Preliminary Fire Safety Strategy

CityOne

Report 2007/206 R3.1

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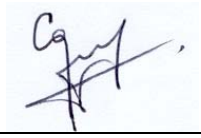
		Approved by:	Carlos Quaglia Signature 
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		Approved by:	Carlos Quaglia Signature

EXECUTIVE SUMMARY

This report documents the preliminary fire safety strategy for the proposed CityOne redevelopment located between George Street and Carrington Street, Sydney. This strategy was prepared by Stephen Grubits & Associates Pty Ltd at the request of Thakral.

The purpose of this report is to document the departures from the Deemed-to-Satisfy (DTS) provisions of the Building Code of Australia (BCA) that are proposed to be satisfied by way of an Alternative Solution and to identify the fire safety features that are considered to be required in order to achieve compliance with the relevant Performance Requirements.

The areas of departure from the Deemed-to-Satisfy (DTS) provisions of the Building Code of Australia (BCA) identified for the building are related to:

- Fire separation
- Compartmentation
- Egress
- Smoke hazard management

This strategy is preliminary only and all parameters suggested herein are subject to detailed analysis and consultation with stakeholders during the Fire Engineering Brief process, including Fire & Rescue NSW and Railcorp. Demonstration that the specified preliminary fire safety strategy for the building will comply with the identified Performance Requirements will be the subject of a fire engineering assessment to be undertaken at a later date, using fire safety engineering methodologies in accordance with the *International Fire Engineering Guidelines* (1). Should the assessment reveal that the proposed systems do not satisfy the performance criteria, additional fire safety systems or modifications to the trial design followed by further assessment would be required.

1 *International Fire Engineering Guidelines,* Edition 2005, Australian Building Codes Board

TABLE OF CONTENTS

1. INTRODUCTION

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- Fire separation
- Compartmentation
- Egress
- Smoke hazard management

The preliminary fire safety strategy documented in this report has been developed with the intent of meeting the Performance Requirements of the BCA.

2. PURPOSE

The purpose of this report is to document the departures from the DTS provisions of the BCA that are proposed to be satisfied by way of an Alternative Solution and to identify the fire safety features that are considered to be required in order to achieve compliance with the relevant Performance Requirements. Demonstration that this design achieves compliance with the relevant Performance Requirements of the BCA will be undertaken as part of the fire engineering assessment at a later date.

3. SCOPE, ASSUMPTIONS & LIMITATIONS

3.1 SCOPE

1. The scope of this report is limited to the specification of a Trial Design for the departures from the DTS provisions of the BCA identified in Section 5 for the building. These departures from the DTS provisions were identified in Stephen Grubits & Associates BCA Assessment Report 2007/206 R1.0.

2. This preliminary fire safety strategy does not consider potential property damage to the subject building. The strategy has been developed based on the objectives of the BCA being that of:

    - Occupant life safety;
    - Facilitate fire brigade intervention; and
    - Protection of adjoining property.

3. Should a change in use or building alterations or additions occur in the future, a revision of the preliminary fire safety strategy contained within this report will be necessary.

3.2 ASSUMPTIONS & LIMITATIONS

1. This strategy is preliminary only and all parameters suggested herein are subject to detailed analysis and consultation with stakeholders during the Fire Engineering Brief process.

2. Demonstration that the specified preliminary fire safety strategy for the building will comply with the identified Performance Requirements will be the subject of a fire engineering assessment to be undertaken at a later date, using fire safety engineering methodologies in accordance with the *International Fire Engineering Guidelines* [2]. Should the assessment reveal that the proposed systems do not satisfy the performance criteria, additional fire safety systems or modifications to the trial design followed by further assessment would be required.

3. All of the fire safety systems are assumed to operate as designed unless specifically stated otherwise.

4. With the exception of the departures from the DTS provisions identified in Section 5, it is assumed that the remainder of the building will comply with the DTS provisions of the BCA.

4. BUILDING DESCRIPTION

The proposed building is located between George and Carrington Streets, Sydney. Lower levels link with Wynyard Railway Station under Wynyard Park.

The building is greater than 25m in height and incorporates a number of buildings uses.

The use of the building is principally office with lower levels containing retail and 2 Levels of basement carparking.

