BUILDING CODE OF AUSTRALIA REPORT

North Shore Private Hospital
Westbound Street, St Leonards NSW

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Date	Revision Number	No. of pages	Issue or Description of Amendment	Checked By	Approved By	Date Approved
19.08.16	01	16	Preliminary Report	Matt Marks	Vanessa Batty	19.08.16

Executive Summary

As Accredited Certifiers, we have reviewed architectural design documents prepared by Health Projects International (HPI) (refer appendix A) for compliance with the Building Code of Australia 2016.

The assessment of the design documentation has revealed that the following areas are required to be assessed against the relevant performance requirements of the BCA. The submission for Construction Certificate will need to include verification from a suitably accredited fire engineer: -

DTS Clause	Description of Non-Compliance	Performance Requirement
C2.3	**Fire Compartmentation** An assessment of the floor area of fire compartmentation has identified the following areas where compartmentation exceeds the prescribed requirements of the BCA:- ▪ LG3 - the size of the fire compartment was identified as being 5550m2 which is greater than the 5000m prescribed in the deemed-to-satisfy provisions of the BCA. ▪ LG2 - the size of the fire compartment was identified as being 5719m2 which is greater than the 5000m prescribed in the deemed-to-satisfy provisions of the BCA. ▪ Ground Floor to level 6 – Patient Care areas are adequately divided into fire compartments not exceeding 2000m^2, Smoke proof walls are required to divide the floor area into <500m2 floor areas. The above mentioned fire and smoke compartments which currently exceed the prescriptive requirements of the BCA, are to be addressed through a revised architectural design and / or in consultation with the Fire Engineer through the development of an alternative solution.	CP1, CP2, EP2.2
D1.4, D1.5	**Provisions for Egress** The following areas exceed the maximum allowable travel distance: ▪ LG2 – 50m to an exit in lieu of 40m ▪ GF – 26m to a point of choice in lieu of 12m, 47m to an exit in lieu of 30m, ▪ L1 – 16.5m to a point of choicein lieu of 12m. ▪ LG2 – 65m between alternative exits in lieu of 60m The extended travel distances are to be addressed through the development of a Fire Engineered Solution.	DP4, EP2.2
E1.8	**Fire indicator Panel** Fire Indicator panel located 10metres from main entrance in lieu of 4m.	EP1.6
E2.3	**Smoke Hazard Management** The current design proposal includes the rationalisation of smoke hazard management within the building with the potential omission of zone smoke control from the above ground levels.	EP2.2

	This design solution is to be reviewed and an alternative solution developed by the Fire Engineer to verify compliance with the Performance Requirements of the BCA.

The fire engineered solution relating to EP2.2 will need to be approved after consultation with the NSW Fire Brigade as part of the Construction Certificate process.

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.

Assessed By

Matthew Marks
Assistant Building Surveyor

1.0 Introduction

The proposed development comprises the construction of a 9 storey Private Hospital which includes 3 levels of carparking, 2 levels of medical treatment and consulting suites, and 4 levels of ward.

The site is located at Westbound Street, St Leonards NSW.

1.1 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.

2.0 Building Assessment Data

Summary of Construction Determination: -

	Building 1
Classification	7a, 9a
Number of Storeys Contained	9
Rise In Storeys	9
Type of Construction	A
Effective Height (m)	>25m

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

Part of Project	**BCA Classification**	**Approx. Floor Area (m^2)**	**Assumed Population**
Lower Ground 3	7a	5550	185
Lower Ground 2	7a	5719	190
Lower Ground 1	7a	232	7
Ground Floor	9a/5	3168	316
Level 1	9a/5	2668	266
Level 2	9a	2416	241
Level 3	9a	1244	124
Level 4	9a	1244	124
Level 5	9a	1244	124
Total		**23485m²**	**504**

Notes:
1. The above populations have been base on the floor areas and calculations in accordance with Table D1.13 of the BCA.
2. The floor areas have been adjusted without ancillary areas such as sanitary facilities, corridors, shelving and or racking layouts in storage areas.

3.0 Structural Provisions

Any new structural works are to comply with the applicable requirements of AS/NZS 1170.1.

Glazing is to comply with AS1288, and AS2047.

