



BUILDING CODE OF AUSTRALIA REPORT

ONE SYDNEY HARBOUR

Barangaroo, Stage 1B Basement

**State Significant Development
Application (SSD 6960)**

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Date	Revision Number	No. of pages	Issue or Description of Amendment	Checked By	Approved By	Date Approved
09.12.14	01	14	DRAFT Report for State Significant Development Application	Vanessa Batty	-	-
10.04.15	02	14	FINAL Report for State Significant Development Application	Vanessa Batty	Stephen Natilli	10.04.15
01.05.15	03	16	FINAL Report for State Significant Development Application	Vanessa Batty	Stephen Natilli	01.05.15
14.08.15	04	16	FINAL Report for State Significant Development Application	Vanessa Batty	Stephen Natilli	14.08.15
12.11.15	05	16	BDA comments addressed for Land Owners Consent	Vanessa Batty	Stephen Natilli	12.11.15

Executive Summary

As Accredited Certifiers, we have reviewed architectural design documents prepared by Lend Lease Design (refer appendix A) for compliance with the Building Code of Australia 2015 (BCA).

Where there are areas that do not comply with the deemed to satisfy provisions, an alternate solution prepared by a suitable qualified person will be prepared to ensure compliance with the Performance Requirements of the BCA.

The assessment of the design documentation has revealed that the following matters will require assessment against the relevant performance requirements of the BCA prior to the issue of a Construction Certificate (CC). The submission for Construction Certificate will need to include verification from a suitably accredited fire engineer: -

DTS Clause	Description of Non-Compliance	Performance Requirement
C2.7, C2.8, C2.9	Separation of building by fire walls The basement is proposed to be considered as a separate building from the buildings above for the purposes of Parts C, D and E of the BCA. The fire separation proposed between the basement and the buildings above varies from the prescriptive requirements of the BCA. The separation is proposed on the horizontal plane in lieu of the prescribed vertical plane.	CP1, CP2, EP1.3, EP1.6 and EP2.2
D1.4, D1.5	Extended Travel Distances The following travel distances are proposed within the basement:- - Up to 25m to a point of choice, in lieu of 20m 60m to an exit, in lieu of 40m 100m between exits, in lieu of 60m	DP4 and EP2.2
E1.8 and Specification E1.8	Fire Control Room The location of the Fire Control Room for the basement will involve a change in level of greater 300mm from the road, and as such, it is considered a deviation of the BCA Clause E1.8 and Clause 8 of Specification E1.8.	EP1.6
E4.9 and AS1670.1-2004	Sound System and Intercom System for Emergency Purposes The proposed system will not meet the requirements of Clause 4.3.5 of AS1670.4-2004 for speech intelligibility	EP4.3
Clauses C2.7, C2.8 and C2.9	The basement is proposed to be fire separated from the buildings above via a combination of vertical and horizontal elements – ie ground floor slab.	CP1, CP2, EP1.3, EP1.6 and EP2.2

The basement and individual buildings above are to be treated as separate buildings for the purposes of determining compliance with sections C, D and E of the BCA with the following exceptions:

- All buildings are to be considered when demonstrating safe occupant egress by way of a precinct wide evacuation strategy.
- Fire services are to be shared between all buildings as part of a precinct wide fire services strategy.

