**<School Name>**

**Block X - <Building Name>**

**Detailed Seismic Assessment**



<INSTRUCTIONS ON USING THIS TEMPLATE>

<All grey highlighted text needs to be checked and overwritten as required>

<All text within “< >” is provided as guide to the template use and is to be deleted or overwritten>

<Complete the header on this page and the header & footer on page 2. Then ensure this has flowed through the rest of the document (including page numbers up to the start of the Appendices”. Note the appendices themselves do not have page numbers). You will need to update the footer on the Appendix A cover page also>

Delete this text box and insert a good overview photo using the picture content control box.

**Template V2.0 (August 2020)**

**<Date>**

**Prepared By: <Consultant Name>**

**For the Ministry of Education**

#### **Document Control**

Document Prepared by:

<Full Legal Company Name>

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Revision History

|  |  |  |  |
| --- | --- | --- | --- |
| **Revision No.** | **Prepared By** | **Description** | **Date** |
| 0 | xxxxxx | <Draft for review> | <xx/yy/yyyy> |
| 1 | xxxxxx | <Final> | <xx/yy/yyyy> |
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Document Acceptance

|  |  |  |  |
| --- | --- | --- | --- |
| **Action** | **Name** | **Signed** | **Date** |
| Site Visit by: | xxxxxx |  |  |
| Prepared by: | xxxxxx |  |  |
| Reviewed by:  CPEng # | xxxxxx  xxxxxx |  |  |
| Approved by:  CPEng # | xxxxxx  xxxxxx |  |  |

Executive Summary

This building report provides the results of a Detailed Seismic Assessment completed for the following building on behalf of the Ministry of Education. The report outlines the basis of the building’s %NBS rating, describes the structural weaknesses and presents recommendations for improvements to mitigate potential risks. The table below presents a summary of the assessment findings.

|  |  |
| --- | --- |
| School | <School name> |
| Block No (PMIS). | <PMIS block number or number off site plan> |
| Block Name/Description | <e.g. main hall, admin block or classroom block> |
| Known Standard Design | <e.g. CANTY, CEBUS, etc. or non-standard> |
| Number of Storeys: | <2> |
| Year of Design (approximate) | <e.g. 1965 approx.> |
| Gross Floor Area (m2) | <1242> |
| Construction Type | <e.g. concrete frame with infill masonry walls> |
| Assessment Type | Detailed |
| Date Building Inspected | <date of actual inspection of building e.g. 20 July 2020> |
| Importance Level | <e.g. IL2> |
| Basis of Structural Assessment | <e.g. the assessment was based upon a physical internal and external walk around, reviewing drawings and undertaking a detailed structural analysis > |
| Stairs | <commentary on stairs> |
| %NBS rating | <e.g. 45% NBS> |
| Structural Weaknesses and life safety hazards | <list the identified CSW, any other Structural Weaknesses and any other life safety hazards> |
| Occupancy Considerations | <e.g. no need to change the building’s current occupancy> |
| Other Observations | <e.g. note any significant degradation of the building observed> |
| Conclusions & Recommendations | < e.g. the building has a seismic rating of 45%NBS. The governing factors are:  It is recommended that the building is strengthened to at least 67%NBS in accordance with current Ministry policy. Further detailed design will need to be undertaken to develop the optimum strengthening solution.  If less than 34%NBS, summarise the significant life safety hazard(s) and mode of failure, and therefore whether the territorial authority is likely to determine the building to be earthquake prone.> |
| Rough order of cost estimate for seismic improvements (where required) | <$XX,XXX> |

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Appendices

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Building Plans

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Detailed Seismic Assessment Calculations

# Introduction

This report provides the results of a Detailed Seismic Assessment (DSA) completed for this building on behalf of the Ministry of Education. The report provides an assessment of the building’s seismic rating, highlights the key risks and presents recommendations.

Specifically, this report:

* Provides an assessment of the building’s rating in terms of percentage of New Building Standard (%NBS), based on loadings as defined in New Zealand loading standard NZS 1170.5:2004.
* Identifies any specific Critical Structural Weaknesses (CSWs), other Structural Weaknesses or life safety hazards associated with the building and presents recommendations for seismic improvements (if required).

The assessment has involved the following:

* Review of calculations, drawings, specifications and geotechnical information where available.
  + <provide a summary list of documents used in assessment here>.
* Inspection of the building to confirm it is consistent with available design documentation.
* Undertaking detailed analysis to determine the seismic strength of the building in accordance with *The Seismic Assessment of Existing Buildings – Technical Guidelines for Engineering Assessments* (Version 1, July 2017) and the Ministry’s Structural and Geotechnical Guidelines (Version 2.0, March 2016).
* Concrete elements have been assessed in accordance with the *Technical Proposal to Revise the Engineering Assessment Guidelines* (November 2018).
* Where elements of the building have been identified as scoring less than 34%NBS, recommendations for seismic improvements are made. Rough order of cost estimates for the structural improvements are included where they are recommended.

