

Reference Designs for Standard Classroom Upgrade

NELSON TWO STOREY BLOCK

Version 1.0, September 2016



Document history

Revision date	Version	Summary of changes
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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 reviewed for acoustic functionality and structural performance, with a schedule of layout options and estimated costs for refurbishment.

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. Common engineering and design issues have been addressed within each of the reference design packages.
- » 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 the reference design packages include basic acoustic and thermal treatments. The additional enhancement options offer solutions to help bring the learning spaces closer to the Ministry’s Designing Quality Learning Spaces (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 the reference design packages.

The Ministry is currently updating the DQLS guidance documents to better reflect the requirements of flexible learning spaces. DQLS Acoustics (version 2.0) was released in September 2016 and is available online. An updated guide for Heating and Ventilation is scheduled for release by the end of 2016.



1.4 Innovative Learning Environments

An Innovative Learning Environment (ILE) 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 that can support a 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.

2 Nelson two storey block

Nelson two storey blocks were generally constructed between 1959 and 1975 and are considered to be well built, structurally resilient and weathertight. A typical Nelson two storey block contained either general learning spaces or a combination of general and specialist learning areas. The image below shows a typical 12-classroom Nelson two storey block.



Side view of a typical 12-classroom Nelson two storey block

The existing layout of the Nelson two storey block can be converted into a flexible learning space within the existing external envelope by:

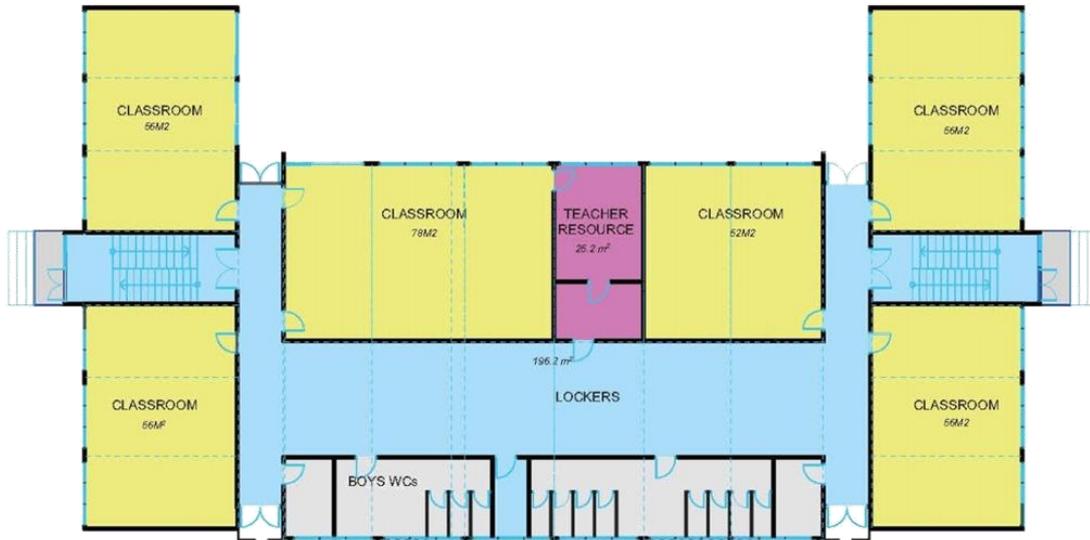
- » Removing as many of the internal walls as practicable along the building length in order to enable collaborative teaching and learning practice through the middle of the building.
- » Removing as many walls as practicable around the stairs to improve collaborative teaching and learning opportunities at each end of the building.
- » Reconfiguring the existing locker area to provide additional breakout learning areas on the ground floor.

This reconfiguration provides flexibility to support a wider variety of teaching and learning modes such as:

