



THE PLANNING, DESIGN, CONSTRUCTION AND MAINTENANCE OF TALL BUILDINGS

Martin Lovegrove CMIOSH MIIRSM PIEMA

Head of Health & Safety Policy & Infrastructure

Berkeley Group

Berkeley Group



Berkeley Group









Industry Guidance



Helping Great Britain work well

Everyone who can influence health and safety at work has a part to play in helping Great Britain work well

hse.gov.uk/strategy/ #HelpGBWorkWell

 Acting together Promoting broader ownership of health and safety in Great Britain	 Tackling ill health Highlighting and tackling the costs of work-related ill health	 Managing risk well Simplifying risk management and helping business to grow
 Supporting small employers Giving SMEs simple advice so that they know what they have to do	 Keeping pace with change Anticipating and tackling new health and safety challenges	 Sharing our success Promoting the benefits of Great Britain's world-class health and safety system

Tall Buildings - Definition

18 METRES?



30 METRES?

OR

Council on Tall Buildings and Urban Habitat (CTBUH) states that a building is considered 'tall' if:

- It is taller than surrounding buildings,
- Its proportions give the appearance of being tall,
- It utilises technologies which are necessitated by its height (e.g. specific vertical transport technologies).

Tall Buildings – Facts

(Source: New London Architecture Report 2017)

A record number of **26 tall buildings completed in 2016**, compared to 10 in 2015. Over the last decade, the average number of tall building completions has been just six per annum

A record number of starts – almost 1 a week. **48 tall buildings started construction in 2016**, an increase of 68% on 2015, when it was 29

83 new tall buildings were submitted for planning this year – down 30% on the year before at 119, which saw 40+ tall buildings submitted in Greenwich Peninsula

The **total pipeline** of tall buildings in London which are proposed, approved and under construction **has increased marginally to 455** in 2016, up from 436 in 2015

24 of London's 33 boroughs have a tall building pipeline. We are seeing a small shift towards outer London, with 82 tall buildings in zones 3-4 and 25 in zone 5

60 new tall buildings have completed in the three years since the first London tall Buildings Survey, and 31 are currently under construction. **By 2019, we estimate 152 new tall buildings** to have completed since the original Survey

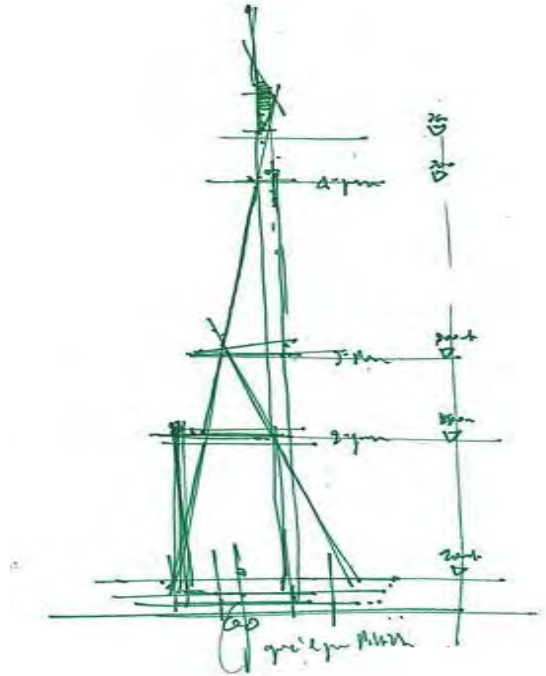
An estimated **30% of homes currently under construction in London are in tall buildings**

256 tall buildings currently have planning permission to go ahead and are awaiting construction. But 31 tall buildings which received planning over 5 years ago are still not on site

100,000 new homes are estimated across the entire tall buildings pipeline, or two years' worth of housing need based on GLA requirements of 50,000 new dwellings per annum

The entire **pipeline is estimated to cover 38 hectares**

Planning



- Planning starts a long time before building starts (The Shard took 12 years from concept to commencement of construction).
- This indicates the level of discussion planning and reworking that is necessary to get the construction of a tall building underway.
- The sooner in the process that the designer and construction team can get together, the more beneficial it will be in the long term.