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Clauses D1.4 and D1.5	The maximum travel distances within the basement carpark are generally proposed as follows: • 30m to a point of choice in lieu of 20m. • 70m to the nearest exit in lieu of 40m. • 100m between alternative exits in lieu of 60m. There may also a number of specific areas which exceed the above parameters.	DP4 and EP2.2
Clause E1.5 and AS 2118.1-1999, AS 2118.6-2012 and AS 4118.1.6-1995	The proposed sprinkler system will adopt in part AS 2118.1-2006 in lieu of AS 2118.1-1999 for 1,200kPa pressure to sprinkler heads to align with the fire hydrant standard. High pressure valves manufactured by Victaulic not covered under AS 4118.1.6-1995 are to be utilised on the high pressure stage of the combined sprinkler / hydrant system.	EP1.4
Clause E1.8 and specification E1.8	In lieu of providing a single fire control room which would be typically required for a united building greater than 50m in effective height it is proposed to provide a fire control room for each tower with an effective height of 50m or greater. It is proposed to provide a fire control room within the basement which will have indication from the precinct fire control rooms above basement and be able to initiate evacuation of the respective building as selected by attending fire brigades. The basement fire control room location involves a change in level to a road or open space in excess of 300mm.	EP1.6
Clause E1.3 and AS 2419.1-2005	Due to the multiple entry points for each building the combined sprinkler / hydrant booster assemblies may not technically be within sight of the main building entry. The fire rated protection around the booster assembly does not extend 2m on each side of and 3m above the upper hose connections in accordance with AS 2419.1-2005.	EP1.3
Specification E2.2a, AS 1670.1-2004, AS 1670.4-2004 and AS 3013-2005	Fire rated fibre optic network communication is proposed throughout the precinct. These fire rated fibre optic cabling systems are not referenced within any Australian Standard which would otherwise be required under the BCA.	CP7 and EP2.2
Clause E4.9 and AS 1670.4-2004	The sound system and intercom system for emergency purposes (SSISEP) within the basement will not necessarily meet the requirements under clause 4.3.6 of AS 1670.4-2004 for intelligibility.	EP4.3
Clause D1.7	The basement and buildings above merge and do not provide independent egress by way of its own fire isolated passageway.	DP4 and DP5

	It is noted that the exits from the basement and buildings above are considered separate exits.	
Clause E1.3 and AS 2419.1-2005	By-pass lines are not proposed to be provided around the intermediate relay pumps to pressure stages higher than 1,000kPa.	EP1.3
Clause D1.6	Paths of travel reduced to 600mm in width in some areas.	DP6
Clause D1.7	Direct access to the fire stairs from the private substations / diesel generator.	DP5
Clause D2.20	Doors from a number of rooms swing against the direction of egress	DP2
Clause E1.4	There are a number of rooms which are located off the fire rated smoke lobbies which will not be provided with fire hose reel coverage.	EP1.1
	The fire rated smoke lobbies are not provided with fire hose reel coverage.	
Clause E1.3 and AS 2118.6-2012 and AS 2419.1-2005	Use of multi-stage relay pump (diagram in AS 2118.6-2012) in lieu of relay pumps at each pressure stage (AS 2419.1-2005 and words in AS 2118.6-2012).	EP1.3

Where items for which an alternate solution is prepared relate to Category 2 items under the Environmental Planning & Assessment Regulation 2000, the fire engineered solution will be approved as part of the Construction Certificate process after consultation with Fire and Rescue NSW.

As Accredited Certifiers, McKenzie Group Consulting are satisfied that the proposed development is capable of achieving compliance with the requirements of the Building Code of Australia, further documentation verifying compliance with the BCA will accompany the application for a Construction Certificate for the development. The application for Construction Certificate shall be assessed under the relevant provisions of the Environmental Planning and Assessment Act 1979 and the Environmental Planning and Assessment Regulation 2000.

Assessed by:
Vanessa Batty
Director

1.0 Introduction

This report supports a State Significant Development Application (SSD 6960) submitted to the Minister for Planning pursuant to Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act). The Development Application (DA) seeks approval for construction of the Stage 1B Basement and associated works at Barangaroo South as described in the Overview of Proposed Development section of this report.

The purpose of this report is to describe the capability of the proposed development to achieve compliance with the Building Code of Australia (BCA).

1.1 Overview of Proposed Development

The Stage 1B Basement DA seeks approval for the construction of a four level basement to accommodate parking for the Stage 1B Residential Buildings (subject to separate SSD applications). The works include the construction of common plant and services, loading docks, waste rooms and storage areas, as well as structural cores and associated building services for the Stage 1B Residential Buildings. The proposed development also includes above ground elements such as roads, car park ramps and risers, and temporary public domain and landscaping works.

1.2 Site Location

Barangaroo is located on the north western edge of the Sydney Central Business District, bounded by Sydney Harbour to the west and north, the historic precinct of Millers Point (for the northern half), The Rocks and the Sydney Harbour Bridge approach to the east, and a range of new development dominated by large CBD commercial tenants to the south.

The Barangaroo site has been divided into three distinct redevelopment areas (from north to south) – the Barangaroo Reserve, Barangaroo Central and Barangaroo South.

