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15 March 2019

South Waikato District Council

Private Bag 7 (3444)

Tokoroa 0738

New Zealand

Attention: Danny Monteith

Dear Danny,

Initial Seismic Assessment Report – Former Countdown Building, Tokoroa

Further to our engagement to South Waikato District Council (SWDC), we have now completed an Initial Seismic Assessment (ISA) of the former Countdown building at 42 Logan Street, Tokoroa using the Initial Evaluation Procedure (IEP). The assessment was carried out after completing a site visit and reviewing partial set of original civil drawings, and architectural drawings provided by the client. A complete set of drawings were provided after the site inspection. This ISA is intended to inform SWDC as part of a wider condition assessment on the potential refurbishment of the building as a public library.

1 Executive Summary

Based on the IEP method, the former Countdown building has a potential seismic rating of **69*% NBS* (IL2)** assessed using *The Seismic Assessment of Existing Buildings - Technical Guidelines for Engineering Assessments*– Parts A and B, dated July 2017 (*Engineering Assessment Guidelines*). The building has been assessed on the basis it is an Importance Level 2 (IL2) building in accordance with the New Zealand Loadings Standard, NZS1170.

This corresponds to a **B grade building** as defined by the New Zealand Society for Earthquake Engineering (NZSEE) building grading scheme. This is more than the minimum threshold for earthquake prone buildings (34%NBS) and more than the threshold for earthquake risk buildings (67%NBS). This could be regarded as exposing the occupants to a low to medium seismic risk relative to a similar new building.

During the course of completing the assessment the following potential critical structural weaknesses were identified in the building:

- It was observed that there are two different seismic systems within the building. Most of the building consists of a transverse steel portal frames, whilst on the western end walls there are reinforced masonry block walls present. It should be noted that the two systems will behave differently, and the seismic response in the transverse direction is potentially governed by the out of plane response of the block walls.
- It was noted that there is some discontinuity in the longitudinal compression strut, particularly, between gridlines 4 and 5 (refer to original drawings).

- Long load paths were observed from the roof tension braced bay to the wall tension braced bays. We note there is only a single braced bay for the entire building on each longitudinal sidewall. The braced bay on the longitudinal sides of the building is offset from the roof brace bay.
- There is no fly bracing present in the transverse portal frames.
- The compression struts between portal frame bays were observed to be potentially slender.
- There was some slack in the tension brace rods in the roof tension bays.

The ISA is considered to provide a relatively quick, high-level and qualitative measure of the building's seismic performance. A more reliable result will be obtained from a Detailed Seismic Assessment (DSA) and is recommended for this building. A DSA could find Structural Weaknesses (SWs) 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.

We further recommend:

- If the structure is to be refurbished to be a public library, we recommend a Detailed Seismic Assessment (DSA) be completed to improve the quality and reliability of the building score.
- The building use should be reviewed for consideration of a higher importance category as a public building of potentially elevated importance (ie high occupancy, civil defence usage etc). Meaning is the refurbished building an IL3 or even IL4 structure?
- The refurbished structure is likely to undergo a "Change of Use" under the Building Act 2004, this requires a number of improvements relative to fire, access, and seismic strength. Regarding the latter, a building needs to be strengthened as much as reasonably practicable. This should be discussed prior to any DSA.
- A desktop investigation into geotechnical/geologic hazards be considered for this building as part of the DSA.
- A DSA should include a weld inspection if lower bound properties in an assessment suggest brittle joint behaviour.

Figure 1 - Aerial view of 42 Logan Street

Figure 2 - Eastern view of 42 Logan Street

2 Introduction

South Waikato District Council (SWDC) requested Beca to prepare an Initial Seismic Assessment for the former Countdown building at 42 Logan Street, Tokoroa 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.

3 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 as a result of experience in the Canterbury earthquakes of 2010/2011. It is used as a tool to assign a percentage of New Building Standard (*%NBS*) seismic rating and associated grade to a building as part of an Initial Seismic Assessment (ISA)

The IEP process also enables territorial authorities, 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.
- It tends to be somewhat conservative, identifying some buildings as having a lower *%NBS* seismic rating, while the subsequent detailed investigation may indicate they are likely to perform better than anticipated. However, there will be exceptions, particularly when structural weaknesses (SWs) are present that have not been recognized 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. Although a minimum level of information is needed if an ISA is to be used to confirm a rating for earthquake-prone building purposes (refer to the EPB methodology for requirements and the recommendations made in this report). 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.
- 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. This will typically be required for assessments used to confirm a rating for earthquake-prone building purposes.
- 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 ceilings, plant, services or glazing that are not considered to present a significant life safety hazard.

