CENTRAUS
STRUCTURAL CONSULTING

DETAILED ENGINEERING EVALUATION

4 Timothy Place – Units 1,2,3,4

Wigram, Christchurch 8013

4 Timothy Place Body Corporate 75916
c/o Pauline Delore

6th May 2016
JN 160108A

CENTRAUS
STRUCTURAL CONSULTING

AEQ House, 61 Cambridge Terrace, Level 2
PO Box 1040
Christchurch 8013

WWW.CENTRAUS.CO.NZ

TABLE OF CONTENTS

1.0 EXECUTIVE SUMMARY

In response to a request by our client, Body Corporate owner representative of the building, Centraus Limited is pleased to present this report of our Detailed Engineering Evaluation of the commercial building located at 4 Timothy Place, Wigram, Christchurch. The Assessment was performed in order to evaluate the building for earthquake damage and determine if any seismic vulnerabilities (critical structural weaknesses) in the seismic load resisting system exist and provide recommendations for repair and further action.

The subject site consists of two interconnected one single storey concrete tilt slab buildings reportedly originally built in 1997.

A Detailed Engineering Evaluation Procedure (DEE) – Qualitative Method (IEP) for this building was completed which concluded that the building is as noted below and providing a classification of risk to the structure as outlined in the New Zealand Society of Earthquake Engineering's "Assessment and Improvement of the Structural Performances of Buildings in Earthquakes".

Our Detailed Engineering Evaluation confirms the rating of 80%NBS resulting in an Earthquake Prone, Low Risk assessment, Grade A for the building. The building is currently in a sound condition and should provide full functionality of the building systems. Our review of the building has identified no other issues which could affect the future performance of the building.

Michael King
BSc, MIPENZ, CPEng, IntPE (NZ), SE (CA USA)
Senior Structural Engineer, Director

2.0 SCOPE OF ENGAGEMENT

Centraus Limited has been engaged to undertake a Detailed Engineering Evaluation of the building located at 4 Timothy Place. The site is a combination timber manufacturing and warehouse facilities within 4 tenancies.

This evaluation has been carried out in accordance with the "Guidance on Detailed Engineering Evaluation of Earthquake Affected Buildings in Canterbury" Draft prepared by the Engineering Advisory Group; Revision 5 dated 19 July 2011.

The assessment is made with regard to Clause B1 – Structure of the New Zealand Building Code. No other building code clauses have been assessed by this report. This structural assessment is based upon review of noted materials and visual evidence and indications present at the time of inspection. The findings of this report may be subject to revision pending deterioration of elements from subsequent aftershocks or ground settlement.

The report is provided solely for use by the owners and shall not be relied on by any other parties without written approval from Centraus Limited.

3.0 BACKGROUND INFORMATION

The building at 4 Timothy Place, Christchurch is a single concrete structure with a lightweight steel framed roof supported on steel portal frames. The base is concrete slab on grade with perimeter foundations. This report covers this building only and does not cover the adjacent structures.

The subject building is positioned in a high seismic zone of the western part of Christchurch on New Zealand's south island. We inspected the property on 5 and 10 May 2016.

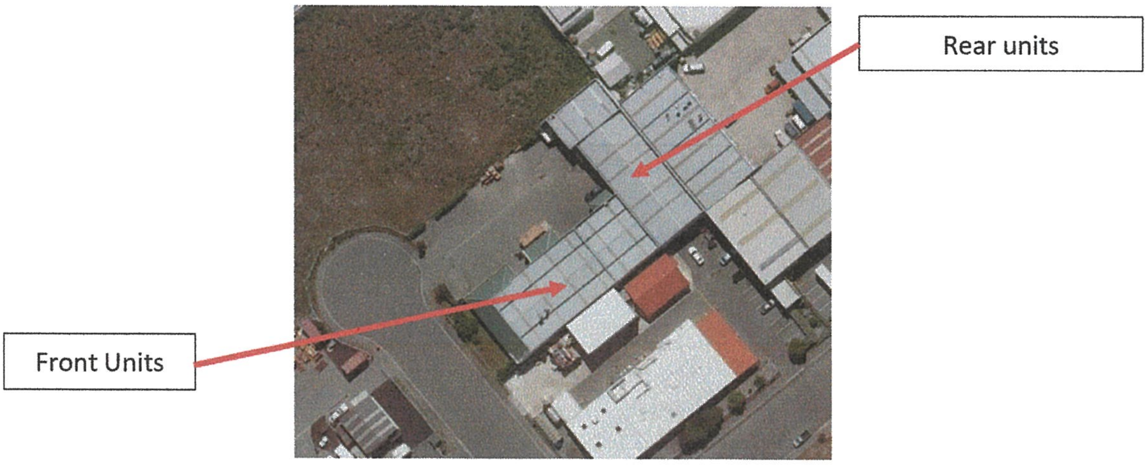

FIGURE 1 – BUILDING SITE LOCATION

For purposes of this report, the property outlook onto Timothy Place is considered to be oriented West.