*For further background information on the Detailed Seismic Assessment (DSA) process please refer to the* [*EQ-Assess*](https://www.eq-assess.org.nz/) *website - this includes commentary and relevant context on Building Act compliance requirements.*

# Building and Site Description

|  |  |
| --- | --- |
| Number of Storeys | <e.g. 2> |
| Gross Floor Area (m2) | <e.g. 1242> |
| Year of Design (approximate) | <e.g. 1965 approx.> |
| Current use | <e.g. Hall, Library, classroom, storage etc.> |
| Structural Alterations | <None / or approx. date carried out> |
| Basement | <None or give details> |
| Gravity Load Resisting System | <give details> Include details on load paths to foundations |
| Lateral Load Resisting System | <give details> |
| Wall/Cladding/Roof System | <give details> |
| Floor System | <provide details as appropriate – in particular for multi-storey buildings> |
| Foundation System | <give details> |
| Geotechnical Considerations | <e.g. Based on our understanding of the underlying geology the subsoil classification for the site is considered to be Class D in accordance with NZS1170.5:2004>  <add any other known/relevant geotechnical aspects such as the site topography that may influence likely building performance> |

Refer to the building plan in Appendix A and photos of the building in Appendix B that will assist with understanding building description.

<It is recommended that the Gross Floor Area and Year of design/construction are validated and do not solely rely on Ministry data.>

<Give a good description of the building construction type including foundation system, frame, cladding, lining, roof and floor construction.>

<Note if the building has been structurally altered add approximate year/s of upgrade if known and detail of the alterations.>

## Building Location



<Insert image snapshot of the site showing building identity and location clearly. Reference source of aerial imagery (e.g. LINZ, Web Map Services) and orientate photo with north aligned to the top of the page>

# Seismic Assessment of the Building

## Analysis Methodology

The building was designed in xxxx by xxxx <(if/or known)>. It was designed to the then current building code NZS xxxx <(if known)> **or** the applicable design code for this time was NZS 4203 (1992) <(if not known)>.

<State the analysis approach used as the basis to determine the seismic capacity of the building (ie how the *Engineering Assessment Guidelines* were applied). This may be two-dimensional frame analysis based on a tributary area or three dimensional advanced analysis for an entire building, as appropriate for the type of building. Comment on whether historical/original calculations were available to assist with the assessment.>

<State what elements have been specifically reviewed.>

## Material Properties and Intrusive Investigations

<List the material properties utilised in the assessment.>

<describe what intrusive investigations were carried out and what was found. If “None” describe basis for assumed materials and structural systems.>

<Input detailed results and photos from any destructive testing, ferro scanning or investigative work.>

## Key Input Parameters

The following table summarises the principal parameters used for the derivation of earthquake loads and the analysis of the building.

<Populate the structural assessment factors in the value column in the table below. Note the values stated are examples only.>

|  |  |
| --- | --- |
| **Parameter** | **Value** |
| Design Working Life | <50 years> |
| Importance Level | <3> |
| Return Period Factor (R) | <1.3> |
| Site Subsoil Classification | <D> |
| Period (seconds) | <0.4> seconds (longitudinal direction) <0.4> seconds (transverse direction) |
| Hazard Factor (Z) | <0.40> |
| Near Fault Factor (N) | <1.0> |
| Ductility Factors | <stating whether the value is assumed or derived> |
| Sp Factor | <0.7> |

<Provide assumptions if necessary, and how these assumptions were derived and the background.>

## Modelling Basis and Assumptions

<Outline the modelling basis and assumptions>

## Building Drifts

Summarise in tabular form the peak building drifts (magnitude and percentage) and the levels at which they occur

## Summary of Seismic Scores and Overall Rating

The following table summarises the %NBS scores for the various elements in the building resulting from the detailed assessment, with relevant commentary on results (covering primary seismic resisting elements e.g. Walls/ Beams/ Columns/ Diaphragms/ Foundations, etc plus Secondary Structural and Non-structural (SNSS) elements.

|  |  |  |
| --- | --- | --- |
| **Element** | **%NBS Capacity** | **Commentary** |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

The assessment confirms that the building achieves an overall seismic rating of XX% NBS (ILY).

This corresponds to a “Grade X’ building as defined in Table A3.1 of the Engineering Assessment Guidelines.

If the rating is less than 34%NBS, prepare and append an Assessment Summary Report (table) using the national template.

