REF: 062706-04BCA

BUILDING CODE OF AUSTRALIA REPORT

Toll IPEC Freight Transport, Warehouse & Distribution Facility
Great Western Highway & Brabham Drive, Huntingwood West

Dated: **22 November 2012**

Prepared for: **Goodman**

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MANAGING COMPLIANCE

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22.10.12	A	15	Draft for discussion	Heath McNab	Brigitte Thearle	26.10.12
15.11.12	B	16	Draft	Heath McNab	Brigitte Thearle	16.11.12
21.11.12	C	16	Draft	Heath McNab	Brigitte Thearle	21.11.12
22.11.12	D	16	Draft	Heath McNab	Brigitte Thearle	22.11.12

Executive Summary

As Accredited Certifiers, we have reviewed architectural design documents prepared by SBA Architects (refer appendix A) for compliance with the Building Code of Australia 2012.

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
C1.1 and Spec C1.1	Reduction of FRL's for internal load bearing elements, required to achieve an FRL of 240minutes.	CP1
C2.3 and C2.4	Perimeter Access to the facility will be required to be assessed as part of the Fire Engineered Solution as the proposed pedestrian bridge and truck breezeway will prevent strict compliance with *unobstructed height* requirements. Also the landscaped areas (noted for future expansion) will cause the vehicular access way to exceed 18m from the Large Isolated Building.	CP9
D1.4	Extended distances of travel to exits will be required. This will be required to be addressed as part of the fire engineered solution as follows: Travel distance to a point of choice: Up to 30m in lieu of 20m Travel distance to an exit where two or more are available: Up to 90m in lieu of 40m	DP4, EP2.2
D1.5	Extended distance between alternative exits appears required. This too shall be addressed as part of the fire engineered solution as follows: Travel distance between alternate exits: Up to 110m in lieu of 60m	DP4, EP2.2
D1.6	Unobstructed height requirement of 2m within paths of travels to exits appear reduced to 1.8m due to conveyor belt locations. It is also anticipated that paths of travel will likely be less than 1m in width, where this is the case this is to be assessed as part of the alternate solution.	DP6
D1.9	Total travel distances via non-fire isolated stairway / ramp likely to exceed 80m. Discharge of non-fire isolated stairway / ramp likely to be greater than 20m from required exit or 40m from two required exits in opposite directions	DP4, EP2.2
D1.10	Path of travel from discharge point from the building to the road necessitates passing under the building in lieu of being provided with open space for the length of the path.	DP4, EP2.2
E2.2	Rationalisation of smoke hazard management, including use of both natural and mechanical exhaust.	EP2.2
E4.5	Illuminated exit signs within the warehouse will likely be mounted greater than 2.7m from the FFL. This is to be addressed in accordance with Performance Requirement EP4.2 of the BCA.	EP4.2

The fire engineered solution relating to Perimeter Access (CP9) and Smoke Hazard Management (EP2.2) will need to be approved after consultation with the NSW Fire Brigade as part of the Construction Certificate process.

The documentation will need further detailing such as door hardware, specifications, service design, as outlined in Appendix D of this report.

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

Heath McNab
Senior Building Surveyor
McKenzie Group Consulting

1.0 Introduction

The proposed Toll IPEC Freight transport, warehouse and distribution facility comprises 7 separate buildings with the predominate building being a warehouse that includes office facilities, which is the basis of this report.

The development proposes 53,305m2 of total building area. There is proposed to be a warehouse, office space across 2 separate locations of the site, a fleet workshop with attached truck wash, a drivers rest area, gatehouses, customer pick-up and staff/visitor entry.

The site is served by two roads, being William Dean Street which is to act as the principal entry and Huntingwood Drive which will act as the truck entry point. The site is currently bounded by Western Sydney Parklands to the north and west, with existing and future developments to the east.