Prior to the issue of the Construction Certificate structural certification is required to be provided.

4.0 Fire Resistance

The buildings should be constructed generally in accordance with Table 3 & 3.9 of Specification C1.1 of the Building Code of Australia 2016. The building is required to be Type A Construction.

Fire resistance levels for building structural members are as follows:
- Health Care portion 120 minutes
- Car park levels 120 minutes

Buildings of Type A Construction are required to designed to have external walls of non-combustible construction in order to comply with the deemed-to-satisfy provisions of the BCA. Concessions are afforded to attachments to external walls subject to achieving compliance with BCA Spec C1.1, Clause 2.4. Design development s to include detailed documentation of the external wall system and test data verifying compliance with these provisions of the BCA.

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

- Separation between the carpark levels and the Commercial Health Care portions of 120 minutes,
- Separation of Lift and Fire Stair Shafts of 120 minutes,
- Fire compartmentation of the building at each floor level,
- Fire compartmentation of the Patient Care Areas must be in accordance with the below requirements:-

Patient care areas

a) Patient care areas must be divided into fire compartments not exceeding 2000 m2.
b) fire compartments must be separated from the remainder of the building by fire walls

Ward Areas

a) where the floor area exceeds 1000m^2, must be divided into floor areas not more than 1000m^2 by walls with an FRL of not less than 60/60/60; and
b) where the floor area exceeds 500 m2, must be divided into floor areas not more than 500m^2 by smoke-proof walls complying with Specification C2.5; and
c) where the floor area is not more than 500m^2, must be separated from the remainder of the patient care area by smoke-proof walls complying with Specification C2.5; and
d) where division of ward areas by fire-resisting walls under (i) or (iii)(A) is not required, any smoke-proof wall required under (iii)(B) or (C) must have an FRL of not less than 60/60/60.

Treatment Areas

a) where the floor area exceeds 1000m^2, must be divided into floor areas not more than 1000m^2 by smoke-proof walls complying with Specification C2.5; and
b) where the floor area is not more than 1000m^2, must be separated from the remainder of the patient care area by smoke-proof walls complying with Specification C2.5.

An assessment of the floor area of fire compartmentation has identified the following areas where compartmentation exceeds the prescribed requirements of the BCA:-

- LG3 - the size of the fire compartment was identified as being 5550m2 which is greater than the 5000m prescribed in the deemed-to-satisfy provisions of the BCA.
- LG2 - the size of the fire compartment was identified as being 5719m2 which is greater than the 5000m prescribed in the deemed-to-satisfy provisions of the BCA.
- Ground Floor to level 6 – Patient Care areas are adequately divided into fire compartments not exceeding 2000m^2, Smoke proof walls are required to divide the floor area into <500m2 floor areas.

The above mentioned fire and smoke compartments which currently exceed the prescriptive requirements of the BCA, are to be addressed through a revised architectural design and / or in consultation with the Fire Engineer through the development of an alternative solution.

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. Any external opening within 3m of the fire source feature protected by -/60/- fire rated construction, or externally located wall wetting sprinklers, or an alternate solution be provided to verify CP2 of the BCA.
2. 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 120/120/120;
3. 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 (or 120/120/120 where it is a room such as a substation);
4. 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.

Fire source feature is defined as;
(a) The far boundary of a road, river, lake or the like adjoining an allotment,
(b) The side or rear boundary of the allotment,
(c) The external wall of another building on the allotment which is not a class 10 building.

4.4 Passive Fire Protection

Other 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,

To be separated from the remainder of the building by construction achieving a minimum fire resistance level of 120 minutes.

4.4 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
- External perimeter doorways
- Required non-fire isolated stairways

Other detailing issues that will need to be addressed include:

- Door Hardware
- Exit door operation
- Stair construction
- Handrail and balustrade construction
- Details of Separation of rising & descending stairs
- Discharge from the Fire Isolated Exits
- Details of the egress provisions to the Road.

