

18 July 2018

Senior Planner
Bonisch Consulting
Attn: Christine McMillian

via email – christine@bonisch.nz

Dear Christine,

INVERCARGILL CBD DEVELOPMENT PROJECT

SUMMARY OF STRUCTURAL INFORMATION FOR RESOURCE CONSENT APPLICATION

The following information relates to structural aspects of the proposed Invercargill CBD Development Project.

- Detailed Seismic Assessment (DSA) of the old Government Life Building
- Detailed Seismic Assessment of the Southland Times Building
- Initial Seismic Assessment (ISA) of 21 buildings and Initial Evaluation Procedure (IEP) of 14 non-heritage buildings
- Invercargill CBD project site plan of seismic ratings for buildings – see ‘Seismic Rating Summary’ plan in Appendix A
- Explanation of seismic rating
- Façade retention of four historic buildings
- Provision of professional engineering services to the selected demolition contractor
- Mitigation of noise & vibration during the construction phase of the project

1. Old Government Life Building (DSA)

A detailed seismic assessment (DSA) report of the five-storey old Government Life Building was completed. The assessment included the adjacent Brown Owl Building. Intrusive investigation and material testing was completed as part of the assessment.

In the report, the Old Government Life Building is referred to as the “West Element” and the Brown Owl Building as the “East Element”. The buildings share a common party wall.

The West Element has seismic capacity of less than 15% NBS (IL2) and is in very poor condition. The building is only tenanted on the ground floor by “Night n’ Day”. Due to the condition and low seismic capacity, it is very challenging to strengthen the old Government Life Building and maintain the current heritage fabric of the building. As such, demolition is thought to be the most practical solution.

The East Element also has a low seismic capacity, with a seismic strength of less than 20% NBS (IL2). Unlike the West Element, the weak elements in the East Element could be strengthened. This would involve significant strengthening work and additional structure throughout the building to achieve a seismic strength of 100% NBS. This will be required if it is to be integrated into the new CBD development.

Refer to the DSA Report for additional information.

2. Southland Times Building (DSA)

The three-storey Southland Times building (excluding the adjacent and attached Southland Times building elements) has also undergone a DSA. The building was found to have a seismic resisting capacity of less than 34% NBS (IL2). The Building Act defines buildings with less than

34% NBS as “potentially” earthquake prone. Some relatively minor strengthening works could lift the building out of earthquake prone status. However, to achieve a seismic capacity of 100%NBS very significant strengthening works (cost) would be required.

It is proposed to retain the façade of the Southland Times Building. The building behind the façade is intended to be demolished for a new building element as part of the new retail complex.

Refer to the DSA Report for additional information.

3. Other building assessments

In addition to the three buildings covered in two DSA reports, 35 other buildings on the CBD block have been assessed. Of these 35 buildings, 20 were listed as heritage buildings and 15 as non-heritage buildings. BMC conducted initial evaluations on all 35 buildings. In addition to the initial evaluation, initial seismic assessments (ISA) were conducted on all 20 heritage buildings and an ISA report written for each of these heritage buildings. The findings from the 14 non-heritage assessments are summarized in a “summary information sheet”. An ISA report was written for one of the non-heritage buildings

4. Invercargill CBD project site plan of seismic rating for existing buildings

Refer to Appendix A for Invercargill CBD project site plan showing seismic rating of each building and the four façade retention locations.

The ‘Seismic Rating Summary’ plan (refer to Appendix A) shows the %NBS rating for each of the 38 buildings on the site. Some buildings have more than one structural form. As such, these buildings have more than one rating element. There are 43 building forms in this group of 38 buildings. Refer to Item 5. below for a description of building grades and %NBS ratings.

As shown in Figure 1, over 80% of the buildings assessed on the CBD development block have a seismic resisting capacity of the less than 34%NBS. The Building Act defines buildings with less than 34% NBS as “potentially” earthquake prone.

The 43 building forms are grouped with the following seismic ratings:

- Grade A (100 to 80% NBS) – 2 building forms
- Grade B (79 to 67% NBS) – 2 building forms
- Grade C (66 to 34% NBS) – 4 building forms
- Grade D (33 to 20% NBS) – 7 building forms
- Grade E (< 20% NBS) – 28 building forms

Most of the buildings were in poor condition and nearly all first-floor areas were untenanted.