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 the version that is in place at the time of the application to the Certifying Authority for the Construction Certificate. For the purposes of this assessment, BCA 2012 has been used as the benchmark for assessment being the version of the BCA applicable at the time of preparation of this report.

2.0 Building Assessment Data

Summary of Construction Determination: -

	Warehouse & Office	Fleet Workshop & Truck Wash	Customer Pick-up	Drivers Rest Area	Entry
Classification	7b	8	5	3	5
Number of Storeys Contained	3	1	1	1	1
Rise In Storeys	3	1	1	1	1
Type of Construction	Type B	Type C	Type C	Type C	Type C
Effective Height (m)	<25m	<25m	<25m	<25m	<25m

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

Part of Project	BCA Classification	Approx. Floor Area (m^2)	Assumed Population
Warehouse	7b	47,000	400
Office	5	4,220	150
Fleet workshop	8	1,200	40
Truck wash	8	225	8
Drivers Rest Area	3	400	21
Gatehouses	5	130	13
Customer pick-up	5	85	9
Staff / visitor entry	5	45	5
	Total	**53,305m²**	**646**

Notes:

1. This report has focused on the main building, which contains the proposed warehouse and office facilities. The building has been assessed on the basis that it be considered one compartment. This consideration is based upon

the Class 5 office being less than 10% of the total floor area of the building, permitting the building as a whole to be classified Class 7b.

2. In accordance with Clause C1.2 any storey with an average internal height of more than 6m (where there is more than one storey above ground) shall be counted as 2 storeys. As such it is assumed that only 1 of the proposed storeys shall qualify and necessitate being counted as 2 storeys due to the average height of the storey being in excess 6m. Therefore the Class 7b building is determined to have a rise of 3 storeys.
3. The floor areas have been adjusted without ancillary areas such as sanitary facilities, corridors, shelving and or racking layouts in warehouse areas.
4. The above populations have been based upon a mix of the specific numbers provided and the floor area as calculated by D1.13. The Carpark areas have been considered ancillary to the use for the purposes of population numbers. Warehouse, offices and beds are based on populations anticipated by the client.

3.0 Structural Provisions

Any new structural works are to comply with the applicable requirements of AS/NZS 1170.1. Please note that with the adoption of BCA2012, AS1170.2-2011 is applicable to the development.

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 warehouse and office buildings should be constructed generally in accordance with Table 4 of Specification C1.1 of the Building Code of Australia 2012. The building is required to be Type B Construction. All other buildings are required to be Type C Construction and comply with Table 5 of Specification C1.1 of the Building Code of Australia 2012. Refer Appendix C for required fire resistance levels.

Fire resistance levels for building structural members are as follows:

- Warehouse (including office) 240 minutes

It is proposed to rationalise the FRL's provided to structural elements as part of the alternate solution. This will be verified to BCA Performance Requirement CP1.

The building has been assessed as one fire compartment.

As the building exceeds the area / volume limitations of the BCA provisions, the building is considered a large isolated building and the following provisions apply:

- Automatic sprinkler protection to AS2118.1 and BCA specifications E1.5 throughout the development / smoke detection and alarm system in accordance with AS1670,
- Perimeter emergency vehicular access 6m wide located within 18m of the entire building perimeter,
- Smoke exhaust or smoke and heat vents required throughout the development
- A Ring Main is to be provided as part of the Hydrant System in accordance with AS2419.1-2005.

Perimeter vehicular access is required to be provided around large isolated buildings. This access is required to be continuous around the building in its entirety, 6m in width, with the furthest part of that access not more than 18m away from the external walls of the building. The perimeter vehicular access throughout is also required to be provided with unobstructed height. The proposed vehicular access necessitates passing through the truck breezeway (under the warehouse above) and the bridge linking the entry building and the warehouse. These areas are considered to have obstructed height.

It is proposed to address the perimeter vehicular access and smoke hazard management as part of the alternate solution to BCA Performance Requirements CP9 and EP2.2.

