Electrical Engineering Building Capital Renewal and Modernisation, The University of NSW

Preliminary BCA Assessment



Prepared by Anthony Ljubicic Dated 3 February 2016 Revision 03

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Introduction

This report presents the findings of a preliminary assessment undertaken of the proposed design of the Electrical Engineering Building Capital Renewal and Modernisation project (EEB_CRM) at the University of New South Wales against the Deemed-to-Satisfy (DtS) provisions of Building Code of Australia (BCA) 2015. It has been prepared by Steve Watson and Partners for UNSW Australia (The University of NSW).

Purpose

The assessment is undertaken for the purpose of, and to the extent necessary for, submission with the Development Application to Council under Part 4 of the Environmental Planning and Assessment Act.

Description of proposed development

Proposed development involves the refurbishment and renewal of the existing Electrical Engineering Building, Rex Vowels Theatre and associated landscaping. The existing EEB_CRM houses the School of Electrical Engineering and Telecommunications and contains a mixture of lectures theatres, teaching labs, research labs and office space.

Statutory Framework

New Work

Clause 145 of the Environmental Planning and Assessment Regulation 2000 (EPAR) requires that all new work comply with the current requirements of the BCA.

This means that all works proposed in the plans are required to comply but that existing features of an existing building need not comply with the BCA unless required to under other clauses of the legislation.

Consent Authority May Require Building to be Upgraded

When determining a development application a Consent Authority (Council) is required to assess fire safety in an existing building under Clause 94 of the EPAR.

The assessment must consider whether the measures contained in a building are inadequate

- i) to protect persons using the building and facilitate their egress in the event of a fire or
- ii) to restrict the spread of fire between buildings.

In determining a development application the consent authority is to take into consideration whether it would be appropriate for the building to be brought into total or partial conformity with the BCA. Normally this discretionary power would only be enacted in the following circumstances:

- the proposed scope of works encompasses a large portion of the building so that a total building upgrade would not be considered an onerous requirement (ie ½ the total volume of the building including other works undertaken in the last 3 years);
- the upgrading measure(s) significantly increase the level of safety and are able to be costeffectively incorporated into the proposed works so that they would not be considered an onerous requirement
- the existing level of safety is so deficient that the council consider a upgrade is necessary irrespective of the scope of works proposed.

No Change of Building use - Structural Strength & Fire Safety

Clause 143 (3) of the Environmental Planning and Assessment Regulation 2000 (EPAR) prevents a certifying authority from issuing a construction certificate if the proposed new work will result in a reduction to the fire protection and structural capacity of the building.

Assessment

Classification	Class 5, 8 and 9b
Number of storeys contained	7
Rise in storeys	6 (topmost storey is not counted in rise in storeys)
Type of construction required	Type A
Floor area and volume limitation	Class 5 and 9b = 8,000m ² and 48,000m ³ Class 8 =5,000m ² and 30,000m ³
Effective height	Less than 25m

A preliminary review of the proposed design has been undertaken against the DTS provisions of the BCA2015. The following table summarises the main items from our assessment:

Item	DTS Clause	Comment		
Section C Fire Resistance				
1.	C1.1 and Spec C1.1	The EEB_CRM has a mixed classification of Class 5, 8 and 9b. Class 5 and 9b generally require 2 hour fire rated construction while Class 8 generally required 4 hour fire rated construction under Type A Construction. The existing structure only achieves a 2 hour fire rating. It is proposed to obtain an alternative solution to allow the structure to achieve an FRL of 120/120/120 throughout. Certification from the structural engineer will be required to confirm the existing FRL's. External walls must be constructed of non-combustible construction.		
2.	C2.2	Fire compartments must comply with the floor area and volume limitations under Table C2.2. The proposed compartmentation will comply with the limitations.		
3.	C3.3	Openings in the external wall in different fire compartments within the minimum distances specified under Table C3.3 are required to be protected. With the northern tower and southern tower proposed to be fire separated openings in the external wall at the central lift lobby are required to be protected in accordance with Clause C3.4. It may be possible to address the issue via a fire engineered alternative solution.		
Section D Access and Egress				
4.	D1.3	Stairs 1 and 2 are proposed to be open stairs which are used for egress from all floors below level 03. From level 03 and 04 the stair will only serve as a circulation stair. An alternative solution is proposed to address the issue of the stairs connecting more than 3 storeys and not being fire isolated.		