Experience to date is that the IEP is a useful tool to identify potential issues and the 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 or a rating that can be used to establish earthquake-prone building status.

4 Basis for the Assessment

The information we have used for our IEP assessment includes:

- A review of structural and architectural drawings obtained from the South Waikato District Council Property Files. This includes original partial civil drawings, original structural drawings and architectural drawings from when refurbishments and extensions were executed.
- A site visual inspection conducted on 17/01/2019 of the building exterior which confirmed the nature of the building and relationship to surrounding buildings, and the exterior cladding details.
- A structural inspection of the building interior on 17/01/2019, which confirmed the general structural form of the building and the apparent accuracy of the drawings available as above. The inspection was limited to areas where safe access was readily available, without intrusive opening up of linings etc. to:
  - Assess the general consistency of building information on the drawings with the observed actual construction.
  - Identify potential structural weaknesses or irregularities.
  - Identify non-structural items that could be a significant life safety hazard.
  - Identify, where possible, items of significant deterioration which might affect %*NBS* assessment.
- The assessment of the soils under the building have been excluded from this assessment.

5 Building Description

Figure 3 Interior retail space of building

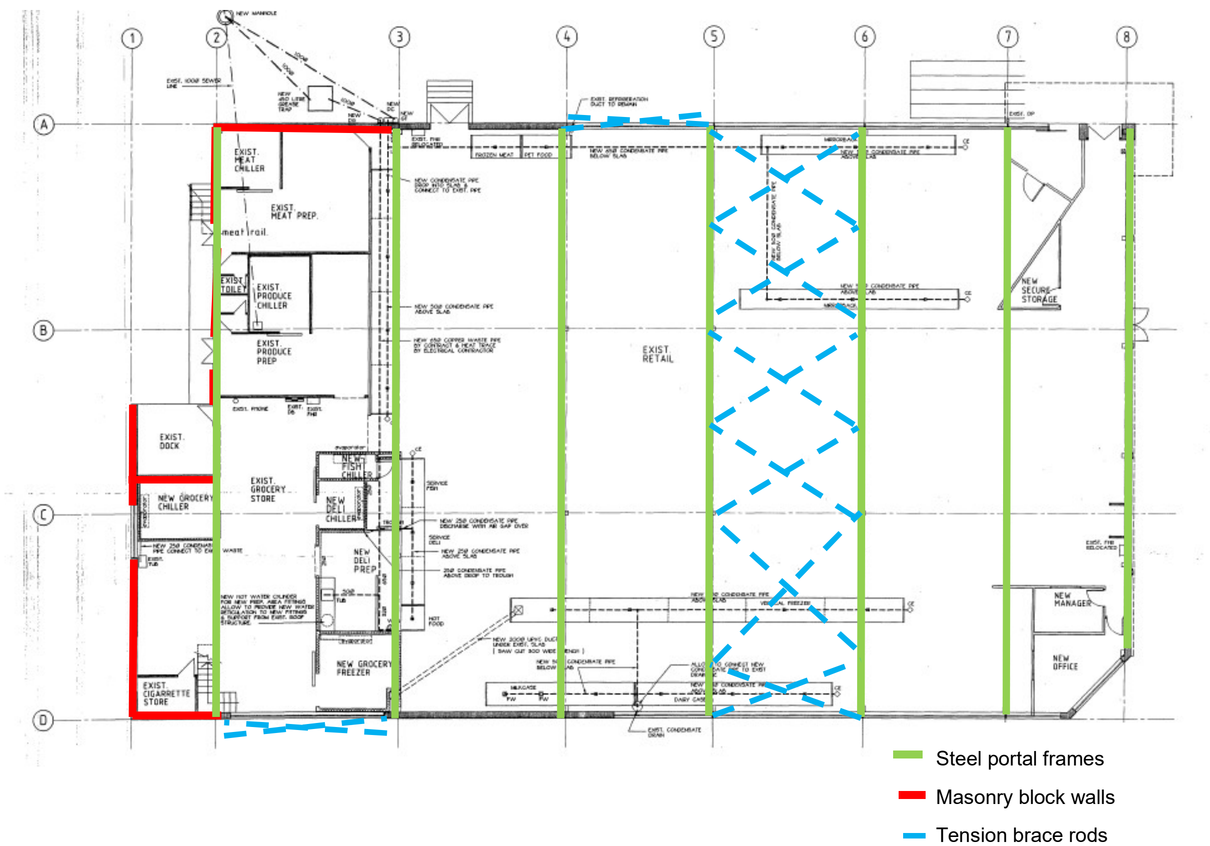
The site is located at the corner of Logan and Mannering Street, Tokoroa, with the lot sloping down gently from east to west. This has resulted in a retaining wall being built along the west end of the building to accommodate vehicle access around the building. The building is a standalone structure on the site, which was originally designed by D.C. AIREY & PARTNERS to be a supermarket.

