[redacted]

Initial Seismic Assessment Report
Original Walter Nash Stadium
14 Tocker Street, Taita

For
Hutt City Community Facilities Trust

Project 9581
February 2019

[redacted]

9581

15 February 2019

Hutt City Community Facilities Trust
Private Bag 31912
Lower Hutt

Attention: [redacted]

Dear [redacted]

Initial Seismic Assessment Report
Original Walter Nash Stadium, 14 Tocker Street, Taita

We have now completed an Initial Seismic Assessment (ISA) of the building at 14 Tocker St, Taita, using the Initial Evaluation Procedure (IEP) as described in Part B of the guideline document, *The Seismic Assessment of Existing Buildings-Technical Guidelines for Engineering Assessments*, dated August 2017. The assessment was carried out after reviewing original structural drawings and completing a site visit on Tuesday 23 October 2018.

Plate 1. Aerial View of Building

Executive Summary

This building has been rated against the new building standard for a structure that may contain people in crowds. Structures that may contain people in crowds are regarded as Importance Level 3 (IL3) in accordance with NZS1170.5:2004.

The assessed potential earthquake rating is 45%NBS (IL3) in the longitudinal (north-south) direction 45%NBS (IL3) in the transverse (east-west) direction, which gives it a seismic 'Grade C'. Therefore, the potential status of the building is earthquake risk and not earthquake prone.

A "Severe Structural Weakness" (SSW) is a structural weakness for which rupture would lead to a catastrophic collapse. No potential SSWs were identified in this building.

The Initial Seismic Assessment (ISA) is considered to provide a relatively quick, high-level and

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qualitative measure of the building's performance. A more reliable result would be obtained from a Detailed Seismic Assessment (DSA). A DSA could find structural aspects of concern that have not been identified from the IEP. Alternatively, a detailed structural assessment may show that structural aspects of potential concern identified in this IEP may have in fact been addressed in the design of the building.

Introduction

Hutt City Community Facilities Trust has engaged [redacted] to carry out an Initial Seismic Assessment (ISA) of the original Walter Nash Stadium at 14 Tocker Street, Taita. This ISA is based on the Initial Evaluation Procedure (IEP) as defined in *Technical Guidelines for Engineering Assessments* referenced above.

Earthquake Prone Building (EPB) methodology is used to identify earthquake-prone buildings, and has been produced by the Ministry of Business, Innovation and Employment in accordance with the Building Act 2004. This ISA meets the requirements of an engineering assessment as prescribed in the EPB methodology.

Background to the IEP and Its Limitations

The IEP procedure was developed in 2006 by the New Zealand Society for Earthquake Engineering (NZSEE) and updated in 2017 to reflect experience with its application and also as a result of experience from the Canterbury earthquakes of 2010/11. It is a tool to assign a percentage of New Building Standard (%NBS) rating and associated grade to a building as part of an Initial Seismic Assessment of existing buildings.

The IEP enables building owners and managers to review their building stock as part of an overall risk management process.

Characteristics and limitations of the IEP include:

- An IEP assessment is primarily concerned with life safety. It does not consider the susceptibility of the building to damage, and therefore to economic losses.
- It tends to be somewhat conservative, identifying some buildings as earthquake prone, or having a lower %NBS score, which subsequent detailed investigation may indicate is less than actual performance. However, there will be exceptions, particularly when potential critical structural weaknesses (CSWs) are present that have not been recognised from the level of investigation employed.
- An IEP can be undertaken with variable levels of available information: e.g. exterior only inspection, structural drawings available or not, interior inspection, etc. The more information available, the more representative the IEP result is likely to be. The IEP records the information that has formed the basis of the assessment and consideration of this is important when determining the likely reliability of the result.
- It is an initial, first-stage review. Buildings or specific issues which the IEP process flags as being problematic or as potentially critical structural weaknesses need further detailed investigation and evaluation. A Detailed Seismic Assessment is recommended if the seismic status of a building is critical to any decision making.

[redacted]

- The IEP assumes that buildings have been designed and built in accordance with the building standard and good practice current at the time. In some instances, a building may include design features ahead of its time, leading to better than predicted performance. Conversely, some unidentified design or construction issues not picked up by the IEP process may result in the building performing not as well as predicted.

