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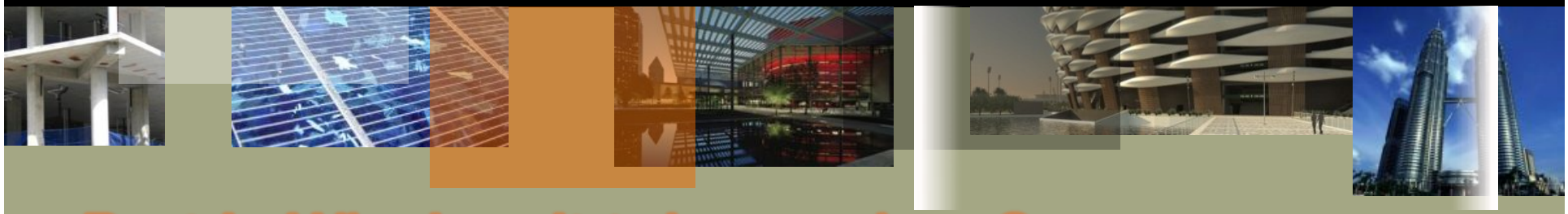
New Zealand Retrospective –

Settling Earthquake Claims



Part i: Why has it taken so long?

Part II: Is there a better approach?

Nick Hyatt
Vice President
Registered Structural Engineer (US)

6 June 2014

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New Zealand Earthquakes

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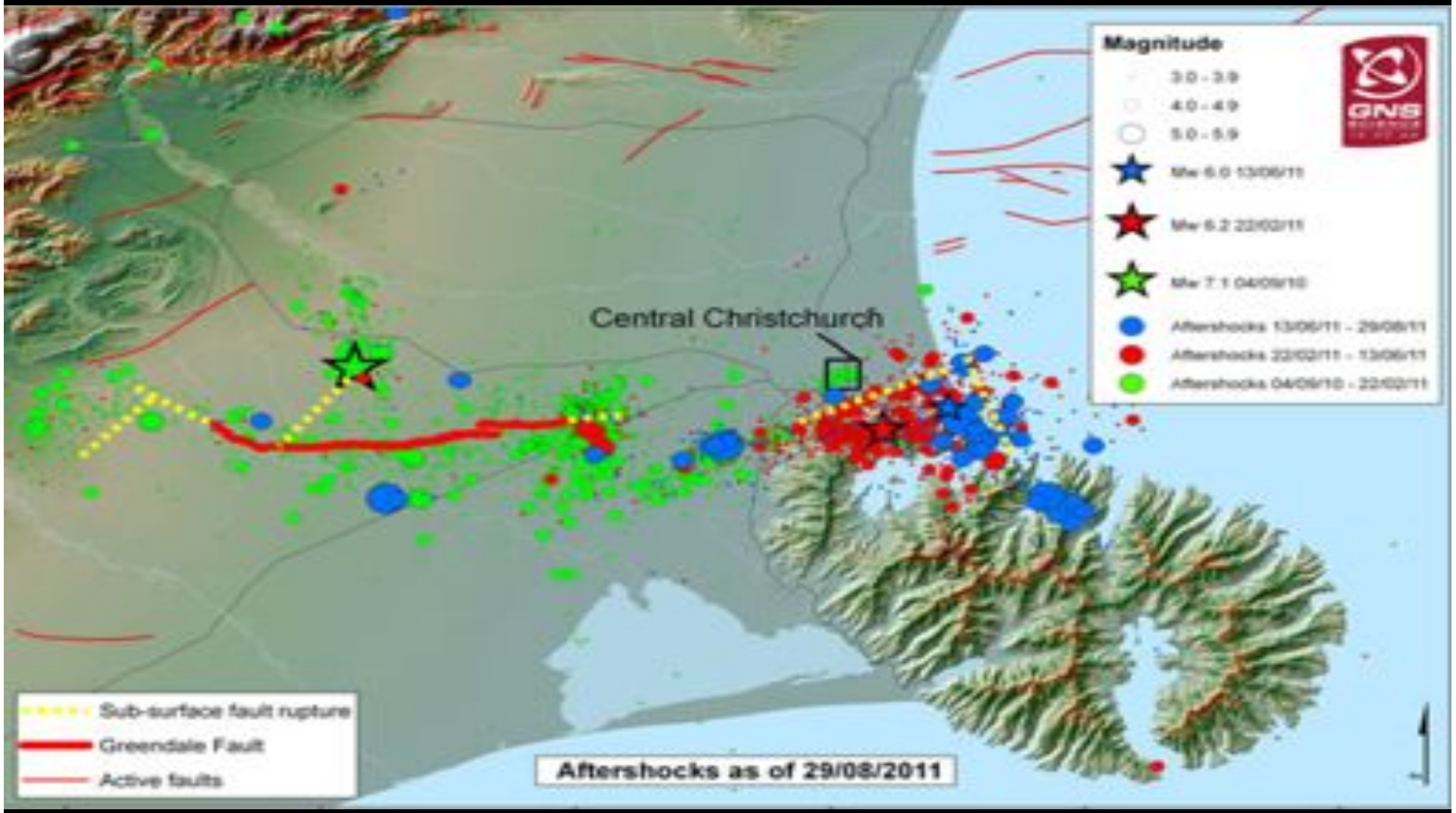
Locations of Earthquakes and After Shocks



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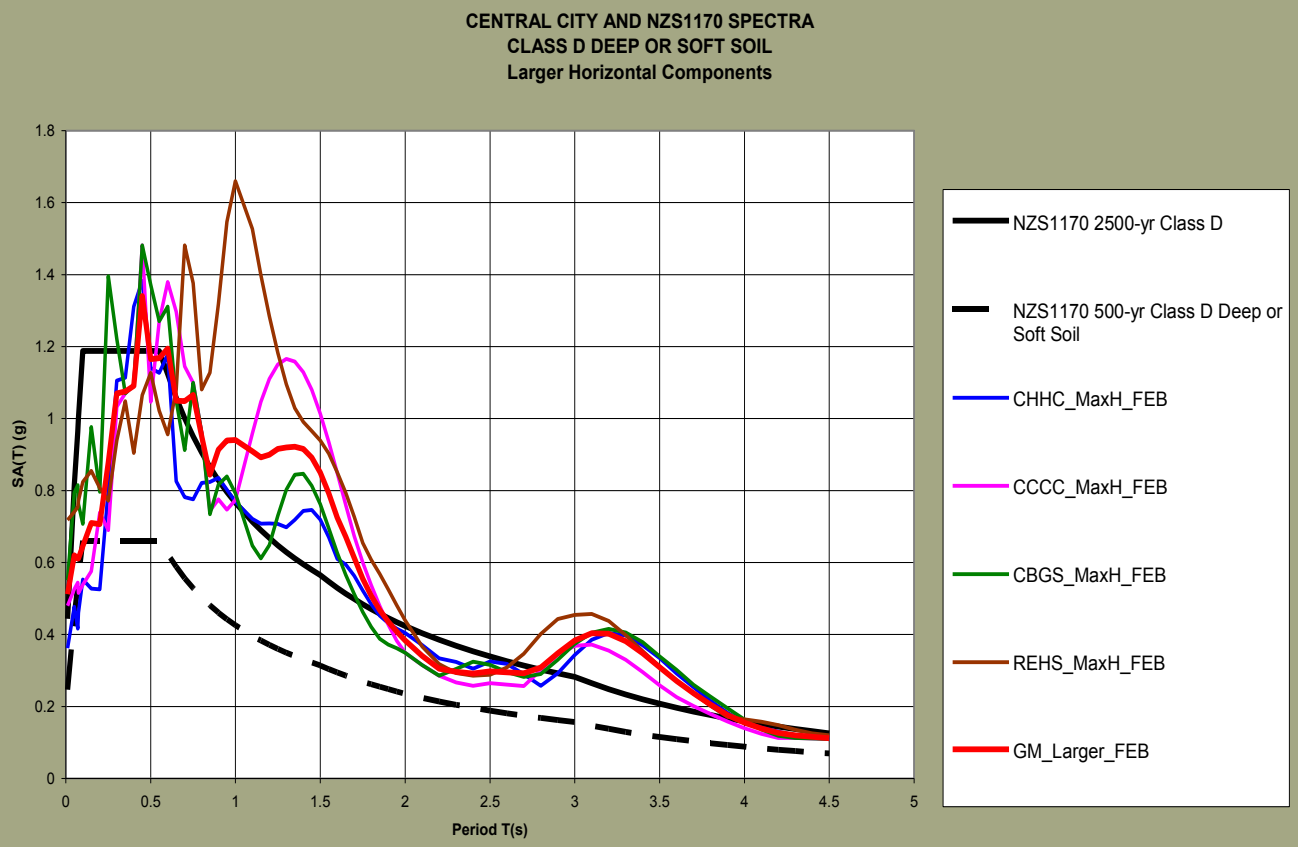
Earthquake Accelerations vs. Building Codes