The building is a 1600m^2, steel portal frame structure with an additional rectangular structure, constructed with masonry block walls which also provide a localised second storey on the western end of the building. There is a step down of roof levels, which is accompanied by a smaller steel portal frame, the step down has resulted in angled compression struts between the steel portal frame structures on grid line 3 and 4. It is assumed to have been designed and built in 1984, with fitout refurbishments undertaken in 1995 and a new entry lobby in 1998 (the two later additions being designed by Tse Group Limited), both considered to not have significant influence on the seismic lateral load systems. This is based on information recovered from the partial Architectural and full set of Structural drawings provided by the client.

Due to the building being designed to serve as a supermarket, the building promotes a large open plan retail space, with adjoining preparation facilities situated at the west end of the building. Above these preparation areas is a localised second storey that provides staff amenities such as break rooms and a kitchen. The building is currently vacant at the time of inspection but is intended on being refurbished into the new Tokoroa public library.

The building is constructed of a combination of a steel portal frame structures and reinforced masonry block walls. As materials, steel frames and reinforced masonry generally perform well if adequately detailed, such is normally the case in modern buildings. Steel is generally able to stretch and dissipate earthquake energy (ductility). Generally, since codes have improved over the years, the more recent the building construction the better the building will perform.

On Gridline A, it is evident that the egress double door, towards the western end of the building, has been relocated west by 2m, through a clear difference in the colour of the cladding. Cracking was observed in the external block walls and brick veneer, which is most likely moisture driven.



Gravity load resisting system:

- The building is mainly constructed from steel portal frames, which have Steel Hollow Section (SHS) columns supporting the frames at third spans.
- The steel columns of the portal structure are encased in concrete, the base plates weren't accessible for inspection.
- Reinforced masonry block walls are in the western end walls.
- The second storey is constructed from timber frames above the masonry block walls, the timber floor in the break room has experienced noticeable creep.
- The roof, consisting of long-run metal sheets, is Tek screwed and supported by steel DHS purlins accompanied by the steel portal frame with columns at third spans along the rafters.
- The walls are constructed from timber frames, cladded with brick veneer, and painted fibre cement flat sheets. The interior walls are lined with fibre cement panels.
- Some of the western end walls are cladded in brick veneer.

Lateral load resisting system:

- Moment resisting steel portal frames in the transverse direction.
- Reinforced masonry block walls in the western end walls.
- 16mm steel tension rods are used in the tension braced bays in the longitudinal direction.
- Steel strut members transfer loads between the portal frames into the tension braced bays.
- The western reinforced masonry walls in the longitudinal direction in plane (at the building corners) may be connected to the longitudinal bracing system, however, no site connections or drawings could confirm this. We note that if they were connected then they would supersede the tension braces in the longitudinal direction. These walls have not been considered as part of the lateral load system (in plane).

Foundation system:

- There are pad foundations below the steel columns.
- Perimeter block walls on a strip foundation, ground floor is generally a 100mm concrete slab on 100mm min granular backfill.
- 100mm concrete slab on top of granular backfill, reinforced with 665 reinforcing steel mesh.
- A localised basement plant room is located at the western end of the building, which has a 0.8mm Dimond Hi-bond composite slab floor (at the general building ground floor level), reinforced with 665 steel mesh.
- A concrete slab cantilevers off the foundation block walls at ground level and supports the masonry veneer walls of the building, note these do not support the roof structure or clear-storey glazing.

A structural inspection of the building interior on 17/01/2019, which confirmed the general structural form of the building and the apparent accuracy of the drawings available as above. The inspection was limited to areas where safe access was readily available, without intrusive opening of linings etc.

