# Regulatory Compliance Report

## Student Village Development
## 90-102 Regent Street, Redfern

**Prepared for:** **Wee Hur Redfern**
**Date:** **8 October 2020**
**Revision:** **B**

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| Date | Rev No | No. of Pages | Issue or Description of Amendment | Assessed By | Approved By | Date Approved |
|---|---|---|---|---|---|---|
| 6/10/20 | A | 37 | Regulatory compliance report | Zoe Brown | Andrew Brohier | 6/10/20 |
| 8/10/20 | B | 37 | Regulatory compliance report | Zoe Brown | Andrew Brohier | 8/10/20 |

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# 1. Executive Summary

**Development Overview**

The proposed development is a new 21 storey building containing:

- 18 storeys of student accommodation, containing 408 beds, with communal facilities including lounge areas, gym, external terraces on level 2, and one ground floor retail tenancy; and
- 2 basement storeys, containing bike storage are and services; and
- 1 level containing only plant equipment located on the uppermost storey of the building.

**Compliance Summary**

As Registered Certifiers we have reviewed the preliminary architectural design documents prepared by AJ+C Architects (refer appendix A) for compliance with the current building assessment provisions, i.e. the Building Code of Australia 2019 Amendment 1 (BCA).

This report has been prepared to assess the project against the Building Code of Australia to enable issuance of construction approvals. Further assessment of the design will be undertaken as the design develops to ensure compliance is achieved prior to approval being issued

**Deviations from the Deemed-to-Satisfy Provisions**

The assessment of the design documentation has revealed that the following areas deviate from the deemed-to-satisfy provisions of the BCA. These items are to be addressed to ensure compliance is achieved, either through design amendment to achieve compliance with the deemed-to-satisfy provisions, or through a performance solution demonstrating compliance with the Performance Requirements of the BCA:

| No. | Description | DTS Clause | Performance Requirements |
|---|---|---|---|
| **Fire Safety Items** | | | |
| 1 | **Fire Resistance Levels**<br><br>In accordance with Clause C1.1, each building element must achieve an FRL in accordance with table 3 of specification C1.1<br><br>The Deemed-to-Satisfy provisions are not met as the Bike storage areas within basement and ground floor and ground floor retail areas are proposed to achieve an FRL of 120 minutes in lieu of the required FRL in accordance with Spec C1.1 | C1.1<br>Spec C1.1 | CP1<br>CP2 |
| 2 | **Public Corridors**<br><br>In accordance with C2.14, Public Corridors within residential portions that exceed 40m in length, must be divided at intervals no greater than 40m with smoke-proof walls complying with Clause 2 of Spec C2.5.<br><br>The deemed-to-satisfy provisions of C2.14 are not met with the following extended distances identified:<br><br><u>Typical Levels:</u> | C2.14 | DP4, EP2.2 |

| No. | Description | DTS Clause | Performance Requirements |
|---|---|---|---|
| | ▪ 42m corridor length | | |
| 3 | **Protection of openings**<br>Multiple openings located along the external walls that are within 3m to side boundary (Southern Boundary), on the Western and Eastern elevations of the building.<br>Where these openings are not protected in accordance with C3.4 of the BCA, this will be required to be addressed through fire engineered solution | C3.2, C3.4 | CP2 |
| 4 | **Bounding construction: Class 3 buildings**<br>Bounding Construction to rooms that are not SOU's adjacent to public corridors have not been provided in accordance with C3.11 in the following locations:<br>▪ Residential levels – Dining areas. Lounge and study & egress pathway from public corridor to fire isolated exits | C3.11 | CP2, EP2.2 |
| 5 | **Exit Travel Distances**<br>The Deemed-to-Satisfy provisions of D1.4 are not met, with the following extended distances identified:<br><u>Level 2:</u><br>▪ 24m to a point of choice from the outdoor common terrace (in lieu of 20m)<br><u>Levels 3 -19:</u><br>▪ 11m to a point of choice from SOU entrance door. | D1.4 | DP4<br>EP2.2 |
| 6 | **Separation of rising and descending stair flights**<br>Rising and Descending required fire-isolated stairways must not have direct connection, and must be separated with non-combustible smoke proof construction in accordance with Clause 2 of Specification C2.5<br>The Deemed-to-Satisfy provisions of D2.4 are not met as the central scissor stairs are directed onto the lower basement level, before connecting to the stairs that lead occupants from Lower Basement level up to street level.<br>Furthermore the stair located on the southern corner on the building on ground floor also contains merging rising and descending stairs. | D2.4 | DP4<br>EP2.2 |
| 7 | **Fire Hydrant**<br>**Pump Room** | E1.3 | EP1.3 |

| No. | Description | DTS Clause | Performance Requirements |
|---|---|---|---|
| | Fire pump room is located on basement level and is not in accordance with AS 2419.1 – 2005 as it does not open directly onto a fire-isolated stair<br><br>**Referenced Standard**<br>In accordance with E1.5 and schedule 4 of the NCC, hydrants to be installed in accordance with AS 2419.1-2005.<br><br>The deemed-to satisfy provisions of E1.3 are not met as hydrants are proposed to be installed in accordance with the 2017 edition of AS 2419.1 which is not adopted in NCC 2019 Amendment 1. | | |
| 8 | **Vertical Sections in Ring Mains**<br><br>In accordance with E1.5 sprinkler protection is required to be provided throughout the building in accordance with AS 2118.1-2017.<br><br>Due to the scissor stair arrangement in the buildings, the vertical mains pass through the other stair at alternate levels rather than remain in a single fire-isolated stair shaft. | E1.5 & Spec E1.5 | EP1.3 & EP1.4 |
| 9 | **Combined Sprinkler and Hydrant System**<br>The building is proposed to have a combined sprinkler hydrant system in accordance with AS 2118.6-2012.<br><br>AS 2118.6-2012 references sprinkler standard AS 2118.1-1999. The deemed to satisfy provisions are not met as the sprinkler system is to AS 2118.1-2017 in lieu of AS 2118.1-1999. | E1.5 & E1.3 | EP1.4 & EP1.3 |
| 10 | **Fire Control Room**<br>Fire Control Room is not located at main entrance of the building.<br><br>Note the following requirements are required for a Fire Control Room as detailed in Specification E1.8 of the BCA:<br>▪ Egress from any part of its floor, to a road or open space, must not involve changes in level which exceed 300mm (to be confirmed) | E1.8<br>Spec E1.8 | EP1.6 |
| **Accessibility Items** | | | |
| 11 | Please provide the report prepared by the Access Consultant for review | | |
| **Miscellaneous Items** | | | |
| 12 | **Weatherproofing of External Walls**<br>As there are no deemed to satisfy provisions relating to the weatherproofing of external walls, a performance solution is to be provided by the façade engineer/registered architect demonstrating that the external walls comply with the requirements of Performance Requirement FP1.4. | - | FP1.4 |

The feasibility and any additional requirements that will apply as a result of the performance solution will need to be confirmed by the professional preparing the performance solution. Any performance solution will need to be prepared by a suitably qualified/accredited professional.

**Fire Safety Services**

The following key fire safety services are required to meet the minimum DTS requirements.

| | |
|---|---|
| 1. | Sprinklers system throughout the building |
| 2. | Fire hydrant system throughout the building |
| 3. | Fire hose reels to the class 6 and 7b portions of the building (not required to the class 3 residential areas) |
| 4. | Fire precautions during construction |
| 5. | Air-pressurization throughout the fire isolated stairs |
| 6. | Automatic smoke detection and alarm system throughout |
| 7. | Sound System and Intercom System for Emergency Purposes |

Refer to part 7 of this report for further details regarding the required services.

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

## 2. Introduction

The proposed development is a new 21 storey building containing:

- 18 storeys of student accommodation, containing 408 beds, with communal facilities including lounge areas, gym, external terraces on level 2, and one ground floor retail tenancy; and
- 2 basement storeys, containing bike storage are and services; and
- 1 level containing only plant equipment located on the uppermost storey of the building.

The site is located on the corner of Regent street and Marian Street.

This report is based upon the review of the design documentation listed in Appendix A of this Report

This report has been prepared to assess the project against the Building Code of Australia to enable issuance of construction approvals. Further assessment of the design will be undertaken as the design develops to ensure compliance is achieved prior to approval being issued

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 Registered Certifier for the Construction Certificate. For the purposes of this Report, BCA 2019 Amendment 1 has been utilised as the version of the BCA applicable at the time of preparation this Report.

## 3. Compliance with the Building Code of Australia

The Building Code of Australia is a performance based document, whereby compliance is achieved by complying with the Governing Requirements and the Performance Requirements.

Performance Requirements are satisfied by one of the following:

1) A Performance Solution
2) A Deemed-to-Satisfy Solution
3) A combination of (1) and (2)

## 4. Documentation of Performance Solutions

A Performance Solution must demonstrate compliance with all relevant Performance Requirements, or the solution must be at least equivalent to the Deemed-to-Satisfy provisions.

