

POLICY ON EARTHQUAKE PRONE BUILDINGS

7560/397/00 A

Building Risk Assessment Earthquake Prone Buildings

Address: 108 St John St - ODC office

Lot No:..... DPS No:..... Building Consent No:.....

<u>Risk Factor</u>	<u>Rating (H/L)</u>	<u>Score</u>
Users		
1. What is the maximum number of users at any one any one time	100 + people (H) = 10 Less than 100 people (L) = 7	7
2. What is the predominant age group of the building users?	Children or Infants (H) = 10 Adults (L) = 3	3
3. What is the general capability of the building users?	Mentally handicapped/immobile (H) = 10 Physically handicapped but mobile (H) = 6 Normal (L) = 3	3
Usage of the building		
4. What is the sleeping activity rating for the building in terms of the building code?	Hospitals Care Institutions, Motels, Hotels, Hostels, Boarding houses, Boarding schools, Halls (H) = 10 Multi-unit dwellings, flats, apartments + Residential accommodation above shops (L) = 3	0
5. Is the building used for any of the following activities?		0
a. Education	Children (H) = 10 Adults (L) = 5	
b. Old people's home	Geriatric (H) = 10 Mobile (L) = 5	
c. Hospital (private or public)	Bedridden (H) = 10 Mobile (L) = 8	
d. Residential institution	Bedridden (H) = 10 Mobile (L) = 5	
e. Place of Assembly	>100 people (H) = 10 <100 (L) = 3	
f. Hotels and motels	>20 people (H) = 7 <5 (L) = 3	
g. Backpackers and Home stays	>20 people (H) = 9 <5 (L) = 5	
h. Attached multi-unit buildings	>5 apartments (H) = 7 3-5 (L) = 5	
6. What is the crowd, working, business or storage activity for the building in terms of the building code?	Manufacturing of combustible materials, cinemas, schools, colleges, libraries, restaurants (when occupant loads exceed 100)(H) = 10 Manufacturing non-combustible materials, pack houses, banks, hairdressers, dentists, doctors, police stations, professional services, Cinemas, churches, court rooms, halls, day care centres, gyms, museums, eating places (when occupant loads up to 100) (L) = 3	3
Building Characteristics		
7. Does the building have common walls with others?	>1 (H) = 5 <1 (L) = 3	3
8. How many storeys does the building have?	2 = 5 add 5 for every subsequent storey	0

1 2 3 4 5 6 7 8 9 includes basements

OPOTIKI DISTRICT COUNCIL

POLICY ON EARTHQUAKE PRONE BUILDINGS

9. Any historic clarification or significance?	Yes = 2	0
10. Is the building in the inner city, in a known geothermal area or previous seismic activity?	Yes (H) = 10	10
11. What is the age and condition of the building? e.g. Pre 1940 = 10 Pre 1965=8	Assign score 1-10 accordingly	1
12. Are there any other factors to be considered? e.g. Parapets, verandahs, attachments or adornments	Assign score 1-10 accordingly	0
Total Score (out of approx 100) <i>Note: < 40 Low Risk 40-60 = Moderate Risk) >60 = High Risk)</i>		30

1980's
- Brick Veneer - cracking
- Timber Frame

Table IEP-2: Initial Evaluation Procedure – Step 2

Table IEP-2 Initial Evaluation Procedure Step 2

Page 2....

(Refer Table IEP - 1 for Step 1; Table IEP - 3 for Step 3; Table IEP - 4 for Steps 4, 5 and 6)

Building Name Location Direction Considered: a) Longitudinal b) Transverse (Choose worse case if clear at start. Complete IEP-2 and IEP-3 for each if in doubt)	<i>OP.C office 1088A Jam St</i>	Ref. By Date	<i>7560/307 DS 7/9/11</i>
--	-------------------------------------	-----------------	-----------------------------------

Step 2 - Determination of (%NBS)_b

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

a) Date of Design and Seismic Zone

- Pre 1935
- 1935-1965
- 1965-1976
- 1976-1992
- 1992-2004

- Seismic Zone: A
- B
- C
- Seismic Zone: A
- B
- C

tick as appropriate

See also notes 1, 3

See also note 2

b) Soil Type

From NZS1170.5:2004, CI 3.1.3

- A or B Rock
- C Shallow Soil
- D Soft Soil
- E Very Soft Soil
- a) Rigid
- b) Intermediate