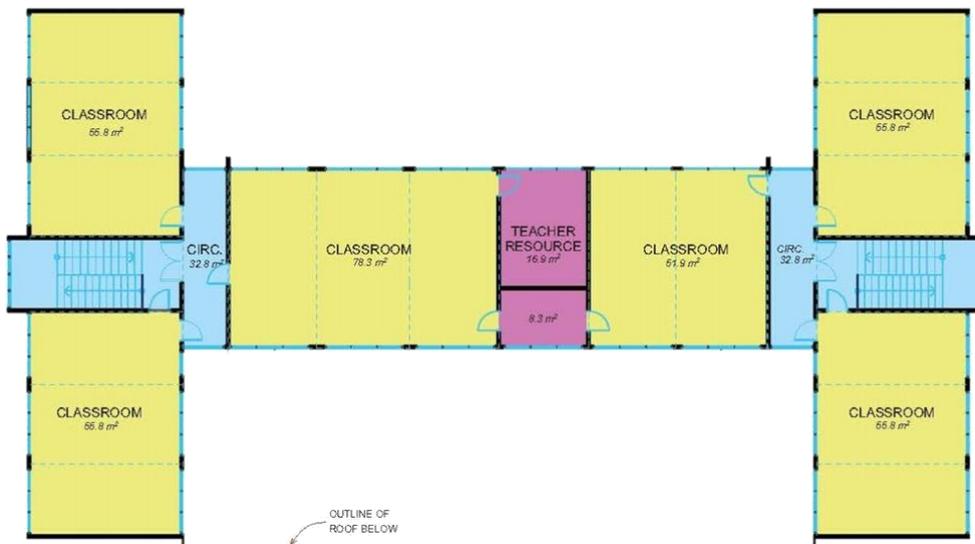
- » Collaborative teaching and learning for up to six teachers throughout the length of each floor plate with the small classrooms at the ends being used as general breakout, specialist breakout and presentation rooms.
- » Collaborative teaching and learning for up to three teachers at each end of the building.
- » Accommodating specialist learning spaces within the block.



2.1 Existing layout configuration



1 — GROUND FLOOR - EXISTING



2 — FIRST FLOOR - EXISTING
Existing footprint of a 12-classroom Nelson two storey block

This package of reference design options for the Nelson two storey block is based on a 38.5m long, 12-classroom block. There are other configurations of the Nelson two storey block, including a variant that is one structural bay longer. Many blocks include specialist learning areas, and many have been substantially modified. When a school's specific requirements, existing building configuration and site conditions are considered, the reference design can be adjusted to suit the number of classrooms at a particular school.



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 designed to accommodate a broad range of teaching and learning practices. Indicative furniture layouts have been provided to give an indication of how the spaces might be arranged.

Within the original blocks, individual classroom sizes varied with smaller classrooms located at the end of the block (55m² net) and larger classrooms (70m² net) towards the middle of the block.

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

- » Maximise connectivity within the whole learning space to enable strong collaboration of all teachers within the block by removing as many walls as practicable.
- » Provide general and theory learning spaces along the length of the building and specialist labs and/or maker spaces at the ends of the building to allow a continuous flow between the spaces.
- » The locker bay on the ground floor, while having a lower than ideal ceiling height, has been incorporated into the learning spaces in order to provide additional breakout learning space.
- » Where possible corners have been maintained in learning spaces for small group learning, while minimising areas that cannot be seen by all teachers.
- » Small breakout areas for individual and small group learning activities have been provided on each floor with the option to add glazed sliding partitions to provide a higher acoustic separation to breakout areas.
- » Moveable whiteboards, short throw projectors and/or LCD TV panels can be used within the collaborative space for instructional teaching and learning in order to maintain flexibility for reconfiguring the learning space. Wall mounted whiteboards and/or projector screens can be mounted in the breakout rooms at the end of the building.
- » Optional glazed sliding partitions can be included to form large breakout / presentation learning areas or specialist learning / maker-space areas at the ends of the building. This can provide some acoustic separation or visual privacy from the rest of the learning area.
- » Allow provision for collaborative teacher work / resource space for teachers to plan and co-ordinate learning activities and store learning resources.



- » Provide substantial acoustic absorption 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 screens can be used to provide additional levels of acoustic separation for groups if required, as well as providing additional pin-up display space to maintain flexibility for reconfiguring the learning space.
- » Improve circulation and accessibility to both floors, including the provision of a lift to the upper floor (Ministry requirement for lift size is 1500mm x 1800mm).
- » Self-contained cubicles and accessible toilets have been inserted in layout option 2. The toilets have both internal and external building access.
- » Bag storage has not been indicated on the plans or included in the cost estimates. Schools can decide if they will accommodate student bags and if so, where and how.

3.2 Standard block modernisation planning options

There are two reconfiguration options for the Nelson two storey block design as set out below:

3.2.1 Layout option 1

In this option the walls are partially removed along the length of the building and openings created to the learning areas at the ends of the building. These openings enable collaboration between three to six teachers on each floor.