4.1 Protection of Openings

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

1. 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 240/240/240 (or 120/120/120 where it is a room such as a substation);
2. Self-closing -/60/30 fire doors to the doors openings of any plant rooms.

4.4 Passive Fire Protection

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

- Emergency power supply,
- Emergency generators,
- Electricity supply,
- Boilers or batteries,
- Hydrant Pump rooms,
- Sprinkler Pump Rooms,
- Plant Rooms containing emergency equipment,

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:

- Required non-fire isolated stairways
- External perimeter doorways

Other detailing issues that will need to be addressed include:

- Door Hardware
- Exit door operation
- Handrail and balustrade construction

5.1 Exit Travel Distances

The travel distance to, and distance between exits have been assessed to exceed the deemed-to-satisfy provisions of the BCA. It is proposed to assess the extended travel distances as part of the alternate solution to BCA Performance Requirements DP4 and EP2.2.

The following travel distances are to be verified as part of the alternate solution:

- Travel distance to a point of choice or single exit: Up to 30m in lieu of 20m
- Travel distance to an exit where two or more are available: Up to 90m in lieu of 40m
- Travel distance between alternate exits: Up to 110m in lieu of 60m

To the eastern portion of the building, exits are not currently shown on the drawings. Please provide details of exit locations to the portion of the building east of the truck breezeway.

Several of the proposed exits discharge into the central and western lengths of the building. The path of travel from these discharge points necessitates passing under the overhead portion of the building at the northern and southern ends of the building. The path of travel from the exit discharge point to the road is to be assessed as part of the alternate solution to BCA Performance Requirement DP4.

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).

It is anticipated that, due to the proposed conveyors and equipment, there may be several areas where the minimum dimensions outlined above will not be met. Where the paths of travel to an exit are less than 1m in width and less than 2m in height (except for doorways) and the areas that these paths provide egress from are not maintenance access only, the dimensions of the exits are to be assessed as part of the alternate solution to BCA Performance Requirement DP6.

The following table summarises the exit widths required:

Floor Level	Exit Width Provided	Number of people (as provided)	Exit Width required
Warehouse/Office Building	25m	550	5m
Fleet Workshop & Truck Wash	TBA	48	1m
Drivers Rest Area	TBA	21	1m
Gatehouses	TBA	13	1m
Customer Pick-Up	TBA	9	1m
Staff/Visitor Entry	TBA	5	1m

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 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, the balustrade shall not contain any horizontal or near horizontal members that facilitate climbing.

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

Handrails are to be provided to each side of the stair, where the stair exceeds a width of 2m. Where an egress stair exceeds 2m in width, an additional handrail is required to ensure that the egress width of 2m is accounted.

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.

Intermediate rails located between 665mm and 7500mm should be provided within Class 9b Primary Schools.

5.4 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.

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.

Access from the carpark is currently proposed to be provided to the entry building which provides a bridge over to the main office and warehouse building. This path will comply with Part D3 of the BCA. Other accessible paths through the site are proposed to be addressed through a management plan, which will be subject to an alternate solution prepared by an access consultant to BCA Performance Requirement DP1.

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.

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 warehouse and office 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,
- 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 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 will be required as part of the fire hydrant requirements. The booster is to be located attached to the building at the main entry or, if remote from the building, located at the main vehicle entry or with sight of the main entry of the building within 20m of a hardstand area.

It is anticipated that a combination of internal and external hydrants will be utilised on site to provide coverage.

Internal fire hydrants are to be provided 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. It is anticipated that additional internal hose reels will be required to provide coverage. These hose reels will be located adjacent to an internal hydrant.

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

6.3 Automatic Sprinkler Protection

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

Location of pumps, tanks, FIP, control valves and booster are to be advised.