The Stage 1B Basement DA Site area is located within Barangaroo South. The Development Application Site is located on land generally known and identified in the approved Concept Plan MP06_0162 (as proposed to be modified) as Blocks 4A and 4B and part of the public domain area between those blocks and Block 5.

1.4 Current Legislation

The applicable legislation governing the design of buildings is the Environmental Planning and Assessment Act 1979. This Act requires that all new building works must be designed to comply with the BCA.

The version of the BCA applicable to the development, is version that in place at the time of the application to the Certifying authority for the Construction Certificate. For the purposes of this report, BCA 2015 has been utilised as the benchmark for BCA compliance, being the version of the BCA applicable at the time of preparation of this report.

2.0 Building Assessment Data

Summary of Construction Determination: -

Stage 1B Basement	
Classification	7a
Number of Storeys Contained	4
Rise In Storeys	0
Type of Construction	Type A*
Effective Height (m)	>50m*

Note:

(*) The Type of construction and effective height of the basement and the proposed buildings to which it is associated are considered to be considered as part of the Fire Engineering Strategy.

Summary of the floor areas and relevant populations where applicable: -

Part of Project	BCA Classification	Approx. Floor Area (m ²)	Assumed Population
Basement Level B1	7a	11,300	377
Basement Level B2	7a	10,900	364
Basement Level B3	7a	10,900	364
Basement Level B4	7a	10,900	364
Basement Level B5	7a	260	9
Total		44,260m²	1,478

Notes:

1. Floor areas are approximate only.
2. The above populations have been based on the floor areas and calculations in accordance with Table D1.13 of the BCA.

3.0 Structural Provisions

Prior to the issue of the Construction Certificate structural certification is required to be provided demonstrating that the detailed structural design of the development will comply with the applicable requirements of AS/NZS 1170.1-4.

4.0 Fire Resistance

As part of the Fire Safety Strategy, prepared by the Fire Engineer, the buildings are to be constructed generally in accordance with Table 3 of Specification C1.1 of the Building Code of Australia 2015, the building is to be Type A Construction.

The building has been assessed on the basis of the following fire separation/compartimentation within the development;

- Separation between the carpark levels and the retails portions of 180 minutes,

Fire resistance levels (FRL) for building structural members are to achieve 120 minutes.

In accordance with the Fire Engineering Strategy for the development, prepared by Defire, the basement is proposed to be considered as a separate building from the buildings above for the purposes of Parts C, D and E of the BCA. The fire separation proposed between the basement and the buildings above varies from the prescriptive requirements of the BCA as the separation is proposed on the horizontal plane in lieu of the prescribed vertical plane. A Performance-based solution is to be developed by the fire engineer to address Performance Requirements CP1, CP2, EP1.3, EP1.6 and EP2.2.

4.1 Protection of Openings

The prescriptive provisions of the BCA stipulate that openings within building elements required to have an FRL shall be protected as follows:

1. Penetrations through fire rated floors to be protected either by a tested prototype (e.g. fire collar, fire damper, etc) or be installed within a fire rated shaft achieving an FRL of 120/120/120;
2. Any penetration through a wall or room required to have an FRL (e.g. substation, boiler room, apartment separating wall etc) is to be protected either by a tested prototype (e.g. fire collar, fire damper, etc) or be installed within a shaft achieving an FRL of 120/120/120;
3. Self-closing -/60/30 fire doors to the doors opening to the fire isolated stairs (note that this also includes the access doors to the condenser units on the plant platforms).

Note that where fire dampers, fire collars, etc are utilised, allowance needs to be made for access hatches to be provided within the walls / ceilings to ensure that maintenance access is provided.

4.2 Passive Fire Protection

Passive fire protection issues that will need to be addressed in detailed documentation phase include:

- Lift motor rooms,
- Emergency power supply,
- Emergency generators,

- Electricity supply,
- Boilers or batteries,
- Hydrant Pump rooms,
- Sprinkler Pump Rooms,

These areas are to be separated from the remainder of the building by construction achieving a minimum fire resistance level of 120 minutes.

4.3 Fire Hazard Properties

The fire hazard properties of fixed surface linings and mechanical ductwork will also need to be addressed within the detailed documentation phase pursuant to specification C1.10 Building Code of Australia.