Compliance with the Performance Requirements is to be demonstrated through one or a combination of the following:

a) Evidence of suitability in accordance with Part A5 of the BCA that shows the use of a material, product, plumbing and drainage product, form of construction or design meets the relevant Performance Requirements.
b) A Verification Method including the following:
    i. The Verification Methods provided in the NCC.
    ii. Other Verification Methods, accepted by the appropriate authority that show compliance with the relevant Performance Requirements
c) Expert Judgement
d) Comparison with the Deemed-to-Satisfy Provisions

Where a Performance Solution is proposed as the method to achieve compliance, the following steps must be undertaken:

a) Prepare a performance-based design brief in consultation with relevant stakeholders
b) Carry out analysis, using one or more of the assessment methods nominated above, as proposed by the performance-based design brief.
c) Evaluate results from (b) against the acceptance criteria in the performance-based design brief
d) Prepare a final report that includes:
    i. All Performance Requirements and/or Deemed-to-Satisfy Provisions identified as applicable
    ii. Identification of all assessment methods used
    iii. Details of required steps above
    iv. Confirmation that the Performance Requirement has been met; and
    v. Details of conditions or limitations, if an exist, regarding the Performance Solution.

This process will come into effect on 1 July 2021.

## 5. Preliminaries

### 5.1. Building Assessment Data

Summary of Construction Determination:

| Part of Project | Building 1 |
|---|---|
| Classification | 3, 6, 7b |
| Number of Storeys | 21<br>*(including 2 basement levels and 1 upper plant level)* |
| Rise In Storeys | 19 |

| Part of Project | Building 1 |
|---|---|
| Type of Construction | Type A |
| Effective Height (m) | 55.5<br>(RL 80.30 – RL 24.80) |

*Note: The effective height of the project includes all stories included in the rise in stories of the project.*

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

| Part of Project | BCA Classification | Approx. Floor Area ($m^2$) | Approximate Volume ($m^3$) | Assumed Population |
|---|---|---|---|---|
| Basement | 3, 7b | 406 | | TBA |
| Lower Ground | 3, 7b, 8* | 273 | | TBA |
| Level 01 (Ground floor) | 3, 6, 7b | 1,078 | | TBA |
| Level 02 | 3 | 795 | | Max 320 |
| Levels 03 -11<br>(Excluding level 09) | 3 | 561 | | Max 200 |
| Level 09 | 3 | 570 | | Max 200 |
| Level 15 | 3 | 570 | | Max 200 |
| Levels 13-18 | 3 | 566 | | Max 200 |
| Level 19 -Plant | 3, 6, 7b | TBA | | TBA |
| **Total** | **3, 6, 7b, 8*** | **11,010 $m^2$** | **TBC** | **TBC** |

Notes:

- Areas less than 10% of the total floor area are considered ancillary and are not required to be separated from the other classifications in accordance with BCA A6.0.

  Where the concession under clause 3.1.3 of AS 2118.1-2017 cannot be applied the substation will be deemed class 8 and 4 hour fire separation is to be achieved, or sprinkler protection to satisfy the DtS requirements of the BCA. Where this is not addressed through the above, a performance solution will be required.

Occupiable Outdoor Areas

BCA 2019 introduced specific provisions regarding occupiable outdoor areas. These provisions outline requirements with regards to fire ratings, egress provisions and coverage from essential services and are contained in this report.

An occupiable outdoor area is defined in the BCA as follows:

*'a space on a roof, balcony or similar part of a building:*
*a) That is open to the sky; and*
*b) To which access is provided, other than access only for maintenance; and*
*c) That is not open space or directly connected with open space'*

### 5.2. Council Development Approval

A Development Permit will be required from the Department of Planning, Industry and Environment (State Government) for the development. A copy of the Development Approval conditions, and approved drawings will be required prior to the issuing of the Building Approval for that component of works.

The proposed development must not be inconsistent with the endorsed drawings and all relevant conditions will need to be satisfied and accurately reflect the construction issue drawings.

### 5.3. Copy of Certificate of Title:

A copy of the Certificate of Title and associated plan of subdivision is required. Where it is proposed to construct any part of the building over, under or within an easement, the consent of the relevant authority and Council is required prior to the issue of the Construction Certificate.

## 6. Structure

### 6.1. Structural Provisions (BCA B1):

New structural works are to comply with the applicable requirements of BCA Part B1, including AS/NZS 1170.0-2002, AS/NZS 1170-1-2002, AS/NZS 1170.2-2011 and AS 1170.4-2007.

Depending on the importance level of the building as determined by AS/NZS 1170.0-2002, the non structural elements of the building, including partitions (and non-structural fire walls), ceilings, services and racking/shelving may be required to comply with the seismic restraint requirements of AS 1170.4-2007. Where this is required, certification will be required confirming that the design of the seismic restraints comply with AS 1170.4-2007. This may be provided by a specialist seismic consultant or by the architect and services design engineers.

It is noted that BCA 2019 introduced a new Verification Method, BV2, which is a pathway available to verify compliance with BCA Performance Requirement BP1.1(a)(iii).

Glazing is to comply with AS1288-2006, and AS2047-2014.

Prior to the issue of the Construction Certificate structural certification is required to be provided by a Professional Engineer registered on the National Engineering Register.

## 7. Fire Protection

### 7.1. Fire Compartmentation (BCA C1.1)

The BCA stipulates three levels of fire-resistant construction, which is based upon the rise in storeys and classification of the building. Each of these types of construction has maximum floor area and volume limitations as per BCA Table C2.2.

Based upon the rise in storeys and use of the building, it is required to be constructed in accordance with the requirements of Type A Construction, in accordance with Table 3 & 3.9 of Specification C1.1 of the Building Code of Australia 2019 Amendment 1.

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

- Bounding construction to the sole occupancy units of 90 minutes,
- Fire compartmentation of the building at each floor level (FRL: 180 minutes to Retail, and 240 minutes to storage)

The maximum floor area and volume limitations of a fire compartment as nominated in the deemed to satisfy provisions are as follows:

| Classification | | Type of Construction |
|---|---|---|
| | | A |
| 6, 7, 8 | max floor area— | 5 000 $m^2$ |
| | max volume— | 30 000 $m^3$ |

### 7.2. Fire Resistance (BCA C1.1)

The building should be constructed generally in accordance with the relevant provisions of Specification C1.1 of the BCA applicable to Type A Construction, Please refer to Appendix B which outlines the required fire rating to be achieved by the development.

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

- Lift Motor Rooms;
- Emergency Power Supply;
- Electricity Supply;
- Hydrant Pump Rooms;
- Sprinkler Pump Rooms;
- Fire Control Room

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

Please note that with regards to fire separation, the provisions and required FRL's that apply to the building also apply to an occupiable outdoor space associated with the building. Fire Hazard Properties (BCA C1.10 and BCA C1.9)

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 of the Building Code of Australia. The following requirements apply:

*Sprinkler Protected Areas*

a) Floor Coverings – Critical radiant Flux not less than 1.2 kW/$m^2$
b) Wall and Ceiling Linings – Material Group No. 1, 2 or 3
c) Other Materials – Spread of Flame Index not exceeding 9 and Smoke Developed Index not exceeding 5

Rigid and flexible air handling ductwork must comply with AS4254 Parts 1 & 2 2012.

Floor linings and floor coverings used in lift cars must have a critical radiant flux not less than 2.2, and wall and ceiling linings must be a Material Group No. 1 or 2.

*External Wall Cladding*

Since the building is of Type A construction, the following components are required to be completely non-combustible:

- External walls, including façade coverings, framing, insulation;
- Flooring and framing of lift pits;
- Non-loadbearing internal walls required to have an FRL;
- All non-loadbearing shafts;
- All loadbearing internal walls and loadbearing fire walls, including those that are part of loadbearing shafts.

Since the building is of Type A construction, the following components are required to be completely non-combustible:

- External walls, including façade coverings, framing, insulation;
- Flooring and framing of lift pits;
- Non-loadbearing internal walls required to have an FRL;
- All non-loadbearing shafts since the building is a Class 3 building;
- All loadbearing internal walls and loadbearing fire walls, including those that are part of loadbearing shafts.

Please provide product specifications and test reports to AS 1530.1-1994 for all materials to demonstrate compliance

For materials and assemblies that are required to be non-combustible, the material or system must be not deemed combustible when tested in accordance with AS 1530.1-1994.

