PtD Practice: Making Buildings Safe to Construct, Operate, and Maintain

Vegetative Roofs

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Purpose

• To provide information about green roof safety and health using examples from research in Singapore and discuss the opportunity for PtD to influence life cycle safety and health on vegetative roofs.
Rationale of the worker OHS & green link

1. ‘Green’ ≠ ‘Sustainable’
2. Green is about improving the lives of humans
3. Green is an entry point for new ideas
4. Green construction $\rightarrow$ conventional construction
How this topic evolved

- 2002 to present – Discussions with Gambatese
- April 2010 – Call from Donna Heidel
- Summer 2010 – Pilot project in US
- Summer 2011 – Fellowship in Singapore
Issues identified in previous US research¹

- Safe Access
- Fall Protection
- Structural Loading
- Relationship of vegetation to other known building hazards

¹ Will be detailed at CIB conference, Wednesday session
Literature Search

- A search for safe design guidance
  - Germany, Toronto, Singapore
- CUGE Guidelines on Design for Safety on Rooftop Greenery (CS E02:2010)
Roof 1
Multiple roofs and greenery with multiple purposes
How will workers navigate utilizing fall protection given the vegetation obstructs movement if attached to lifeline?

A classic case of why “safe design” is preferred over “safe re-design”...
Possible ‘design’ solutions

You can develop others...
There must be sufficient space between the greenery so the worker can access all sides and front of the greenery to complete necessary maintenance work.

A walkway behind the greenery allows worker to latch to the horizontal lifeline and travel away from the edge to complete necessary maintenance work.
There must be sufficient space between the greenery so the work can access the greenery to do the appropriate work.

Here the horizontal lifeline must be installed above the highest point of the greenery taking into account mature growth and the angle from that height to the back of a worker (~1.5m) where his/her lanyard would be attached.
Roof 2

A retrofitted extensive roof with planting trays
Roof 3

A roof garden at a polytechnic
A change in roof garden ‘vision’
Structural Loading

• In February 2011, a green roof in Chicago collapsed
• In the previous example, the architect’s vision for the greenery did not match the structural loading.
  ▫ The vision changed after the structure was built.
  ▫ There will be a 4” visible white space gap between the soil height and the wooden seating border.
  ▫ Identified by the green roof installation consultant
Roof 4

An award winner
How do they maintain that?

- 2 full-time crew
- Mowed every 10 days
  - Push mower
  - Originally wore spikes on shoes, now they don’t
- Watering twice daily
- Weeding
- Fertilizing
- Trimming
Safe Design: An Opportunity for Innovation

U.S. safe design practice will not be driven by safety

Please see CIB Paper on this topic – Thursday
How can we maintain this wall?

• Aerial lift
• Ladders
• Scaffolding
• Gondola like system
• Workers on stilts
• It’s maintenance free!
Summary

- Vertical and rooftop greenery systems
  - Have maintenance needs - safety and aesthetics go hand in hand
  - Present a wonderful opportunity to demonstrate the feasibility of PtD
- CUGE’s Safe Design Guidelines offer performance based design guidance.
  - Future updates based on research
  - Vertical greenery design guidance to be developed
Recommendations for the U.S.

• Integrate of PtD into green building elements using rooftop greenery as a model.
• Redesign for safety is good: Design for safety is preferred.
• Innovation and creativity can occur when considering safety in the design.
• Learn from the experience of other countries and entities is essential if we want to PREVENT injuries, illnesses, and fatalities
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- Comments, Questions, Discussions

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