22 February 2011 Earthquake produced accelerations significantly higher than building (500 year) Code

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Engineering Issues on Remaining Claims

- Problems with Settlement – Now and then
- Definition of damage
- Appropriate Repairs
- New Damage
- Liquefaction and Settlement

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Problems with Claim Settlement
Early days

- Stigma attached to a “Repaired Building”
  - Tenantable, safe
- Early settlements set precedent of full cash pay-out
  - Unsophisticated owners
  - Unequal comparisons to adjacent properties
- Culture of demolition
  - Uncertain about repair strategies
  - Fresh start offered certainty

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Problems with Claim Settlement Today

- Stigma attached to a “Repaired Building”
  - Loss of value
- Early settlements set precedent of full cash pay-out
  - Entitlement
- Culture of demolition
  - Not as much
- Definition of Damage
  - What is an appropriate repair
  - Earthquake Prone Buildings

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Problems with Claim Settlement Today

> Ground issues

- Uncertainty about ground conditions
- Will deep foundation solutions work
- How do you relevel a large building
- Are other technologies (grouting and polymers) effective
- Reluctance by engineers make definitive recommendations

Definition of Damage

- Pre-existing Conditions
  - Movement of an old crack
  - Historic settlement
- Proximate Cause
  - Lack of maintenance
  - Derelict buildings
  - Ignored prior strengthening recommendation
- De minimis conditions
  - When does a crack require repair
  - Is every inconsequential change “damage”

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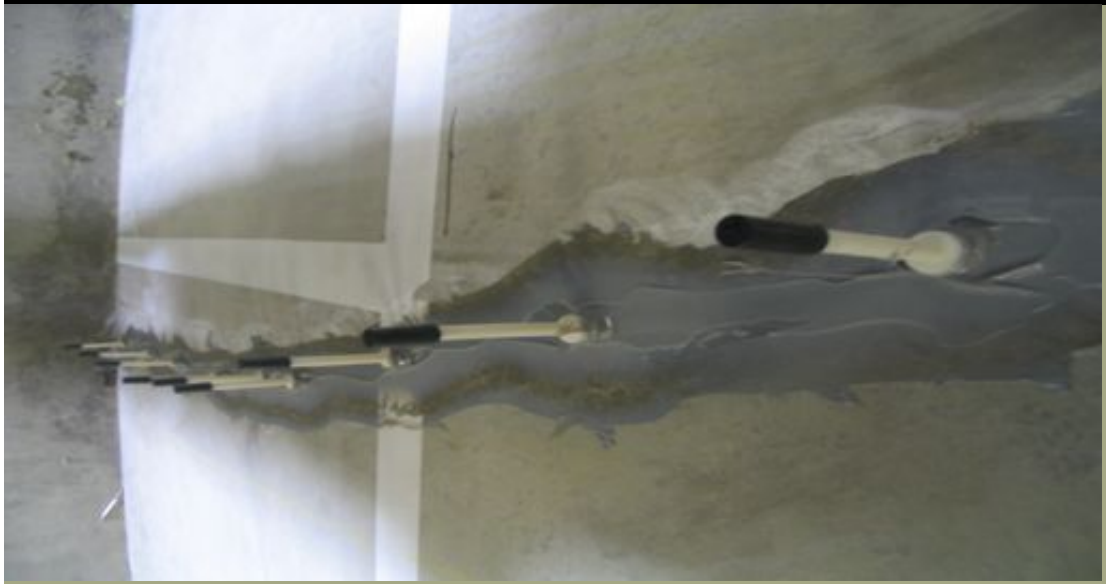
Appropriate Repairs



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> Restore the function, amenity, and future maintenance characteristics
> Look and feel the same.
> Reasonable and appropriate response to the damage

Owner Engineer Response

> Give the owner exactly what they had before.
> Cracks are unacceptable regardless of significance or impact
> Rebuild elements that are still serviceable

Appropriate Repairs

- Cracks in concrete
  - No way to remove the crack
  - Epoxy injection is a repair accepted worldwide
  - Cracks smaller than 0.2 mm can not be repaired
  - Concrete is expected to crack
- Masonry damage
  - Code allows for “repair-in-kind” if damage is not “substantial”
  - Repointing is normal maintenance

Earthquake Prone Buildings

- Regulatory Response to Understrength Building Stock
  - Territorial Authority can require engineering study
  - Buildings with a strength less than 33% NBS are “Prone”
  - CCC and EAG advocate strengthening to 67% of current code
  - Considerable confusion over what is Legally required
- Current High Court Ruling
  - Only strengthening to 33% is enforceable
  - Section 124 notice required for strengthening

Earthquake Prone Buildings Strengthening

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> Add elements as required to improve performance.

> Some changes are inevitable

> Work to 33% for damaged elements only

Owner Engineer Response

> Give the owner exactly what they had before.

> Change of aesthetic or space is unacceptable regardless of cost.

> Must work to 67% target

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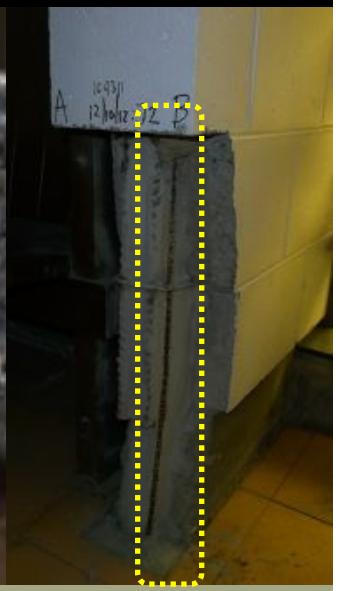
Strain Hardening
New definition of damage



- Reinforcing steel is a component of concrete and masonry structures
- Most columns, beams, and walls have steel within
- Steel adds tensile strength and toughness to structures
- Structures are expected to crack as tensile force develops in the steel

Strain Hardening
New definition of damage

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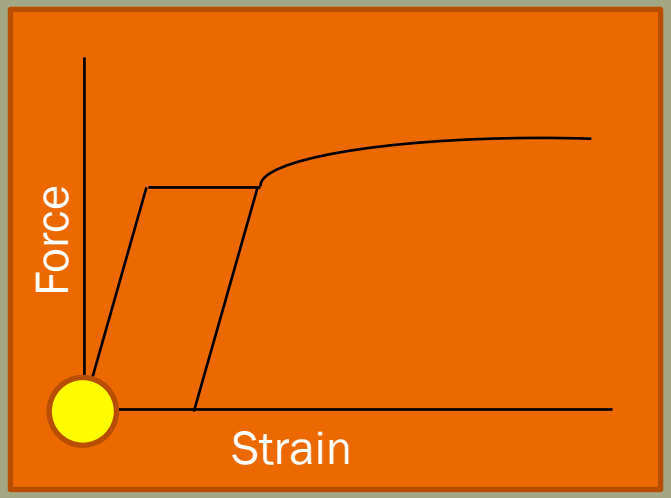

> Bars stretch under tension

- Stretch is elastic to a point
- Further stretch is permanent
- After a certain point fracture occurs
- Fracture can occur at smaller strains under cyclic loading (fatigue)

Strain Hardening
New definition of damage

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- Problem is a loss of future resilience
  - Rarely is strength or function impaired
  - Structures may be fully code compliant, but not as before
- Potential problem is not well defined
  - Actual issue is low cycle fatigue
  - Limited academic research
  - No definition of limits in practice
- Difficult to measure
  - No standard field test
  - Experimental methods are costly and not definitive
- Repair is not clear

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Liquefaction and Lateral Spreading

Photo credit information here.