5.1 Exit Travel Distances

The Deemed-to-satisfy provisions of the BCA prescribe that travel distances to exits should not exceed:

Class 5-9
- 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

Class 9a
- No point on the floor to be more than 12m from a point of choice
- Maximum distance of travel of 30m
- Alternative exits not more than 45m apart

The following areas exceed the maximum allowable travel distance:

- LG2 – 50m to an exit in lieu of 40m
- GF – 26m to a point of choice in lieu of 12m, 47m to an exit in lieu of 30m,
- L1 – 16.5m to a point of choice in lieu of 12m.
- LG2 – 65m between alternative exits in lieu of 60m

Further design development will require an alternative egress rote being provided from LG1 level. Once an alternative exit is documented, travel distances from this level will be reviewed to assess compliance with the deemed-to-satisfy provisions of the BCA.

Paths of travel to exits and travel distances will be continued to be assessed through design development. Travel distances to exits within the building will exceed that prescribe by the BCA and as such, will be assessed as part of the Fire Engineered Solution for the development verifying compliance with DP4 and EP2.2.

5.2 Dimensions of Exits

Minimum dimensions of 1000mm 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	Exit Width Provided	Number of people (as provided)	Exit Width required
Lower Ground 3	4m	185	2m
Lower Ground 2	4m	190	2m
Lower Ground 1	1m	7	1m
Ground Floor	7m	316	3m
Level 1	4m	266	3m
Level 2	4m	241	2.5m
Level 3	3m	124	1.25m
Level 4	3m	124	1.25m
Level 5	3m	124	1.25m

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 must 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.

Fire-Isolated stairs 2, 3, 6, 8 and the staff corridor exits, located on the Ground Floor level involve passing within 6m of an external wall of the same building, that part of the wall is required to achieve and FRL of 60/60/60 and any opening be protected in accordance with C3.4 of the BCA,

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.

Any windows with a sill height of less than 1.7m in bedrooms or 865mm in all other cases with a fall of more than 2m for windows, 4m for all other cases, openings are to be restricted or a protective barrier that does not allow a 125mm sphere to pass through.

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 2011. 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 or access to these areas is to be assessed by an access consultant.

Where the main public entrance is via a ramp, tactile indicators shall be provided in accordance with AS 1428.4 at the top and bottom. Parking shall be provided for people with disabilities in accordance with in accordance with Clause D3.5 of the BCA. Facilities services and features of the building accessible to people with disabilities shall be identified by signage complying with Clause D3.6 of the BCA.

General

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

- 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.
- From another accessible building connected by a pedestrian link.
- All areas used by the public.

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

A hearing augmentation-listening system shall be installed throughout the building in accordance with the requirements of Clause D3.7 of the BCA.

6.0 Fire Services & Equipment

The following fire services will need to be provided throughout the building:

- An automatic sprinkler system in accordance with the relevant provision of clause E1.5 of the BCA and AS 2118.1-1999, throughout the whole 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,
- Portable Fire Extinguishers in accordance with Clause E1.6 of the BCA and AS 2444-2001,
- Sound System & 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

A fire Control centre shall be provided in accordance with Clause E1.8 of the BCA.

6.1 Fire Hydrants

A system of Fire Hydrants is required to be provided to BCA Clause E1.3 and AS 2419.1-2005. We will reply upon design certificate from a Hydraulic Consultant.

A booster assembly 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 10m of the Building.

Fire hydrants are to be provided within fire isolated stairs/within 4.0m of required exits.

6.2 Fire Hose Reels

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

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 AS2118-1999

Location of pumps, tanks, FIP, control valves and booster are satisfactory to be detailed on plans for further assessment.

An occupant warning system that is triggered upon activation of the sprinkler system is required to be provided in accordance with BCA Specification E1.5.

7.0 Ventilation and Smoke Hazard Management

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

- Zone Smoke Control in accordance with the requirements of AS/NZS 1668.1-1998;
- Automatic Shutdown of Mechanical Systems in accordance with the requirements of AS/NZS 1668.1-1998 which does not form part of a Zone smoke control system on the activation of;
  - Smoke Detectors and the Automatic Fire Detection and Alarm system, and the Sprinkler System complying with E1.5,
- Automatic Smoke Detection and Alarm System in accordance with the requirements of BCA Spec E2.2a and AS 1670.1-2004
- Automatic Pressurisation to Fire Isolated Exits in accordance with the requirements of AS/NZS 1668.1-1998

A fire indicator panel is required as part of the detection system. This panel is to be located within 4m of the main entry. Any variation to the prescriptive provisions will require the consent of the fire brigade and should form part of the fire safety engineering report to verify the performance requirements of the BCA. The proposed Fire indicator Panel is proposed to be located 10m from the main entry. This is required to be assessed by a fire safety engineer against the performance provisions of the BCA.

