

# Reference Designs for Standard Classroom Upgrade

**FORMULA BLOCK**





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# 1 Introduction

The Ministry of Education (the Ministry) has developed this suite of reference design options to help schools that are upgrading existing standard classroom blocks. This is part of a strategy to enable a wider adoption of Innovative Learning Environments (ILE) supported by flexible learning spaces. There are design options ranging from minor to substantial layout reconfigurations.

## 1.1 Reference designs

The designs in this package will show schools how to modify existing standard blocks to create flexible learning spaces for a range of budgets.

The design options have been developed by architects with extensive experience in school design. They have been carefully reviewed by an educationalist for their suitability for accommodating a broad range of teaching and learning practice. They have also been reviewed by acousticians for acoustic functionality, by engineers for structural implications, and a quantity surveyor to provide cost estimates.

## 1.2 Benefits

Using these reference design packages to upgrade existing standard classroom blocks will:

- » Help schools visualise ways to convert a cellular space into a flexible learning space.
- » Reduce the time and money that schools have to spend on consultant fees when upgrading standard classroom blocks. The common engineering and design issues have been addressed within the reference design package.
- » Ensure that schools with standard classroom blocks have spaces that are flexible and can support teaching practice as it evolves and changes.
- » Help schools to create teaching spaces that are well designed, structurally sound, and will continue to be valuable assets in the school property portfolio for many years to come.

## 1.3 Interaction with the “Designing Quality Learning Spaces” (DQLS)

The layout options in this package include basic acoustic and thermal treatments. The additional enhancement options offer solutions to help bring the learning spaces closer to the Ministry’s DQLS recommendations. Schools should evaluate their needs when planning an upgrade to ensure appropriate DQLS measures are included.

It has been assumed that the existing natural ventilation and natural lighting of the standard blocks are adequate when all windows and doors are operable. The artificial lighting and heating needs of individual blocks vary by region and have not been addressed in this reference design.

The Ministry is currently updating the information in the DQLS to better reflect the requirements of Innovative Learning Environments.

## 1.4 Innovative Learning Environments

An Innovative Learning Environment is the complete physical, social and pedagogical context in which learning is intended to occur. A flexible learning space is one that is capable of supporting teaching practice as it evolves and changes.

Traditional classroom blocks have cellular classrooms that often limit the flexibility of the learning spaces. Students and teachers need learning spaces that can be used in different ways and can support the range of learning and teaching styles. Flexible learning spaces typically have a variety of spaces, including large connected spaces where several teachers and students can collaborate, and smaller breakout spaces for specialised learning and smaller group work.

Further questions about the reference designs for existing standard classroom blocks can be directed to: [Property.Help@education.govt.nz](mailto:Property.Help@education.govt.nz).

## 2 Formula block

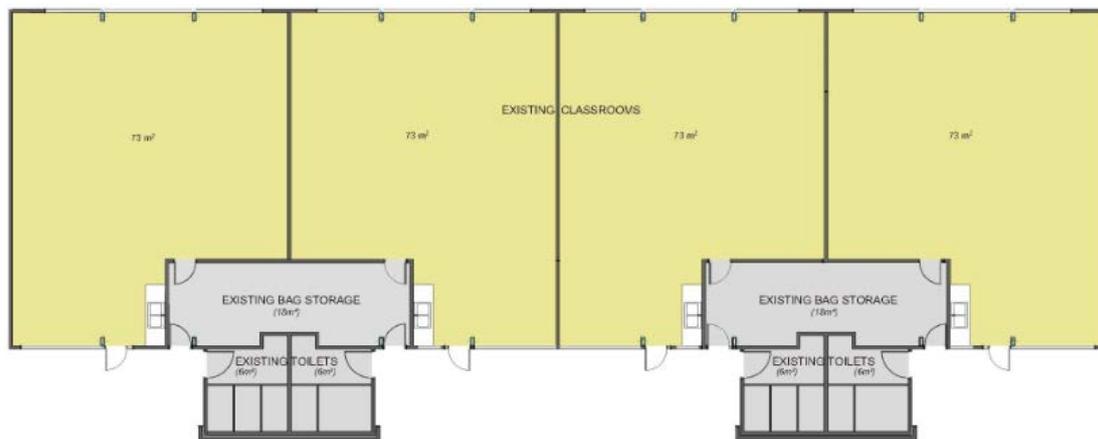
Formula blocks were constructed between 1962 and 1970. They are of lightweight timber construction and are characterised by consecutive pairs of classrooms with common cloakroom and brick clad toilet facilities. The image below shows a typical two-classroom Formula block.



