Appendix 7: Structural Assessment – BECA

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Invercargill Licensing Trust
c/- The Building Intelligence Group
P O Box 448
Christchurch 8140
New Zealand

6 June 2018

Attention: Tess Browne

Dear Tess

Initial Seismic Assessment Report - 57-81 Dee Street, Invercargill

We have now completed an Initial Seismic Assessment (ISA) of the buildings situated at 57-81 Dee Street, Invercargill including the buildings situated at 7 and 11 Don Street, Invercargill using the Initial Evaluation Procedure (IEP) as described in Part B of the guidance document *The Seismic Assessment of Existing Buildings - Technical Guidelines for Engineering Assessments*, dated July 2017 (*Technical Guidelines*). The assessment was carried out after completing a site visit, an internal and external walk over visual non-intrusive inspection and a review of the available plan drawings.

Executive Summary

The buildings at 57-87 Dee Street, are a complex of existing buildings which are interconnected and span over a time frame from pre 1935 unreinforced masonry (URM) construction to more modern reinforced concrete, concrete masonry in fill and structural steel building constructed at various times, however for the purpose of this report the date of construction for the alterations is considered to be circa 1969. The URM building consisting of 57-81 Dee Street vary from three storeys in the north to two storey URM building to the south with a significant alternation to the street façade. The building at 11 Don Street is a standalone two storey concrete frame and concrete masonry infill panel structure with a light roof, concrete suspended floors and a basement over the full foot print of the building.

The results of our assessment are summarised below:

Table 1: Summary of ISA Results.

Building Name	%NBS Score[1]	Building Grade[2]	Life-Safety Risk[2]	Building Designation[3]
Langlands Building 73-81 Dee Street	< 20%NBS(IL2)	E	Very High	N/A
Old Deka Building 57-67 Dee Street	< 20%NBS(IL2)	E	Very High	N/A
57-67 Dee Street (Rear)	60%NBS(IL2) <20%NBS(IL2) due to structural connection to URM adjacent buildings	C	Medium	N/A
7 Don Street	60%NBS(IL2) <20%NBS(IL2) due to structural connection to URM adjacent buildings	C	High	N/A
11 Don Street	65%NBS(IL2)	C	Medium - Low	N/A

Notes:

1. These have been assessed using *The Seismic Assessment of Existing Buildings - Technical Guidelines for Engineering Assessments*, dated July 2017 (*Technical Guidelines*). The buildings have been assessed on the basis they are Importance Level 2 (IL2) buildings in accordance with the New Zealand Loadings Standard, NZS1170.
2. The building grade, life-safety risk is defined by NZSEE and relates to the %NBS score. Refer section 7 of this report for more information.
3. The Building Act (2004) designates buildings with less than 34%NBS as “Earthquake Prone” Buildings, and those with less than 67%NBS as “Earthquake Risk” Buildings, as per the NZSEE definitions.

The buildings consisting of 57-81 Dee Street correspond to Grade E buildings as defined by the New Zealand Society for Earthquake Engineering (NZSEE) building grading scheme. This is lower that the threshold for an Earthquake Prone building. Because the buildings are interconnected with reliance for structural support, the minimum building score for any part of the interconnected building becomes the minimum rating for the whole interconnected building complex. This could be regarded as exposing the occupants to a very high seismic risk.

The building consisting of 11 Dee Street correspond to Grade C buildings as defined by the New Zealand Society for Earthquake Engineering (NZSEE) building grading scheme. This is greater that the threshold for an Earthquake Prone building but lower than the threshold for an earthquake risk building. This could be regarded as exposing the occupants to a moderate seismic risk.

The ISA is considered to provide a relatively quick, high-level and qualitative measure of the building’s seismic rating. A more reliable result will be obtained from a Detailed Seismic Assessment (DSA). A DSA could find Critical Structural Weaknesses (CSWs) not identified from the IEP, or that a feature initially identified as a potential Critical Structural Weakness has been addressed in the design of the building.

1 Introduction

The Invercargill Licensing Trust requested Beca to prepare an Initial Seismic Assessment for the buildings located 57-81 Dee Street and 11 Don Street, Invercargill, using the IEP procedure, while also providing background information on the Initial Evaluation Procedure and its limitations. This report has been prepared in response to this request.

2 Background to the IEP Process

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 process 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 (i.e. not assessed for SLS limit state).
- It tends to be somewhat conservative identifying some buildings as earthquake prone, or having a lower %NBS seismic rating, while subsequent detailed investigation may indicate they are likely to perform better than anticipated. However, there will be exceptions, particularly when critical structural weaknesses (CSWs) are present that have not been recognised from the level of investigation employed.
- It 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 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 within a building which the IEP process flags as being potentially problematic or as potential critical structural weaknesses, need further detailed investigation and evaluation. A Detailed Seismic Assessment (DSA) is recommended if the status of a building is critical to any decision making.
- The IEP assumes that the building has 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 a potentially 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 building's design.
- An IEP does not take into account the seismic performance of non-structural items such as ceiling, plant, services or glazing.

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 and grade should be considered as indicative only. A more detailed investigation and analysis of the building will

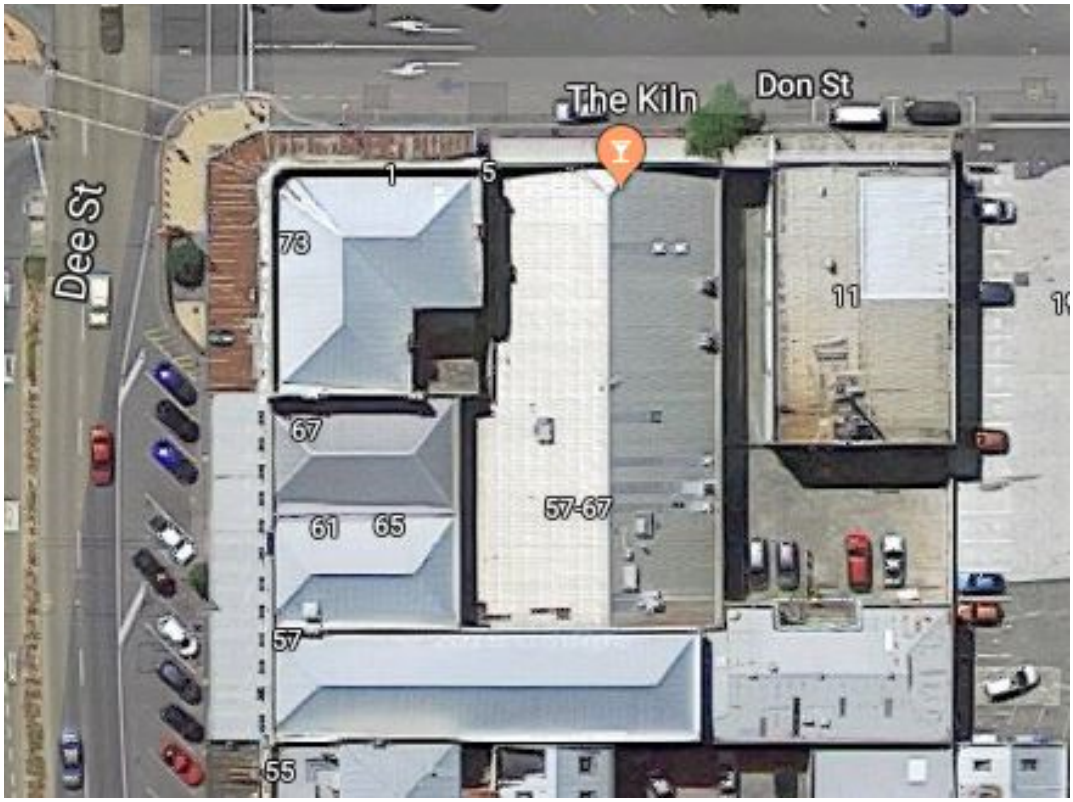
typically be required to provide a definitive assessment and come up with concept seismic improvement strategies.

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 34%NBS and therefore, if ratified by the TA, the building should not be considered as earthquake prone.

3 Basis for the Assessment

The information we have used for our IEP assessment includes:

- A review of part plan drawings obtained from the Invercargill City Council LIM reports for the associated buildings. We received the following drawings:
- A site visual inspection conducted on 14 May 2018 of the building's interior and exterior which confirmed the nature of the building and relationship to surrounding buildings. The inspection was limited to areas where safe ready access was available to:
  - Confirm the as-constructed buildings were consistent with the drawings and documentation.
  - Identify potential critical structural weaknesses, or irregularities able to be observed.
  - Identify, where possible, items of significant deterioration which might affect %NBS assessment.
- The assessment of the soils under the building have been based on information from the geotechnical report.



4 Building Description

73-81 Dee, Langlands Building

Summary information about 73-81 Dee Street.

Table 2: Building Summary Information

Item	Details	Notes
Building Name	73-81 Dee Street	
Street Address	73-81 Dee Street, Invercargill	
Building Area	Approx. gross plan area of 380 m2	
Age	Pre 1900	Possibly circa 1890's
No. of Storeys / Basements	Three storeys and part basement	
Occupancy / Use	Unoccupied.	
Gravity System	Light weight roof structure on unreinforced masonry walls with internal timber suspended floors.	
Lateral Stability System	URM Walls acting in plane.	
Foundation System	Concrete part basement and local concrete foundations under load bearing URM walls.	
Construction Information	No original drawings have been made available	

Old Deka Building 57-67 Dee Street

Summary information about 57-67 Dee Street is given in Table 3.

Table 3: Building Summary Information

Item	Details	Notes
Building Name	57-67 Dee Street Old Deka Building	
Street Address	57-67 Dee Street, Invercargill	
Building Area	Approx. gross plan area of 700 m2	
Age	Pre 1900. Building was part of the original Langlands block of building but has significant alteration to the facade	Possibly circa 1890's
No. of Storeys / Basements	Two storey with part basement	
Occupancy / Use	Hospitality on ground floor only (Barluca). First floor is unoccupied. .	
Gravity System	Light weight roof structure on unreinforced masonry walls with internal timber suspended floors.	
Lateral Stability System	URM Walls acting in plane.	

Item	Details	Notes
Foundation System	Concrete part basement and local concrete foundations under load bearing URM walls.	
Construction Information	No original drawings have been made available	

57-67 Dee Street Rear Building

Summary information about 57-67 Dee Street is given in Table 4.

Table 4: Building Summary Information

Item	Details	Notes
Building Name	57-67 Dee Street	
Street Address	57-67 Dee Street, Invercargill	
Building Area	Approx. gross total area of 250 m^2	
Age	Circa 1969	Drawings dated 1969 show the building constructed at the rear of the later Deka Building
No. of Storeys / Basements	Single storey	
Occupancy / Use	Hospitality (back of house) on ground floor.	
Gravity System	Light weight roof structure on reinforced concrete walls	Note that this building is structurally connected to the URM building to the west.
Lateral Stability System	Reinforced concrete walls.	
Foundation System	Shallow reinforced concrete foundations	
Construction Information	No original drawings have been made available	

7 Don Street

Summary information about 7 Don Street is given in Table 5.

Table 5: Building Summary Information

Item	Details	Notes
Building Name	7 Don Street	
Street Address	7 Don Street, Invercargill	
Building Area	Approx. gross total area of 850 m^2	
Age	Circa 1969	Drawings dated 1969 show the building constructed in conjunction with the later Deka Building
No. of Storeys / Basements	Single storey	
Occupancy / Use	Hospitality (The Kiln)	

Item	Details	Notes
Gravity System	Light weight roof structure on reinforced concrete frame with concrete masonry infill	Note that this building is structurally connected to the URM building to the west.
Lateral Stability System	Reinforced concrete frame and concrete masonry infill.	
Foundation System	Shallow reinforced concrete foundations	
Construction Information	No original drawings have been made available	

11 Don Street Street Rear Building

Summary information about 11 Don Street is given in Table 6.