- It is a largely qualitative process and should be undertaken or overseen by an experienced engineer. It involves considerable knowledge of the earthquake behaviour of buildings, and judgement as to key attributes and their effect on building performance. Consequently, it is possible that the %NBS derived for a building by independent experienced engineers may differ.

- An IEP may over-penalise some apparently critical features which could have been satisfactorily taken into account in the design.

- An IEP does not take into account the seismic performance of non-structural items such as ceilings, plant, services or general glazing that are not considered to present a significant life safety hazard.

Experience to date is that the IEP is a useful tool to identify potential issues and expected overall performance of a building in an earthquake. However, the process and the associated %NBS rating and grade should be considered as only providing an indicative indication of the building's compliance with current code requirements. A detailed investigation and analysis of the building will typically be required to provide a definitive assessment.

The IEP has been based on a review of drawings and an inspection of both the interior and exterior of the building and can be considered to be a comprehensive assessment at the ISA level. The rating determined is greater than or equal to 34%NBS and therefore, if ratified by the TA, the building should not be considered as earthquake prone.

Basis for the Assessment

The information we have used for our IEP assessment includes:

Subsoil class D has been used, based on the [redacted] *"HCC Sportsville – Existing Building Condition Report and Site Notes" (Revision C: 27/08/10)*. This is consistent with *The Proceedings of the Ninth Pacific Conference on Earthquake Engineering, 14-16 April, 2011, "NZS 1170.5:2004 site subsoil classification of Lower Hutt" D. Boon, N.D. Perrin, G.D. Dellow & R. Van Dissen* which indicates that the site is on the boundary of site subsoil class C "shallow soil" and site subsoil class D "soft soil".

The period has been estimated as being 0.4 seconds when categorized in "masonry shear walls" calculated for a mass height of 7.5m.

Adjustment factor (F) of 1.3 in the longitudinal direction has been adopted because high level calculations on the steel moment frame have been carried out in accordance with The Guidelines Part C – Detailed Seismic Assessment. For members bending about their weak axis member ductility category and structure ductility category are both 3 so μ = 1.25. These calculations indicate greater than 35% capacity at first yield would be achieved if a detailed seismic assessment was to be carried out. The calculations conservatively assumed 0.6kPa wall and roof load, and site subsoil class D "Soft Soil Sites" as described above. Therefore, with the adoption of realistic dead loadings, say 0.4kPa, and accepting non-structural damage to longitudinal wall

[redacted]

linings and claddings, caused by building displacements, 45% NBS(IL3) in the transverse direction is reasonable.

Adjustment factor (F) of 1.3 in the transverse direction has been adopted because the building appears to have been designed and built in accordance with or better than the building standard and good practice current at the time.

The plan shape is roughly rectangular with double symmetry. At ground level (to 3m height) there are perimeter reinforced concrete block walls. Above 3m (to 7.5m height) there are 6 transverse steel portal frames and two longitudinal steel moment frames.

A more reliable assessment might include a detailed seismic assessment of the transverse portal frame, longitudinal moment frame, block walls out of plane, tiered seating, building drift relative to adjacent structures, displacement compatibility of end wall to portal frame, foundations etc.

The key assumptions made during our assessment are shown in Table 1 that follows.

Table 1: IEP Assumptions

IEP Item	Assumption	Justification
Date of Building Design	1973	Original Drawings
Soil Type	D	Proceedings of the Ninth Pacific Conference on Earthquake Engineering,14-16 April, 2011, "NZS 1170.5:2004 site subsoil classification of Lower Hutt" D. Boon, N.D. Perrin, G.D. Dellow & R. Van Dissen.
Building Importance Level	3	AS/NZS1170.0
Ductility of Structure	2 Transverse 2 Longitudinal	Transverse steel portal frame, longitudinal steel moment frame.
Plan Irregularity Factor, A	1.0 Transverse 1.0 Longitudinal	*The Seismic Assessment of Existing Buildings -Technical Guidelines for Engineering Assessments*, August 2017, Part B, Appendix BA, Figure BA.5. Bracing walls are well distributed.
Vertical Irregularity Factor, B	Not significant	*The Seismic Assessment of Existing Buildings-Technical Guidelines for Engineering Assessments*, August 2017, Part B, Appendix BA, Figure BA.5. Single storey therefore no vertical irregularity.
Short Columns Factor, C	No	Short columns were not observed.
Pounding Factor, D	1	Pounding is unlikely to cause significant structural damage.
Site Characteristics	Not significant	*The Seismic Assessment of Existing Buildings-Technical Guidelines for Engineering Assessments*, August 2017, Part B, section B4.2. Settlement/earthquake damage observed but mitigated by the presence of reinforcing steel. Slip hazard does not exist.
Factor F	1.3 Transverse	The building appears to have been designed and built in accordance with or better than the building standard and good practice current at the time.
Factor F	1.3 Longitudinal	High level calculations on the steel moment frame have been carried out in accordance with The Guidelines Part C – Detailed Seismic Assessment. Ductility adopted was 1.25.

