

INITIAL SEISMIC ASSESSMENT REPORT (ISA PLUS) 'Valor Fitness & Health' - 7 Dee Street, Invercargill



Client Name: HWCP Management Ltd)

BMC Reference: 1711-2266

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Issue Register:

Revision	Date	Description		
	9/04/2018	ISA (Plus)		
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1 Executive Summary

The following report covers the Initial Seismic Assessment (ISA Plus) of the building at 'Valor Fitness & Health' - 7 Dee Street, Invercargill. The building has been classified as having a "Tier 2" heritage being a site of local significance in the "Proposed Invercargill City Council Plan", dated January 2017. However, in the Invercargill City Central City Area Heritage Building Review Re-assessment of November 2016 it was recommended for *"Removal from the list"* due to its *"poor condition"* and it having *"little streetscape value as most of original frontage removed or decayed and little historic value"*.

The single storey building is part of a retail set of buildings facing Dee St and consists of two distinct building elements, a single storey element to the West (front) and a 2 storey element to the East (rear) both constructed of unreinforced masonry (bricks) and timber floors and roofs all constructed circa 1906. The building is located in the Invercargill CBD. This location is a 'medium' seismic risk region with a seismic hazard factor of 0.17. For comparison Christchurch has a seismic hazard factor of 0.3 and is a 'high' seismic risk region, while Dunedin has a seismic hazard factor of 0.13 and is a 'low' seismic risk region.

Documentation available to BMC for the purposes of this assessment is summarised in Section 4.1. This assessment is based on these documents and site visit observations only. For the purposes of this evaluation, the above described building has been assessed as a structure of Importance Level 2 (IL2) – Normal Building.

General condition of the building is poor with "soft storey" in the transverse direction (end walls open).

BMC have completed an NZSEE Initial Evaluation Procedure (IEP) spreadsheet. In addition BMC has provided an assessment of the out-of-plane performance of a critical wall.

From this assessment the building is considered to have a lateral load carrying capacity of 10-20% New Building Standard (IL2) as follows,

Location	Building %NBS (IL2)	Seismic Grade	Limiting performance
2 storey	10-20%NBS	E	Out-of-plane capacity of North and East end walls (facing carpark)

Refer to section 5 for explanation and summary of assessment

A 'Desk Top' geotechnical assessment from nearby sites has been referenced in relation to likely geotechnical conditions for this site. The building has shallow strip footing foundations which will likely be subject to some differential settlement as a result of liquefaction under a significant (ULS) seismic event.

Our ISA Plus found that the building at 7 Dee Street, Invercargill has a capacity less than 34%NBS(IL2), and the building, therefore, is considered to be potentially Earthquake Prone as defined in the Building Act.

Note, the ISA is considered to provide a relatively quick, high-level and mostly qualitative measure of the building's performance. If a more defined level of performance is required then a Detailed Seismic Assessment (DSA) would need to be carried out.



2 Scope of Our Engagement

As requested by HWCP Management Ltd), we have undertaken a comprehensive Initial Seismic Assessment (ISA Plus) of the seismic capacity of the building at the above noted address.

The seismic assessment and reporting have been undertaken in accordance with the qualitative procedures detailed in "The Seismic Assessment of Existing Buildings, Technical Guidelines for Engineering Assessments" issued by the Ministry of Business, Innovation and Employment (MBIE) and now cited in the Building (Earthquake-prone Buildings) Amendment Act 2016 (which has now been integrated into the Building Act 2004) with reference to potentially earthquake prone buildings. BMC have included a simple calculation / assessment of an element of the building form(s) or structure(s) that BMC have assessed as limiting the global seismic capacity of the building.