Table 6: Building Summary Information

Item	Details	Notes
Building Name	11 Don Street	
Street Address	11 Don Street, Invercargill	
Building Area	Approx. gross plan area of 410 m^2	
Age	Circa 1969	Drawings dated 1969 show the building constructed
No. of Storeys / Basements	Two Storey with basement	
Occupancy / Use	Currently unoccupied, office use	
Gravity System	Light weight roof structure on reinforced concrete walls with concrete masonry infill	
Lateral Stability System	Reinforced concrete walls with concrete masonry infill.	
Foundation System	Shallow reinforced concrete foundations	
Construction Information	No original drawings have been made available	

Site Soil Parameters

We have assumed a Class D soil type as per AS/NZS 1170 for the site as defined in the geotechnical report.

Figure 1: Site Location Plan

5 IEP Assessment Results

73-81 Dee Street, Langlands Building

Our IEP assessment of the building 73-81 Dee Street has a capacity less than 20%NBS(IL2), corresponding to a 'Grade E' building as defined by the New Zealand Society for Earthquake Engineering (NZSEE) building grading scheme.

The key assumptions made during our assessment are shown in the table below. Refer also to the attached IEP assessment.

Table 7: IEP Assessment Results

IEP Item	Assumption	Justification
Date of Building Design	Pre 1900	Circa 1890.
Soil Type	D – Deep or soft soils	The soil type is considered to be D based on the available geotechnical information
Building Importance Level	2	The building is considered a normal structure as defined in AS/NZS 1170.0.
Ductility of Structure	μ=1.25 (Longitudinal and Transverse)	Unreinforced Masonry Walls. Allow for a low level of ductility due to the likely increased damping of the URM walls due to weaker mortar
Plan Irregularity, Factor A	0.7 (Longitudinal and Transverse)	Buildings are a conglomeration of URM buildings structurally connected with irregular load paths.
Vertical Irregularity, Factor B	0.7	Ground floor has been altered to allow for retail presence at ground floor changing the lateral stiffness of the building at this level.
Short Columns, Factor C	1.0	N/A.
Pounding, Factor D	0.9 (Longitudinal and Transverse)	Buildings consist of three and two story URM structural walls with flexible diaphragms.
Site Characteristics, Factor E	1.0	Flat site with apparent low risk of liquefaction.
Factor F	1.0	Typical URM construction with no features which would suggest any degree of additional resilience or redundancy. There was no specific degradation in the building which would effect the gravity or lateral load capacity of the building.

57-67 Dee Street, Old Deka Building

Our IEP assessment of the building 57-67 Dee Street has a capacity less than 20%NBS(IL2), corresponding to a 'Grade E' building as defined by the New Zealand Society for Earthquake Engineering (NZSEE) building grading scheme.

The key assumptions made during our assessment are shown in the table below. Refer also to the attached IEP assessment.

Table 8: IEP Assessment Results

IEP Item	Assumption	Justification
Date of Building Design	Pre 1900	Main structural components of the building are part of the original Langland's block of buildings circa 1890
Soil Type	D – Deep or soft soils	The soil type is considered to be D based on the available geotechnical information
Building Importance Level	2	The building is considered a normal structure as defined in AS/NZS 1170.0.
Ductility of Structure	μ=1.25 (Longitudinal and Transverse)	Unreinforced Masonry Walls. Allow for a low level of ductility due to the likely increased damping of the URM walls due to weaker mortar
Plan Irregularity, Factor A	0.7 (Longitudinal and Transverse)	Buildings are a conglomeration of URM buildings structurally connected with irregular load paths
Vertical Irregularity, Factor B	0.7	Ground floor has been altered to allow for hospitality use at ground floor changing the lateral stiffness of the building at this level
Short Columns, Factor C	1.0	N/A.
Pounding, Factor D	0.9 (Longitudinal and Transverse)	Buildings consist of three and two story URM structural walls with flexible diaphragms.
Site Characteristics, Factor E	1.0	Flat site with apparent low risk of liquefaction
Factor F	1.0	Typical URM construction with no features which would suggest any degree of additional resilience or redundancy. There was no specific degradation in the building which would effect the gravity or lateral load capacity of the building

57-67 Dee Street, Rear building

Our IEP assessment of the building 57-67 Dee Street rear building has a capacity 40%NBS(IL2), corresponding to a 'Grade C' building as defined by the New Zealand Society for Earthquake Engineering (NZSEE) building grading scheme.

The key assumptions made during our assessment are shown in the table below. Refer also to the attached IEP assessment.

Table 9: IEP Assessment Results

IEP Item	Assumption	Justification
Date of Building Design	Circa 1969	
Soil Type	D – Deep or soft soils	The soil type is considered to be D based on the available geotechnical information
Building Importance Level	2	The building is considered a normal structure as defined in AS/NZS 1170.0.
Ductility of Structure	μ=2.0 (Longitudinal and Transverse)	Structural reinforced concrete walls with internal gravity portal frames to support roof
Plan Irregularity, Factor A	1.0 (Longitudinal and Transverse)	Non observed
Vertical Irregularity, Factor B	1.0	Single Storey
Short Columns, Factor C	1.0	N/A.
Pounding, Factor D	0.9 (Longitudinal and Transverse)	Building is structural connected to adjacent two storey URM building
Site Characteristics, Factor E	1.0	Flat site with apparent low risk of liquefaction
Factor F	1.0	Typical warehouse construction with no features which would suggest any degree of additional resilience or redundancy. There was no specific degradation in the building which would affect the gravity or lateral load capacity of the building

7 Don Street,

Our IEP assessment of the building 7 Don Street has a capacity 30%NBS(IL2), corresponding to a 'Grade D' building as defined by the New Zealand Society for Earthquake Engineering (NZSEE) building grading scheme.

The key assumptions made during our assessment are shown in the table below. Refer also to the attached IEP assessment.

Table 10: IEP Assessment Results

IEP Item	Assumption	Justification
Date of Building Design	Circa 1969	
Soil Type	D – Deep or soft soils	The soil type is considered to be D based on the available geotechnical information.
Building Importance Level	2	The building is considered a normal structure as defined in AS/NZS 1170.0.
Ductility of Structure	μ=2.0 (Longitudinal and Transverse)	Structural reinforced concrete walls with internal gravity portal frames to support roof.
Plan Irregularity, Factor A	1.0 (Longitudinal and Transverse)	Non observed
Vertical Irregularity, Factor B	1.0	Single Storey (Structurally attached to adjacent two and three storey URM buildings.
Short Columns, Factor C	1.0	N/A.
Pounding, Factor D	0.9 (Longitudinal and Transverse)	Building is structural connected to adjacent two storey URM building.
Site Characteristics, Factor E	1.0	Flat site with apparent low risk of liquefaction.
Factor F	1.0	Typical warehouse construction with no features which would suggest any degree of additional resilience or redundancy. There was no specific degradation in the building which would affect the gravity or lateral load capacity of the building.

11 Don Street,

Our IEP assessment of the building 11 Don Street has a capacity 65%NBS(IL2), corresponding to a 'Grade C' building as defined by the New Zealand Society for Earthquake Engineering (NZSEE) building grading scheme.

The key assumptions made during our assessment are shown in the table below. Refer also to the attached IEP assessment.

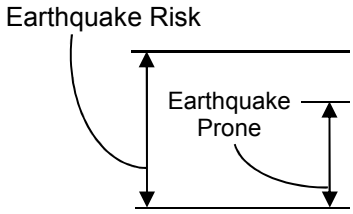
Table 11: IEP Assessment Results

IEP Item	Assumption	Justification
Date of Building Design	Circa 1969	
Soil Type	D – Deep or soft soils	The soil type is considered to be D based on the available geotechnical information.
Building Importance Level	2	The building is considered a normal structure as defined in AS/NZS 1170.0.
Ductility of Structure	μ=2.0 (Longitudinal and Transverse)	Structural reinforced concrete walls with Concrete Masonry infill panels.
Plan Irregularity, Factor A	1.0 (Longitudinal and Transverse)	Non observed.
Vertical Irregularity, Factor B	1.0	Two storey building with a basement with a uniform load path for the full height of the building.
Short Columns, Factor C	1.0	N/A.
Pounding, Factor D	10 (Longitudinal and Transverse)	Stand-alone building.
Site Characteristics, Factor E	1.0	Flat site with apparent low risk of liquefaction.
Factor F	1.0	There is possible redundancy and additional resilience in the building. Without the benefit of additional structural drawings we cannot confirm what level of additional resilience or redundancy is in the building.

6 IEP Grades and Relative Risk

Table 3 below taken from the NZSEE Guidelines provides the basis of a proposed grading system for existing buildings, as one way of interpreting the *%NBS* seismic rating.

Table 8: Building Grading System for Earthquake Risk



Building Grade	Percentage of New Building Standard (%NBS)	Approx. Risk Relative to a New Building	Life-Safety Risk Description
A+	>100	<1 times	Low risk
A	80 – 100	1 – 2 times	Low risk
B	67 – 79	2 – 5 times	Low risk
C	34 – 66	5 – 10 times	Medium risk
D	20 – 33	10 – 25 times	High risk
E	<20	more than 25 times	Very high risk

The New Zealand Society for Earthquake Engineering (which provides authoritative advice to the legislation makers, and should be considered to represent the consensus view of New Zealand structural engineers) classifies a building achieving greater than 67%NBS as “Low Risk” and having “Acceptable (improvement may be desirable)” building structural performance. However, NZSEE classifies a building achieving less than 33%NBS as “High Risk” and having “Unacceptable (improvement required under the Act)” building structural performance.

7 Assessment of Egress Stairs and Building Parts

It is considered important recent learnings from the Christchurch Earthquake be incorporated into the initial assessment. In particular, concern has been raised around the poor performance of stairs and their supports, and also the risk presented by heavy building appendages next to public access ways, such as old masonry parapets, chimneys and canopies.

The lightweight external stairs observed in the building are unlikely to be vulnerable to building drift and so unlikely to collapse prior to a global collapse mechanism forming.

8 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 4129:2009 “The Seismic Performance of Engineering Systems in Buildings”.

An assessment has not been made of the bracing of the ceilings, in-ceiling ducting, 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.

9 Explanatory Notes

- This report has been prepared by Beca at the request of our Client and is exclusively for our Client's use for the purpose for which it is intended in accordance with the agreed scope of work. Beca accepts no responsibility or liability to any third party for any loss or damage whatsoever arising out of the use of or reliance on this report by that party or any party other than our Client.
- Our inspection was limited to a high level visual examination of the buildings where safe and ready access existed at the time, and we have not undertaken any intrusive inspections or testing. This report is necessarily limited in that respect and does not address any matter that is not discoverable from such an inspection, including any damage or defect in inaccessible places and/or latent defects. Beca is not able to give any warranty or guarantee that all possible damage, defects, conditions or qualities have been identified. The work done by Beca and the advice given is therefore on a reasonable endeavours basis.
- The building assessment is necessarily reliant on the accuracy, currency and completeness of the information provided to us, including the structural drawings, and we have not sought to independently verify any of the information provided.
- The Initial Seismic Building Assessment is based on the Initial Evaluation Procedure (IEP) methodology as detailed in the New Zealand Society for Earthquake Engineering's handbook "Assessment and Improvement of the Structural Performance of Buildings in Earthquake". This procedure provides an assessment of the likely seismic rating of the building in comparison with a new building designed to the current code (100% New Building Standard (100%NBS)). Except to the extent that Beca expressly indicates in the report, no assessment has been made to determine whether or not the building complies with the building codes or other relevant codes, standards, guidelines, legislation, plans, etc.
- The focus of the assessment is seismic performance only. No gravity or wind load assessments have been undertaken.

10 Conclusions and Recommendations

Our ISA assessment for the buildings consisting of 57-81 Dee Street, 7 Don Street and 11 Don Street, Invercargill carried out using the IEP, is summarised below.