*Combustible Materials*

The following materials, though combustible or containing combustible fibres, may be used wherever a non-combustible material is required:

a) Plasterboard.
b) Perforated gypsum lath with a normal paper finish.
c) Fibrous-plaster sheet.
d) Fibre-reinforced cement sheeting.
e) Pre-finished metal sheeting having a combustible surface finish not exceeding 1 mm thickness and where the Spread-of-Flame Index of the product is not greater than 0.
f) Sarking type materials that do not exceed 1mm in thickness and have a Flammability Index not greater than 5.
g) Bonded laminated materials where -
   (i) each laminate is non-combustible; and
   (ii) each adhesive layer does not exceed 1 mm in thickness; and
   (iii) the total thickness of the adhesive layers does not exceed 2 mm; and
   (iv) the Spread-of-Flame Index and the Smoke-Developed Index of the bonded laminated material as a whole does not exceed 0 and 3 respectively.

It is recommended that once material selections are made, copies of the fire test certificates/reports be provided for review and approval.

Any Aluminium Composite Panels must be labelled in accordance with SA TS 5344.
The BCA does nominate that ancillary elements may not be fixed to an external wall that is required to be non-combustible unless they comprise of the following:

a) An ancillary element that is non-combustible.
b) A gutter, downpipe or other plumbing fixture or fitting.
c) A flashing.
d) A grate or grille not more than 2 m² in area associated with a building service.
e) An electrical switch, socket-outlet, cover plate or the like.
f) A light fitting.
g) A required sign.
h) A sign other than one provided under (a) or (g) that—
   i) achieves a group number of 1 or 2; and
   ii) does not extend beyond one storey; and
   iii) does not extend beyond one fire compartment; and

iv) is separated vertically from other signs permitted under (h) by at least 2 storeys.

Please provide fire hazard properties reports for any proposed signs and confirm their extent i.e. not spanning more than one storey or fire compartment:

### 7.3. Separation of equipment (C2.12)

Equipment listed below must be separated from the remainder of the building providing a FRL as required by Spec C1.1 but not less than 120/120/120 with a self-closing fire door with an FRL or not less than -/120/30. When separating a lift shaft and life motor room, an FRL of not less than 12/-/- is required.

a) Lift motors and lift control panels; or
b) Emergency generators used to sustain emergency equipment operating in the emergency mode; or
c) Central smoke control plant; or

### 7.4. Vertical Separation of openings in external walls (BCA C2.6)

The building is protected with a sprinkler system throughout in accordance with Specification E1.5 and therefore spandrel separation is not required.

### 7.5. Public Corridors: 3 Buildings (BCA C2.14)

Public corridors exceeding 40m in length to be divided into intervals of not more than 40m by smoke proof walls complying with Clause 2 of BCA Specification C2.5.

The deemed-to-satisfy provisions of C2.14 are not met with the following extended distances identified:

Upper Typical Floors:

- 42m Corridor Length

### 7.6. Protection of Openings in External Walls (BCA C3.2 / C3.3 / C3.4)

The prescriptive provisions of the BCA stipulate that any external opening within 3m of the boundary, within 6m of the far boundary of a road, river, lake or the like that adjoins the allotment, or within 6m of another building on the allotment requires protection by -/60/- fire rated construction, or externally located wall wetting sprinklers.

Where a building is separated into fire compartments, the distance between parts of external walls and openings within them must be not less than the table below unless those parts of each external wall has an FRL not less than 60/60/60 and openings are protected.

| Angle Between Walls | Minimum Distance |
|---|---|
| $0^o$ (walls opposite) | 6m |
| More than $0^o$ to $45^o$ | 5m |
| More than $45^o$ to $90^o$ | 4m |
| More than $90^o$ to $135^o$ | 3m |
| More than $135^o$ to $180^o$ | 2m |
| More than $180^o$ | Nil |

Multiple openings located along the external walls that are within 3m to side boundary, on the Northern elevations of the building. Confirmation is to be provided on the proposed protected measures in accordance with C3.4 of the BCA.

*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.*

### 7.7. Protection of Openings fire rated building elements (BCA C3.5 and BCA C3.10)

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

a) 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 the same as the FRL of the floor it is passing through;
b) 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 the same as the FRL of the floor it is passing through; (or 120/120/120 where it is a room such as a substation);
c) 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.

As the design develops, details will need to be included in relation to sealing of penetrations / construction of fire rated shafts.

## 8. Access and Egress

### 8.1. Provision for Escape (BCA D1)

The egress provisions for the proposed building are provided by the following:

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

The egress provisions that apply to the building also apply to any occupiable outdoor areas.

Detailing issues that will need to be addressed as the design develops include:

- Door Hardware
- Exit Door Operation
- Stair Construction
- Handrail and Balustrade construction
- Details of Separation of Rising and Descending Stairs
- Discharge from Fire Isolated Exits

- Details of the egress provisions to the Road.
- Door swings

### 8.2. Travel via Fire Isolated Exits (BCA D1.7)

The proposed exits are required to be fire isolated.

The BCA requires each fire isolated stairway 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 in a storey 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 an unimpeded path of travel not more than 20m to a road or open space; or
- 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 of not less than 3m, and provides an unimpeded path of travel to a road or open space of not less than 6m.

Additionally, where the path of travel from the point of discharge requires occupants to pass within 6m of any part of the external wall of the same building (measured horizontally), that external wall must have a 60/60/60 FRL and have any openings protected internally for a distance of 3m above or below the path of travel.

### 8.3. Fire Stair Re-Entry (BCA D2.22)

The doors of a fire isolated exit must not be locked from the inside so as to allow provision for fire stair re-entry within fire isolated exits serving any storey above any effective height of 25m.

The requirement for doors to remain unlocked do not apply to a door fitted with a fail-safe device that automatically unlocks the door upon activation of a fire alarm and –

a) On at least every fourth storey the doors are not able to be locked and a sign is fixed on such doors stating that re-entry is available; or
b) An intercommunication system, or an audible or visual alarm system operated from within the enclosure is provided, and a sign is fixed adjacent to such doors explaining its purpose and method of operation.

### 8.4. Exit Travel Distances (BCA D1.4)

The locations of the proposed exits would appear to indicate that the deemed to satisfy requirements in terms of travel distances, distances between alternative exits and egress widths would be satisfied.

The travel distances to exits should not exceed:

**Class 6 & 7b areas**

- no point on the floor must be more than 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 3**

- 6m from an exit or from a point of choice from the entrance doorway of a sole occupancy unit

- 20m from a single exit at the level of egress to a road or open space
- Alternate exits not more than 45m apart

The above indicates that the deemed to satisfy requirements in terms of travel distances would be satisfied, with the exception of the following areas:

Basement Level:

- 26m to a single exit (in lieu of 20m)

Level 2:

- 24m to a point of choice from the outdoor common terrace (in lieu of 20m)

Levels 3 -19:

- 11m to a point of choice from SOU entrance door.

The extended travel distances will need to be addressed to comply with the requirements of the deemed to satisfy provisions noted above, or be assessed as performance solutions by the Fire Safety Engineer using BCA Performance Requirements DP4 & EP2.2

### 8.5. Dimensions of Exits (BCA D1.6)

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 AS1657-2018 in which case a 600mm clear width is required).

The following table summarises the exit widths required by BCA Clause D1.6:

| Storey | Number of people | Exit Width Required | Exit Width Provided |
|---|---|---|---|
| **Basement** | 200 (max.) | 2.0 | 2.0 |
| **Lower Ground** | 200 (max.) | 2.0 | 2.0 |
| **Ground Floor** | 110 | 2.0 | 4.0 |
| **Residential Floors** | 200 max.<br>Based on exit width provided | 2.0 | 2.2 |

Doorways are permitted to contain a clear opening width of the required width of the exit minus 250mm, 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 920 mm doors).

### 8.6. Balustrades and Handrails (BCA D2.16 / BCA D2.17 / D2.24)

Generally

Balustrading to a minimum height of 1000mm with a maximum opening of 124mm in any direction should be provided adjacent to balconies, landings, corridors etc where located adjacent to a change in level exceeding 1000mm, or where it is possible to fall through an openable window located more than 4m above the surface beneath.

Where it is possible to fall more than 4m to the surface below, the balustrade shall not contain any horizontal or near horizontal members that facilitate climbing between 150 – 760mm above the floor.

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

The public stairs and ramps located along an accessible path of travel 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.

In addition to the above, handrails are required to both sides of all stairs with a width of 2m or more.

Openable Windows in Bedrooms

In bedrooms of Class 3 buildings, where the distance from the floor level to the level below exceeds 2m, window openings shall be provided with protection in accordance with BCA Clause D2.24.

Where the lowest part of the window opening is less than 1.7m above a floor, the window opening must be:

a) Fitted with a device to restrict the opening; or
b) Fitted with a screen with secure fittings

The device or screen required must –

a) Not permit a 125mm sphere to pass through it; and
b) Resist an outward horizontal action of 250N; and
c) Have a child resistant release mechanism if the screen or device is able to be removed, unlocked or overridden

Further review will be undertaken to ensure compliance as the design develops.