This structural assessment includes:-

- Review of existing building plans or production of a scale layout plan and review of any prior reports, if available;
- Undertaking interior and exterior visual inspection of exposed elements on-site, where access is available;
- Consideration of the general established geotechnical evidence for the site (from the initial 'Desktop Study' relevant to the CBD block by Geosolve Ltd);
- Completion of an Initial Evaluation Procedure (IEP) spreadsheet(s);
- Engineering assessment and/or calculation of a primary or critical structural element that is considered to limit the global seismic capacity of the building
- Production of a summary report

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 on the visual evidence and indications present at the time of inspection. No specific invasive investigation work has been carried out (although wall thicknesses and wall/parapet heights may be determined). The findings of this report may therefore be subject to revision pending further and more detailed investigation or assessment and/or deterioration of elements from earthquake or ground settlement. This report does not address any hidden or latent defects that may have been incorporated in the original design and construction.

This assessment has been restricted to structural aspects only. Waterproofing elements, electrical and mechanical equipment, fire protection and safety systems, service connections, water supplies and sanitary fittings have not been reviewed, and secondary elements such as internal fit out have not been reviewed.

The scope of this evaluation is limited to the initial or first stage assessment of the potential performance of the building in an earthquake ONLY. No assessment has been made of other load cases such as wind, snow and gravity.



Our professional services are performed using a degree of care and skill normally exercised, under similar circumstances, by reputable consultants practicing in this field at this time. No other warranty, expressed or implied, is made as to the professional advice presented in this report.

This report is provided solely for use by HWCP Management Ltd) and shall not be relied on by any other parties without written approval from Batchelar McDougall Consulting.

3 Building Description

3.1 General Overview

The building located at 'Valor Fitness & Health' - 7 Dee Street, Invercargill is a 2 storey structure. The building is currently untenanted. It was most recently tenanted by Valor Fitness & Health.



Figure 1: Location of 7 Dee Street.

A full description of the building(s) is provided in Table 1 below.

Building Feature	Description
Building address:	'Valor Fitness & Health' - 7 Dee Street, Invercargill
Overall plan dimensions:	6 x 20 m
Number of storeys:	1 generally, 2 to rear 25% of length
Gross floor area:	Approximately 150m2
Building history:	constructed circa 1906



Building Feature	Description
Archive Plan Availability	No
Occupancy:	Untenanted. Retail (previously)
Importance Classification: (AS/NZS 1170.0:2002: Table 3.2)	IL2 Normal Building
Heritage Classification:	Recommended for removal from Tier 2 Local List in 2016 (ref:- Invercargill City: Central City Heritage Building Review Re-assessment November 2016).

Table 1: Building Description

3.2 Construction Materials & Configuration

Based on the visual observations the following structure has been identified.

The roof structure of the building consists of corrugated iron roofing likely on timber purlin / rafters supported on timber trusses to the duo pitch roof form to the front 75% of the length and to rafters and purlins to the mono-pitched roof to the rear 25% of the length.

The first floor is most likely timber joists supported on 230mm wide unreinforced masonry (brick) walls throughout. The ground floor is a reinforced concrete ground bearing slab. The front façade of the building is essentially fully glazed.

Gravity loads are transferred to the foundations via URM walls, and timber or steel beams.

Foundations are typically reinforced concrete strip footings under external walls.

The building is in a poor condition with evidence of high levels of erosion to the bricks and mortar to the exposed elevations.



Photo 1: Rear of building showing second floor elevated roof section.



3.3 Lateral Load Resisting Structural System

The lateral load resisting system for this section of the building relies on the in-plane shear capacity of the external brick walls in both the 'across' and 'along' directions. There is very little capacity in the transverse direction as the ground floor elevations are essentially open. Out-of-plane wall / floor / roof seismic loads or forces are transferred through the mid-floor and / or roof structure via diaphragm action to orthogonal walls. This diaphragm action is unlikely to be effective particularly at roof level. There are no connections noted or visible at roof level.

3.4 Foundations & Geotechnical

There are no obvious signs of significant settlement in foundations or wall cracking. Foundation details for the building are unknown but assumed to be concrete strip footings.

A 'Desk Top' geotechnical study titled Invercargill CBD Project Stage 1 dated February 2018 by Geosolve Ltd (Ref: 171019) has been completed. This study focused on the likely ground conditions for the Old Government Life & Old Southland Times buildings but does relate generally to the CBD block as a whole.

