



Seismic Management Guidelines

Asset Management and Systems

1. Guideline Definitions

AADT – Average Annual Daily Traffic count

AC – Auckland Council

AT - Auckland Transport

ATCOP - Auckland Transport Code of Practice

CCO – Council Controlled Organisation

Earthquake prone buildings are defined in Section 122 of the Building Act 2004 as those likely to collapse causing injury or death, or damage to any other property, during or following a moderate earthquake.

Legal road has the same meaning as **road** in the Local Government Act 1974 (Section 315). In short, it covers the total area of land between road boundaries including:

- carriageway (formed road)
- footpath including kerb and channelling
- cycle ways, cycle paths
- land that is legally designated as road but is not currently formed as carriageway or footpath (road reserve)

Lifeline Routes are essential 'utility' services that support the life of the community – such as water, wastewater, stormwater, power, gas, telecommunications and transportation networks.

Moderate Earthquake is legally defined as, in relation to a building, an earthquake that would generate shaking at the site of the building that is of the same duration as, but that is one-third as strong as, the earthquake shaking (determined by normal measures of acceleration, velocity and displacement) that would be used to design a new building at the site.

NZTA – New Zealand Transport Agency

Over-dimension Route – is a corridor designed to accommodate over height or weight vehicles that exceed one or more of the dimension limits outlined in section 4 of the Land Transport Rule: Vehicle Dimensions and Mass 2002.

Richter Scale is a numerical scale for expressing the magnitude of an earthquake on the basis of seismograph oscillations.

Seismic event is a sudden inelastic deformation within a given volume of rock that radiates detectable seismic energy.

SOI – Statement of Intent

Terminology is used in this document to describe whether an aspect or statement is a requirement under law/mandatory or good practice:

- **Must** – indicates something that is mandatory or required by law
- **Should** – indicates a recommendation
- **May** – indicates something that is optional and may be considered for use.

2. Guideline Summary

The Mayor's vision outlines turning Auckland into the world's most liveable city by 2040. The Auckland Plan has identified that an efficient and integrated network of roads and public transport is vital to delivering this vision. As a Council Controlled Organisation (CCO), AT is responsible for delivering the region's transport services – from roads and footpaths to cycling, parking and public transport. Through the Statement of Intent and to contribute to

the achievement of priority areas and targets contained in the Auckland Plan, AT is required to prioritise and optimise investment across transport modes and related infrastructure.

AT has developed a set of guidelines to ensure that the transport services will be delivered on a consistent basis around the Auckland region. These guidelines identify the approach AT will apply when managing the transport assets. The approach identified in the guidelines is cognizant with the Level of Service identified in the Integrated Transport Programme and Asset Management Plan.

The AT Seismic Management Guideline supports AT's contribution to Auckland's "Lifeline" initiative, ensuring that the risks associated with key transport infrastructure are identified and managed appropriately. This guideline also identifies the processes which AT will follow after a seismic event.

3. Background

AT is responsible for the management of the road and passenger transport networks. This responsibility extends to identifying susceptible infrastructure and the processes around managing the associated risks.

Following the Canterbury earthquakes, the need to identify earthquake susceptible infrastructure has increased. This has been reflected in an increased interest in seismic screening by infrastructure owners.

In the past Auckland was considered to be of low seismic risk and infrastructure design requirements were lower than in areas of perceived higher risk, such as Wellington. It is probable that the seismic screening process will identify that a reasonable proportion of existing infrastructure assets older than 25 years will require retrofitting and strengthening.

Historically councils had a limited budget and some had a programme to undertake seismic screening of its building and infrastructure assets. The Building Act 2004 requires all Territorial Authorities to adopt an earthquake prone buildings policy, which, as defined, includes bridges, retaining walls, wharves, ferry and rail facilities, and car park buildings. The policy must be based on the findings of an initial earthquake assessment with a focus on identifying earthquake prone buildings. AC is a Territorial Authority for the purposes of the Act and so has developed its own Earthquake-Prone, Dangerous and Insanitary Buildings Policy (2011–2016).

AT's Seismic Management Guideline will support AC's policy.

4. Purpose and Scope

AT is adopting a risk-based approach to management of the transport assets in the event of a natural disaster or emergency situation.

The purpose of the seismic management guideline is to ensure AT has a consistent and coherent approach to managing the seismic risk of network and other critical assets. The guideline seeks to ensure that AT undertakes risk-appropriate screening of the critical assets and the resulting information is used to manage/mitigate the risks.