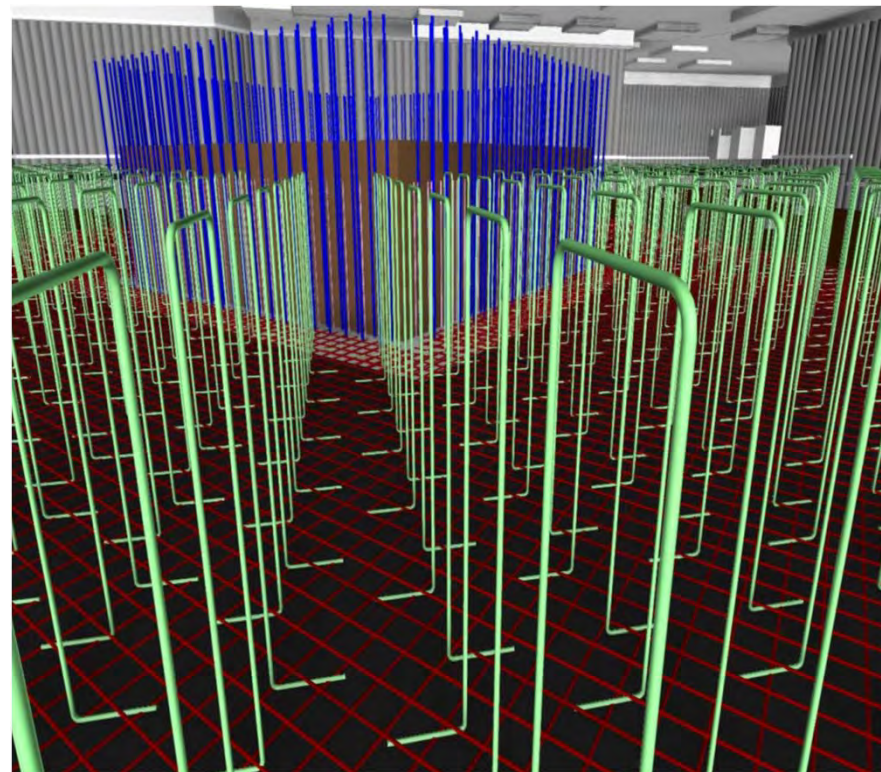
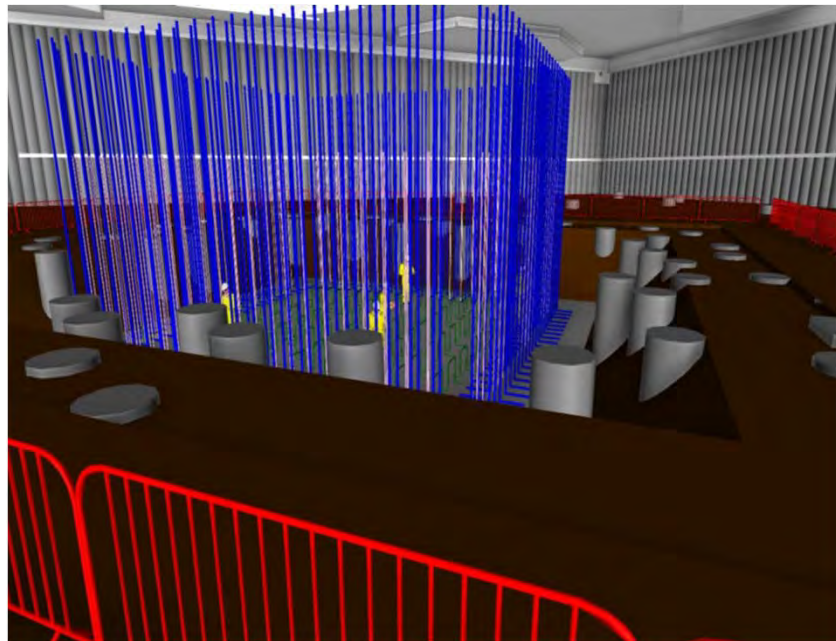
Planning