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Settlement Damage

Christchurch, New Zealand

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Settlement / Tilting

Christchurch, New Zealand

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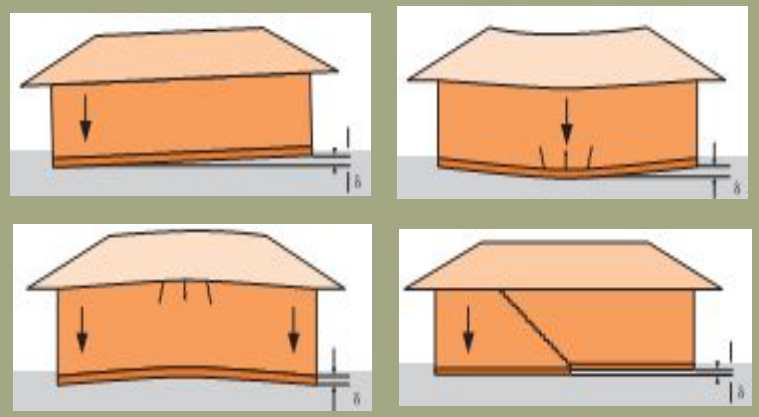
Building Settlement

Global Settlement

> Amount of settlement of the building as a whole

Differential Settlement

> Difference in settlement from one portion of the building to another.



Images courtesy of Ministry of Business, Innovation, and Employment

Building Settlement Code Guidance

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Residential

- The Ministry of Business, Innovation, and Employment jurisdiction.
- A threshold of 1:200 slope or 50 mm overall settlement determines when relevelling **may** be required.

Commercial

- No explicit criteria from the New Zealand Building Code for what is acceptable.
- Compliance Document B1 indicates that differential slope of 25 mm in 6 m (1:240) meets expected performance.

Building Settlement Application

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Thornton Tomasetti Approach

> 1:240 Threshold determines when relevelling **may** be required

> Settlement must be new

- Is new damage consistent with observed levels
- Is there evidence of historic problems
- Is settlement consistent with condition of linings, fittings, and finishes

> Settlement must impair function, amenity, use of the structure.

> Global settlement is not damage

Building Settlement Re-Levelling

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New Foundations

- Deep piles
- Raft foundation
- Can be expensive and often times leads to a total loss

Soil Improvements

- Building re-levelling vs slab relevelling
- Compaction grouting
- Jacking on grouting (JOG)
- Jet Grouting
- Depending on soil conditions, can potentially be more economical than new foundation

Rise of Litigaton

- Most straight forward claims have been settled
- Remaining claims are more contentious
- Many are progressing toward litigation

Insured's Advocates (Claims Preparers)

- Frequently claim up to the sum insured for four major events:
  - 4 September 2010
  - 26 December 2010
  - 22 February 2011
  - 13 June 2011
- Time pressure tactics used in the U.S. are ineffective in NZ
- Most claims are on hold and insurers are waiting to see the outcome of a few early cases
- Some local brokers and project managers have adopted the aggressive tactics
- Court dates are scheduled for most of these claims

Code Upgrade / Seismic Strengthening

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- Flows from ‘Local Authority/Public Authority’ (Code Upgrade) clause in insurance policy
- Pressures from Government; local Christchurch authorities; professional bodies, especially engineers
- Significant potential extra costs
- ‘Future-proofing’ not covered by policies

Code Upgrade / Seismic Strengthening

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Solution

> Obtain top-flight legal advice

> Understand engineering issues and NZ legislation

> Provide clear Guidelines to Claims personnel, adjusters, retained engineers etc

> Maintain consistent stance

Allocation

- Five main events
- Proper allocation to each essential
- Especially where reinsurance programme covers different events/years
- Also affects – number of deductibles; limits per event/year; ‘Reinstatement of Sum Insured’ clauses; Business Interruption losses

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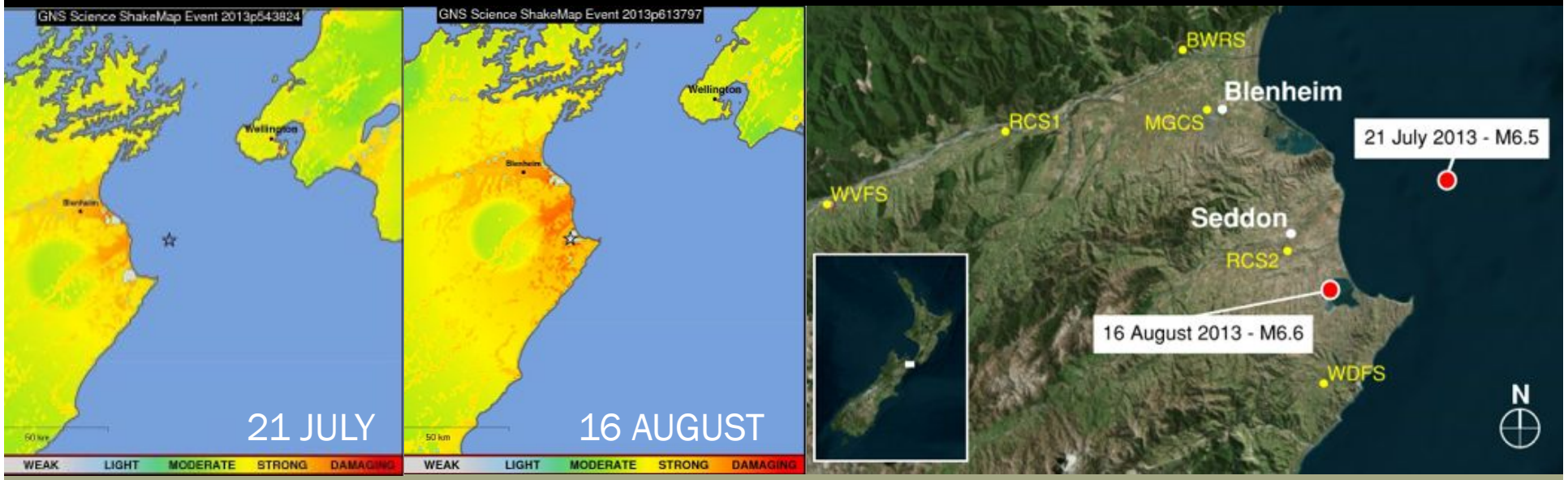
Part II:
More Earthquakes in NZ



- > Confidentiality note: These claims are still active and evolving
- > 21 July 2013 Cook Strait Earthquake: M6.5, 13km deep
- > 16 August 2013 Lake Grassmere Earthquake: M6.6, 8km deep
- > Minor to negligible building structural damage in Wellington and Marlborough
- > Minor to significant wine tank damage throughout Marlborough

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Marlborough Wine Industry

- New Zealand wine exports valued at $1.2B in 2012
- Marlborough region produces 70% of the industry's wine
- ~50 independent wineries with significant variation in size
- Material assets include warehouse buildings, plant, and wine storage tanks
- Most valuable asset is the wine itself

