

**Initial Evaluation Procedure (IEP) Assessment - Completed for Hutt City Council**

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Street Number & Name:	71 Eastern Hutt Road	Job No.:	5-C3957.00
AKA:		By:	GSF
Name of building:	Belmont Memorial Hall	Date:	5/09/2019
City:	Belmont, Hutt City	Revision No.:	0

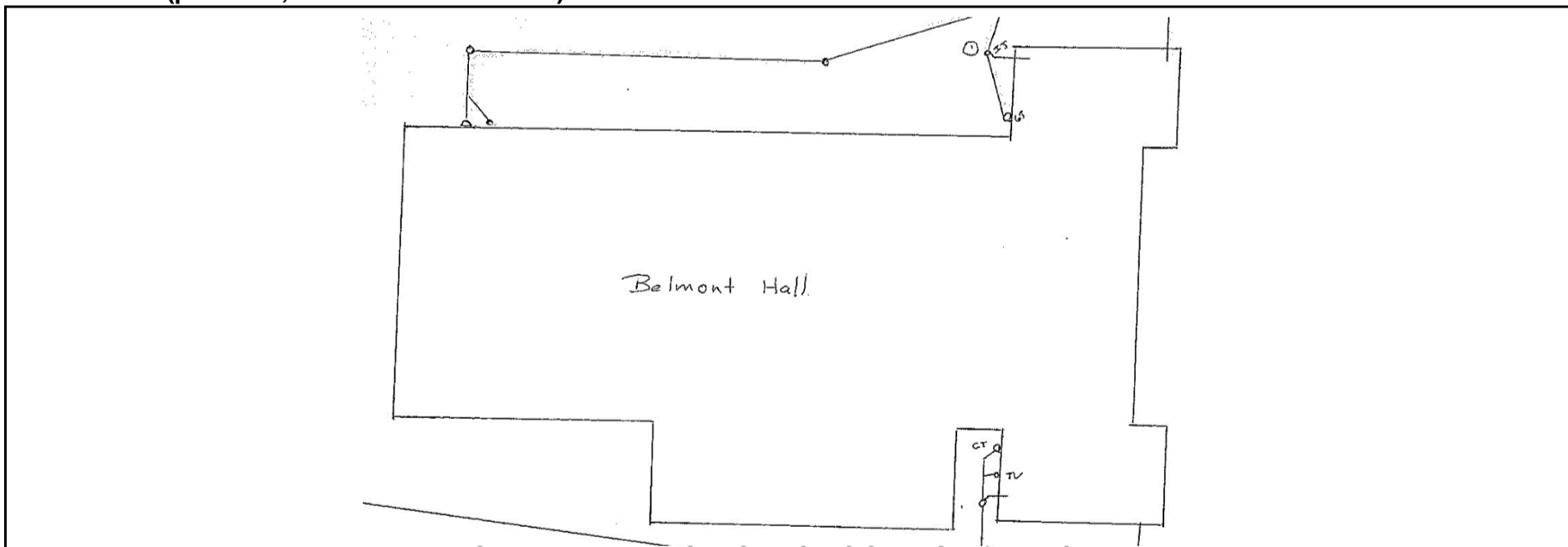
**Table IEP-1 Initial Evaluation Procedure Step 1**

**Step 1 - General Information**

**1.1 Photos (attach sufficient to describe building)**



**1.2 Sketches (plans etc, show items of interest)**



**1.3 List relevant features (Note: only 10 lines of text will print in this box. If further text required use Page 1a)**

Structure: Steel portal frames encased in concrete and concrete bond beam, part height reinforced masonry block walls encased by reinforced bond beams  
 Foundations: Concrete perimeter wall with piles some concrete slab on grade, assume pads under the portal frames.  
 Roof: Steel frame with lightweight cladding  
 Subsoil: D soft or deep soils - assumed based on location  
 Construction Date: 1950s assumed

**1.4 Note information sources**

Tick as appropriate

Visual Inspection of Exterior    
 Visual Inspection of Interior    
 Drawings (note type)

Specifications    
 Geotechnical Reports    
 Other (list)

Information Reviewed: limited drawings for additions, some scanning of original masonry walls and concrete columns

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**Table IEP-2 Initial Evaluation Procedure Step 2**