Item	DTS Clause	Comment
5.	D1.4	The distance to a point of choice exceeds 20m. The worst case is approximately 30m. An alternative solution is proposed to address the extended travel distances.
		The travel distance to an exit exceeds 40m in some locations. With the proposed fire separation of the northern block from the southern block a horizontal exit will be provided which will address the issue.
6.	D1.6	Sufficient exit widths must be provided to serve the population on the floor. The proposed exits will provide sufficient egress widths for the proposed population.
7.	D1.7	The main central stair in the south block adjacent the Rex Vowels Theatre does not discharge directly outside. There may be an issue of the path of travel from the discharge of exits passing within 6m of the external wall of the same building. A fire engineered alternative solution will be required to address the issue.
8.	D2.16	The existing balustrades within the existing stairways do not comply. Balustrades will need to be upgraded comply with the current requirements of the BCA.
9.	D2.20	The proposed horizontal exit will serve as an exit in both directions. Therefore, the door is required to swing in both directions to comply. A fire door which is able to swing in both directions will need to be installed.
10.	D3	Access must be provided throughout in accordance with Part D3 and AS1428.1. Detailed design will be required to indicate compliance with AS1428.1-2009.
Sectio	on E Access an	d Egress
11.	E1.3	The hydrant system is to be upgraded. The hydrants booster is located within 10m of the building and is not within sight of the main entrance to the building. It is proposed to address the issue via an alternative solution. The hydrant pump room does not strictly comply with comply with AS2419.1 as the pump room does not open directly to a compliant "open space". 'Open space" is defined as a space within the allotment adequately protected from fire, open to the sky and connected directly with a public road. The area where the pump room opens to is open to the sky and is connected to the road but requires passing within 6m of the external wall of the building which means it is not adequately protected from fire. This will be addressed in the fire engineering report. The fire services engineer is to advise of any detailed design issues which will require an alternative solution.
12.	E1.4	Fire hose reel coverage is required throughout in accordance with AS2441. Hose reels are not permitted to pass through fire or smoke doors. An alternative solution may be required to address the issue of coverage where the proposed fire curtains around the stairs are to be installed.

Itom	DTS Clause	Comment
nem	ED DIS Clause	The building being a Class E. 9 and 0b School with an effective beight of less them 25 m is
13.	E2.2	The building being a Class 5, 8 and 9b School with an effective neight of less than 25m is
		required to be provided with either of the following:
		 In each fire-isolated stairway, an automatic air pressurisation system for fire- isolated evits in accordance with AS (NIZS 1668 1) or
		isolated exits in accordance with AS/NZS 1008.1; or
		 a zone smoke control system in accordance with AS/NZS 1668.1, if the building has more than one fire compartments or
		more than one fire compartment, or
		• an automatic shoke detection and alarm system complying with specification
		EZ.2d, UI
		• a sprinkler system complying with specification E1.5.
		system is proposed as part of the proposed alternative solution
		system is proposed as part of the proposed alternative solution.
		A Class 9b building must be provided with automatic shutdown of any air-handling
		system (other than non-ducted individual room units with a capacity not more than
		1000 l/s and miscellaneous exhaust air systems installed in accordance with Sections 5
		and 11 of AS/NZS 1668.1) which does not form part of the smoke hazard management
		system, on the activation of smoke detectors or sprinkler system.
14.	Part E4	Emergency lighting and exit signage is to be installed throughout in accordance with
		AS2293.1.
		A sound system and intercom system for emergency purposes (aka EWIS) is required in
		accordance with AS1670.4.
15.	Refer to app	endix C for the list of the essential fire services that are required to be installed in the
	building und	er the DTS provisions of the BCA. Additional measures will be required as part of the fire
	engineered a	alternative solution.
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Sectio	on F Health an	d Amenity
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Item	DTS Clause	Comment			
19.	F4.5	Mechanical ventilation is to be provided in accordance with AS 1668.2			
Sectio	Section H Theatres Stages and Public Halls				
20.	Part H1	The seating with Rex Vowels theatre and other lecture theatres are to comply with Clause H1.4 of the BCA If the lighting is able to be dimmed in Rex Vowels theatre and other lecture theatres then aisle lights must be provided to illuminate the fill length of the aisle and the tread of each step.			
Section J Energy Efficiency					
21.	Section J	The design of the building is to comply with the requirements of any JV2 assessment or the DTS requirements specified under Section J.			

Conclusion

A preliminary assessment of the proposed design has been undertaken against the DTS provisions of the BCA2015. It is determined that the building is capable of comply with the requirements of the Building Code of Australia with a combination of compliance with the DTS provisions and via alternative solutions satisfying the Performance Requirements of the BCA.

