Climate Change
Building Adaptation – Case Study

Rohan Prathapasinghe

Coordinator
Building Project Management
Capital Works

Vulnerability Assessment

- **Climate Change Adaptation Plan 2011**

  - Key action to undertake a Vulnerability Assessment of Council Assets

  - Buildings were selected as the first asset to undergo assessment

- ARUP appointed to undertake Climate Change Vulnerability Assessment of Selected Council Buildings

Building Selection Framework

- 14 key buildings at 8 different locations
- Range of buildings including major civic and operational buildings, historical buildings, used for emergency management or housing vulnerable clientele.

Key Findings

- **280 assessments were completed**
  - 25 (9%) very high vulnerability
  - 99 (35%) high vulnerability
  - 156 (56%) medium to low vulnerability

Key Findings

- **High vulnerabilities occurred in buildings with**
  - essential functions during extreme weather events
  - serve vulnerable populations
  - house valuable assets
- **Most vulnerable building components**
  - loss of electricity
  - heat transfer through windows
  - damage to roof and windows in high winds
  - roof and surrounds - storm water drainage
  - exposed heating and cooling equipment

Adaptation Action Plan

- **Building Adaptation Actions** – building responding to very high vulnerabilities eg. Backup power generation

- **Management Actions** – revisit Council's 5yr. Capworks against adaptation actions

- **Design Actions** – Adaptation measures to be implemented during maintenance, refurbishment and new builds.

Costs

- **ARUP report included indicative costs**

  - $500k for short term actions (5 years)

  - $1m for long term actions (10 years)

Building Adaptation Works to Box Hill Town Hall

- Prioritisation based on it's use as an Emergency Management Centre
- 16 actions to be undertaken over the short term (5 years)

Recommended Actions

1. **Install back-up power generation** - Review impact of a loss of mains electricity on service delivery
2. **Arborist Report** – surrounding trees and risk of damage to buildings and equip.
3. **Install protective screens over the windows** – protection from nearby trees
4. **Inspect and seal around window frames**
5. **Undertake structural report -** Vulnerability of foundations, basement/below grade walls and retaining walls
6. **Undertake Geotechnical report** – Assess vulnerability of foundations, basement/below grade walls and retaining walls
7. **Inspect roof drainage and capacity of surrounding pits and pipes -** Ensure adequate drainage to prevent ponding and flooding

Recommended Actions

8. **Install window blinds, glazing film or double-glazing**
9. **Confirm the insulation levels in the roof**
10. **Inspect roofs, walls, windows and doors for water leaks and structural stability -** integrity to withstand high winds
11. **Review windows and doors for appropriate control joints**
12. **Review wall cladding for appropriate control joints**
13. **Shading to heat rejection equipment**
14. **Inspect lift motor rooms assess cooling and ventilation**
15. **Temperature at electrical infrastructure on very hot days**
16. **New cooling equipment (when installed) -** ensure ability to cope with longer operating times

Budget

- 2012/13 - $36,741
- 2013/14 - $143,841
- 2014/15 - $145,008
- 2015/16 - $50,000

Reports

The following works have been undertaken to date…

- A feasibility study has been prepared to review the impact of a loss of main electricity on service delivery.

- An arborist report has been prepared inspecting near-by trees to understand the risk of limbs breaking off in high winds and causing damage to buildings and equipment.

- A structural report has been undertaken to assess the vulnerability of the foundations and building against climate change.

Inspections

- **Inspections undertaken as part of structural report**

  - Inspection of roof drainage and capacity of surrounding pits and pipes to ensure there is adequate drainage to prevent ponding and flooding.

  - Inspection of roofs, walls, windows and doors for water leaks and structural stability/integrity to withstand high winds.

  - Inspection of wall cladding, windows and doors to ensure they have appropriate control joints and space for expansion.

Works

- Works have been undertaken so that the town hall is now generator ready (requirements of emergency relief centre taken into consideration)

- Standby generator has been tested on site (250 amps)

Works

- Installation of protective glazing film to windows to prevent heat transfer to internal spaces and to protect from tree limbs and other impact items.

- A regular tree pruning program is in place.

Works

- **Drainage**

  - Installation of larger gutters, box gutters, overflows, sumps and downpipes.