3.1 Building Description

The original construction documents were unavailable for our review. The building was reportedly designed in 1997 as a single storey warehouse building. This building is a concrete tilt slab structure with a sloped steel purlins supported on steel portal frames. There were two types of steel portals used in the buildings. The front two units have a double dipped portal providing two internal gutter lines. The rear units have single ridge with hidden gutters at the tilt panel sides. The floors are concrete with perimeter foundations which appears to have a closure pour of concrete against the panels.

There is a car park which extends to the front of the structures. Each unit has a built on office structure with sloped roof and glass panels along the parking lot side. Refer to figure 1 and Appendix A for photos taken at specific areas throughout the subject building.

Our report is based upon discussions with owners and information as gathered at the site, no independent analysis has been performed. The inspection was limited to readily accessible areas of the property only. No intrusive investigations were completed.

3.2 Gravity Load Resisting System

Table 1 below outlines the gravity load resisting system for the subject building.

Building Portion	Description
Sides	The gravity load resisting system for the steel framed roof supported on steel portals. The end concrete panels support the ends of the steel purlins. The portals and concrete walls supported on foundations

Table 1 – Gravity Load Resisting System

3.3 Lateral Load Resisting System

A building's lateral load resisting system (LLRS) helps brace the structure against earthquake and wind loading. The building is generally concrete tilt-slab walls on all sides. Loads are typically generated at the roof diaphragms and distributed to the lateral system described below through diagonal roof bracing and supported by in plane shear action through the wall panels to the foundations. The steel portal frames also assist to support the roof and out of plane loads from the concrete panels. These systems complete the load path by distributing these induced forces to the foundation below.

3.4 GEOTECHNICAL CONDITIONS AND FOUNDATION SYSTEM

The land in this area is not included in the Landcheck information as it is commercially zoned. We do not have any other geotechnical notation on the site.

A review of the site did not note any observable settlement in the area of the buildings, parking lots or adjacent streets.

Site-specific geotechnical investigation will identify the best foundation design for your property to reduce the risk of injury to people and damage to your property in future earthquakes.

3.5 EARTHQUAKE DAMAGE DESCRIPTION

We reviewed the site visually in order to determine the nature and scope of the current building condition. From our site observations we did not note any discernible earthquake damage to the buildings which would materially affect the overall structural capacity.

The concrete slab on grade were visible in most areas and it was no damages were noted.

4.0 QUALITATIVE ASSESSMENT

Our evaluation of the existing structure includes an assessment of specific building characteristics as gathered at the site. We have provided a Qualitative Assessment in accordance with the New Zealand Society of Earthquake Engineers Assessment and Improvement of the Structural Performance of Buildings in Earthquakes, See Appendix B. We have reviewed the two separate buildings as a single structure as they are interconnected and should structurally act together, in our opinion. In order to be conservative we have assumed all of the buildings are built in 1997 to match the oldest building.

In order to identify potential seismic deficiencies associated with the existing building, an analysis of key elements of the seismic force resisting system has been reviewed based on earthquake actions in accordance with the New Zealand Standard (NZS) 1170.5. Seismic vulnerabilities and Critical Structural Weaknesses (CSW's) associated with site and building characteristics have been taken into account in accordance with NZSEE's "Assessment and Improvement of the Structural Performance of Buildings in Earthquakes".

Portion	Loading direction and loaded element	%NBS Before earthquakes	%NBS After earthquakes
Mobile Station	Both directions - Concrete masonry infill to concrete columns tilt slab Bracing walls	80%	80% Assumed undamaged Structurally

TABLE 3 – %NBS CHARACTERIZATIONS

The review concluded that the building is currently at 80% of New Building Standard (%NBS), thus classifying the most of the structures as *Low Risk*, Grade A. The grade is as outlined in the New Zealand Society of Earthquake Engineering's "Assessment and Improvement of the Structural Performances of Buildings in Earthquakes".