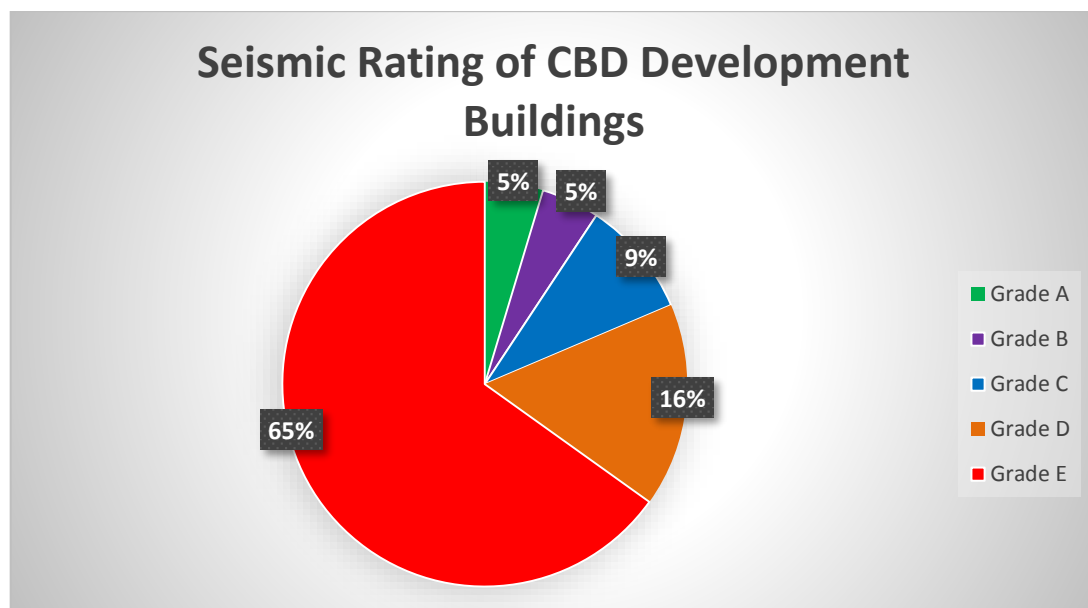


Figure 1 - Seismic rating of CBD development buildings

5. Explanation of seismic ratings

The seismic rating of a building is expressed as percentage of New Build Standard (%NBS) for the appropriate building importance level (IL2). This is defined as the degree to which the building structure complies with the earthquake strength requirements of a new Building Code compliant building of similar size and form in the same location. Note for buildings that were built in NZ prior 1932, there was no requirement to take account of any earthquake loading. Today the requirement is significant and updated regularly as new earthquake events add to the empirical data for a given location. Many of the Invercargill CBD block buildings were constructed pre-1932.

An 'earthquake prone' building is considered to be one which in the event of a moderate earthquake (considered to be an earthquake that is 33% of a design or Code Ultimate Limit State (ULS) event), would reach capacity of the primary structural elements resisting the earthquake load AND as a result has the potential to collapse in part or wholly, causing injury or fatality.

The NZ Society of Earthquake Engineers (NZSEE) is considered to be the learned society relating to building earthquake matters and is a primary contributor to related building standards and regulations. The following table from NZSEE publications sets the bands of building ratings that are typically used in describing the seismic life safety risk of a building that has been seismically assessed.

Percentage of New Building Standard (%NBS)	Alpha rating	Approx. risk relative to a new building	Life-safety risk description
>100	A+	Less than or comparable to	Low risk
80-100	A	1-2 times greater	Low risk
67-79	B	2-5 times greater	Low to Medium risk
34-66	C	5-10 times greater	Medium risk
20 to <34	D	10-25 times greater	High risk
<20	E	25 times greater	Very high risk

Figure 2 – Building rates based on %NBS from NZSEE

6. Façade retention works

Four historic façades are proposed to be retained and built into the fabric of the proposed new development. The green star on the 'Seismic Rating Summary' plan define the façade retention locations.

To minimise the time exposure of the façade (supported by temporary structure) it is proposed to leave the façade attached to the existing building (or a significant part of the building) where possible.

The following action items will be addressed for each façade retention design. This will provide a high level of certainty that the façade will not be exposed to loading or conditions that could lead to demolition or loss of the façade,

- a) Full structural survey of building including the detail related to the stability of the façade and identification of any related issues. Establishment of monitoring pins as appropriate.
- b) Design and detailing of temporary works that provides stability for the façade as a standalone element. The design can allow propping to the exterior or interior sides of the façade. This would provide flexibility for reducing the disruption to the public in the event the façade retention is erected for an extended length of time awaiting its connection to a new building structure. Refer to graphic below showing on an example of façade retention from the exterior side.
- c) Design and detailing of any strengthening to the façade itself and/or foundation remedial works. This may be required to stabilise or deal with any issues and/or alterations to the façade openings as part of the integration with the new development.