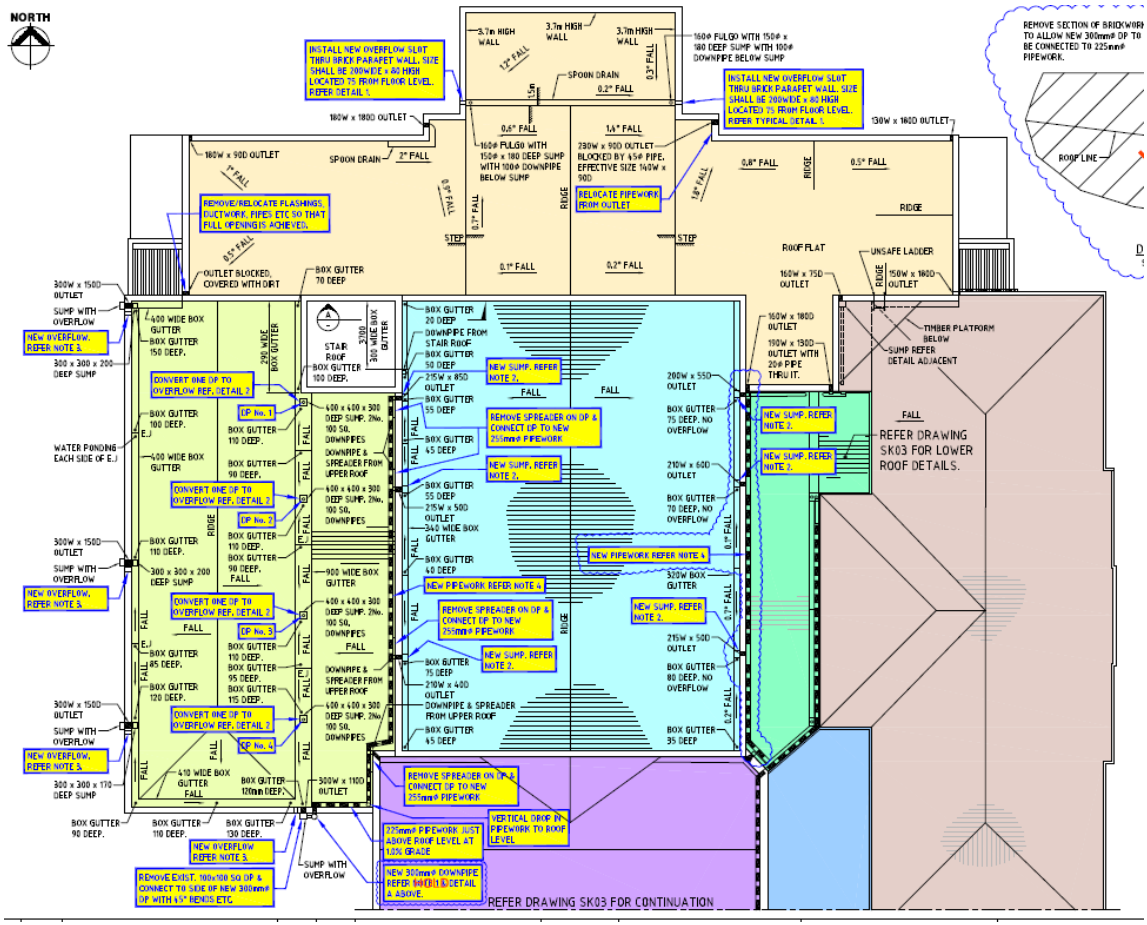
  - Installation of larger stormwater grates and pits.

- **Roof Works**

  - Installation of additional roof fixings, bracing and tie down rods and strapping to prevent wind uplift loads in high winds.

