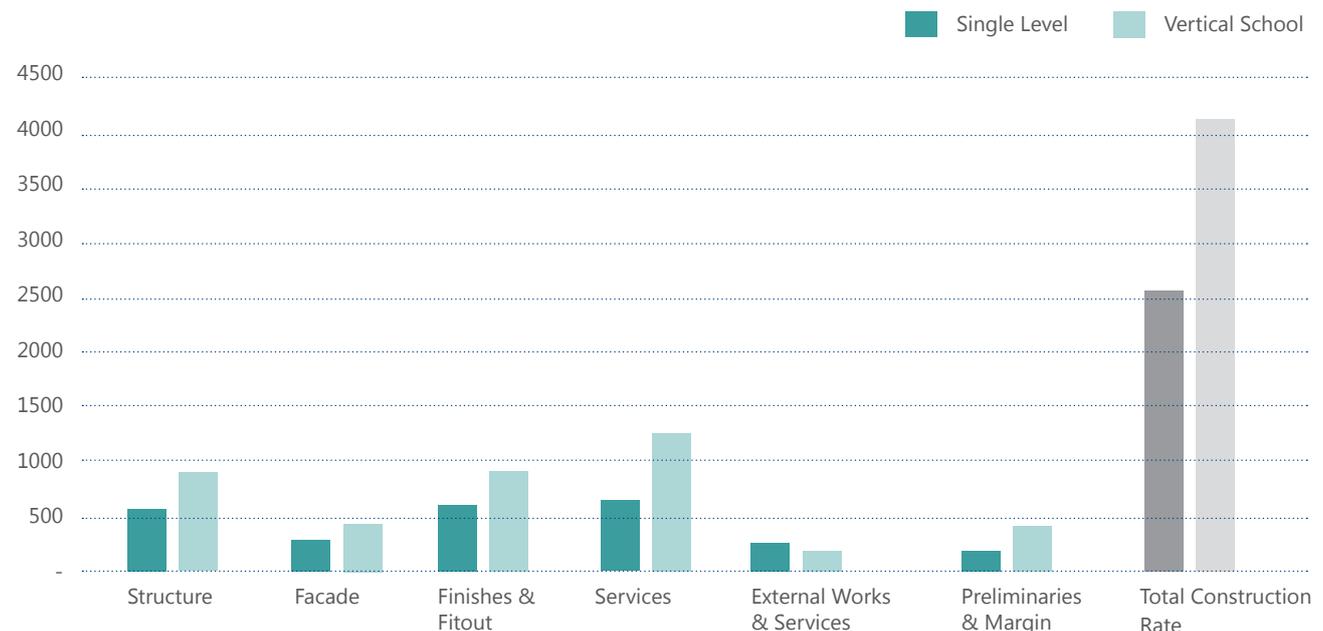
Finally, many areas undergoing significant growth have little available land, which means new schools are built on existing sites, often alongside school buildings of historical significance. In this case, existing buildings must be repurposed as part of the overall scheme.

Summary

Aside from their land saving potential, vertical schools come with other benefits. Being close to the CBD can put cultural and university facilities right at a school's doorstep, not to mention easy access to public transport and other community amenities. However, vertical schools do come at a cost.

Considering all the factors outlined, from planning efficiencies to more complex construction, we believe the additional cost would be in the order of 60 per cent as shown:

*\$/m2 average - total construction cost divided by the FECA (Fully Enclosed Covered Area). Excludes contingencies, consultant fees, authority charges, loose furniture, equipment, GST



