



## holmesfire | fire engineering strategy

SACRED HEART COLLEGE BLOCK A, EUPHRAISE HOUSE, SEISMIC  
STRENGTHENING

65 LAINGS ROAD  
LOWER HUTT

THE MISSION COLLAGES TRUST BOARD LOWER HUTT

VERSION A

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### ISSUE AUTHORISATION

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A	3 June 2016	For Consent	VAD	GZB

Version	Extent of revision

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Reviewed by:

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The building owner must be aware that the fire safety solutions described in this report address the requirements of the Building Code. Consideration of protection of the building owner's property is not included unless this has been specifically requested.



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### 1 PURPOSE

The purpose of this report is to determine the minimum fire safety precautions that must be installed within the existing Block A building at Sacred Heart College, Lower Hutt to demonstrate compliance with Section 112 of the New Zealand Building Act 2004 with respect to the fire regulations.

This is a legal requirement whereby it must be shown that after the completion of works, the objectives of the New Zealand Building Code relating to means of escape from fire are satisfied to the extent required by the Act.

This Fire Safety Strategy Report includes a performance based Scope of Works advising of fire safety issues affecting architecture, building services and structure in accordance with the requirements of the New Zealand Building Code.

As such this report is a performance document that is intended to be used by the Architect and other consultants in implementing their detailed designs and preparing their working drawings and specifications. The consultants whose documentation is required to incorporate the requirements of this Fire Safety Strategy Report are expected to have read this report, understood the implications as it affects their scope of work and have incorporated the relevant fire safety requirements into their drawings and specifications.

This is not a 'For Construction' document, and shall be read in conjunction with all other appropriate project design documents (drawings, specifications, and other documents) prepared by the other design disciplines.

### 2 DESIGN PHILOSOPHY

To demonstrate compliance with the relevant fire safety clauses of the Building Code, the following Compliance Documents have been adopted as the design basis:

1. C/AS4 -Acceptable Solution for Buildings with Public Access and Educational Facilities, Risk Group CA, Amendment 3, 1 July 2014.

#### 2.1 New Zealand Fire Service Commission

In accordance with section 46(1) of the Building Act 2004 some kinds of applications for Building Consent must be provided to the New Zealand Fire Service Commission for review.

The proposed works constitute an internal fit-out only, therefore under Clause 3(c) of the Gazette we believe this application need not be forwarded to the New Zealand Fire Service Commission.



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### 3 GENERALLY

The Block A building of the Sacred Heart College in Lower Hutt is two level building containing classrooms, staff areas and a canteen. The proposed works consists of seismic strengthening of the building.

Adjacent and connected to the Block A building is the school auditorium, library and the performing arts centre connected by a lobby. These areas are fire separated from Block A with plasterboard partitions and tagged 60 minutes fire doors. The adjacent areas have recently been refurbished and the means of egress of these other areas have been addressed as part of the earlier works.

The upper floor of the Block A building is served by two safe path stairs in each end of the building exiting directly to the outside. Egress from the auditorium also utilize these stairs. The doors bounding the south stair are mostly new fire doors tagged -/60/-sm while the remaining doors and all the doors bounding the north stair are solid core doors with Georgian wired glass. The south stair surface linings consists of plywood wall coverings and a wood ceiling.

A previous audit report of the building has identified that the stair width in Block A is not sufficient to accommodate the occupant load of the upper floor. To address this an additional external stair is proposed to be provided from the upper floor as part of the works.

The building has an existing Type 4 smoke alarm system installed throughout and this is to be retained as part of the works.

#### 3.1 Limitation of Scope

This report addresses the fire safety requirements for the building in general terms, the fire safety precautions as required C/AS4 have been considered for the building as a whole, and the discharge of the building's exitways has been reviewed and any issues noted. The detailed scope of this assessment covers the area of alteration, given the scope of the proposed alterations we believe this is reasonable.

### 4 SCOPE OF WORKS

We believe that the proposed alterations to the Block A Building will be in compliance with the objectives of the New Zealand Building Code clauses C1 to C6 Protection from Fire, to the extent required by the Building Act, based on implementation of the following Scope of Works. This shall be read in conjunction with the attached Fire Safety Sketches.

#### 4.1 Active Fire Safety Systems

- 4.1.1 The existing smoke detection system is to be retained altered as necessary in accordance with NZS 4512 to suit the proposed works in the area of alteration.