### 8.7. Slip Resistance

The adoption of BCA 2014 introduced a requirement for slip resistance of stairway treads and ramp surfaces. The requirements are as follows:

Table D2.14 SLIP-RESISTANCE CLASSIFICATION

| Application | Surface conditions | |
|---|---|---|
| | Dry | Wet |
| Ramp steeper than 1:14 | P4 or R11 | P5 or R12 |
| Ramp steeper than 1:20 but not steeper than 1:14 | P3 or R10 | P4 or R11 |
| Tread or landing surface | P3 or R10 | P4 or R11 |
| Nosing or landing edge strip | P3 | P4 |

## 9. Services and Equipment

The following section of this report describes the essential fire safety measures and the minimum performance requirements of those measures. A draft essential fire safety schedule can be found in Appendix B.

It is noted that the provisions below also apply to occupiable outdoor areas.

### 9.1. Fire Hydrants (BCA E1.3)

A system of Fire Hydrants is required to be provided in accordance with BCA Clause E1.3 and AS2419.1-2005.

Pressure and flow information will be required to confirm the required pressures and flow to the system, depending on the type of hydrant to be utilized;

The fire services/hydraulic engineer is to confirm the required flow rates for the development.

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

A fire ring main is required as the effective building height is greater than 25m.

The below items have been identified as non-compliances against the deemed-to satisfy provisions of Clause E1.3

**Pump Room**

Fire pump room is located on basement level and is not in accordance with AS 2419.1 – 2005 as it does not open directly onto a fire-isolated stair

**Referenced Standard**

In accordance with E1.5 and schedule 4 of the NCC, hydrants to be installed in accordance with AS 2419.1-2005.

The deemed-to satisfy provisions of E1.3 are not met as hydrants are proposed to be installed in accordance with the 2017 edition of AS 2419.1 which is not adopted in NCC 2019 Amendment 1.

**Vertical Sections in Ring Mains**

Due to the scissor stair arrangement in the buildings, the vertical mains pass through the other stair at alternate levels rather than remain in a single fire-isolated stair shaft.

**Combined Hydrant and Sprinkler System**

The building is proposed to have a combined sprinkler hydrant system in accordance with AS 2118.6-2012.

AS 2118.6-2012 references sprinkler standard AS 2118.1-1999. The deemed to satisfy provisions are not met as the sprinkler system is to AS 2118.1-2017 in lieu of AS 2118.1-1999.

### 9.2. Fire Hose Reels

A Fire Hose Reel System is required to be provided to the class 6 and class 7b areas of the building in accordance with BCA Clause E1.4 and AS2441-2005 (not required to the class 3 residential areas)

Fire hose reels are to be located within 4m of exits and provide coverage within the building based on a 36m hose length and 4m of water spray. Where required, additional fire hose reels shall be located internally as required to provide coverage. These hose reels are to be located adjacent to internal hydrants.

Fire hose reel cupboards must not contain any other services such as water meters, etc., and doors to fire hose reel cupboards are not to impede the path of egress unless a performance solution is developed under BCA Performance Requirement EP1.1

Fire hose reel coverage plans are to be provided to enable further assessment

### 9.3. Fire Extinguishers (BCA E1.6)

The provision of portable fire extinguishers is required to BCA Clause E1.6 and AS2444 - 2001 to provide coverage.

Table E.6 details when portable fire extinguishers are required:

| Occupancy Class | Risk Class (as defined in AS 2444) |
|---|---|
| General provisions – Class 2 to 9 buildings | a) To cover Class AE or E fire risks associated with emergency services switchboards. (Note 1)<br>b) To cover Class F fire risks involving cooking oils and fats in kitchens.<br>c) To cover Class B fire risks in locations where flammable liquids in excess of 50 litres are stored or used (not excluding that held in fuel tanks of vehicles).<br>d) To cover Class A fire risks in normally occupied fire compartments less than 500m$^2$ not provided with fire hose reels (excluding open deck carparks).<br>e) To cover Class A fire risks in classrooms and associated schools not provided with fire hose reels.<br>f) To cover Class A fire risks associated with Class 2 or 3 building or class 4 part of building. |

In addition, extinguishers are to be provided to the class 3 portions of the building in accordance with the below:

- an ABE type fire extinguisher is to be installed with a minimum size of 2.5 kg; and
- extinguishers are to be distributed outside a sole-occupancy unit:
  a) to serve only the storey at which they are located; and
  b) so that the travel distance from the entrance doorway of any sole-occupancy unit to the nearest fire extinguisher is not more than 10 m.

Fire extinguishers are to be located in accordance with AS 2444 - 2001, often collocated with fire hydrants and/or fire hose reels.

The fire extinguisher locations are to be provided to enable further assessment.

### 9.4. Automatic Sprinkler Protection (BCA E1.5)

Automatic sprinkler protection is required to Specification E1.5 and AS2118.1-2017 to the following areas:

- Throughout the entire building as the effective height exceeds 25m;

The sprinkler system shall be connected to and activate an occupant warning system complying with BCA Specification E2.2a.

Details of the proposed sprinkler system design will need to be reviewed as the design develops.

An occupant warning system should be provided in accordance with BCA Specification E1.5.

In accordance with E1.5 sprinkler protection is required to be provided throughout the building in accordance with AS 2118.1-2017. Due to the scissor stair arrangement in the buildings, the vertical mains pass through the other stair at alternate levels rather than remain in a single fire-isolated stair shaft.

The building is proposed to have a combined sprinkler hydrant system in accordance with AS 2118.6-2012. AS 2118.6-2012 references sprinkler standard AS 2118.1-1999. The deemed to satisfy provisions are not met as the sprinkler system is to AS 2118.1-2017 in lieu of AS 2118.1-1999.

### 9.5. Smoke Hazard Management (BCA E2.2)

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

- Automatic Shutdown of Mechanical Systems in accordance with the requirements of AS/NZS 1668.1-2015 Amendment 1;
- Automatic Smoke Detection and Alarm System in accordance with the requirements of BCA Spec E2.2a and AS 1670.1-2018;
- Automatic Pressurisation to Fire Isolated Exits in accordance with the requirements of AS/NZS 1668.1-2015 Amendment 1

A fire indicator panel is required as part of the detection system. This panel is to be located within 4m of the main entry and should be incorporated within the fire control room. 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.

### 9.6. Lift Services (BCA E3.4 and BCA E3.6)

The passenger lifts to be installed are to be:-

- Fitted with warning signs, fire service controls in accordance with Clauses E3.3, Figure E3.3, E3.7, E3.9 and E3.10 of the BCA.
- Stretcher facilities are to be provided within the lifts with minimum dimensions of 600m wide, 2000mm long and 1400mm high;
- At least two emergency lifts with stretcher facilities in accordance with Part E3.4 of the BCA. The two emergency lifts shall be located in separate shafts. These lifts are to serve all storeys that are served by passenger lifts.
- Be provided with the following in order to satisfy accessibility requirements:
  - A handrail in accordance with AS1735.12-1999,
  - Minimum internal floor dimensions of 1400 x 1600mm for lifts which travel more than 12m, or 1100 x 1400mm for lifts which travel not more than 12m,
  - 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 AS1735.12 - 1999
  - For lifts serving more than 2 levels, automatic audible information within the lift car identifying the level each time the car stops, and audible and visual indication at each lift landing to indicate the arrival of a car
- Emergency hands free communication, including a button that alerts a call centre of a problem and a light to signal that the call has been received

### 9.7. Exit Signs and Emergency Lighting (BCA E4.2 and BCA E4.5)

Emergency Lighting and Exit Signs indicating exit location paths of travel to exits to be provided in accordance with BCA Part E4 and AS/NZS 2293.1-2018, including the potential use of photo luminescent exit signs.

Where exit signs are proposed to be above 2.7m to avoid potential damage by forklifts in the warehousing areas, this will need to be documented as a performance solution by an accredited fire safety engineer. This would need to be assessed to BCA Performance Requirement EP4.2.

Details are required to be provided for review at Construction Certificate Stage.

### 9.8. Sound Systems and Intercom Systems for Emergency Purposes (BCA E4.9)

A Sound System and Intercom System is required in accordance with AS1670.4-2018 and BCA Clause E4.9

Details are to be provided for our review at Construction Certificate Stage.

### 9.9. Fire Control Room (BCA E1.8)

As the building has an effective height of greater than 25m, a fire control centre is required. Where the effective height of the building exceeds 50m, the fire control centre must be located within a dedicated room in accordance with the requirements of BCA Specification E1.8

The proposed Fire Control Room does not comply as the Fire Control Room is not located at main entrance of the building.

Note the following requirements are required for a Fire Control Room as detailed in Specification E1.8 of the BCA:

- Egress from any part of its floor, to a road or open space, must not involve changes in level which exceed 300 mm

### 9.10. Fire Precautions During Construction (BCA E1.9)

After the building has reached an effective height of 12m, the following fire services are required to be operational:

- Required fire hydrants and fire hose reels on every storey covered by the roof/floor structure (except the 2 uppermost storeys); and
- Booster connections installed.

