Avalon Park Pavilion
61 Taita Drive, Avalon

Initial Seismic Assessment

for
Hutt City Council

Project 9741

December 2019

9741

17 December 2019
Private Bag 31912
Lower Hutt 5040

Attention: Aaron Marsh

Dear Aaron,

Initial Seismic Assessment Report
Avalon Park Pavilion, 61 Taita Drive, Avalon

We have now completed an Initial Seismic Assessment (ISA) of the Avalon Park Pavilion at 61 Taita Drive, Avalon 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 completing a site visit on Wednesday 4 December 2019.

Executive Summary

This building has been rated against the new building standard for a normal structure which is regarded as Importance Level 2 (IL2) in accordance with NZS1170.5:2004.

The assessed potential earthquake rating is 40%NBS (IL2) in both the longitudinal (SE-NE) and transverse (NW-SE) directions, 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 Severe Structural Weaknesses have been identified.

The Initial Seismic Assessment (ISA) is considered to provide a relatively quick, high-level and 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 Council has engaged Sawrey Consulting Engineers Ltd (SCEL) to carry out an Initial Seismic Assessment (ISA) of the Avalon Park Pavilion located at 61 Taita Drive in Avalon, Lower Hutt. 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.
- 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 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.

Basis for the Assessment

The information we have used for our IEP assessment includes:

- The building was constructed for Lower Hutt City Council in 1967.

- Subsoil class D has been used based on GNS Science's Lower Hutt Valley Site Subsoil Class Map and our engineering judgment.

- The period has been determined as being 0.40 seconds based on the reinforced masonry shear walls.

- A Hazard Scaling Factor of Z = 0.4 has been used based on the location of the site in the Hutt Valley, south of Taita Gorge.

- The building has been assumed to have an Importance Level 2 (normal structures).

- A ductility factor of μ = 2.0 has been assumed which is consistent with recommendations for a reinforced masonry building of this era.

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	1967	This is the date on the original drawings
Soil Type	D	GNS Science's Lower Hutt Valley Site Subsoil Class Map
Building Importance Level	2	AS/NZS1170.0
Ductility of Structure	2.0	Reinforced masonry building
Plan Irregularity Factor, A	0.7	Significant
Vertical Irregularity Factor, B	1.0	Insignificant
Short Columns Factor, C	1.0	Insignificant
Pounding Factor, D	1.0	Insignificant
Site Characteristics	1.0	Insignificant – Greater Wellington GIS viewer indicates low liquefaction potential
Factor F	1.3	A significant number of reinforced masonry shear walls in both directions. Closely spaced portal frames across the hall. Potential plan irregularity somewhat compensated for at ULS by bracing being relatively evenly distributed throughout the building.

Building Description

The building was constructed in 1967 for Lower Hutt City Council. It is single storey with a light metal-clad roof and brick veneer cladding. The foundations are shallow footings. There is a large lightweight verandah attached to the building on two sides.

There are steel portal frames across the hall. The remainder of the building has reinforced concrete shear walls.

IEP Assessment Result

Our IEP assessment of this building indicates the building can achieve 40%NBS (IL2) in both the longitudinal and transverse directions. The IEP assessment of this building therefore indicates an overall earthquake rating of 40%NBS (IL2 corresponding to a 'Grade C' building as defined by the New Zealand Society for Earthquake Engineering (NZSEE) building grading scheme. This is above the threshold for Earthquake Prone Buildings (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 overall score of 40%NBS (IL2), 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 also investigate other potential weaknesses that may not have been considered in the initial seismic assessment.

We note that a geotechnical desktop study would be required as part of the DSA.

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

SAWREY CONSULTING ENGINEERS LTD

[redacted]

[redacted]

Appendix A: ISA Technical Summary Report
Appendix B: IEP Form

Appendix A - ISA Technical Summary Report

Building Information	
Building Name/Description	Avalon Park Pavilion
Street Address	61 Taita Drive, Avalon, Lower Hutt
Territorial Authority	Hutt City Council
No. of Storeys	1
Area of Typical Floor (approx.)	325m^2
Year of Design (approx.)	1967
NZ Standard Designed to	NZSS 1900:1965
Structural System including Foundations	Steel portal frames across the hall. Reinforced masonry shear wall elsewhere. Foundations are shallow footings.
Key Features of Ground Profile and Identified Geohazards	The building is on a flat site. Greater Wellington GIS viewer indicates low liquefaction potential.
Previous Strengthening	None
Heritage Issues/Status	None
Other	N/A

Assessment Information	
Consulting Practice	Sawrey Consulting Engineers Ltd
CPEng Responsible	[redacted].
Date/Version of Drawings Reviewed	1967
Geotechnical Report(s)	None
Date Building Inspected	4 December 2019
Previous Assessment Reports	ISA dated 9 January 2015
Other Relevant Information	N/A