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4.1.2 The existing manual fire alarm system is required to be altered as necessary in accordance with NZS 4512 to suit the proposed works in the area of alteration.

4.1.3 The existing fire alarm sounder system is required to be altered as necessary to suit the works in accordance with the standard of installation.

### 4.2 Means of Escape and Wayfinding

4.2.1 Doors are required to open in the direction indicated on the attached plans.

Doors are required to swing in both directions where there is egress in both directions.

4.2.2 All doors on escape routes shall have a clear height of no less than 1955 mm for the required width of the opening.

4.2.3 An additional egress stair is required from the first floor of Block A and is required to have a clear width of no less than 1200 mm. Handrails are permitted to impinge into the required escape route width by up to 100 mm.

The stair is to be separated by a distance of no less than 2.0 m to the adjacent firecells on the ground floor.

An indicative location of the additional stairs is shown on the attached sketches.

4.2.4 All locking devices on doors on escape routes from the area of alteration shall be clearly visible, located where such a device would normally be expected, designed to be easily operated without a key or other implement and allow the door to open in a normal manner.

4.2.5 Doors on escape routes from the area of alteration that are fitted with electronic locking devices shall also be fitted with a push button or switch that releases the lock and allows the door to be opened (in the direction of escape) without a swipe card or key code, unless the doors act under free handle. This push button or switch may be placed behind a break-glass panel but must be clearly labelled "Emergency door release". Electromechanical locks that are not free handle are required to unlock (fail safe/open) in the event of power failure or door malfunction.

4.2.6 Vision panels are to be provided to doors into exitways (into the safe path stairs) and to doors in corridors along an escape route, and those that swing in two directions. Vision panels in smoke control doors shall be no less than 150 mm from the leaf edge.

4.2.7 Escape routes shall comply with NZBC D1.



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- 4.2.8 The existing emergency lighting fixtures are to be retained in accordance to the standard they were installed to.

New emergency lighting fixtures are to be provided to the proposed external stair in accordance with F6/AS1.

- 4.2.9 The existing exit signage is required to be retained and altered as necessary throughout the area of alteration in accordance with F8/AS1 (note that F8/AS1 4.5.1 permits signs to be internally illuminated, externally illuminated or photoluminescent).

Indicative locations of exit signs are shown on the attached plans; however these do not take account of possible obscuration due to the installation of storage racks, plant, furniture and other fittings and therefore should not be assumed to depict all required signs.

- 4.2.10 Fire related safety features within the area of alteration are required to be provided with signage in accordance with F8/AS1. This includes signs to manual call points, fire and smoke control doors, door release buttons or switches and signs in the stairwell to identify the floor level

### 4.3 Control of Internal Fire and Smoke Spread

- 4.3.1 Doors bounding the safe path stairs in Block A are required to be certified fire rated door sets complying with NZS 4520 that achieve a FRR of no less than -/60/30 sm.

The existing doors tagged -/60/- sm may be retained and will comply on an ANARP basis. Doors with no tags are required to be replaced with complying door sets.

- 4.3.2 All penetrations through fire separations (created by wires, cables, pipes, flush boxes, etc) that are created or uncovered as part of these works are required to be fire stopped with systems (collars, wraps, sleeves, mastics, etc) that are approved for the proposed use (e.g. rating, orientation, penetration type, construction type) in accordance with AS 1530 and AS 4072.1. Where fire stopping systems to AS 4072.1 are not able to be provided, it is acceptable to incorporate systems tested to BS EN 1366.3, or UL 1479. Fire stopping systems are required to be installed strictly in accordance with the manufacturer's instructions.

- 4.3.3 Throughout the area of alteration any new the internal surface finishes shall meet the following early fire hazard indices limitations (when tested to ISO 9705 as per C/VM2 Clause A1.2, or ISO 5660 as per C/VM2 Clause A1.3).



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The wood and plywood surface finishes of the walls and ceiling of the safe path stairs are to be upgraded to achieve these requirements.

Building Elements	Location	Maximum Material Group
Ceilings and walls	Exitways (safe path stairs)	1S
Ceilings	Crowd spaces	2S
Walls	Crowd spaces	2S
HVAC ducts	Internal surfaces	1S
	External surfaces	3

The correlation of wall and ceiling surface finishes derived from Australian or European classifications to the Group Number requirements of NZBC Clause 3.4(a) can, without the need for further testing, be taken as described in the following table.