Key findings from the Geosolve report that are likely to relate to this 36 Tay Street building assessment are,

- Ground / Soil Class D is to be used for the purposes of seismic assessment
- Some Liquefaction induced differential settlement is likely in a significant (ULS) seismic event
- Bearing conditions for typical strip footings are less than 'good ground' as defined by NZS3604 (approx. half). Note BMC has not checked actual foundation bearing pressures for this building.

4 Building Inspection

4.1 Documentation

Documentation received by us that we consider relevant to this report includes:-

Description	Revision	Issue Date
None (no plans developed)		

4.2 Observations and/or Damage

The building was inspected by Warren Holt of BMC on 27/02/2018. This was a visual inspection only of the external accessible areas of the building. No invasive inspection works were carried out.

No specific / significant items of structural damage were observed although the brickwork generally is in poor condition.

The following photo images and observations and specific comments relate to the inspection. A complete photo record of the inspection is available on request.



No#	Photo	Comments
1		The façade comprises of URM with plaster render and potentially stone or concrete detailing to the dentilled string course. A horizontal crack has propagated at the change in section of the end detail of the parapet wall Note there is no seismic gap to the building to the South and there is better lateral load resistance in this buildings meaning that load from this building will be passed into the structure of 5 Tay St if it remains in place.
2		The brickwork is suffering from significant erosion to both the bricks and the mortar as identified by this panel to the East (rear) elevation.
3		The brickwork erosion continues to the North (side) elevation with this view towards the West (front) elevation. The parapet wall thickness can be seen to be in the order of 230mm thick.
4		The brickwork erosion continues to the North (side) elevation with this view towards the East (rear) elevation including the 2 storey high element of the building. The parapet wall thickness can again be seen to be in the order of 230mm thick.



5 Assessment

5.1 Specific Calculations / Engineering assessment

The following additional items of calculation / consideration have been undertaken as part of this assessment.

The rear wall element with respect to out-of-plane (OOP) performance, acts as a cantilever from ground floor level given the lack of effective restraint provided by the floor construction detailing typical of this era of building. This is likely to be the critical element from a seismic perspective for this part of the building. Assuming the parameters relating to this vertical cantilever brick wall are, height = 6.0m approx., thickness = 230mm. BMC has carried out an OOP calculation resulting in a 16%NBS performance for this wall (see Appendix A for calc sheet). Note this does not allow for the either the loss of brick section or mortar jointing which is visually evident on site

The in-plane performance of the brick walls is likely to be adequate (>34%NBS) where present. Note, the front and rear ground floor elevations have no effective capacity as they are largely open.

5.2 IEP Spreadsheet Calculations

The NZ Society of Earthquake Engineers (NZSEE) have developed an assessment calculation (the IEP Spreadsheet) to be used in a preliminary estimation of the seismic capacity (Percentage of New Build Standard (%NBS)) of a building. This is primarily based on comparing the current seismic design Loadings Code (NZS1170.5) in 2018 with the seismic design load at the time the building was designed. It assumes that the original design was built to at least 100%NBS of the design load at this time. It allows for other 'engineering judgement' and observation factors to be incorporated but the process is at best a preliminary estimation.

We have carried out an IEP assessment for this building with the following results,'

IEP Score - 15-20%NBS (limited by out-of-plane performance of the two storey element walls, lack of bracing to the façade and potential diaphragm fixing issues).

The ISA assessment of this building therefore indicates an overall score of 10-20%NBS (IL2) if the building is taken as a whole, including the specific assessment results, corresponding to a 'Grade E' building as defined by the New Zealand Society for Earthquake Engineering (NZSEE) building grading scheme. This is below the threshold for earthquake prone buildings (34%NBS) and below the threshold for earthquake risk buildings (67%NBS) as recommended by the NZSEE. The IEP Spreadsheets are (for both parts of the building) included as Appendix A.

6 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 the bracing of the false ceilings, in-ceiling ducting, services and plant or contents. These issues are outside the scope of this initial assessment but could be the subject of another investigation.

False (or suspended) ceilings exist on ground floor level of this building.

