

## CONSULTANT ADVICE

### Building Code of Australia (BCA) Preliminary Review

#### PRELIMINARIES

PROJECT REF.	170087
Project Details	Inner Sydney High School (ISHS) Corner of Cleveland and Chalmers Street, Surry Hills NSW 2010
Development Proposal	Internal reconfiguration of existing heritage listed building & construction of a new fourteen (14) storey multi-purpose school building including rooftop play area (approximately 56.5m from park level).
Client	NSW Department of Education C/- FJMT
Date	06 June 2017 (Rev C)

#### DEVELOPMENT DESCRIPTION

Proposed Works	Description
Classification(s)	9b
Use	School (Assembly Building); <b>Entertainment Venue</b> (Determined by Clause 16.08 of EFSG for Basement and Lower Ground)
Rise in Storeys	Fourteen (14)
Levels Contained	Fifteen (15)
Type of Construction	Type A
Effective Height	More than 50m (50.5m) <i>Note: Effective height requirements synopsis;</i> - Provision of Fire Control Room - Provision of Hydrant Mid-Level Pumping station
Fire Compartment Sizes	TBC. Details of proposed Volume and Floor Areas are to be provided. <i>Note: BCA Deemed to Satisfy (DTS) limits the maximum compartment size to be less than ,8000m2 and 48,000m3 (Type A Building)</i>

## BASIS OF ADVICE

### Certification

This advice is based upon:-

- The Building Code of Australia 2016.
- Architectural documentation referenced

## DOCUMENTATION ASSESSED

Drawing Number	Title	Issue
ICHS - 2001	GA – Basement Plan	For Information
ICHS - 2002	GA – Lower Ground Plan	For Information
ICHS - 2003	GA – Ground Floor Plan	For Information
ICHS - 2004	GA – Level 1 Plan	For Information
ICHS - 2005	GA – Level 2 -3 Plan	For Information
ICHS - 2006	GA – Level 4 -5 Plan	For Information
ICHS - 2007	GA – Level 6 – 8 Plan	For Information
ICHS - 2008	GA – Level 8 – 9 Plan	For Information
ICHS - 2009	GA – Level 10 – 11 Plan	For Information
ICHS - 2010	GA – Level 12 Roof	For Information
ICHS - 3001	North Elevation	For Information
ICHS - 3002	West Elevation	For Information
ICHS - 3003	South Elevation	For Information
ICHS - 3004	East Elevation	For Information
ICHS - 4001	Section A	For Information
ICHS - 4002	Section B	For Information
ICHS - 4003	Section C	For Information

## LIMITATIONS

### Limitations

This report seeks to provide high level advice only, to assist with the development of the architectural design. This is not to be construed as a comprehensive (clause by clause) BCA assessment, which will be required once the design further evolves.

The information provided is preliminary in nature and intended for the clients use only, accordingly it is not to be distributed to any external authorities.