Group Number to NZBC Clause C3.4(a) using ISO 9705:1993	Australian Group Number to NCC Specification C1.10 Clause 4 using AS ISO 9705:2003	European Classification to EN 13501-1:2007+A1:2009
1-S	Group 1, and a smoke growth rate index not more than 100	Class A1, A2 or B and Smoke production rating s1 or s2
1	Group 1	Class A1, A2 or B
2-S	Group 2, and a smoke growth rate index not more than 100	Class C and Smoke production rating s1 or s2
2	Group 2	Class C
3	Group 3	Class D

- 4.3.4 Any foamed plastic building materials or exposed combustible insulating materials forming part of a wall, ceiling or roof system are required to have a completed system (foamed plastic and/or foamed plastic plus a surface lining) meeting the above maximum material group number as applicable for the location of this building material. In addition the foamed plastic is to meet the flame propagation criteria as specified in AS 1366. It is strongly recommended that foamed plastic materials are not used.
- 4.3.5 Any new flooring shall meet the following critical radiant flux limitations (when tested to ISO 9239-1).

Area of Building	Minimum Critical Radiant Flux [kW/m <sup>2</sup> ]
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Area of Building	Minimum Critical Radiant Flux [kW/m <sup>2</sup> ]
Exitways (safe path stairs)	2.2
All other occupied spaces	2.2

- 4.3.6 Within the building any new suspended flexible fabrics shall have a Flammability Index of no greater than 12 (when tested to AS 1530.2).
- 4.3.7 New flexible fabrics used as underlay to roofing or exterior cladding that is exposed to view, shall have a flammability index of no greater than 5 (when tested to AS 1530.2)

The scope of works above lists the fire safety precautions needed for compliance with the fire safety requirements of the Building Code, this scope of works should be read with the plans appended to this report.





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### 5 MEANS OF ESCAPE

#### 5.1 Risk Groups and Occupant Loads

The following is a summary of the design occupancies and risk group classifications within the building of alteration.

Table 1: Summary of Risk Groups and Occupant Loads

Level	Description	Risk Group	Area [m <sup>2</sup> ]	Occupant Density [m <sup>2</sup> /person]	Occupant Load
G	Block A Classrooms	CA	7x25 <sup>1</sup>		175
	Cafeteria	CA	167	1.25	134 <sup>1</sup>
	Auditorium	CA	No. of Seats		600 <sup>2</sup>
	Performing arts centre classrooms	CA	112	2	56
	Performing arts centre offices	WB	69	10	7
1	Block A Classrooms	CA	17x25		425
	Library	CA	238	7	34
	Performing Arts Centre	CA	75	2	38
	Total				735

#### Explanatory Notes:

1. Classroom occupancy as advised by client.
2. Not included in total to avoid duplication.
3. As advised by client. The full capacity of the auditorium is not expected to be used when the Block A classrooms are used. Therefore, for the purpose of evaluating the means of egress from the Block A classrooms the auditorium occupant load will not be included to avoid duplication.

The above occupant loads are based upon the methods recommended in the Acceptable solutions C/AS4.

#### 5.2 Fire Safety Precautions and Fire Resistance Ratings

The following summarises the fire safety precautions for the building of alteration from C/AS4.



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Table 2: Fire Safety Systems Required

Risk Group	Occ. Load	Escape Height [m]	Systems	Notes
CA	100 to 1000	4.0 to 25	4, 9, 18 <sup>1</sup>	

### Explanatory Notes:

1. Not required where Fire Service hose run distance from the point of Fire Service vehicular access to any point on any floor is less than 75 m.

Table 3: Fire Resistance Ratings Required

Risk Group	Life Rating [min]	Property Rating [min]
CA	60	120

Given the above the proposed fire safety features are shown below with comparison to the requirements of C/AS4 as appropriate.

Table 4: Proposed Fire Safety Precautions

Feature	C/AS4 Requirement	Existing/Proposed Features
Fire Rating	(60)/60/60 between firecells.	<p>(60)/60/60 between firecells.</p> <p>Existing fire rating consists of concrete slabs between the floor levels, and plasterboard partitions bounding safe paths stairs and between Block A and the auditorium lobby. The exact construction of the plasterboard walls was not able to be determined on site.</p> <p>The doors in the south stair and to the auditorium lobby fire separations consists mainly of tagged -/60/- sm fire doors. The doors bounding the north stair and some of the doors bounding the south stair are solid core timber doors with Georgian wired glazing.</p> <p>As part of the works the untagged fire doors bounding the stairs are proposed to be replaced by -/60/30 sm tagged doors.</p>



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Feature	C/AS4 Requirement	Existing/Proposed Features
Alarm System	An automatic fire alarm system consisting of smoke detectors and manual call points.	An automatic smoke detection system is provided.
Fire Hydrant System	Not required as Fire Service hose run distance is less than 75 m.	Not required as Fire Service hose run distance is less than 75 m.
Other Protection	Smoke control in air handling systems.	No air handling systems passing through fire separations have been identified in the building.

