Table IEP-1 Initial Evaluation Procedure Step 1

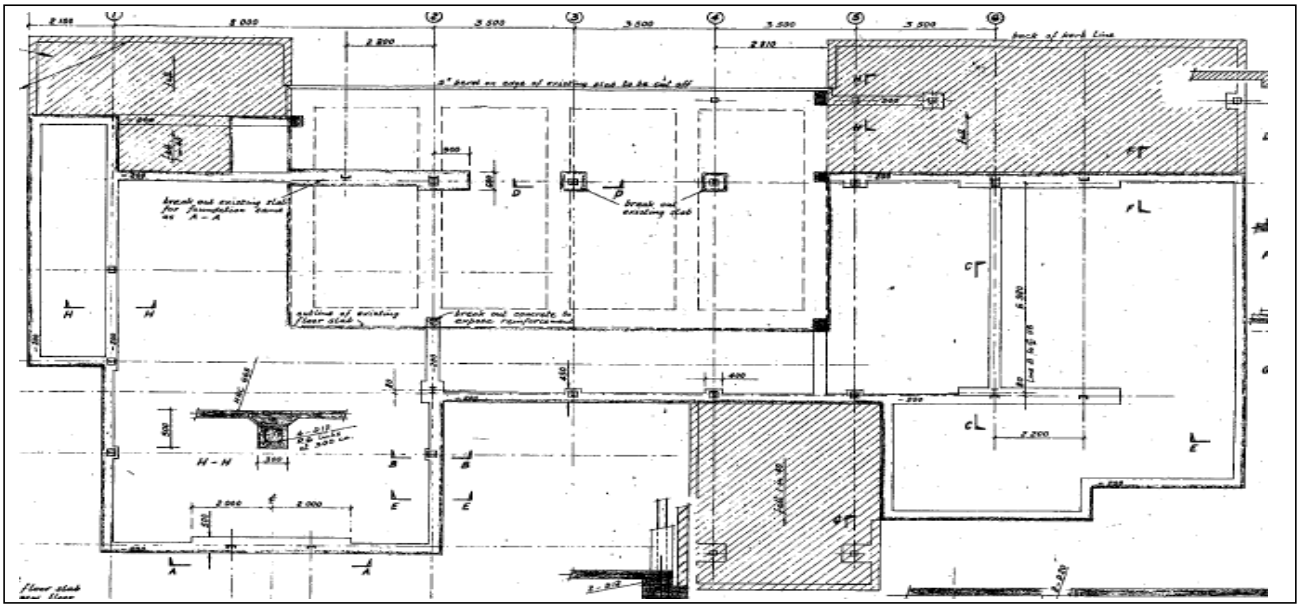
(Refer Table IEP - 2 for Step 2; Table IEP - 3 for Steps 3; Table IEP - 4 for Steps 4, 5 and 6)

Building Name:	**Taupo Airport Terminal**	**Ref:**	**130752**
Location:	**Taupo , New Zealand**	**By:**	**LH**
		Date:	**30/08/2013**

Step 1 - General Information

1.1 Photos (attach sufficient to describe building)

1.2 Sketch of building plan



1.3 List relevant features

Structural drawings indicate that Taupo Airport terminal was designed and constructed circa 1979 for its intended use as the airport terminal building. The building is single level and irregularly shaped vertically and also horizontally.

Foundations consist of reinforced concrete strip footings around the perimeter and below internal load bearing walls. There are reinforced concrete pads below frame column positions. The foundation layout is included above.

The main super-structure of the building is constructed from a series of structural steel frames the columns of which are concrete encased. Longitudinal steel beams are also concrete encased. The building has large openings on the runway side to allow observation of aircraft. Other than windows and doors the balance of the building is clad in brick veneer. The roof is pitched steeply with a number of hips and has timber trusses spanning across the building. Above the trusses is timber sarking. The roof structure is braced further with rod style

1.4 Note information sources

	tick as appropriate
Visual Inspection of Exterior	☑
Visual Inspection of Interior	☑
Drawings (note type)	☐
Specifications	☐
Geotechnical Reports	☐
Other (list)	☑ Property File from TDC

Table IEP-2 Initial Evaluation Procedure - Step 2

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

Building Name:	Taupo Airport Terminal	**Ref:**	130752
Location:	Taupo , New Zealand	**By:**	LH
Direction Considered:	**a) Longitudinal & b) Transverse**		
(Choose worse case if clear at start. Complete IEP-2 and IEP-3 for each if in doubt)		**Date:**	**30/08/2013**

