



Ignorance, Uncertainty and Human Errors in Contemporary Construction

KREISSON

IGNORANCE, UNCERTAINTY AND HUMAN ERRORS IN BUILDING CONSTRUCTION

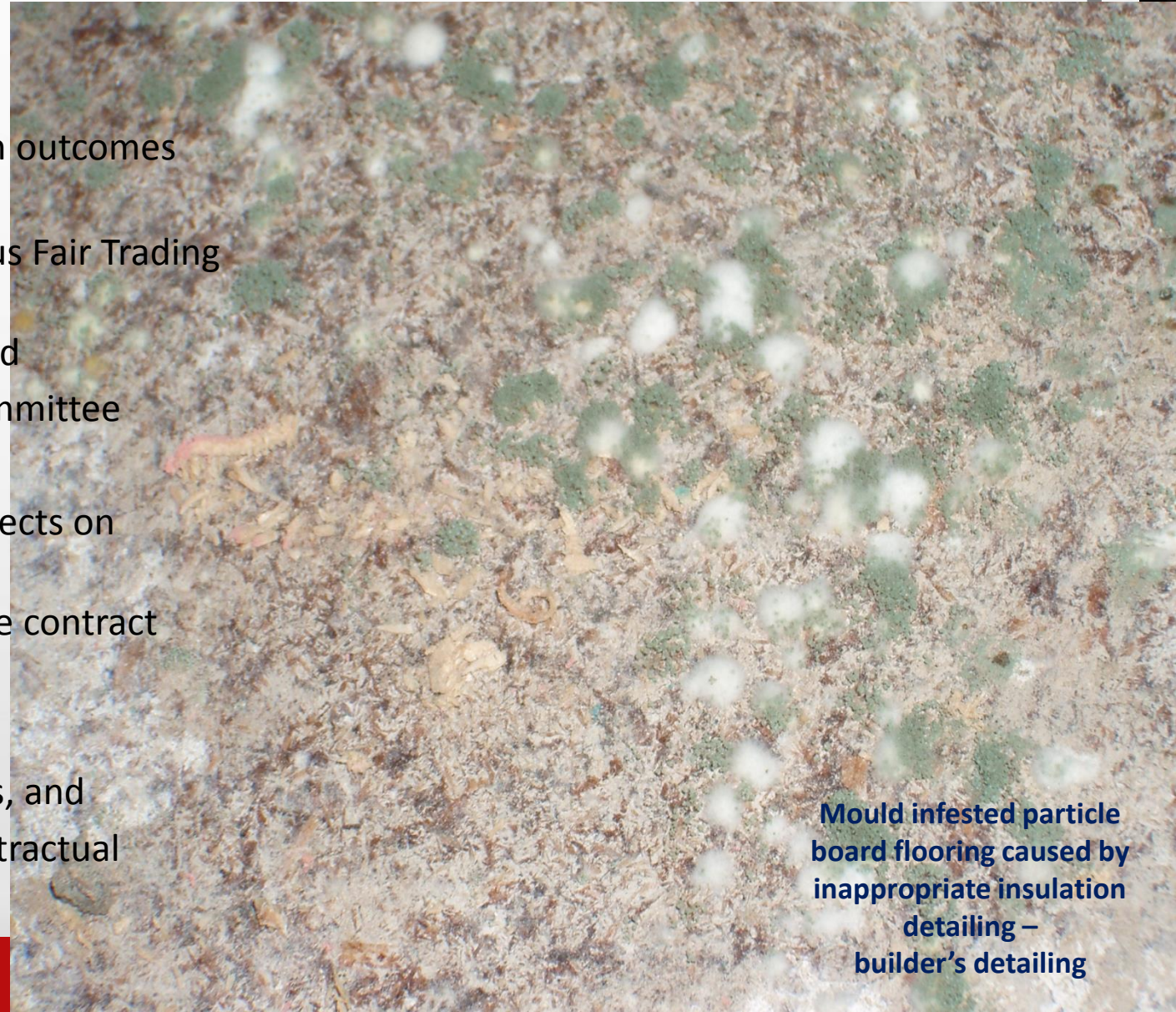
KREISSON LEGAL

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PETER SARLOS
ARCHITECT : LAWYER : CHARTERED BUILDING SURVEYOR

THE PROBLEM

- Anecdotal evidence has shown that construction outcomes have deteriorated over the past 2 decades.
- Research based on data from the ABS and various Fair Trading regional bureaucracies
 - the UNSW City Futures research program; and
 - The Engineers Australia Multidisciplinary Committee
- Has demonstrated that since about 2000: -
- Over 80% of all development has significant defects on completion;
- About 45% of the defects are rectified under the contract
- The cause of the defects can be ascribed to:
 - structural change in the industry
 - Legislative changes in support of the changes, and
 - Changes in the nature and complexity of contractual arrangements.