Table 5: Other Precautions Related to Means of Escape

Feature	F6/AS1 and F8/AS1 Requirement	Existing/Proposed Features
Visibility in Escape Routes	Emergency lighting fixtures to be provided in accordance with F6/AS1.	Emergency lighting fixtures present, central system in block A corridors and north stair, localised fixtures present in south stair.  Existing emergency lighting fixtures are to be retained, and new are to be installed by the proposed external stair in accordance to F6/AS1.
Exit & Directional Signage	Exit and directional signage required in accordance with F8/AS1.	The building is provided with illuminated exit and directional signage throughout.

### 5.3 Escape Route Features

The following summarises the configuration of the escape routes within the building.

#### BLOCK A GROUND FLOOR

The occupants on the ground floor have the option of exiting the building via the south and north stair doors, via the lobby to the auditorium and arts centre, and via the school yard entrance to the east. In addition to this all ground floor classrooms have exits directly to the outside.

#### CAFETERIA

The occupants in the cafeteria can exit directly to the outside via the exit doors to the north and south, and into the south stair of Block A.



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### BLOCK A FIRST FLOOR

The occupants on the first floor of Block A can egress via the safe path stairs in the north and south ends of the building block. In addition to the existing stair a new external stair will be added to the middle of the building as part of the proposed works, providing first floor occupants with a three means of escape.

### LIBRARY

Occupants in the library can exit the building either directly to the outside via an external stair, or via the south stair of Block A.

### AUDITORIUM

Occupants in the auditorium can egress either via the ground level auditorium entrance into the auditorium lobby from where can exit to the outside via east, west and south exit doors, or via the exit doors in top of the tiered seating leading into Block A where they can utilize the south and north safe path stairs.

### PERFORMING ARTS CENTRE

The ground floor of the performing arts centre has exits to the auditorium lobby from where can exit to the outside via east, west and south exit doors. Occupants on the first floor of the performing arts centre can exit to the auditorium lobby via an internal stair and to the outside via an external stair.

## 5.4 Escape Route Widths

The following summarises the allowable and actual escape route widths provided from the floor level or area noted.



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Table 6: Egress Width Requirements - Horizontal

Level	Description	Occ. Load	Total Width Required [mm]	Width Required Horiz. <sup>1</sup> [mm]	Width Actual Horiz. [mm]
G	Block A total	600	4200	3x1400	1x1470 1x1600 1x1500 7x760
	Auditorium Lobby	600	4200	3x1400	2x900 2x1500
	Cafeteria	134	938	2x760	2x1500 1x760
1	Block A	425	2975	2x1500	2x1470 2x760
	Library	34	306	1x700	1x1470 1x760

Table 7: Egress Width Requirements - Vertical

Level	Description	Occ. Load	Total Width Required [mm]	Width Required Vert. <sup>2</sup> [mm]	Width Actual Vert. [mm]
1	Block A and Library	459	4131	2x2100	1x1100 1x1270 1x1200 1x900 1x1000
	Performing Arts Centre	38	342	1x1000	1x1400 1x1000

### Explanatory Notes:

1. Handrails are permitted to impinge into the required escape route width by up to 100 mm without affecting the required vertical travel width.

The above shows that the escape route widths within the building comply with the minimum requirements of C/AS4.



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### 5.5 Travel Distances

The following summarises the allowable and actual travel distances, taking into account the permitted distances based on the installed fire safety systems.

Table 8: Summary of Actual and Permitted Travel Distances

Level	Description	DEOP Permitted [m]	DEOP Actual [m]	TOP Permitted [m]	TOP Actual [m]
G	Block A	40	6	100	53
	Auditorium	40	7	100	54
	Performing Arts Centre	40	17	100	42
1	Block A	40	17	100	68
1	Performance Arts Centre	40	11	100	50 <sup>1</sup>

Explanatory Notes:

1. Measured travel distances have been increased by a factor of 1.2 for the internal stair.

The above shows that the travel distances within the building comply with the maximum permitted by C/AS4.

