

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

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Street Number & Name:	9-11 Myrtle Street	Job No.:	5-C3957.00
AKA:		By:	GSF
Name of building:	Hutt Art Society	Date:	10/12/2019
City:	Hutt City Central	Revision No.:	0

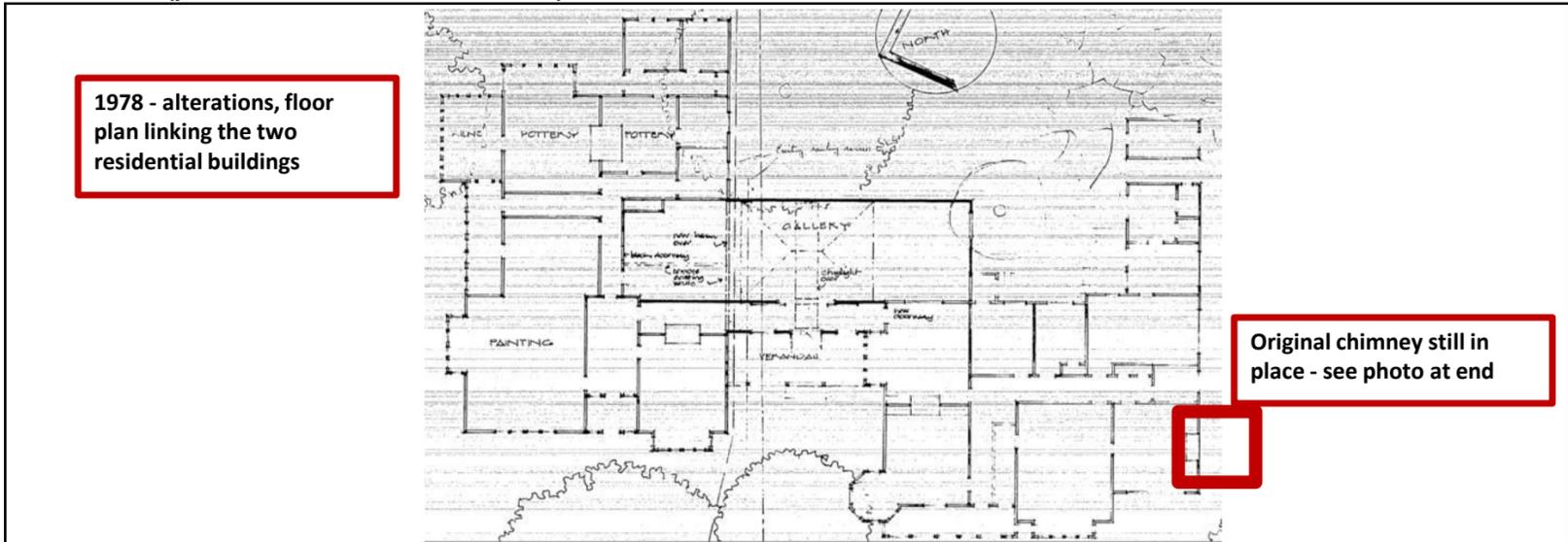
Table IEP-1 Initial Evaluation Procedure Step 1

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: Timber framed with lined walls and weatherboard cladding
 Foundations: Concrete foundation walls and concrete piles - re-plied
 Roof: Timber truss with lightweight cladding
 Subsoil: D soft or deep soils - NZS1170.5:2004 Site Subsoil Classification of Lower Hutt
 Construction Date: 1920s

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: 1937 and 1978 Additions link the buildings

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Table IEP-2 Initial Evaluation Procedure Step 2

Step 2 - Determination of (%NBS)_b

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

2.1 Determine nominal (%NBS) = (%NBS)_{nom}

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 - Wellington

Building Type: Others - Wellington

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:

Timber frames

h_n = 5
A_c = 1.00

5 m
1.00 m²

- 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_n = height in metres from the base of the structure to the uppermost seismic weight or mass.

T: 0.40

0.40

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)_{nom} = Ax BxCxD

(%NBS)_{nom} 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

N(T,D):

Transverse

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:

Lightweight timber

μ =

b) Factor H

For pre 1976 (maximum of 2)
For 1976 onwards

= k_μ
= 1.57
= 1
Factor H:

k_μ
1.57
1

(where k_μ 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)_b

(equals (%NBS)_{nom} 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
3.1 Plan Irregularity Effect on Structural Performance <input type="radio"/> Severe <input type="radio"/> Significant <input checked="" type="radio"/> Insignificant Comment: Yes but insignificant on performance		Factor A 1.0
3.2 Vertical Irregularity Effect on Structural Performance <input type="radio"/> Severe <input type="radio"/> Significant <input checked="" type="radio"/> Insignificant Comment: Nil		Factor B 1.0
3.3 Short Columns Effect on Structural Performance <input type="radio"/> Severe <input type="radio"/> Significant <input checked="" type="radio"/> Insignificant Comment: Nil		Factor C 1.0
3.4 Pounding Potential (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

Separation	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

Comment: Nil

b) Factor D2: - Height Difference Effect

Factor D2 For Longitudinal Direction: 1.0

Separation	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

Comment: Nil

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 liquifaction but no impact on performance

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: lightweight timber, re-piled, lightweight roof with well arranged and braced walls