Step 2 - Determination of $(\%NBS)_b$

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

a) Date of Design and Seismic Zone

Note: Only periods between 1965-1992 require seismic zone to be chosen

- ○ Pre 1935 — see notes 1, 3
- ○ 1935-1965
- ○ 1965-1976
- ◉ 1976-1992 — see note 2
- ○ 1992-2004

Seismic Zone: Zone A

b) Soil Type

From NZS1170.5:2004, Cl3.1.3

NZS1170.5:2004
- ○ A or B Rock
- ○ C Shallow Soil
- ◉ D Soft Soil
- ○ E Very Soft Soil

From NZS4203:1992,Cl 4.6.2.2
(for 1992-2004 only, and only if known)

NZS4203:1992
- ◉ Rigid
- ○ Intermediate

c) Estimate Period, T

can use following:

		period, T	Longitudinal	Transverse	
			0.602	**0.602**	seconds
$T = 0.09h_n^{0.75}$	for moment resisting concrete frame		○ MRCF	○ MRCF	
$T = 0.14h_n^{0.75}$	for moment resisting steel frame		◉ MRSF	◉ MRSF	
$T = 0.08h_n^{0.75}$	for eccentrically braced frame		○ EBF	○ EBF	
$T = 0.06h_n^{0.75}$	for all other frame structures		○ Other	○ Other	
$T = 0.09h_n^{0.75}/A_c^{0.5}$	for concrete shear walls		○ CSW	○ CSW	
$T \le 0.4$sec	for masonry shear walls		○ MSW	○ MSW	

Where h_n = height from base of structure to uppermost seismic weight

or mass, Ac = $\sum A_i(0.2 + L_{wi}/h_n)^2$

A_i = cross-sectional shear area of shear wall I in the first storey of building (m2)

l_w = length of shear wall I in the first storey in the direction parallel to the applied forces (m)

with the restriction that l_w / h_n shall not exceed 0.9

	Longitudinal	Transverse
h_n =	7	7
A_c =	0.0	0

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

Longitudinal	**20.0**	**$(\%NBS)_{nom}$**
Tranverse	**20.0**	**$(\%NBS)_{nom}$**

Add specific value from figure 3.3

Note 1: For buildings designed prior to 1965 and known to be designed as a public building in accordance with the code, 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, or by 1.2 - Zone B

1

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

1

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

1

Longitudinal	20.00	**$(\%NBS)_{nom}$**
Tranverse	20.00	**$(\%NBS)_{nom}$**

2.2 Near Fault Scaling Factor, Factor A
If T≤1.5 sec, Factor A=1

a) Near fault factor, N(T,D)
(from NZS1170.5:2004, Cl 3.1.6)

Longitudinal:	1
Transverse:	1

b) Near fault Scaling Factor = **1/N(T,D)**

	Factor A
Longitudinal:	1
Transverse:	1

2.3 Hazard Scaling Factor, Factor B

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

Site Area: Taupo

Z = 0.28

Z_{1992} = 0.9 Refer to Figure 3.5(b) (NZS 4203: 1992)

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 3.57

2.4 Return Period Scaling Factor, Factor C

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

Choose Importance Level
○ 1 ○ 2 ◉ 3 ○ 4

b) Return Period Scaling factor from accompanying Table 3.1

Factor C 1.1

2.5 Ductility Scaling Factor, Factor D

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

***μ* =**	**2**	Longitudinal Direction
***μ* =**	**2**	Transverse Direction

b) Ductility Scaling factor

	Longitudinal k_μ	Transverse k_μ
For pre 1976 =	1.43	1.43
For 1976 onwards =	1	1

(where kμ is NZS1170.5:2004 Ductility Factor, from accompanying Table 3.3)

	Factor D
Longitudinal:	1.00
Transverse:	1.00

2.6 Structural Performance Factor, Factor E

a) Structural Performance Factor, S_p
(from accompanying Figure 3.4)