Building Description

The original 1973 single storey contains two basketball courts and tiered seating over amenity rooms.

In 1996 the tiered seating was altered for the addition of a score bench, in 2002 a new corridor with toilets, kitchen/servery and entry was added to the west side of the building, and in 2013 the corridor was extended the full length of the west side of the building for the addition of a meeting/storage room.

The building is 7.5m high over the courts and tiered seating and 5m high over the amenities on the north and west sides. The tall part of the building consists of 6 transverse (east-west) steel portal frames and two longitudinal (north-south) moment frames. The distance between two frames is considered to be one bay, therefore the tall part of the building is 5 bays long (44.5m total) by 1 bay wide (34.1m).

The roof of the tall building is sheet metal on steel purlins bolted to welded cleats. There is steel equal angle cross bracing in each end bay. The ends of the roof bracing are fully welded.

Around the perimeter of the tall part of the building is a 3m high reinforced concrete block wall. Along the north and west side the internal block wall is shared by the lower amenities part of the building. There are continuous shallow strip footings supporting the walls. The amenities part of the building has a similar 3m reinforced concrete block wall around the perimeter and internal partitions are timber framed.

The tiered seating is timber framed, the floor under the courts is constructed of suspended timber framing on concrete piles. The majority of the floor to the amenities area is 125mm reinforced concrete slab on grade.

All dates and dimensions given in this description are approximate and should not be relied upon for further assessment.

IEP Assessment Result

Our IEP assessment of this building indicates the building can achieve 45%NBS (IL3) in the longitudinal direction and 45%NBS (IL3) in the transverse direction. The IEP assessment of this building therefore indicates an overall earthquake rating of 45%NBS (IL3), corresponding to a 'Grade C' building as defined by the New Zealand Society for Earthquake Engineering (NZSEE) building grading scheme. This is above 34%NBS, but below the threshold for earthquake risk buildings (67%NBS) as recommended by the NZSEE.

The key assumptions made during our assessment are shown in Table 1 above. Refer also to the attached IEP assessment and ISA technical summary report.

IEP Grades and Relative Risk

NZSEE (which provides authoritative advice to the legislation makers and should be considered to represent the consensus view of New Zealand structural engineers) classifies buildings achieving greater than 67%NBS as "Low or medium Risk" and having "Acceptable (improvement may be desirable)" building structural performance.

Table 2 taken from the Technical Guidelines referred to earlier provides the basis for a proposed grading system for existing buildings, as one way of interpreting the %NBS earthquake rating.

This building has been classified by the IEP as a 'Grade *C*' building and is therefore considered to be a medium life-safety risk.

Table 2: Relative Earthquake Risk

Building Grade	Percentage of New Building Strength (*%NBS*)	Approx. Risk Relative to a New Building	Life-safety Risk Description
A+	>100	<1	low risk
A	80 to 100	1 to 2 times	low risk
B	67 to 79	2 to 5 times	low or medium risk
C	34 to 66	5 to 10 times	medium risk
D	20 to 33	10 to 25 times	high risk
E	<20	more than 25 times	very high risk

Seismic Restraint of Non-Structural Items

During an earthquake, the safety of people can be put at risk due to non-structural items falling on them. These items should be adequately seismically restrained, where possible, to the NZS 4219:2009 "The Seismic Performance of Engineering Systems in Buildings".

An assessment has not been made of bracing of the ceilings, services and plant. We have also not checked whether tall or heavy furniture has been seismically restrained or not. These issues are outside the scope of this initial assessment but could be the subject of another investigation.

Conclusion

Our ISA assessment for this building, carried out using the IEP indicates an earthquake rating of 45%NBS (IL3), which corresponds to a 'Grade C' building, as defined by the NZSEE building grading scheme. This is *above* the threshold for Earthquake Prone Buildings (34%NBS) and *below* the threshold for Earthquake Risk Buildings (67%NBS) as defined by the NZSEE and the New Zealand Building Code.