Table 9: Summary of ISA Results.

Building Name	%NBS Score[1]	Building Grade[2]	Life-Safety Risk[2]	Building Designation[3]
Langlands Building 73-81 Dee Street	< 20%NBS(IL2)	E	Very High	N/A
Old Deka Building 57-67 Dee Street	< 20%NBS(IL2)	E	Very High	N/A
57-67 Dee Street (Rear)	60%NBS(IL2) <20%NBS(IL2) due to structural connection to URM adjacent buildings	C	Medium	N/A
7 Don Street	60%NBS(IL2) <20%NBS(IL2) due to structural connection to URM adjacent buildings	C	High	N/A
11 Don Street	65%NBS(IL2)	C	Medium - Low	N/A

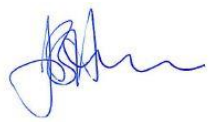
Notes:

1. These have been assessed using *The Seismic Assessment of Existing Buildings - Technical Guidelines for Engineering Assessments*, dated July 2017 (*Technical Guidelines*). The buildings have been assessed on the basis they are Importance Level 2 (IL2) buildings in accordance with the New Zealand Loadings Standard, NZS1170.
2. The building grade, life-safety risk is defined by NZSEE and relates to the %NBS score. Refer section 7 of this report for more information.
3. The Building Act (2004) designates buildings with less than 34%NBS as “Earthquake Prone” Buildings, and those with less than 67%NBS as “Earthquake Risk” Buildings, as per the NZSEE definitions.

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 DSA. A DSA would also investigate other potential structural 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 or if you would like clarification on any aspect of this letter.

Yours sincerely



John Heenan
Technical Director - Structural Engineering

on behalf of
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Email: john.heenan@beca.com

Initial Evaluation Procedure (IEP) Assessment - Completed for {Client/TA} Page 1

WARNING!! *This initial evaluation has been carried out solely as an initial seismic assessment of the building following the procedure set out in the "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:	**73-81 Dee Street**	**Job No.:**	**5320381**
AKA:		**By:**	**JBH**
Name of building:	**Langlands Building**	**Date:**	**6/06/2018**
City:	**Invercargill**	**Revision No.:**	**A**

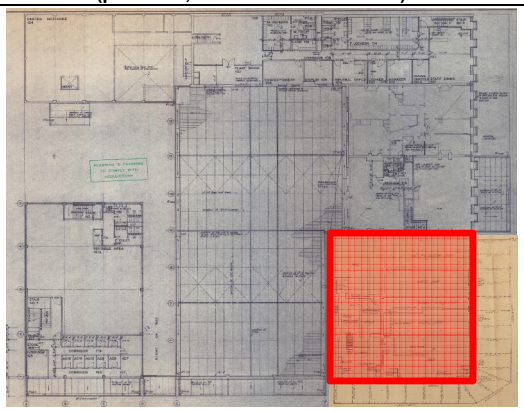
Table IEP-1 Initial Evaluation Procedure Step 1

Step 1 - General Information

1.1 Photos (attach sufficient to describe building)

NOTE: THERE ARE MORE PHOTOS ON PAGE 1a ATTACHED

1.2 Sketches (plans etc, show items of interest)



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)

Constructed in circa 1886..
Used as retail (currently vacant).
Plan area of building is approximately 375 m2
Three storey and two storey buildings with partial basements
Structural system
The gravity load resisting system comprises the lightweight timber truss roof supported on unreinforced masonry (URM) walls.
The seismic load resisting system comprises unreinforced masonry shear walls in both the transverse (east-west) direction and the longitudinal direction (north-south) direction.
The buildings has undergone significant alteration to both the facades and the internal structures over the years and as such the lateral load paths are interrupted by both vertical and plan irregularities.
Timber tongue and groove floor acting as flexible diaphragm.
The connection between the floors/roof and the URM walls are consider to be effective gravity connections only with limited capacity to transfer lateral loads

1.4 Note information sources Tick as appropriate

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

Partial drawings of buildings from LIM report. Batchelar McDougall Consulting, Façade Capacity & Restraint Report (6/04/2018)

Initial Evaluation Procedure (IEP) Assessment - Completed for {Client/TA} Page 2

Street Number & Name:	**73-81 Dee Street**	**Job No.:**	**5320381**
AKA:		**By:**	**JBH**
Name of building:	**Langlands Building**	**Date:**	**6/06/2018**
City:	**Invercargill**	**Revision No.:**	**A**

Table IEP-2 Initial Evaluation Procedure Step 2

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

(Baseline *(%NBS)* for particular building - refer Section B5)

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

	Longitudinal	Transverse
a) Building Strengthening Data		
Tick if building is known to have been strengthened in this direction	☐	☐
If strengthened, enter percentage of code the building has been strengthened to	N/A	N/A
b) Year of Design/Strengthening, Building Type and Seismic Zone		
Pre 1935	◉	◉
1935-1965	○	○
1965-1976	○	○
1976-1984	○	○
1984-1992	○	○
1992-2004	○	○
2004-2011	○	○
Post Aug 2011	○	○
Building Type:	Others	Others
Seismic Zone:	**Not applicable**	**Not applicable**
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: URM walls acting in plane	h_n = 14.8	14.8 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):	◉	◉
Where h_n = height in metres from the base of the structure to the uppermost seismic weight or mass.	**T:** 0.40	0.40
e) Factor A: Strengthening factor determined using result from (a) above (set to 1.0 if not strengthened)	**Factor A:** 1.00	1.00
f) Factor B: Determined from NZSEE Guidelines Figure 3A.1 using results (a) to (e) above	**Factor B:** 0.03	0.03
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:** 0.80	0.80
***(%NBS)* $_{nom}$ = AxBxCxD**	***(%NBS)* $_{nom}$** 2%	2%

WARNING!! *This initial evaluation has been carried out solely as an initial seismic assessment of the building following the procedure set 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} Page 3

Street Number & Name:	**73-81 Dee Street**	**Job No.:**	**5320381**
AKA:		**By:**	**JBH**
Name of building:	**Langlands Building**	**Date:**	**6/06/2018**
City:	**Invercargill**	**Revision No.:**	**A**

Table IEP-2 Initial Evaluation Procedure Step 2 continued

2.2 Near Fault Scaling Factor, Factor E

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

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

2.3 Hazard Scaling Factor, Factor F

a) Hazard Factor, *Z*, for site

Location: Invercargill — **Refer right for user-defined locations**

Z =	0.17	(from NZS1170.5:2004, Table 3.3)
Z_{1992} =	0.68	(NZS4203:1992 Zone Factor from accompanying Figure 3.5(b))
Z_{2004} =	0.17	(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:	5.88	5.88

2.4 Return Period Scaling Factor, Factor G

a) Design Importance Level, I

(Set to 1 if not known. For buildings designed prior to 1965 and known to be designed as a public building set to 1.25. For buildings designed 1965-1976 and known to be designed as a public building set to 1.33 for Zone A or 1.2 for Zone B. For 1976-1984 set I value.)

	Longitudinal	Transverse
I =	1	1

b) Design Risk Factor, R_o

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

	Longitudinal	Transverse
R_o =	1	1

c) Return Period Factor, R

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

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

d) Factor G = IR_o/R

	Longitudinal	Transverse
Factor G:	1.00	1.00

2.5 Ductility Scaling Factor, Factor H

a) Available Displacement Ductility Within Existing Structure

Comment:
Allow for a low level of ductility due to the likely increased damping of the URM walls due to weaker mortar

	Longitudinal	Transverse
μ =	1.25	1.25

b) Factor H

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

(where k_μ is NZS1170.5:2004 Inelastic Spectrum Scaling Factor, from accompanying Table 3.3)

2.6 Structural Performance Scaling Factor, Factor I

a) Structural Performance Factor, S_p

(from accompanying Figure 3.4)

Tick if light timber-framed construction in this direction

	Longitudinal	Transverse
	☐	☐
S_p =	0.93	0.93

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

	Longitudinal	Transverse
Factor I:	1.08	1.08

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

2.7 Baseline *%NBS* for Building, $(\%NBS)_b$

(equals $(\%NBS)_{nom}$ x E x F x G x H x I)

	Longitudinal	Transverse
	17%	**17%**

WARNING!! *This initial evaluation has been carried out solely as an initial seismic assessment of the building following the procedure set 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} Page 4

Street Number & Name:	**73-81 Dee Street**	**Job No.:**	**5320381**
AKA:		**By:**	**JBH**
Name of building:	**Langlands Building**	**Date:**	**6/06/2018**
City:	**Invercargill**	**Revision No.:**	**A**

Table IEP-3 Initial Evaluation Procedure Step 3

Step 3 - Assessment of Performance Achievement Ratio (PAR)
(Refer Appendix B - Section B3.2)

a) Longitudinal Direction

potential CSWs | **Effect on Structural Performance (Choose a value - Do not interpolate)** | **Factors**

3.1 Plan Irregularity

Effect on Structural Performance ○ *Severe* ◉ *Significant* ○ *Insignificant* **Factor A** 0.7

Buildings are a conglomeration of URM buildings structurally connected with irregular load paths

3.2 Vertical Irregularity

Effect on Structural Performance ○ *Severe* ◉ *Significant* ○ *Insignificant* **Factor B** 0.7

Ground floor has been altered to allow for retail presense at ground floor changing the lateral stiffness of the building at this level

3.3 Short Columns

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

Comment

3.4 Pounding Potential

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

a) Factor D1: - Pounding Effect

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

Factor D1 For Longitudinal Direction: 1.0

Table for Selection of Factor D1	Severe	Significant	Insignificant
Separation	0<Sep<.005H	.005<Sep<.01H	Sep>.01H
Alignment of Floors within 20% of Storey Height	○ 1	◉ 1	○ 1
Alignment of Floors not within 20% of Storey Height	○ 0.4	○ 0.7	○ 0.8

Comment

b) Factor D2: - Height Difference Effect

Factor D2 For Longitudinal Direction: 0.9

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

Buildings consist of three and two stroey URM structurals with flexible diaphragms

Factor D 0.9

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

Flat site with apparent low risk of liquefaction

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 1.0

Record rationale for choice of Factor F:

Typical URM construction with no features which would suggest any degree of additional resilience or redundancy. There was no specific degradation in the buuilding which would effect the gravity or lateral load capacity of the building

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

PAR

Longitudinal **0.44**

WARNING!! *This initial evaluation has been carried out solely as an initial seismic assessment of the building following the procedure set 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} Page 5

Street Number & Name:	73-81 Dee Street	Job No.:	5320381
AKA:		By:	JBH
Name of building:	Langlands Building	Date:	6/06/2018
City:	Invercargill	Revision No.:	A

Table IEP-3 Initial Evaluation Procedure Step 3

Step 3 - Assessment of Performance Achievement Ratio (PAR)
(Refer Appendix B - Section B3.2)

b) Transverse Direction

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

Buildings are a conglomeration of URM buildings which are structurally connected with an irregular load path

3.2 Vertical Irregularity

Effect on Structural Performance ◉ *Severe* ◉ *Significant* ○ *Insignificant* **Factor B** 0.7

Ground floor has been altered to allow for retail presense at ground floor changing the lateral stiffness of the building at this level

3.3 Short Columns

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

Comment

3.4 Pounding Potential

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

a) Factor D1: - Pounding Effect

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

Factor D1 For Transverse Direction: 1.0

Table for Selection of Factor D1	Severe	Significant	Insignificant
Separation	0<Sep<.005H	.005<Sep<.01H	Sep>.01H
Alignment of Floors within 20% of Storey Height	○ 1	◉ 1	○ 1
Alignment of Floors not within 20% of Storey Height	○ 0.4	○ 0.7	○ 0.8