**Step 2 - Determination of (%NBS)<sub>b</sub>**

(Baseline (%NBS) for particular building - refer Section B5 )

**2.1 Determine nominal (%NBS) = (%NBS)<sub>nom</sub>**

**a) Building Strengthening Data**

Tick if building is known to have been strengthened in this direction

If strengthened, enter percentage of code the building has been strengthened to

Longitudinal

Transverse



N/A

N/A

**b) Year of Design/Strengthening, Building Type and Seismic Zone**

- Pre 1935
- 1935-1965
- 1965-1976
- 1976-1984
- 1984-1992
- 1992-2004
- 2004-2011
- Post Aug 2011

- Pre 1935
- 1935-1965
- 1965-1976
- 1976-1984
- 1984-1992
- 1992-2004
- 2004-2011
- Post Aug 2011

Building Type: Others

Building Type: Others

Seismic Zone: Not applicable

Seismic Zone: Not applicable

**c) Soil Type**

From NZS1170.5:2004, CI 3.1.3 :

D Soft Soil

D Soft Soil

From NZS4203:1992, CI 4.6.2.2 :  
(for 1992 to 2004 and only if known)

Not applicable

Not applicable

**d) Estimate Period, T**

Comment:

h<sub>n</sub> = 5.5  
A<sub>c</sub> = 1.00

5.5 m  
1.00 m<sup>2</sup>

- Moment Resisting Concrete Frames:  $T = \max\{0.09h_n^{0.75}, 0.4\}$
- Moment Resisting Steel Frames:  $T = \max\{0.14h_n^{0.75}, 0.4\}$
- Eccentrically Braced Steel Frames:  $T = \max\{0.08h_n^{0.75}, 0.4\}$
- All Other Frame Structures:  $T = \max\{0.06h_n^{0.75}, 0.4\}$
- Concrete Shear Walls:  $T = \max\{0.09h_n^{0.75}/A_c^{0.5}, 0.4\}$
- Masonry Shear Walls:  $T \leq 0.4\text{sec}$
- User Defined (input Period):

Where h<sub>n</sub> = height in metres from the base of the structure to the uppermost seismic weight or mass.

T: 0.40

0.50

**e) Factor A:** Strengthening factor determined using result from (a) above (set to 1.0 if not strengthened)

Factor A: 1.00

1.00

**f) Factor B:** Determined from NZSEE Guidelines Figure 3A.1 using results (a) to (e) above

Factor B: 0.03

0.03

**g) Factor C:** For reinforced concrete buildings designed between 1976-84 Factor C = 1.2, otherwise take as 1.0.

Factor C: 1.00

1.00

**h) Factor D:** For buildings designed prior to 1935 Factor D = 0.8 except for Wellington and Napier (1931-1935) where Factor D may be taken as 1.0, otherwise take as 1.0.

Factor D: 1.00

1.00

(%NBS)<sub>nom</sub> = Ax Bx CxD

(%NBS)<sub>nom</sub> 3%

3%

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**Table IEP-2 Initial Evaluation Procedure Step 2 continued**

**2.2 Near Fault Scaling Factor, Factor E**

If  $T \leq 1.5\text{sec}$ , Factor E = 1

a) Near Fault Factor,  $N(T,D)$

(from NZS1170.5:2004, Cl 3.1.6)

Longitudinal

Transverse

N(T,D):

b) Factor E

=  $1/N(T,D)$

Factor E:

**2.3 Hazard Scaling Factor, Factor F**

a) Hazard Factor, Z, for site

Location:  Refer right for user-defined locations

Z =  (from NZS1170.5:2004, Table 3.3)

$Z_{1992}$  =  (NZS4203:1992 Zone Factor from accompanying Figure 3.5(b))

$Z_{2004}$  =  (from NZS1170.5:2004, Table 3.3)

b) Factor F

For pre 1992

=  $1/Z$

For 1992-2011

=  $Z_{1992}/Z$

For post 2011

=  $Z_{2004}/Z$

Factor F:

**2.4 Return Period Scaling Factor, Factor G**

a) Design Importance Level, I

(Set to 1 if not known. For buildings designed prior to 1965 and known to be designed as a public building set to 1.25. For buildings designed 1965-1976 and known to be designed as a public building set to 1.33 for Zone A or 1.2 for Zone B. For 1976-1984 set I value.)