The ISA is considered to provide a relatively quick, high-level and qualitative measure of the building's performance. In order to confirm the seismic performance of this building with more reliability you may wish to request a Detailed Seismic Assessment (DSA). A DSA would likely focus on issues such as the face loading of the reinforced block walls, the roof bracing, foundations and connections between structural elements.

A DSA would also investigate other potential weaknesses that may not have been considered in the initial seismic assessment.

We trust this letter and initial seismic assessment meets your current requirements. We would be pleased to discuss further with you any issues raised in this report. Please do not hesitate to contact us if you would like clarification of any aspect of this letter.

Yours faithfully

[redacted]

[redacted]

Initial Seismic Assessment - Appendices
Original Walter Nash Stadium
14 Tocker Street, Taita

For
Hutt City Community Facilities Trust

Project 9581
February 2019

Appendix A – Engineering Assessment Technical Summary

Building Information	
Building Name/Description	Original Walter Nash Stadium – two basketball courts, tiered seating and amenities.
Street Address	14 Tocker Street, Taita, Lower Hutt 5011
Territorial Authority	Hutt City Council
No. of Storeys	Single
Area of Typical Floor (approx.)	1530m^2
Year of Design (approx.)	1973 Original Building (2 basketball courts, tiered seating, amenities) 1996 New score bench. 2002 North-west entry and an addition on the west side for a corridor, kitchen and toilets. 2013 extension of the corridor and the addition of a storage/meeting room.
NZ Standard Designed to	NZSS1900:1965, Chapter 8
Structural System including Foundations	Suspended timber framed floor on shallow piles with some slab on grade. Shear walls of reinforced concrete blockwork on shallow foundations supporting steel portal frames in the transverse direction and steel moment resisting frames in the longitudinal direction, member bending about weak axis. Corrugated iron roofing on steel purlins.
Key Features of Ground Profile and Identified Geohazards	Greater Wellington Regional Council hazard mapping indicates the liquefaction hazard at the site is "none", and "low" for slope failure.
Previous Strengthening	None
Heritage Issues/Status	None
Other	N/A

Assessment Information	
Consulting Practice	[redacted]
CPEng Responsible	
Date/Version of Drawings Reviewed	Original Building – CM Strachan and Associates 1973 South-west addition – Beca 2013
Geotechnical Report(s)	[redacted]
Date Building Inspected	23 October 2018
Previous Assessment Reports	IEP by [redacted] IEP by [redacted]
Other Relevant Information	IEP in 2010 resulted in <35%NBS (IL3) in the longitudinal direction other results are similar

Summary of Engineering Assessment Methodology and Key Parameters Used	
Occupancy Type(s) and Importance Level	Recreation Facility, Importance Level IL3.
Site Subsoil Class	D
Summary of Assessment Methodology Used	Initial Evaluation Procedure (IEP) in accordance with *The Seismic Assessment of Existing Buildings-Technical Guidelines for Engineering Assessments*, dated August 2017 (The Guidelines) Part B – Initial Seismic Assessment. Support calculations carried out utilizing SLaMA on a longitudinal steel moment resisting frame under north-south actions. Conservatively assume 0.6kPa roof and wall load. Actual loading 0.4kPa or less so score was upgraded. Assessment carried out in accordance with The Guidelines Part C – Detailed Seismic Assessment. A first yield approach was adopted. For bending about weak axis of members, member ductility category and structure ductility category = 3 and μ=1.25.
Other Relevant Information	N/A
Assessment Outcomes	
Assessment Status	Final
Assessed Seismic Rating	45%NBS (IL3)
Seismic Grade	C
Describe the Governing Critical Structural Weakness and Likely Mode of Failure	Critical structural weakness could be the out-of-plane strength of the internal transverse (north-south) walls in bending or the longitudinal steel moment frame in bending.
Comment on Parts Identified and Assessed	Longitudinal Steel Moment Resisting Frame (MRF) assessed at 45%NBS (IL3) capacity or higher.
Recommendations	NZSEE recommends upgrading to as near as reasonably practicable to new building standard (i.e. 100%NBS), and considers 80%NBS to be the minimum seismic rating for an existing building to be considered "low risk". Items for potential consideration in a future DSA: 1. Transverse Portal Frame 2. Longitudinal Moment Frame at the outside walls, including displacements. 3. Block walls out-of-plane between columns 4. Bleachers - life-safety assessment 5. Building drift relative to adjacent structures 6. Displacement compatibility of end wall to portal frame 7. Description of a strengthening concept to a target %NBS (IL3) if required. 8. Geotechnical Engineering Study