7 Continued Occupancy Recommendations

Based on our assessment of the building, BMC consider continued occupancy for the next 6-12 months only is appropriate *subject to the conditions of the Building (Earthquake-prone Buildings) Amendment Act 2016,* without subsequent inspections.

If required a DSA or a more detailed assessment with intrusive investigation work into the nature and capacity of the timber diaphragm connections to the brick walls at roof and 1st floor levels walls and any internal walls, if present, was to be undertaken it could potentially raise its capacity to above 34%NBS and also enable an understanding of other aspects of its seismic performance.

8 Conclusions

Based on our assessment, the building has a seismic load carrying capacity of less than 34%NBS (IL2) and the building therefore, is considered to be potentially Earthquake-prone as defined by the Building Act.

The building has been classified by Invercargill City Council as a site of local significant, giving it a "Tier 2" heritage status in the "Proposed Invercargill City District Pan, dated January 2017. However, it it was recommended for removal from the listing by "Invercargill City: Central City Area Heritage Building Review Re-assessment 2016". The buildings current condition is determined as being poor.

If a more defined level of performance is required then a Detailed Seismic Assessment (DSA) would need to be carried out.

For more summary comments please refer to the Executive Summary.



APPENDIX A - NZSEE IEP Spreadsheet(s) & OOP Wall calc

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b) Factor F For pre 1992 For 1992-2011 For post 2011	= = =	1/Z			
For pre 1992 For 1992-2011 For post 2011	= = =	1/∠			
For post 2011	=	Z_{1002}/Z			
		Z_{2004}/Z			
			Factor F: 5.88		5.88
 (Jost of Hinds view). For buildings designe building set to 1.25. For buildings designe building set to 1.33 for Zone A or 1.2 for Z b Design Risk Factor, R (set to 1.0 if other than 1976-2004, or not set to 1.0 if other than 1976-2004, or not set to 1.0 if other than 1976-2004, or not set to 1.20 if other than 19	nce Jeno 1965 and know Zone B. For 1976 and known ot known) nce Level)	t l value.)	$I = 1$ $R_{o} = 1$ $R_{o} = 1$ $R_{o} = 1$ $R_{o} = 1$	▼]4 □1	
d) Factor G	=	IR _o /R			1.00
.5 Ductility Scaling Factor, Fa	ctor H		Factor G: 1.00		1.00
a) Available Displacement Ductil	ity Within Existing	Structure			1.50
URM			$\boldsymbol{\mu} = 1.50$		1.50
b) Factor H			k,		<i>k</i>
	For pre 1976 (ma	iximum of 2)	= 1.29		1.29
	For 1976 onward	S	Factor H: 1.29		1.29
(where $k\mu$ is NZS1170.5:2004 Inelastic §	Spectrum Scaling Factor,	from accompanying Table 3.3)		
6 Structural Performance Sca a) Structural Performance Factor (from accompanying Figure 3.4)	aling Factor, Facto r, S _p	or I			
Tick if light timber-framed const	truction in this directi	on	S _p = 0.85		0.85
b) Structural Performance Scalin Note Factor B values for 1992 to 2004 I	ig Factor have been multiplied by 0.	$= 1/S_p$.67 to account for Sp in this p	Factor I: 1.18		1.18
7 Baseline %NBS for Building (equals (%NBS) _{nom} x E x F x	g, <i>(%NBS)</i> _b G x H x I)		20%		20%