The proposed development envisages connecting a number of surrounding buildings including Wynyard Station and Met Centre

[2] *International Fire Engineering Guidelines,* Edition 2005, Australian Building Codes Board

5. DEPARTURES FROM THE DTS PROVISIONS OF THE BCA

The general departures from the DTS provisions of the BCA that are intended to be addressed by the preliminary fire safety strategy documented in this report are listed below. As the design is in only at the concept stage, only broad level departures have been identified. The departures that were identified were documented in Stephen Grubits & Associates BCA Assessment Report 2007/206 R1.0.

The general areas of departure from the BCA DtS are as follows:

- Smoke Exhaust
- Compartment size
- Fire Separation
- Egress
    - Travel distances
    - Aggregate exit with
    - Fire isolated stairs
    - Travel vis non- fire isolated stairs

6. PERFORMANCE REQUIREMENTS

The Performance Requirements of the BCA identified below have been based on the general departures from the BCA identified in Section 5. The performance requirements were identified in accordance with the methodology outlined in Clause A0.10 of the BCA. The relevant Performance Requirements are as follows:

CP1 *A building must have elements which will, to the degree necessary, maintain structural stability during a fire appropriate to-*

(a) the function or use of the building; and

(b) the fire load; and

(c) the potential fire intensity; and

(d) the fire hazard; and

(e) the height of the building; and

(f) its proximity to other property; and

(g) any active fire safety systems installed in the building; and

(h) the size of any fire compartment; and

(i) fire brigade intervention; and

(j) other elements they support; and

(k) the evacuation time.

CP2 *(a) A building must have elements which will, to the degree necessary, avoid the spread of fire-*

(i) to exits; and

(ii) to sole-occupancy units and public corridors; and

(iii) between buildings; and

(iv) in a building,

(b) Avoidance of the spread of fire referred to in (a) must be appropriate to-

(i) the function or use of the building; and

(ii) the fire load; and

(iii) the potential fire intensity; and

(iv) the fire hazard; and

(v) the number of storeys in the building; and

(vi) its proximity to other property; and

(vii) any active fire safety systems installed in the building; and

(viii) the size of any fire compartment; and

(ix) fire brigade intervention; and

(x) other elements they support; and

(xi) the evacuation time.

DP4 *Exits must be provided from a building to allow occupants to evacuate safely, with their number, location and dimensions being appropriate to-*

(a) the travel distance; and

(b) the number, mobility and other characteristics of occupants; and

(c) the function or use of the building; and

(d) the height of the building; and

(e) whether the exit is from above or below ground level.

DP5 *To protect evacuating occupants from a fire in the building exits must be fire isolated, to the degree necessary. appropriate to-*

(a) the number of storeys connected by the exits; and

(b) the fire safety system installed in the building; and

(c) the function or use of the building; and

(d) the number of storeys passed through by the exits; and

(e) fire brigade intervention.

DP6 *So that occupants can safely evacuate the building, paths of travel to exits must have dimensions appropriate to-*

(a) the number, mobility and other characteristics of occupants; and

(b) the function or use of the building.

EP1.4 *An automatic fire suppression system must be installed to the degree necessary to control the development and spread of fire appropriate to-*

(a) the size of the fire compartment; and

(b) the function or use of the building; and

(c) the fire hazard; and

(d) the height of the building.

EP2.2 *(a) In the event of a fire in a building the conditions in any evacuation route must be maintained for the period of time occupants take to evacuate the part of the building so that-*

(i) the temperature will not endanger human life; and

(ii) the level of visibility will enable the evacuation route to be determined; and

(iii) the level of toxicity will not endanger human life.

(b) The period of time occupants take to evacuate referred to in (a) must be appropriate to-

(i) the number, mobility and other characteristics of the occupants; and

(ii) the function or use of the building; and

(iii) the travel distance and other characteristics of the building; and

(iv) the fire load; and

(v) the potential fire intensity; and

(vi) the fire hazard; and

(vii) any active fire safety systems installed in the building; and

(viii) fire brigade intervention.

7. TRIAL DESIGN

The Trial Design for the building is as follows:

General

1. The building is to comply with the DTS provisions of the BCA except for the departures from the DTS provisions identified in Section 5.
   Note: fire safety measures specified within this Trial Design do not necessarily reflect all of the required fire safety measures for the building.