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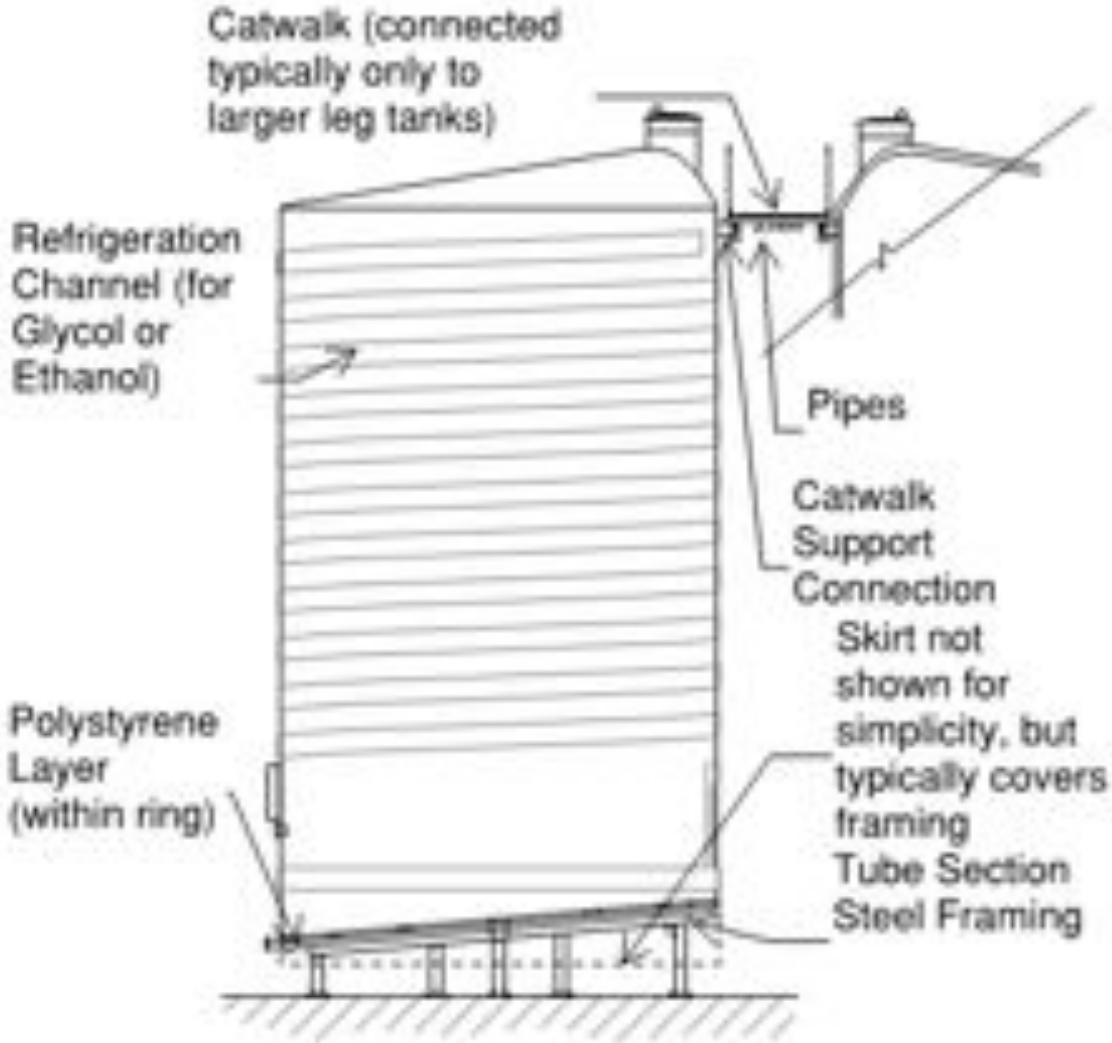
Wine Storage Tanks

- Designed for less seismic force than buildings (usually ½ as much)
- No minimum design loads mandated by the NZ Building Act
- Constructed with sheets of stainless steel: 1,000 to 300,000 litres
- Cyclical use with vintage: empty in February, full in April

Wine Storage Tanks

Typical Leg Supported Tank



Side Leg Supported Tank

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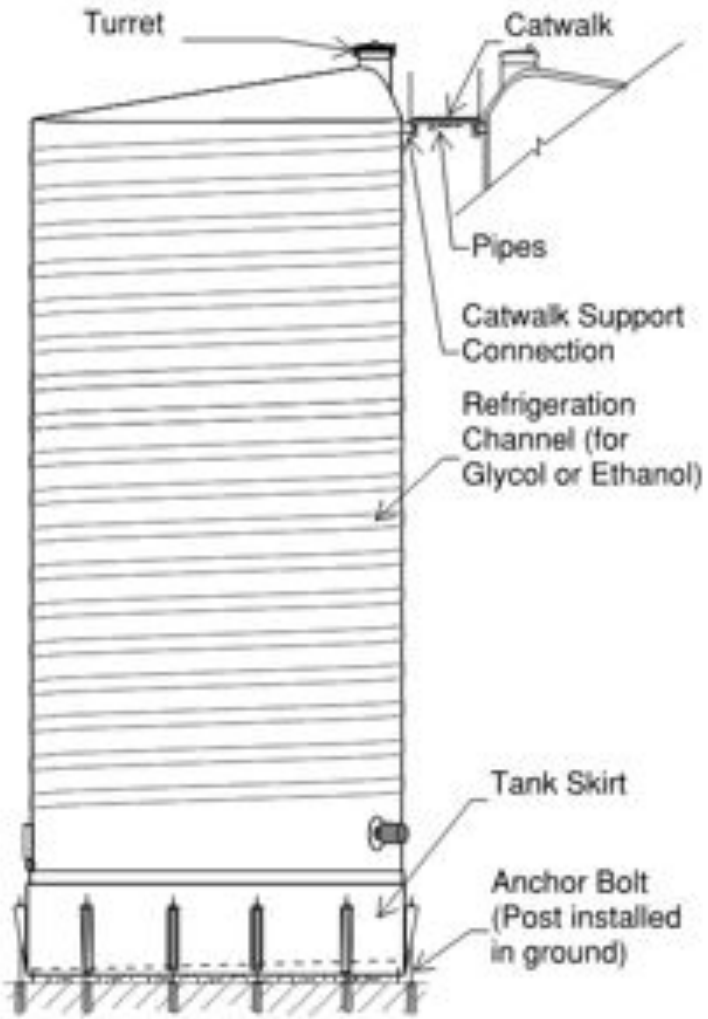
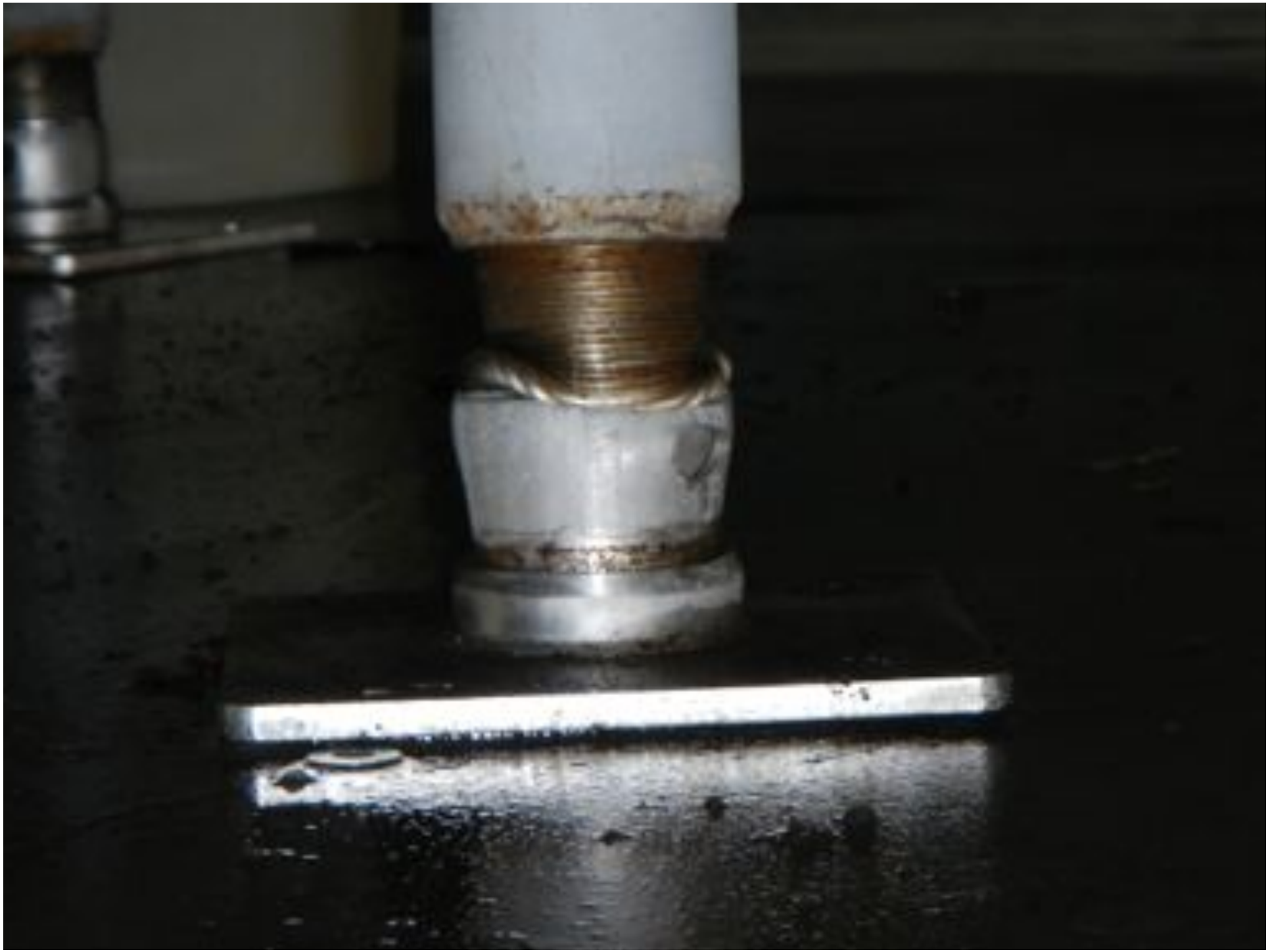
Wine Storage Tanks