0.7	Longitudinal Direction
0.7	Transverse Direction

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

	Factor E
Longitudinal:	1.43
Transverse:	1.43

2.7 Baseline %NBS for Building, $(\%NBS)_b$
(equals $(\%NBS)_{nom}$ xAxBxCxDxE)

Longitudinal:	112
Transverse:	112

Table IEP-2 Initial Evaluation Procedure - Step 3

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

Building Name:	**Taupo Airport Terminal**	**Ref:**	**130752**
Location:	**Taupo , New Zealand**	**By:**	**LH**
Direction Considered:	**a) Longitudinal & b) Transverse**		
(Choose worse case if clear at start. Complete IEP-2 and IEP-3 for each if in doubt)		**Date:**	**30/08/2013**

a) Longitudinal Direction

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)*
3.1 Plan Irregularity *Effect on Structural Performance*	**Factor A** 0.7	Plan Irregularity: ○ Severe ◉ Significant ○ Insignificant
		Comment
3.2 Vertical Irregularity *Effect on Structural Performance*	**Factor B** 0.7	Vertical Irregularity: ○ Severe ◉ Significan ○ Insignificant
		Comment
3.3 Short Columns *Effect on Structural Performance*	**Factor C** 1	Short Columns: ○ Severe ○ Significan ◉ Insignificant
		Comment

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= **1**

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	○ 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= **1**

Table for Selection of Factor D2	Severe	Significant	Insignificant
	0<Sep<.005H	.005<Sep<.01H	Sep>.01H
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 1 ***(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
Factor E 1	○ 0.5 max	○ 0.7	◉ 1

3.6 Other Factors

Factor F 2 ***for≤ 3 storeys - maximum value 2.5, otherwise - maximum value 1.5. No minimum***

Record rationale for choice of Factor F:
Has concrete encased steel frame elements, sarking etc

2.7 Performance Achievement Ratio (PAR)

(equals **AxBxCxDxExF**)

PAR **0.98**

Table IEP-2 Initial Evaluation Procedure - Step 3

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

Building Name:	**Taupo Airport Terminal**	**Ref:**	**130752**
Location:	**Taupo , New Zealand**	**By:**	**LH**
Direction Considered:	**a) Longitudinal & b) Transverse**		
(Choose worse case if clear at start. Complete IEP-2 and IEP-3 for each if in doubt)		**Date:**	**30/08/2013**

b) Transverse Direction

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)*
3.1 Plan Irregularity *Effect on Structural Performance*	**Factor A** 0.7	Plan Irregularity: ○ Severe ◉ Significant ○ Insignificant
		Comment
3.2 Vertical Irregularity *Effect on Structural Performance*	**Factor B** 0.7	Vertical Irregularity: ○ Severe ◉ Significant ○ Insignificant
		Comment
3.3 Short Columns *Effect on Structural Performance*	**Factor C** 1	Short Columns: ○ Severe ○ Significant ◉ Insignificant
		Comment

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= 1

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	○ 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= 1

Table for Selection of Factor D2	Severe	Significant	Insignificant
	0<Sep<.005H	.005<Sep<.01H	Sep>.01H
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 1 ***(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

Factor E 1	Severe	Significant	Insignificant
	○ 0.5 max	○ 0.7	◉ 1

3.6 Other Factors

Factor F 2 ***for ≤ 3 storeys - maximum value 2.5, otherwise - maximum value 1.5. No minimum***

Record rationale for choice of Factor F:

Concrete encased steel frames in this direction. Timber roof structure including sarking.

2.7 Performance Achievement Ratio (PAR)

(equals **AxBxCxDxExF**)

PAR 0.98

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)

Building Name:	**Taupo Airport Terminal**	**Ref:**	**130752**
		By:	**LH**
Location:	**Taupo , New Zealand**		
		Date:	**30/08/2013**

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

		Longitudinal	Transverse
4.1	**Assessed Baseline (%NBS)$_b$** (from Table IEP - 1)	**112**	**112**
4.2	**Performance Achievement Ratio (PAR)** (from Table IEP - 2)	**0.98**	**0.98**
4.3	**PAR x Baseline (%NBS)b**	**110**	**110**
4.4	**Percentage New Building Standard (%NBS)** (Use lower of two values from Step 3.3)		**110**

Step 5 - Potentially earthquake Prone?

(Mark as appropriate) **%NBS≤ 33** **NO**

Step 6 - Potentially Earthquake Risk? **%NBS<67** **NO**

Step 7 - Provisional Grading for Seismic Risk based on IEP

Seismic Grade **A+**

Evaluation Confirmed by…

Signature 

Name Ian C. Smith

CPEng. No 27179

Relationship between Grade and SPS:

Grade:	A+	A	B	C	D	E
SPS:	> 100	100 to 80	80 to 67	67 to 33	33 to 20	< 20