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

See also note 2

c) Estimate Period, T

Can use following:

- $T = 0.09h_n^{0.75}$ for moment-resisting concrete frames
- $T = 0.14h_n^{0.75}$ for moment-resisting steel frames
- $T = 0.08h_n^{0.75}$ for eccentrically braced steel frames
- $T = 0.06h_n^{0.75}$ for all other frame structures
- $T = 0.09h_n^{0.75} / A_c^{0.5}$ for concrete shear walls
- $T \leq 0.4$ sec for masonry shear walls

Where h_n = height in m from the base of the structure to the uppermost seismic weight or mass
 $A_c = \sum A_i (0.2 + L_{wi}/h_n)^2$
 A_i = cross-sectional shear area of shear wall i in the first storey of the building, in m^2
 L_{wi} = length of shear wall i in the first storey in the direction parallel to the applied forces, in m
 with the restriction that L_{wi}/h_n shall not exceed 0.9

2.05 Seconds

d) (%NBS)_{nom} determined from Figure 3.3

2.0 (%NBS)_{nom}

Note 1: For buildings designed prior to 1965 and known to be designed as public buildings in accordance with the code of the time, multiply (%NBS)_{nom} by 1.25.

For buildings designed 1965 - 1976 and known to be designed as public buildings in accordance with the code of the time, multiply (%NBS)_{nom} by 1.33 - Zone A
 1.2 - Zone B

Note 2: For reinforced concrete buildings designed between 1976-84 multiply (%NBS)_{nom} by 1.2

Note 3: For buildings designed prior to 1935 multiply (%NBS)_{nom} by 0.8 except for Wellington where the factor may be taken as 1.

2.0 (%NBS)_{nom}

Continued over page

Table IEP-2: Initial Evaluation Procedure – Step 2 continued

Table IEP-2 Initial Evaluation Procedure Step 2 continued

Page 3....

2.2 Near Fault Scaling Factor, Factor A

If $T \leq 1.5$ sec, Factor A = 1

a) Near Fault Factor, $N(T,D)$
(from NZS1170.5:2004, Cl 3.1.6)

[]

b) Near Fault Scaling Factor = $1/N(T,D)$

Factor A

[1]

2.3 Hazard Scaling Factor, Factor B

a) Hazard Factor, Z , for site
(from NZS1170.5:2004, Table 3.3)

[]

b) Hazard Scaling Factor

For pre 1992 = $1/Z$
For 1992 onwards = Z_{1992}/Z

(Where Z_{1992} is the NZS4203:1992 Zone Factor from accompanying Figure 3.5(b))

Factor B

[3.3]

2.4 Return Period Scaling Factor, Factor C

a) Building Importance Level
(from NZS1170.0:2004, Table 3.1 and 3.2)

[4]

b) Return Period Scaling Factor from accompanying Table 3.1

Factor C

[1]

2.5 Ductility Scaling Factor, D

a) Assessed Ductility of Existing Structure, μ
(shall be less than maximum given in accompanying Table 3.2)

[1]

b) Ductility Scaling Factor

For pre 1976 = k_{μ}
For 1976 onwards = 1

(where k_{μ} is NZS1170.5:2004 Ductility Factor, from accompanying Table 3.3)

Factor D

[1]

2.6 Structural Performance Scaling Factor, Factor E

a) Structural Performance Factor, S_p
from accompanying Figure 3.4

[1]

b) Structural Performance Scaling Factor = $1/S_p$

Factor E

[1]

2.7 Baseline %NBS for Building, (%NBS)_b
(equals (%NSB)_{nom} x A x B x C x D x E)

[3.3]

Table IEP-3: Initial evaluation procedure – Step 3

Table IEP-3 Initial Evaluation Procedure Step 3

Page

(Refer Table IEP - 1 for Step 1; Table IEP - 2 for Step 2; Table IEP - 4 for Steps 4, 5 and 6)