Portals and walls have been inserted along the length of the building to provide bracing, and where walls are used, they only extend across half the width of the building in order to maintain connectivity along the space. These walls have been used to form small breakout areas.

The locker space has been reconfigured to provide additional breakout learning areas and teacher / resource room for the 12 teachers.

A lift and lobby space on each floor has been installed making the upper floor fully accessible.

3.2.2 Layout option 2

The walls are removed along the length of the building and openings created to the learning areas at the ends of the building. These openings enable collaboration between three to six teachers on each floor.

Portals have been inserted along the length of the building to provide bracing with maximum flexibility for student groupings and teacher collaboration. Small breakout areas can be formed with moveable screens anywhere in the space.

Walls to the staircase landing on the upper floor have been removed, increasing connectivity of the learning space at either end of the building. A lift and lobby space per floor has been installed making the upper floor fully accessible.



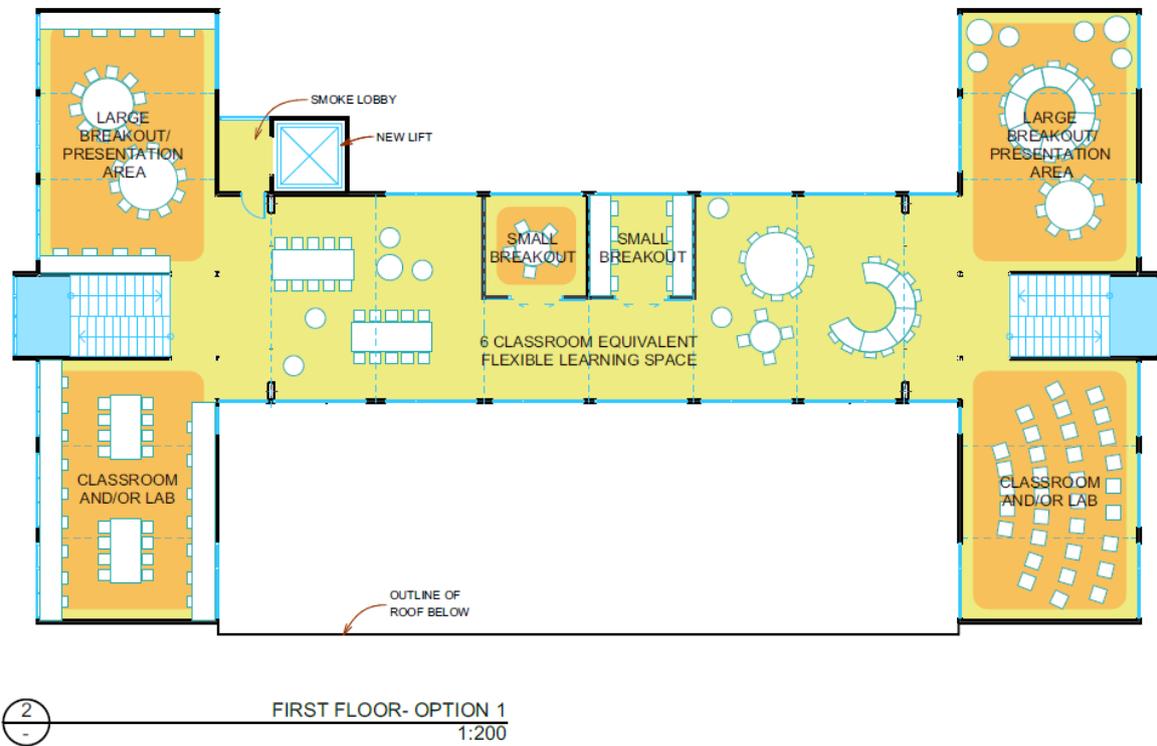
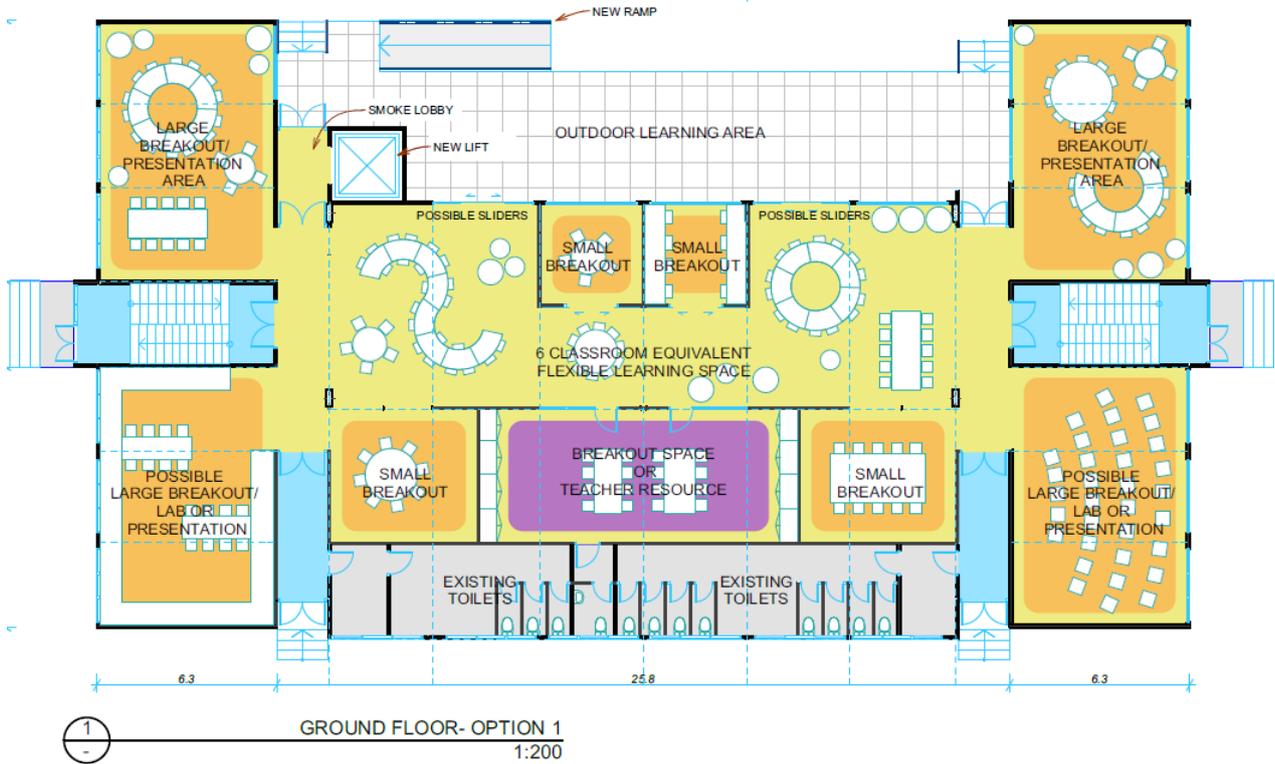
The locker space has been reconfigured to provide additional breakout learning areas and teacher / resource room for the 12 teachers.