I =

b) Design Risk Factor,  $R_o$

(set to 1.0 if other than 1976-2004, or not known)

$R_o$  =

c) Return Period Factor, R

(from NZS1170.0:2004 Building Importance Level)

Choose Importance Level

1  2  3  4

1  2  3  4

R =

d) Factor G

=  $IR_o/R$

Factor G:

**2.5 Ductility Scaling Factor, Factor H**

a) Available Displacement Ductility Within Existing Structure

*Comment:*

Concrete encased Steel Portal frames transverse, concrete encased portals and bond beams transverse

$\mu$  =

b) Factor H

For pre 1976 (maximum of 2)  
For 1976 onwards

=  $k_\mu$   
= 1.57  
= 1  
Factor H:

$k_\mu$   
1.72  
1

(where  $k_\mu$  is NZS1170.5:2004 Inelastic Spectrum Scaling Factor, from accompanying Table 3.3)

**2.6 Structural Performance Scaling Factor, Factor I**

a) Structural Performance Factor,  $S_p$

(from accompanying Figure 3.4)

Tick if light timber-framed construction in this direction

$S_p$  =

b) Structural Performance Scaling Factor

=  $1/S_p$

Factor I:

Note Factor B values for 1992 to 2004 have been multiplied by 0.67 to account for  $S_p$  in this period

**2.7 Baseline %NBS for Building, (%NBS)<sub>b</sub>**

(equals (%NBS)<sub>nom</sub> x E x F x G x H x I )

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**Table IEP-3 Initial Evaluation Procedure Step 3**

**Step 3 - Assessment of Performance Achievement Ratio (PAR)**

(Refer Appendix B - Section B3.2)

**a) Longitudinal Direction**

potential CSWs	Effect on Structural Performance (Choose a value - Do not interpolate)	Factors
<b>3.1 Plan Irregularity</b> Effect on Structural Performance <input type="radio"/> Severe <input type="radio"/> Significant <input checked="" type="radio"/> Insignificant Comment: Nil		Factor A 1.0
<b>3.2 Vertical Irregularity</b> Effect on Structural Performance <input type="radio"/> Severe <input type="radio"/> Significant <input checked="" type="radio"/> Insignificant Comment: N/A		Factor B 1.0
<b>3.3 Short Columns</b> Effect on Structural Performance <input type="radio"/> Severe <input type="radio"/> Significant <input checked="" type="radio"/> Insignificant Comment: Nil		Factor C 1.0
<b>3.4 Pounding Potential</b> (Estimate D1 and D2 and set D = the lower of the two, or 1.0 if no potential for pounding, or consequences are considered to be minimal)		

**a) Factor D1: - Pounding Effect**

**Note:**  
 Values given assume the building has a frame structure. For stiff buildings (eg shear walls), the effect of pounding may be reduced by taking the coefficient to the right of the value applicable to frame buildings.

**Factor D1 For Longitudinal Direction:** 1.0

Table for Selection of Factor D1	Severe 0 < Sep < .005H	Significant .005 < Sep < .01H	Insignificant Sep > .01H
Alignment of Floors within 20% of Storey Height	<input type="radio"/> 1	<input type="radio"/> 1	<input checked="" type="radio"/> 1
Alignment of Floors not within 20% of Storey Height	<input type="radio"/> 0.4	<input type="radio"/> 0.7	<input type="radio"/> 0.8
N/A			

**b) Factor D2: - Height Difference Effect**

**Factor D2 For Longitudinal Direction:** 1.0

Table for Selection of Factor D2	Severe 0 < Sep < .005H	Significant .005 < Sep < .01H	Insignificant Sep > .01H
Height Difference > 4 Storeys	<input type="radio"/> 0.4	<input type="radio"/> 0.7	<input checked="" type="radio"/> 1
Height Difference 2 to 4 Storeys	<input type="radio"/> 0.7	<input type="radio"/> 0.9	<input type="radio"/> 1
Height Difference < 2 Storeys	<input type="radio"/> 1	<input type="radio"/> 1	<input type="radio"/> 1
N/A			

**Factor D** 1.0

**3.5 Site Characteristics - Stability, landslide threat, liquefaction etc as it affects the structural performance from a life-safety perspective**

Effect on Structural Performance <input type="radio"/> Severe <input type="radio"/> Significant <input checked="" type="radio"/> Insignificant	Factor E	1.0
Comment: Potential for lateral spreading due to location near Hutt River 200m to the South-East		

**3.6 Other Factors - for allowance of all other relevant characteristics of the building**

For ≤ 3 storeys - Maximum value 2.5  
 otherwise - Maximum value 1.5.  
 No minimum.