The Construction (Design and Management) Regulations (CDM) place explicit duties and obligations on all parties involved in construction projects. Duty holders are specifically identified in the Regulations, and are noted as being:

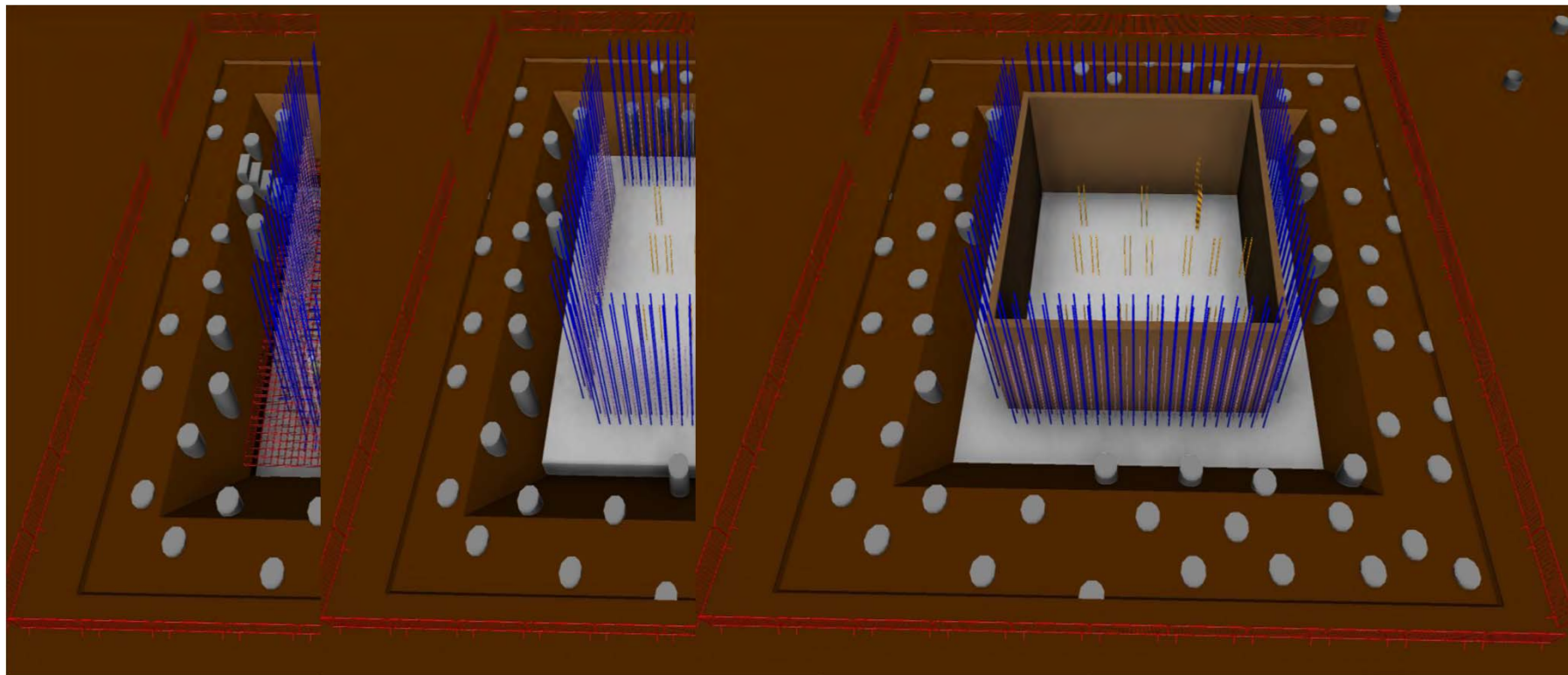
- clients
- principal designers
- designers
- principal contractors
- contractors
- workers.