Challenges

- Consultant appointment and understanding of project
- Consultant documentation for existing buildings – detailed pre-inspections



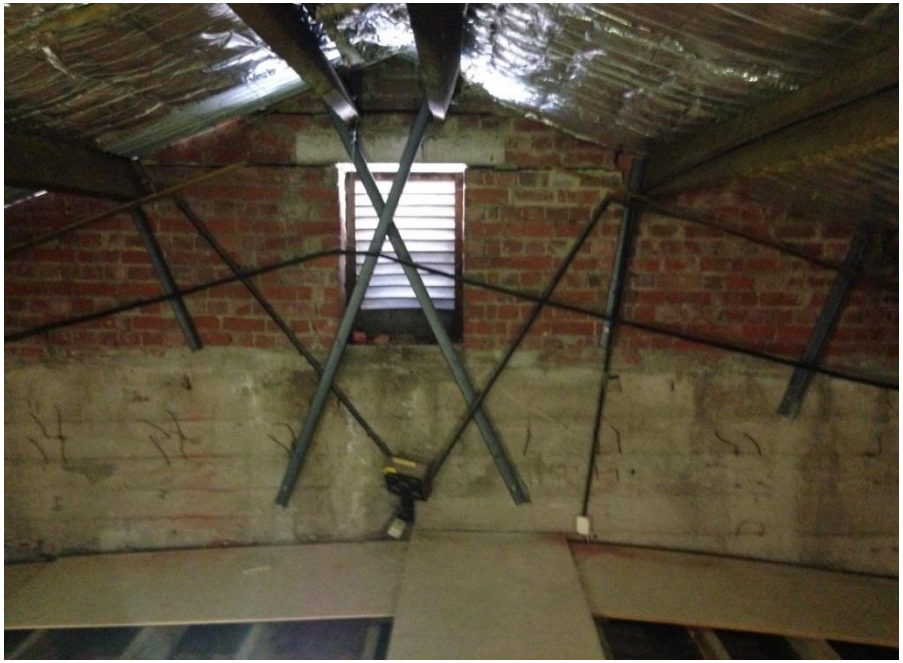
Challenges cont..

- Contractor appointment and understanding of climate change adaptation

Challenges cont..

- **BCA and Australian Standards for design not straightforward**
- BCA used to design for wind loads on post disaster structures
- Absence in BCA for storm water drainage design for post disaster structures
- Australian Standards adopted for storm water drainage design for post disaster structures

Challenges Cont..



OH&S when implementing projects

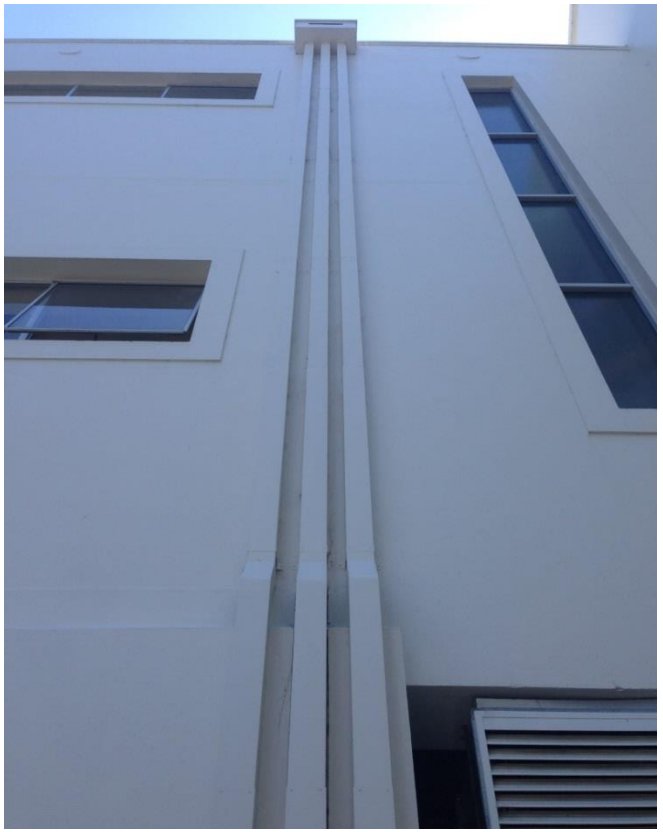
Challenges Cont..

Climate Change vs Sustainability

Challenges Cont..

Climate Change vs Heritage overlays

Challenges Cont..



Climate Change vs Aesthetics

Challenges Cont..

Project handover workshop

- Building users – Facilities maintenance

Next Steps

- $300k funding allocation over next 3 years
- Build staff awareness and promotion
- Setup of consultants and contractor team
- Prepare standard design details
- Climate change design principles for new buildings (consultant brief)


CITY OF BOX
1927