6 IEP Assessment Results

Our IEP assessment of this building indicates the building can achieve **69*%NBS* (IL2)** in the longitudinal direction and 80*%NBS* (IL2) in the transverse direction. Therefore, the IEP assessment of this building indicates an overall potential seismic rating of 69*%NBS* (IL2), corresponding to a '**Grade B**' building as defined by the New Zealand Society for Earthquake Engineering (NZSEE) building grading scheme. This is above the threshold for earthquake prone buildings (34%NBS) and above the threshold for earthquake risk buildings (67*%NBS*) as recommended by the NZSEE.

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

Table 1: IEP Assessment Results

IEP Item	Assumption	Justification
Date of Building Design	1984 – 1997 Category	*From the Architectural and structural drawings*
Soil Type	*D – soft soils*	The soil type is considered likely to be *D*, or a Deep Soil.

IEP Item	Assumption	Justification
Building Importance Level	*2*	The building use, size and occupancy level is typical for a structure of Importance Level *2*.
Ductility of Structure	μ=*1.5* μ=*2*	*Taken as ductility of tension rod bracing* *Taken as the ductility for MRSF*
Plan Irregularity, Factor A	*1*	
Vertical Irregularity, Factor B	*1*	*No significant changes of vertical geometry. In the transverse direction, there is a slight change in roof height and structure at the west end of the structure, however this would not cause risk to life safety.*
Short Columns, Factor C	*1*	*No short columns present in the building*
Pounding, Factor D	*1*	*No visible risk to pounding occurring*
Site Characteristics, Factor E	*1*	*No visible ground risks observed on site.*
Factor F	*0.75 – L* *0.75 - T*	*Longitudinal: We note that in the longitudinal direction there is a discontinuity of the compression struts between gridline 4 and 5. We observed that there were long load paths that led to one tension braced bay for the entire building. It should be noted that the struts connecting the portal frames are suspected to be slender SHS.* *Transverse: The seismic response of the structure is likely limited by the out of plane response of the reinforced masonry walls. Also no flybracing is present to the steel rafters.*

It is noted that there is a localised lateral load path above the masonry block walls at the western end, between the block wall and the structural steel. To increase the IEP score we recommend investigating the following:

- Completing a DSA to further understand the weaknesses of the building.
- Reinstating the compression strut that has been removed on gridline B
- Tightening or replacing the steel rods within the existing brace bays.
- Insert additional brace bays in conjunction with a DSA.

A DSA will likely also include the following:

- A desktop geotechnical investigation of Geohazards.
- Weld inspection of critical transverse moment knee joints in the steel portal frames.

We propose prior to any concept strengthening or reuse is conducted, the following is discussed with the architect and the client:

- The end use of the building and therefore its importance level under AS/NZ 1170.0. The building use should be reviewed for consideration of a higher importance category as a public building of potentially elevated importance (ie high occupancy, civil defence usage etc), meaning is the refurbished building an IL3 or even IL4 structure.

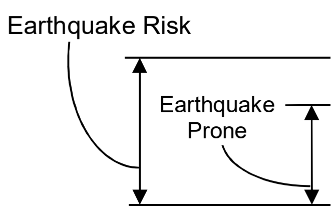
- The change of use provisions should be discussed and understood by all as to how they need to be met. The refurbished structure is likely to undergo a "Change of Use" under the Building Act 2004, this requires a number of improvements relative to fire, access, and seismic strength. Regarding the latter, a building needs to be strengthened as much as reasonably practicable

7 IEP Grades and Relative Risk

Table 2 below taken from the *Engineering Assessment Guidelines* provides the basis of a proposed grading system for existing buildings, as one way of interpreting the *%NBS* earthquake rating.

Table 2: 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 (Relative to a Similar New Building)
A+	>100	<1 times	Low risk
A	80 – 100	1 – 2 times	Low risk
B	67 – 79	2 – 5 times	Low to medium 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



This building has been classified by the IEP as a grade ***B*** building and is therefore considered to be a ***low to medium*** life-safety risk compared with a similar new building.

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.

8 Assessment of Egress Stairs and Parts of Buildings

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.

