

btw company

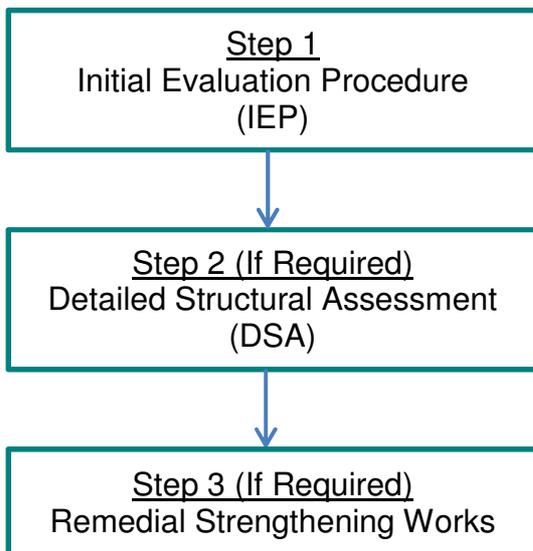
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Earthquake – Prone Buildings

BTW Company Ltd (BTW) employ a number of structural engineers qualified to undertake building inspections and assessments in terms of District Councils' policies on Earthquake Prone Buildings. All parts of New Zealand are subject to the risk of infrequent, but damaging earthquakes. Subsequent to the Darfield and Christchurch earthquakes, insurance companies, building owners and tenants all have greater awareness of the need to evaluate older buildings to determine the degree of risk and the possible need for remedial work.

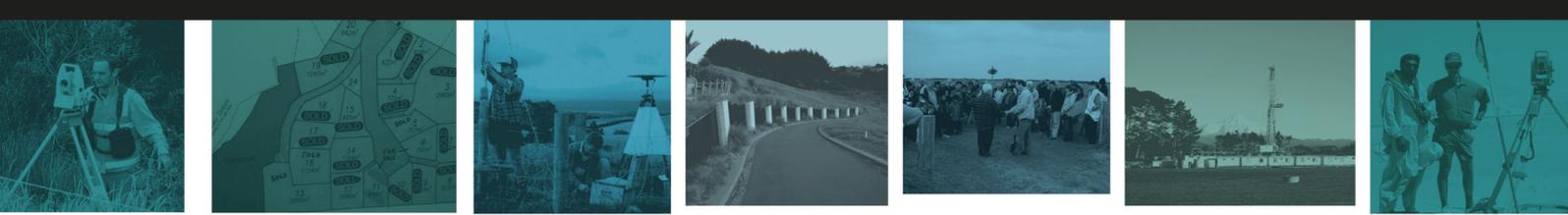
Legislation, expected to be enacted in 2013/14, will require relatively tight time frames for building owners to assess and upgrade (or demolish) their earthquake prone buildings. Further details are available on request in the form of BTW's Notes on Earthquake Prone Buildings.

BUILDING EVALUATION PROCESS



We can help you with each step





BTW Company Capability Includes;

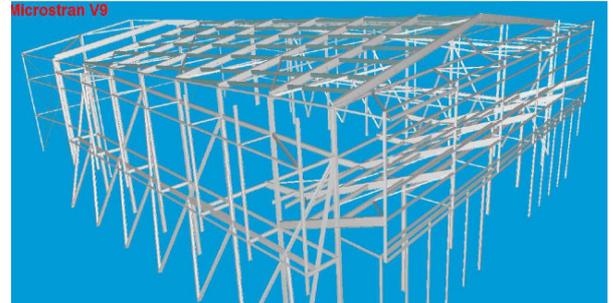
- Structural engineers – Russell Harrison (CPEng), Jeck Icaro, Mathew Dickey & David Jimenez.
- Understanding of current and proposed legislation and District Council policies.
- Initial Evaluation Procedure (IEP) for a quick, qualitative assessment of capacity to withstand earthquakes. For most, smaller buildings this will normally cost in the range of \$800 to \$1800, excluding GST.
- Detailed Structural Assessment (DSA), preliminary design and cost estimates for proposed structural upgrades.
- Structural design and documentation service for building upgrades. This includes structural calculations, drawings, specifications and contract supervision to enable the Owner to obtain a Building Consent and undertake any required remedial work.

We are available to discuss your building and your questions about earthquake assessments and building upgrades. Please contact us as follows:

Telephone: (06) 759 5040

Mobile: (Russell) 027 256 2941
(Jeck) 027 558 2693

Email: russell.harrison@btwcompany.co.nz ,
jeck.icaro@btwcompany.co.nz



New Plymouth Girls High School Project
Photo of classroom (H block) & images from structural analysis model



New Plymouth Girls High School Project
Photo of classroom analysed (B block)



Quality
ISO 9001

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Notes on Earthquake Prone Buildings