The current design proposal includes the rationalisation of smoke hazard management within the building with the potential omission of zone smoke control from the above ground levels. This design solution is to be reviewed and an alternative solution developed by the Fire Engineer to verify compliance with the Performance Requirements of the BCA.

Throughout the development the provision of natural or mechanical ventilation is required to all habitable rooms in accordance with F4.5 Building Code of Australia and AS 1668 and AS/NZS 3666.1.

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 600m 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 Sanitary Facilities

The sanitary & other facilities within the development are yet to be determined, due to the preliminary nature of the proposal. An analysis will be undertaken once tenants and indicative layouts/tenant numbers are known.

Please note the Unisex facilities provided for people with disabilities may be counted once for each sex. These facilities are to be provided in accordance with AS1428.1-2001.

Where detailed fitout is pending analysis will be undertaken once tenants and indicative layouts/tenant numbers are known. No allowance has been made for corridors etc that would be provided.

10.0 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
    - Glazing
    - Building Sealing
    - Air Conditioning & Ventilation Systems
    - Artificial Lighting & 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.

Certification from an appropriately qualified engineer should be provided for either option with a report / computations outlining how compliance is achieved.

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.

Appendix A - Design Documentation

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

Drawing No.	Title	Date	Drawn By	Revision
Site Plan	NSPH - East Tower	9.02.16	HPI	2
NSPH10-P-LG3	NSPH - East Tower	9.02.16	HPI	2
NSPH10-P-LG2	NSPH - East Tower	9.02.16	HPI	2
NSPH10-P-LG1	NSPH - East Tower	9.02.16	HPI	2
NSPH10-P-G	NSPH - East Tower	9.02.16	HPI	2
NSPH10-P-1	NSPH - East Tower	9.02.16	HPI	2
NSPH10-P-2	NSPH - East Tower	9.02.16	HPI	2
NSPH10-P-3	NSPH - East Tower	9.02.16	HPI	2
NSPH10-P-6	NSPH - East Tower	9.02.16	HPI	2

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 Detection and Alarm System	BCA Spec. E2.2a & AS 1670 – 2004
4.	Automatic Fire Suppression System	BCA Spec. E1.5 & AS 2118.1 – 1999, AS 2118.4 – 1995 (Residential) AS 2118.6 – 1995 (Combined sprinkler & hydrant)
5.	Building Occupant Warning System activated by the Sprinkler System	BCA Spec. E1.5 & AS 1670 – 2004
6.	Emergency Lifts	BCA Clause E3.4 & AS 1735.2 – 2001
7.	Emergency Lighting	BCA Clause E4.2, E4.4 & AS/NZS 2293.1 – 2005
8.	EWIS	BCA Clause E4.9 & AS 1670.4 - 2004
9.	Emergency Evacuation Plan	AS 3745 – 2002
10.	Exit Signs	BCA Clauses E4.5, E4.6 & E4.8 and AS/NZS 2293.1 – 2005
11.	Exit Signs (non-illuminated)	BCA Clause E4.7
12.	Fire Control Centres and Rooms	BCA Spec. E1.8
13.	Fire Blankets	AS 2444 – 2001
14.	Fire Dampers	BCA Clause C3.15, AS 1668.1 – 1998 & AS 1682.1 & 2 – 1990
15.	Fire Doors	BCA Clause C3.2, C3.4, C3.5, C3.6, C3.7 & C3.8 and AS 1905.1 – 2005
16.	Fire Hose Reels	BCA Clause E1.4 & AS 2441 – 2005
17.	Fire Hydrant System	Clause E1.3 & AS 2419.1 – 2005
18.	Fire Seals	BCA Clause C3.15 & AS 1530.4 – 1997
19.	Lightweight Construction	BCA Clause C1.8 & AS 1530.3 – 1999
20.	Mechanical Air Handling System	BCA Clause E2.2, AS/NZS 1668.1 – 1998 & AS 1668.2 – 1991
21.	Paths of Travel	EP&A Reg 2000 Clause 186
22.	Portable Fire Extinguishers	BCA Clause E1.6 & AS 2444 – 2001
23.	Pressurising Systems	BCA Clause E2.2 & AS/NZS 1668.1 – 1998
24.	Required Exit Doors (power operated)	BCA Clause D2.19(d)
25.	Self-Closing Fire Hoppers	BCA Clause C3.13 & AS 1530.4 – 1997
26.	Smoke and Heat Vents	BCA Spec. E2.2c & AS 2665 – 2001
27.	Smoke Hazard Management System	BCA Part E2 & AS/NZS 1668.1 – 1998
28.	Smoke and/or Heat Alarm System	BCA Spec. E2.2a & AS 3786 – 1993
29.	Smoke Dampers	AS/NZS 1668.1 – 1998
30.	Smoke Doors	BCA Spec. C3.4
31.	Solid Core Doors	BCA Clause C3.11
32.	Stand-by Power System	BCA Clause G3.8
33.	Wall-Wetting Sprinklers	BCA Clause C3.4 & AS 2118.2 – 1995
34.	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 2016:

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 *fire-source feature* to which it is exposed is—				
For *loadbearing* 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-*loadbearing* 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 *external wall*, where the distance from any *fire-source feature* 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—				
Fire-resisting lift and stair *shafts*—				
Loadbearing	90/ 90/ 90	120/120/120	180/120/120	240/120/120
Non-*loadbearing*	–/ 90/ 90	–/120/120	–/120/120	–/120/120
Bounding *public corridors*, public lobbies and the like—				
Loadbearing	90/ 90/ 90	120/–/–	180/–/–	240/–/–
Non-*loadbearing*	–/ 60/ 60	–/–/–	–/–/–	–/–/–
Between or bounding *sole-occupancy units*—				
Loadbearing	90/ 90/ 90	120/–/–	180/–/–	240/–/–
Non-*loadbearing*	–/ 60/ 60	–/–/–	–/–/–	–/–/–
Ventilating, pipe, garbage, and like *shafts* not used for the discharge of hot products of combustion—				
Loadbearing	90/ 90/ 90	120/ 90/ 90	180/120/120	240/120/120
Non-*loadbearing*	–/ 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

Table 3.9 REQUIREMENTS FOR CARPARKS

Building element			FRL (not less than) Structural adequacy/Integrity/Insulation
			ESA/M (not greater than)
Wall			
(a)	*external wall*		
	(i)	less than 3 m from a *fire-source feature* to which it is exposed:	
		Loadbearing	60/60/60
		Non-*loadbearing*	–/60/60
	(ii)	3 m or more from a *fire-source feature* to which it is exposed	–/–/–
(b)	*internal wall*		
	(i)	*loadbearing*, other than one supporting only the roof (not used for carparking)	60/–/–
	(ii)	supporting only the roof (not used for carparking)	–/–/–
	(iii)	non-*loadbearing*	–/–/–
(c)	*fire wall*		
	(i)	from the direction used as a *carpark*	60/60/60
	(ii)	from the direction not used as a *carpark*	as *required* by Table 3
Column			
(a)	supporting only the roof (not used for carparking) and 3 m or more from a *fire-source feature* to which it is exposed		–/–/–
(b)	steel column, other than one covered by (a) and one that does not support a part of a building that is not used as a *carpark*		60/–/– or 26 m^2/tonne
(c)	any other column not covered by (a) or (b)		60/–/–
Beam			
(a)	steel floor beam in continuous contact with a concrete floor slab		60/–/– or 30 m^2/tonne
(b)	any other beam		60/–/–
Fire-resisting lift and stair shaft (within the *carpark* only)			60/60/60
Floor slab and vehicle ramp			60/60/60
Roof (not used for carparking)			–/–/–
Notes:	1. ESA/M means the ratio of exposed surface area to mass per unit length.		
	2. Refer to Specification E1.5 for special requirements for a sprinkler system in a *carpark* complying with Table 3.9 and located within a multi-classified building.		