There are three stairs located on site, the building has one internal staircase with the other two providing access to the building exterior. The internal staircase is constructed from timber and will likely continue to provide egress in a seismic event. The two external stairs located on the western end of the building are constructed using reinforced concrete, which have been cast insitu and tied into the masonry block walls with starter bars. We note these are of low height and appear to be well connected to the concrete structure. There are no significant hazards along egress routes, and as this building is a standalone structure, there will not be any fall hazards from adjacent buildings that might impact safe egress.

9 Neighbouring Buildings, Potential Site Characteristics and Associated Issues

Although identification is beyond the scope of this assessment and they do not influence the *%NBS* seismic rating for the building, we note that no additional issues have been identified through our assessment which could cause a risk to life safety.

10 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, and the like, unless these have been identified and noted elsewhere in this report as being a potential significant life safety hazard (as defined in the Engineering Assessment Guidelines). 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.

We note that during the inspection that there were services located above the deli and fish chillers. At the time of the inspection, it was unclear whether these services were tied down. We assumed that the timber handrails and mesh would provide sufficient restraint in a seismic event to prevent additional risk to life safety. This assumption should be further reviewed in a DSA if they are to be retained in repurposing of the building.

11 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 *Engineering Assessment Guidelines*. 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.

12 Conclusions and Recommendations

Our ISA assessment for the former Countdown building, carried out using the IEP, indicates a potential seismic rating of **69*%NBS* (IL2)**, which corresponds to a **Grade B building**, as defined by the NZSEE grading scheme. This is above the threshold for Earthquake Prone Buildings (34*%NBS*), and above the threshold for Earthquake Risk Buildings (67*%NBS*) as defined by the NZSEE grading scheme.

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). It is recommended that a DSA be completed for this building, if the council proceeds in refurbishing the building into a public library. A DSA would likely focus on the following issues:

- There is a discontinuity of load paths between adjacent steel frames as some compression struts are placed offset of the plan gridlines.
- The capability of the tension brace bays to withstand the seismic weight and forces generated by the entire building.
- The extent of the localised load paths on top of the block walls at the western end of the building.
- Steel moment frame connections and buckling sensitivity.
- A DSA would also investigate or could identify other potential weaknesses that may not have been considered in the initial seismic assessment. If the structure is to be refurbished to be a public library, we recommend a detailed seismic assessment be completed to improve the quality and reliability of the building score.

We propose prior to any concept strengthening or reuse is conducted, the following is discussed with the architect and the client:

- The end use of the building and therefore its importance level under AS/NZ 1170.0. The building use should be reviewed for consideration of a higher importance category as a public building of potentially elevated importance (ie high occupancy, civil defence usage etc), meaning is the refurbished building an IL3 or even IL4 structure.
- The change of use provisions should be discussed and understood by all as to how they need to be met. The refurbished structure is likely to undergo a "Change of Use" under the Building Act 2004, this requires a number of improvements relative to fire, access and seismic strength. Regarding the latter, a building needs to be strengthened as much as reasonably practicable

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

Chris Twaddle
Associate Structural Engineer

on behalf of

Beca Limited

Direct Dial: +6479607243
Email: chris.twaddle@beca.com

Appendix A - Engineering Assessment Summary

1. Building Information	
Building Name/ Description	Former Tokoroa Countdown Building
Street Address	42 Logan Street, Tokoroa
Territorial Authority	South Waikato District Council
No. of Storeys	1
Area of Typical Floor (approx.)	1600m^2
Year of Design (approx.)	1984
NZ Standards designed to	NZS3101:1982, ISO1170:1977 (Assumed) NZS4203:1978
Structural System including Foundations	Steel moment resisting portal frames, tension rod brace bays, reinforced masonry block walls
Does the building comprise a shared structural form or shares structural elements with any other adjacent titles?	No
Key features of ground profile and identified geohazards	No geohazards visible, small retaining wall present to aid in providing a smooth entrance to carpark for vehicles.
Previous strengthening and/ or significant alteration	Not Known
Heritage Issues/ Status	No heritage value
Other Relevant Information	NA

