Technical Note 01 – Interaction Between Seismic Resilience and Asset Management

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1 Background

Modern asset management practices help organisations improve efficiency and reduce costs by identifying the lowest lifecycle cost construction, maintenance and renewal options.

Since new construction and renewals provide opportunities to review and improve system resilience, it is useful to review the links between asset management and resilience.

2 Asset Management

Asset management is a means of providing an agreed level of service at an acceptable cost in the longer term.

Key factors described in the International Infrastructure Management Manual include:

- Identifying the levels of service required and understanding the demand on the system;
- Understanding the composition, condition and performance of the system;
- Managing risk;
- Selecting options;
- Managing renewals;
- Managing financial aspects including ensuring that budgets are affordable and ensuring that funding for works is allocated appropriately as betterment and renewals.

Areas where seismic considerations meet asset management needs are summarised below.

2.1 Levels of Service

Post event levels of service are an important driver for understanding the resilience of a utility system. Managing post-event needs and restoration process are driven by the need to meet customer demand. Improving post-event levels of service or reducing recovery times can be justified betterment of customer levels of service as well as managing customer risk.

2.2 Composition of the System

The composition and, to a lesser extent, the condition and performance of the system are used in predicting break rates for identified seismic hazards.

2.3 Managing Risk

Risk is a major driver for resilience-related work. In many cases, seismic considerations address more low frequency-high consequence risks, whereas conventional asset management tends to address more routine events with less severe consequences and to treat emergency management as a special case. However, a risk based approach can accommodate any event frequency and any event consequence.

2.4 Selecting Options

Optimised decision making is effective at ensuring that non-financial factors are taken into consideration. Where resilience provides non-financial benefits, ODM concepts provide an opportunity to incorporate the non-financial benefits.

2.5 Managing Renewals

Drivers for renewals include performance, condition, obsolescence or financial considerations. Inadequate resilience is an additional driver for renewing a pipeline.

2.6 Managing Financial Aspects

Current accounting practices require that costs for betterment and renewals are distinguished. Works to upgrade resilience, whether by additional works (betterment), replacement of obsolete systems (whether providing betterment or not) and through non-asset solutions can be distinguished in the same way as for other reasons.

Where sufficient information is available, predicted break rates can be used to estimate the financial impacts and risk costs of failing to upgrade resilience. The risk-costs can then be compared with the costs incurred.

Following an earthquake, the repairs are likely to include elements of like-for-like replacement and betterment where resilience is being upgraded or the system is being improved during repairs. The concept the split between renewals and betterment is therefore also applicable for repair costs.

3 Summary

This review shows that resilience considerations can be readily accommodated within standard asset management systems and practices. The case for doing this is easily justified by reference to the importance of meeting agreed customer levels of service after an event as well as in normal service.

Because resilience considerations influence system selection and renewals decisions, as well as influencing product quality and risk management, understanding resilience is an essential part of successful asset management. Conversely, asset management provides an effective mechanism for implementing changes that will improve system resilience.

4 Conclusions

Seismic resilience considerations can be readily incorporated into established asset management practices whether making improvements to existing systems or renewing obsolete systems.

5 References

International Infrastructure Management Manual, IPWEA, 5th Edition 2015.
Water New Zealand, Opus, Quake Centre "Levels of Service Performance Measures for the Seismic Resilience of Three Waters Network Delivery", 2015