Comment

b) Factor D2: - Height Difference Effect

Factor D2 For Transverse Direction: 0.9

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

Buildings consist of three and two storey URM building with flexible diaphragms

Factor D 0.9

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

Flat site wit apparent low probability of liquefaction

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 1.00

Record rationale for choice of Factor F:

Typical URM construction with no features which would suggest any degree of additional resilience or redundancy. There was no specific degradation in the buuilding which would effect the gravity or lateral load capacity of the building

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

PAR

Transverse **0.44**

WARNING!! *This initial evaluation has been carried out solely as an initial seismic assessment of the building following the procedure set 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:	73-81 Dee Street	Job No.:	5320381
AKA:		By:	JBH
Name of building:	Langlands Building	Date:	6/06/2018
City:	Invercargill	Revision No.:	A

Table IEP-4 Initial Evaluation Procedure Steps 4, 5, 6 and 7

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

		Longitudinal	Transverse
4.1	**Assessed Baseline *%NBS (%NBS)*$_b$** (from Table IEP - 1)	17%	17%
4.2	**Performance Achievement Ratio (PAR)** (from Table IEP - 2)	0.44	0.44
4.3	**PAR x Baseline *(%NBS)*$_b$**	15%	15%
4.4	**Percentage New Building Standard *(%NBS)* - Seismic Rating** (Use lower of two values from Step 4.3)		15%

Step 5 - Is *%NBS* < 34? YES

Step 6 - Potentially Earthquake Risk (is *%NBS* < 67)? YES

Step 7 - Provisional Grading for Seismic Risk based on IEP

Seismic Grade E

Additional Comments (items of note affecting IEP based seismic rating)

The IEP score for the building is consistant with the detailed assessment undertaken by BMC for the facade for critical elements. The buildings being considered are an amalgamation of several structures which are structurally connected with differing heights and stiffness's. The building rating is therefore governed by the lowest scoring element of the structurally connected buildings.

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

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

Street Number & Name:	73-81 Dee Street	Job No.:	5320381
AKA:		By:	JBH
Name of building:	Langlands Building	Date:	6/06/2018
City:	Invercargill	Revision No.:	A

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	3
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  **Signature**

John B Heenan **Name**

111129 **CPEng. No**

Initial Evaluation Procedure (IEP) Assessment - Completed for {Client/TA} Page 1

WARNING!! *This initial evaluation has been carried out solely as an initial seismic assessment of the building following the procedure set out in the "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:	**57-67 Dee Street**	**Job No.:**	**5320381**
AKA:		**By:**	**JBH**
Name of building:	**Deka Building**	**Date:**	**6/06/2018**
City:	**Invercargill**	**Revision No.:**	**A**

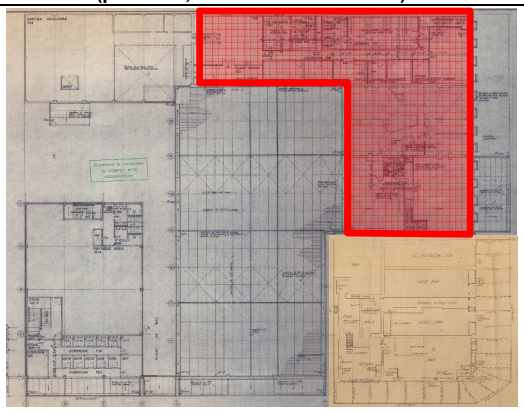
Table IEP-1 Initial Evaluation Procedure Step 1

Step 1 - General Information

1.1 Photos (attach sufficient to describe building)

NOTE: THERE ARE MORE PHOTOS ON PAGE 1a ATTACHED

1.2 Sketches (plans etc, show items of interest)



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)

Constructed in circa 1886..
Used as bar and retail.
Plan area of building is approximately 700 m2
Three storey and two storey buildings with partial basements
Structural system
The gravity load resisting system comprises the lightweight timber truss roof supported on unreinforced masonry (URM) walls.
The seismic load resisting system comprises unreinforced masonry shear walls in both the transverse (east-west) direction and the longitudinal direction (north-south) direction.
The buildings has undergone significant alteration to both the facades and the internal structures over the years and as such the lateral load paths are interrupted by both vertical and plan irregularities.
Timber tongue and groove floor acting as flexible diaphragm.
The connection between the floors/roof and the URM walls are consider to be effective gravity connections only with limited capacity to transfer lateral loads

1.4 Note information sources Tick as appropriate

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

Partial drawings of buildings from LIM report. Batchelar McDougall Consulting, Façade Capacity & Restraint Report (6/04/2018)

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

Street Number & Name:	**57-67 Dee Street**	**Job No.:**	**5320381**
AKA:		**By:**	**JBH**
Name of building:	**Deka Building**	**Date:**	**6/06/2018**
City:	**Invercargill**	**Revision No.:**	**A**

Table IEP-2 Initial Evaluation Procedure Step 2

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

(Baseline *(%NBS)* for particular building - refer Section B5)

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

	Longitudinal	Transverse
a) Building Strengthening Data		
Tick if building is known to have been strengthened in this direction	☐	☐
If strengthened, enter percentage of code the building has been strengthened to	N/A	N/A
b) Year of Design/Strengthening, Building Type and Seismic Zone		
Pre 1935	◉	◉
1935-1965	○	○
1965-1976	○	○
1976-1984	○	○
1984-1992	○	○
1992-2004	○	○
2004-2011	○	○
Post Aug 2011	○	○
Building Type:	Others	Others
Seismic Zone:	**Not applicable**	**Not applicable**
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: URM walls acting in plane	h_n = 14.8	14.8 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):	◉	◉
Where h_n = height in metres from the base of the structure to the uppermost seismic weight or mass.	**T:** 0.40	0.40
e) Factor A: Strengthening factor determined using result from (a) above (set to 1.0 if not strengthened)	**Factor A:** 1.00	1.00
f) Factor B: Determined from NZSEE Guidelines Figure 3A.1 using results (a) to (e) above	**Factor B:** 0.03	0.03
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:** 0.80	0.80
***(%NBS)*$_{nom}$ = AxBxCxD**	***(%NBS)*$_{nom}$** 2%	2%

WARNING!! *This initial evaluation has been carried out solely as an initial seismic assessment of the building following the procedure set 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} Page 3

Street Number & Name:	**57-67 Dee Street**	**Job No.:**	**5320381**
AKA:		**By:**	**JBH**
Name of building:	**Deka Building**	**Date:**	**6/06/2018**
City:	**Invercargill**	**Revision No.:**	**A**

Table IEP-2 Initial Evaluation Procedure Step 2 continued

2.2 Near Fault Scaling Factor, Factor E

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

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

2.3 Hazard Scaling Factor, Factor F

a) Hazard Factor, *Z*, for site

Location: Invercargill — **Refer right for user-defined locations**

Z =	0.17	(from NZS1170.5:2004, Table 3.3)
Z_{1992} =	0.68	(NZS4203:1992 Zone Factor from accompanying Figure 3.5(b))
Z_{2004} =	0.17	(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:	5.88	5.88

2.4 Return Period Scaling Factor, Factor G

a) Design Importance Level, I

(Set to 1 if not known. For buildings designed prior to 1965 and known to be designed as a public building set to 1.25. For buildings designed 1965-1976 and known to be designed as a public building set to 1.33 for Zone A or 1.2 for Zone B. For 1976-1984 set I value.)

	Longitudinal	Transverse
I =	1	1

b) Design Risk Factor, R_o

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

	Longitudinal	Transverse
R_o =	1	1

c) Return Period Factor, R

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

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

d) Factor G = IR_o/R

	Longitudinal	Transverse
Factor G:	1.00	1.00

2.5 Ductility Scaling Factor, Factor H

a) Available Displacement Ductility Within Existing Structure

Comment:
Allow for a low level of ductility due to the likely increased damping of the URM walls due to weaker mortar

		Longitudinal	Transverse
		k_μ	k_μ
μ =		1.25	1.25
b) Factor H			
For pre 1976 (maximum of 2)	=	1.14	1.14
For 1976 onwards	=	1	1
Factor H:		1.14	1.14

(where k_μ is NZS1170.5:2004 Inelastic Spectrum Scaling Factor, from accompanying Table 3.3)

2.6 Structural Performance Scaling Factor, Factor I

a) Structural Performance Factor, S_p

(from accompanying Figure 3.4)

Tick if light timber-framed construction in this direction

	Longitudinal	Transverse
	☐	☐
S_p =	0.93	0.93

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

	Longitudinal	Transverse
Factor I:	1.08	1.08

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

2.7 Baseline *%NBS* for Building, $(\%NBS)_b$

(equals $(\%NBS)_{nom}$ x E x F x G x H x I)

	Longitudinal	Transverse
	17%	**17%**

WARNING!! *This initial evaluation has been carried out solely as an initial seismic assessment of the building following the procedure set 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} Page 4

Street Number & Name:	**57-67 Dee Street**	**Job No.:**	**5320381**
AKA:		**By:**	**JBH**
Name of building:	**Deka Building**	**Date:**	**6/06/2018**
City:	**Invercargill**	**Revision No.:**	**A**

Table IEP-3 Initial Evaluation Procedure Step 3

Step 3 - Assessment of Performance Achievement Ratio (PAR)
(Refer Appendix B - Section B3.2)

a) Longitudinal Direction

potential CSWs | **Effect on Structural Performance (Choose a value - Do not interpolate)** | **Factors**

3.1 Plan Irregularity

Effect on Structural Performance ○ *Severe* ◉ *Significant* ○ *Insignificant* **Factor A** 0.7

Buildings are a conglomeration of URM buildings structurally connected with irregular load paths

3.2 Vertical Irregularity

Effect on Structural Performance ○ *Severe* ◉ *Significant* ○ *Insignificant* **Factor B** 0.7

Ground floor has been altered to allow for hospitality area (open plan bar) at ground floor changing the lateral stiffness of the building at this level

3.3 Short Columns

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

Comment

3.4 Pounding Potential

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

a) Factor D1: - Pounding Effect

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

Factor D1 For Longitudinal Direction: 1.0

Table for Selection of Factor D1	Severe	Significant	Insignificant
Separation	0<Sep<.005H	.005<Sep<.01H	Sep>.01H
Alignment of Floors within 20% of Storey Height	○ 1	◉ 1	○ 1
Alignment of Floors not within 20% of Storey Height	○ 0.4	○ 0.7	○ 0.8

Comment

b) Factor D2: - Height Difference Effect

Factor D2 For Longitudinal Direction: 0.9

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

Buildings consist of three and two stroey URM structurals with flexible diaphragms

Factor D 0.9

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

Flat site with apparent low risk of liquefaction

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 1.0

Record rationale for choice of Factor F:

Typical URM construction with no features which would suggest any degree of additional resilience or redundancy. There was no specific degradation in the buuilding which would effect the gravity or lateral load capacity of the building

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

PAR

Longitudinal **0.44**

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Initial Evaluation Procedure (IEP) Assessment - Completed for {Client/TA} Page 5

Street Number & Name:	57-67 Dee Street	Job No.:	5320381
AKA:		By:	JBH
Name of building:	Deka Building	Date:	6/06/2018
City:	Invercargill	Revision No.:	A

Table IEP-3 Initial Evaluation Procedure Step 3

Step 3 - Assessment of Performance Achievement Ratio (PAR)
(Refer Appendix B - Section B3.2)

b) Transverse Direction

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

Buildings are a conglomeration of URM buildings which are structurally connected with an irregular load path

3.2 Vertical Irregularity

Effect on Structural Performance ○ Severe ◉ Significant ○ Insignificant **Factor B** 0.7

Ground floor has been altered to allow for hospitality area (open plan bar) at ground floor changing the lateral stiffness of the building at this level