5.0 Egress

The egress provisions from the proposed building are provided by fire isolated stairways (Note: Stairs are required to be fire isolated where they connect more than 2 storeys)

Other detailing issues that will be addressed in Construction Certificate documentation will include:

- Door Hardware,
- Exit door operation,
- Stair construction,
- Handrail and balustrade construction,
- Details of separation of rising and descending stairs and their interface with the buildings above,
- Discharge from the Fire Isolated Exits,
- Details of the egress provisions to the Road.

5.1 Exit Travel Distances

The locations of the proposed exits would appear to indicate that travel distances and distances between alternative exits are extended from the prescriptive requirements of the BCA. The prescriptive requirements of the BCA are as follows:-

BCA Class 7

- 20m to a single exit or point of choice and where two exits are provided, a maximum of 40m to one of those exits; and
- exits shall be located to not be more than 60m apart and not closer than 9m

A performance based solution is proposed to be developed by the Fire Engineer during further design development, to verify extended travel distances of up to:-

- 30m to a point of choice in lieu of 20m.
- 70m to the nearest exit in lieu of 40m.
- 100m between alternative exits in lieu of 60m.

5.2 Dimensions of Exits

Minimum dimensions of 1000mm wide and 2000mm height to be provided within exits, with the paths of travel should provide a minimum width of 1000mm (note that all maintenance access, cat walks, etc may comply with AS1657 in which case a 600mm clear width is required).

The following table summarises the exit widths required:

Floor Level	Approx. Exit Width Provided	Number of people (as provided)	Exit Width required
Basement Level B1	7m	377	2.7m
Basement Level B2	7m	364	3.4m
Basement Level B3	7m	364	3.4m
Basement Level B4	7m	364	3.4m

Doorways are permitted to contain a clear opening width of 750mm with a height of 1980mm as part of egress requirements. Access for persons with disabilities however requires a clear doorway opening width of 850mm (i.e minimum 870 mm doors).

5.3 Fire Isolated Exits

Each fire-isolated stairway or fire-isolated ramp is to provide independent egress from each storey served and discharge directly, or by way of its own fire-isolated passageway to:

- A road or open space; or
- To a point within the confines of the building, that is used only for pedestrian movement, car parking or the like and is open for at least 2/3 of its perimeter; and from which an unimpeded path of travel, not further than 20 m, is available to a road or open space; or
- Into a covered area that adjoins a road or open space, is open for at least 1/3 of its perimeter, has an unobstructed clear height throughout, including the perimeter openings, of not less than 3 m and provides an unimpeded path of travel from the point of discharge to the road or open space of not more than 6 m.

Where a path of travel from the point of discharge of a fire-isolated exit necessitates passing within 6m of any part of an external wall of the same building, measured horizontally at right angles to the path of travel, that part of the wall must have an FRL of not less than 60/60/60 and any openings protected internally in accordance with C3.4, for a distance of 3 m above or below, as appropriate, the level of the path of travel, or for the height of the wall, whichever is the lesser.

The discharge of exits from the basement is to be further reviewed for compliance with the BCA through design development including consideration for interface with the buildings located on Ground Floor.

5.4 Balustrading and Handrail

Balustrading to a height of 1000mm with a maximum opening of 125mm in any direction should be provided adjacent to balconies, landings, corridors etc where located adjacent to a change in level exceeding 1000mm.

Where it is possible to fall more than 4m to the finished floor below, the balustrade shall not contain any horizontal or near horizontal members that facilitate climbing.

Handrails should generally be provided at a minimum height of 865mm alongside of all ramps and stairs.

The main public stairs and ramps should be designed in accordance with the requirements of AS1428.1 for persons with disabilities. This requires a handrail on each side of the stair and ramp and for the handrail to extend approximately 550mm – 600mm past the last tread / end of ramp.

5.5 Access for Persons with a Disability

Access for people with disabilities shall be provided to and within the building in accordance with the requirements of Clause D3.2, D3.3 and D3.4 of the BCA 2015. Parts of the building required to be accessible shall comply with the requirements of AS1428.1-2009.

The design would generally comply with the prescriptive provisions of the BCA with additional ongoing review being undertaken as to door widths, circulation, etc. Further details are to be provided and assessed by an access consultant prior to the issue of the Construction Certificate.