Table 2.2 NZSEE Risk Classifications and Improvement Recommendations

Description	Grade	Risk	%NBS	Existing Building Structural Performance	Improvement of Structural Performance	
					Legal Requirement	NZSEE Recommendation
Low Risk Building	A or B	Low	Above 67	Acceptable (improvement may be desirable)	The Building Act sets no required level of structural improvement (unless change in use) This is for each TA to decide. Improvement is not limited to 34%NBS.	100%NBS desirable. Improvement should achieve at least 67%NBS
Moderate Risk Building	B or C	Moderate	34 to 66	Acceptable legally. Improvement recommended		Not recommended. Acceptable only in exceptional circumstances
High Risk Building	D or E	High	33 or lower	Unacceptable (Improvement required under Act)	Unacceptable	Unacceptable

* *Reprint from NZSEE, Assessment and Improvement of the Structural Performance of Buildings in Earthquakes*

4.1 Critical Structural Weakness and Mitigation

The structural system, in our opinion, has performed well and appears to be well built. At this point, we have inspected this building and do not note any likely CSW areas of concern.

5.0 Conclusions, Occupancy and Recommendations

The building has been designed to resist the seismic loading provided in 1997 and newer. The lateral systems provided in the buildings are considered to be specific engineered design. The Z factor has recently been modified in the Canterbury region from 0.22 to 0.3 indicating a 27% increase in design loading. The building contains most items which have a moderate to high ductility rating and can perform satisfactorily in future seismic events.

In our estimation the combination of reinforced concrete tilt panel walls and steel portal frames provide seismic path which provides a relatively high ductility performance. In our opinion the building has a rating of at least 80%NBS (New Building Standard) and therefore is not considered earthquake prone (<34%NBS) nor less than 67%NBS and is very regular resulting in a building which should behave in a satisfactory manner.

In our opinion, although the building did perform well in the recent seismic loading it is expected to behave similar to more modern buildings with more ductile systems.

As the building is of *Low Risk*, the anticipated performance will be as good as those of a pre-earthquake level as well as newly constructed building.

At this point we propose that no limitations be placed upon occupation of the building.

APPENDIX A: PHOTOS

Photo 1 – Street and West South side with front office areas into carpark

Photo 2 – Front unit at street side

Photo 3 – Front units with drop portal frame at roof

Photo 4 – Front units with drop portal frame at roof with one of two gutters in middle of span