2. Assessment Information	
Consulting Practice	Beca Ltd
CPEng Responsible, including: • Name • CPEng number • A statement of suitable skills and experience in the seismic assessment of existing buildings[1]	• Chris Twaddle • CPEng #1008072 • Chris has nearly 18 years of experience in structural consultancy practises. Including seismic design and in particular more intensive practise in seismic assessment and strengthening of existing structures since 2010. Primarily these structures were buildings. • Recent training in this spec include the recent NZ Concrete Conference in 2018 and the 2017 NZSEE Conference.
Documentation reviewed, including: • date/ version of drawings/ calculations[2] • previous seismic assessments	• 1984 partial Civil drawings, 1984 Structural drawings, 1995 fitout refurbishments, and, 1998 new lobby on eastern end.
Geotechnical Report(s)	None
Date(s) Building Inspected and extent of inspection	17/01/2019, Visual inspection of interior and exterior. Measured location of vertical and horizontal reinforcing within the western masonry walls.
Description of any structural testing undertaken and results summary	None
Previous Assessment Reports	None
Other Relevant Information	None

[1] This should include reference to the engineer's Practice Field being in Structural Engineering, and commentary on experience in seismic assessment and recent relevant training

[2] Or justification of assumptions if no drawings were able to be obtained

3. Summary of Engineering Assessment Methodology and Key Parameters Used	
Occupancy Type(s) and Importance Level	Importance level 2, not currently occupied.
Site Subsoil Class	Soil Class D (Assumed)
For an ISA:	
Summary of how Part B was applied, including: • Key parameters such as μ, S_p and F factors • Any supplementary specific calculations	Ductility of the structure μ = 2 for MRSF μ = 1.5 for tension braced bays S_{p_long} = 0.85 S_{p_trans} = 0.7 Factor F: 0.75 (longitudinal direction) 0.75 (transverse direction)

4. **Assessment Outcomes**		
Assessment Status (Draft/Final)		
Assessed *%NBS* Rating	***69% NBS* (IL2)** If the building is to be refurbished into a public library, an IL3 importance category should be considered.	
Seismic Grade and Relative Risk (from Table A3.1)	**Grade B**	
For an ISA:		
Describe the Potential Critical Structural Weaknesses	Discontinuity of longitudinal load paths,	
Does the result reflect the building's expected behaviour, or is more information/ analysis required?	Yes, however, a DSA is recommended[3] if the council proceeds with refurbishments to a public library. A DSA should focus on: • L – strutting, bracing and out of plane masonry. • T – Portal frame moment connections, stability and out of plane masonry. • Review of the proposed IL of the refurbished structure. • Review of the change of use provisions in the building act regarding seismic strength.	
If the results of this ISA are being used for earthquake prone decision purposes, and elements rating <34*%NBS* have been identified:	**Engineering Statement of Structural Weaknesses and Location** **-No**	***Mode of Failure and Physical Consequence* Statement(s)** -NA
Recommendations (*optional for EPB purposes*)	NA.	

[3] Indicate what form should the DSA take/ what the specific areas to focus on are

Initial Evaluation Procedure (IEP) Assessment - SWDC

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

Street Number & Name:	42 Logan Street	Job No.:	4682211
AKA:	Cnr of Logan St & Mannering St, Tokoroa	By:	RM
Name of building:	Former Countdown Building	Date:	8/01/2019
City:	Tokoroa	Revision No.:	1

Table IEP-1 Initial Evaluation Procedure Step 1

Step 1 - General Information

1.1 Photos (attach sufficient to describe building)

Aerial of 42 Logan Street

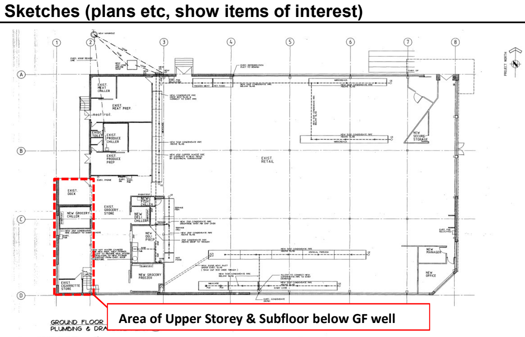
South Western Corner

Eastern Fascade

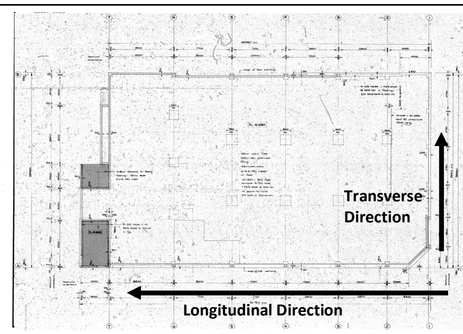
South Eastern Corner

NOTE: THERE ARE MORE PHOTOS ON PAGE 1a ATTACHED

1.2 Sketches (plans etc, show items of interest)



Refurbishment plan for Countdown



Original foundation plan

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)