Due to the height of the building this will need to be considered and implemented during construction.

## 10. Health and Amenity

### 10.1. Sanitary Facilities (BCA F2.2 and BCA F2.3)

*Retail*

Separate sanitary facilities are required to be provided for male & female employees. In relation to the public, sanitary facilities are required to be provided either where more than 600 persons can be accommodated (standard shops) or for café / restaurant where there are more than 20 seats.

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 AS1428.1-2009

*Student Accommodation*

For each 10 residents in the building, the below is required to be provided:

- A bath or shower; and
- A closet pan and wash basin

The design submitted indicates that the student accommodation building should satisfy the above requirements.

*Bathroom Construction*

Where bathrooms or rooms containing water closets have the WC within 1200mm of the doorway, the door shall be either sliding, open outwards, or be provided with removable hinges.

### 10.2. Floor Wastes

Floor wastes to be provided within bathrooms and laundries where located above another sole occupancy unit. The floor shall be sloped towards these wastes.

Floor wastes are required to be provided where wall hung urinals are provided and the floor shall be sloped towards these wastes.

Floor wastes are not indicated, and details are to be provided at Construction Certificate Stage.

### 10.3. Light and Ventilation (BCA Part F4)

Class 3

Natural light and ventilation is to be provided to all habitable rooms at a rate of 10% and 5% of the floor area of the rooms respectively.

A required window that faces a boundary of an adjoining allotment or a wall of the same building or another building on the allotment must not be less than a horizontal distance from that boundary or wall that is the greater of:

(i) generally — 1 m; and
(ii) 50% of the square root of the exterior height of the wall in which the window is located, measured in metres from its sill.

Class 6 & 7

Natural Ventilation is required to be provided to rooms at a rate of 5% of the floor area in openings. Alternatively, mechanical ventilation is required in accordance with AS1668.2-2012

Artificial lighting complying with AS/NZS1680.0-2009 is to be incorporated with the final detailed design to be developed to confirm this.

These provisions also apply to areas considered as occupiable outdoor areas.

### 10.4. Sound Transmission and Insulation (BCA F5)

Building elements within Class 3 buildings should provide the following sound insulation levels.

| Location | Notes | Sound Insulation Requirement |
|---|---|---|
| Walls separating habitable rooms | | $R_w + C_{tr} \geq 50$ |
| Walls separating habitable room and kitchen or bathroom | Wall must be of Discontinuous Construction | $R_w + C_{tr} \geq 50$ |
| Floor separating habitable rooms | Impact isolation required | $R_w + C_{tr} \geq 50$<br>$L_{n,w} + C_l \leq 62$ |
| Duct, soil, waste or water supply pipe, including pipes that is located in a floor or wall cavity, serves or passes through more than one room | Adjacent habitable room or<br>Adjacent non-habitable room | $R_w + C_{tr} \geq 40$<br>or<br>$R_w + C_{tr} \geq 25$ |
| Door to habitable room | | $R_w \geq 30$ |

Please note for walls requiring impact resistance an air gap between leafs of the wall construction is required to be provided.

Please provide a report from the acoustic engineer verifying design compliance with the provisions of part F5 of the BCA.

### 10.5. Condensation management (BCA Part F6)

Pliable building membranes installed to an external wall must:

- achieve compliance with AS 4200.1, and
- be installed in accordance with AS4200.2, and
- be located on the exterior side of the primary insulation layer or the wall assembly and except for the single skin mason and single sin concrete be separated from water sensitive materials.

Exhaust systems must achieve a minimum flow rate of 25L/s for bathrooms and sanitary compartments must discharge directly or via a duct to outdoor air or to a roof space that is ventilated.

Kitchens and laundries to achieve a minimum flow rate 40L/s and discharge directly or via a shaft or duct to outdoor air.

Exhaust systems discharging directly or via a shaft or a duct to a roof space must be through evenly distributed systems. Openings for minimum flow requirements must have a total unobstructed area of 1/300 of the respective ceiling area if the roof pitch is greater than 22º. 30% of the total unobstructed area required for exhaust being discharged directly or via a shaft or duct to outdoor air must be located not more than 900 mm below the ridge or highest point of the roof space.

### 10.6. Waterproofing (BCA FP1.4)

Performance Requirement FP1.4 which relates to the prevention of the penetration of water through external walls, must be complied with. It is noted that there are no Deemed-to-Satisfy Provisions for this Performance Requirement in respect of external walls.

As such, a performance solution is to be prepared by a suitably qualified professional that demonstrates that the external walls of the proposed building complies with Performance Requirement FP1.4 which reads as follows:

*A roof and external wall (including openings around windows and doors) must prevent the penetration of water that could cause—*

*a) unhealthy or dangerous conditions, or loss of amenity for occupants; and*
*b) undue dampness or deterioration of building elements.*

<u>External above Ground Membranes</u>

All external above ground areas (roof slabs, balconies etc.) shall be protected by a waterproofing system in accordance with AS4654 Parts 1 and 2 – 2012.

For external balconies the waterproofing membrane must have a vertical upward termination height in accordance with the table below dependant on the wind class of the site. The wind class is determined by the structural engineer.

| Wind Class Regions A & B | Wind Class Regions C & D | Ultimate Limit State Wind Speed | Termination Height (mm) |
|---|---|---|---|
| N1 | - | 34 | 40 |
| N2 | - | 40 | 50 |

| | | | |
|---|---|---|---|
| N3 | C1 | 50 | 70 |
| N4 | C2 | 61 | 100 |
| N5 | C3 | 74 | 150 |
| N6 | C4 | 86 | 180 |

Wet Areas

Internal wet areas throughout the development (e.g. bathrooms, laundries) shall be waterproofed in accordance with AS3740 - 2010 requirements.

Further review will be undertaken as the design develops with respect to the specification of waterproofing membrane, provision of water-stops at doorways etc.

### 10.7. Stormwater Drainage

Stormwater drainage systems serving the building are to comply with AS3500.3 - 2018.

The use of a syphonic stormwater drainage system is not covered by Australian Standards and any design incorporating one would need an appropriate performance solution will need to be documented by the hydraulic consultant addressing the system compliance against BCA Performance Requirements FP1.2 & FP1.3.

## 11. Energy Efficiency

### 11.1. SECTION J (Transition Period)

The commentary below is an assessment based on the provisions included in BCA 2019 Amendment 1.

### 11.2. SECTION J (JP1 Energy Use)

Efficient energy use must be achieved appropriate to the function and use of the building, level of human comfort, solar radiation, energy source of the services and sealing of the building envelope. To achieve this JV1, JV2, JV3 and JV4 verification methods have been introduced as options available to achieve compliance.

It is noted that a deemed to satisfy pathway is still available.

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.

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

**Verification Methods**

The Verification Methods available to demonstrate compliance with the BCA on a performance basis are as follows:

JV1 NABERS Energy for Offices

- To achieve compliance with JP1 a class 5 building must achieve a minimum of 5.5 NABERS Energy for Offices Base Building Commitment Agreement and comply with ANSI/ASHRAI Standard 140.
- To achieve the energy model for (JP1 (i)) solar radiation the base buildings greenhouse gas emissions are not more than 67% of the 5.5 star level when excluding:

- Tenant supplementary heating; and
- Cooling systems; and
- External lighting; and
- Car park services.
- A thermal comfort level between predicted mean vote of -1 to +1 is achieve across not less than 95% of the floor area of all occupied zones for not less than 98% f annual hours of operation.

- The building also need to comply with additional requirements of Spec JVa.

JV2 Green Star

- To achieve compliance with JP1 for Class 3,4,5,6, 7, 8, 9 and common area of Class 2 buildings Green Star can be used as a verification method when the calculation method complies with ANSI/ASHRAE Standard, Specification JVb and when:
  - The building complies with simulation requirements and is registers for a Green Star – Design & As-Built rating; and
  - The annual greenhouse gas emissions of the proposed building are less than 90% of the annual greenhouse gas emissions of the reference building; and
  - In the proposed building, a thermal comfort level of between predicted mean vote of -1 to +1 is achieve across not less than 95% of the floor area of all occupied zones for not less than 98% of the annual hours of operation of the building; and
  - The building complies with the additional requirements of Specification JVa.

JV3 Verification Using a Reference Building

- To achieve compliance with JP1 for Class 3,4,5,6, 7, 8, 9 and common area of Class 2 buildings verification using a reference building can be used when the calculation method complies with ANSI/ASHRAE Standard, Specification JVb and when:
  - It is determined that the annual greenhouse gas emissions of the proposed building are not more than the annual greenhouse gas emissions of a reference building when the proposed building is modeled with the proposed services and the proposed building is modelled with the same services as the reference building. The proposed building thermal comfort level is to be between predicted mean vote of -1 to +1 across not less than 95% of the floor area of all occupied zones for not less than 98% of the annual hours of operation; and
  - The building achieves the additional requirements in Specification JVa; and
  - The greenhouse gas emissions of the proposed building may be offset by renewable energy generated and use on site and another process such as reclaimed energy used on site.