- d) Design and documentation for a detailed demolition/temporary works management and construction plan for each façade retention scheme.
- e) Engineering supervision of the demolition and temporary works construction. Ongoing monitoring as required.

A typical façade retention structure is shown below in Figure 3. This structure was designed by BMC.

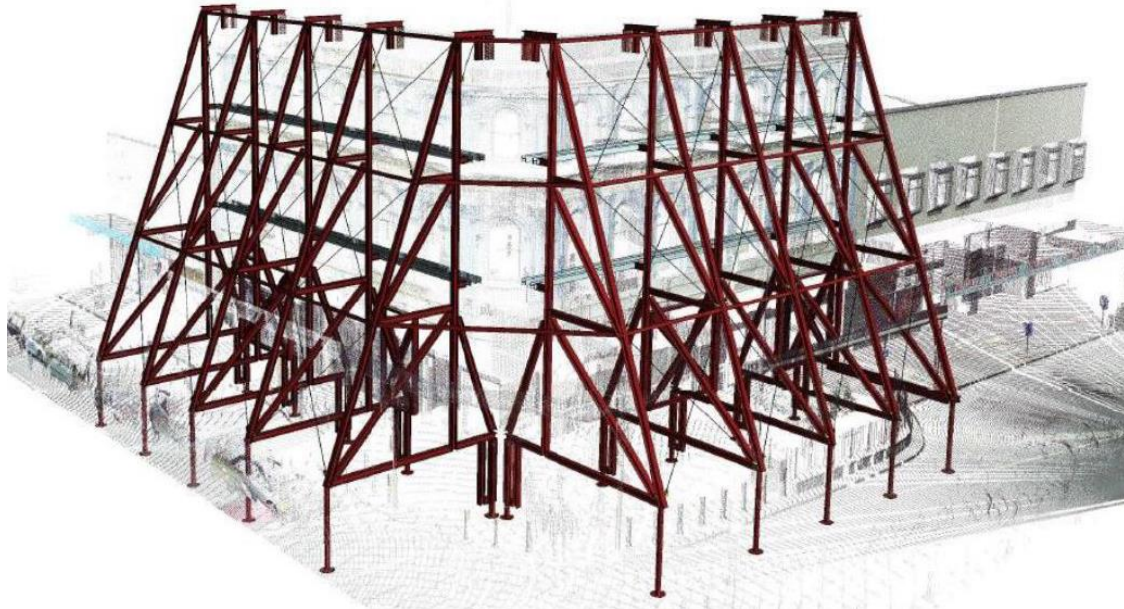


Figure 3 – Typical façade retention structure

7. Provision of professional engineering services to demolition contractor

Demolition Contractors (Ryal Bush) have been provided with preliminary structural information of all buildings in the CBD project site. Ryal Bush have provided a DRAFT demolition plan and mitigation measures that will address key issues of concern during demolition. These issues include dust, noise, public safety, road/traffic management, and public access to businesses in adjacent buildings during the course of the works.

BMC has considerable demolition planning and execution experience following the Canterbury Earthquake Sequence. This experience and expertise will be provided to the demolition contractors to assist in the review and execution of the staged demolition plan.

8. How vibration damage to adjacent buildings will be managed and mitigated during construction

Construction works for the new build elements will be ongoing over a period of time. Vibration damage (and usually related noise) will be required to be managed throughout the duration of works. The following mitigation measures are proposed:

- prior to the demolition works commencing, complete a dilapidation survey for all buildings directly adjacent to the CBD development site. This will provide a benchmark for the condition of adjacent buildings.
- establish a demolition management plan. This plan will specify times of operation, site traffic access routes, maximum noise limits, equipment types and demolition procedures (to be signed off by ICC). Monitoring equipment installed as required.
- for piling operations related to new build construction, driven piles will not be used unless no suitable alternatives can be found. Use of bored or screw piles will be given preference.

For any further queries on the above information, please do not hesitate to contact BMC.