Toilets have been reconfigured to provide self-contained cubicles together with accessible toilets. This approach provides privacy for students and frees up area for further resource and storage area.

3.3 Additional enhancement options

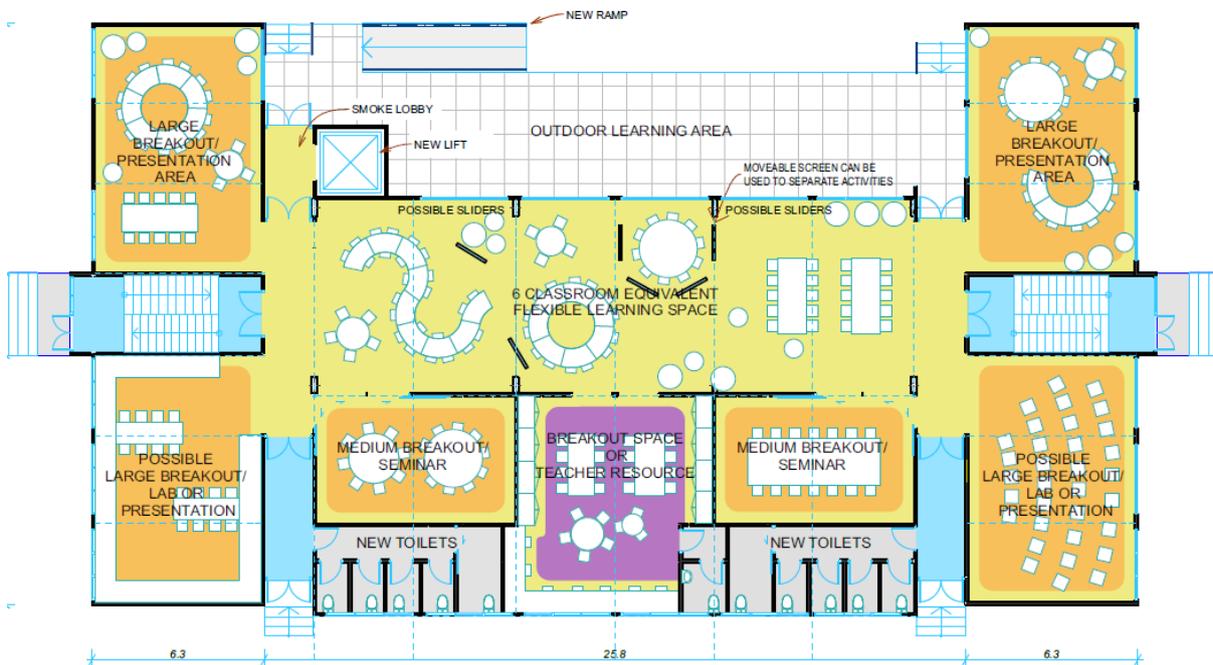
There are a number of optional enhancements that are not included in the base modernisation package, but may be undertaken concurrently with the reconfigurations. The enhancement options are shown in Section 5 and Appendix 1. Note that some enhancements (for example B16 and B17) will have to be undertaken if the blocks have not already been modernised in these areas.