Mould infested particle board flooring caused by inappropriate insulation detailing – builder's detailing



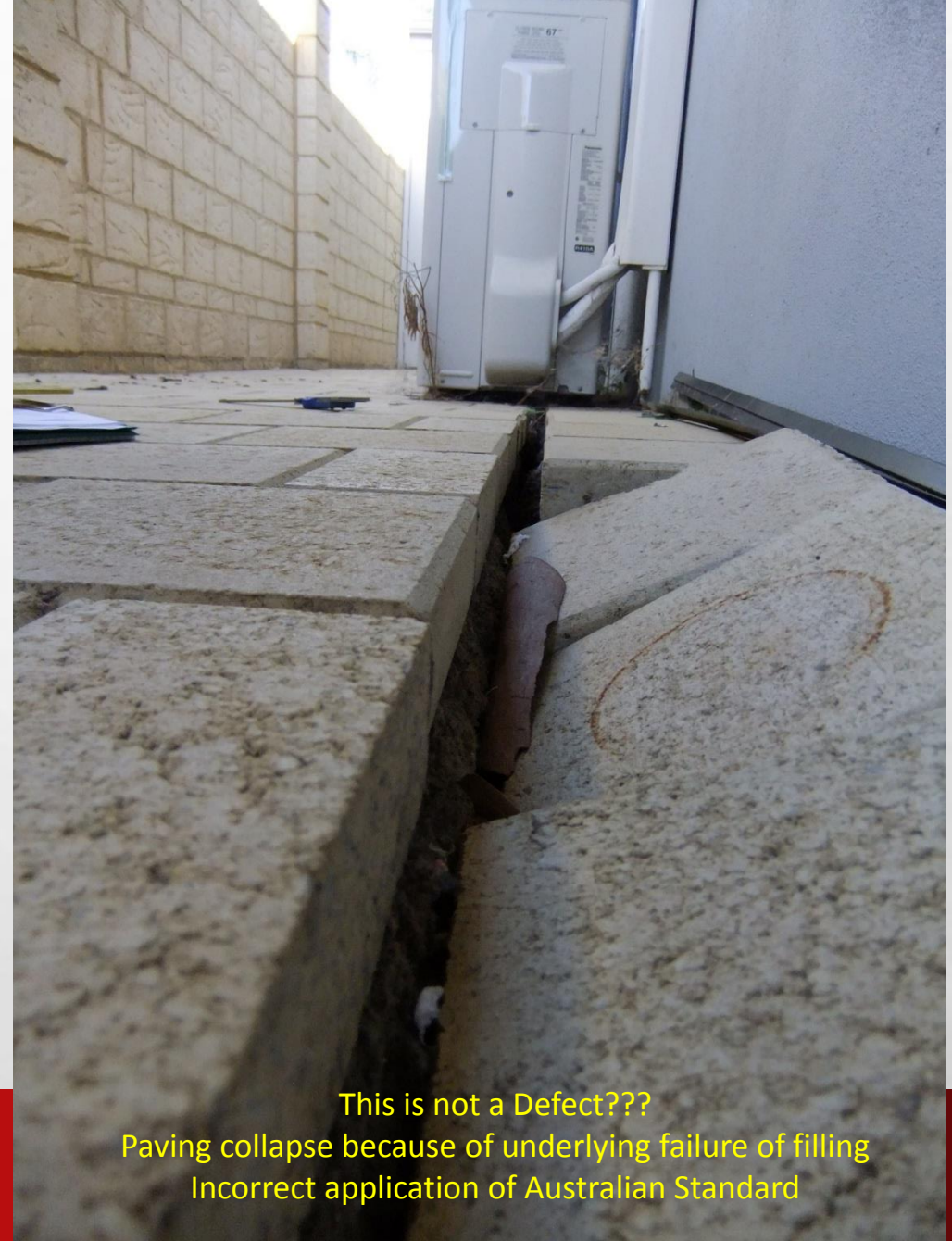
Exterior wall separated from supporting pier and retaining wall below - gap opens to 40mm . – inappropriate application of AS2870