## BCA ASSESSMENT

### PART A – COMPLIANCE MATTERS FOR CONSIDERATION

BCA CLAUSE	Comments
<b>Clause 2.4 of Spec C1.1, or Clause 3.1 of Spec C1.1</b>	<p>In accordance with Spec C1.1, Type A Construction requirements are to be provided throughout.</p> <p>Generally this will see most major building elements (Walls, Floors, Columns and Shafts) require an inherent Fire Resistance Level (FRL) of 2 hours (Refer – Table 3 of Appendix A)</p> <p>Any combustible materials or composite panels to the façade are to be verified as compliant with BCA, and either compliant as defined in AS 1530.1 or be listed as non-combustible in accordance with BCA Clause C2.12</p> <p>Alternatively, performance assessment by the Fire Safety Engineer may be considered.</p>
<b>C2.2</b>	<p>Detailed Fire Compartmentation plans to be prepared and issued by Architect (in conjunction with Fire Safety Engineer) for review against this clause.</p> <p>For a building of Type A construction the BCA limits fire compartment sizes as follows;</p> <ul style="list-style-type: none"> <li>Floor Area: Max 8,000m<sup>2</sup>;</li> <li>Volume: Max 48,000m<sup>3</sup></li> </ul> <p>Should the building exceed the above limits, Performance Solution to be formulated by Defire.</p>
<b>C2.10</b>	<p>Lift Shaft to comply with fire ratings as required by BCA (FRL 120/120/120) and not be glass or open style.</p> <p>Furthermore, new lifts are to be in their own independent shaft and not combined with stair shafts.</p> <p>In addition, emergency lift provisions are to be provided for the building, due to the effective height exceeding 25m, and are to serve each level of the building</p> <p><b>Note:</b> This will require an Emergency Lift to be provided at each bank of lifts.</p>
<b>C2.12/C2.13</b>	<p>Equipment listed in this clause of the BCA, if provided, is to be fire separated by construction achieving FRL 120/120/120.</p> <p>Such equipment may include (but not limited to);</p> <ul style="list-style-type: none"> <li>Lift motors and control panels</li> <li>Emergency generators</li> <li>Central smoke control plant</li> <li>Boilers</li> <li>Batteries exceeding 24volts and 10 amp hours (some UPS)</li> <li>Electrical substation</li> <li>Main switchboard (which sustains emergency equipment)</li> <li>Electrical conductors (supplying a substation or main switchboard above)</li> </ul>

BCA CLAUSE	Comments
<b>C3.2</b>	<p>Openings within external walls which are located within 3m of the side or rear allotment boundaries (fire source feature) are required to be protected in accordance with Clause C3.4 of the BCA (i.e. Drenchers, Fire Shutters, Fire Windows, Fire Doors).</p> <p>Site Survey to be provided to confirm exact location of the allotment boundaries, and include setback dimensions.</p> <p>Where any openings are identified as being situated within 3m of the allotment boundary it is recommended this issue be addressed by the Fire Safety Engineer as part of the overall fire safety strategy for the building.</p> <p><b>Note 1:</b> The DTS provisions of the BCA do not provide concession in relation to parklands; however can be used as means of justification within the FER by Defire.</p> <p><b>Note 2:</b> Where the development is spread across multiple lots, a consolidation of allotments is required, or alternatively Fire Engineering to be considered.</p>
<b>C3.3</b>	<p>Parts of external walls and associated openings in different fire compartments are required to be adequately protected (by way of fire resisting construction or drenchers/fire shutters to openings) in accordance with this clause.</p> <p>It is understood that the old and new sections of the building will be separate fire compartments and accordingly corresponding walls and associated openings must be reviewed.</p> <p>Recommended that this item is addressed by way of Performance Solution and reviewed by Defire.</p>
<b>Spec C1.10</b>	Floor, Wall and Ceiling linings are to all comply with the provisions of this Specification C1.10 for a sprinkler protected building (Group 1/ 2/ 3 materials)
<b>D1.2</b>	<p>Each level of the building requires a min of 2 exits, as the building is over 25m.</p> <p>The current design adequately achieves compliance in this regard.</p>
<b>D1.3</b>	<p>All stairs which connect or pass by more than 3 storeys are required to be fire isolated.</p> <p>Details of proposed fire compartmentation of stair and lift shafts to be provided to determine compliance.</p>
<b>D1.4/D1.5</b>	<p>Travel Distances</p> <p>For the most part travel distances are within the requirements of</p> <ul style="list-style-type: none"> <li>• 20m to a point of choice;</li> <li>• 40m to closest exit;</li> <li>• 60m between alternative exits;</li> <li>• Travel by non-fire isolated stair – maximum of 80m from location on floor to open space.</li> </ul> <p>There are some areas where the distances exceed these allowances of the DTS provisions of the BCA, these will be further outlined, but appear to be within allowable tolerances for fire safety engineering</p> <p>Expected distances for the design are in the realm of:</p> <ul style="list-style-type: none"> <li>• 20m to Point of Choice</li> <li>• 50m to exit</li> <li>• 80m between exits</li> </ul> <p>This will be further refined and assessed as the design progresses; also measurement of distance through non-fire isolated stairs to open space will need to be less than 80m as per BCA Clause D1.9.</p>
<b>D1.6</b>	The unobstructed width of each exit or path of travel to an exit (except at doorways) must be not less than 1,000mm for the basement and lower ground floor entertainment venues.