Layout option 1

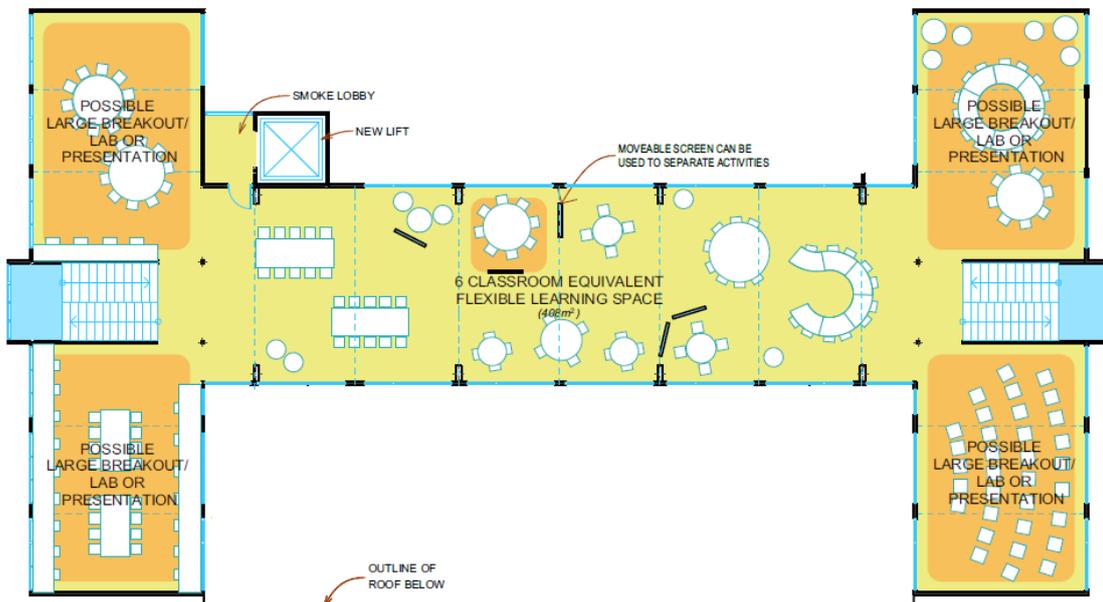


FURNITURE LAYOUT INDICATIVE ONLY

Layout option 2



1
-
GROUND FLOOR - OPTION 2
1:200



2
-
FIRST FLOOR - OPTION 2
1:200

FURNITURE LAYOUT INDICATIVE ONLY



4 Structural principles

Timber framed school buildings, including Nelson two storey blocks, are much stronger than seismic calculations previously suggested, and generally such blocks do not require any earthquake strengthening. More information about the Ministry's research on the seismic resilience of timber framed school buildings can be found [online](#).