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
3.1 Plan Irregularity Effect on Structural Performance <input type="radio"/> Severe <input type="radio"/> Significant <input checked="" type="radio"/> Insignificant Comment: Yes but insignificant on performance		Factor A 1.0
3.2 Vertical Irregularity Effect on Structural Performance <input type="radio"/> Severe <input type="radio"/> Significant <input checked="" type="radio"/> Insignificant Comment: Nil		Factor B 1.0
3.3 Short Columns Effect on Structural Performance <input type="radio"/> Severe <input type="radio"/> Significant <input checked="" type="radio"/> Insignificant Comment: Nil		Factor C 1.0
3.4 Pounding Potential (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 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

Comment: Nil

b) Factor D2: - Height Difference Effect

Factor D2 For Transverse 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

Comment: Nil

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 liquifaction but no impact on performance	

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: lightweight timber, re-piled, lightweight roof with well arranged and braced walls

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) _b (from Table IEP - 1)	22%	22%
4.2 Performance Achievement Ratio (PAR) (from Table IEP - 2)	2.50	2.50
4.3 PAR x Baseline (%NBS) _b	55%	55%
4.4 Percentage New Building Standard (%NBS) - Seismic Rating (Use lower of two values from Step 4.3)		55%

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: Potentially EQ Prone - recommend removal of the chimney as marked
The area potentially impacted by the chimney is outside of the building and a generally unoccupied zone
Building overall rated 55%IL2

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.

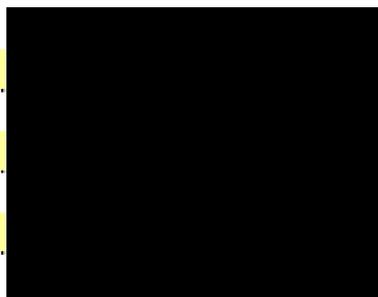
Occupancy not considered to be significant - no further consideration required

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



Signature

Name

CPEng. No

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Table IEP-1a Additional Photos and Sketches



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1. Building Information	
Building Name/ Description	Hutt Art Society
Street Address	9-11 Myrtle Street, Hutt City Central
Territorial Authority	Hutt City Council
No. of Storeys	1
Area of Typical Floor (approx.)	260 sqm
Year of Design (approx.)	1920s
NZ Standards designed to	Nil
Structural System including Foundations	Timber framed structure with lined and diagonal timber braced walls with weatherboard cladding, let in 1 inch bracing for all walls. Sarked timber framed roof and piled foundation.
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	Flat even ground profile, subsoil D, variable potential for liquefaction
Previous strengthening and/ or significant alteration	Some re-piling, approximately 1960-1965 Two Residential buildings linked to become a single structure in 1978
Heritage Issues/ Status	Nil
Other Relevant Information	Several original chimneys removed

2. Assessment Information	
Consulting Practice	WSP New Zealand Ltd
CPEng Responsible, including: <ul style="list-style-type: none"> • Name • CPEng number • A statement of suitable skills and experience in the seismic assessment of existing buildings¹ 	[REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED]
Documentation reviewed, including: <ul style="list-style-type: none"> • date/ version of drawings/ calculations² • previous seismic assessments 	Alterations to residence, Myrtle street dated 1937 Plan drawings titled, Extension to No.9 and 11 Myrtle Street dated 1978
Geotechnical Report(s)	NA – assumed based on local knowledge refer to section 3
Date(s) Building Inspected and extent of inspection	11 December 2019
Description of any structural testing undertaken and results summary	None
Previous Assessment Reports	NA
Other Relevant Information	Nil

¹ 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

² Or justification of assumptions if no drawings were able to be obtained

3. Summary of Engineering Assessment Methodology and Key Parameters Used	
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> http://nzsee.org.nz/db/2011/013.pdf
For an ISA:	
Summary of how Part B was applied, including: <ul style="list-style-type: none"> • Key parameters such as μ, S_p and F factors • Any supplementary specific calculations 	Ductility – 2.0 lined and braced timber framed walls Sp Factor – 0.5 for lightweight timber structure F Factor – 2.5 both directions (maximum) based on the arrangement and length of the bracing walls, sarked roof with lightweight cladding and re-piled foundations.
For a DSA:	
Summary of how Part C was applied, including: <ul style="list-style-type: none"> • the analysis methodology(s) used from C2 • other sections of Part C applied 	NA
Other Relevant Information	NA

4. Assessment Outcomes		
Assessment Status (Draft or Final)	Final	
Assessed %NBS Rating	<34%NBS IL2 based on Chimney, the primary structure is rated 60%IL2	
Seismic Grade and Relative Risk (from Table A3.1)	D Grade 10 to 25 times risk comparable to new building	
For an ISA:		
Describe the Potential Critical Structural Weaknesses	One partially demolished brick chimney	
Does the result reflect the building's expected behaviour, or is more information/ analysis required?	Yes – the ISA is sufficient, the primary timber structure is rated at 55%IL2	
If the results of this ISA are being used for earthquake prone decision purposes, <u>and</u> elements rating <34%NBS have been identified:	Engineering Statement of Structural Weaknesses and Location NA	Mode of Failure and Physical Consequence Statement(s) NA
For a DSA:		
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) ³ :	Engineering Statement of Structural Weaknesses and Location	Mode of Failure and Physical Consequence Statement(s)
Recommendations (optional for EPB purposes)	Overall building rated 55%IL2 – recommend removal of the chimney	

³ 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.