- **Structural Change in the building industry: -**

- Refocus on time and cost at the sacrifice of quality;
- Changes in procurement through risk transference (*NPWC No Disputes* conference papers 1991): -
 - Client, and
 - contractor
 - To the lowest denominator – the sub-contractor;
- Separation of design and construction (*NPWC No Disputes* conference papers 1991): -
 - Increased defects
 - Increased disputation
 - Continuing impost on owners and occupiers.

STRUCTURAL CHANGE

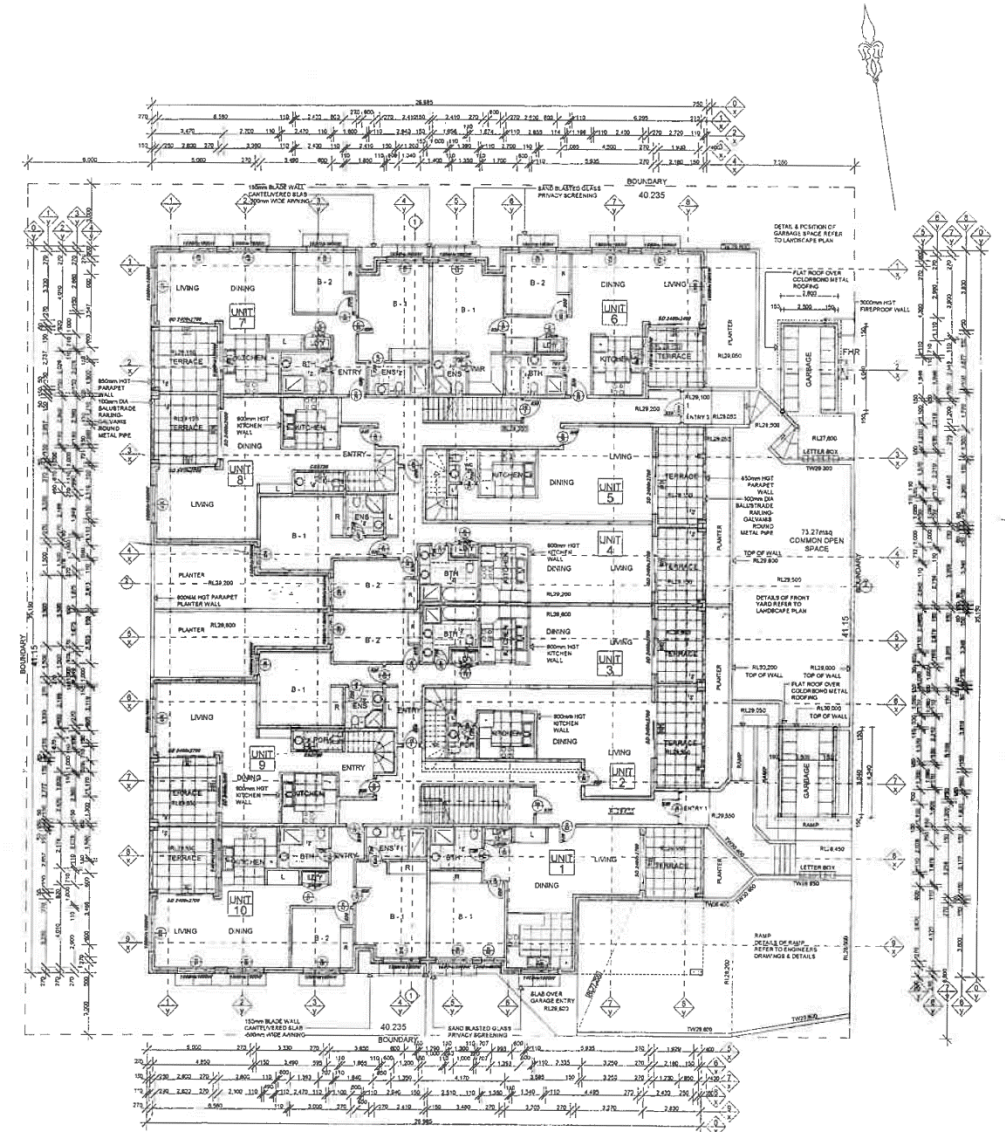
- **THE IMPACT OF CHANGE**
 - **Increasing complexity of bespoke contracts**
 - Comprehension and compliance
 - Adherence to terms and conditions
 - contractual regulation of construction administration
 - **Certification**
 - EP&A Regulations allows PCA's delegation of certification
 - Self certification facilitates self interest
 - Certification undermines contractual obligations