General

Access to be provided to and within the building pursuant to AS1428.1-2009 as follows:

- To and within any level containing accessible carparking spaces,
- Via the principle public entry and at least 50% of all other entrances,
- From designated car parking spaces for the use of occupants with a disability, and
- From another accessible building connected by a pedestrian link.

Note that entrances that are not accessible are to be located within 50m of an entrance that is accessible.

6.0 Fire Services and Equipment

The design of fire services and equipment is to be carried out through further design development, certification of system compliance will be verified prior to the issue of the Construction Certificate. The following fire services will need to be provided throughout the building:-

- Fire hydrants in accordance with clause E1.3 of the BCA and AS 2419.1-2005,
- Fire hose reels in accordance with clause E1.4 of the BCA and AS 2441-2005,
- An automatic sprinkler system in accordance with the relevant provision of clause E1.5 of the BCA and AS 2118.1-1999.
- Portable Fire Extinguishers in accordance with Clause E1.6 of the BCA and AS 2444-2001,
- Fire Control Room in accordance with BCA Clause E1.8 and Specification E1.8.
- Sound System and Intercom System for Emergency Purposes in accordance with AS 1670.4-2004.
- Emergency lighting, exit signage and directional exit signage is required throughout the building in accordance with Part E of the BCA and AS/NZS 2293.1-2005

The location of the Fire Control Room for the basement will involve a change in level of greater 300mm from the road, this is considered a deviation from the deemed-to-satisfy provisions of the

BCA, an alternative solution is to be developed by and verified by the Fire Engineer for compliance with Performance Requirement EP1.6.

The sound system and intercom system for emergency purposes (SSISEP) within the basement will not necessarily meet the requirements under clause 4.3.6 of AS 1670.4-2004 for intelligibility, an alternative solution is to be developed and verified by the Fire Engineer for compliance with performance requirement EP4.3.

6.1 Fire Hydrants

A system of Fire Hydrants is to be provided to BCA Clause E1.3 and AS 2419.1-2005.

A booster assembly is required as part of the fire hydrant requirements. The booster if is required to be located attached to the building at the main entry. If remote from the building at the main vehicle entry or with sight of the main entry of the building within 20m of a hardstand area.

Fire hydrants are to be provided within fire isolated stairs where required by AS 2419.1-2005.

6.2 Fire Hose Reels

A Fire Hose Reel System is required to BCA Clause E1.4 and AS2441-2005.

Fire hose reels are to be located within 4m of exits and provide coverage within the building based on a 36m hose length.

Please note that fire hose reel coverage cannot pass through fire or smoke doors.

6.3 Automatic Sprinkler Protection

An Automatic Fire Suppression System is required to Specification E1.5 and AS2118.1-1999.

The location of pumps, tanks, FIP, control valves and booster assembly is to be determined through further design development prior to the issue of a Construction Certificate.

7.0 Ventilation and Smoke Hazard Management

Smoke hazard management shall be provided throughout the building by means of the following systems:

- Automatic Pressurisation to Fire Isolated Exits in accordance with the requirements of AS/NZS 1668.1-1998
- Smoke detection system in accordance with Clause 5 of BCA Specification E2.2a to operate the automatic pressurisation System.
- Mechanical ventilation system to AS1668.2-2012 and clause 5.5 of AS1668.1-1998 except that
 - Fans with metal blades suitable for the operation at normal temperature may be used; and
 - The electrical power and control cabling need not be fire rated.

8.0 Lift Services

The passenger lifts to be installed are to be: -

- Fitted with warning signs, fire service controls in accordance with AS 1735.2,

- Stretcher facilities are to be provided within the lifts with minimum dimensions of 600mm wide, 2000mm long and 1400mm high,
- An emergency lift with stretcher facilities in accordance with part E3.4 of the BCA and AS 1735.2,
- Be provided with the following: -
 - A handrail in accordance with AS 1735.12
 - Minimum internal floor dimensions as specified in AS 1735.12,
 - Fitted with a series of door opening sensory devices which will detect a 75mm diameter or across the door opening between 50mm and 1550mm above floor level,
 - Have a set of buttons for operating the lift located at heights above level complying with AS 1735.12.