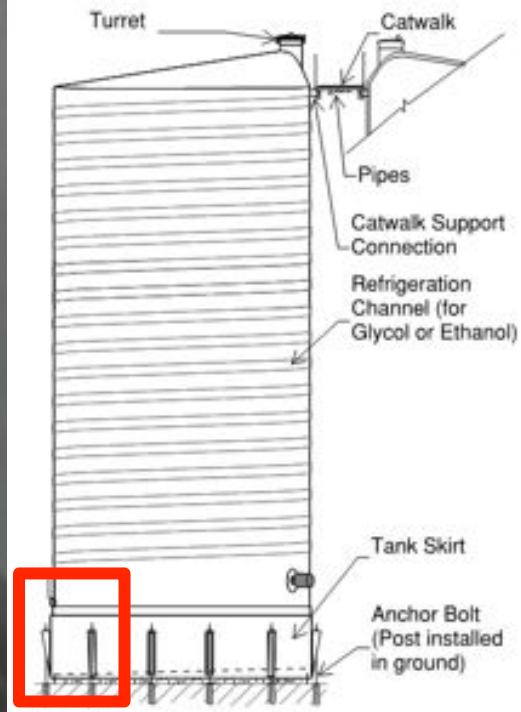
Typical Plinth Supported Tank



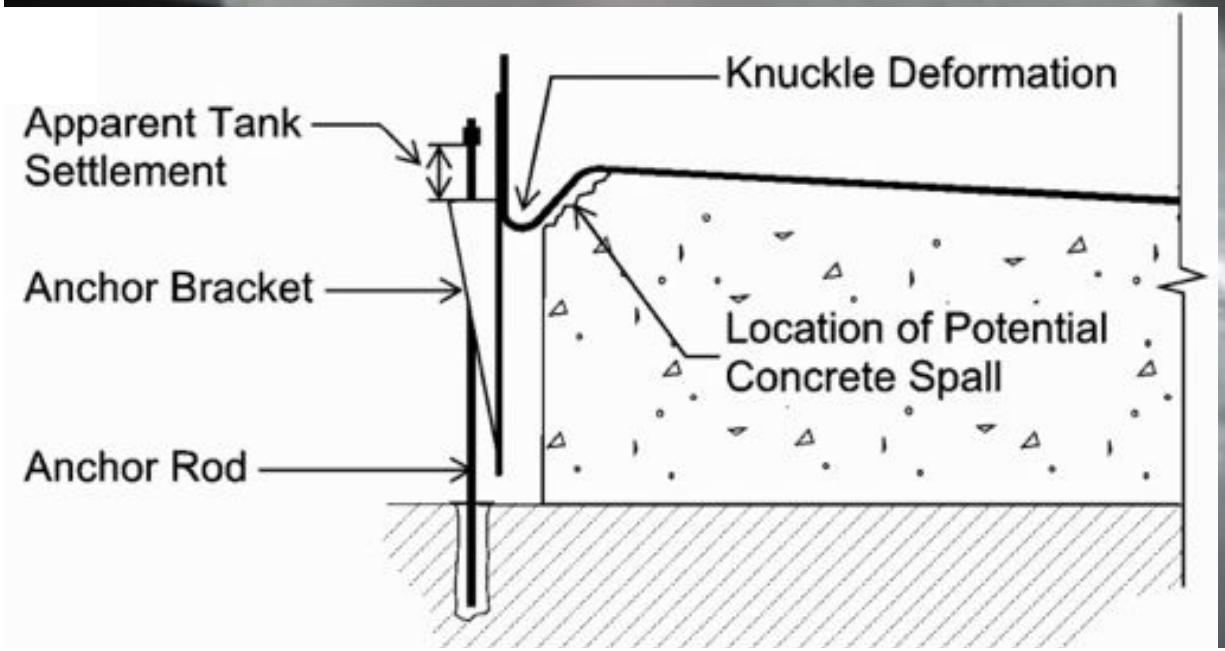
Side of Plinth Supported Tank


P2-1503





Side of Plinth Supported Tank



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The Flow of the Claim




1. Triage – damage mitigation and reconnaissance
2. Assessment – define and quantify the damage
3. Repair Design – identify appropriate repairs for the damage
4. Resolution – settle the claim or manage reinstatement

Step 1: Triage

Those who are likely to live, regardless of what care they receive;
Those who are likely to die, regardless of what care they receive;
Those for whom immediate care might make a positive difference in outcome.

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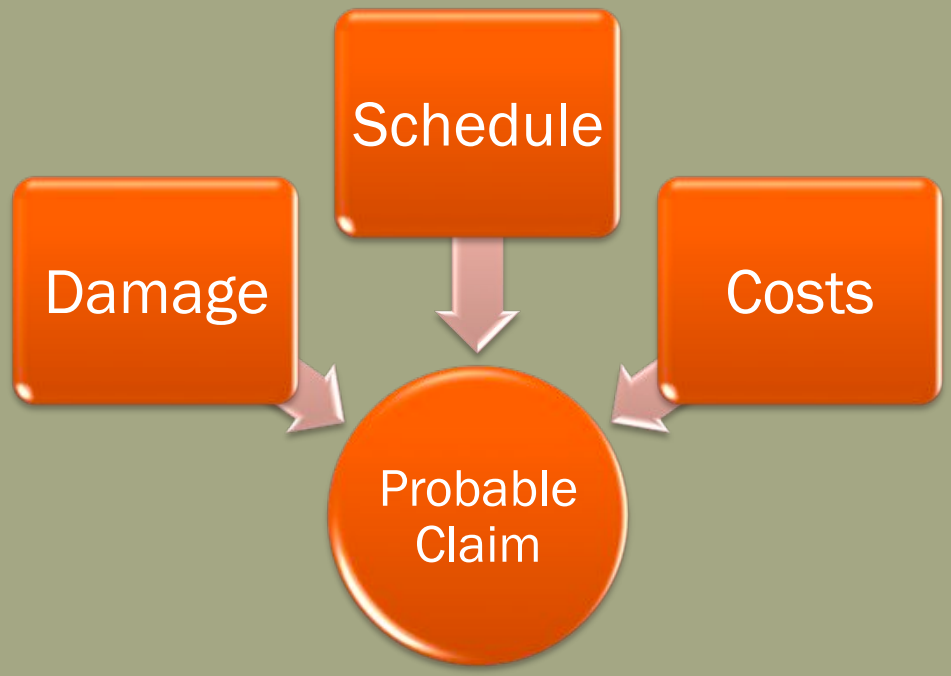
Triage and Reconnaisance

- Immediate appointment of a technical consultant on behalf of the insurer can reduce business interruption and loss of production
- Consider visiting properties immediately, even if a claim was not filed
  - We visited 20 wineries in the first week (six teams, one adjuster paired with one engineer)
- Develop temporary "make-safe" repairs with tank manufacturers

Setting Reserves



- Develop a 'gut feel' for the extent of damage substantiated with gigabytes of photographs and targeted measurements
- Identify the worst-case damage scenarios
- Collaboration needed between adjuster, engineer, and cost estimator to produce meaningful reserve estimates

Step 2: Assessment

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An Engineer's Brief (New Zealand Specific)

1. Identify the earthquake-related damage, which is considered to be some physical alteration to the building that is material in nature (i.e. not *de minimis*) that impacts detrimentally on the function or value of the building.

Damage Assessment

2. Identify the lowest cost repair approach that will reinstate each damaged element *to a condition substantially the same as, but not better or more extensive than, its condition when new.*

Insurance Policy Response

3. Confirm that, after the repair(s), the repaired elements will comply with the building code, but only to the extent that they complied before initiating the repairs.