This is not a Defect???

Paving collapse because of underlying failure of filling
Incorrect application of Australian Standard

- Ignorance facilitates reductions in contract documentation
 - undermines manageability
 - Lack of adequate instruction =
 - Inadequate estimation =
 - Search for alternative solutions and
 - Devolution to expertise of the subcontractor =
 - Loss of coordination between trades.
 - Reliance on the skills and knowledge of the **lowest common denominator** - cost
 - Reliance on management skills not technical skills
 - Emphasis on the implicit and not the specific
 - Not understanding how one part relates to another part = lack of coordination
 - Managing without understanding = limitations in technical skills
- Ignorance is facilitated by poor regulation
 - Limitation in requirements for CC requirements
 - PCA certification reliance on certification by others
 - PCA certification based on limited trade knowledge
 - PCA documentation based on regulation not contractual outcomes



1:200 scale plans and elevations
 All specifications and detailing incorporated
 An approved CC Drawing

IGNORANCE – AN EXAMPLE

- **Developer commissions**
 - designer to prepare Development Application
 - Architect to prepare CC –
 - 1:200 scale drawings for CC
 - CC drawings become construction drawings
 - Basic *specification* on drawings
 - No coordination with structural and mechanical engineers
 - Structural Engineer
 - Relies on standard documents
 - Relies on architects details
 - Architect not commissioned to provide services beyond CC
 - Contractors have to rely on knowledge of standards and implied detailing.
 - Mechanical engineer
 - Documents mechanical ventilation except to top floor internal bathrooms – skylights
 - Assumes skylights are ventilating skylights
 - Bathrooms unventilated
 - Inflow to other bathrooms documented but not allowed for.
- **Outcome --- every wall has cracked and**
 - **mould has developed in building**
 - **Owners have to live with the defective work.**



UNCERTAINTY

- **Lacrosse Fire, Docklands**

- \$15 million damage
 - Caused by cigarette in balcony
 - set fire to excessive storage of materials on balcony
 - Extending to wall cladding
 - Spread from 6th floor to 21st floor in less than 15 minutes
- Caused did not comply with NCC combustibility requirements

- **Causes**

- Shared accommodation contributes to storage on balconies
- Contractor substitution
 - Incorrect certification of material
 - Material and certification by PM delegate



JUST ANOTHER FIRE – DIFFERENT COUNTRY



- Inferno in the 63-story The Address residential complex in Dubai where skyscraper blazes remain a worry.
- Fires have hit skyscrapers in Dubai and other cities in the UAE in recent years.
- A popular type of cladding covering the buildings that can be highly flammable.



• ARE DA DRAWINGS ADEQUATE FOR CC?