- Assessed as an IL2 building
- Typically single storey, stand alone portal structure with a localized second storey and basement at western end.
- Construction completed in 1984, refurbishments completed in 1995 and a new entry lobby (non structural) completed in 1997.
- Roof is long-run metal sheets that have not been replaced since construction, locations of rust are visible.
- Rectangular in plan, building is constructed with steel portal frames, western end wall of building consists of reinforced masonary blocks walls.
- Masonry walls in the western end walls of the building may result in differential stiffness in transverse direction, however, there does not appear to be a diaphragm system present so therfore we believe effects are significant.
- No short columns or major discontinuities which result in vertical geometric irregularities, we note that there is a change in steel portal frame height but there are compression struts present. All Load paths are accounted for throughout the entire building, except for discontinuity of compression struts between transverse gridlines 4 and 5.
- No visible risk to building through instability of land, or geotechnical problems. No visible risk of pounding effects occurring.

1.4 Note information sources Tick as appropriate

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

Drawings received from South Waikato District Council

Initial Evaluation Procedure (IEP) Assessment - SWDC

Street Number & Name:	42 Logan Street	Job No.:	4682211
AKA:	Cnr of Logan St & Mannering St, Tokoroa	By:	RM
Name of building:	Former Countdown Building	Date:	8/01/2019
City:	Tokoroa	Revision No.:	1

Table IEP-2 Initial Evaluation Procedure Step 2

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

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

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

	Longitudinal	Transverse
a) Building Strengthening Data		
Tick if building is known to have been strengthened in this direction	☐	☐
If strengthened, enter percentage of code the building has been strengthened to	N/A	N/A
b) Year of Design/Strengthening, Building Type and Seismic Zone		
Pre 1935	○	○
1935-1965	○	○
1965-1976	○	○
1976-1984	○	○
1984-1992	⦿	⦿
1992-2004	○	○
2004-2011	○	○
Post Aug 2011	○	○
Building Type:		
Seismic Zone:	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)	Flexible	Flexible
d) Estimate Period, *T*		
h_n =	5.9	5.9 m
A_c =	1.00	1.00 m^2
Moment Resisting Concrete Frames: $T = \max\{0.09h_n^{0.75}, 0.4\}$	○	○
Moment Resisting Steel Frames: $T = \max\{0.14h_n^{0.75}, 0.4\}$	○	○
Eccentrically Braced Steel Frames: $T = \max\{0.08h_n^{0.75}, 0.4\}$	○	○
All Other Frame Structures: $T = \max\{0.06h_n^{0.75}, 0.4\}$	○	○
Concrete Shear Walls $T = \max\{0.09h_n^{0.75}/A_c^{0.5}, 0.4\}$	○	○
Masonry Shear Walls: $T \leq 0.4$sec	○	○
User Defined (input Period):	⦿	⦿
T:	0.50	0.53

Comment:

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

		Longitudinal	Transverse
e) Factor A:	Strengthening factor determined using result from (a) above (set to 1.0 if not strengthened)	Factor A: 1.00	1.00
f) Factor B:	Determined from NZSEE Guidelines Figure 3A.1 using results (a) to (e) above	Factor B: 0.17	0.17
g) Factor C:	For reinforced concrete buildings designed between 1976-84 Factor C = 1.2, otherwise take as 1.0.	Factor C: 1.00	1.00
h) Factor D:	For buildings designed prior to 1935 Factor D = 0.8 except for Wellington where Factor D may be taken as 1, otherwise take as 1.0.	Factor D: 1.00	1.00
***(%NBS)* $_{nom}$ = AxBxCxD**		*(%NBS)* $_{nom}$ 17%	17%

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Initial Evaluation Procedure (IEP) Assessment - SWDC

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City:	**Tokoroa**	**Revision No.:**	**1**

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: Tokoroa **Refer right for user-defined locations**

Z = 0.21 (from NZS1170.5:2004, Table 3.3)

Z_{1992} = 0.92 (NZS4203:1992 Zone Factor from accompanying Figure 3.5(b))

Z_{2004} = 0.21 (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:	4.76	4.76