JV4 Building Envelope Sealing

- Compliance with sealing of the building against air leakage is verified when the envelope is sealed at an air permeability rate tested in accordance with Method 1 of AS/NZS ISO 9972, of not more than –
  - For a class 2 building or a class 4 part of a building, 10$m^3$hr.$m^2$ at 50 Pa reference pressure; or
  - For a class 5, 6, 8, 9a or 9b building other than a ward area in climate zones 1, 7 and 8, 5 $m^3$/hr.$m^2$ at 50 Pa reference pressure; or
  - For class 3 or 9c building, or a class 9a ward area in climate zones 1, 3, 4, 6, 7 and 8 5$m^3$/hr.$m^2$ at 50 Pa reference pressure.
- Part J3 and performance solution that uses on of the other NCC assessment Methods which verifies that compliance with JP1 (e) will be achieve can also be used as verification methods.

## 11.3. Building Fabric (Part J1)

**Roof and Ceiling Construction (Part J1.3)**

For a deemed-to-satisfy solution roofs and or ceilings are to be constructed to provide a total R-Value greater than or equal to-

(i) in climate zones 1, 2, 3, 4 and 5, R3.7 for a downward direction of heat flow; and

In climate zones 1, 2, 3, 4, 5, 6 and 7, the solar absorptance of the upper surface of a roof must be not more than 0.45.

Where the layer of insulation is penetrated by the percentages as tabled below, additional upgrading of the remainder of the insulation level is required.

To achieve compliance with J0.2 (c) a roof that has a metal sheet roofing fixed to metal purlins, metal rafters or metal battens and does not have a celling lining or has a ceiling lining fixed directly to those metal purlins, metal rafters or metal battens must have a thermal break. The thermal break to be consisting of a material with a R-Value of not less than R0.2, installed at all points of contact between the metal sheet roofing and its supporting metal purlins, metal rafters or metal battens.

**Roof lights (Part J1.4)**

Where roof lights are installed they must have :-

(a) a total area of not more than 5% of the floor area of the room or space served; and
(b) transparent and translucent elements, including any imperforate ceiling diffuser, with a combined performance of:-
    (i) for Total system SHGC, in accordance with the below table; and
    (ii) for Total system U-value, not more than U3.9;

| Roof light shaft index (see Note 1) | Total area of roof lights up to 3.5% of the floor area of the room or space | Total area of roof lights more than 3.5% and up to 5% of the floor area of the room or space |
|---|---|---|
| Less than 1.0 | Not more than 0.45 | Not more than 0.29 |
| 1.0 to less than 2.5 | Not more or equal to than 0.51 | Not more than 0.33 |
| Greater than 2.5 | Not more than or equal to 0.76 | Not more than 0.49 |

**External Walls and Glazing (Part 1.5)**

For walls and glazing construction the total system U-value must not be greater than-

(i) for a Class 2 common area, a Class 6 & 7 building, U2.0; and
(ii) for a Class 3 building–
    (a) in climate zones 1, 3, 4, 6 or 7, U1.1; or
    (b) in climate zones 2 or 5, U2.0; or
    (c) in climate zones 8, U0.9;

The total system U-value of wall-glazing construction should be calculated in accordance with Specification J1.5a.

Wall components of the wall-glazing construction must achieve a minimum total R-Value of R1.0 where the wall is less 80% if the area and reflect the value specified in Table J1.5a where the wall is *0% or more of the area.

There are further design parameters for display glazing and solar admittances for wall-glazing construction, both of which should comply with the relevant provisions of J1.5.

To achieve compliance with J0.2 (c) a wall that does not have a wall lining or has a wall lining that is fixed directly to the same metal frame and has a lightweight external cladding such as weatherboards, fibre-cement or metal sheeting fixed to a metal frame must have a thermal break. The thermal break is to consist of a material with an R-Value of not less than R.02, installed at all points of contact between the external cladding and metal frame.

**Floors (Part J1.6)**

Floors are to achieve an R rating of 2.0.

## 11.4. Building sealing (Part J3)

**Windows and Doors (Part J3.4)**

a) A door, openable window or the alike must be sealed –
   (i) When forming part of the envelope; or
   (ii) In climate zones 4,5,6,7 or 8
b) The requirements of (a) do not apply to –
   (i) A window complying with AS2047; or
   (ii) A fire door or smoke door; or
   (iii) A roller shutter door, roller shutter grille or other security door or device installed only for out of house security
c) A seal to restrict air infiltration –
   (i) For the bottom edge of a door, must be draft protection device; and
   (ii) For the other edged of a door or the edges of an openable window or other such opening, may be a foam or rubber compression strip, fibrous seal or the like.
d) An entrance to a building, if leading to a conditioned space must have an airlock, self-closing door, rapid roller door, revolving door or the like, other than –
   (i) When the conditioned space has a floor area of not more than 50m²; or
   (ii) Where a café, restaurant, open front shop or the like has –
      (A) A 3m deep un-conditioned zone between the main entrance, including an open front, and the conditioned space; and
      (B) At all other entrances to the café, restaurant, open front shop or the like, self-closing doors.
   (iii) A loading dock entrance, if leading to a conditioned space, must be fitted with a rapid roller door or the like

**Exhaust fans (Part J3.5)**

An exhaust fan must be fitted with a sealing device such as a self-closing damper or the like when serving a conditioned space or a habitable room in climate zone 5.

**Construction of ceilings, walls and floors (Part J3.6)**

A seal to restrict air infiltration must be fitted to each edge of the external doors and openable windows. The seals may be foam or compressible strip, fibrous seal or the like. The main entry doors must have either an airlock, or self-closing doors, or a revolving door.

Ceilings, walls, floors and any openings such as a window frame, door frame, roof light frame or the like must be constructed to minimise air leakage in accordance with the below when forming part of –

(i) The envelope; or

(ii) In climate zones 4, 5, 6, 7 or 8

Construction required by above must be –

(iii) Enclosed by internal lining systems that are close fittings at ceiling, wall and floor junctions; or
(iv) Sealed at junctions and penetrations with –
  (A) Close fitting architrave, skirting or cornice; or
  (B) Expanding foam, rubber compressible strip, caulking or the like

The above does not apply to openings, grilles or the like required for smoke hazard management.

**Evaporative coolers (Part J3.7)**

An evaporative cooler must be fitted with a self-closing damper or the like –

(a) When serving a heated space; or
(b) In climate zones 4,5,6,7 or 8.

### 11.5. Air Conditioning and Ventilation systems (Part J5.0)

Air conditioning and ventilation systems must be designed to comply with the following provisions:

- Be capable of being deactivated when the building or part of a building being served by that system is not occupied;
- Where motorised dampers are in place, they should close when the system is deactivated
- Where serving a sole-occupancy unit in a Class 3 building, must not operate when any external door of the sole-occupancy unit that opens to a balcony or the like, is open for more than one minute;
- Time switches should be provided to control an air-conditioning system of more than 2kWr and a heater of more than 1kW $_{heating}$ used for air-conditioning, and be capable of switching electric power on and off at variable pre-programmed times on variable pre-programmed days.
- Ductwork and fittings in an air-conditioning system should have insulation complying with AS/NZS 4859.1 and have an insulation R-Value greater than or equal to:-
  - for flexible ductwork R1.0; or
  - for cushion boxes, that of the connecting ductwork; or
  - That specified in Table J5.5

Table J5.5

| Location of ductwork and fittings | Climate zone 5 |
|---|---|
| Within a conditioned space | 1, 2 |
| Where exposed to direct sunlight | 3.0 |
| All other locations | 2.0 |

Mechanical:

- Be capable of being deactivated where the building or part of the building served by that system is not occupied
- Time switches must be provided to a mechanical ventilation system with an air flow rate of more than 1000 L/s, capable of switching electric power on and off at variable pre-programmed times and on variable pre-programmed days;

Heaters

A heater used for air-conditioning or as part of an air-conditioning system must be a either a solar heater, gas heater, heat pump heaters, a heater using reclaimed heat or an electric heater.