Building Name: 100 St. JOHNST. Location: 100 St. JOHNST. Direction Considered: a) Longitudinal b) Transverse (Choose worse case if clear at start. Complete IEP-2 and IEP-3 for each if in doubt)	Ref. By: 7860/307 Date: 29/1/14
--	--

Step 3 - Assessment of Performance Achievement Ratio (PAR)

(Refer Appendix B - Section B3.2)

Critical Structural Weakness	Building Score	Effect on Structural Performance (Choose a value - Do not interpolate)		
		Severe	Significant	Insignificant
3.1 Plan Irregularity Effect on Structural Performance Comment:	Factor A <input type="checkbox"/>	0.4 max	0.7	1
3.2 Vertical Irregularity Effect on Structural Performance Comment:	Factor B <input type="checkbox"/>	0.4 max	0.7	1
3.3 Short Columns Effect on Structural Performance Comment:	Factor C <input type="checkbox"/>	0.4 max	0.7	1

3.4 Pounding Potential
(Estimate D1 and D2 and set D = the lower of the two, or =1.0 if no potential for pounding)

a) Factor D1: - Pounding Effect
Select appropriate value from Table

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

Factor D1

	Severe	Significant	Insignificant
Separation 0 < Sep < .005H	0.7	0.8	1
Alignment of Floors within 20% of Storey Height	0.7	0.8	1
Alignment of Floors not within 20% of Storey Height	0.4	0.7	0.8

b) Factor D2: - Height Difference Effect
Select appropriate value from Table

Factor D2

	Severe	Significant	Insignificant
0 < Sep < .005H	0.4	0.7	1
Height Difference > 4 Storeys	0.4	0.7	1
Height Difference 2 to 4 Storeys	0.7	0.9	1
Height Difference < 2 Storeys	1	1	1

Factor D

(Set D = lesser of D1 and D2 or.. set D = 1.0 if no prospect of pounding)

3.5 Site Characteristics - (Stability, landslide threat, liquefaction etc) Effect on Structural Performance	Severe	Significant	Insignificant
Soil	0.5 max	0.7	1

3.6 Other Factors

Factor F

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

Record rationale for choice of Factor F:

1.5 minor cracking

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

1.05

Table IEP-4: Initial evaluation procedure – Steps 4, 5 and 6

Table IEP- 4 Initial Evaluation Procedure Steps 4, 5 and 6 (Refer Table IEP - 1 for Step 1; Table IEP - 2 for Step 2; Table IEP - 3 for Step 3)		Page ...				
Building Name ODC. Location 108 G. JOHN ST.	Ref. 2560/317 By [Signature] Date 28/5/14					
Step 4 - Percentage of New Building Standard (%NBS)						
	Longitudinal	Transverse				
4.1 Assessed Baseline (%NBS)_a (from Table IEP - 1)	<input type="text"/>	<input type="text" value="66"/>				
4.2 Performance Achievement Ratio (PAR) (from Table IEP - 2)	<input type="text"/>	<input type="text" value="1.075"/>				
4.3 PAR x Baseline (%NBS)_b	<input type="text"/>	<input type="text" value="69"/>				
4.4 Percentage New Building Standard (%NBS) (Use lower of two values from Step 3.3)		<input type="text" value="69"/>				
Step 5 - Potentially Earthquake Prone?						
(Mark as appropriate)	%NBS > 33	<input type="text" value="NO"/>				
	%NBS ≤ 33	<input type="text" value="YES"/>				
Step 6 - Potentially Earthquake Risk?						
(Mark as appropriate)	%NBS ≥ 67	<input checked="" type="text" value="NO"/>				
	%NBS < 67	<input type="text" value="YES"/>				
Step 7 - Provisional Grading for Seismic Risk based on IEP						
	Seismic Grade	<input type="text" value="D"/>				
Evaluation Confirmed by... [Signature]		Signature				
	BT SHILTON	Name				
	15499	CPEng. No				
Relationship between Seismic Grade and %NBS :						
Grade:	A+	A	B	C	D	E
%NBS:	> 100	100 to 80	80 to 67	67 to 33	33 to 20	< 20