2. Should a change in use or building alterations or additions occur in the future, a reassessment will be needed to verify consistency with this preliminary fire safety strategy.

Fire Safety Systems

3. Provision of sprinkler systems throughout the building in accordance with the requirements of Specification E1.5 and G3.8 of the BCA and AS 2118.1-1999. The sprinkler system should have the following additional characteristics:

   - The entire building (tower and basement levels) are required to be sprinklered throughout.
   - Sprinkler systems are to be independent of those serving adjacent buildings such as the Wynyard railway station or the Met Centre.
   - A Grade 1 water supply is required to serve the sprinkler system i.e. the system is to be fed from two different connections to the town main.
   - Sprinkler valves (including subsidiary valves) shall be monitored.

4. Glazing bounding the atriums shall be toughened glass.

5. Provision of a fire hydrant system serving the building in accordance with the requirements of Clause E1.3 of the BCA and AS 2419.1 - 2005.

6. Provision of a fire hose reel system serving the building in accordance with the requirements of Clause E1.4 of the BCA and AS 2441 - 2005.

7. Provision of portable fire extinguishers throughout the building in accordance with the requirements of Clause E1.6 of the BCA and AS 2444 - 2001.

8. Provision of emergency lighting in accordance with BCA Clauses E4.2 and E4.4.

9. Provision of exit signs in accordance with BCA Clauses E4.5, NSW E4.6 and E4.8.

Smoke Management System

10. Levels within the office tower that have a void connecting to the atrium, are required to be separated from the atrium via toughened glazing.

11. Mechanical smoke exhaust will be provided at the top of the atrium. This system will serve Carrington Street level, Wynyard Lane Level, Concourse, Hunter Connection & Mezzanine Levels. Make up air will be provided by a combination of mechanical systems and openings providing outside air.

12. Portions of the building which are not directly adjacent to the atrium (more than 10 m from a void in the atrium) will have a localised smoke exhaust system which will contain the smoke within that portion of the floor. Multiple systems are likely to be required. Make up air will be provided via a combination of mechanical systems and openings providing outside air.

13. A zone smoke control system shall be provided in the commercial (office) parts of the building.

14. The Basement Levels will have a localised smoke hazard management system. Make up air will be provided via mechanical systems.

15. Make-up air shall be provided via mechanical systems or via appropriately sized openings or a combination of the two.

16. Smoke baffles are required around all voids that contain stairs or escalators that are used for egress purposes

17. A smoke detection system shall be provided in accordance with the requirements of Specification G3.8 of the BCA and shall activate the automatic smoke exhaust system. The smoke detection system is required to be connected to a fire alarm monitoring system connected to a fire station or fire station dispatch centre in accordance with AS 1670.3-2004.

18. Emergency Warning and Intercommunication Systems (EWIS) shall be provided in accordance with Specification G3.8 of the BCA.

Egress

19. Additional fire isolated exits are required in the following areas:
    - Hunter Arcade Level
    - Hunter Arcade Mezzanine Level
    - The office tower

20. Exit travel distances within the building are to comply with Clause D1.4 of the BCA, with the exception of the following:

    - The distance to the nearest exit within the atrium must not exceed 60 m.

    Note: the distance to a point of choice however must not exceed 20m in accordance with Clause D1.4 of the BCA.

21. The distances of travel between alternative exits within the building are to comply with Clause D1.5 of the BCA, with the exception of the following:

- The distance between alternative exits must not exceed 80m if there are only two exits accessible or 100m if three or more exits are accessible.

22. Egress stairs connecting more than 3 storeys are to be fire isolated and pressurised.

23. A shortfall in aggregate exit width occurs on every level within the building. A reassessment of the aggregate exit width would be required once additional exits have been provided. In general a reduction of the aggregate exit width required by Clause D1.6 of the BCA can be justified. In certain cases this reduction can be up to 30% in areas with performance-based smoke exhaust systems, however this is subject detailed analysis.

24. To facilitate egress from Wynyard Station, horizontal exits may be permitted within the horizontal fire separation provided between properties as outlined in item 27 below. This may require fire-rated exit doors to be provided adjacent to the roller shutters or other fire-separating construction provided.