3.3 Short Columns

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

Comment

3.4 Pounding Potential

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

a) Factor D1: - Pounding Effect

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

Factor D1 For Transverse Direction: 1.0

Table for Selection of Factor D1	Severe	Significant	Insignificant
Separation	0<Sep<.005H	.005<Sep<.01H	Sep>.01H
Alignment of Floors within 20% of Storey Height	○ 1	◉ 1	○ 1
Alignment of Floors not within 20% of Storey Height	○ 0.4	○ 0.7	○ 0.8

Comment

b) Factor D2: - Height Difference Effect

Factor D2 For Transverse Direction: 0.9

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

Buildings consist of three and two storey URM building with flexible diaphragms

Factor D 0.9

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

Flat site wit apparent low probability of liquefaction

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 1.00

Record rationale for choice of Factor F:

Typical URM construction with no features which would suggest any degree of additional resilience or redundancy. There was no specific degradation in the buuilding which would effect the gravity or lateral load capacity of the building

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

PAR

Transverse **0.44**

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

Street Number & Name:	**57-67 Dee Street**	**Job No.:**	**5320381**
AKA:		**By:**	**JBH**
Name of building:	**Deka Building**	**Date:**	**6/06/2018**
City:	**Invercargill**	**Revision No.:**	**A**

Table IEP-4 Initial Evaluation Procedure Steps 4, 5, 6 and 7

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

		Longitudinal	Transverse
4.1	**Assessed Baseline *%NBS (%NBS)*$_b$** (from Table IEP - 1)	17%	17%
4.2	**Performance Achievement Ratio (PAR)** (from Table IEP - 2)	0.44	0.44
4.3	**PAR x Baseline *(%NBS)*$_b$**	15%	15%
4.4	**Percentage New Building Standard *(%NBS)* - Seismic Rating** (Use lower of two values from Step 4.3)		15%

Step 5 - Is *%NBS* < 34? YES

Step 6 - Potentially Earthquake Risk (is *%NBS* < 67)? YES

Step 7 - Provisional Grading for Seismic Risk based on IEP

Seismic Grade E

Additional Comments (items of note affecting IEP based seismic rating)

The IEP score for the building is consistant with the detailed assessment undertaken by BMC for the facade for critical elements. The buildings being considered are an amalgamation of several structures which are structurally connected with differing heights and stiffness's. The building rating is therefore governed by the lowest scoring element of the structurally connected buildings.

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

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

Street Number & Name:	57-67 Dee Street	Job No.:	5320381
AKA:		By:	JBH
Name of building:	Deka Building	Date:	6/06/2018
City:	Invercargill	Revision No.:	A

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	2
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  **Signature**

John B Heenan **Name**

111129 **CPEng. No**

Initial Evaluation Procedure (IEP) Assessment - Completed for {Client/TA} Page 1

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Street Number & Name:	**57-67 Dee Street**	**Job No.:**	**5320381**
AKA:		**By:**	**JBH**
Name of building:	**Deka Rear Building**	**Date:**	**6/06/2018**
City:	**Invercargill**	**Revision No.:**	**A**

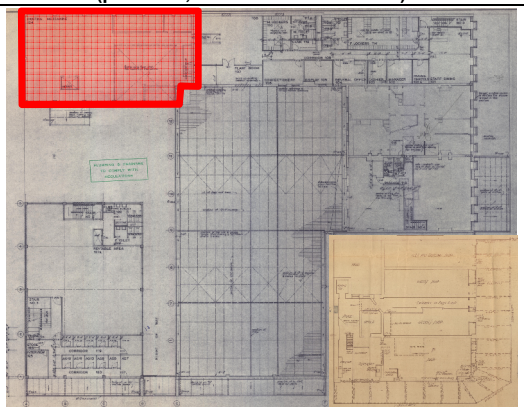
Table IEP-1 Initial Evaluation Procedure Step 1

Step 1 - General Information

1.1 Photos (attach sufficient to describe building)

NOTE: THERE ARE MORE PHOTOS ON PAGE 1a ATTACHED

1.2 Sketches (plans etc, show items of interest)



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)

Constructed in circa 1969..
Used as retail (currently vacant).
Plan area of building is approximately 250 m2
Two storey rear extension of original Deka building.
Structural system
The gravity load resisting system comprises steel portal frames.
The seismic load resisting system comprises concrete shear walls in the transverse (east-west) direction and steel portal frames in the longitudinal direction (north-south) direction.
The first floor is composed of a concrete suspended slab, fixed into the surrounding concrete walls.

1.4 Note information sources Tick as appropriate

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

Partial drawings of buildings from LIM report.

Initial Evaluation Procedure (IEP) Assessment - Completed for {Client/TA} Page 2

Street Number & Name:	**57-67 Dee Street**	**Job No.:**	**5320381**
AKA:		**By:**	**JBH**
Name of building:	**Deka Rear Building**	**Date:**	**6/06/2018**
City:	**Invercargill**	**Revision No.:**	**A**

Table IEP-2 Initial Evaluation Procedure Step 2

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

(Baseline *(%NBS)* for particular building - refer Section B5)

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

	Longitudinal	Transverse
a) Building Strengthening Data		
Tick if building is known to have been strengthened in this direction	☐	☐
If strengthened, enter percentage of code the building has been strengthened to	N/A	N/A
b) Year of Design/Strengthening, Building Type and Seismic Zone		
Pre 1935	○	○
1935-1965	○	○
1965-1976	◉	◉
1976-1984	○	○
1984-1992	○	○
1992-2004	○	○
2004-2011	○	○
Post Aug 2011	○	○
Building Type:	Others	Others
Seismic Zone:	Zone B	Zone B
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: Concrete shear walls in transverse direction, steel portal frames longitudinally.	h_n = 14.8	14.8 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):	○	○
Where h_n = height in metres from the base of the structure to the uppermost seismic weight or mass.	**T:** 0.45	0.68
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:** 0.05	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)* $_{nom}$** 5%	6%

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Initial Evaluation Procedure (IEP) Assessment - Completed for {Client/TA} Page 3

Street Number & Name:	**57-67 Dee Street**	**Job No.:**	**5320381**
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City:	**Invercargill**	**Revision No.:**	**A**

Table IEP-2 Initial Evaluation Procedure Step 2 continued

2.2 Near Fault Scaling Factor, Factor E

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

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

2.3 Hazard Scaling Factor, Factor F

a) Hazard Factor, *Z*, for site

Location: Invercargill — **Refer right for user-defined locations**

Z =	0.17	(from NZS1170.5:2004, Table 3.3)
Z_{1992} =	0.68	(NZS4203:1992 Zone Factor from accompanying Figure 3.5(b))
Z_{2004} =	0.17	(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:	5.88	5.88

2.4 Return Period Scaling Factor, Factor G

a) Design Importance Level, I

(Set to 1 if not known. For buildings designed prior to 1965 and known to be designed as a public building set to 1.25. For buildings designed 1965-1976 and known to be designed as a public building set to 1.33 for Zone A or 1.2 for Zone B. For 1976-1984 set I value.)

	Longitudinal	Transverse
I =	1	1

b) Design Risk Factor, R_o

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

	Longitudinal	Transverse
R_o =	1	1

c) Return Period Factor, R

(from NZS1170.0:2004 Building Importance Level)

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

	Longitudinal	Transverse
R =	1.0	1.0

d) Factor G = IR_o/R

	Longitudinal	Transverse
Factor G:	1.00	1.00

2.5 Ductility Scaling Factor, Factor H

a) Available Displacement Ductility Within Existing Structure

Comment:
Similar ductility in both directions for concrete shear walls and steel portal frames with concrete encased columns.

	Longitudinal	Transverse
μ =	2.00	2.00

b) Factor H

		k_μ Longitudinal	k_μ Transverse
For pre 1976 (maximum of 2)	=	1.65	1.97
For 1976 onwards	=	1	1
Factor H:		1.65	1.97

(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

2.7 Baseline *%NBS* for Building, $(\%NBS)_b$

(equals $(\%NBS)_{nom}$ x E x F x G x H x I)

Longitudinal	Transverse
69%	**92%**

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Initial Evaluation Procedure (IEP) Assessment - Completed for {Client/TA} Page 4

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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** 1.0

Comment

3.2 Vertical Irregularity

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

Comment

3.3 Short Columns

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

Comment

3.4 Pounding Potential

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

a) Factor D1: - Pounding Effect

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

Factor D1 For Longitudinal Direction: 1.0

Table for Selection of Factor D1	Severe	Significant	Insignificant
Separation	0<Sep<.005H	.005<Sep<.01H	Sep>.01H
Alignment of Floors within 20% of Storey Height	○ 1	◉ 1	○ 1
Alignment of Floors not within 20% of Storey Height	○ 0.4	○ 0.7	○ 0.8

Comment

b) Factor D2: - Height Difference Effect

Factor D2 For Longitudinal Direction: 0.9

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

Buildings consist of three and two storey URM structurals with flexible diaphragms

Factor D 0.9

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

Flat site with apparent low risk of liquefaction

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 1.0

Record rationale for choice of Factor F:

Typical warehouse construction with no features which would suggest any degree of additional resilience or redundancy. There was no specific degradation in the buuilding which would effect the gravity or lateral load capacity of the building

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

PAR

Longitudinal **0.90**

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

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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

potential CSWs — **Effect on Structural Performance** (Choose a value - Do not interpolate) — **Factors**

3.1 Plan Irregularity

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

Comment

3.2 Vertical Irregularity

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

Comment

3.3 Short Columns

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

Comment

3.4 Pounding Potential

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

a) Factor D1: - Pounding Effect

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

Factor D1 For Transverse Direction: 1.0

Table for Selection of Factor D1	Severe	Significant	Insignificant
Separation	0<Sep<.005H	.005<Sep<.01H	Sep>.01H
Alignment of Floors within 20% of Storey Height	○ 1	◉ 1	○ 1
Alignment of Floors not within 20% of Storey Height	○ 0.4	○ 0.7	○ 0.8

Comment

b) Factor D2: - Height Difference Effect

Factor D2 For Transverse Direction: 0.9

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

Buildings consist of three and two storey URM building with flexible diaphragms

Factor D 0.9

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

Flat site wit apparent low probability of liquefaction

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 1.00

Record rationale for choice of Factor F:

Typical warehouse construction with no features which would suggest any degree of additional resilience or redundancy. There was no specific degradation in the buuilding which would effect the gravity or lateral load capacity of the building

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

PAR

Transverse **0.90**

WARNING!! *This initial evaluation has been carried out solely as an initial seismic assessment of the building following the procedure set 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:	**57-67 Dee Street**	**Job No.:**	**5320381**
AKA:		**By:**	**JBH**
Name of building:	**Deka Rear Building**	**Date:**	**6/06/2018**
City:	**Invercargill**	**Revision No.:**	**A**

Table IEP-4 Initial Evaluation Procedure Steps 4, 5, 6 and 7

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

		Longitudinal	Transverse
4.1	**Assessed Baseline *%NBS (%NBS)*$_b$** (from Table IEP - 1)	69%	92%
4.2	**Performance Achievement Ratio (PAR)** (from Table IEP - 2)	0.90	0.90
4.3	**PAR x Baseline *(%NBS)*$_b$**	60%	85%
4.4	**Percentage New Building Standard *(%NBS)* - Seismic Rating** (Use lower of two values from Step 4.3)		60%

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 buildings being considered are an amalgamation of several structures which are structurally connected with differing heights and stiffness's. The building rating is therefore governed by the lowest scoring element of the structurally connected buildings.