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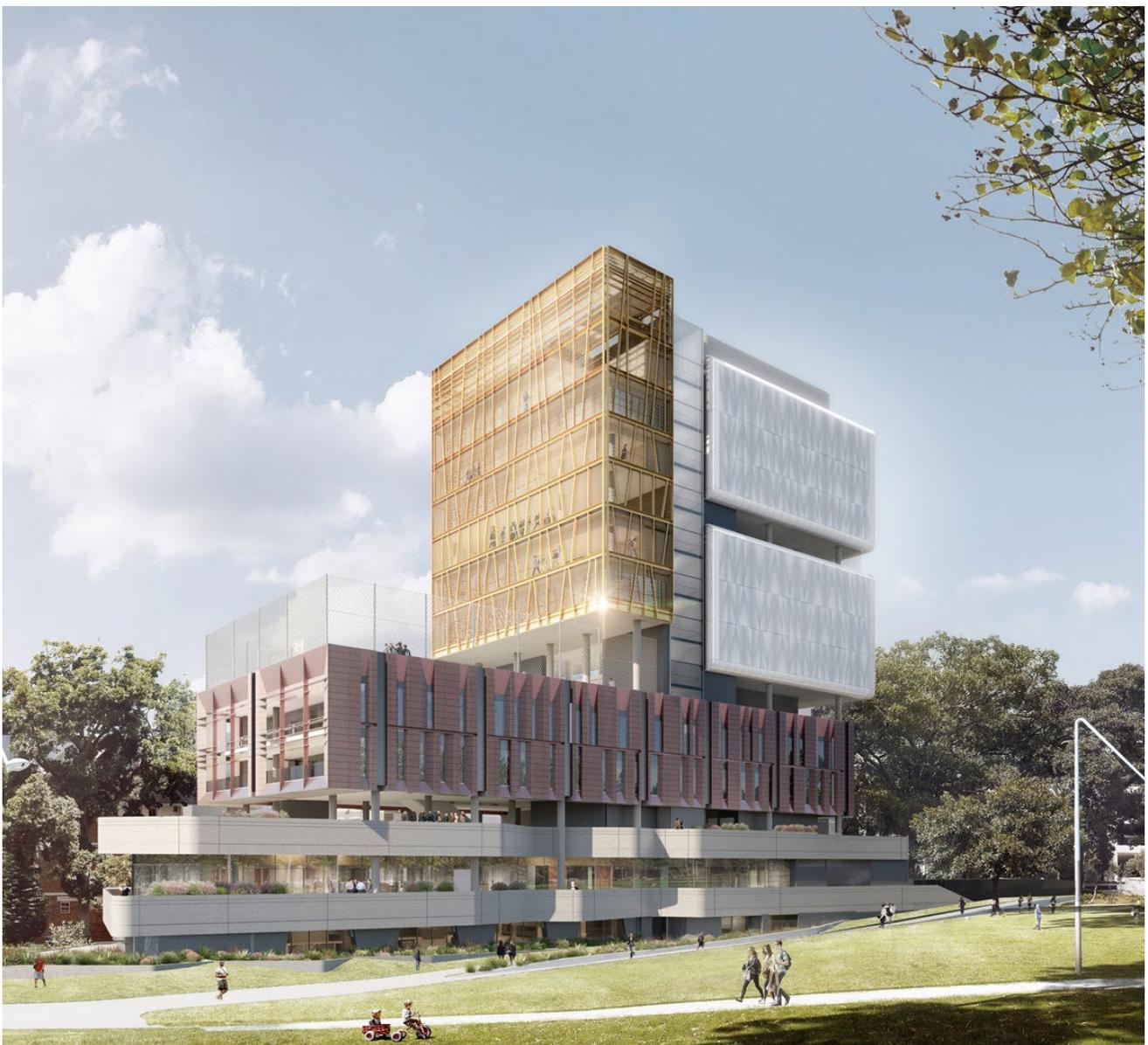
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Suggestions for future success

To minimise the impact of additional costs for building vertical schools, Slattery recommends the adoption of the following strategies:

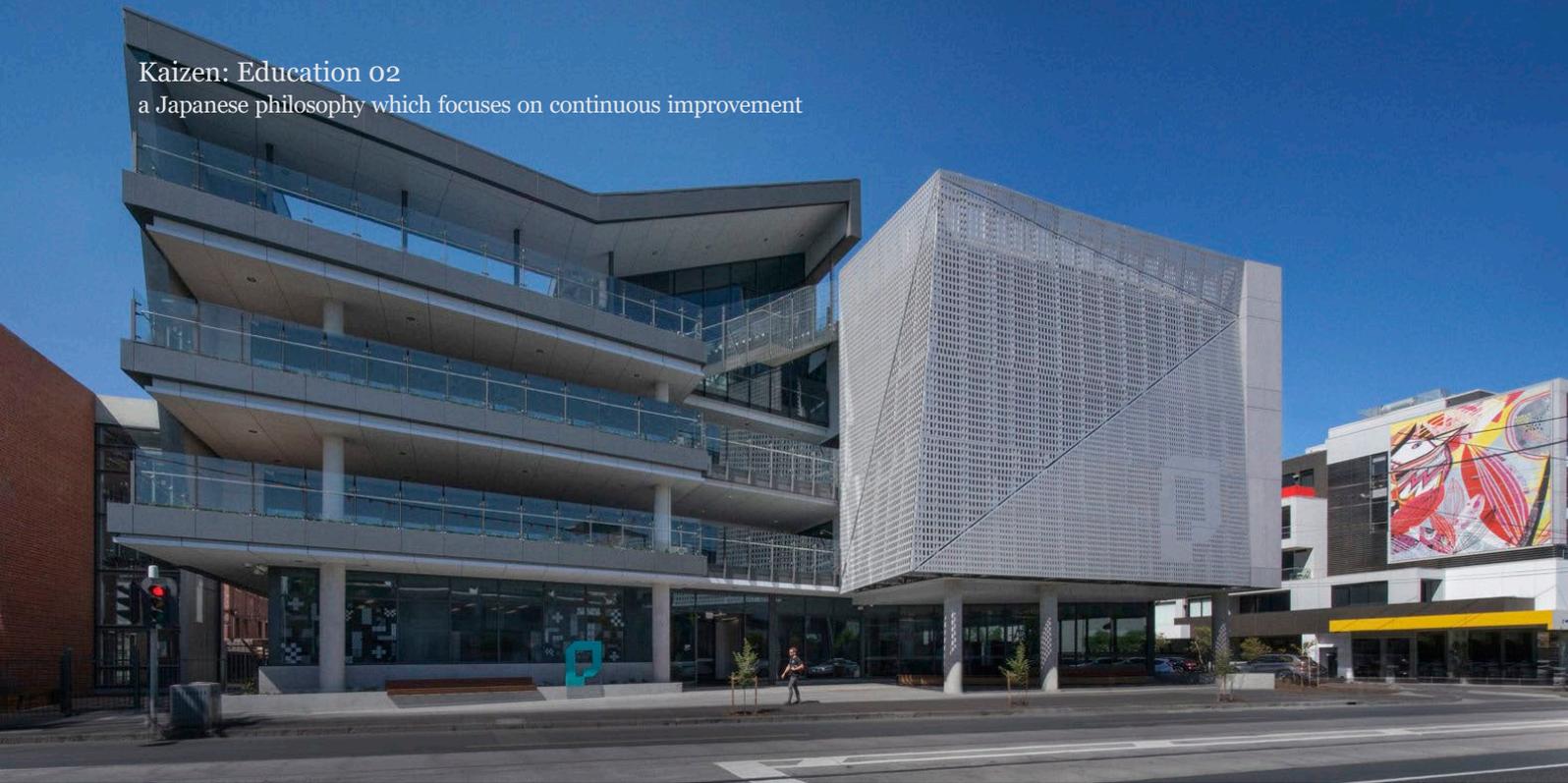
- examine efficient and inclusive circulation methods to reduce the cost of staff and students moving around the building
- review vehicular circulation and car parking requirements prior to site acquisition to determine whether this can be provided on, below or above ground
- consider the real cost of outdoor spaces at the outset including safety, security and amenity
- conduct extensive due diligence of site conditions prior to site acquisition (environmental and geotechnical).

Ultimately, partnering with your quantity surveyor and consultant team will minimise cost implications and deliver a much better outcome.



Inner Sydney High School, Surry Hills NSW
Image courtesy of FJMT Studio

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Prahran High School, Victoria
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About Slattery & Kaizen

Slattery is a property and construction advisory firm specialising in quantity surveying, cost management and early phase project advisory, with an outstanding history spanning more than 40 years.

We work hand-in-hand with governments, institutions and organisations as well as planners, developers, architects and design teams on a broad range of property and construction projects.

A commitment to excellence and innovation, and an ability to become an integral part of the project team has earned Slattery the trust and respect of clients and project teams alike. Slattery adds value by taking control and ownership of the cost management process from the outset. We understand the importance to drive innovation and productivity.

Slattery's Kaizen Papers focus on sharing knowledge, ideas and pertinent cost information related to our industry. Kaizen is the Japanese word for improvement, and a business philosophy that strives for continuous improvement in process. We produce papers across the sectors we work with, which are shared with our clients and made available on our website for all to view.

We invite you to explore these further at www.slattery.com.au/thought-leadership

Education

Slattery has worked on more than 300 state government schools nationally. With a breadth of school projects under our belt – and experience working with project teams across all sectors throughout the entire design and construction phase – we can see why some projects work well and others don't.

We are passionate about achieving good outcomes for the education sector, project teams and students alike. For more information about Slattery and our education team, please contact National Education Sector Lead Tom Dean at tom.dean@slattery.com.au