et Number & Name:	7 Dee Street			Jo	ob No.:	1711-2266
	Valor Health and	Fitness		B	y:	W Holt
ne of building: :	Invercargill			Da Ri	ate: evision No.:	27/02/2018 A
ble IEP-3 Initial Eva	aluation Procedui	re Step 3				
o 3 - Assessment of Perfe er Appendix B - Section B3.2)	ormance Achieveme	ent Ratio (PAR)				
ongitudinal Direction						
potential CSWs		Effect on Struct (Choose a value -	ural Performa Do not interpol	ince late)		Fac
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eet Number & Name:	7 Dee Street		Job No.:	1711-2266
A:	Valor Health and Fitness		By:	W Holt
me of building: y:	Invercargill		Revision No.:	27/02/2018 A
bla IEP 2 Initial Eval	untion Broadure Stop 2			
ep 3 - Assessment of Perfor fer Appendix B - Section B3.2)	mance Achievement Ratio (PAR)		
Transverse Direction				Faat
potential CSWs	Effect on S (Choose a v	Structural Performance alue - Do not interpolate)		Fact
Plan Irregularity	Severe	Significant	n Insignificant	
diaphragm length and soft store	y end walls		_ morghinean	Factor A 0.7
Vortical Irrogularity				
Effect on Structural Performance	e Severe	Significant	Insignificant	Factor B 1.0
Effect on Structural Performance	e 🖸 Severe	Significant	Insignificant	Factor C 1.0
Comment				
Values given assume the bui may be reduced by taking th	ilding has a frame structure. For stiff b e coefficient to the right of the value a	uildings (eg shear walls), the pplicable to frame buildings.	effect of pounding	
Values given assume the bu may be reduced by taking th Table for Selection of Fa	ilding has a frame structure. For stiff b e coefficient to the right of the value a ctor D1	uildings (eg shear walls), the oplicable to frame buildings. Factor D1 For Transverse Severe Signification	effect of pounding Direction: 1.0 Insignificant Sons 01H	
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Fable IE	ouilding:	Valor Health	and Fitness			Job N By: Date:	lo.:	1711-2266 W Holt 27/02/2018
		Invercargill				Revis	ion No.:	A
	2P-4 Initial E	Valuation Proc	edure Steps	5 4, 5, 6 and	17			
step 4 - i	rencentage of Nev	v Bulluing Standa	aru (<i>761463)</i>		Long	itudinal		Transverse
l.1 Ass (f	essed Baseline %A rom Table IEP - 1)	IBS (%NBS) _b			2	20%		20%
l.2 Perf	ormance Achieven rom Table IEP - 2)	nent Ratio (PAR)			C	0.70		0.49
I.3 PAR	x Baseline <i>(%NB</i> S) _ь			1	5%		10%
l.4 Pero	centage New Buildi Use lower of two value	ng Standard (%NB s from Step 4.3)	3S)					10%
Step 5 - I	Potentially Earthq	uake Prone? (Mark as approp	oriate)			%	NBS <u><</u> 34	YES
Step 6 - I	Potentially Earthq	uake Risk? (Mark as approp	oriate)			%	NBS < 67	YES
Step 7 - I	Provisional Gradi	ng for Seismic Ri	sk based on I	EP		Seisn	nic Grade	E
Addi Inter	nal inspection may find	ms of note affecting	IEP score) which will increas	e the plan irregu	llarity rating			
Addi Inter	ationship betw	ms of note affecting d internal cross walls v	IEP score) which will increas	e the plan irregu	llarity rating			
Rel	ationship betw	ms of note affecting d internal cross walls v een Grade and :: A+	IEP score) which will increas I %NBS :	e the plan irregu	larity rating	D	E	1

reet N KA: ame of ity:	umber & Name: building:	7 Dee Street Valor Health and Fit Invercargill	ness	Job No.: By: Date: Revision No	1711-2266 W Holt 27/02/2018 .: A
able I	EP-5 Initial Ev	aluation Procedure S	itep 8		
tep 8 -	Identification of po significant risk to a	otential Severe Critical St a significant number of o	ructural Weaknesses tl occupants	hat could result in	
.1 Nu	mber of storeys abov	ve ground level			1
.2 Pre	esence of heavy conc	crete floors and/or concrete	e roof? (Y/N)		N
Oc	cupancy not consid	dered to be significant -	no further consideratio	n required	
Ris	sk not considered t	o be significant - no furt	her consideration requi	ired	
	IEP Assessm	ent Confirmed by	CUMP.	Signature	
			Warren Holt	Name	
			1026871	CPEng. No	

eet Number & Name	7 Dee Street	Job No 1	1711-2266
	Valor Health and Fitness	By:	W Holt
ne of building:	Valor ricalin and rithess	Date:	27/02/2018
v:	Invercargill	Revision No.:	A
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