Photo 5 – Rear building

Photo 6 – Interior of warehouse in rear units with ridge portal frames

Photo 7 – Rear units with interior offices built on floor

Photo 8 – Rear units with diagonal roof braces and portal

Photo 9 – Rear units with diagonal roof braces and portal knee joint

Photo 10 – Portal base embedded into concrete foundations

Photo 11 – Offices outside concrete building

Photo 12 – Offices outside concrete building

Photo 13 – Unit 1 at rear corner

Photo 14 – Portal beam for roof within unit 1

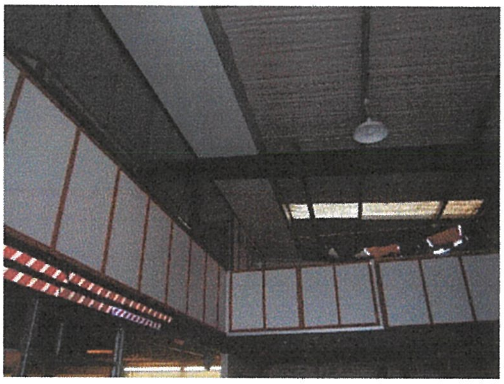

Photo 15 – Unit 1 mezzanine and roof framing

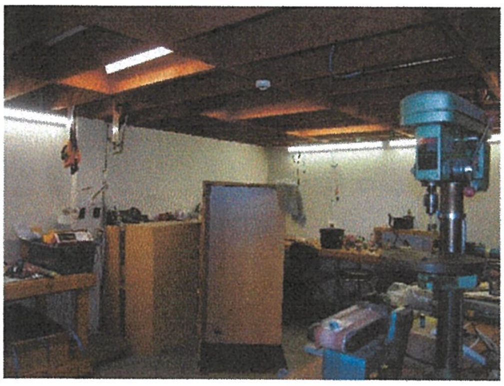

Photo 16 – Underside of mezzanine framing

Photo 17 – First floor offices on mezzanine

Photo 18 – Roof framing to panel connection

APPENDIX B: IEP FORM – 4 TIMOTHY PLACE

Printed 5/05/2016

NZSEE IEP Spreadsheet Version 0.8

Initial Evaluation Procedure (IEP) Assessment

Page 1

WARNING!! *This initial evaluation has been carried out solely as an initial seismic assessment of the building following the procedure set out in the New Zealand Society for Earthquake Engineering document "Assessment and Improvement of the Structural Performance of Buildings in Earthquakes, June 2006". This spreadsheet must be read in conjunction with the limitations set out in the accompanying report, and should not be relied on by any party for any other purpose. Detailed inspections and engineering calculations, or engineering judgements based on them, have not been undertaken, and these may lead to a different result or seismic grade.*

Street Number & Name:	4 Timothy Place	Job No.:	160108A
AKA:		By:	MJK
Name of building:		Date:	6/05/2016
City:	Wigram, Christchurch 8042	Revision No.:	A

Table IEP-1 Initial Evaluation Procedure Step 1

Step 1 - General Information

1.1 Photos (attach sufficient to describe building)





NOTE: THERE ARE MORE PHOTOS ON PAGE 1a ATTACHED

1.2 Sketches (plans etc, show items of interest)

(Refer to main report)

NOTE: THERE ARE MORE SKETCHES ON PAGE 1a ATTACHED

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

(Refer to main report)

1.4 Note information sources Tick as appropriate

Visual Inspection of Exterior	☑	Specifications	☐
Visual Inspection of Interior	☑	Geotechnical Reports	☐
Drawings (note type)	☑	Other (list)	☐

Limited drawings with structural information

Printed 5/05/2016

NZSEE IEP Spreadsheet Version 0.8

Initial Evaluation Procedure (IEP) Assessment

Page 2

Street Number & Name:	4 Timothy Place	Job No.:	160108A
AKA:		By:	MJK
Name of building:		Date:	6/05/2016
City:	Wigram, Christchurch 8042	Revision No.:	A

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)*$_{nom}$

	Longitudinal	Transverse
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	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	○	○
Building Type:		
Seismic Zone:		
c) Soil Type		
From NZS1170.5:2004, Cl 3.1.3 :	D Soft Soil	D Soft Soil
From NZS4203:1992, Cl 4.6.2.2 : (for 1992 to 2004 and only if known)	Flexible	Flexible
d) Estimate Period, *T*		
Comment: h_n =	3	3 m
A_c =	8.71	5.81 m^2
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: $T \leq 0.4sec$	○	●
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:**	0.22	0.22
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 where Factor D may be taken as 1, otherwise take as 1.0. — **Factor D:**	1.00	1.00
***(%NBS)*$_{nom}$ = AxBxCxD** — *(%NBS)*$_{nom}$	22%	22%

WARNING!! *This initial evaluation has been carried out solely as an initial seismic assessment of the building following the procedure set out in the New Zealand Society for Earthquake Engineering document "Assessment and Improvement of the Structural Performance of Buildings in Earthquakes, June 2006". This spreadsheet must be read in conjunction with the limitations set out in the accompanying report, and should not be relied on by any party for any other purpose. Detailed inspections and engineering calculations, or engineering judgements based on them, have not been undertaken, and these may lead to a different result or seismic grade.*

Printed 5/05/2016

NZSEE IEP Spreadsheet Version 0.8

Initial Evaluation Procedure (IEP) Assessment

Page 3

Street Number & Name:	4 Timothy Place	Job No.:	160108A
AKA:		By:	MJK
Name of building:		Date:	6/05/2016
City:	Wigram, Christchurch 8042	Revision No.:	A

Table IEP-2 Initial Evaluation Procedure Step 2 continued

2.2 Near Fault Scaling Factor, Factor E

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

		Longitudinal	Transverse
a) Near Fault Factor, $N(T,D)$ (from NZS1170.5:2004, Cl 3.1.6)	N(T,D):	1	1
b) Factor E = 1/N(T,D)	Factor E:	1.00	1.00

2.3 Hazard Scaling Factor, Factor F

a) Hazard Factor, Z, for site

Location: Christchurch — Refer right for user-defined locations

$Z =$ 0.3 (from NZS1170.5:2004, Table 3.3)

$Z_{1992} =$ 0.8 (NZS4203:1992 Zone Factor from accompanying Figure 3.5(b))

$Z_{2004} =$ 0.22 (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

	Longitudinal	Transverse
Factor F:	2.67	2.67

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.)