Appendix B – Initial Evaluation Procedure (IEP)

Initial Evaluation Procedure (IEP) Assessment - Completed for {Client/TA}

WARNING!! *This initial evaluation has been carried out solely as an initial seismic assessment of the building following the procedure set out in the "The Seismic Assessment of Existing Buildings" Technical Guidelines for Engineering Assessments, July 2017. 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, o r engineering judgements based on them, have not been undertaken, and these may lead to a different result or seismic grade.*

Street Number & Name:	**14 Tocker Street**	**Job No.:**	**9581**
AKA:	**Old Walter Nash Stadium**	**By:**	**ULM**
Name of building:		**Date:**	**26/12/2018**
City:	**Lower Hutt**	**Revision No.:**	**36059 v 1**

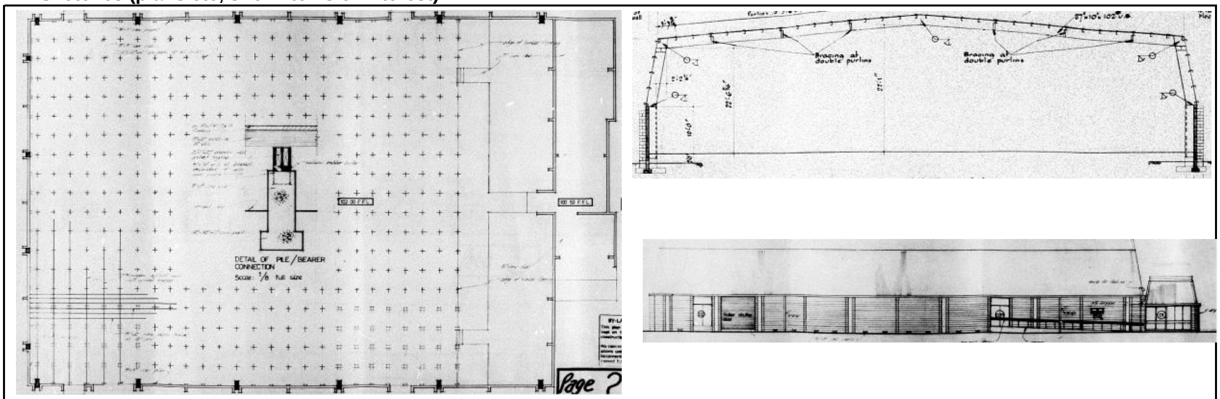
Table IEP-1 Initial Evaluation Procedure Step 1

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)



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)

The original 1973 building (45m x 34m) is a single storey gymnasium containing two basketball courts and a grandstand over amenities.
Amenities includes meeting rooms, changing rooms, toilets, storage areas and a corridor. The building is 7.5m tall.
The floor under the courts is suspended timber on shallow RC piles.
The floor under the amenities is 125mm thick RC slab on grade.
There are 6 (five bays of) east-west (transverse) steel portal frames (27"x10"x102lb).
There are 2 north-south (longitudinal) portal frames formed by a tie beam (10"x5 3/4" 21lb) between the east-west portal frames.
Around the perimeter are 2.7m high reinforced concrete block walls with plinths at 4m maximum centres & four 5/8" dia bolts to each east-west portal leg
Strip footings for the block work and foundation pads for the steel portal frames are shallow.
The tiered seating and the walls underneath are timber framed. There are vertical girts (6"x6" 15.7lb) along the north and south wall .
Steel pulrins are fixed to east-west (transverse) steel portal frames with welded cleats.
Roof bracing is 3"x3/8" EA steel cross braces in two bays, one bay along the north wall and one bay along the south wall.
In 1996, 2002 and 2013 there were minor structural aditions to the west side of the building and alterations to the tiered seating.

1.4 Note information sources Tick as appropriate

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

Inspection of interior & exterior. Original drawings (1973 design & construction); drawings for the 2013 addition.