Building Code Compliance

4. Consider the identified scope of repair as one complete scope of building work, and provide an opinion on whether the building consent authority is likely to (a) allow it to be exempt from consent, (b) require consent, or (c) deny consent. If (c) then identify and explain what further work is likely to be required by law or local policy.

Additional Work that MAY be covered by the policy

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Assessment: Document Damage

- Develop a systematic approach to record damage to assets that may be similar but <u>not</u> identical
- Also record general information such as dimensions and exact material types (e.g. different types of stainless steel)

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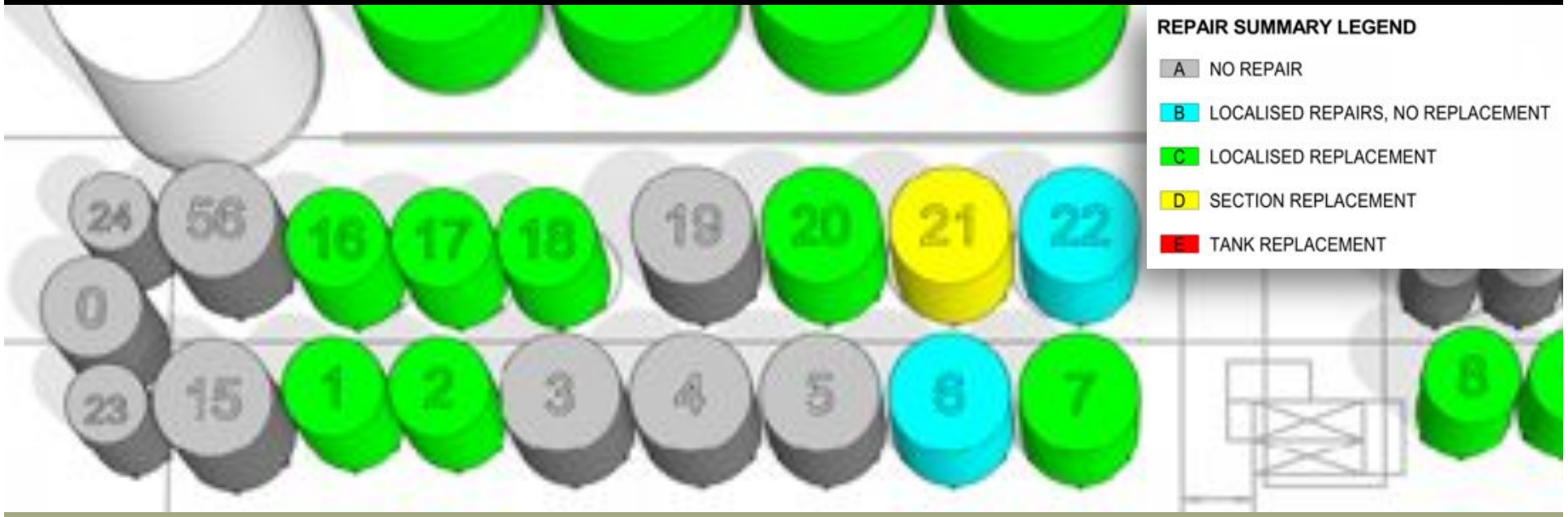
Assessment: How good is your record?



- Data collection at the time of the loss is cheap and easy…This is often the only chance to collect information that is not contaminated
- Organised records are a strong defense against expanding claims
- Forensic Information Modeling, “FIM”

Step 3: Repair Design

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Additional Work that MAY be covered by the policy

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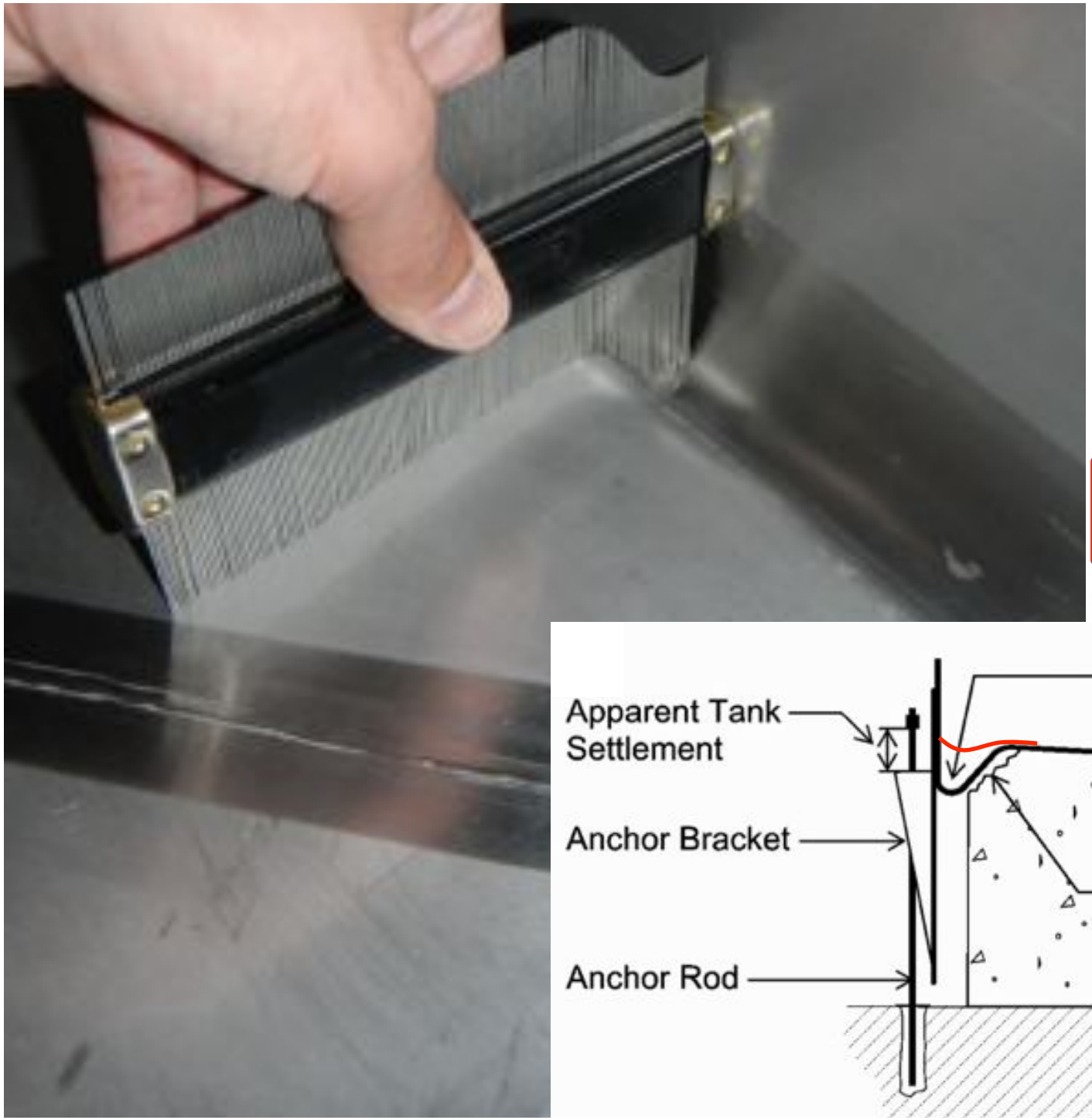
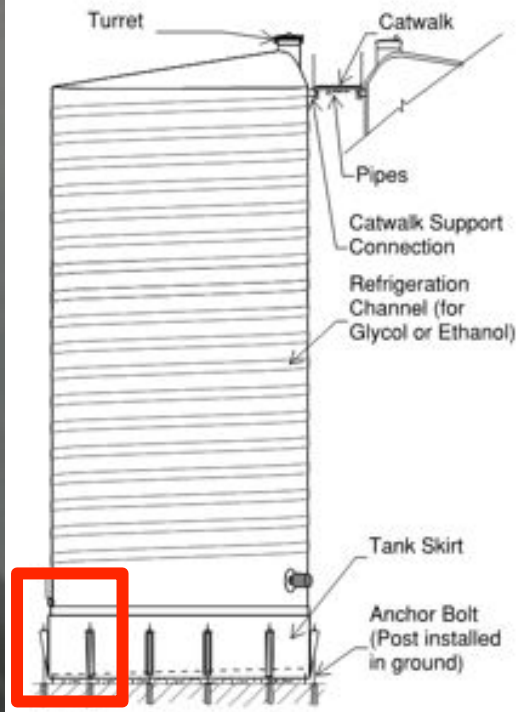
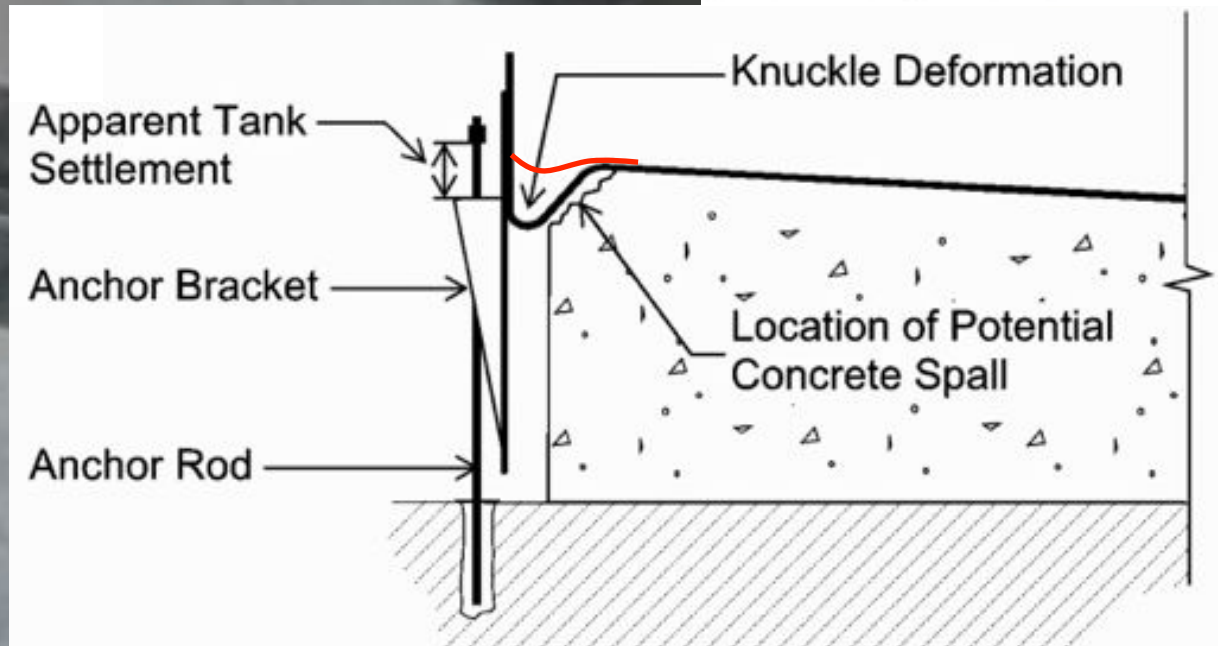
Identification of Appropriate Repairs