A number of the existing Nelson two storey blocks have already been seismically strengthened. This will alter how the flexible learning space modifications shown on the architectural drawings can be carried out and the required seismic strengthening to achieve 67% of the New Building Standard (NBS). When planning modifications, school and territorial authority records should be reviewed, and a chartered professional engineer should carry out a site survey. These steps will help to establish whether any strengthening or alterations have already been carried out on the specific block. Nelson two storey blocks can have different configurations including different stair structures: either timber stairs supported by timber walls or concrete stairs supported by concrete walls. These reference designs have been based on the concrete stair and wall configuration.

The strengthening design in Appendix 2 achieves at least 67% of NBS. The wall opening sizes have been optimised with appropriate supporting wall structure provided.

The following risks and costs have not been included, but should be addressed in the final 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; and

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 and the designers can use these cost estimates to:

- » Select an appropriate pre-designed layout option (1 or 2) for upgrading an existing Nelson two storey block.
- » Include any of the additional enhancement options when carrying out either of the layout options.

Gauge an approximate cost for upgrading teaching spaces by selecting the specific works from the priced 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 Nelson two storey block have been estimated by quantity surveyors as:

A1	Layout option 1	\$1,800,000
A2	Layout option 2	\$2,000,000

Additional optional enhancements have been estimated as:

B1	Layout option 1: 4 x 1.8m wide interior glass sliding doors to 4 small breakout,	\$19,000
B2	Layout option 2: 4 x interior glass sliding doors to the 2 medium breakout rooms on the ground floor. 2 x 1.4m & 2 x 3.6m wide doors	\$28,000
B3	Layout option 1 or 2: 2 x interior glass sliding doors to the 2 large breakout rooms on the ground level at one end. 1 x 1.8m & 1 x 2.8m wide doors	\$14,000
B4	Layout option 1 or 2: 4 x interior glass sliding doors to the 2 large breakout rooms on the upper level at one end, 3 x 1.2 & 1 x 2.6m wide doors	\$19,000
B5	120m ² outdoor learning area on the ground floor	\$85,000
B6	Sliding / hinged door to outside learning area	\$25,000
B7	Improve rain noise mitigation and internal acoustics	\$16,000
B8	Layout option 1: Improve acoustic separation between new learning and breakout spaces & the existing toilets	\$2,000
B9	Improve thermal performance	Included
B10	Replace roof & rainwater goods	\$196,000
B11	Repaint exterior	\$33,000



B12	Re-clad exterior (excluding ends) (excludes additional cost of asbestos removal, see C3)	\$101,000
B13	Re-glaze existing exterior doors & windows	\$163,000
B14	Replace exterior doors & windows	\$376,000
B15	Accessible ramp access	\$22,000
B16	Inter-floor acoustics & fire separation	\$75,000
B17	Existing staircase upgrade	\$23,000

Fire protection options have been estimated at:

C1	Fire sprinkler with existing site fire infrastructure	\$128,000
C2	Fire sprinkler system without existing site fire infrastructure	\$170,000

The cost estimates have the following exclusions:

D1	Goods & services tax	D5	ICT equipment
D2	Consultant fees	D6	Window treatments
D3	Removal of hazardous materials like friable asbestos	D7	Cost fluctuations from July 2016
D4	Treatment of contaminations, including soil	D8	Furniture, fittings and equipment

Pricing is based on average New Zealand prices. There may be moderate price variations by region. The pricing was accurate as of July 2016. The full detailed budget estimates are attached in Appendix 3.



6 Limitations and liability

The reference design packages are 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 structural 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 along with the fire and accessibility reports have been completed to preliminary design stage. These documents will need to be developed and adapted for the site before being used to apply 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 a 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 and 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 is for architects, and the wider design teams, and can act as a starting point for a site specific design solution. The architectural scope and design layout options have been prepared by Brewer Davidson Architects to the preliminary design stage. These can be downloaded from the [Ministry's website](#).

The architectural scope includes generic provisions for fire safety and accessibility for Options 1 and 2. Assumptions and exclusions are set out in the architectural scope. The final design will need to be developed to ensure it is well suited to the school's existing space and site. 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 the site specific calculations required for upgrading a Nelson two storey block to a flexible learning space using the design options in this package. It has been prepared by Aurecon to the 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 estimates

The cost estimate report has been prepared by Rider Levett Bucknall and can be downloaded from the [Ministry's website](#). The pricing was accurate as of July 2016.

Schools can use these cost estimates to:

- » Select an appropriate pre-designed layout option (1 or 2) for an existing Nelson two storey block.
- » Include 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.

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