**Front view of typical 2-classroom Formula block**

The existing layout of the Formula block lends itself well to conversion into a flexible learning space. It is straightforward to create large collaborative areas by removing walls between classrooms. Smaller breakout areas are achievable by using the existing cloakroom space.

This package of reference design options for the Formula block is based on a four classroom block. When a school's specific requirements and site conditions are considered, the modifications can be adjusted to suit the number of classrooms at the particular school.



**Existing footprint of a 4-classroom Formula block**

## 3 Design principles

### 3.1 Planning principles

The principles underlying the reference designs presented in this package are consistent with those outlined in the *Designing Schools in New Zealand – Requirements and Guidelines* document (Version 1.0, October 2015), which is available [online](#).

The design layout options have been reviewed by an educationalist for their suitability for accommodating a broad range of teaching and learning practice.

The design principles underlying the reconfigured standard classroom block layouts are:

- » Maximise connectivity within the whole learning space to enable strong collaboration of all teachers within the block by removing walls between existing classrooms. Form minimum opening widths between existing classrooms of around 4m to a height of 2.7m.
- » Allow corners in the learning space for small group learning, while minimising areas that cannot be seen by all teachers.
- » Indicative furniture layouts have been provided to give an indication of how the spaces might be arranged.
- » Moveable screens have been indicated on the layouts which can be used to provide additional levels of acoustic separation for groups if required, as well as providing additional pin-up display space and maintaining flexibility for reconfiguring the learning space.
- » Allow provision for at least two small breakout areas and the optional provision to add glazed sliding partitions to provide acoustic separation.
- » Allow for the optional provision for a large breakout/presentation style learning area which has some acoustic separation from the rest of the learning area through the installation of large glazed sliding doors.
- » Allow for the optional provision of a collaborative teacher work area/resource space which may also be used as a learning area.
- » Wet areas have been located within the spaces and positioned so the learning activities can expand into the learning space in order to not restrict the numbers of students. They have been positioned so they are easily accessible to the outside. For at least one layout option the wet area has been positioned at one end of the learning space so that noisier activities often associated with messy/maker learning can be separated by distance to allow quieter learning activities to occur at the same time at the other end of the block.
- » Self-contained cubicles and accessible toilets have been inserted in layout option 3. The toilets have both internal and external building access.
- » Substantial acoustic absorption has been provided within the learning spaces using highly sound absorbent ceiling tiles and acoustically absorptive pin-board over the walls. This will lower the overall level of background noise and allow a variety of learning activities to occur concurrently in a teacher managed environment.
- » Moveable whiteboards, short throw projectors and/or LCD TV panels will be used within the space for instructional teaching and learning in order to maintain flexibility for reconfiguring the learning space.
- » A bag storage option has been indicated on the plans however it has not been included in the cost estimates. Schools can decide on how, where and if they accommodate student bags.

## **3.2 Standard block modernisation planning options**

There are three design options for the Formula block.

### **3.2.1 Layout option 1**

This is considered the 'do-minimum' reconfiguration of the block to achieve sufficiently connected space that will enable ILE through collaborative teaching and learning practice. This option reconfigures the space so that more substantial reconfiguration (illustrated in layout option 2 and 3) can be undertaken at a later date should schools wish to stage their upgrade. One existing cloakroom is converted into a new wet area and the other is opened up to become a small breakout area off the general learning space. Toilet spaces are maintained.

### **3.2.2 Layout option 2**

This is a variant of layout option 1. The walls between classrooms are completely removed to provide maximum connection and flexibility within the general learning area. This option reconfigures the space so that more substantial reconfiguration (illustrated in layout option 3) can be undertaken at a later date should schools wish to stage their upgrade. One existing cloakroom is converted into a new wet area and the other is opened up to become a small breakout area off the general learning space. Toilet spaces are maintained.