- Early discussions with the insured about what you consider to be appropriate repairs are essential to avoid unrealistic expectations
- Interaction between the insurer's and insured's engineers is ideal if they are simultaneously assembling scopes of repair





Side of Plinth Supported Tank



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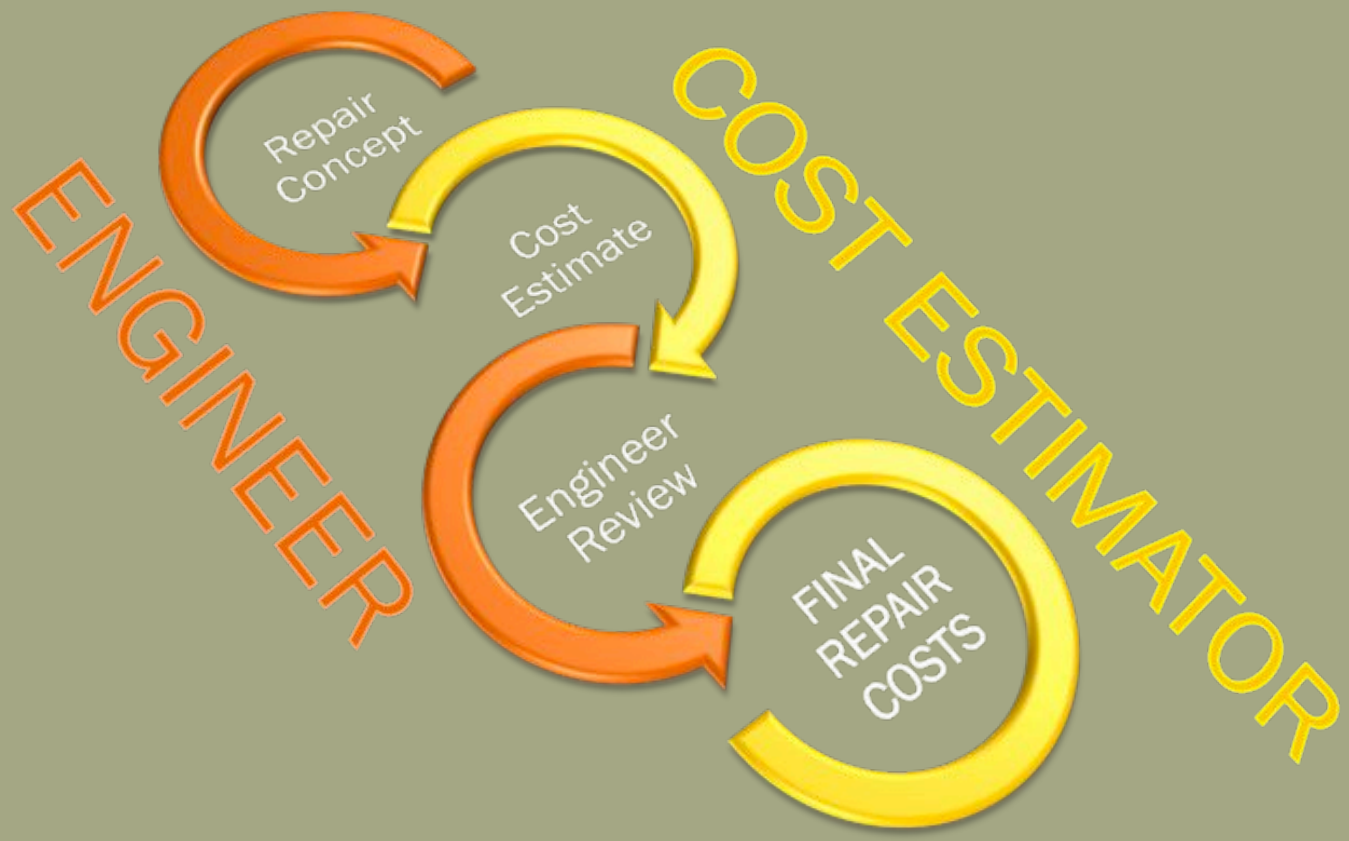
Develop Realistic Repair Costs



- Engineers must review the cost estimates prepared based on their scope of work, a.k.a. the 360 Review
- Cost estimators may misinterpret the engineers' scope of work if there is no communication

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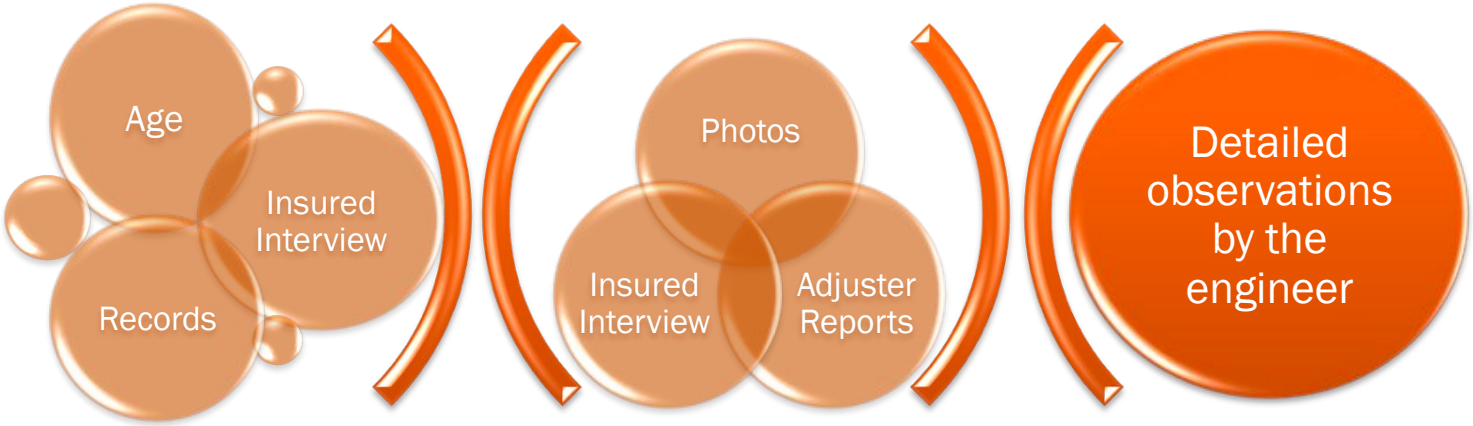
Allocate Repair Costs to Multiple Events