**Factor F** 2.5

**Record rationale for choice of Factor F:**  
 Comment: Steel portal frames, lightweight roof with plasterboard/gib diaphragm, reinforced masonry walls in plane to mid height with heavy cladding, F factor 2.5

**3.7 Performance Achievement Ratio (PAR)**

(equals A x B x C x D x E x F)

**PAR**  
**Longitudinal** 2.50

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**Table IEP-3 Initial Evaluation Procedure Step 3**

**Step 3 - Assessment of Performance Achievement Ratio (PAR)**

(Refer Appendix B - Section B3.2)

**b) Transverse Direction**

potential CSWs	Effect on Structural Performance (Choose a value - Do not interpolate)	Factors
<b>3.1 Plan Irregularity</b> Effect on Structural Performance <input type="radio"/> Severe <input type="radio"/> Significant <input checked="" type="radio"/> Insignificant Comment: Nil		<b>Factor A</b> 1.0
<b>3.2 Vertical Irregularity</b> Effect on Structural Performance <input type="radio"/> Severe <input type="radio"/> Significant <input checked="" type="radio"/> Insignificant Comment: N/A		<b>Factor B</b> 1.0
<b>3.3 Short Columns</b> Effect on Structural Performance <input type="radio"/> Severe <input type="radio"/> Significant <input checked="" type="radio"/> Insignificant Comment: Nil		<b>Factor C</b> 1.0
<b>3.4 Pounding Potential</b> (Estimate D1 and D2 and set D = the lower of the two, or 1.0 if no potential for pounding, or consequences are considered to be minimal)		

**a) Factor D1: - Pounding Effect**

**Note:**  
 Values given assume the building has a frame structure. For stiff buildings (eg shear walls), the effect of pounding may be reduced by taking the coefficient to the right of the value applicable to frame buildings.

**Factor D1 For Transverse Direction:** 1.0

Table for Selection of Factor D1	Severe	Significant	Insignificant
Separation	0<Sep<.005H	.005<Sep<.01H	Sep>.01H
Alignment of Floors within 20% of Storey Height	<input type="radio"/> 1	<input type="radio"/> 1	<input checked="" type="radio"/> 1
Alignment of Floors not within 20% of Storey Height	<input type="radio"/> 0.4	<input type="radio"/> 0.7	<input type="radio"/> 0.8

Comment: Nil

**b) Factor D2: - Height Difference Effect**

**Factor D2 For Transverse Direction:** 1.0

Table for Selection of Factor D2	Severe	Significant	Insignificant
	0<Sep<.005H	.005<Sep<.01H	Sep>.01H
Height Difference > 4 Storeys	<input type="radio"/> 0.4	<input type="radio"/> 0.7	<input checked="" type="radio"/> 1
Height Difference 2 to 4 Storeys	<input type="radio"/> 0.7	<input type="radio"/> 0.9	<input type="radio"/> 1
Height Difference < 2 Storeys	<input type="radio"/> 1	<input type="radio"/> 1	<input type="radio"/> 1

Comment: N/A

**Factor D** 1.0

**3.5 Site Characteristics - Stability, landslide threat, liquefaction etc as it affects the structural performance from a life-safety perspective**

Effect on Structural Performance <input type="radio"/> Severe <input type="radio"/> Significant <input checked="" type="radio"/> Insignificant	<b>Factor E</b> 1.0
Comment: Potential for lateral spreading due to location near Hutt River 200m to the South-East	

**3.6 Other Factors - for allowance of all other relevant characteristics of the building**

For ≤ 3 storeys - Maximum value 2.5  
 otherwise - Maximum value 1.5.  
 No minimum.