### **3.2.3 Layout option 3**

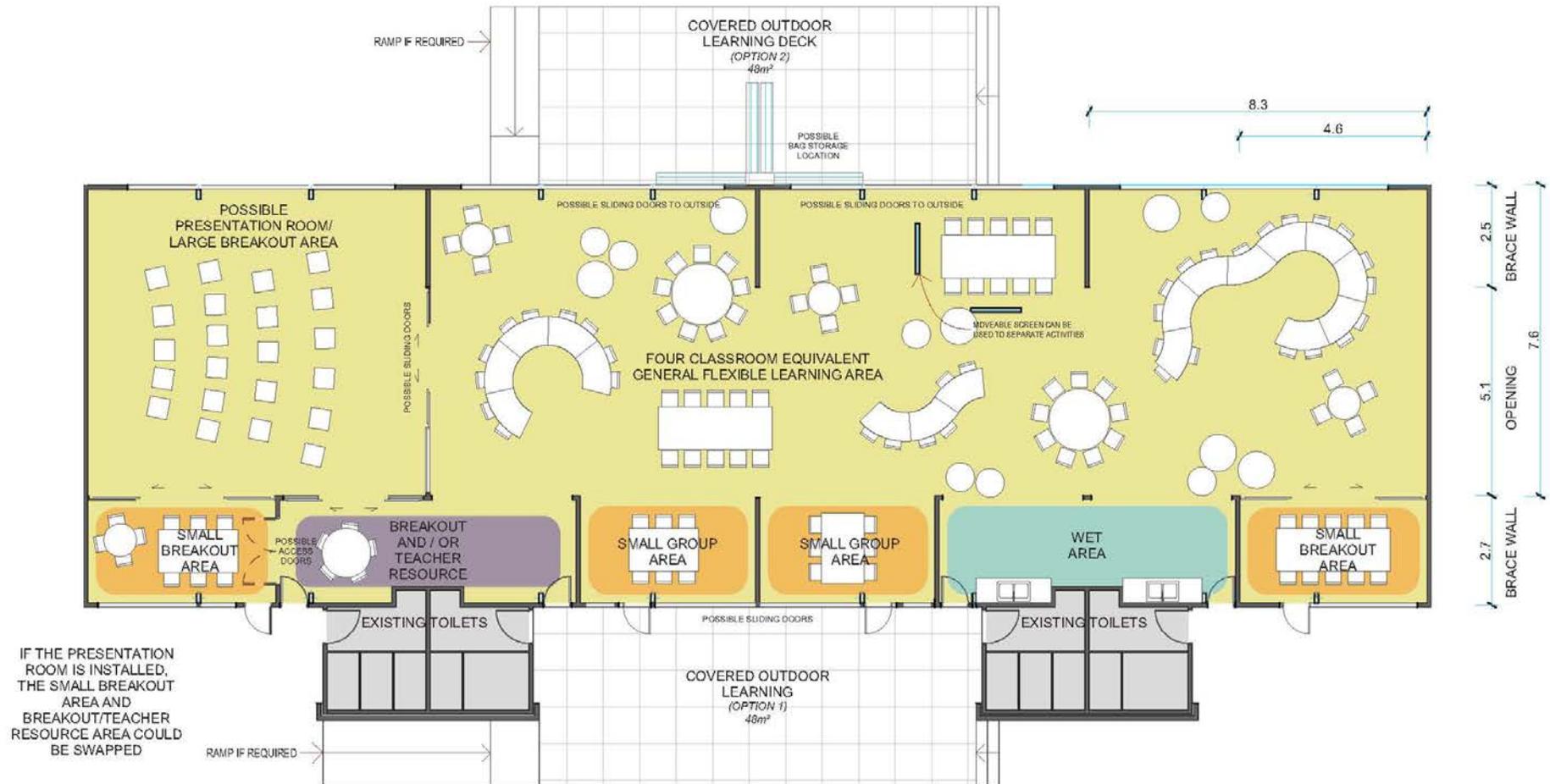
This substantial reconfiguration completely removes walls between classrooms to provide maximum connection and flexibility within the general learning area. The wet area has been relocated to one end of the learning space. Toilets have been relocated and reconfigured to provide self-contained cubicles, include an accessible cubicle and provide both interior and exterior access. The additional space left over from the toilet reconfiguration can be used as teacher resource and/or break out learning space.

## **3.3 Additional enhancement options**

There are a number of optional enhancements that are not included in the base modernisation package, but may be undertaken concurrently with the reconfigurations. These are shown in Section 5 and Appendix 1.