9.0 Energy Efficiency

The proposed development shall comply with Part J of the BCA. To achieve compliance, there are two options available:

1. The building can comply with the deemed-to-satisfy provisions of the BCA, relating to the following areas:
 - Building Fabric
 - Building Sealing
 - Air Conditioning and Ventilation Systems
 - Artificial Lighting and Power
 - Hot Water Supply
2. The building can be verified against a reference building as per Verification Method JV3. This requires that the proposed building and its services be shown to have an annual energy consumption of equal or less than the reference building which has been modelled as per the requirements of Part J of the BCA.

Access for maintenance is to be provided to the building in accordance with the requirements of BCA Part J8.

The proposed site will be located in a climate zone 5.

Due to special nature of the building some energy provisions may not be appropriate.

Certification from an appropriately qualified engineer will be provided for either option prior to the issue of a Construction Certificate via a report / computations outlining how compliance is achieved.

10.0 Conclusion

In conclusion, as Accredited Certifiers, McKenzie Group Consulting are satisfied that the proposed development is capable of achieving compliance with the requirements of the Building Code of Australia, further documentation verifying compliance with the BCA will accompany the application for a Construction Certificate for the development. The application for Construction Certificate shall be assessed under the relevant provisions of the Environmental Planning & Assessment Act 1979 (As Amended) and the Environmental Planning & Assessment Regulation 2000.

Appendix A - Design Documentation

The following documentation was used in the assessment and preparation of this report: -

Drawing / Document No.	Title	Revision	Drawn By
BB2_PA2_A000	Title Sheet	Rev A	Lend Lease
BB2_PA2_A001	Aerial Location Plan	Rev A	Lend Lease
BB2_PA2_A002	Survey Plan	Rev A	Lend Lease
BB2_PA2_A003	Demolition, Excavation & Services Zone Plan	Rev A	Lend Lease
BB2_PA2_A100	Basement Plan Level B0	Rev A	Lend Lease
BB2_PA2_A101	Basement Plan Level B1	Rev A	Lend Lease
BB2_PA2_A102	Basement Plan Level B2	Rev A	Lend Lease
BB2_PA2_A103	Basement Plan Level B3	Rev A	Lend Lease
BB2_PA2_A104	Basement Plan Level B4	Rev A	Lend Lease
BB2_PA2_A105	Basement Plan Level B5	Rev A	Lend Lease
BB2_PA2_A300	Section 01	Rev A	Lend Lease
BB2_PA2_A301	Section 02	Rev A	Lend Lease
BB2_PA2_A302	Section 03	Rev A	Lend Lease
BB2_PA2_A303	Section 04	Rev A	Lend Lease
BB2_PA2_A401	Building Elements - Podium 1	Rev A	Lend Lease
BB2_PA2_A402	Building Elements - Podium 2	Rev A	Lend Lease
BB2_PA2_A400	Building Elements - Ground Floor	Rev A	Lend Lease
BB2_PA2_A501	Building Elements - Elevations	Rev A	Lend Lease

Appendix B - Draft Fire Safety Schedule

Essential Fire Safety Measures	Standard of Performance
1. Access Panels, Doors and Hoppers	BCA Clause C3.13
2. Automatic Fail Safe Devices	BCA Clause D2.19 & D2.21
3. Automatic Fire Suppression System	BCA Spec. E1.5 & AS 2118.1 – 1999,
4. Emergency Lifts	BCA Clause E3.4 & AS 1735.2 – 2001
5. Emergency Lighting	BCA Clause E4.2, E4.4 & AS/NZS 2293.1 – 2005
6. EWIS	BCA Clause E4.9 & AS 1670.4 - 2004
7. Exit Signs	BCA Clauses E4.5, E4.6 & E4.8 and AS/NZS 2293.1 – 2005
8. Fire Control Centres and Rooms	BCA Spec. E1.8
9. Fire Dampers	BCA Clause C3.15, AS 1668.1 – 1998 & AS 1682.1 & 2 – 1990
10. Fire Doors	BCA Clause C3.2, C3.4, C3.5, C3.6, C3.7 & C3.8 and AS 1905.1 – 2005
11. Fire Hose Reels	BCA Clause E1.4 & AS 2441 – 2005
12. Fire Hydrant System	Clause E1.3 & AS 2419.1 – 2005
13. Fire Seals	BCA Clause C3.15 & AS 1530.4 – 1997
14. Lightweight Construction	BCA Clause C1.8 & AS 1530.3 – 1999
15. Mechanical Air Handling System	BCA Clause E2.2, AS/NZS 1668.1 – 1998 & AS 1668.2 – 1991
16. Paths of Travel	EP&A Reg 2000 Clause 186
17. Portable Fire Extinguishers	BCA Clause E1.6 & AS 2444 – 2001
18. Pressurising Systems	BCA Clause E2.2 & AS/NZS 1668.1 – 1998
19. Residential Automatic Sprinkler System	AS 2118.4 – 1995
20. Smoke Hazard Management System	BCA Part E2 & AS/NZS 1668.1 – 1998
21. Smoke Dampers	AS/NZS 1668.1 – 1998
22. Smoke Doors	BCA Spec. C3.4
23. Warning and Operational Signs	Section 183 of the EP & A Regulations 2000, AS 1905.1 – 2005, BCA Clause C3.6, D2.23, E3.3