## 6 SPREAD OF SMOKE AND FIRE

### 6.1 Internal Fire Rating Requirements

As the Life Rating of the building is 60 minutes, it is required under C/AS4 that each firecell be separated with bounding construction that achieves a FRR of no less than (60)/60/60sm. The fire separations are indicated on the attached plans.

The existing fire separations consists of concrete slabs between the floor levels, and plasterboard partitions bounding safe paths stairs and between Block A and the auditorium lobby. The exact specification of the plasterboard partitions was not possible to determine on site, however are expected to have been designed as fire walls as they contain fire doors.

The doors in the south stair and to the auditorium lobby fire separations consists mainly of tagged -/60/- sm fire doors. The doors bounding the north stair and some of the doors bounding the south stair are solid core timber doors with Georgian wired glazing.

To provide an increased protection of the safe path stairs in Block A the existing untagged fire doors bounding the stairs are proposed to be replaced by -/60/30 sm tagged doors as part of the works.



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All penetrations through fire separations (created by wires, cables, pipes, flush boxes, etc) that are created or uncovered as part of these works are required to be fire stopped with systems (collars, wraps, sleeves, mastics, etc) that are approved for the proposed use (e.g. rating, orientation, penetration type, construction type) in accordance with AS 1530 and AS 4072.1. Where fire stopping systems to AS 4072.1 are not able to be provided, it is acceptable to incorporate systems tested to BS EN 1366.3, or UL 1479. Fire stopping systems are required to be installed strictly in accordance with the manufacturer's instructions.

Regarding the significant upgrade of the fire doors to bring the building more in line with the current requirements and taken into account the extent of works being proposed, we believe that the internal fire separations in the building will comply on an as near as is reasonable basis.

### 6.2 Surface Finishes

The existing surface finishes in Block A consists mainly of plasterboard linings. The ceiling of the ground and first floor corridors consists of timber cladding. The wall linings in the ground floor corridor and in the stairs are partly covered by plywood boards.

To protect the egress routes from the first floor the wood and plywood surface linings in the safe path stairs are proposed to be upgraded to achieve Group Number 1S. The existing plasterboard surface linings in this area are considered achieve this rating ANARP. Given this upgrade, the improved egress conditions from the upper floor by the proposed additional stair, and taking into account the extent of the seismic strengthening work proposed we believe that the surface finishes in the building will comply on an as near as is reasonably practicable basis.

## 7 DUTY OF CARE

Please note that the solution we are proposing herein will meet the requirements of the New Zealand Building Code to the extent required by the Building Act with respect to the means of escape from fire behaviour only.

Under the New Zealand Building Act 2004, there is no requirement for the building owner to protect their own property other than to satisfy the life safety objectives of the Building Act. As such, in the event of a fire, it is possible that the property loss within the building could be significant.

The extent of emergency lighting specified in this fire report are minimum for fire safety only and does not specifically account for lighting that may be needed for other emergencies. Please note that other emergency lighting not specified in this report and not related to fire safety may be required for compliance with Clause F6 of the New Zealand Building Code.







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Escape route widths specified in this fire report are minimum widths for fire safety only and do not specifically account for widths that may be needed for access for people with disabilities. Also note that other escape routes features (not specified in this report) and not related to fire safety may be required for compliance with Clauses D1 and F4 of the New Zealand Building Code.

Submission of this Report for Building Consent implies full understanding and acceptance of the above.