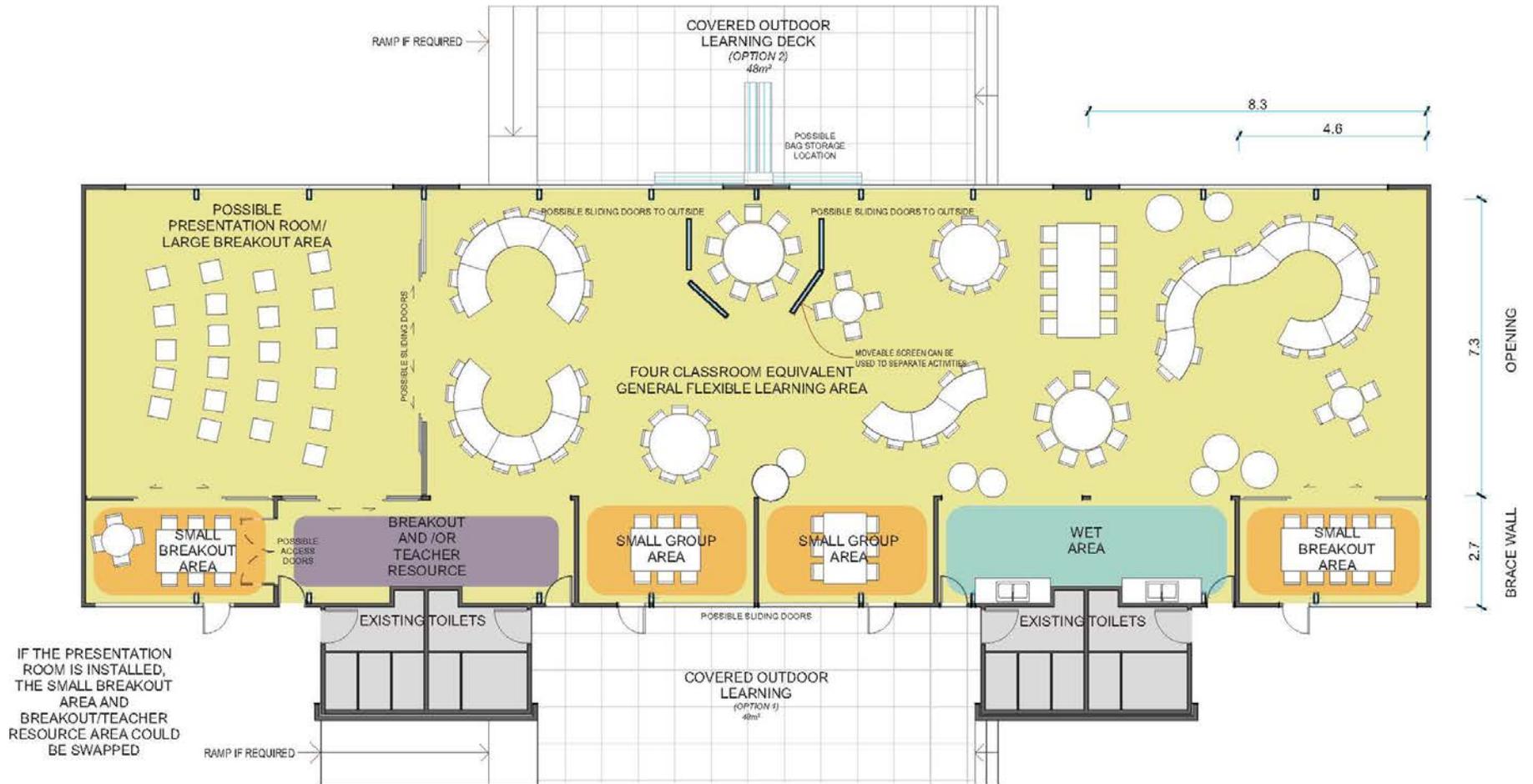


### Layout option 1



**FURNITURE LAYOUT INDICATIVE ONLY**

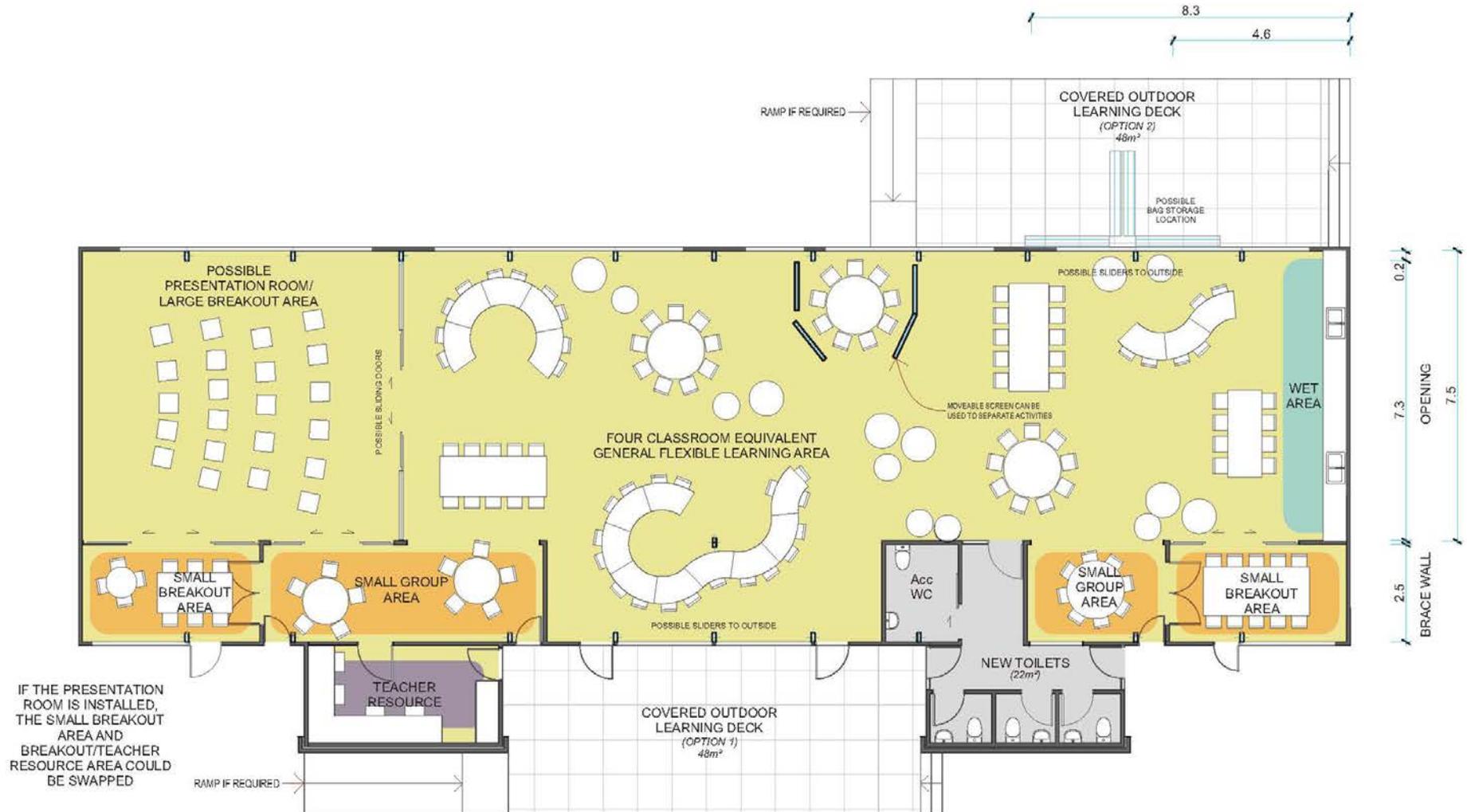
Layout option 2



IF THE PRESENTATION ROOM IS INSTALLED, THE SMALL BREAKOUT AREA AND BREAKOUT/TEACHER RESOURCE AREA COULD BE SWAPPED

FURNITURE LAYOUT INDICATIVE ONLY

Layout option 3



FURNITURE LAYOUT INDICATIVE ONLY

## 4 Structural principles

The strengthening design in Appendix 2 achieves at least 67% of New Building Standard (NBS). The wall opening sizes have been optimised and the associated structure provided.

Timber framed school buildings, including Formula blocks, are much stronger than calculations suggested, and generally do not require any earthquake strengthening. You can find more information about the Ministry's research on the seismic resilience of timber framed school buildings [online](#).

The following risks and costs have not been included in the design, engineering, or quantity surveyor assessments and estimates:

- » Removal of hazardous materials, including asbestos and asbestos contaminated materials
- » Treatment of contaminations, including soil
- » Strengthening of existing foundations if current strength is insufficient for loads of the modified structure
- » Rot and/or borer damage to existing timber.

Appendix 2 provides detail on the structural scope, including:

- » Design Features Report
- » Structural Calculations
- » Structural Drawings
- » Structural Specification
- » Fire Report
- » Accessibility Report

## 5 Cost estimates

Schools can use these cost estimates to:

- » Select an appropriate pre-designed layout option (1, 2 or 3) for upgrading an existing Formula block.
- » Include any of the additional enhancement options when carrying out any of the layout options.
- » Gauge an approximate cost for upgrading teaching spaces by selecting the specific works from the pricing menu.