25. An Emergency Management Plan complying with AS 3745 is to be developed. Once the Emergency Management Plan is developed, it is to be implemented with exercises, periodic audits, and suitable procedures to maintain safety. This should include training under simulated fire emergency conditions for all relevant personnel.

Fire Resistance & Compartmentation

26. The building is to be divided into quasi-fire compartments through the use of the following methods:
    - Fire resistance construction between shops or shops can be grouped in an areas up to 2000m^2;
    - Where combustibles are located less than 3m from the edge of the void, separation by drenched tempered glazing is required.
27. Fire-separation of adjoining properties via the provision of fire doors or drenched fire shutters or fire curtains at the building interfaces, including connections to Wynyard Station.
28. The FRL of the building elements are to be in accordance with the requirements of Specification C1.1 of the BCA based on Type A construction, unless specifically stated otherwise.

Maintenance

29. Essential fire or other safety measures must be maintained and certified on an ongoing basis, in accordance with the provisions of the Environmental Planning and Assessment Regulation, 2000. The Alternative Solution Report will detail the Essential Fire Safety Measures critical to the alternative solution that are required to be added to the building's schedule of essential fire safety measures.

8. CONCLUSION

The preliminary fire safety strategy documented in this report has been developed with the intent of meeting the relevant Performance Requirements of the BCA.

This report has documented the general departures from the DTS Provisions of the BCA that are proposed to be satisfied by way of an Alternative Solution and has identified the fire safety features that are considered to be required in order to achieve compliance with the relevant Performance Requirements.

This strategy is preliminary only and all parameters suggested herein are subject to consultation with stakeholders during the Fire Engineering Brief process, including the NSW Fire Brigades. Demonstration that the specified preliminary fire safety strategy for the building will comply with the identified Performance Requirements will be the subject of a fire engineering assessment to be undertaken at a later date, using fire safety engineering methodologies in accordance with the *International Fire Engineering Guidelines* [3]. Should the assessment reveal that the proposed systems do not satisfy the performance criteria, additional fire safety systems or modifications to the trial design followed by further assessment would be required.

Implementation of the fire safety strategy outlined in this report is considered to result in the building being able to comply with the BCA.

9. REFERENCES

- *Building Code of Australia 2007* - Volume 1 - Australian Building Codes Board – CanPrint Communications Pty Ltd
- *International Fire Engineering Guidelines,* Edition 2005, Australian Building Codes Board
- CityOne BCA Assessment Report 2007/206 R1.0, Prepared by Stephen Grubits & Associates Pty Ltd.

3 *International Fire Engineering Guidelines,* Edition 2005, Australian Building Codes Board

APPENDIX A Documentation

The following drawings were used in the preparation of this report:

Drawing No.	*Title*	*Issue*	*Date*	*Drawn By*
SK-06	Proposed Long Section	-	02.03.2011	-
SK-06	Existing and Proposed Long Section	-	02.03.2011	-
Sheet 01	West Elevation – Indicative Envelope	-	December 2010	Hassell
Sheet 02	South Elevation – Indicative Envelope	-	02.03.2011	ML
-	Upper tower Levels 31-33	-	Sept 2006	PTW
-	Upper tower Levels 28-30	-	Sept 2006	PTW
-	Typical tower	B	Sept 2006	PTW
-	Mid Rise Tower	-	Sept 2006	PTW
-	Low Rise Tower	-	Sept 2006	PTW
-	Hunter arcade & mezzanine level	-	Sept 2006	PTW
-	Carrington Street level	-	Sept 2006	PTW
-	Wynyard Lane Level	-	Sept 2006	PTW
-	Final Stage Expansion beneath Wynyard Park	-	Aug 2007	PTW
-	Interim Stage Expansion beneath Wynyard Park	-	Aug 2007	PTW
-	Initial Stage Expansion beneath Wynyard Park	-	Aug 2007	PTW
-	Concourse Level Design Principles	-	Sept 2006	PTW
-	Section A-A North-South	-	Sept 2006	PTW
-	Section B-B North-South	-	Sept 2006	PTW
-	Section C-C North-South	-	Sept 2006	PTW