Appendix C- Fire Resistance Levels

The table below represents the Fire resistance levels required in accordance with BCA 2015:

Table 3 TYPE A CONSTRUCTION: FRL OF BUILDING ELEMENTS

Building element	Class of building — FRL: (in minutes)			
	Structural adequacy/Integrity/Insulation			
	2, 3 or 4 part	5, 7a or 9	6	7b or 8
EXTERNAL WALL (including any column and other building element incorporated therein) or other external building element, where the distance from any <i>fire-source feature</i> to which it is exposed is—				
For <i>loadbearing</i> parts—				
less than 1.5 m	90/ 90/ 90	120/120/120	180/180/180	240/240/240
1.5 to less than 3 m	90/ 60/ 60	120/ 90/ 90	180/180/120	240/240/180
3 m or more	90/ 60/ 30	120/ 60/ 30	180/120/ 90	240/180/ 90
For non- <i>loadbearing</i> parts—				
less than 1.5 m	—/ 90/ 90	—/120/120	—/180/180	—/240/240
1.5 to less than 3 m	—/ 60/ 60	—/ 90/ 90	—/180/120	—/240/180
3 m or more	—/—/—	—/—/—	—/—/—	—/—/—
EXTERNAL COLUMN not incorporated in an <i>external wall</i> , where the distance from any <i>fire-source feature</i> to which it is exposed is—				
less than 3 m	90/—/—	120/—/—	180/—/—	240/—/—
3 m or more	—/—/—	—/—/—	—/—/—	—/—/—
COMMON WALLS and FIRE WALLS—	90/ 90/ 90	120/120/120	180/180/180	240/240/240
INTERNAL WALLS—				
<i>Fire-resisting lift and stair shafts—</i>				
<i>Loadbearing</i>	90/ 90/ 90	120/120/120	180/120/120	240/120/120
<i>Non-loadbearing</i>	—/ 90/ 90	—/120/120	—/120/120	—/120/120
<i>Bounding public corridors, public lobbies and the like—</i>				
<i>Loadbearing</i>	90/ 90/ 90	120/—/—	180/—/—	240/—/—
<i>Non-loadbearing</i>	—/ 60/ 60	—/—/—	—/—/—	—/—/—
<i>Between or bounding sole-occupancy units—</i>				
<i>Loadbearing</i>	90/ 90/ 90	120/—/—	180/—/—	240/—/—
<i>Non-loadbearing</i>	—/ 60/ 60	—/—/—	—/—/—	—/—/—
<i>Ventilating, pipe, garbage, and like shafts not used for the discharge of hot products of combustion—</i>				
<i>Loadbearing</i>	90/ 90/ 90	120/ 90/ 90	180/120/120	240/120/120
<i>Non-loadbearing</i>	—/ 90/ 90	—/ 90/ 90	—/120/120	—/120/120
OTHER LOADBEARING INTERNAL WALLS, INTERNAL BEAMS, TRUSSES and COLUMNS—				
	90/—/—	120/—/—	180/—/—	240/—/—
FLOORS	90/ 90/ 90	120/120/120	180/180/180	240/240/240
ROOFS	90/ 60/ 30	120/ 60/ 30	180/ 60/ 30	240/ 90/ 60