**Factor F** 2.50

**Record rationale for choice of Factor F:**  
 Comment: Steel portal frames with lightweight roof, reinforced masonry walls to mid height with heavy cladding acting out of plane, supported by ancillary structures, F factor 2.5

**3.7 Performance Achievement Ratio (PAR)**  
 (equals A x B x C x D x E x F)

**PAR**  
**Transverse** 2.50

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**Table IEP-4 Initial Evaluation Procedure Steps 4, 5, 6 and 7**

**Step 4 - Percentage of New Building Standard (%NBS)**

	Longitudinal	Transverse
4.1 Assessed Baseline %NBS (%NBS) <sub>b</sub> (from Table IEP - 1)	16%	18%
4.2 Performance Achievement Ratio (PAR) (from Table IEP - 2)	2.50	2.50
4.3 PAR x Baseline (%NBS) <sub>b</sub>	40%	45%
4.4 Percentage New Building Standard (%NBS) - Seismic Rating (Use lower of two values from Step 4.3)		40%

**Step 5 - Is %NBS < 34?**

NO

**Step 6 - Potentially Earthquake Risk (is %NBS < 67)?**

YES

**Step 7 - Provisional Grading for Seismic Risk based on IEP**

Seismic Grade **C**

**Additional Comments (items of note affecting IEP based seismic rating)**

Comment: Concrete masonry walls scanned, reinforcing identified at 600mm centres both ways, partial grouted

**Relationship between Grade and %NBS:**

Grade:	A+	A	B	C	D	E
%NBS:	> 100	100 to 80	79 to 67	66 to 34	< 34 to 20	< 20

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**Table IEP-5 Initial Evaluation Procedure Step 8**

**Step 8 - Identification of potential Severe Structural Weaknesses (SSWs) that could result in significant risk to a significant number of occupants**

- 8.1 Number of storeys above ground level 1
- 8.2 Presence of heavy concrete floors and/or concrete roof? (Y/N) N

**Potential Severe Structural Weaknesses (SSWs):**

Note: Options that are greyed out are not applicable and need not be considered.

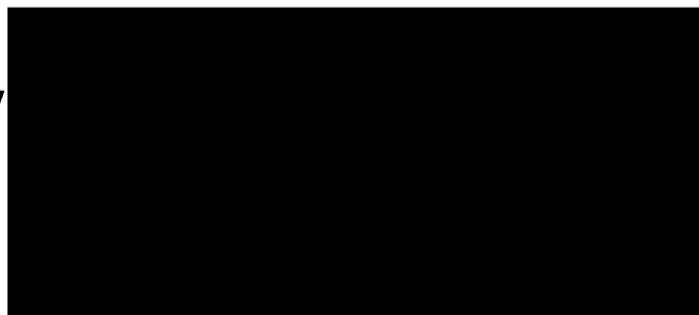
**Occupancy not considered to be significant - no further consideration required**

**Risk not considered to be significant - no further consideration required**

The following potential Severe Structural Weaknesses (SSWs) have been identified in the building that could result in significant risk to a significant number of occupants:

1. None identified
2. Weak or soft storey (except top storey)
3. Brittle columns and/or beam-column joints the deformations of which are not constrained by other structural elements
4. Flat slab buildings with lateral capacity reliant on low ductility slab-to-column connections
5. No identifiable connection between primary structure and diaphragms
6. Ledge and gap stairs

**IEP Assessment Confirmed by**



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**Table IEP-1a Additional Photos and Sketches**



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<b>1. Building Information</b>	
Building Name/ Description	Belmont Memorial Hall
Street Address	71 Eastern Hutt Road, Belmont
Territorial Authority	Hutt City Council
No. of Storeys	1
Area of Typical Floor (approx.)	300 sqm
Year of Design (approx.)	1950 assumed (confirmed constructed prior to 1956)
NZ Standards designed to	NA
Structural System including Foundations	Concrete perimeter walls and piles with some concrete slab on grade, assume pads under the portal frames. Concrete encased steel portal frames with reinforced concrete bond beams, infilled with reinforced concrete masonry. Ancillary structures have reinforced concrete masonry walls. Roof systems are typically lightweight with steel and lined bracing elements, the roof cladding is lightweight
Does the building comprise a shared structural form or shares structural elements with any other adjacent titles?	No
Key features of ground profile and identified geohazards	Generally flat under the building and wider site, potential for lateral spreading
Previous strengthening and/ or significant alteration	None
Heritage Issues/ Status	Nil
Other Relevant Information	Seismic Hazard Map Series: Liquefaction Hazard, Map Sheet 3, 1993 Liquefaction Hazard Hutt Valley.