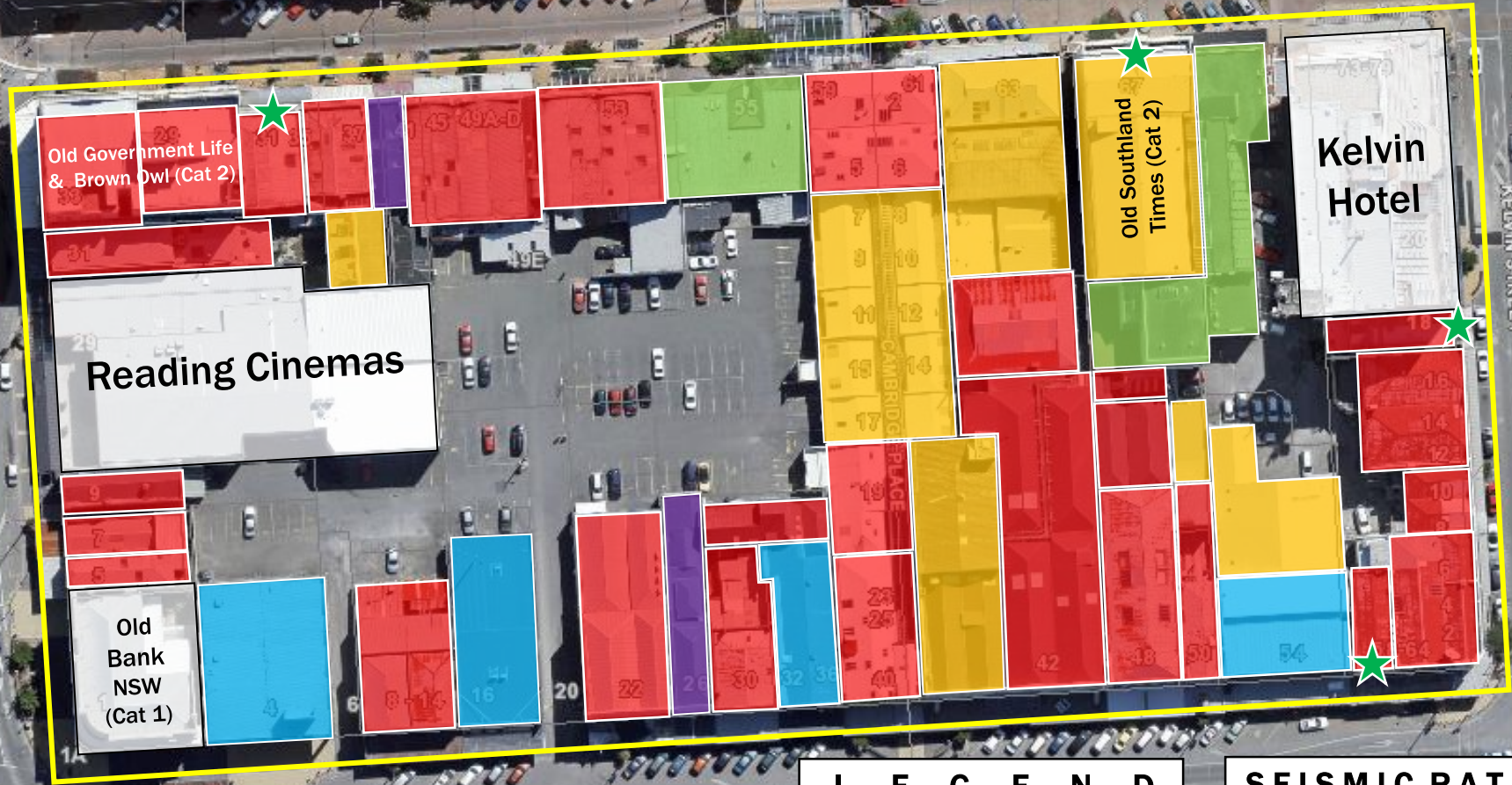
Kind regards,



Graham McDougall, Project Director
Batchelar McDougall Consulting

APPENDIX A – ‘Seismic Rating Summary’ plan

Seismic Rating Summary



LEGEND

- Buildings to remain (not assessed) Name
- Façade to be retained

PLEASE NOTE:

1. DSA reports on old Government Life Building & Southland Times Building only
2. All other assessments ISA only

SEISMIC RATING

- Grade A building = 80-100% NBS
- Grade B building = 67-79% NBS
- Grade C building = 34-66% NBS
- Grade D building = 21-33% NBS
- Grade E building = <20% NBS