## Structural Weaknesses & Life Safety Hazards

<Discuss and note as required: note that any items here must also be listed in the Executive Summary. Note if any Severe Structural Weaknesses are present>

### Critical Structural Weakness

<Describe the Critical Structural Weakness for this building - i.e. the lowest scoring Structural Weakness from this detailed assessment.>

### Stairs

<Highlight and discuss stair construction and supports with reference to the DBH Practice Advisory 13: Egress Stairs.>

### Secondary Structural and Non-structural Elements

<Describe the Secondary Structural and Non-structural (SNSS) elements that have been included within this assessment, and their scores *(with reference to Tables A4.1 and A4.2 of the Engineering Assessment Guidelines).>*

<In addition, provide comment on any of the following aspects:

* heavy light fittings (individual light fittings of greater than 5kg in weight that are not fixed directly to framing)
* heavy heating units
* other unsecured heavy fixtures or furniture or overhead items
* portions of buildings that interface with other buildings>

<If there is a safety hazard which has the potential to immediately cause an injury, then appropriate steps to isolate the hazard, or isolate people from the hazard need to be undertaken. The Ministry of Education Delivery Manager is to be contacted immediately.>

# Seismic Improvements

## Suggested Improvements

The building achieves a seismic rating of 67%NBS, and therefore in accordance with the Ministry of Education policy no seismic improvements are considered necessary.

*<Or alternatively>*

To increase the seismic %NBS capacity to achieve a minimum 67%NBS capacity as indicated in the Ministry’s policy, the following seismic improvements are recommended:

<For the outline design of any proposed strengthening, provide a conceptual sketch indicating an approximate scope and extent of the strengthening. Add any other relevant commentary.>

## Rough Order of Cost Estimate

<A rough order of cost estimate for the suggested improvements above is $XX,XXX. (Consider providing a breakdown for individual suggested improvements). Provide any relevant commentary on how the rough order of cost estimate was established.>

The above rough order of cost estimate is for the structural improvement work only and does not allow for the following:

* Building Consent Fees
* Consultancy fees
* Alterations and making good to architectural and building services components to incorporate the suggested seismic improvements.
* Other costs associated with upgrades that may be considered if a strengthening project was to proceed
* Cost escalations

A more accurate cost estimate will be developed after completing a detailed design for the suggested structural improvements and with the engagement of a qualified builder and/or quantity surveyor.

*<Or alternatively>*

<State “Not required if no seismic improvements are suggested.>

# Conclusions & Recommendations

## Conclusions

The building achieves an overall seismic rating of XX% NBS when considered as an Importance Level 2/3 building.

<Either>

As this rating is less than the earthquake prone threshold in the Building Act of 34%NBS, this building is likely to be determined earthquake prone by <ABC> Council when they receive this report. As required by the EPB Methodology, we append an Assessment Summary Table.

This building requires strengthening in order to meet the Ministry of Education’s policy objective of not being earthquake-prone as a short term goal,

<Or>

This does meet the Ministry of Education’s minimum seismic strength requirements of not being earthquake-prone in the short term, but does not meet the medium term goal of 67% NBS or above.

<Or*>*

This meets the Ministry of Education’s medium term goal of 67% NBS or above.

*<Choose one of the 3 options above.>*

<Include statement on occupancy status e.g. “No need to change the current occupancy of the building” *or* provide sufficient reasons why a change of building occupancy is recommended.>

## Recommendations

Seismic improvements have been suggested to achieve a minimum seismic rating of 67%NBS. A rough order of cost estimate for these improvements has been established.

Detailed design will need to be undertaken to further develop the suggested seismic improvements and provide more cost certainty. Upon completion of design documentation a building consent application will need to be lodged and approved prior to the suggested seismic improvements being undertaken.

<Or alternatively>

The building satisfies the Ministry of Education’s desired minimum seismic rating of 67% NBS and no seismic improvements are considered necessary for this building.

<List any other items that were noted during the site visit that are relevant to the building.>

# Explanatory Statement

This report contains the professional opinion of XXXX as to the matters set out herein, in the light of the information available to it during preparation, using its professional judgment and acting in accordance with the standard of care and skill normally exercised by professional engineers providing similar services in similar circumstances. No other express or implied warranty is made as to the professional advice contained in this report.

We have prepared this report in accordance with the brief as provided and our terms of engagement. The information contained in this report has been prepared by XXXX at the request of its client, the Ministry of Education, and is exclusively for its use and reliance. It is not possible to make a proper assessment of this report without a clear understanding of the terms of engagement under which it has been prepared, including the scope of the instructions and directions given to and the assumptions made by XXXX. The report will not address issues which would need to be considered for another party if that party’s particular circumstances, requirements and experience were known and, further, may make assumptions about matters of which a third party is not aware. No responsibility or liability to any third party is accepted for any loss or damage whatsoever arising out of the use of or reliance on this report by any third party.

The report is also based on information that has been provided to XXXX from other sources or by other parties. The report has been prepared strictly on the basis that the information that has been provided is accurate, complete and adequate. To the extent that any information is inaccurate, incomplete or inadequate, XXXX takes no responsibility and disclaims all liability whatsoever for any loss or damage that resulting from any conclusions based on information that has been provided to XXXX.

Appendix A:

Building Plans

(Key floor plans)

<Add plans of building here.>

Appendix B:

Building Photographs

<Add photos of the actual building here with labels and any issues identified in the report.>



Figure 1 - <Type a brief photo caption>

Appendix C:

Detailed Seismic Assessment Calculations

(Refer to separate volume)

<Add Detailed Seismic Assessment calculations here.>