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

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

Street Number & Name:	57-67 Dee Street	Job No.:	5320381
AKA:		By:	JBH
Name of building:	Deka Rear Building	Date:	6/06/2018
City:	Invercargill	Revision No.:	A

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	2
8.2	Presence of heavy concrete floors and/or concrete roof? (Y/N)	Y

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  **Signature**

John B Heenan **Name**

111129 **CPEng. No**

Initial Evaluation Procedure (IEP) Assessment - Completed for {Client/TA} Page 1

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Street Number & Name:	**7 Don Street**	**Job No.:**	**5320381**
AKA:		**By:**	**JBH**
Name of building:		**Date:**	**6/06/2018**
City:	**Invercargill**	**Revision No.:**	**A**

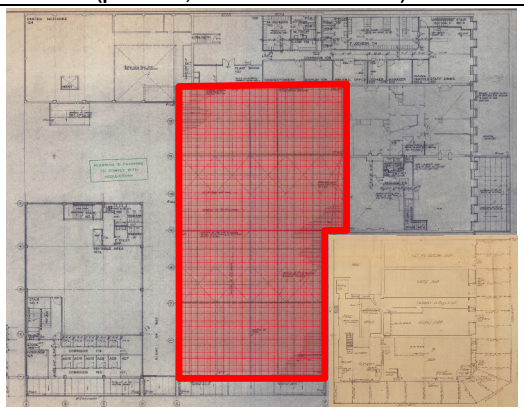
Table IEP-1 Initial Evaluation Procedure Step 1

Step 1 - General Information

1.1 Photos (attach sufficient to describe building)

NOTE: THERE ARE MORE PHOTOS ON PAGE 1a ATTACHED

1.2 Sketches (plans etc, show items of interest)



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)

Constructed in circa 1969..
Used as retail (currently vacant).
Plan area of building is approximately 850 m2
Single storey construction.
Structural system
The gravity load resisting system comprises steel portal frames.
The seismic load resisting system comprises steel portal frames in the transverse (east-west) direction and reinforced concrete frames with block infill in the longitudinal direction (north-south) direction.

1.4 Note information sources Tick as appropriate

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

Partial drawings of buildings from LIM report.

Initial Evaluation Procedure (IEP) Assessment - Completed for {Client/TA} Page 2

Street Number & Name:	**7 Don Street**	**Job No.:**	**5320381**
AKA:		**By:**	**JBH**
Name of building:		**Date:**	**6/06/2018**
City:	**Invercargill**	**Revision No.:**	**A**

Table IEP-2 Initial Evaluation Procedure Step 2

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

(Baseline *(%NBS)* for particular building - refer Section B5)

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

	Longitudinal	Transverse
a) Building Strengthening Data		
Tick if building is known to have been strengthened in this direction	☐	☐
If strengthened, enter percentage of code the building has been strengthened to	N/A	N/A
b) Year of Design/Strengthening, Building Type and Seismic Zone		
Pre 1935	○	○
1935-1965	○	○
1965-1976	◉	◉
1976-1984	○	○
1984-1992	○	○
1992-2004	○	○
2004-2011	○	○
Post Aug 2011	○	○
Building Type:	Others	Others
Seismic Zone:	Zone B	Zone B
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: Masonry shear walls in longitudinal direction, steel portal frames in transverse direction.	h_n = 14.8	14.8 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):	○	○
Where h_n = height in metres from the base of the structure to the uppermost seismic weight or mass.	**T:** 0.40	0.45
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:** 0.05	0.05
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)* $_{nom}$** 5%	5%

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Initial Evaluation Procedure (IEP) Assessment - Completed for {Client/TA} Page 3

Street Number & Name:	**7 Don Street**	**Job No.:**	**5320381**
AKA:		**By:**	**JBH**
Name of building:		**Date:**	**6/06/2018**
City:	**Invercargill**	**Revision No.:**	**A**

Table IEP-2 Initial Evaluation Procedure Step 2 continued

2.2 Near Fault Scaling Factor, Factor E

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

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

2.3 Hazard Scaling Factor, Factor F

a) Hazard Factor, *Z*, for site

Location: Invercargill — **Refer right for user-defined locations**

Z =	0.17	(from NZS1170.5:2004, Table 3.3)
Z_{1992} =	0.68	(NZS4203:1992 Zone Factor from accompanying Figure 3.5(b))
Z_{2004} =	0.17	(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:	5.88	5.88

2.4 Return Period Scaling Factor, Factor G

a) Design Importance Level, I

(Set to 1 if not known. For buildings designed prior to 1965 and known to be designed as a public building set to 1.25. For buildings designed 1965-1976 and known to be designed as a public building set to 1.33 for Zone A or 1.2 for Zone B. For 1976-1984 set I value.)

	Longitudinal	Transverse
I =	1	1

b) Design Risk Factor, R_o

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

	Longitudinal	Transverse
R_o =	1	1

c) Return Period Factor, R

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

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

d) Factor G = IR_o/R

	Longitudinal	Transverse
Factor G:	1.00	1.00

2.5 Ductility Scaling Factor, Factor H

a) Available Displacement Ductility Within Existing Structure

Comment:
Similar ductility in both directions for masonry shear walls and steel portal frames with concrete encased columns.

	Longitudinal	Transverse
μ =	2.00	2.00

b) Factor H

		k_μ Longitudinal	k_μ Transverse
For pre 1976 (maximum of 2)	=	1.57	1.65
For 1976 onwards	=	1	1
Factor H:		1.57	1.65

(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

2.7 Baseline *%NBS* for Building, $(\%NBS)_b$

(equals $(\%NBS)_{nom}$ x E x F x G x H x I)

Longitudinal	Transverse
66%	**69%**

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Initial Evaluation Procedure (IEP) Assessment - Completed for {Client/TA} Page 4

Street Number & Name:	**7 Don Street**	**Job No.:**	**5320381**
AKA:		**By:**	**JBH**
Name of building:		**Date:**	**6/06/2018**
City:	**Invercargill**	**Revision No.:**	**A**

Table IEP-3 Initial Evaluation Procedure Step 3

Step 3 - Assessment of Performance Achievement Ratio (PAR)
(Refer Appendix B - Section B3.2)

a) Longitudinal Direction

potential CSWs | **Effect on Structural Performance (Choose a value - Do not interpolate)** | **Factors**

3.1 Plan Irregularity

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

Comment

3.2 Vertical Irregularity

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

Comment

3.3 Short Columns

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

Comment

3.4 Pounding Potential

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

a) Factor D1: - Pounding Effect

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

Factor D1 For Longitudinal Direction: 1.0

Table for Selection of Factor D1	Severe	Significant	Insignificant
Separation	0<Sep<.005H	.005<Sep<.01H	Sep>.01H
Alignment of Floors within 20% of Storey Height	○ 1	◉ 1	○ 1
Alignment of Floors not within 20% of Storey Height	○ 0.4	○ 0.7	○ 0.8

Comment

b) Factor D2: - Height Difference Effect

Factor D2 For Longitudinal Direction: 0.9

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

Buildings consist of three and two storey URM structurals with flexible diaphragms

Factor D 0.9

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

Flat site with apparent low risk of liquefaction

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 1.0

Record rationale for choice of Factor F:

Typical warehouse construction with no features which would suggest any degree of additional resilience or redundancy. There was no specific degradation in the buuilding which would effect the gravity or lateral load capacity of the building

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

PAR

Longitudinal **0.90**

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

Street Number & Name:	**7 Don Street**	**Job No.:**	**5320381**
AKA:		**By:**	**JBH**
Name of building:		**Date:**	**6/06/2018**
City:	**Invercargill**	**Revision No.:**	**A**

Table IEP-3 Initial Evaluation Procedure Step 3

Step 3 - Assessment of Performance Achievement Ratio (PAR)

(Refer Appendix B - Section B3.2)

b) Transverse Direction

potential CSWs — **Effect on Structural Performance** (Choose a value - Do not interpolate) — **Factors**

3.1 Plan Irregularity

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

Comment

3.2 Vertical Irregularity

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

Comment

3.3 Short Columns

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

Comment

3.4 Pounding Potential

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

a) Factor D1: - Pounding Effect

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

Factor D1 For Transverse Direction: 1.0

Table for Selection of Factor D1	Severe	Significant	Insignificant
Separation	0<Sep<.005H	.005<Sep<.01H	Sep>.01H
Alignment of Floors within 20% of Storey Height	○ 1	◉ 1	○ 1
Alignment of Floors not within 20% of Storey Height	○ 0.4	○ 0.7	○ 0.8

Comment

b) Factor D2: - Height Difference Effect

Factor D2 For Transverse Direction: 0.9

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

Buildings consist of three and two storey URM building with flexible diaphragms

Factor D 0.9

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

Flat site wit apparent low probability of liquefaction

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 1.00

Record rationale for choice of Factor F:

Typical warehouse construction with no features which would suggest any degree of additional resilience or redundancy. There was no specific degradation in the buuilding which would effect the gravity or lateral load capacity of the building

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

PAR

Transverse **0.90**

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

Street Number & Name:	**7 Don Street**	**Job No.:**	**5320381**
AKA:		**By:**	**JBH**
Name of building:		**Date:**	**6/06/2018**
City:	**Invercargill**	**Revision No.:**	**A**

Table IEP-4 Initial Evaluation Procedure Steps 4, 5, 6 and 7

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

		Longitudinal	Transverse
4.1	**Assessed Baseline *%NBS (%NBS)*$_b$** (from Table IEP - 1)	66%	69%
4.2	**Performance Achievement Ratio (PAR)** (from Table IEP - 2)	0.90	0.90
4.3	**PAR x Baseline *(%NBS)*$_b$**	60%	60%
4.4	**Percentage New Building Standard *(%NBS)* - Seismic Rating** (Use lower of two values from Step 4.3)		60%

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 buildings being considered are an amalgamation of several structures which are structurally connected with differing heights and stiffness's. The building rating is therefore governed by the lowest scoring element of the structurally connected buildings.

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

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

Street Number & Name:	7 Don Street	Job No.:	5320381
AKA:		By:	JBH
Name of building:		Date:	6/06/2018
City:	Invercargill	Revision No.:	A

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  **Signature**

John B Heenan **Name**

111129 **CPEng. No**

Initial Evaluation Procedure (IEP) Assessment - Completed for {Client/TA} Page 1

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Street Number & Name:	**11 Don Street**	**Job No.:**	**5320381**
AKA:		**By:**	**JBH**
Name of building:		**Date:**	**06/06/2018**
City:	**Invercargill**	**Revision No.:**	**A**

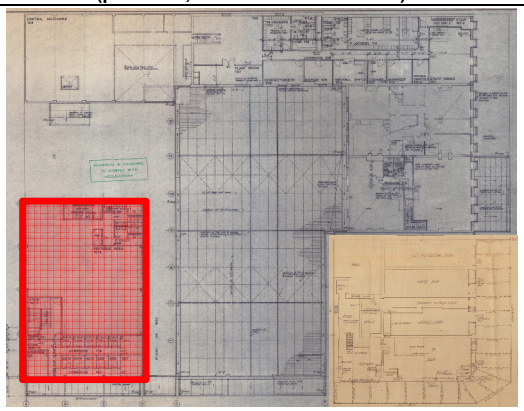
Table IEP-1 Initial Evaluation Procedure Step 1

Step 1 - General Information

1.1 Photos (attach sufficient to describe building)

NOTE: THERE ARE MORE PHOTOS ON PAGE 1a ATTACHED

1.2 Sketches (plans etc, show items of interest)



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)

Constructed in circa 1969..
Used as retail (currently vacant).
Plan area of building is approximately 410 m2
Two storey construction.
Structural system
The gravity load resisting system comprises a lightweight steel roof supportede by reinforced concrete frames.
The seismic load resisting system comprises reinforced cocnrete frames with masonry block infills in both the transverse (east-west) direction the longitudinal direction (north-south) direction.
The first floor is composed of a concrete suspended slab, fixed into the concrete frames.

1.4 Note information sources Tick as appropriate

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

Partial drawings of buildings from LIM report.