"Pre-existing" Condition

Event 1
21 July 2013

Event 2
16 August 2013

Multiple Events + "Frustrated" Repairs = Cost Allocation Ambiguity

> Sound engineering judgment based on reports, photographs, and knowledge of adjacent takes precedence over other approaches

> Models based on analysis of regional information (e.g. cyclone windspeed or earthquake intensity) can fill in the gaps, but should be subordinate to recorded observations

> Repair costs are driven by the first event that "triggered" the repair

Allocate replacement cost to Event 1 or 2 or split proportionally???

Step 4: Resolution

comply with the building code, but only to the extent that they complied before initiating the repairs.

Building Code Compliance

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Additional Work that MAY be covered by the policy

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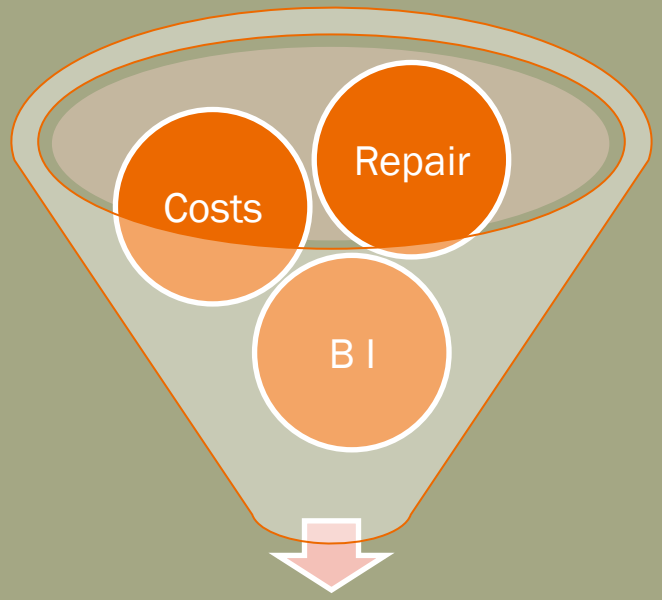
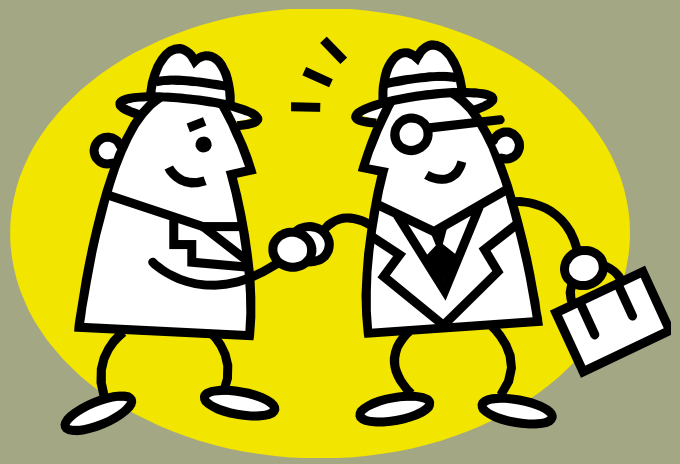
Claim Resolution and Follow-up



Claim Valuation



- When do the technical experts help in settlement negotiations
- Consistent reports that correlate with the settlement are important for the reinsurers

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Investigating Variations

- Separate betterment
- Clerk of the works – observe and report on repairs
- Document repairs were completed correctly

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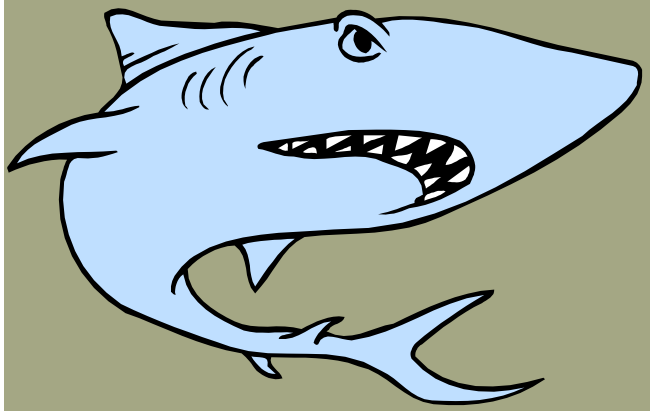
Recovery for Design & Construction Defects



- Subrogation = Recovery
- Prepare for Litigation
- Keep clear lines of communication with the technical experts

  When the lawyers take over it can be unclear about who's in charge

Managing and Resolving the Claim

For success we need two way communication

> What you need to tell us –

What is the policy response

What is damage

What is the client relationship like – collaborative vs. guarded

> What we can tell you –

What are the risks –

where are costs going

What are the opportunities –

cost mitigation, alternative repairs, early settlement

Is the client solution focused or confrontational?

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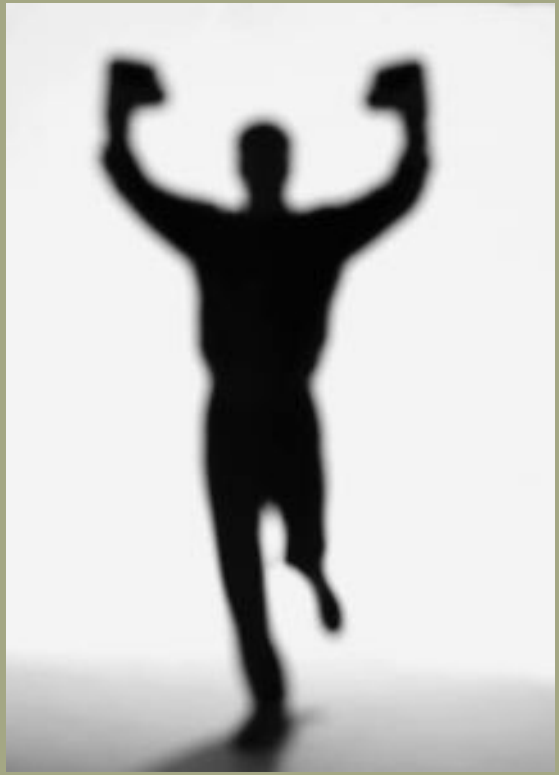
Maximise the Value of Your Consultant

- Involve them early
- Give them a clear brief

  Damage and repair definitions
- Make the insurer/solicitor define the policy when it is not clear
- Collaborate – listen to their feedback and adjust the brief when necessary



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Variety of problems – One common approach

- From Architectural Cladding to Zoned Heating Systems
- Systematic, scientific approach informed by our collective experience
- Focused on investigation, problem solving, and resolution

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Our Office Locations

Abu Dhabi, U.A.E.
Beijing, PRC
Boston, MASS.
Chicago, Ill.
Christchurch, NZ
Dallas, Texas
Denver, Colo.
Dubai, U.A.E.
Ft. Lauderdale, Fla.
Ho Chi Minh City, Vietnam
Hong Kong, PRC
Irvine, Calif.
Kansas City, Mo.
London, U.K.
Los Angeles, Calif.
Moscow, Russia
Mumbai, India
New York, N.Y.
Newark, N.J.
Philadelphia, Pa.
Portland, Maine
San Diego, Calif.
San Francisco, Calif.
São Paulo, Brazil
Shanghai, PRC
Washington, D.C.