Design

Building Information Modelling (BIM)



Design



Fire

(strategies in the construction phase)

Challenges associated with FIRE in the construction phase:

- Response times by the emergency services are reduced by the requirement to get to higher levels quickly
- Stair and lift cores need to accommodate large numbers of people if they are evacuated from the building, as well as emergency services entering the building at the same time.
- Weather conditions at height affects the dynamics of the fire, for example wind effect at height.
- Firefighting lifts and wet and dry risers need to be commissioned at the earliest opportunity.
- Consideration of moving from temporary to permanent fire detection and alarm systems.

Fire

(strategies in the construction phase)

Complete evacuation of the building



Fire

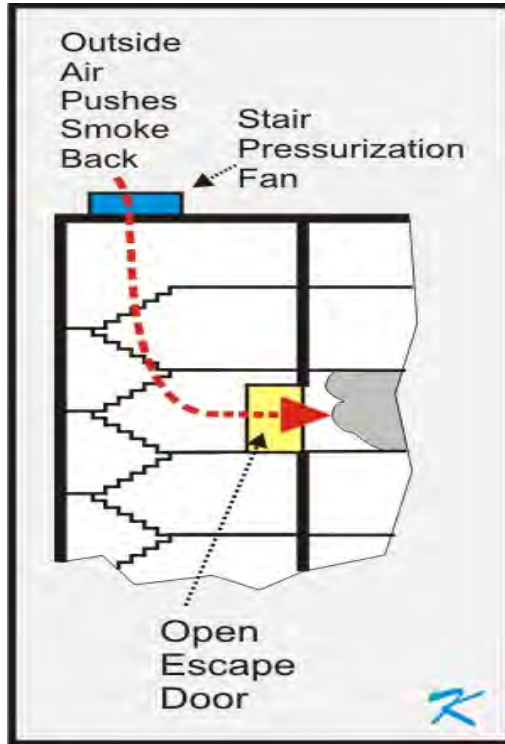
(strategies in the construction phase)



- Integrated stair tower
- Only one structure to erect and dismantle
- Modular form
 - Speeds up erection and dismantling
 - Reducing the exposure to work at height / falling objects

Fire

(strategies in the construction phase)



Stair Pressurisation

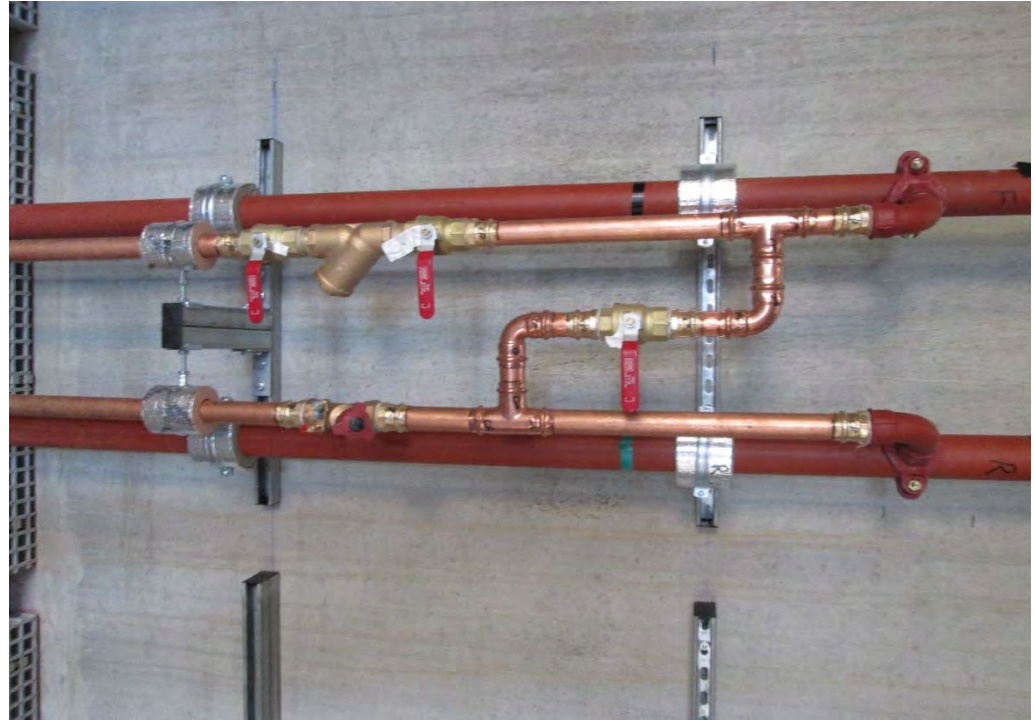
- Fire starts
- Fire detected
- Stair pressurisation fans start up automatically
- Pressure increases in stair core
- Fire escape doors opened and higher pressure means smoke is pushed back out of stairwell