Summary of Engineering Assessment Methodology and Key Parameters Used	
Occupancy Type(s) and Importance Level	Importance Level IL2
Site Subsoil Class	D (Deep or Soft Soil)
Summary of Assessment Methodology Used	The Seismic Assessment of Existing Buildings Technical Guidelines for Engineering Assessments July 2017 Initial Seismic Assessment Part B. High level assessment (basic data collected; exterior inspection; IEP) plus an interior inspection.
Other Relevant Information	N/A

Assessment Outcomes	
Assessment Status	Final
Assessed Seismic Rating	40%NBS (IL2)
Seismic Grade	C (Medium Life Safety Risk)
Describe the Governing Critical Structural Weakness and Likely Mode of Failure	More detailed assessment would be required to confirm the likely failure mode, but possibly the steel portal frames across the hall or the reinforced masonry shear walls.
Comment on Parts Identified and Assessed	Brick veneer cladding out-of-plane. Further investigation and analysis would be necessary to determine actual capacity of brick veneer. Large verandah attached to two sides of building. Framing and roofing of verandah is lightweight. Further investigation and analysis would be necessary to determine actual capacity of verandah.
Recommendations	A Detailed Seismic Assessment (DSA) would be necessary to confirm the seismic performance of this building with more reliability. A DSA would also investigate other potential weaknesses that may not have been considered in the initial seismic assessment. We note that a geotechnical desktop study would be required as part of the DSA.

Appendix B – Initial Evaluation Procedure (IEP)

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

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, or engineering judgements based on them, have not been undertaken, and these may lead to a different result or seismic grade.*

Street Number & Name:	**61 Taita Drive, Avalon**	**Job No.:**	**9741**
AKA:		**By:**	**KJG**
Name of building:	**Avalon Park Pavilion**	**Date:**	**16/12/2019**
City:	**Avalon, Lower Hutt**	**Revision No.:**	**0**

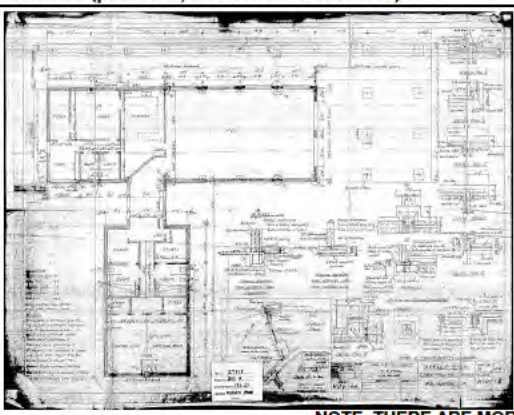
Table IEP-1 Initial Evaluation Procedure Step 1

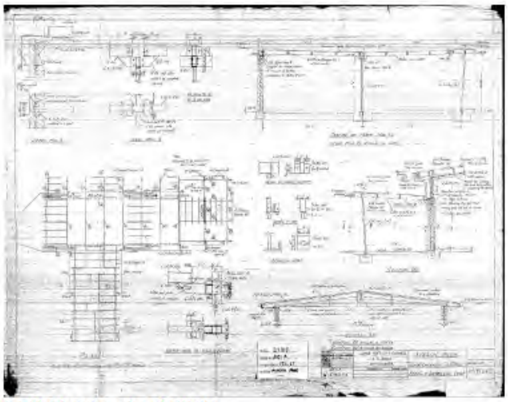
Step 1 - General Information

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 building was constructed in 1967.

The building is single storey with a light metal clad roof and brick veneer cladding. The hall has steel portal frames across it. The remainder of the building has reinforced masonry shear walls.

The foundations consist of shallow footings.

There is a large verandah attached to the building on two sides.

1.4 Note information sources Tick as appropriate

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

Original drawings. The drawings are difficult to read in places.

Initial Evaluation Procedure (IEP) Assessment - Completed for Hutt City Council **Page 1a**

Street Number & Name:	**61 Taita Drive, Avalon**	**Job No.:**	**9741**
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City:	**Avalon, Lower Hutt**	**Revision No.:**	**0**

Table IEP-1a Additional Photos and Sketches

Add any additional photographs, notes or sketches required below:

Note: print this page separately

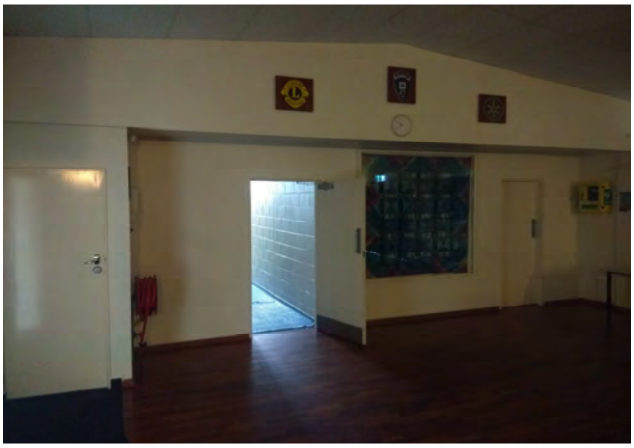

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Table IEP-2 Initial Evaluation Procedure Step 2

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: h_n =	4	4 m
A_c =	1.00	1.00 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: $T \leq 0.4$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%

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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: Hutt Valley-south of Taita Gorge **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.)

	Longitudinal	Transverse
I =	1.33	1.33

b) Design Risk Factor, R_o

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

	Longitudinal	Transverse
R_o =	1	1

c) Return Period Factor, R

(from NZS1170.0:2004 Building Importance Level)

Choose Importance Level

	Longitudinal	Transverse
Importance Level	○ 1 ◉ 2 ○ 3 ○ 4	○ 1 ◉ 2 ○ 3 ○ 4
R =	1.0	1.0

d) Factor G = IR_o/R

	Longitudinal	Transverse
Factor G:	1.33	1.33

2.5 Ductility Scaling Factor, Factor H

a) Available Displacement Ductility Within Existing Structure

Comment:

Reinforced masonry shear walls and steel portal frames.

	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 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 =	0.70	0.70

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

	Longitudinal	Transverse
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**)	**45%**	**45%**

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Table IEP-3 Initial Evaluation Procedure Step 3

Step 3 - Assessment of Performance Achievement Ratio (PAR)

(Refer Appendix B - Section B3.2)

a) Longitudinal Direction

potential CSWs	Effect on Structural Performance (Choose a value - Do not interpolate)			Factors
3.1 Plan Irregularity — *Effect on Structural Performance*	○ Severe	◉ Significant	○ Insignificant	Factor A: 0.7
3.2 Vertical Irregularity — *Effect on Structural Performance*	○ Severe	○ Significant	◉ Insignificant	Factor B: 1.0
3.3 Short Columns — *Effect on Structural Performance*	○ Severe	○ Significant	◉ Insignificant	Factor C: 1.0

3.4 Pounding Potential

(Estimate D1 and D2 and set D = the lower of the two, or 1.0 if no potential for pounding, or consequences are considered to be minimal)

a) Factor D1: - Pounding Effect

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

Factor D1 For Longitudinal Direction: 1.0

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

Greater Wellington GIS viewer indicates low liquefaction potential.

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:

A significant number of reinforced masonry shear walls in both directions. Closely spaced portal frames across the hall. Potential plan irregularity somewhat compensated for at ULS by bracing being relatively evenly distributed throughout the building.

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

PAR
Longitudinal: 0.91

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

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AKA:		By:	KJG
Name of building:	Avalon Park Pavilion	Date:	16/12/2019
City:	Avalon, Lower Hutt	Revision No.:	0

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** 0.7

3.2 Vertical Irregularity

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

3.3 Short Columns

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

3.4 Pounding Potential

(Estimate D1 and D2 and set D = the lower of the two, or 1.0 if no potential for pounding, or consequences are considered to be minimal)

a) Factor D1: - Pounding Effect

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

Factor D1 For Transverse Direction: 1.0

Table for Selection of Factor D1	Severe	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

Greater Wellington GIS viewer indicates low liquefaction potential.

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:

A significant number of reinforced masonry shear walls in both directions. Closely spaced portal frames across the hall. Potential plan irregularity somewhat compensated for at ULS by bracing being relatively evenly distributed throughout the building.

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

PAR
Transverse 0.91

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

Street Number & Name:	61 Taita Drive, Avalon	Job No.:	9741
AKA:		By:	KJG
Name of building:	Avalon Park Pavilion	Date:	16/12/2019
City:	Avalon, Lower Hutt	Revision No.:	0

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)	45%	45%
4.2	Performance Achievement Ratio (PAR) (from Table IEP - 2)	0.91	0.91
4.3	PAR x Baseline *(%NBS)*$_b$	40%	40%
4.4	Percentage New Building Standard *(%NBS)* - Seismic Rating (Use lower of two values from Step 4.3)		40%

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)

Relationship between Grade and *%NBS*:

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

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AKA:		**By:**	**KJG**
Name of building:	**Avalon Park Pavilion**	**Date:**	**16/12/2019**
City:	**Avalon, Lower Hutt**	**Revision No.:**	**0**

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] **Signature**

Name

CPEng. No

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