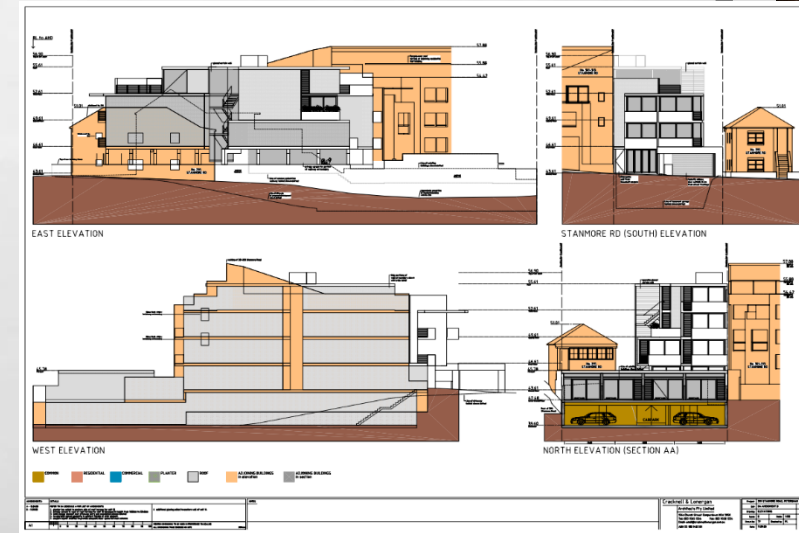
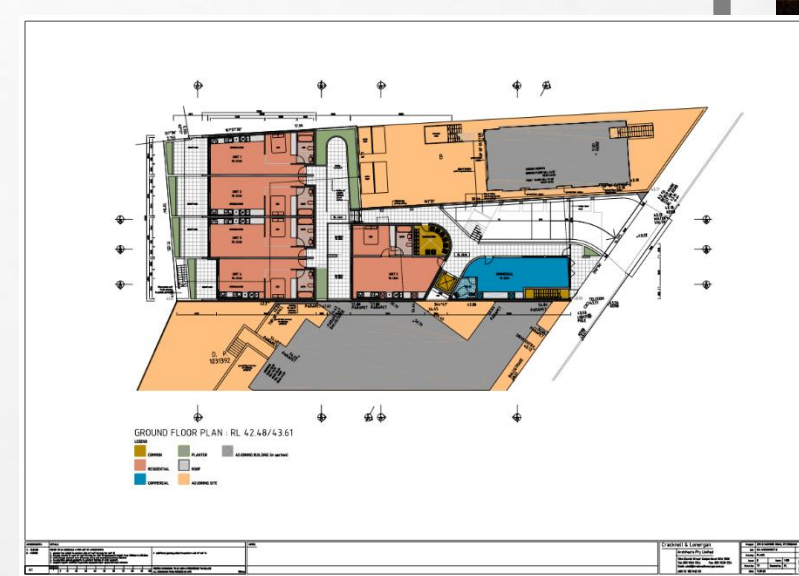
- The building leaked – every dwelling!
- DA drawings became CC drawings
 - CC approved
 - Architect terminated
 - Builder proposes modifications by changing structural profiles
 - Modification compromises weather protection
 - Engineer advises architectural detailing – advice ignored

• ARE DA DRAWINGS ADEQUATE FOR CC?

- Every dwelling leaked
 - Mold infestation
 - 4 dwellings uninhabitable
 - Roof membranes failed
 - Stormwater design caused flooding in basement

• RECTIFICATION

- Collapse of developer and no HOWI coverage
- Residents had to wear cost of rectification
- Rectification compromised



Fire door compromised - Step omitted - Door manufacturer designed for step not built – stormwater floods apartment

UNCERTAINTY & IGNORANCE

- **THE CRACK IS NOT A CRACK**
 - **What is a Crack**
 - Apparent hairline crack in wall
 - licensing authority determines not a crack under AS2870
 - Crack in compression
 - “crack” located at top of overturning wall.
 - Inspector operating outside skills base.
 - **Design Failure**
 - Drawings inadequate (draftsman design and documentation)
 - No consolidated site planning and site elevations.
 - Engineer design to data – does not recognize drainage issues
 - Council controls not taken into account
 - Australian standard misinterpreted as a result of imposed conditions
 - Reactive soil reacts
 - **Defects**
 - Excessive and significant cracking
 - Building movement results in encroachments
 - Extent of damage results in recommendation for demolition
- **OUTCOME**
 - **Identified problems with AS2870**
 - **Building recommended for demolition**