BCA CLAUSE	Comments
	<p>All other areas require doorways of 850mm clear, and stairs to be the minimum clear width of 1,000mm clear (or wider where required to enable increased aggregate egress widths)</p> <p><b>Note:</b> where 3m of egress width is required, this is the clear internal dimensions of the handrails, not the width of the bounding walls.</p> <p>Based on population of 1200 Students and 100 Staff (should this number be required to be accommodated on any one level) the following egress widths are required:</p> <ul style="list-style-type: none"> <li>• 1200 = 10.5m</li> <li>• 1280 = 11m</li> <li>• 1300 = 11.m</li> </ul> <p>It is our understanding that any shortfalls of egress width will be reviewed by Defire to assess against the performance provisions of the BCA.</p> <p>Other levels with reduced egress width are to provide details of how populations will be managed to ensure population does not exceed the allowable egress widths.</p>
D1.7	<p>Fire isolated stairs are to discharge independently directly to open space (i.e. open to the sky).</p> <p>Any awnings, canopies or the like proposed outside or adjacent to required stair discharge points are to be confirmed and further reviewed, where they will necessitate occupants to pass underneath en route to road or open space.</p> <p>Location of all proposed covered outdoor structures are to be reviewed in detail as part of the overall egress management strategy for the development, in conjunction with the Fire Engineer.</p>
D1.12	<p>Travel by non-required non fire isolated stairs – the upper levels of the building are provided with an open stair that connects more than 2 levels, as such this is a non-compliance with this clause of the BCA is to be assessed via Performance Solution by Defire.</p>
D1.13	<p>The following population densities are provided as a guide by this clause of the BCA for a school building;</p> <ul style="list-style-type: none"> <li>• General Classroom: 2 sqm /p</li> <li>• Multi-Purpose Hall: 1 sqm/p</li> <li>• Staff Room: 10 sqm/p</li> <li>• Trade and Practical Area: <ul style="list-style-type: none"> <li>- 5 sqm/p (machine shop or the like);</li> <li>- 50 sqm/p (other areas for fabrication and processing)</li> </ul> </li> </ul> <p><b>Note:</b> The primary limiting factors with respect to population loads, are sanitary facilities and egress widths.</p>
D3	<p>The appointed Access Consultant is to review accessibility to and within the existing and new building, in accordance with the following provisions;</p> <ul style="list-style-type: none"> <li>• Parts D2, D3 &amp; F2 of the BCA 2016</li> <li>• AS1428.1 – 2009</li> <li>• AS1428.4 - 1992</li> <li>• AS1735.12 – 1999</li> <li>• Disability (Access to Premises – Buildings) Standards 2010 (<b>Existing Building</b>)</li> </ul>
Part E	<p>The building is proposed to be in excess of over 50m in effective height , and accordingly the following fire safety services will be required throughout;</p>