A gas water heater, that is used as part of an air-conditioning system must:-

(i) if rated to consume 500 MJ/hour of gas or less, achieve a minimum gross thermal efficiency of 86% ; or

(ii) If rated to consume more than 500 MJ/hour of gas, achieve a minimum gross thermal efficiency of 90%

Refrigerant chillers

An air-conditioning system refrigerant chiller must comply with MEPS and the full load operation energy efficiency ratio and integrated part load energy efficiency ratio laid out under clause J5.10 of the BCA when determined in accordance with AHRI 551/591

Unitary air-conditioning equipment

Unitary air-conditioning equipment including packaged air-conditioners, split systems, and variable refrigerant flow systems must comply with MEPS and for a capacity greater than or equal to 65 kWr –

(a) Where water cooled, have a minimum energy efficiency ratio of 4.0 $W_r$/ $W_{input\ power}$ for cooling when tested in accordance with AS/NZS 3823.1.2 at test condition T1, where input power includes both compressor and fan input power; or

(b) Where air cooled, have a minimum energy efficiency ratio of 2.9 $W_r$ / $W_{input\ power}$ for cooling when tested in accordance with AS/NZS 3823.1.2 at test condition T1, where input power includes both compressor and fan input power.

## 11.6. Artificial Lighting and Power (Part J6)

**Interior Artificial Lighting and Power Control (Part J6.2 & 6.3)**

The aggregate design illumination power load must not exceed the sum of the allowances obtained by multiplying the area of each space by the maximum illumination power density below:-

The maximum illumination power density;

| | |
|---|---|
| Stairways, including fire-isolated stairways | 2W/m$^2$ |
| Toilet, locker room, staff room, rest room or the like | 3W/m$^2$ |
| Lift cars | 3W/m$^2$ |
| Service area, cleaner's room and the like | 3W/m$^2$ |
| Control room, switch room or the like | |
| (A) intermittent monitoring | 3W/m$^2$ |
| (B) Constant monitoring | 4.5W/m$^2$ |
| Plant room: | |
| (A) Where an average of 160 lx vertical illuminance is required on a vertical panel such as in switch rooms | 4W/m$^2$ |
| (B) With a horizontal illuminance target of 80 lx | 2W/m$^2$ |
| Retail: | 14W/m$^2$ |
| Corridors: | 5W/m$^2$ |
| Lounge area for communal use in a Class 3 or 9c building | 4.5W/m$^2$ |
| Dormitory of Class 3 building: | |
| (A) Used for sleeping only | 3W/m$^2$ |

| | |
|---|---|
| (B) Used for sleeping & study | 4W/m$^2$ |
| Storage | 1.5W/m$^2$ |
| Kitchen and food preparation area: | 4W/m$^2$ |
| Restaurant, café, bar: | 14W/m$^2$ |

Artificial Lighting must be controlled by a time switch, other control device or a combination of both.

Each light control in a building must not operate lights within an area of more than;

- 250m$^2$ if in a Class 6 building
- Not operate lighting for an area more than -
  a) 250m$^2$ for a space of not more than 2000m$^2$;
  b) 1000m$^2$ for a space of more than 2000m$^2$
  if in a Class 3, 6, 7, 8 (other than a laboratory) or 9 building;
- 1000m$^2$ for a space of more than 2000m$^2$

Interior decorative and display lighting

Interior decorative and display lighting, such as for a foyer mural or art display, must be controlled -

- Separately from other artificial lighting; and
- By a manual switch for each area other than when operating times of the displays are the same in a number of areas (e.g. where in a museum) in which case they may be combined; and
- By a time switch in accordance with Specification J6 where the display lighting exceeds 1 kW

Window display must be controlled separately from other display lighting exceeds 1kW.

Exterior artificial lighting

Artificial lighting attached to or directed at the façade of the building if it exceeds a total of 100W must;

- Use LED luminaires for 90% of the total lighting load; or
- Be controlled by a motion detector in accordance with Specification J6 of the BCA;
- When used for decorative purposes, such as façade lighting or signage lighting, have a separate switch in accordance with Specification J6.

**Lifts (Part 6.7)**

Lifts must be configured to ensure artificial lighting and ventilation in the car are turned off when it is unused for 15 minutes and achieve the idle and standby energy performance level required, and the energy efficiency class under J6.7 of the BCA.

## 11.7. Heated Water Supply (Part 7)

**Heated water supply (Part J7.2)**

A heated water supply system for food preparation and sanitary purposes must be designed and installed in accordance with Part B2 of NCC Volume Three — Plumbing Code of Australia.

## 12. Access for People with Disabilities

The development is required to comply with the accessibility provisions contained within:

- The Building Code of Australia 2019 Amendment 1;
- Disability (Access to Premises – Buildings) Standards 2010;
- AS1428.1-2009 General Requirements for Access – New Building Work;
- AS1428.4.1 -2009 Tactile Ground Surface Indicators
- AS2890.6-2009 Car Parking for People with Disabilities

**Note**: With the introduction of the Commonwealth *Disability Discrimination Act (DDA)* in 1992 (enacted in 1993), all organisations have a responsibility to provide equitable and dignified access to goods, services and premises used by occupants. Organisations and individuals since its introduction, are required to work to the objects of the Act which are to eliminate, as far as possible, discrimination against persons on the ground of disability in the **areas of work, accommodation, education, access to premises, clubs and sports, and the provision of goods, facilities, services and land, existing laws and the administration of Commonwealth laws and programs.**

This report assesses against the requirements contained with the Building Code of Australia (and documents referred to therein) and is not considered to be a full assessment against the Disability Discrimination Act.

### 12.1. General Building Access Requirements (BCA D3.1)

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 2019 Amdt 1 and AS 1428.1. Parts of the building required to be accessible shall comply with the requirements of:-

- AS1428.1-2009 General Requirements for Access – New Building Work;
- AS1428.4.1 -2009 Tactile Ground Surface Indicators
- AS2890.6-2009 Car Parking for People with Disabilities

Access for persons with a disability is to be provided as follows:

Apartment (Class 3 buildings)

- From the pedestrian entrance to at least 1 floor containing Sole Occupancy Units and to the entrance door of all Sole Occupancy Units on that floor, and to at least one type of each common facility, such as gyms, shops, laundries (shared), gaming rooms etc.
- Where an AS1428.1 compliant lift or ramp is provided in addition to the above and access is required to and within all spaces, and to the entrance of doors to single occupancy units on the levels, served by the lift or ramp.

Where individual Class 3 single occupancy units are provided:

| | |
|---|---|
| 1 to 10 single occupancy units | To and within 1 accessible sole occupancy units |
| 11 to 40 | To and within 2 accessible sole occupancy units |
| 41 to 60 | To and within 3 accessible sole occupancy units |
| 61 to 80 | To and within 4 sole occupancy units |
| 81 to 100 | To and within 5 sole occupancy units |
| 101 to 200 | To and within 5 sole occupancy units and 1 for every 25 sole occupancy units over 100 |

| | |
|---|---|
| 201 to 500 single occupancy units | To and within 9 accessible sole occupancy units, plus 1 for every 30 units in excess of 200 units |
| More than 500 | To and within 19 accessible sole occupancy units, plus 1 for every 50 units in excess of 500 units |

* Not more than 2 required accessible units may be located adjacent to each other; and
* Where more than 2 sole occupancy units are required to be accessible, they must be indicative of the range of units/rooms available.

Shops (Class 6)

To and within all areas normally used by the occupants

Storage areas (Class 7b)

To and within all areas normally used by the occupants, but as the uses of these areas could be deemed inappropriate, confirmation is required as the appropriateness of the areas in question by the owners or tenant.

### 12.2. Provision for Access to Buildings

The BCA prescribes access to be provided to and within the building as follows:

- Via the principle pedestrian entry and at least 50% of all other entrances from the allotment boundary
- 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 occupants.

In buildings over 500m$^2$ in floor area, a non-accessible entrance must not be located more than 50m from an accessible entrance.

Where a pedestrian entry contains multiple doors, the following is required;

- Entrance containing not more than 3 doors, at least one of the doorways must be accessible.
- Where an entrance contains more than 3 doors, not less than 50% of the doorways must be accessible.

A door is considered to be accessible if it is automatic (open and closing) or is more than 850mm in clear opening width and contains the required door circulation space.

### 12.3. Accessibility within Building (BCA D3.3)

A building required to be accessible is required to be equipped with either a AS 1428.1 compliant lift or AS 1428.1 compliant ramp, (but the maximum vertical rise of a ramp must not exceed 3.6m).

Within the building the following are required;

- Door circulation space as per AS1428.1 Clause 13.3
- Doorways must have a clear opening of 850mm;
- Passing spaces (1.8m wide passages) must be provided at maximum of 20m intervals
- Within 2.0m of end access ways/corridors, turning areas spaces are required to be provided.
- Carpet pile height of not more than 11mm to an adjacent surface and backing <4mm
- Any glazing capable of being mistaken for a doorway or opening must be clearly marked (or contain chair rail, hand rail or transom as per AS 1288 requirements)

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.

### 12.4. Car Parking (BCA D3.5)

The development does not include any car parking

### 12.5. Tactile Indicators (BCA D3.8)

Tactile indicators are required to be provided to warn occupants of all stairs (except Fire Isolated stairs) and ramps regardless of public nature or private environment and where an overhead obstruction occurs less than 2.0m above the finished floor level.