An occupant warning system that is triggered upon activation of the sprinkler system should 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:

- Automatic Shutdown of Mechanical Systems in accordance with the requirements of AS/NZS 1668.1-1998;
- Automatic Smoke Exhaust System activated by Automatic Smoke Detection & Alarm System in accordance with the requirements of BCA Spec E2.2b
- Automatic Smoke Detection and Alarm System in accordance with the requirements of BCA Spec E2.2a and AS 1670.1-2004

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.

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.
- 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 shall be provided at the rate of 1 WC per 20 male occupants, 1 WC per 15 female occupants and 1 basin per 30 occupants. Urinals are to be provided at the rate of 2 for the first 50 male occupants, and 1 per 50 male occupants above 50.

Class	Occupant Number	Pop	Required			Proposed		
			WC	Urinals	Basins	WC	Urinals	Basins
5 (Main Office) Occupant number of 100 provided	Male	50	3	2	2	12	11	8
	Female	50	4	NA	2	13	NA	9
	Unisex Facility	-	*1 Assumed	NA	*1 Assumed	*TBA	NA	*TBA
5 (Operations Office) Occupant number of 50 provided	Male	25	2	1	1	4	4	3
	Female	25	2	NA	1	3	NA	2
	Unisex Facility	-	*1	NA	*1	*0	NA	*0

Class	Occupant Number	Pop	Required			Proposed		
			WC	Urinals	Basins	WC	Urinals	Basins
7b (Warehouse) 4 amenity blocks noted Occupant number of 400 provided	Male	200	10	5	10	12	0	0
	Female	200	14	NA	10	8	NA	0
	Unisex Facility	-	*3	NA	*3	*0	NA	*0
3 (Drivers Rest Area) Occupant number of 21 provided	Male	11	2	0	2	5	0	3
	Female	11	2	NA	2	2	NA	2
	Unisex Facility	-	*1	N/A	*1	*0	N/A	*0
8 (Fleet Workshop / Truck Wash) No occupant number provided	Male	24	2	1	2	3	0	0
	Female	24	2	NA	2	0	NA	0
	Unisex Facility	-	*1	NA	*1	*1	NA	*1

*Accessible facilities are to be provided to at least 50% of the proposed banks of amenity blocks in accordance with Clause F2.4 of the BCA.

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.

There are several amenities blocks currently shown within the warehouse. Currently one of the six proposed blocks contains an accessible facility. Where an accessible facility is not proposed to be provided to at least 50% of the proposed banks, the sanitary facility arrangement is to be assessed by a suitably qualified access consultant to BCA Performance Requirement FP2.1.

Ambulant facilities are to be provided at each bank of sanitary facilities where an accessible facility is provided.

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 6.

10.1 Access for Maintenance

Access if to be provided to all plant, equipment and components associated with the provision of the above energy requirements i.e.

- Adjustable or monitored shading devices
- Time switches and motion detectors
- Room temperature thermostats
- Plant thermostats such as boilers or refrigeration units
- Motorised air dampers and central valves
- Reflectors, Lenses and Diffusers of light fittings
- Heat transfer equipment

Appendix A - Design Documentation

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

Drawing No.	Title	Date	Drawn By	Revision
DA-01	Cover Sheet & Location Plan	13.11.12	SBA Architects	C
DA-03	Site Plan	13.11.12	SBA Architects	E
DA-04	Warehouse Ground Floor Plan	13.11.12	SBA Architects	E
DA-05	Warehouse Mezzanine Plan	13.11.12	SBA Architects	D
DA-06	Warehouse Roof Plan	13.11.12	SBA Architects	C
DA-07	Warehouse Elevations	13.11.12	SBA Architects	D
DA-08	Warehouse Sections & Elevations	13.11.12	SBA Architects	D
DA-09	Office Plans & Elevations	13.11.12	SBA Architects	C