2.4 Return Period Scaling Factor, Factor G

		Longitudinal	Transverse
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.)	I =	1	1
b) Design Risk Factor, R_o (set to 1.0 if other than 1976-2004, or not known)	R_o =	1	1
c) Return Period Factor, R (from NZS1170.0:2004 Building Importance Level) *Choose Importance Level*		○1 ⦿2 ○3 ○4	○1 ⦿2 ○3 ○4
	R =	1.0	1.0
d) Factor G = IR_o/R	**Factor G:**	1.00	1.00

2.5 Ductility Scaling Factor, Factor H

a) Available Displacement Ductility Within Existing Structure

		Longitudinal	Transverse
Comment: MRSF, μ = 2. Tension bracing bays, μ = 1.5.	μ =	1.50	2.00

b) Factor H

		k_μ	k_μ
For pre 1976 (maximum of 2)	=	1.36	1.76
For 1976 onwards	=	1	1
	Factor H:	1.00	1.00

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

2.6 Structural Performance Scaling Factor, Factor I

a) Structural Performance Factor, S_p

(from accompanying Figure 3.4)

		Longitudinal	Transverse
Tick if light timber-framed construction in this direction		☐	☐
	S_p =	0.85	0.70
b) Structural Performance Scaling Factor = $1/S_p$	**Factor I:**	1.18	1.43

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

	Longitudinal	Transverse
2.7 Baseline *%NBS* for Building, *(%NBS)*$_b$ (equals ***(%NBS)***$_{nom}$ x E x F x G x H x I)	**93%**	**114%**

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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

Building is rectangular in the longitudinal direction with a consistent layout of masonry walls and steel portal frames.

3.2 Vertical Irregularity

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

No significant changes of vertical geometry in the longitudinal direction.

3.3 Short Columns

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

No Short Columns present in building

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

No visible risk to pounding effect occurring.

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

No visible risks observed around site.

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

No visible risks observed around site.

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** 0.8

Record rationale for choice of Factor F:

We note that in the longitudinal direction there is a discountinuity of the compression struts between gridline 4 and 5. We observed that there were long load paths that led to one tension braced bay for the entire building. It should be noted that the struts connecting the portal frames are suspected to be slender SHS.

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

PAR — Longitudinal 0.75

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Table IEP-3 Initial Evaluation Procedure Step 3

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

b) Transverse Direction

Factors

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

3.1 Plan Irregularity

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

Discontinuity of lateral resisting systems would result in differential stiffness effects in the transverse direction. Not considered significant.

3.2 Vertical Irregularity

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

No significant changes of vertical geometry in the transverse direction, There is a slight change in roof height and structure at the west end of the building, however, this would not cause increased risk to life safety.

3.3 Short Columns

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

No short columns present in the building.

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

No visible risk to pounding effect occuring.

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

No visible risk to pounding effect occuring.

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

No visible risks observed around site.

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 0.75

Record rationale for choice of Factor F:

The seismic response of the structure is likely limited by the out of plane response of the reinforced masonary walls.

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

PAR
Transverse **0.75**

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

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

		Longitudinal	Transverse
4.1	**Assessed Baseline *%NBS (%NBS)*** $_b$ (from Table IEP - 1)	93%	114%
4.2	**Performance Achievement Ratio (PAR)** (from Table IEP - 2)	0.75	0.75
4.3	**PAR x Baseline *(%NBS)*** $_b$	69%	85%

4.4 **Percentage New Building Standard *(%NBS)* - Seismic Rating** (Use lower of two values from Step 4.3) — **69%**

Step 5 - Is *%NBS* < 34? — **NO**

Step 6 - Potentially Earthquake Risk (is *%NBS* < 67)? — **NO**

Step 7 - Provisional Grading for Seismic Risk based on IEP

Seismic Grade — **B**

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

It is recommended that to increase the rating the following be executed:
- Provide continuity with the compression struts, with focus between gridline 4 and 5.
- Assess and strengthen tension braces if required.
- Assess the need for additional braced bays, and struts/ties between the steel portals to provide continuity to the load paths.
- Consider the need for fly bracing to the portal.
- Review the reinforced masonry.
- Assess the steel portal frame moment frame welds.

Relationship between Grade and *%NBS*:

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

IEP Assessment Confirmed by  **Signature**

Chris Twaddle **Name**

1008072 **CPEng. No**

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Table IEP-1a Additional Photos and Sketches

Add any additional photographs, notes or sketches required below:

Note: print this page separately

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