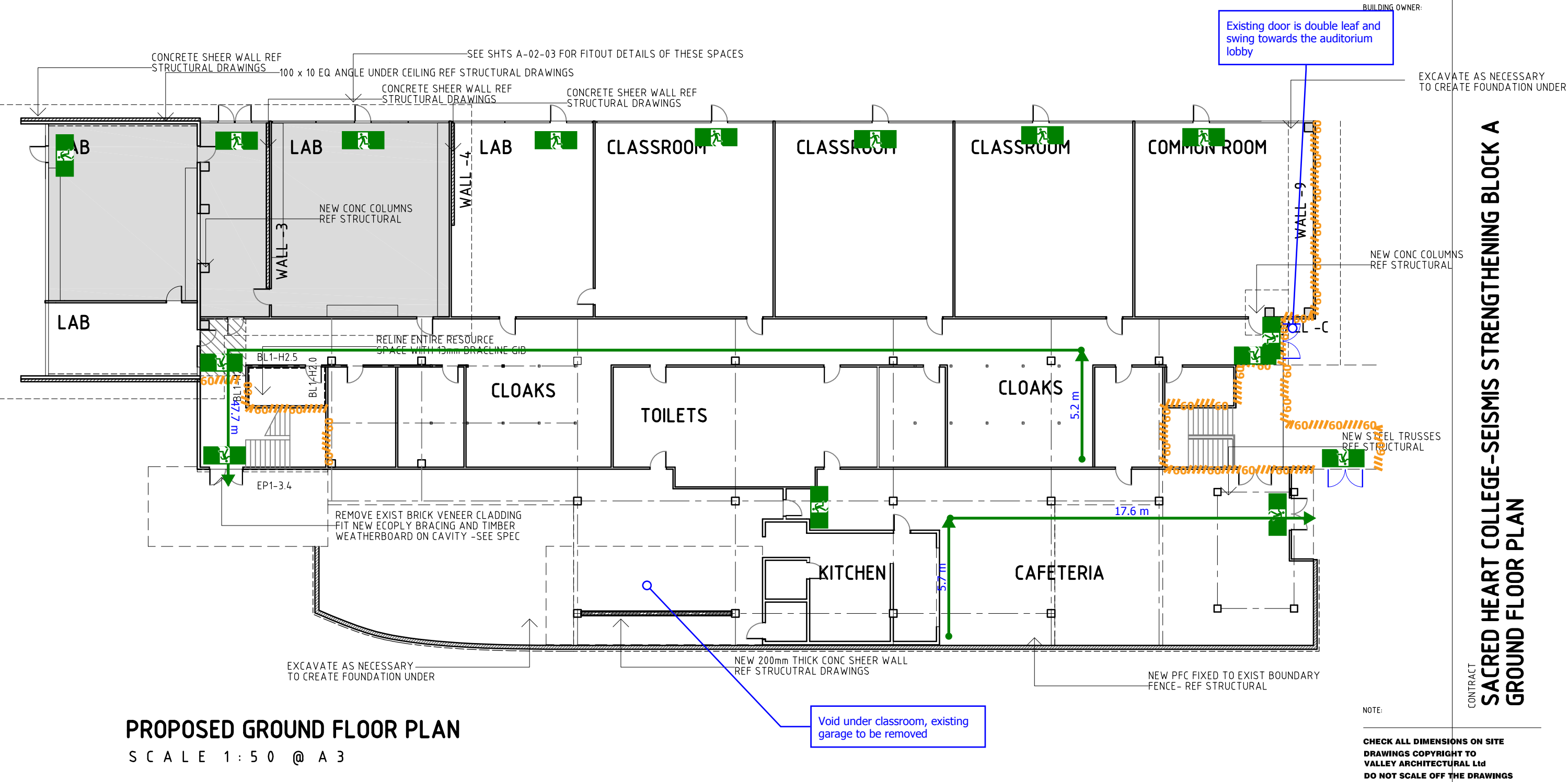


<b>Legend</b>  Exit Sign  Egress route  (60)/60/60 Sm (assumed existing)	<b>Project Title</b>  Sacred Heart College Seismic Strengthening	<b>Sketch Title</b>  Fire / Smoke Separations & Means of Escape	Drawn: VAD      Date: 03/06/16		
			Job No      Sheet No      Rev 103747.03 <b>FSK 01</b> A		
			This sketch does not constitute a complete fire engineering design or detail. Detailed construction drawings are provided by others. Best viewed in colour. Not all fire separations around ducts and shafts are shown.		