Appendix B - Draft Fire Safety Schedule

	Essential Fire Safety Measures	Standard of Performance
1.	Access Panels, Doors	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
5.	Building Occupant Warning System activated by the Sprinkler System	BCA Spec. E1.5 & AS 1670 – 2004
6.	Emergency Lighting	BCA Clause E4.2, E4.4 & AS/NZS 2293.1 – 2005
7.	Exit Signs	BCA Clauses E4.5, E4.6 & E4.8 and AS/NZS 2293.1 – 2005 Alternate solution to BCA Performance Requirement EP4.2
8.	Fire Control Centre	BCA Spec. E1.8
9.	Fire Hose Reels	BCA Clause E1.4 & AS 2441 – 2005 Alternate solution to BCA Performance Requirement EP1.1
10.	Fire Hydrant System	Clause E1.3 & AS 2419.1 – 2005 Alternate solution to BCA Performance Requirement EP1.3
11.	Mechanical Air Handling System	BCA Clause E2.2, AS/NZS 1668.1 – 1998 & AS 1668.2 – 1991
12.	Paths of Travel	EP&A Reg 2000 Clause 186 Alternate solution to BCA Performance Requirement DP4 & EP2.2
13.	Perimeter Vehicular Access	BCA Clause C2.4 Alternate solution to BCA Performance Requirement CP9
14.	Portable Fire Extinguishers	BCA Clause E1.6 & AS 2444 – 2001
15.	Smoke Hazard Management System	BCA Part E2 & AS/NZS 1668.1 – 1998 Alternate solution to BCA Performance Requirement EP2.2
16.	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 2012:

Table 4 TYPE B 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/ 30	120/ 90/ 60	180/120/ 90	240/180/120
3 to less than 9 m	90/ 30/ 30	120/ 30/ 30	180/ 90/ 60	240/ 90/ 60
9 to less than 18 m	90/ 30/–	120/ 30/–	180/ 60/–	240/ 60/–
18 m or more	–/–/–	–/–/–	–/–/–	–/–/–
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/ 30	–/ 90/ 60	–/120/ 90	–/180/120
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
Fire-resisting stair *shafts*				
Non-*loadbearing*	–/ 90/ 90	–/120/120	–/120/120	–/120/120
Bounding *public corridors*, public lobbies and the like—				
Loadbearing	60/ 60/ 60	120/–/–	180/–/–	240/–/–
Non-*loadbearing*	–/ 60/ 60	–/–/–	–/–/–	–/–/–
Between or bounding *sole-occupancy units*—				
Loadbearing	60/ 60/ 60	120/–/–	180/–/–	240/–/–
Non-*loadbearing*	–/ 60/ 60	–/–/–	–/–/–	–/–/–
OTHER LOADBEARING INTERNAL WALLS and COLUMNS—	60/–/–	120/–/–	180/–/–	240/–/–
ROOFS	–/–/–	–/–/–	–/–/–	–/–/–

Table 5 TYPE C 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—				
Less than 1.5 m	90/ 90/ 90	90/ 90/ 90	90/ 90/ 90	90/ 90/ 90
1.5 to less than 3 m	–/–/–	60/ 60/ 60	60/ 60/ 60	60/ 60/ 60
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 1.5 m	90/–/–	90/–/–	90/–/–	90/–/–
1.5 to less than 3 m	–/–/–	60/–/–	60/–/–	60/–/–
3 m or more	–/–/–	–/–/–	–/–/–	–/–/–
COMMON WALLS and FIRE WALLS—	90/ 90/ 90	90/ 90/ 90	90/ 90/ 90	90/ 90/ 90
INTERNAL WALLS-				
Bounding *public corridors*, public lobbies and the like—	60 / 60/ 60	–/–/–	–/–/–	–/–/–
Between or bounding *sole-occupancy units*—	60/ 60/ 60	–/–/–	–/–/–	–/–/–
Bounding a stair if *required* to be rated—	60/ 60/ 60	60/ 60/ 60	60/ 60/ 60	60/ 60/ 60
ROOFS	–/–/–	–/–/–	–/–/–	–/–/–