	Longitudinal	Transverse
I =	1	1

b) Design Risk Factor, R_o

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

	Longitudinal	Transverse
	Not Known	Not Known
R_o =	1	1

c) Return Period Factor, R

(from NZS1170.0:2004 Building Importance Level)

Choose Importance Level: ○1 ◉2 ○3 ○4 (Longitudinal); ○1 ◉2 ○3 ○4 (Transverse)

	Longitudinal	Transverse
R =	1.0	1.0

d) Factor G = IR_o/R

	Longitudinal	Transverse
Factor G:	1.00	1.00

2.5 Ductility Scaling Factor, Factor H

a) Available Displacement Ductility Within Existing Structure

Comment:

	Longitudinal	Transverse
μ =	1.25	1.25

b) Factor H

		Longitudinal k_μ	Transverse k_μ
For pre 1976 (maximum of 2)	=	1.14	1.14
For 1976 onwards	=	1	1
Factor H:		1.00	1.00

(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

	Longitudinal	Transverse
S_p =	0.93	0.93

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

	Longitudinal	Transverse
Factor I:	1.08	1.08

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

	Longitudinal	Transverse
2.7 Baseline %NBS for Building, $(\%NBS)_b$ (equals $(\%NBS)_{nom}$ x E x F x G x H x I)	64%	64%

WARNING!! *This initial evaluation has been carried out solely as an initial seismic assessment of the building following the procedure set out in the New Zealand Society for Earthquake Engineering document "Assessment and Improvement of the Structural Performance of Buildings in Earthquakes, June 2006". This spreadsheet must be read in conjunction with the limitations set out in the accompanying report, and should not be relied on by any party for any other purpose. Detailed inspections and engineering calculations, or engineering judgements based on them, have not been undertaken, and these may lead to a different result or seismic grade.*

Printed 5/05/2016

NZSEE IEP Spreadsheet Version 0.8

Initial Evaluation Procedure (IEP) Assessment

Page 4

Street Number & Name:	4 Timothy Place	Job No.:	160108A
AKA:		By:	MJK
Name of building:		Date:	6/05/2016
City:	Wigram, Christchurch 8042	Revision No.:	A

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	○ Severe	○ Significant	◉ Insignificant	Factor A 1.0
Comment				
3.2 Vertical Irregularity				
Effect on Structural Performance	○ Severe	○ Significant	◉ Insignificant	Factor B 1.0
Comment				
3.3 Short Columns				
Effect on Structural Performance	○ Severe	○ Significant	◉ Insignificant	Factor C 1.0
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, 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	Significant	Insignificant
Separation	0<Sep<.005H	.005<Sep<.01H	Sep>.01H
Alignment of Floors within 20% of Storey Height	○ 1	○ 1	◉ 1
Alignment of Floors not within 20% of Storey Height	○ 0.4	○ 0.7	○ 0.8
Comment			

b) Factor D2: - Height Difference Effect

Factor D2 For Longitudinal Direction: 1.0

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
Comment			

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	○ Severe	○ Significant	◉ Insignificant	Factor E 1.0
Comment				

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

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

Factor F 1.3

Record rationale for choice of Factor F:
Building is very regular. It is a light roof building though with redundancy.

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

	PAR
Longitudinal	1.25

WARNING!! *This initial evaluation has been carried out solely as an initial seismic assessment of the building following the procedure set out in the New Zealand Society for Earthquake Engineering document "Assessment and Improvement of the Structural Performance of Buildings in Earthquakes, June 2006". This spreadsheet must be read in conjunction with the limitations set out in the accompanying report, and should not be relied on by any party for any other purpose. Detailed inspections and engineering calculations, or engineering judgements based on them, have not been undertaken, and these may lead to a different result or seismic grade.*

Printed 5/05/2016

NZSEE IEP Spreadsheet Version 0.8

Initial Evaluation Procedure (IEP) Assessment

Page 5

Street Number & Name:	4 Timothy Place	Job No.:	160108A
AKA:		By:	MJK
Name of building:		Date:	6/05/2016
City:	Wigram, Christchurch 8042	Revision No.:	A

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

Factors

potential CSWs

Effect on Structural Performance
(Choose a value - Do not interpolate)

3.1 Plan Irregularity
Effect on Structural Performance ○ Severe ○ Significant ◉ Insignificant **Factor A** 1.0
Comment

3.2 Vertical Irregularity
Effect on Structural Performance ○ Severe ○ Significant ◉ Insignificant **Factor B** 1.0
Comment