The guideline is made up to two parts:

Part One: Screening Programme

- Identifies the hierarchy of AT assets which require seismic management
- Provides a tiered screening process
- Provides a process for reporting the screening results and taking action

Part Two: Event Response

- Identifies a target seismic event (or level of events) that would trigger a response from AT for action
- Provides a process with roles, responsibilities and actions in the event of a target seismic event

In the event of a natural disaster it will be important to ensure key routes and services remain open and accessible to emergency services. Seismic management addressed in this guideline includes:

- key roads/corridors,
- bridges, particularly “lifeline” bridges,
- retaining walls and seawalls,
- carpark buildings,
- stormwater system,
- northern busway,
- major rail stations (the railway tracks are owned and maintained by KiwiRail),
- wharves – passenger transport, and
- high masts

5. Guidelines

5.1 Event Response

5.1.1 Seismic Event Response Levels

The seismic response levels identify the event level which then triggers a particular set of responses or actions from AT. For the purposes of this guideline the event levels are:

Level One: a small seismic event (typically less than a moderate earthquake, and reported on Geonet) generally felt by the general public. May be less than 4 on the Richter scale, but is dependent on depth and proximity in relation to key Auckland facilities.

Level Two: a seismic event generated by a moderate earthquake. The event may be >4 on the Richter scale.

5.1.2 Roles and Actions

The roles of AT staff and their responsibilities in the case of a seismic event are described below.

Roles:

The immediate response to any Level Two seismic event should be coordinated by the Auckland Civil Defence team.

The AT Operations team must coordinate the first response internally, informing the CE and Communications team in accordance with the AT emergency response policy.

The AT Chief Operations Officer must coordinate the asset inspections and report the outcome to the CE and Civil Defence.

The AT Assets team will be available to assist as required. Road Corridor Managers (RCMs) should be coordinated by their manager to inspect the key arterial routes and access ways. Support may be provided through the existing Asset Management Contracts.

PT Facilities Managers – Bus, Rail and Ferries should inspect the critical assets relevant to their areas of responsibility. Support should be provided through the existing Asset Management Contracts, Kiwirail and the Harbour Master.

Process:

Level One Event: The Operations team will coordinate the inspections (road corridor and passenger transport) under the emergency response policy and report to the Chief Operations Officer. The COO shall report to the CE the outcome of the inspections and recommend any further actions if required.

Level Two Event: The Operations teams shall work with the Civil Defence Control Room staff as instructed. The asset inspections should be completed under the emergency response policy (unless instructed differently by

Civil Defence) and reported to the COO. The COO should report the outcomes to the CE and coordinate any repair works with the Civil Defence team from AC.

5.2 Screening Programme

5.2.1 Hierarchy of Critical Assets

The hierarchy of critical assets for the purposes of this guideline is based on the road network classification and hierarchy of network structures. The lifeline priority routes are typically considered the highest level in terms of criticality, with the road network classification (strategic, primary, secondary etc.) forming the less critical levels.

Asset Type	Specific Assets or Definition
Roads	Criticality level 1: Amber roads from the Lifeline priority routes classification (key routes or those that provide access to key facilities – typically heavily trafficked/arterial roads) Criticality level 2: Strategic, primary and secondary roads (roads not included in Level 1) Criticality level 3: Connector roads, local roads, service lanes and shared zones
Bridges	Critical bridges are typically those which carry a key or arterial route or a bridge that carries services (electrical, water supply/sewer), particularly where a bridge failure would interrupt access to key facilities or potentially result in the death/injury of a large number of people.
Culverts	Major culverts of 3.6m in diameter, particularly where failure or collapse of the culvert would interrupt access to key routes or facilities.
Major rail stations	Major railway stations include Britomart Transport Centre, Newmarket, New Lynn and Manukau.
Major wharves	Major wharves include the Downtown Ferry Terminal, particularly Pier 1 and Pier 2, Devonport, Matiatia, Tryphena and Half Moon Bay.
Retaining walls and Seawalls	Critical retaining walls and seawalls are those which are >1m in height AND directly support the integrity of a key arterial route or access way OR are >2m in height and the subsidence or loss of which would result in damage to a key facility or access way.
High masts	Critical masts are those over 5m in height which carries way-finding lights and/or telecommunications signals.
Busway	The Northern busway corridor is the responsibility of NZTA.

Appendix A contains the Schedule of Critical Assets.

