Living and Sustainability: An Environmental Critique of Design and Building Practices, Locally and Globally

1. Paper / Proposal Title:

Impact of Wind on Construction Projects: High-rise case

2. Format: Verbal presentation

3. Author(s) Name:

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4. University or Company Affiliation:

University of Reading (Kelvin Fan); Seeing Stone Ltd. (Sunila Lobo)

5. Abstract (300 words):

Abstract (350 words):

Wind impact can be significant to design, construction and operation of structures, especially with super-tall buildings (CWCT, 1999). It can also pose risk to health and safety or affect the stability of tower cranes, causing collapse; thereby delaying the construction programme. It is thus important that wind speeds be monitored and because such adverse weather events are not compensation events, the contractor will have to include time risk in the construction

programme. Wind impact is significant, especially with climate change, and is thus a critical area for research. This study's focus is on the impact of wind on the ongoing construction of a multi-million pound 50 storey, 143m building project, called Highrise, located in London. The study analyses historical wind data from the construction location provided by a European weather company and more current data by the project, as well as interviews with project staff to examine actions to mitigate wind impact as the project progresses. Despite wind tunnel studies and adherence to codes, it was found that risk mitigation for the contractor is difficult, as wind gust is difficult to predict. Buffers have to be included, to ensure that the programme does not overrun budget. As it is still under construction, it is not possible to determine whether there has been sufficient attention on preparing for different wind scenarios; particularly where critical activities are concerned. When completed and in use, the downdraught effect of winds can be a risk at ground level but in Highrise's case it should not be, due to its site topography and the lack of nearby buildings of higher height[1]. In terms of living on the top floors, research by Sæmundsson (2007) found that there will be excessive movement in the top floors of the 190m Turning Torso in Sweden; such that sensitive people may perceive motion and hanging objects may even move. However, there is no data yet on whether the Highrise project occupants would endure such discomfort on the higher floors. Such data could inform planning and risk mitigation for sustainable living on future projects, in construction and in use.

References:

Parkinson, J. (2015) The problem with the skyscraper wind effect; By Justin Parkinson BBC News Magazine, 9 July 2015; http://www.bbc.co.uk/news/magazine-33426889; accessed on 6 December 2016.

Sæmundsso, A. F. (2007) Wind effects on high rise buildings Vindeffekter på höga byggnader; Examensarbete Thesis / Lunds Tekniska Högskola, Department of Structural Engineering, Avdelningen för Konstruktionsteknik (Lund University). CODEN:LUTVDG/TVBK-07/5153+74 ISSN 0349-4969

6. Author(s) Biography (200 words each):

Kelvin Fan is currently a final year undergraduate student at the School of Construction Management and Engineering at the University of Reading, UK. He conducted this primary research over summer 2016, as a sponsored student of an EPSRC Vacation Bursary Award. He was located at the high-rise project office over 6 weeks of the 10

[1] Micro-climate analysis of wind effects at its terraces and at its base was undertaken at Dubai's 828m Burj Khalifa; whether this will be or was done for the Highrise project, (especially at its three sky-garden levels) is still to be determined.

week project. He is continuing this research for his final year dissertation this academic year.

Dr. Sunila Lobo was a staff member of the School of Construction Management and Engineering at the University of Reading, UK until 30 September 2016, leading the MSc Construction Cost Management programme as Programme Director, as well as conducting research. She applied for and won the EPSRC Vacation Bursary award 2016 on the the 'Impact of Wind on Construction'. She supervised Kelvin as he conducted this research over the summer. Her main research interests are on how digital technology can transform business models as well as impact teams, organisations and society as a whole. She has conducted related research on major infrastructure projects which has been published in *Construction Management and Economics* and *Engineering Project Organisation Journal.*