Fire

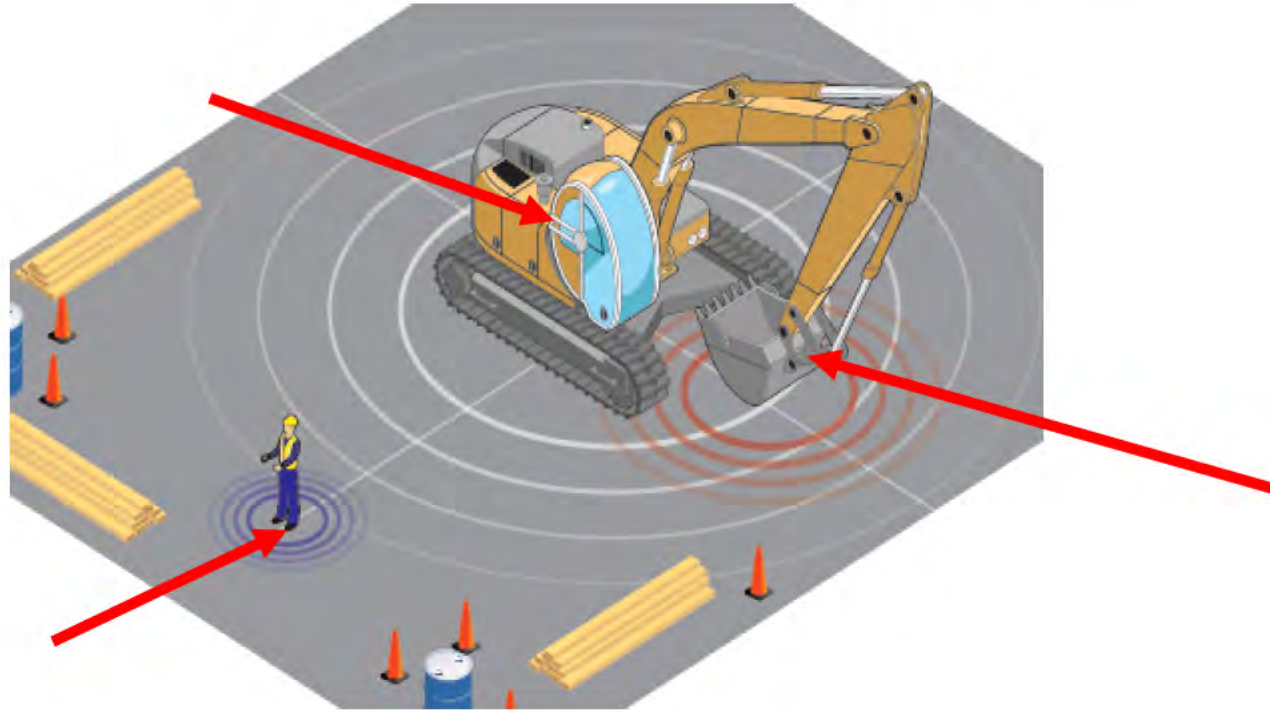
(strategies in the construction phase)

Other considerations:

- Appointing a single fire engineering consultant
- Early involvement and consultation with the local fire and rescue services and other relevant bodies including insurers
- Reduction in the need for hot works by using alternative methods
- Horizontal and vertical compartmentation