Options should be selected with involvement from the Ministry and a design team to ensure the most suitable option for the existing space is pursued.

Cost estimates to upgrade a Formula block have been estimated by quantity surveyors as:

<b>A1</b>	Layout option 1	\$273,000
<b>A2</b>	Layout option 2	\$273,000
<b>A3</b>	Layout option 3	\$334,000

Additional optional enhancements have been estimated as:

<b>B1</b>	2 x Interior glass sliding doors to two small breakout areas	\$29,000
<b>B2</b>	Layout option 1 & 2: 48m <sup>2</sup> outdoor learning area	\$29,000
<b>B3</b>	2 x sliding doors to outside learning area	\$25,000
<b>B4</b>	Layout option 1: Large breakout room with sliding door	\$35,000
<b>B5</b>	Layout option 2 & 3: Large breakout room with sliding door	\$43,000
<b>B6</b>	Teaching area and breakout space next to large breakout room (2 x doors)	\$14,000
<b>B7</b>	Rain noise mitigation to the ceiling	\$48,000
<b>B8</b>	Improve acoustic separation	\$6,000
<b>B9</b>	Improve thermal performance	\$14,000
<b>B10</b>	Replace roof and rainwater goods	\$57,000
<b>B11</b>	Repaint the exterior, including cladding, window joinery, doors and trims	\$9,000
<b>B12</b>	Replace the exterior window joinery and doors	\$101,000
<b>B13</b>	Install accessible ramp access	\$23,000

The cost estimates have the following exclusions:

<b>C1</b>	Goods and services tax
<b>C2</b>	Consultant fees
<b>C3</b>	Removal of hazardous materials
<b>C4</b>	Treatment of contaminations, including soil
<b>C5</b>	Furniture, fittings and equipment
<b>C6</b>	ICT equipment
<b>C7</b>	Window treatments
<b>C8</b>	Cost fluctuations from September 2015
<b>C9</b>	Consent fees

Pricing is based on average New Zealand prices. There may be moderate price variations by region. The pricing was accurate in September 2015. The full detailed budget estimates are attached in Appendix 3.

## 6 Limitations and liability

This reference design package is a starting point for obtaining the necessary documentation for a standard block upgrade project. These designs are based on a number of assumptions including building location, construction details and member sizes as shown on the original drawings.

There is some variation in the geometry, material and construction within each standard block type. Standard blocks may also have had structural modifications since their original construction. Specific site and building characteristics will influence the lateral load requirements under the New Zealand Building Code.

The architectural documents have been completed to preliminary design stage, and need to be adapted to the site before being used for Building Consent. The structural documents, which have been completed to detailed design stage, can be provided to a local structural engineer to assist them in the production of a site specific structural documentation package. The site specific structural documentation package can then be provided to the territorial authority for Building Consent and to a contractor for pricing and construction.

The level of external professional input required will depend on a school's existing classroom block and their plans for upgrading it. The Ministry's Property Advisors can help schools to determine the level of external professional input required. In using these designs, Project Managers will also need to consider the extent to which the school should engage an architect, acoustic engineer, structural engineer, services engineer, fire consultant or a quantity surveyor. Schools will also need to consider whether they require a building survey measure of their building(s).

# Appendix 1 Architectural scope and plans

The architectural scope and design layout options have been prepared by Brewer Davidson Architects and can be downloaded from the [Ministry's website](#). These have been prepared to preliminary design stage.

The architectural scope is for architects and the wider design team to ensure the design is well suited to the school's existing space and site. Assumptions and exclusions are detailed in this section. The design plans show schools, project managers and designers how to modify existing standard blocks to create flexible learning spaces for a range of budgets.

## Appendix 2 Structural scope

The structural scope is to assist engineers with site specific calculations required for upgrading Formula blocks to flexible learning space using the design options in this package. It has been prepared by Aurecon to detailed design stage.

The structural scope can be downloaded from the [Ministry's website](#) and consists of:

- » Design Features Report
- » Structural Calculations
- » Structural Drawings
- » Structural Specification
- » Fire Report
- » Accessibility Report

## Appendix 3 Cost estimate

The cost estimate report has been prepared by Rider Levett Bucknall and can be downloaded from the [Ministry's website](#).

Schools can use these cost estimates to:

- » Select an appropriate pre-designed layout option (1, 2 or 3) for an existing Formula block.
- » Include any additional enhancement options when carrying out either of the layout options.
- » Gauge an approximate cost for upgrading the teaching space by selecting the specific works from the priced menu.