### 12.6. Stairs (BCA D3.3 inter Alia AS1428.1)

Stairs shall be constructed as follows:

a) Where the intersection is at the property boundary, the stair shall be set back by a minimum of 900mm so that the handrail and TGSIs do not protrude into the transverse path of travel.
b) Where the intersection is at an internal corridor, the stair shall be set back one tread width plus 300mm (nominally 700mm as per AS 1428.1-2009 Fig 26(b)), so the handrails do not protrude into transverse path of travel.
c) Stairs shall have opaque risers.
d) Stair nosing shall not project beyond the face of the riser and the riser may be vertical or have a splay backwards up to a maximum 25mm.
e) Stair nosing profiles shall;
   - Have a sharp intersection;
   - Be rounded up to 5mm radius; or
   - Be chamfered up to 5mm x 5mm
f) All stairs, including fire isolated stairs shall, at the nosing of each tread have a strip not less than 50mm and not more than 75mm deep across the full width of the path of travel. The strip may be set back a maximum of 15mm from the front of the nosing. The strip shall have a minimum luminance contrast of 30% to the background. Where the luminous contrasting strip is affixed to the surface of the tread, any change in level shall not exceed a difference of 5mm.

### 12.7. Accessible Sanitary Facilities (BCA F2.4)

*Unisex Accessible Sanitary Facilities*

An accessible unisex sanitary facility must be located so that it can be entered without crossing an area reserved for one sex only and provided in accordance with AS 1428.1-2009 and must contain a closet pan, washbasin, shelf or bench top and adequate means of disposal of sanitary products and as per following.

| Building Type | Minimum accessible unisex sanitary compartments to be provided |
|---|---|
| Office / shops | a) 1 on every storey containing sanitary compartments; and<br>b) Where a storey has more than 1 bank of sanitary compartments containing male and female sanitary compartments, at not less than 50% of those banks. |

*Ambulant Facilities*

At each bank of toilets where there is one or more toilets in addition to an accessible unisex sanitary compartment, a sanitary compartment suitable for a person with an ambulant disability in accordance with AS 1428.1-2009 must be provided for use by males and females.

Where male sanitary facilities are provided at a separate location to female sanitary facilities, accessible unisex sanitary facilities are only required at one of those locations.

An accessible unisex sanitary compartment or an accessible unisex shower need not be provided on a storey or level that is not provided with a passenger lift or ramp complying with AS 1428.1-2009

### 12.8. Signage (BCA D3.6)

As part of the detailed design package, specifications will need to be developed indicating:

- Sanitary Facility Identification Signs (note that they are to comply with BCA Specification D3.6 and include the use of Braille, Tactile, etc and be placed on the wall on the latch side of the facility);
- Directional / Way Finding signs to the Lifts, Sanitary Facilities, etc;
- Hearing Augmentation System;
- Identify each door required by BCA Clause E4.5 to be provided with an exit sign, stating ‘EXIT’ and ‘Level” number
- Braille and tactile signs must be illuminated to ensure *luminance contrast* requirements are met at all times during which the sign is required to be read.

### 12.9. Hearing Augmentation (BCA D3.7)

A hearing augmentation system shall be installed throughout the building in accordance with the requirements of Clause D3.7 of the BCA, where ever in a 9b building, auditorium conference room, meeting room etc. contain a PA system not used for emergency purposed or any ticket office or teller’s booth or reception where the public is screened from the service provider.

### 12.10. Lifts (BCA E3.6)

Lifts compliant to BCA E3.6 and BCA E3.7 must be provided, where required to be provided, with a minimum size of 1400 x 1600mm or 1100mm x 1400mm (whichever is appropriate) in size – with appropriate handrails and auditory commands.

## 13. Appendix A - Reference Documentation

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

| Drawing No. | Title | Date | Revision |
|---|---|---|---|
| DA2000 | Basement & Lower Ground Floor Plans | 9/10/2020 | 1 |
| DA2001 | Ground & Level 2 Floor Plans | 24/09/2020 | 12 |
| DA2002 | Level 3 & Lower Typical Floor Plans | 24/09/2020 | 11 |
| DA2003 | Level 9 & 15 Communal Floor Plans | 24/09/2020 | 12 |
| DA2004 | Upper Typical & Roof Plan | 24/09/2020 | 11 |
| DA3001 | East Elevation | 9/10/2020 | 1 |
| DA3002 | North Elevation | 9/10/2020 | 1 |
| DA3003 | West Elevation | 9/10/2020 | 1 |
| DA3004 | South Elevation | 9/10/2020 | 1 |

## 14. Appendix B - Draft Fire Safety Schedule

| No. | Measure | Particulars of Measure<br>*(including where the requirement for the measure is set out or described i.e. in building plans or in a performance solution report)* |
|---|---|---|
| **STATUTORY FIRE SAFETY MEASURES** | | |
| 1. | Access Panels, Doors and Hoppers | BCA 2019 Amdt 1 Clause C3.13 |
| 2. | Automatic Fail Safe Devices | BCA 2019 Amdt 1 Clause D2.19 & D2.21 |
| 3. | Automatic Fire Detection and Alarm System | BCA 2019 Amdt 1 Spec. E2.2a & AS 1670.1 – 2018, AS/NZS 1668.1 - 2015 |
| 4. | Automatic Fire Suppression System (sprinklers) | BCA 2019 Amdt 1 Spec. E1.5 & AS 2118.1 – 2017,<br>AS 2118.6 – 2012 (Combined sprinkler & hydrant)<br>Fire Engineering Report |
| 5. | Emergency Lifts | BCA 2019 Amdt 1 Clause E3.4 & AS 1735.2 – 2001 |
| 6. | Emergency Lighting | BCA 2019 Amdt 1 Clause E4.2, E4.4 & AS/NZS 2293.1 – 2018 |
| 7. | EWIS (Sound Systems and Intercom Systems for Emergency Purpose) | BCA 2019 Amdt 1 Clause E4.9 & AS 1670.4 - 2018 & AS 4428.4-2004 |
| 8. | Exit Signs | BCA 2019 Amdt 1 Clauses E4.5, NSW E4.6 & E4.8 and AS/NZS 2293.1 – 2018 |
| 9. | Fire Control Room | BCA 2019 Amdt 1 Spec. E1.8<br>Fire Engineering Report |
| 10. | Fire Dampers | BCA 2019 Amdt 1 Clause C3.15, AS/NZS 1668.1 – 2015 & AS 1682.1&2 - 1990 |
| 11. | Fire Doors | BCA 2019 Amdt 1 Clause C3.2, C3.4, C3.5, C3.6, C3.7 & C3.8, Spec C3.4 and AS 1905.1 – 2015 |
| 12. | Fire Hose Reel Systems | BCA 2019 Amdt 1 Clause E1.4 & AS 2441 – 2005 Amdt 1 |
| 13. | Fire Hydrant Systems | BCA 2019 Amdt 1 Clause E1.3 & AS 2419.1 – 2005 Amdt 1<br>Fire Engineering Report |
| 14. | Fire Seals protecting fire resisting components of the building | BCA 2019 Amdt 1 Clause C3.12, C3.15, C3.16 & AS 1530.4 – 2014 |
| 15. | Lightweight Construction | BCA 2019 Amdt 1 Clause C1.8, C3.17 & AS 1530.3 – 1999 |
| 16. | Mechanical Air Handling System (Shut down and Stair pressurisation) | BCA 2019 Amdt 1 Clause E2.2, AS/NZS 1668.1 – 2015 |
| 17. | Portable Fire Extinguishers | BCA 2019 Amdt 1 Clause E1.6 & AS 2444 – 2001 |
| 18. | Smoke Dampers | AS/NZS 1668.1 – 2015 |
| 19. | Warning and Operational Signs | EP&A Reg 2000 Clause 183, BCA 2019 Amdt 1 Clause C3.6, D2.23, E3.3 |
| **OTHER FIRE SAFETY MEASURES** | | |
| 20. | Paths of Travel | BCA 2019 Amdt 1<br>EP&A Reg 2000 Clause 183, 184, 184 & 186<br>Fire Engineering Report |
| 21. | Required Exit Doors (power operated) | BCA 2019 Amdt 1 Clause D2.19 |
| 22. | Self-Closing Fire Hoppers | BCA 2019 Amdt 1 Clause C3.13 & AS 1530.4 – 2015 |

## 15. Appendix C - Fire Resistance Levels

The table below represents the Fire resistance levels required in accordance with BCA 2019 Amendment 1:

| **Table 3 TYPE A CONSTRUCTION: FRL OF BUILDING ELEMENTS** | **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 within it) 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 | | | | FRL (not less than) Structural adequacy/Integrity/Insulation<br>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. | | | |