Initial Evaluation Procedure (IEP) Assessment - Completed for {Client/TA}

Street Number & Name:	14 Tocker Street	Job No.:	9581
AKA:	Old Walter Nash Stadium	By:	ULM
Name of building:		Date:	26/12/2018
City:	Lower Hutt	Revision No.:	36059 v 1

Table IEP-1a Additional Photos and Sketches

Add any additional photographs, notes or sketches required below:

Note: print this page separately

fig 1a.1 inside gymnasium (portal frames & tiered seating)

fig 1a.2 inside the north-west entry (2002 addition)

fig 1a.3 outside the south wall (inside the adjacent 2013 building)

fig 1a.4 outside the south-east wall (seismic gap to the 2013 building to the south)

fig 1a.5 welded connection at roof bracing, fly bracing and purlin cleat

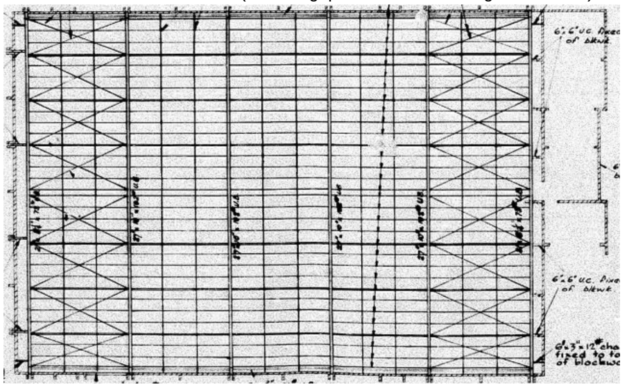


fig 1a.6 original structural roof bracing plan

WARNING!! *This initial evaluation has been carried out solely as an initial seismic assessment of the building following the procedureset out "The Seismic Assessment of Existing Buildings" Technical Guidelines for Engineering Assessments, July 2017. 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.*

Initial Evaluation Procedure (IEP) Assessment - Completed for {Client/TA}

Street Number & Name:	**14 Tocker Street**	**Job No.:**	**9581**
AKA:	**Old Walter Nash Stadium**	**By:**	**ULM**
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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)* $_{nom}$

	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:	Public Buildings	Public Buildings
Seismic Zone:	Zone A	Zone A
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)	**Not applicable**	**Not applicable**

d) Estimate Period, *T*

Comment:

		Longitudinal	Transverse
h_n =		7.5	7.5 m
A_c =		1.00	1.00 m^2
Moment Resisting Concrete Frames:	$T = \max\{0.09 h_n^{0.75}, 0.4\}$	○	○
Moment Resisting Steel Frames:	$T = \max\{0.14 h_n^{0.75}, 0.4\}$	○	○
Eccentrically Braced Steel Frames:	$T = \max\{0.08 h_n^{0.75}, 0.4\}$	○	○
All Other Frame Structures:	$T = \max\{0.06 h_n^{0.75}, 0.4\}$	○	○
Concrete Shear Walls	$T = \max\{0.09 h_n^{0.75} / A_c^{0.5}, 0.4\}$	○	○
Masonry Shear Walls:	$T \leq 0.4\text{sec}$	◉	◉
User Defined (input Period):		○	○
	T:	0.40	0.40

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

			Longitudinal	Transverse
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:**	0.06	0.06
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) $_{nom}$ **= AxBxCxD**		***(%NBS)*** $_{nom}$	6%	6%

WARNING!! *This initial evaluation has been carried out solely as an initial seismic assessment of the building following the procedureset out in "The Seismic Assessment of Existing Buildings" Technical Guidelines for Engineering Assessments, July 2017. 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.*

Initial Evaluation Procedure (IEP) Assessment - Completed for {Client/TA}

Street Number & Name:	14 Tocker Street	Job No.:	9581
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Table IEP-2 Initial Evaluation Procedure Step 2 continued

2.2 Near Fault Scaling Factor, Factor E

If $T \leq$ 1.5sec, 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: Wellington **Refer right for user-defined locations**

Z = 0.4 (from NZS1170.5:2004, Table 3.3)

Z_{1992} = 1.2 (NZS4203:1992 Zone Factor from accompanying Figure 3.5(b))

Z_{2004} = 0.4 (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:	2.50	2.50

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.)

b) Design Risk Factor, R_o

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

c) Return Period Factor, R

(from NZS1170.0:2004 Building Importance Level) *Choose Importance Level*

d) Factor G = IR_o/R

		Longitudinal	Transverse
a)	I =	1.33	1.33
b)	R_o =	1	1
c)	Importance Level	○ 1 ○ 2 ◉ 3 ○ 4	○ 1 ○ 2 ◉ 3 ○ 4
c)	R =	1.3	1.3
d)	**Factor G:**	1.02	1.02

2.5 Ductility Scaling Factor, Factor H

a) Available Displacement Ductility Within Existing Structure

Comment:

steel portal frames in each direction.