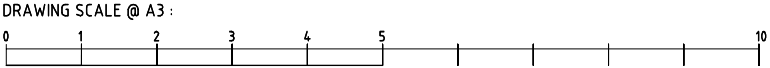


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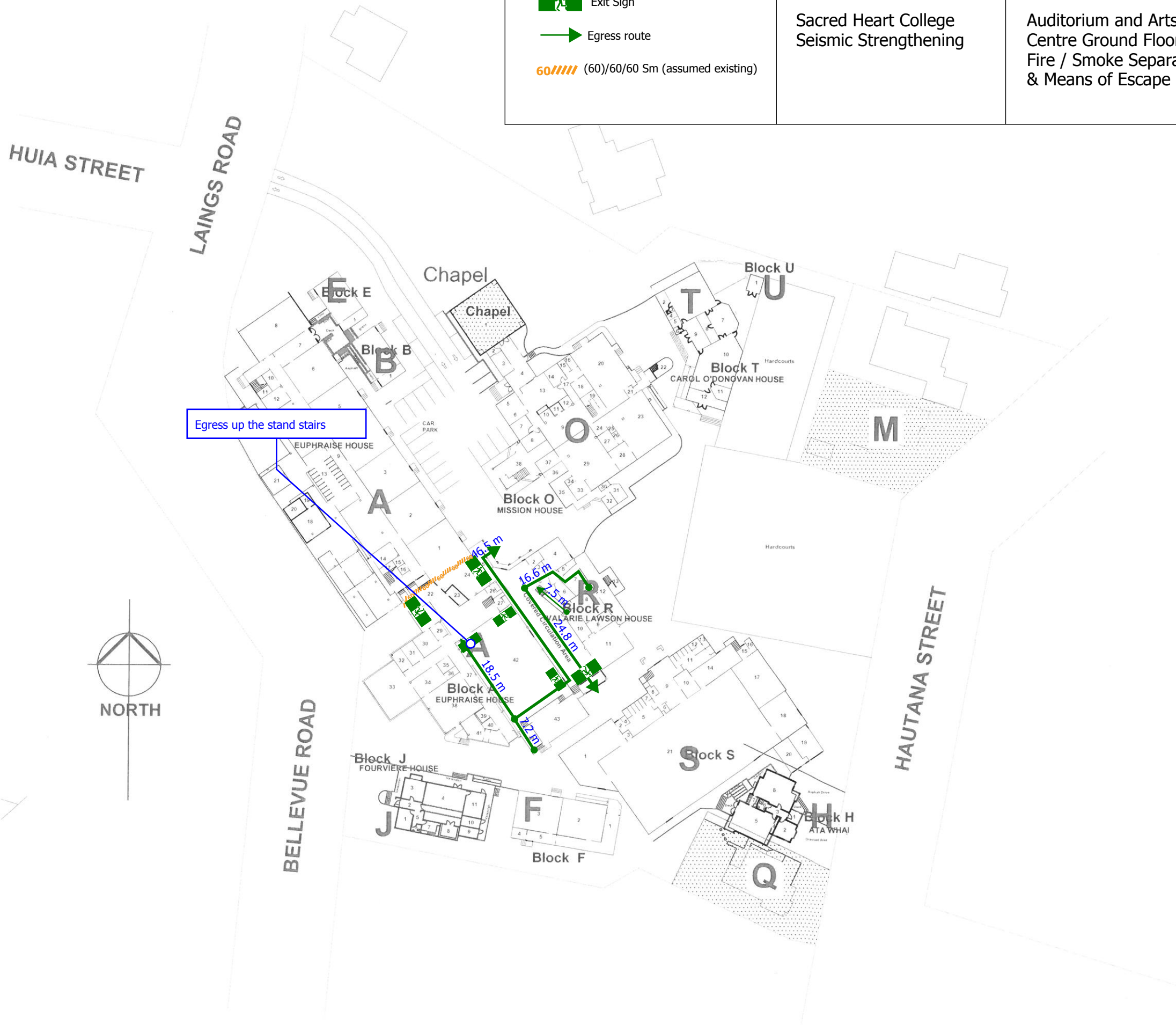
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<div>Legend</div> <div><div> Exit Sign</div><div> Egress route</div><div> (60)/60/60 Sm (assumed existing)</div></div>	<div>Project Title</div> <div>Sacred Heart College Seismic Strengthening</div>	<div>Sketch Title</div> <div>Auditorium and Arts Centre Ground Floor - Fire / Smoke Separations &amp; Means of Escape</div>	<div>Drawn: VAD      Date: 03/06/16</div>		
			<div>Job No</div> <div>103747.03</div>	<div>Sheet No</div> <div><b>FSK 03</b></div>	<div>Rev</div> <div>A</div>
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<p>Legend</p> <p> Exit Sign</p> <p> Egress route</p> <p> (60)/60/60 Sm (assumed existing)</p>	<p>Project Title</p> <p>Sacred Heart College Seismic Strengthening</p>	<p>Sketch Title</p> <p>Auditorium and Arts Centre First Floor - Fire / Smoke Separations &amp; Means of Escape</p>	<p>Drawn: VAD      Date: 03/06/16</p>	
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