BCA CLAUSE	Comments
	<ul style="list-style-type: none"> <li>Automatic Fire Suppression (AS2118.1 – 1999)</li> <li>Smoke Detection (AS1670.1 – 2015)</li> <li>Fire Hydrants (AS2419.1- 2005)</li> <li>Fire Hose Reels (AS2441- 2005)</li> <li><b>Note:</b> Except to classrooms and associated corridors</li> <li>Smoke Exhaust provisions (AS1668.1 – 2015)</li> <li><b>Note:</b> Entertainment Venue and over 25m requirements</li> <li>Fire Control <u>Room</u> as per BCA Spec E1.8</li> <li>Illuminated Exit Signs and Emergency Lighting (AS2293.1 – 2005)</li> <li>Stair pressurisation (AS1668.1 – 2015)</li> <li>G3 Atrium Provisions (TBC – any atrium spaces exceeding 3 storeys)</li> </ul> <p><b>Note:</b> some of these may be removed or enhanced as a result of the fire engineering process, as the design further evolves.</p> <p><b>Note 2:</b> It is expected that the existing low rise heritage buildings will be exempt from the &gt;25m BCA requirements as a result of fire engineering, which Defire will further advise on upon further detailed review.</p>
<b>Spec E1.8</b>	<p>A building with an effective height exceeding 50m, must be provided with a Fire Control room complying with this clause. The room must include (but not limited to) the following features;</p> <ul style="list-style-type: none"> <li>Fire resisting concrete or masonry enclosing walls (FRL120/120/120)</li> <li>Fire sealed service penetrations</li> <li>Self-closing -/120/30 smoke sealed fire door</li> <li>Natural ventilation (via window to outside air) or pressurisation system that serves the room only as per AS1668 &amp; auto activated by fire alarm</li> <li>Access to the room by 2 paths of travel <ul style="list-style-type: none"> <li>One from front entrance of the building; and</li> <li>One direct from public place or fire isolated passageway which leads to public place</li> </ul> </li> <li>Minimum room size as follows; <ul style="list-style-type: none"> <li>10sqm and the length of any internal side not less than 2.5m, and</li> <li>Not less than 8sqm net floor area (where only prescribed equipment installed)</li> </ul> </li> </ul>
<b>F2.3</b>	<p>Separate sanitary facilities for male and female students and staff must be provided throughout the building having consideration to use and proposed population numbers.</p> <p>If Standalone facilities are proposed then signage for Male or Female, Staff or Student is required, Disabled toilets may remain unallocated to staff or student.</p> <p>Spread of toilets through the building is acceptable, providing the whole building has toilet provisions for the student and staff numbers; this assumes access to all areas containing toilets is available for staff and students for their respective facilities.</p> <p>Sharing of toilets between staff and students is not permitted by this clause of the BCA, and was further reinforced in BCA 2016 to ensure separation of male and female facilities was provided.</p> <p>Based on a proposed student population of 1200 &amp; staff population of the following minimum facilities would be necessary;</p>

BCA CLAUSE	Comments																				
	<table><tr><td></td><td>WC</td><td>Basin</td><td>Urinal</td></tr><tr><td>Male Students (600p)</td><td>8</td><td>10</td><td>7</td></tr><tr><td>Female Students (600p)</td><td>15</td><td>10</td><td>N/A</td></tr><tr><td>Male Staff (50)</td><td>3</td><td>2</td><td>3</td></tr><tr><td>Female Staff (50)</td><td>4</td><td>2</td><td>N/A</td></tr></table> <p><b>Note :</b> A gender split of 50:50 has been applied, which is required by BCA Clause F2.3, any other split is only allowable if the school was a single sex school and not co-ed.</p>		WC	Basin	Urinal	Male Students (600p)	8	10	7	Female Students (600p)	15	10	N/A	Male Staff (50)	3	2	3	Female Staff (50)	4	2	N/A
	WC	Basin	Urinal																		
Male Students (600p)	8	10	7																		
Female Students (600p)	15	10	N/A																		
Male Staff (50)	3	2	3																		
Female Staff (50)	4	2	N/A																		
F2.4 / AS1428.1 (2009)	<p>Provision of a unisex accessible toilet complying with AS1428.1 – 2009, must be installed throughout each storey of the building where a bank of toilets is provided at that floor.</p> <p>Where there is more than one bank of toilets located on the floor, a unisex accessible facility must be provided to not less than 50% of those banks.</p> <p>Access Consultant to advise with respect to layout and spatial requirements.</p>																				
F2.4 / AS1428.1 (2009)	<p>At each bank of toilets where there is one or more toilets in addition to an accessible unisex facility, at that bank of toilets a sanitary compartment suitable for a person with ambulant disability in accordance with AS1428.1 (2009) must be provided, details inserted below.</p>																				