5.2.2 Seismic Screening Process

A phased risk-based seismic screening process should be undertaken for critical assets identified in section 5.1.1 above. This seismic screening process draws on the general principles of two documents:

- New Zealand Society for Earthquake Engineering (NZSEE) Assessment and Improvement of the Structural Performance of Buildings in Earthquakes (2006)
- Transit New Zealand Manual for Seismic screening of bridges SM110 rev 2 (1998)

The seismic screening process will be following two levels of assessment:

1. **Primary Level Assessment:** High level desk top evaluation of the potential susceptibility of the structure to seismic loading.
 - For building structures this will follow the NZSEE Initial Evaluation Procedure.
 - For Bridges and Culverts this will follow stages 1 to 7 of SM110. The assets will be prioritised on the basis of risk of failure of the asset and the consequences of that failure, both in terms of potential injury or loss of life and network operation. This will be archived by a modified selection criteria list including, in order of priority:

- 1) Structures that are not programmed to be replaced within the following 5 years.
- 2) Structures on Life line routes.
- 3) Structures on Over-dimension routes.
- 4) Structures on Single access routes to a community.
- 5) Structures with known deficient designs (ex: large ARMCO culverts).
- 6) Structures in identified potential liquefaction zones.
- 7) Structures constructed prior to 1950.
- 8) Structures on routes of large AADT.
- 9) All other structures constructed before 1972.
- 10) All other significant structures on all other routes.

- For other structures (Retaining walls and masts) this will follow the NZSEE IEP process as far as possible.

The assessment shall generate a ranked list of assets not excluded on the basis of risk which then require a more detailed assessment (secondary level).

2. *Secondary Level Assessment*: Further detailed assessment analysing the potential response to seismic loading.

Secondary level assessment shall only be undertaken on assets not excluded through the primary level assessment. It can take two forms:

- a. Qualitative assessment of the structures that couldn't be excluded through Primary level assessment because of insufficient information. This qualitative assessment will involve all necessary investigations. It will lead to either the exclusion of the asset or its selection for Quantitative assessment.
- b. Quantitative assessment of all structures not excluded through Primary level assessment of qualitative assessment. The results of the quantitative assessments shall include:
 - An assessment of the risk associated with each individual asset screened in terms of potential loss of life and severity of network interruption
 - Recommendations for the mitigation or strengthening of the asset
 - An estimated cost

The seismic assessment results shall be reported to the AT Manager – Assets and the Executive Leadership Team. The results shall also be reported to the Finance and Risk Committee of AT. Funding for the mitigation or strengthening work shall be prioritised in the LTP on the basis of a risk-based management approach. A separate funding application to AC may be required depending on the risk and works identified during the assessment.

5.2.3 Existing Assets

All assets identified in the hierarchy of critical assets in Section 5.1.1 above shall be screened through the primary level assessment. In addition, the existing asset network inventory and capital work programme shall be reviewed to identify infrastructure assets that are programmed to be replaced within the following 5 years. These will be excluded from the screening process.

Assets not excluded through primary level assessment shall be assessed at a secondary level to determine the level of intervention required as described in Section 5.1.2 above.

The seismic screening scope excludes buildings tenanted by AT but owned by AC.

5.2.4 New Assets

New assets will need to be designed and constructed in accordance with the NZ Loading Standard (NZS 3101) and the NZTA Bridge Manual (if relevant), as well as the design and building specifications for new structures provided in the ATCOP.

6. Monitoring and Review





These guidelines shall be reviewed in 12 months and thereafter as part of the three year review cycle aligned to the LTP, unless changes to legislation require an earlier review.

7. Related Guidelines

The performance standards and detailed specifications for the maintenance of assets are provided in the ATCOP and the AT Public Transport Asset Management Plan (2012). The AT Emergency Response Policy is also referred to in this guideline.

8. Document Status

Owner (contact for updates, clarity etc.)	Siri Rangamuwa (Asset Management Planning Manager)
Version no:	1.0 (Final)
Issue date:	October 2013
Review date:	October 2014
Document ref no:	P-0014
	Intranet Ref:

WRITTEN by	Siri Rangamuwa Asset Management Planning Manger	 01/11/13
ENDORSED by	Tony McCartney Group Manager Road Corridor	 6/11/13
ENDORSED by	Andrew Allen Group Manager Services	
APPROVED by	Andy Finch Manager Strategic Asset Management and Systems	 21/2/14

Appendix A

Schedule of Critical Assets

