

Structural Resilience Policy Summary for Designing Village Housing and Infrastructure in the South-Pacific for Wind, Earthquake and Tsunami

Background

In cities of the South Pacific region, structural design and construction generally follow established building regulations and design standards. However, village housing and infrastructure in developing countries often incorporate traditional materials and detailing, which do not necessarily have the structural resilience implicit in modern regulations.

Purpose

This Structural Resilience Policy Summary is intended for use by structural engineers charged with designing, checking or certifying village housing and infrastructure in the South-Pacific for wind, earthquake and tsunami loads.

The purpose to provide guidance and give confidence to design professionals, builders and building owners, that buildings designed and constructed in accordance with this policy will have a consistent level of structural reliability, compatible with due consideration of use, cost, risk of failure, available skills and construction technology.

Limitation

This Structural Resilience Policy Summary should be available to other building professionals, such as architects, builders and executives of NGOs; although it is not expected that they will be familiar with all of the terminology and the detail of the concepts embraced in the policy.

Comprehensive Policy and Details Manual

This Structural Resilience Policy Summary serves as an introduction to a much more comprehensive manual, *Structural Resilience Policy and Details for Designing Village Housing and Infrastructure in the South-Pacific for Wind, Earthquake and Tsunami*.

That manual includes:

- Part 1 – Structural Design Policy
- Part 2 – References
- Part 3 – Country Design and Analysis Assumptions
- Part 4 – Bracing, Anchorage and Connection Details
- Appendix 1 – Cyclone Categories
- Appendix 2 – Worked Example
- Appendix 3 – Regional Loads

Countries Covered by This Policy

The following countries of the South Pacific region are covered by this policy:

Australia, Cook Islands, Fiji, French Polynesia, Kiribati, Nauru, New Caledonia, New Zealand, Niue, Papua New Guinea, Samoa, American Samoa, Solomon Islands, Tonga, Tuvalu, Vanuatu, Wallis and Futuna.

Policy Where Building Regulations are Enforced

In those locations where building regulations are enacted and routinely enforced, Australian NGOs should ensure that all new construction adheres to those regulations. For example, construction in cities and in developed countries should adhere to local building regulations.

Policy for Small Buildings where Building Regulations are Not Enforced

This policy applies only to small detached village buildings (such as houses and small community buildings), presenting a low degree of hazard to life and other property in case of failure.

It applies only to single storey buildings, with cladding on elevated braced timber frame or to reinforced concrete masonry buildings built on concrete slab-on-ground.

The maximum dimensions of such buildings shall not exceed 12.5 m x 8.0 m, 2.7 m storey height, maximum eaves height 6.0 m, maximum ridge height 8.5 m, and maximum pitch 35°.

The intended design life shall not be less than 25 years.

Unless specifically over-riden by existing in-country building regulations, requirements shall be interpreted in the light of the most recent Australian and Australian/New Zealand Standards listed below.

- Design for Ultimate Limit State – Annual Probability of Exceedance is 1 in 250. Reference Period (design life) is 25 years, leading to a probability of exceedance during the life of 0.10. Load factors (applied to the representative loads) and capacity reduction factors (applied to a specified “lower 5 percentile” characteristic strengths of components) shall ensure that the probability of failure is “low” (e.g. Target Reliability Index $\beta = 3.1$)
 - Load Combinations– As per AS/NZS 1170.0
 - Permanent Loads – As per AS/NZS 1170.1
 - Imposed Loads – As per AS/NZS 1170.1
 - Wind Loads – Analysis as per AS 4055, using wind speeds from the relevant Building Regulations or, if appropriate, HB 212
 - Earthquake Loads – Analysis assumptions set out in AS 1170.4, EDC II, using hazard factors appropriate to the region
 - Tsunami Loads – For structures that are required to be designed for tsunami (except those that should be moved), analysis shall be in accordance with using the method in Australian Building Codes Board Handbook, *Construction of Buildings in Flood Hazard Areas* for a velocity of 1.5 m/s. Structural components shall be designed to withstand the design event, assuming that the cladding is partially destroyed.
- Flood Loads – For structures that are required to be designed for flood (except those that should be moved), analysis shall be in accordance with using the method in Australian Building Codes Board Handbook, *Construction of Buildings in Flood Hazard Areas* for a velocity of 1.5 m/s. Structural components shall be designed to withstand the design event, assuming that the cladding remains intact.
- Soil Properties – Site classification, construction and analysis to AS 2870; Soil loads to AS 4678