Initial Evaluation Procedure (IEP) Assessment - Completed for {Client/TA} Page 2

Street Number & Name:	**11 Don Street**	**Job No.:**	**5320381**
AKA:		**By:**	**JBH**
Name of building:		**Date:**	**6/06/2018**
City:	**Invercargill**	**Revision No.:**	**A**

Table IEP-2 Initial Evaluation Procedure Step 2

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

(Baseline *(%NBS)* for particular building - refer Section B5)

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

	Longitudinal	Transverse
a) Building Strengthening Data		
Tick if building is known to have been strengthened in this direction	☐	☐
If strengthened, enter percentage of code the building has been strengthened to	N/A	N/A
b) Year of Design/Strengthening, Building Type and Seismic Zone		
Pre 1935	○	○
1935-1965	○	○
1965-1976	◉	◉
1976-1984	○	○
1984-1992	○	○
1992-2004	○	○
2004-2011	○	○
Post Aug 2011	○	○
Building Type:	Others	Others
Seismic Zone:	Zone B	Zone B
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 = 14.8	14.8 m
Reinforced concrete frames with masonry infills in both directions.	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: $T \le 0.4$sec	◉	◉
User Defined (input Period):	○	○
Where h_n = height in metres from the base of the structure to the uppermost seismic weight or mass.	**T:** 0.40	0.40
e) Factor A: Strengthening factor determined using result from (a) above (set to 1.0 if not strengthened)	**Factor A:** 1.00	1.00
f) Factor B: Determined from NZSEE Guidelines Figure 3A.1 using results (a) to (e) above	**Factor B:** 0.05	0.05
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)* $_{nom}$** 5%	5%

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Initial Evaluation Procedure (IEP) Assessment - Completed for {Client/TA} Page 3

Street Number & Name:	**11 Don Street**	**Job No.:**	**5320381**
AKA:		**By:**	**JBH**
Name of building:		**Date:**	**6/06/2018**
City:	**Invercargill**	**Revision No.:**	**A**

Table IEP-2 Initial Evaluation Procedure Step 2 continued

2.2 Near Fault Scaling Factor, Factor E

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

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

2.3 Hazard Scaling Factor, Factor F

a) Hazard Factor, *Z*, for site

Location: Invercargill — **Refer right for user-defined locations**

Z =	0.17	(from NZS1170.5:2004, Table 3.3)
Z_{1992} =	0.68	(NZS4203:1992 Zone Factor from accompanying Figure 3.5(b))
Z_{2004} =	0.17	(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:	5.88	5.88

2.4 Return Period Scaling Factor, Factor G

a) Design Importance Level, I

(Set to 1 if not known. For buildings designed prior to 1965 and known to be designed as a public building set to 1.25. For buildings designed 1965-1976 and known to be designed as a public building set to 1.33 for Zone A or 1.2 for Zone B. For 1976-1984 set I value.)

	Longitudinal	Transverse
I =	1	1

b) Design Risk Factor, R_o

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

	Longitudinal	Transverse
R_o =	1	1

c) Return Period Factor, R

(from NZS1170.0:2004 Building Importance Level)

Choose Importance Level ○1 ●2 ○3 ○4 ○1 ●2 ○3 ○4

	Longitudinal	Transverse
R =	1.0	1.0

d) Factor G = IR_o/R

	Longitudinal	Transverse
Factor G:	1.00	1.00

2.5 Ductility Scaling Factor, Factor H

a) Available Displacement Ductility Within Existing Structure

Comment:

Reinforced cocnrete frames with masonry infills in both directions

	Longitudinal	Transverse
μ =	2.00	2.00

b) Factor H

		k_μ (Longitudinal)	k_μ (Transverse)
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

2.7 Baseline *%NBS* for Building, $(\%NBS)_b$

(equals $(\%NBS)_{nom}$ x E x F x G x H x I)

	Longitudinal	Transverse
	66%	**66%**

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

Street Number & Name:	**11 Don Street**	**Job No.:**	**5320381**
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City:	**Invercargill**	**Revision No.:**	**A**

Table IEP-3 Initial Evaluation Procedure Step 3

Step 3 - Assessment of Performance Achievement Ratio (PAR)

(Refer Appendix B - Section B3.2)

a) Longitudinal Direction

potential CSWs | **Effect on Structural Performance (Choose a value - Do not interpolate)** | **Factors**

3.1 Plan Irregularity

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

Comment

3.2 Vertical Irregularity

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

Comment

3.3 Short Columns

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

Comment

3.4 Pounding Potential

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

a) Factor D1: - Pounding Effect

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

Factor D1 For Longitudinal Direction: 1.0

Table for Selection of Factor D1	Severe	Significant	Insignificant
Separation	0<Sep<.005H	.005<Sep<.01H	Sep>.01H
Alignment of Floors within 20% of Storey Height	○ 1	○ 1	◉ 1
Alignment of Floors not within 20% of Storey Height	○ 0.4	○ 0.7	○ 0.8

Comment

b) Factor D2: - Height Difference Effect

Factor D2 For Longitudinal Direction: 1.0

Table for Selection of Factor D2	Severe	Significant	Insignificant
	0<Sep<.005H	.005<Sep<.01H	Sep>.01H
Height Difference > 4 Storeys	○ 0.4	○ 0.7	○ 1
Height Difference 2 to 4 Storeys	○ 0.7	○ 0.9	○ 1
Height Difference < 2 Storeys	○ 1	○ 1	◉ 1

Comment

Factor D 1.0

3.5 Site Characteristics - *Stability, landslide threat, liquefaction etc as it affects the structural performance from a life-safety perspective*

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

Flat site with apparent low risk of liquefaction

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 1.0

Record rationale for choice of Factor F:

Typical commerical building construction with no features which would suggest any degree of additional resilience or redundancy. There was no specific degradation in the buuilding which would effect the gravity or lateral load capacity of the building

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

PAR

Longitudinal **1.00**

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

Street Number & Name:	**11 Don Street**	**Job No.:**	**5320381**
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Name of building:		**Date:**	**6/06/2018**
City:	**Invercargill**	**Revision No.:**	**A**

Table IEP-3 Initial Evaluation Procedure Step 3

Step 3 - Assessment of Performance Achievement Ratio (PAR)

(Refer Appendix B - Section B3.2)

b) Transverse Direction

potential CSWs — **Effect on Structural Performance** (Choose a value - Do not interpolate) — **Factors**

3.1 Plan Irregularity

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

Comment

3.2 Vertical Irregularity

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

Comment

3.3 Short Columns

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

Comment

3.4 Pounding Potential

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

a) Factor D1: - Pounding Effect

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

Factor D1 For Transverse Direction: 1.0

Table for Selection of Factor D1	Severe	Significant	Insignificant
Separation	0<Sep<.005H	.005<Sep<.01H	Sep>.01H
Alignment of Floors within 20% of Storey Height	○ 1	○ 1	◉ 1
Alignment of Floors not within 20% of Storey Height	○ 0.4	○ 0.7	○ 0.8

Comment

b) Factor D2: - Height Difference Effect

Factor D2 For Transverse Direction: 1.0

Table for Selection of Factor D2	Severe	Significant	Insignificant
	0<Sep<.005H	.005<Sep<.01H	Sep>.01H
Height Difference > 4 Storeys	○ 0.4	○ 0.7	○ 1
Height Difference 2 to 4 Storeys	○ 0.7	○ 0.9	○ 1
Height Difference < 2 Storeys	○ 1	○ 1	◉ 1

Comment

Factor D 1.0

3.5 Site Characteristics - *Stability, landslide threat, liquefaction etc as it affects the structural performance from a life-safety perspective*

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

Flat site wit apparent low probability of liquefaction

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 1.00

Record rationale for choice of Factor F:

Typical commercial building construction with no features which would suggest any degree of additional resilience or redundancy. There was no specific degradation in the buuilding which would effect the gravity or lateral load capacity of the building

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

PAR

Transverse **1.00**

WARNING!! *This initial evaluation has been carried out solely as an initial seismic assessment of the building following the procedure set 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:	11 Don Street	Job No.:	5320381
AKA:		By:	JBH
Name of building:		Date:	6/06/2018
City:	Invercargill	Revision No.:	A

Table IEP-4 Initial Evaluation Procedure Steps 4, 5, 6 and 7

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

		Longitudinal	Transverse
4.1	**Assessed Baseline *%NBS (%NBS)*$_b$** (from Table IEP - 1)	66%	66%
4.2	**Performance Achievement Ratio (PAR)** (from Table IEP - 2)	1.00	1.00
4.3	**PAR x Baseline *(%NBS)*$_b$**	65%	65%
4.4	**Percentage New Building Standard *(%NBS)* - Seismic Rating** (Use lower of two values from Step 4.3)		65%

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

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

Street Number & Name:	11 Don Street	Job No.:	5320381
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Name of building:		Date:	6/06/2018
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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	2
8.2	Presence of heavy concrete floors and/or concrete roof? (Y/N)	Y

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  **Signature**

John B Heenan **Name**

111129 **CPEng. No**

www.beca.com

Report

Invercargill Licensing Trust: Demolition of 57-81 Dee Street

Prepared for the Invercargill Licensing Trust

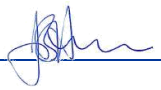
Prepared by Beca Limited

13 June 2018

Revision History

Revision Nº	Prepared By	Description	Date
A	John Heenan	Issued for approval	6/06/2018
B	John Heenan	Final	8/06/2018
C	John Heenan	Final with minor text revisions	13/06/2018

Document Acceptance

Action	Name	Signed	Date
Prepared by	John Heenan		13/06/2018
Reviewed by	Sheila Karimi		13/06/2018
Approved by	**John Heenan**		13/06/2018
on behalf of	Beca Limited		

Contents

Attachments

5320381-EW-SK001. Partial Basement Areas

5320381-EW-SK002. DP 8108 (Copy)

DP 14605

5320381-EW-SK003. Adjacent Buildings

5320381-EW-SK004. Boundary Basement Wall Buttress Detail

1 INTRODUCTION

Beca Limited have been engaged by the Invercargill Licensing Trust to inspect the buildings consisting of 57 – 81 Dee Street and 11 Don Street Invercargill.

2 EXISTING BUILDINGS

The site contains several different buildings structures which are (with the exception of 11 Don Street) structurally connected ie. Rely at some level on the support of adjacent buildings or structure.

The existing buildings consist of

11 Don Street

11 Don Street is a two storey reinforced concrete frame building with concrete block infill panels. The building has a full reinforced concrete basement over building footprint with reinforced concrete beams, columns and floor construction at ground floor and first floor. The roof appears to be light weight construction on either structural steel or timber roof framing.

This building is well constructed and is in good condition.

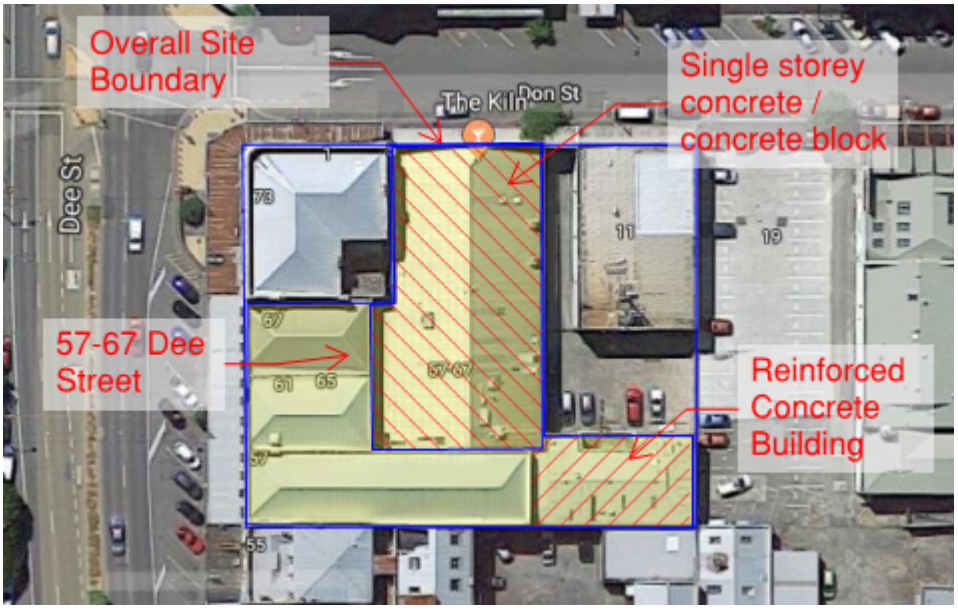
57-67 Dee Street

The building which makes up 57-67 Dee street (by title, refer DP 8108) consists of several structures which have differing construction but are typically structural connected ie. They rely on each building for providing support.