Anthony Ljubicic Director Steve Watson & Partners Pty Ltd

Appendix A – Referenced Documentation

Drawing No.	Title	Issue	Date	Drawn By
DA_A_1101	General Arrangement Plan - Lower Ground	С	28/1/2015	Hassell
DA_A_1102	General Arrangement Plan - Ground	С	28/1/2015	Hassell
DA_A_1103	General Arrangement Plan – Level 1	С	28/1/2015	Hassell
DA_A_1104	General Arrangement Plan – Level 2	С	28/1/2015	Hassell
DA_A_1105	General Arrangement Plan – Level 3	С	28/1/2015	Hassell
DA_A_1106	General Arrangement Plan – Level 4	С	28/1/2015	Hassell

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

TYPE A CONSTRUCTION: FRL OF BUILDING ELEMENTS				
Building element		Class o	f building - FRL: (ii	n minutes)
		Structu	ral adequacy/Inte	grity/Insulation
	2, 3 or 4 part	5, 9 or 7a	6	7b or 8
EXTERNAL WALL (includ	ing any column a	nd other building el	ement incorporate	ed therein) or
other external building e	lement, where tl	he distance from any	y fire-source featu	re to which it is
exposed is-				
For loadbearing parts-				
less than 1.5m	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 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, wh	ere the distance f	rom 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 stai	r 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 corridor	s, 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 IN	NTERNAL 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

Appendix B – Construction Details

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Appendix C – Schedule of proposed statutory Fire Safety Measures

Measure	Standard of Performance
Access panels, doors and hoppers to	BCA2015 Clause C3.13 and tested prototypes (AS 1530.4 –
fire resisting shafts	2005)
Automatic fail safe devices	Scheduled devices release upon trip of smoke detection,
	fire detection or sprinkler activation in accordance with
	BCA2015 Clause D2.21.
Automatic fire detection and alarm	BCA2015 Clause 5 and 7 of Specification E2.2a and AS/NZS
system (smoke detection system to	1668.1 – 1998 (System monitoring in accordance with
automatically shutdown air-handling	AS1670.3-2004)
system or smoke detection system to	
activate smoke exhaust system or	
smoke and near vents)	
Automatic fire suppression systems	BCA2015 Specification E1.5 and AS 2118.1 – 1999
(Sprinklers)	
Emergency lighting	BCA2015 Clause E4.2, E4.4 and AS 2293.1 – 2005
Sound System and	BCA2015 Clause E4.9 and AS 1670.4 – 2004
Intercommunication System for	
Emergency Purposes (aka EWIS)	
Exit signs	BCA2015 Clause E4.5, NSW E4.6, E4.7, E4.8 and AS 2293.1 –
	2005
Fire control centre	BCA2015 Specification E1.8
Fire dampers	BCA2015 Clause C3.15 and AS/NZS 1668.1 – 1998 (AS
	1682.1-1990 and AS 1682.2-1990)
Fire doors	BCA2015 Specification C3.4 and AS 1905.1 – 2005
Fire hydrants systems	BCA2015 Clause E1.3 and AS 2419.1 – 2005
Fire seals protecting opening in fire	BCA2015 Clause C3.15, Specification C3.15 and AS 1530.4 –
resisting components of the building	2005 and AS 4072.1 – 2005 and installed in accordance
	with the tested prototype.
Hose reel system	BCA2015 Clause E1.4 and AS 2441 – 2005
Lightweight construction	BCA2015 Specifications C1.8, Clause A2.3 and AS 1530.4-
	2005

Measure	Standard of Performance
Mechanical air handling system	BCA2015 Clause E2.2 and AS/NZ 1668.1-1998
(automatic shut down of air-	
handling system)	
Portable fire extinguishers	BCA2015 Clause E1.6 and AS 2444 – 2001
Smoke detectors and heat detectors	BCA2015 Clause C3.5 and AS 1670.1 – 2004
(detectors for the automatic closing	
operation of fire doors in fire walls)	
Smoke detectors and heat detectors	BCA2015 Clause C3.7 and AS 1670.1 – 2004
(detectors for the automatic closing	
operation of horizontal exits)	
Smake detectors and heat detectors	PCA201E Claure C2 8 and AS 1670 1 2004
Shoke detectors and heat detectors	BCA2015 Clause CS.8 and AS 1070.1 – 2004
(detectors for the automatic closing	
operation of fire doors to fire	
isolated exits)	
Wall wetting sprinkler and drencher	BCA2015 Clause C3.4 and AS 2118.2 – 1995
systems	
Warning and operational signs	BCA2015 Clauses D1.17, D2.23, D3.6, E3.3, E3.9, E3.10 and
	Specifications E3.1

<u>Note</u>: Schedule may need to be amended subject to the inclusion of a fire engineered alternative solution prior to the issue of a Construction Certificate