		Longitudinal	Transverse
	μ =	2.00	2.00

b) Factor H

		Longitudinal	Transverse
		k_μ	k_μ
For pre 1976 (maximum of 2)	=	1.57	1.57
For 1976 onwards	=	1	1
	Factor H:	1.57	1.57

(where kμ 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 ☐ ☐

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

		Longitudinal	Transverse
	S_p =	0.70	0.70
	Factor I:	1.43	1.43

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**)	**34%**	**34%**

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Initial Evaluation Procedure (IEP) Assessment - Completed for {Client/TA}

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Name of building:		Date:	26/12/2018
City:	Lower Hutt	Revision No.:	36059 v 1

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

Lower 3m has reinforced block walls around the perimiter, upstairs is two way symmertry.

3.2 Vertical Irregularity

Effect on Structural Performance ○ *Severe* ○ *Significant* ◉ *Insignificant* **Factor B** 1.0

Heavy reinforced block work on around upt to 3m, light stell frame 3m to 7.5m.

3.3 Short Columns

Effect on Structural Performance ○ *Severe* ○ *Significant* ◉ *Insignificant* **Factor C** 1.0

Short columns have not been observed.

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

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

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

In a liquifaction event, the building may settle but reinforcing concrete foundations, block walls and steel frames are well tied together. No lanslide risk noted.

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:

Prelim calcs for longitudinal seismic actions show the steel portal frames at 35% capacity for a very conservative 0.6kPa loading for roof & light walls. This becomes ~45%NBS using realistic loadings. Displacement damage is expected to longitudinal wall claddings & linings.Bldg looks well constructed. Reinf masonry & reinf concrete walls are well documented

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

PAR
Longitudinal **1.30**

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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

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

Lower 3m has reinforced block walls around the perimiter, upstairs is two way symmertry.

3.2 Vertical Irregularity

Effect on Structural Performance ○ *Severe* ○ *Significant* ◉ *Insignificant* **Factor B** 1.0

Heavy reinforced block work on around upt to 3m, light stell frame 3m to 7.5m.

3.3 Short Columns

Effect on Structural Performance ○ *Severe* ○ *Significant* ◉ *Insignificant* **Factor C** 1.0

Short columns have not been observed.

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

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

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

In a liquifaction event, the building may settle but reinforcing concrete foundations, block walls and steel frames are well tied together. No lanslide risk noted.

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** 1.30

Record rationale for choice of Factor F:

The building appears very well constructed. Reinforced masonry block and reinforced concrete walls are well documented.

PAR

3.7 Performance Achievement Ratio (PAR)
(equals **A x B x C x D x E x F**) **Transverse** **1.30**

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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)	34%	34%
4.2 Performance Achievement Ratio (PAR) (from Table IEP - 2)	1.30	1.30
4.3 PAR x Baseline *(%NBS)*$_b$	45%	45%
4.4 Percentage New Building Standard *(%NBS)* - Seismic Rating (Use lower of two values from Step 4.3)		45%

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)

The original building was designed in 1973, therefore the seismic demand for design was much lower than it is today, but acco unted for in this procedure.

The connection between the north wall and the adjacent east-west (transverse) portal may be damaged in a seismic event because o f displacement incompatiiblites.

Construction appears ot be of good quality and original drawings show reinforcing steel in concrete and block work. Reinforce d concrete blockwork out of plane in the east west direction require further assessment for more reliable results.

Two previous IEP's have been carried out prior to Aug 2010 (not seen). The result of this IEP are similar. One of the IEP's r esulted in <34%NBS in the longitudinal direction. The %NBS of this IEP is slighly higher and potentially more rliable because of access to original 1972 structural drawings, the updated 2017 assessment guidelines, and high level back-ground calculations for the building rating in the longitudinal direction.

Relationship between Grade and *%NBS* :

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Initial Evaluation Procedure (IEP) Assessment - Completed for {Client/TA} **Page 7**

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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 [redacted]

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