The section of the building located at 5-7 Don Street is a single storey reinforced concrete and concrete block construction on a slab on grade with probably shallow foundations. The roof consists of a light weight construction on structural steel and timber roof support.

The section of building at the rear of 57 Dee Street which is on the east boundary consists of a reinforced concrete building with a structural steel truss roof and light weight cladding.

The remainder of this building is the “old DEKA” building from 57-67 Dee Street. This building is a two storey predominantly unreinforced masonry (URM) with significant alternations from the original building fabric for the past retail usage. There is a partial basement over the footprint of the building (refer attached drawing 5320381-EW-SK001). The basement is constructed of concrete with the URM walls from ground floor to roof. The internal floors are timber with structural steel/timber gravity beams for both the ground floor and the first floor with a timber framed roof over and light weight cladding. We expect that some of the remaining URM construction in this section of the building is part remnant of the original Langlands block buildings. The Langlands block buildings were a continuous URM construction along Dee Street from Esk to Don Street.



These conglomeration of buildings are in varying condition with the reinforced concrete and concrete block building sections appearing to be in relatively good condition.

The two storey URM building and partial basement condition is typically for the age of the building. The basement is not fully water tight and the upper sections of the building have been cut about to effect usage to the ground floor bar areas. There was no specific distress noted to the URM elements of this building. We would typically consider the mortar in this age of building to be relatively soft and the brick strength to be moderate.

It is noted that portions of these buildings are URM and as such are considered to be earthquake prone. In the event of demolition the contractor shall take adequate precautions during demolition to ensure that demolition is undertaken in a controlled fashion, and any additional precautions for compliance with Health and Safety are in place.

73-81 Dee Street

The building situated on the corner of Don and Dee streets is the corner section of the original Langlands block building (Langford Building). There has been significant alteration to the original façade with most ornamentation removed and the ground floor altered significantly over the years to accommodate retail tenancies.

The building is a three storey unreinforced masonry building with typically double and triple brick structural load bearing walls with internal timber floors at ground, first and second floor levels. The roof is timber framed with light weight cladding

The building has a partial basement over the footprint of a relatively low depth (approximately 2.2m below ground floor level) constructed on concrete. It is specifically noted that there is a services recess formed in both the Dee Street and Don Street frontages of the basement. There are exposed services in these recesses and we are not aware of any future requirement to access these services.

The condition of the "Langford building" is typical for the age of building. There is some distress noted in the external façade with cracks evident through the external plaster work and URM construction at window spandrel beams, parapet level and at several other locations. The internal floors are in good condition with the floor joist being recessed into the load bearing brick walls. This provides a gravity connection only with lateral load transfer unpredictable from this type of connection.

The basement is not water tight and is of a very low stud height (1.8m). There does not appear to be significant area of degradation in the basement area which would suggest any settlement issues of the structure.

This building is constructed predominantly of unreinforced masonry construction and as such is considered to be earthquake prone. In the event of demolition the contractor shall take adequate precautions during demolition to ensure that demolition is undertaken in a controlled fashion, and any additional precautions for compliance with Health and Safety are in place.

3 BUILDING DEMOLITION

To determine the implications of demolition, a Demolition Management Plan has been prepared by Ryal Bush Demolition for the demolition and removal of materials from the site. This report is to be read in conjunction with the Demolition Management Plan prepared by Ryal Bush Demolition and the methodology for demolition described in this report.

Hazardous Demolition Materials

The above report has identified a small quantity of roofing material which contains asbestos sheeting which will need to be removed under controlled conditions.

Any further identified hazardous materials identified either before or during demolition should be managed in the correct manner.

Reinstatement

To reinstate the site the entire area would be required to be backfilled to match the existing ground levels with a suitable hardfill material (AP40 or approved equivalent). All backfill would need to be in layers not exceeding 200mm thick compacted thickness to achieve 95% of optimum dry density as determined by the NZ standard compaction test for the back fill material.

The existing basement structures to remain would need to have holes punched into the floors to ensure that no additional ground water hydrostatic pressure can develop under the original basement structures.

4 ADJACENT BUILDINGS

The site is an inner city corner site with boundaries to Don and Dee streets to the north and west respectively. The east boundary is adjacent to an empty site currently used by Wilsons Parking. The south boundary has three building immediately adjacent being described as buildings;

A. Street front building of the adjacent 55 Arcade complex.

B. Rear building of the 55 Arcade complex.

C. Rear building to 34 Esk Street.

D. Rear building to 36 Esk Street (diagonally adjacent to the south east corner of the site).

(Refer to drawing 5320381-EW-SK003 for the locations of these buildings).

All of the above buildings appear to be predominantly of unreinforced masonry construction. We have no additional information which suggests these buildings have been either secured or strengthened and our visual external inspection of these buildings, where we were able to access, there was no evidence observed that these buildings had been subject to typically expected strengthening work.

It is considered likely that these building would be assessed to have a capacity less than 34% NBS (IL2). The assessed capacity of the buildings, being less than 34%NBS (IL2) is likely to result in these buildings being described as being earthquake prone, however only the Territorial Authority has the authority to classify earthquake prone buildings under the Earthquake Prone Buildings Amendment Act. It is noted that if some strengthening or securing work has been undertaken on these buildings (which has not been able to be observed externally) then the risk associated with a URM building adjacent to the proposed hotel site will be greatly reduced.

The proposed Hotel development site would be backfilled to existing ground levels for either construction of the new hotel or to provide parking for the proposed Hotel. Any elevation differences would be provided with a suitably designed retaining structure to the respective boundary allowing for any adjacent building surcharge of the retaining structure or any other adjacent use surcharge ie. Sidewalks and driveways.

Street Boundaries (North and West)

The following methodology would be required in the event of demolition of the buildings adjacent to the street boundaries;

- All existing basement structures will be retained against the street boundaries.
- Existing basement walls shall be propped with mass concrete buttresses (refer drawing 5320381-EW-SK004 for proposed detail) to ensure that the existing wall does not displace prior to back filling.
- Where there is no basement, the existing building foundations are to be removed adjacent to the boundary and the excavation backfilled.
- Where the existing basement or foundations clash with the proposed new foundations, these will be broken out locally and additional propping to the existing basement wall (as described above) will be provided.
- In all cases the surface and construction of the adjacent side walk shall be protected to ensure any in ground services are maintained.

East Boundary

The Wilsons parking site will need to be hoarded off to provide security to the site and provide a working area for demolition.

- Where there is a basement structure adjacent to this boundary, the basement structure shall remain and any additional propping in the form of mass concrete buttresses shall be provided as the supporting ground floor slab is removed.
- There is an elevation difference between the Wilsons Parking site and the south east corner of the site. The existing retaining wall shall remain and be backfilled against to the final surface level for the Hotel development.

South Boundary

- Building A. Street Frontage of the 55 Arcade.

This building appears to be predominantly constructed of URM and in lieu of any information on strengthening of this building, is consider to be likely to have a seismic capacity less than 34% NBS (IL2).

The Deposited Plan DP8108 (refer drawing 5320381-EW-SK002 attached) and DP 14605 (attached) indicates that the south boundary of the development site is on the face of the existing URM walls, with no additional note for either a party wall or easement for support. Therefore it is considered that there will be two separate walls on the boundary providing support to each building on the boundary which do not provide support to the adjacent building.

The partial basement of the “old DEKA” buildings is to be retained adjacent to this boundary and any additional mass concrete buttresses provided to prevent any displacement of the existing basement wall. This will provide underpinning to the adjacent buildings where there is partial basement.

As the proposed development does not include any foundations immediately adjacent to this building there is no further underpinning envisaged to be required to this building.

- Building B. Rear building of the 55 Arcade complex

There is a clear gap between this building and the south boundary of the proposed Hotel site (refer drawing 5320381-EW-SK002 and DP14605 attached).

This building appears to be predominantly constructed of URM and in lieu of any information on strengthening of this building, is consider to be likely to have a seismic capacity less than 34% NBS (IL2).

The existing basement structure is to remain adjacent to this building (refer to drawings 5320381-EW-SK003) and any additional propping to this basement wall shall be provided as mass concrete buttresses as described on drawing 5320381-EW-SK004 to prevent and displacement of the existing basement wall. The existing basement shall act as underpinning to the adjacent building foundations until the proposed hotel site can be backfilled with compacted engineered fill.

As the proposed development does not include any foundations immediately adjacent to this building there is no further underpinning envisaged to be required to this building.

- Building C. Rear Building to 34 Esk Street

This building appears to be predominantly constructed of URM and in lieu of any information on strengthening of this building, is consider to be likely to have a seismic capacity less than 34% NBS (IL2)..

The portion of building to be demolished immediately adjacent to Building C is constructed of a reinforced concrete construction with no observed gap between the buildings.

The existing building to be demolished will need to be "deconstructed" to prevent any damage to building C. As there is an elevation difference between building C and the proposed Hotel site the bottom section of the existing reinforced concrete wall and foundation shall remain adjacent to this section of boundary and be propped with mass concrete buttresses as per drawing 5320381-EW-SK004 to provide additional underpinning to the adjacent building C.

As the proposed development does not include any foundations immediately adjacent to this building there is no further underpinning envisaged to be required to this building.

- Building D. Rear building of 36 Esk Street

This building appears to be predominantly constructed of URM and in lieu of any information on strengthening of this building, is considered to be likely to have a seismic capacity less than 34%NBS (IL2).

As per building C, all retaining structures and existing building foundations on the boundary shall remain to provide support and underpinning to the adjacent buildings and land.

As the proposed development does not include any foundations immediately adjacent to this building there is no further underpinning envisaged to be required to this building.

Buildings with a Seismic capacity less than 34% NBS (IL2)

As noted above, all of the adjacent building to the proposed Hotel site are predominantly constructed of Unreinforced Masonry (URM), and in lieu of any information on possible securing or strengthening of these buildings, they would typically be considered to be likely to have a seismic capacity less than 34% NBS (IL2).. These buildings are likely to be assessed as potentially earthquake prone regardless of whether there is a building adjacent to them or not.

In accordance with the Earthquake Prone Buildings Amendment Act 2016, for the City of Invercargill, which is considered in the "Medium Risk" zone (Hazard Factor Z = 0.17) the time frames for identifying and strengthening potentially earthquake prone buildings is;

Identify	Identify (Priority Buildings)	Strengthen	Strengthen (Priority Buildings)
10 years	5 years	25 years	12.5 years

The above Act will also require any identified earthquake prone buildings to be identified and placarded on site to inform any user of the earthquake status of the building.

It is the building owner's responsibility to undertake any assessment and any subsequent strengthening work on any building and typically cannot be influenced by a neighbouring property unless the building is deemed to present an immediate life safety hazard which the Territorial Authority may deem as a dangerous building or building element.

The condition of the adjacent URM buildings is unknown as these are currently covered and present no walls or structure for inspection. These walls will be inspected and monitored during demolitions works for potential dilapidation, damage and movement.

It is not envisaged that any further propping or shoring will be required to the adjacent buildings, other than that described above, either during demolition or construction of the new Hotel. The demolition of the existing buildings on the proposed hotel site are unlikely to make any of the adjacent buildings any different that they currently are with respect to both gravity and lateral load capacity.