Mobile Plant – Proximity Sensors



Vibration Suppression



Reinforcing Pile Wall



Formwork



- Proprietary lightweight formwork to create columns
- Preformed panels pinned together to create shuttering for the columns
- Removes need for hammering and nailing and creating the formwork from scratch

Jump Form

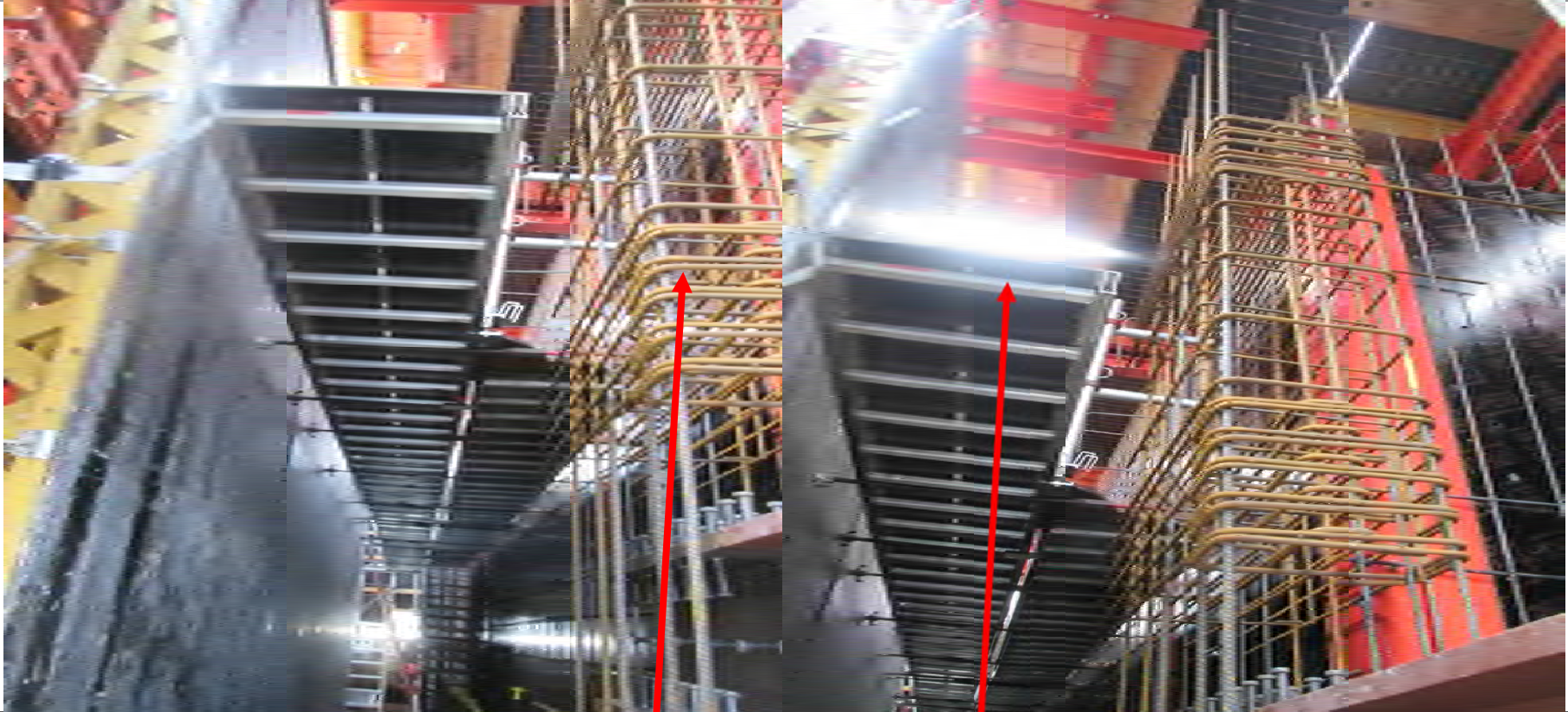


Jumpform systems comprise the formwork and working platforms for cleaning/fixing of the formwork, steel fixing and concreting. The formwork supports itself on the concrete cast earlier so does not rely on support or access from other parts of the building or permanent works.