3.3 Short Columns
Effect on Structural Performance ○ Severe ○ Significant ◉ Insignificant **Factor C** 1.0
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, 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	○ 1	○ 1	◉ 1
Alignment of Floors not within 20% of Storey Height	○ 0.4	○ 0.7	○ 0.8

Comment

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	○ 0.4	○ 0.7	○ 1
Height Difference 2 to 4 Storeys	○ 0.7	○ 0.9	○ 1
Height Difference < 2 Storeys	○ 1	○ 1	◉ 1

Comment

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 ○ Severe ○ Significant ◉ Insignificant **Factor E** 1.0
Comment

3.6 Other Factors - *for allowance of all other relevant characterstics of the building*
For ≤ 3 storeys - Maximum value 2.5
otherwise - Maximum value 1.5.
No minimum.
Factor F 1.25

Record rationale for choice of Factor F:
Building is very regular. It is a light roof building though with redundancy.

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

PAR
Transverse 1.25

WARNING!! *This initial evaluation has been carried out solely as an initial seismic assessment of the building following the procedure set out in the New Zealand Society for Earthquake Engineering document "Assessment and Improvement of the Structural Performance of Buildings in Earthquakes, June 2006". This spreadsheet must be read in conjunction with th e limitations set out in the accompanying report, and should not be relied on by any party for any other purpose. Detailed inspections and engineering calculations, or engineering judgements based on them, have not been undertaken, and these may lead to a different result or seismic grade.*

Printed 5/05/2016

NZSEE IEP Spreadsheet Version 0.8

Initial Evaluation Procedure (IEP) Assessment

Page 6

Street Number & Name:	4 Timothy Place	Job No.:	160108A
AKA:		By:	MJK
Name of building:		Date:	6/05/2016
City:	Wigram, Christchurch 8042	Revision No.:	A

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)	64%	64%
4.2	Performance Achievement Ratio (PAR) (from Table IEP - 2)	1.25	1.25
4.3	PAR x Baseline *(%NBS)$_b$*	80%	80%
4.4	Percentage New Building Standard *(%NBS)* (Use lower of two values from Step 4.3)		80%

Step 5 - Potentially Earthquake Prone? (Mark as appropriate) *%NBS* ≤ 34 NO

Step 6 - Potentially Earthquake Risk? (Mark as appropriate) *%NBS* < 67 NO

Step 7 - Provisional Grading for Seismic Risk based on IEP

Seismic Grade A

Additional Comments (items of note affecting IEP score)

Relationship between Grade and *%NBS*:

Grade:	A+	A	B	C	D	E
%NBS:	> 100	100 to 80	79 to 67	66 to 34	33 to 20	< 20

WARNING!! *This initial evaluation has been carried out solely as an initial seismic assessment of the building following the procedure set out in the New Zealand Society for Earthquake Engineering document "Assessment and Improvement of the Structural Performance of Buildings in Earthquakes, June 2006". This spreadsheet must be read in conjunction with the limitations set out in the accompanying report, and should not be relied on by any party for any other purpose. Detailed inspections and engineering calculations, or engineering judgements based on them, have not been undertaken, and these may lead to a different result or seismic grade.*

Printed 5/05/2016

NZSEE IEP Spreadsheet Version 0.8

Initial Evaluation Procedure (IEP) Assessment **Page 7**

Street Number & Name:	4 Timothy Place	Job No.:	160108A
AKA:		By:	MJK
Name of building:		Date:	6/05/2016
City:	Wigram, Christchurch 8042	Revision No.:	A

Table IEP-5 Initial Evaluation Procedure Step 8

Step 8 - Identification of potential Severe Critical Structural Weaknesses 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

Occupancy not considered to be significant - no further consideration required

Risk not considered to be significant - no further consideration required

IEP Assessment Confirmed by ______________ **Signature**

Michael King **Name**

1022085 **CPEng. No**

WARNING!! *This initial evaluation has been carried out solely as an initial seismic assessment of the building following the procedure set out in the New Zealand Society for Earthquake Engineering document "Assessment and Improvement of the Structural Performance of Buildings in Earthquakes, June 2006". This spreadsheet must be read in conjunction with th e limitations set out in the accompanying report, and should not be relied on by any party for any other purpose. Detailed inspections and engineering calculations, or engineering judgements based on them, have not been undertaken, and these may lead to a different result or seismic grade.*