The building is moving in a south westerly direction at 5mm per annum

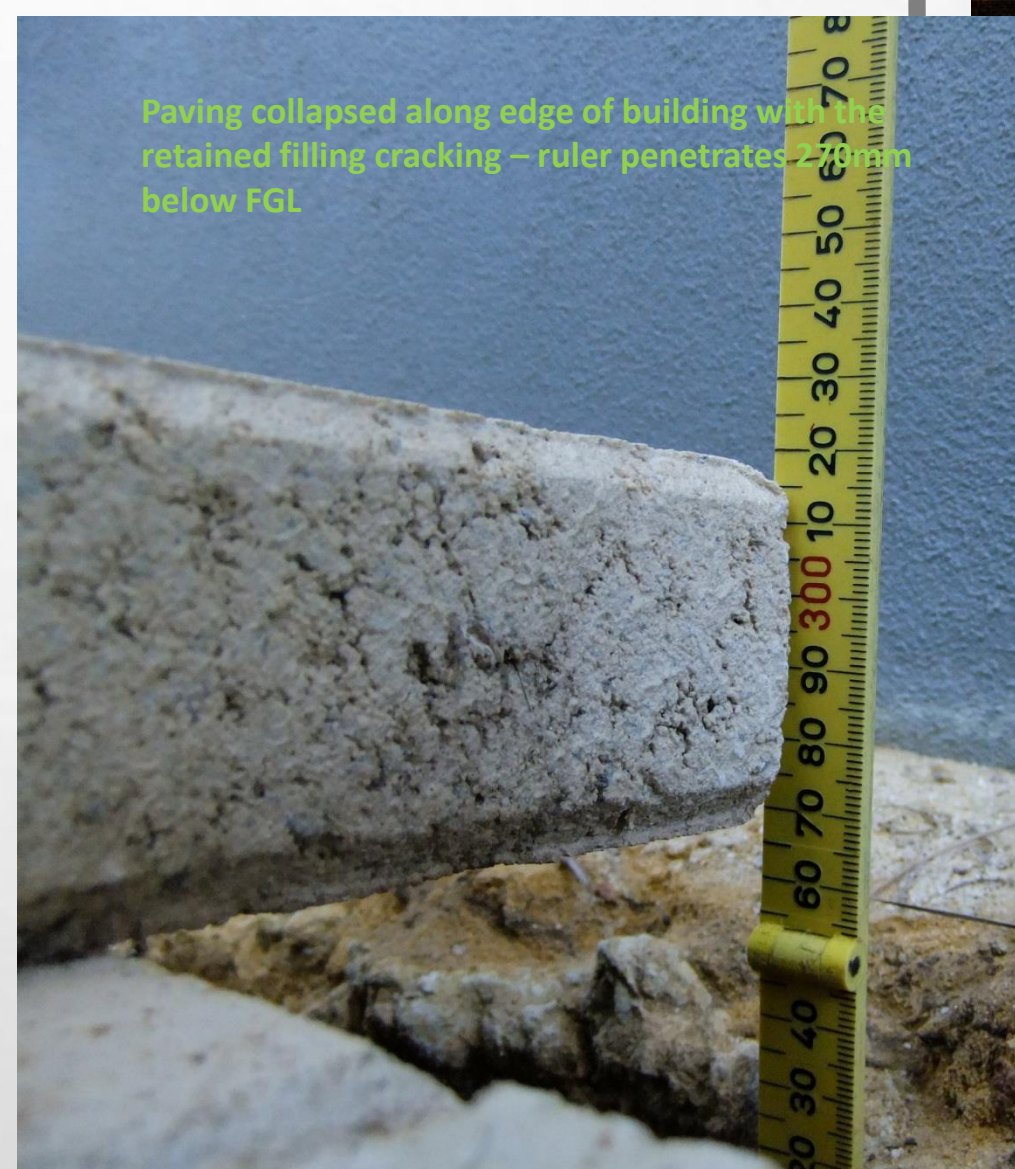
HUMAN ERROR

- **HUMAN ERROR CAN BE CAUSED BY:**

- Various causes
 - Lack of skill and / or knowledge (ie ignorance)
 - Lack of oversight leads to uncertainty
 - Failure to provide adequate direction – ignorance and financial focus
 - Lack of adequate resources because of time and funding availability
 - Reliance of standard documentation
 - the use of “*cut and paste*”
 - Minimization of documentation to meet budget

Collapse of fill caused by engineers error in interpreting public foundation data

Paving collapsed along edge of building with the retained filling cracking – ruler penetrates 278mm below FGL



CHANGES



• THE IMPACT OF CHANGE

- Award winning design
- PM requires cost saving
- Remove SS handrail from balustrade
- Characterization of glass changes from infill to structural
- Change in characterisation not noticed by architect or engineer
- Glass fails causing accident resulting in injury
- Engineer claims problem outside of scope
- Architect claims outside of skill

• HUMAN ERROR EXACERBATED BY LATE CHANGES / DETAILING