Part 1 - Two assessment procedures, IEP and DSA

May 2013

1. Many (mainly pre-1935) buildings are Earthquake Prone as defined by New Zealand law. In simple terms this means that if the building is subjected to earthquake actions 1/3 as strong as are used for the design of new buildings then there is a high risk that the building will collapse, with the potential to cause loss of life and serious injury.
2. The limit below which a building is defined as Earthquake Prone is therefore referred to as one third of New Building Standard, abbreviated to 1/3 NBS or 33% NBS.
3. Structural engineers have developed two procedures for the evaluation of existing buildings to determine the degree to which they can withstand earthquake shaking. These are the Initial Evaluation Procedure (IEP) and the Detailed Structural Assessment (DSA). Both procedures result in the building being rated as a percentage of NBS. In addition an alphabetic seismic grade ranging from A+ to E is determined.
4. The IEP is an initial screening system designed to separate the better buildings from those which could potentially be Earthquake Prone. It is a relatively cheap, quick procedure which is intended to ensure that all potentially Earthquake Prone buildings are rated below 33% NBS and therefore require further investigation. The IEP is not a normal quantitative structural analysis and inevitably there are some buildings which will be rated below 33% NBS at the IEP stage, but which later prove to have a higher rating. Indicatively, an IEP requires a time input of 5 to 10 hours.
5. The DSA is a rigorous, quantitative structural analysis based on the specific structural form, materials and dimensions of the building. Typically a DSA will require a review of original drawings, extensive inspection and measurements of the building and will often require invasive work to determine the significant structural details, eg the number and size of reinforcing bars in concrete structures. Indicatively, and depending on the details in any particular case a DSA could involve approximately 50 to 200 hours work.
6. Buildings which are not classified as Earthquake Prone may nevertheless pose real risks of dangerous failure in the event of a large earthquake. **No building can be considered to be fully earthquake proof.** Earthquakes to the 33% NBS level have an estimated 1 in 50 chance of occurring in any given year whereas earthquakes to the 100% NBS level have a 1 in 500 chance of occurrence.
7. Earthquake Prone buildings will, as a matter of law, need to be upgraded or demolished within specified timeframes. After law changes which may take effect late in 2013, it is expected that unreinforced masonry (URM) buildings will need to be upgraded before 2021 and a further eight years will be allowed for other buildings.
8. The New Zealand Society for Earthquake Engineering recommends that buildings be strengthened to the 100% NBS level if this is reasonably possible but that a level of 67% NBS is the minimum to be achieved. In addition, tenants, financiers and insurers often require or prefer that buildings have a rating not less than 67% NBS.

Notes prepared by-
Colin Bell BE(Civil), MIPENZ, CPEng
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Making it happen.

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Notes on Earthquake Prone Buildings

Part 2 - Unreinforced Masonry Buildings

May 2013

1. Many early buildings, mainly predating the 1931 Napier earthquake, are constructed substantially of unreinforced masonry (URM), usually consisting of brick walls with timber floors. Stone masonry buildings also exist, particularly as churches or older public buildings. URM buildings often perform very poorly in earthquakes and were never designed to withstand the effects of severe earthquake shaking.
2. After an initial (IEP) assessment showing a building to be potentially earthquake prone (less than 33%NBS) the Territorial Authority (District or City Council) will require the building owner to undertake a detailed structural assessment (DSA) to confirm (or not) that the building is earthquake prone. Proposed new law will require the Territorial Authorities to enforce the completion of this process within two years, ie by approximately the end of year 2015.
3. The DSA is a rigorous, quantitative structural analysis based on the specific structural form, materials and dimensions of the building. Typically a DSA will require a review of original drawings (usually missing or of little help), extensive inspection and measurements of the building and will often require invasive work to determine the significant structural details. Indicatively, and depending on the details in any particular case a DSA could involve approximately 50 to 200 hours work.
4. In the case of many URM buildings the DSA will serve mainly to confirm what is already known, that the building is definitely earthquake prone. In addition the DSA is significant progress toward a detailed design of possible structural upgrades which will result in a much more secure building in the event of a large earthquake. The DSA should include preliminary design and preliminary cost estimates for the required upgrades. Having an estimate of likely upgrade costs will help building owners to decide whether to upgrade the building or alternatively to simply demolish the building and then rebuild or sell the property.
5. The New Zealand Society for Earthquake Engineering recommends that buildings be strengthened to the 100% NBS level if this is reasonably possible but that a level of 67% NBS is the minimum to be achieved. In addition, tenants, financiers and insurers often require or prefer that buildings have a rating not less than 67% NBS. The proposed new legislation is expected to require a lower level of strengthening, 50%NBS for chimneys parapets and external walls and 34%NBS otherwise.
6. The new legislation is expected to require upgrading or demolition within a maximum period of seven years from the date of enactment, ie probably before year 2021. Territorial Authorities are expected to be enabled to enforce earlier deadlines for the strengthening of specific buildings which are assessed as more important or posing higher risks of injury etc.
7. There is a range of options for upgrading URM buildings. These include; additional structural frames (often structural steel), reinforced concrete walls, near-surface mounted reinforcing, surface bonded fibre reinforced polymer, strengthening of existing floor and ceiling diaphragms together with upgraded connections between walls and diaphragms.

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