BCA CLAUSE	Comments
	<p><b>SECTION A-A</b></p> <p><b>ELEVATION</b></p> <p><b>PLAN</b></p> <p><b>SECTION A-A</b></p> <p><b>ELEVATION</b></p> <p><b>PLAN</b></p> <p><b>Dimensions in millimetres:</b></p> <ul style="list-style-type: none"> <li><b>SECTION A-A:</b> <ul style="list-style-type: none"> <li>Clearance above toilet: 100 to 310</li> <li>Clearance from side wall: 50 to 60</li> <li>Clearance from front wall: 460 to 480</li> <li>Width: 900 to 920</li> </ul> </li> <li><b>ELEVATION:</b> <ul style="list-style-type: none"> <li>Clearance above toilet: 400 to 450</li> <li>Clearance from side wall: 400 to 450</li> <li>Clearance from front wall: 200 to 250</li> <li>Angle: 30° to 45°</li> <li>Zone for position of toilet paper dispenser</li> <li>Maximum height: 700 max.</li> <li>Maximum width: 300 max.</li> <li>Clearance from side wall: 460 to 480</li> <li>Width: 900 min.</li> <li>Width: 610 to 660</li> <li>Standard projection for WC</li> </ul> </li> <li><b>PLAN:</b> <ul style="list-style-type: none"> <li>Standard projection for W.C.</li> <li>Circulation space - door must not intrude</li> <li>Clearance from side wall: 900 min.</li> <li>Width: 900 to 920</li> </ul> </li> </ul>

## SCHOOL FACILITIES STANDARD ASSESSMENT

## PART A – COMPLIANCE MATTERS FOR CONSIDERATION

CLAUSE	Comments
16.08	<p>This Clause of the SFS requires that the entertainment venue provisions of the BCA be applied to any Gymnasium, Performance Studio or Communal Hall.</p> <p>Based on this the Basement and Lower Ground floors are to achieve compliance with the requirements of NSW Part H101 (Entertainment Venues) of the BCA.</p> <p>Which will include but not limited to:</p> <ul style="list-style-type: none"> <li>• Fire Separation of the Entertainment Venue from the rest of the building</li> <li>• Stages if they exceed 50m2 then Smoke Exhaust will be required over the stage – confirmation once design progresses to limit this will be required to ensure this provision is not needed, if this exceeds 150m2 then additional provisions applies.</li> <li>• Lighting Bar – needs to be confirmed as not being used for scenery or other props, if that occurs then additional requirements apply</li> <li>• Smoke Exhaust to the Entertainment Level – based on Clause 16.08 of SFS, the exemption under NSW Table E2.2b does not apply, which means that Automatic Smoke Exhaust will be required to the Gym, Movement Studio and Lower Ground Floor areas within the Entertainment Venue (5MW).</li> </ul>