Jump Form



Jump Form



Jump Form



Off Site Construction



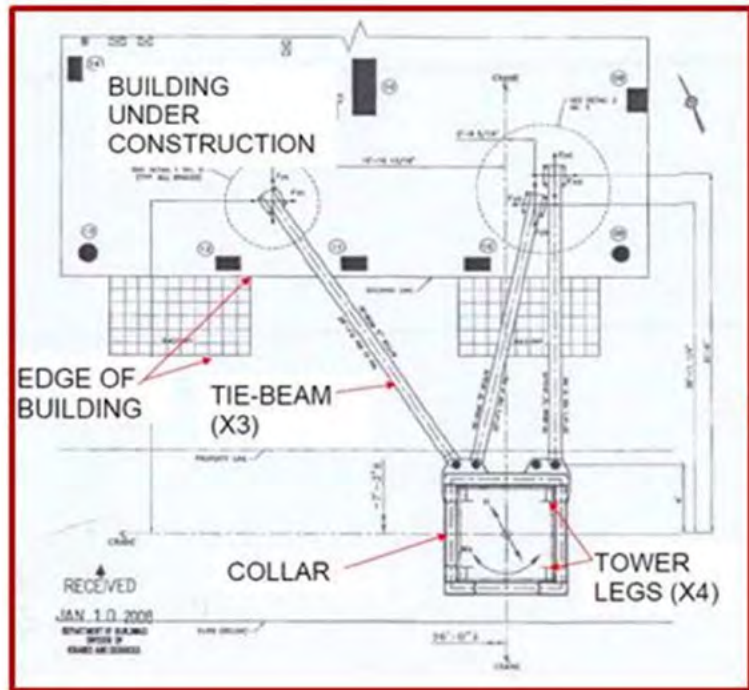
Off Site Construction



Off Site Construction



Crane Operations

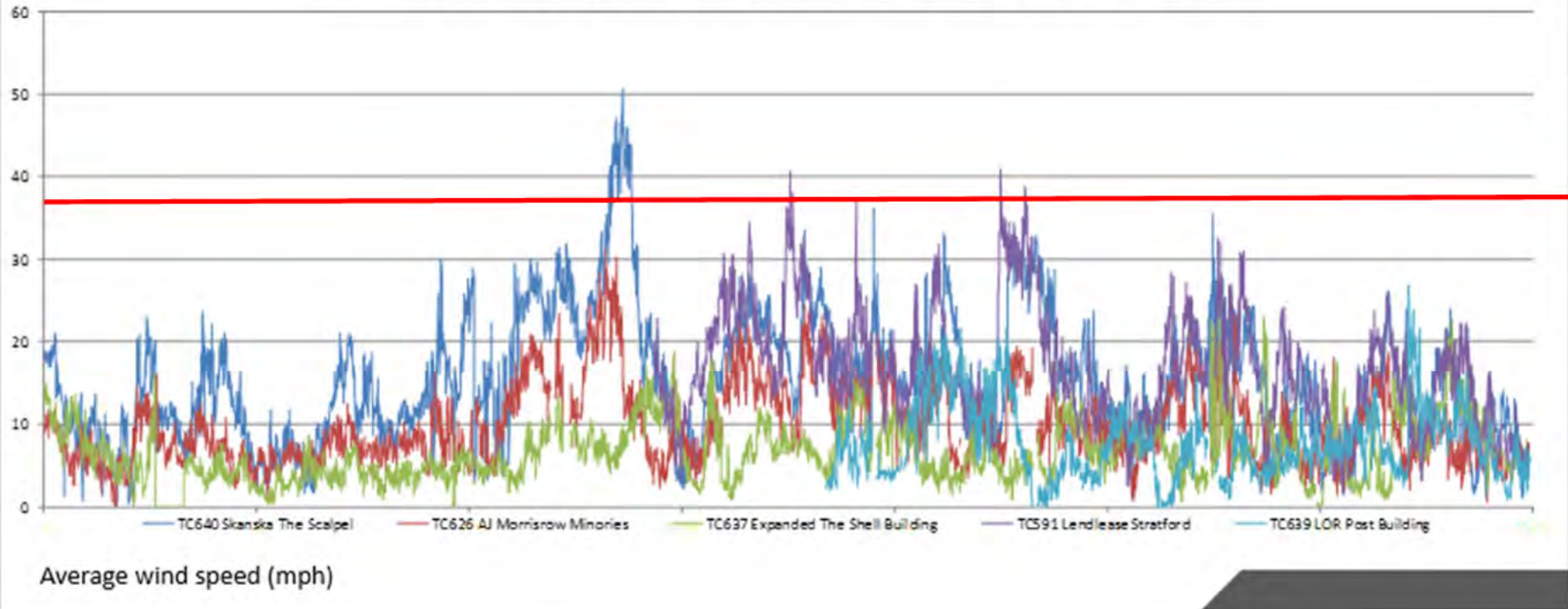


Crane Operations

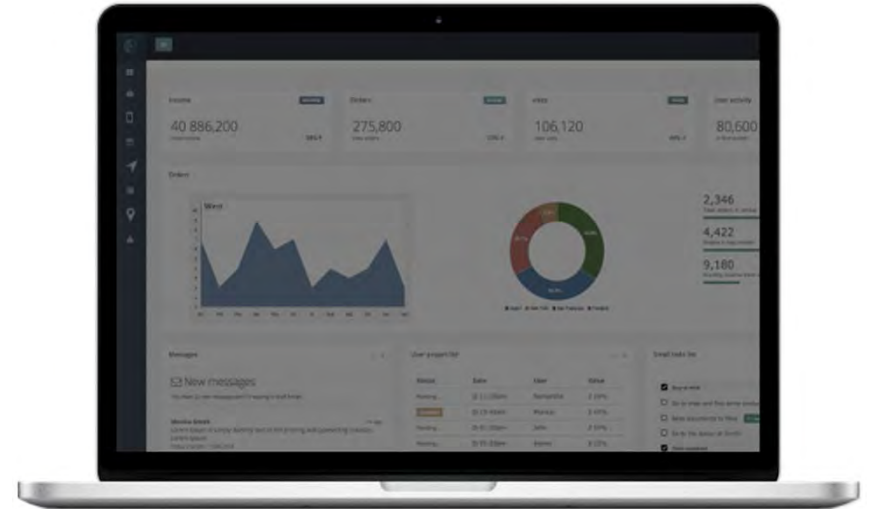


Crane Operations

Windspeed Comparison - London Sites 14-28th Feb 2017



Storage of Materials



Working at Height

- The leading edge particularly on tall buildings presents a number of issues where there is potential for operatives, tools or materials to fall.
- The effect of wind on the building and as it gets taller the impact of this will be greater.

Arrangements need to be in place.

- Leading edge protection
- Leading edge training and specific inductions
- Tethering policies for tools and hard hats
- Storage of materials to prevent them from blowing off the building



Working at Height



Columns within the reinforced concrete frame have been set back from the edge, which has enabled full-height edge protection screens to be erected around the perimeter of the building at each floor level except where work is taking place.

Working at Height



Working at Height



Working at Height



Working at Height



Working at Height



Working at Height



Working at Height



Working at Height



Maintenance



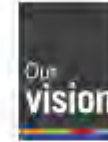
Maintenance





Martin Lovegrove CMIOSH MIIRSM PIEMA
Head of Health & Safety Policy & Infrastructure

martin.lovegrove@berkeleygroup.co.uk



The Berkeley Group Holdings plc
Berkeley House | 19 Portsmouth Road | Cobham | KT11 1JG

Office 01932 584 634 Mobile 07818 587 094

www.berkeleygroup.co.uk