<b>2. Assessment Information</b>	
Consulting Practice	
CPEng Responsible, including: <ul style="list-style-type: none"> <li>• Name</li> <li>• CPEng number</li> <li>• A statement of suitable skills and experience in the seismic assessment of existing buildings<sup>1</sup></li> </ul>	
Documentation reviewed, including: <ul style="list-style-type: none"> <li>• date/ version of drawings/ calculations<sup>2</sup></li> <li>• previous seismic assessments</li> </ul>	Minor drawings: Additions 1962 - toilets
Geotechnical Report(s)	NA – subsoil assumed based on local knowledge and Seismic Hazard Maps
Date(s) Building Inspected and extent of inspection	22 August 2019
Description of any structural testing undertaken and results summary	None
Previous Assessment Reports	NA
Other Relevant Information	Nil

<sup>1</sup> This should include reference to the engineer's Practice Field being in Structural Engineering, and commentary on experience in seismic assessment and recent relevant training

<sup>2</sup> Or justification of assumptions if no drawings were able to be obtained

<b>3. Summary of Engineering Assessment Methodology and Key Parameters Used</b>	
Occupancy Type(s) and Importance Level	Importance Level 2
Site Subsoil Class	D assumed based on local knowledge and <i>NZS1170.5:2004 Site Subsoil Classification of Lower Hutt</i> <a href="http://nzsee.org.nz/db/2011/013.pdf">http://nzsee.org.nz/db/2011/013.pdf</a>
<b><u>For an ISA:</u></b>	
Summary of how Part B was applied, including: <ul style="list-style-type: none"> <li>• Key parameters such as <math>\mu</math>, <math>S_p</math> and F factors</li> <li>• Any supplementary specific calculations</li> </ul>	Ductility Longitudinal – Steel portal frames with part height reinforced concrete bond beams 2.0 Transverse - Steel portal frames 2.0 Sp Factor –0.70 both directions F Factor – 2.5 longitudinal (maximum) cross braced portal frames and part height reinforced concrete masonry walls with few openings in plane action. 2.5 – transverse portal frames with heavy masonry walls out of plane, frames supported by walls of ancillary buildings
<b><u>For a DSA:</u></b>	
Summary of how Part C was applied, including: <ul style="list-style-type: none"> <li>• the analysis methodology(s) used from C2</li> <li>• other sections of Part C applied</li> </ul>	NA
Other Relevant Information	NA

<b>4. Assessment Outcomes</b>		
Assessment Status (Draft or Final)	Final	
Assessed %NBS Rating	40%NBS IL2	
Seismic Grade and Relative Risk (from Table A3.1)	C – 5 - 10 times greater risk than a new building	
<b>For an ISA:</b>		
Describe the Potential Critical Structural Weaknesses	None identified	
Does the result reflect the building's expected behaviour, or is more information/ analysis required?	Yes – the ISA is sufficient	
If the results of this ISA are being used for earthquake prone decision purposes, <u>and</u> elements rating <34%NBS have been identified:	<b>Engineering Statement of Structural Weaknesses and Location</b>  NA	<b>Mode of Failure and Physical Consequence Statement(s)</b>  NA
<b>For a DSA:</b>		
Comment on the nature of Secondary Structural and Non-structural elements/ parts identified and assessed		
Describe the Governing Critical Structural Weakness		
If the results of this DSA are being used for earthquake prone decision purposes, <u>and</u> elements rating <34%NBS have been identified (including Parts) <sup>3</sup> :	<b>Engineering Statement of Structural Weaknesses and Location</b>	<b>Mode of Failure and Physical Consequence Statement(s)</b>
Recommendations (optional for EPB purposes)		

<sup>3</sup> If a building comprises a shared structural form or shares structural elements with other adjacent titles, information about the extent to which the low scoring elements affect, or do not affect the structure.