## EXISTING BUILDING UPGRADE ELEMENTS

### PART A – COMPLIANCE MATTERS FOR CONSIDERATION

CLAUSE	Comments
	<ul style="list-style-type: none"> <li>Existing final exit doors are to be min of 750mm clear opening</li> <li>Existing final exit doors to swing outwards in direction of travel</li> <li>Sprinklers complying with AS 2118.1-1999 to be installed throughout</li> <li>Illuminated exit signage and emergency lighting complying with AS2293.1 - 2005 to be installed to all areas</li> <li>Fire Hydrants coverage to be reviewed and upgraded to comply with AS2419.1 – 2005 &amp; BCA 2016. Items of particular note; <ul style="list-style-type: none"> <li>Hydrants to be located within fire stairs or within 4m of an exit / non fire isolated stair</li> <li>Existing mid landing Hydrants to be relocated to the floor to which they serve</li> <li>Hydrant Booster assembly to be further reviewed with respect to performance (flows /pressures) and location (not within sight of main entry and position from building being less than 10m)</li> </ul> </li> <li>Performance Solution for not providing over 25m provisions to existing heritage buildings</li> <li>Disabled Access to be reviewed and requirements of the Access to Premises standard to be implemented by the Access Consultant</li> <li>Finishes – any new floor and wall finishes will need to comply with Spec C1.10 of the BCA 2016 <p><b>Note:</b> existing will not need to be upgraded if being retained.</p> </li> <li>Section J – only new works will need to comply, as the existing buildings are currently air conditioned an upgrade for insulation provisions is not required.</li> <li>Existing non-compliant balustrading (stairs and Juliet balconies) to be upgraded</li> <li>Cupboards / Enclosures located beneath existing required stairs are to be removed or alternatively lined with fire rated light weight construction (FRL 60/60/60) including self-closing fire door</li> <li>Existing EDB's located along each path of travel are to be provided with non-combustible enclosures and smoke sealed</li> <li>Non-compliant door hardware (knob style) to be replaced with free release lever action handles throughout (located at 900 – 1100mm AFFL)</li> <li>Timber Floors – to be addressed by Performance Solution (Defire to advise)</li> </ul>

**Justin Jones-Gardiner**  
Director

Accredited Certifier / PCA (Grade A1) – NSW BPB0204

# GROUPDLA

## APPENDIX A

BCA Spec C1.1

Table 3 – Type A Construction: FRL of Building Elements

Building Element	Class of Building – FRL (in minutes) Structural Adequacy/Integrity/Insulation			
	Class 2, 3 or 4 part	Class 5, 9 or 7 (car park)	Class 6	Class 7 (other than carpark) or 8
<b>External Wall</b> (including any column and other building element incorporated therein) or other external building element, where the distance from and fire-source feature to which it is exposed is:				
For Loadbearing Parts:				
Less than 1.5m	90/90/60	120/120/120	180/180/180	240/240/240
1.5m to less than 3m	90/60/60	120/90/90	180/180/120	240/240/180
3m or more	90/60/30	120/60/30	180/120/90	240/180/90
For Non-Loadbearing Parts:				
less than 1.5m	- /90/90	- /120/120	-/180/180	-/240/240
1.5m to less than 3m	- /60/60	- /90/90	-/180/120	-/240/180
3m or more	- / - / -	- / - / -	-/-/-	-/-/-
<b>External Column</b> not incorporated in an external wall, where the distance from any fire source feature to which it is exposed is:				
Less than 3m	90/-/-	120/-/-	180/-/-	240/-/-
3m or more	-/-/-	-/-/-	-/-/-	-/-/-
<b>Common Walls and Fire Walls:</b>				
	90/90/90	120/120/120	180/180/180	240/240/240
<b>Internal Walls</b> – 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 <b>Public Corridors</b> public lobbies and the like:				
Loadbearing	90/90/90	120/ - / -	180/ - / -	240/-/-
Non-Loadbearing	- /60/60	- / - / -	- / - / -	- / - / -
Between or Bounding <b>Sole Occupancy Units:</b>				
Loadbearing	90/90/90	120/ - / -	180/ - / -	240/-/-
Non-Loadbearing	- /60/60	- / - / -	- / - / -	- / - / -

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Building Element	Class of Building – FRL (in minutes) Structural Adequacy/Integrity/Insulation			
	Class 2, 3 or 4 part	Class 5, 9 or 7 (car park)	Class 6	Class 7 (other than carpark) or 8
`Ventilating, pipe, garbage and like <b>shafts</b> 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
<b>Other Loadbearing Internal Walls, Internal Beams, Trusses and Columns:</b>				
	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