

# Beyond Safety:

Design for safety leads to improvements in diversity, productivity + sustainability

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Co-founder  
Bryden Wood



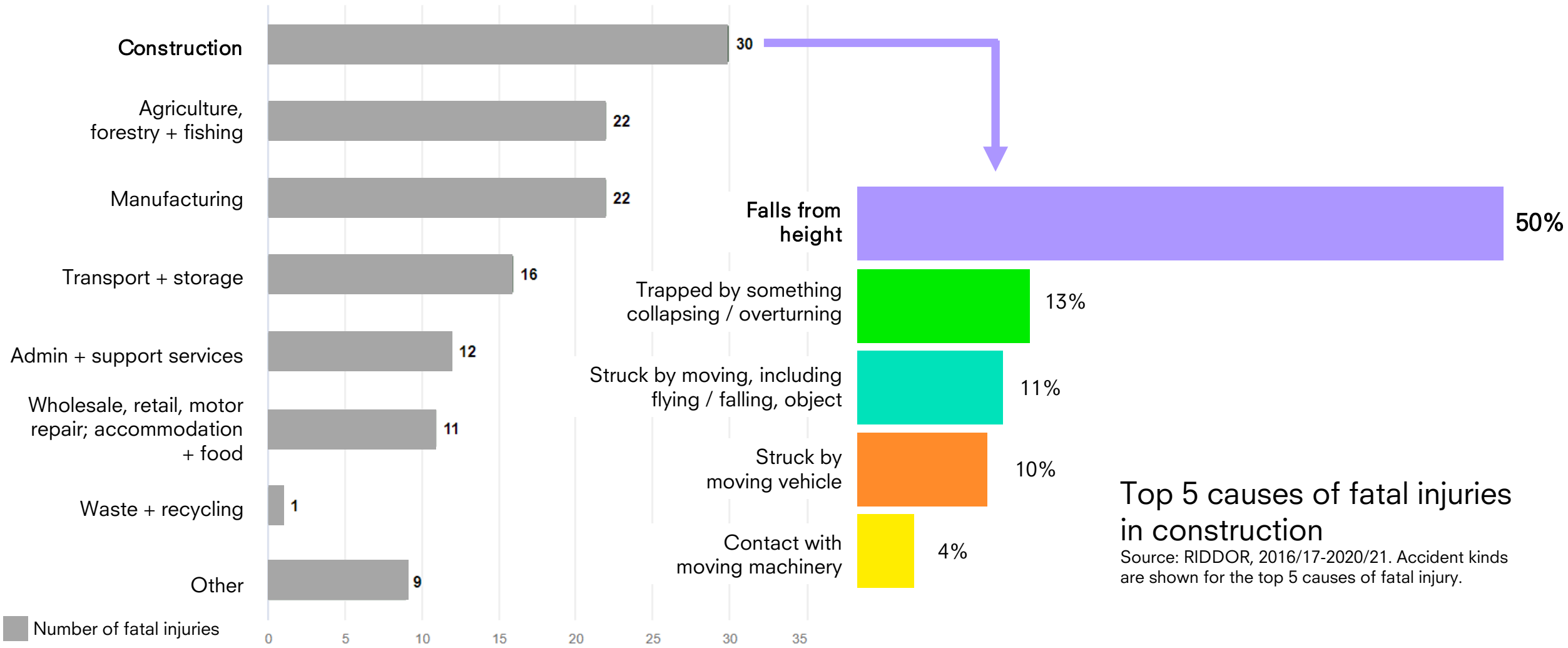
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We've made great progress

but...



# Fatal injuries (all workers, UK, 2021/22)



## Top 5 causes of fatal injuries in construction

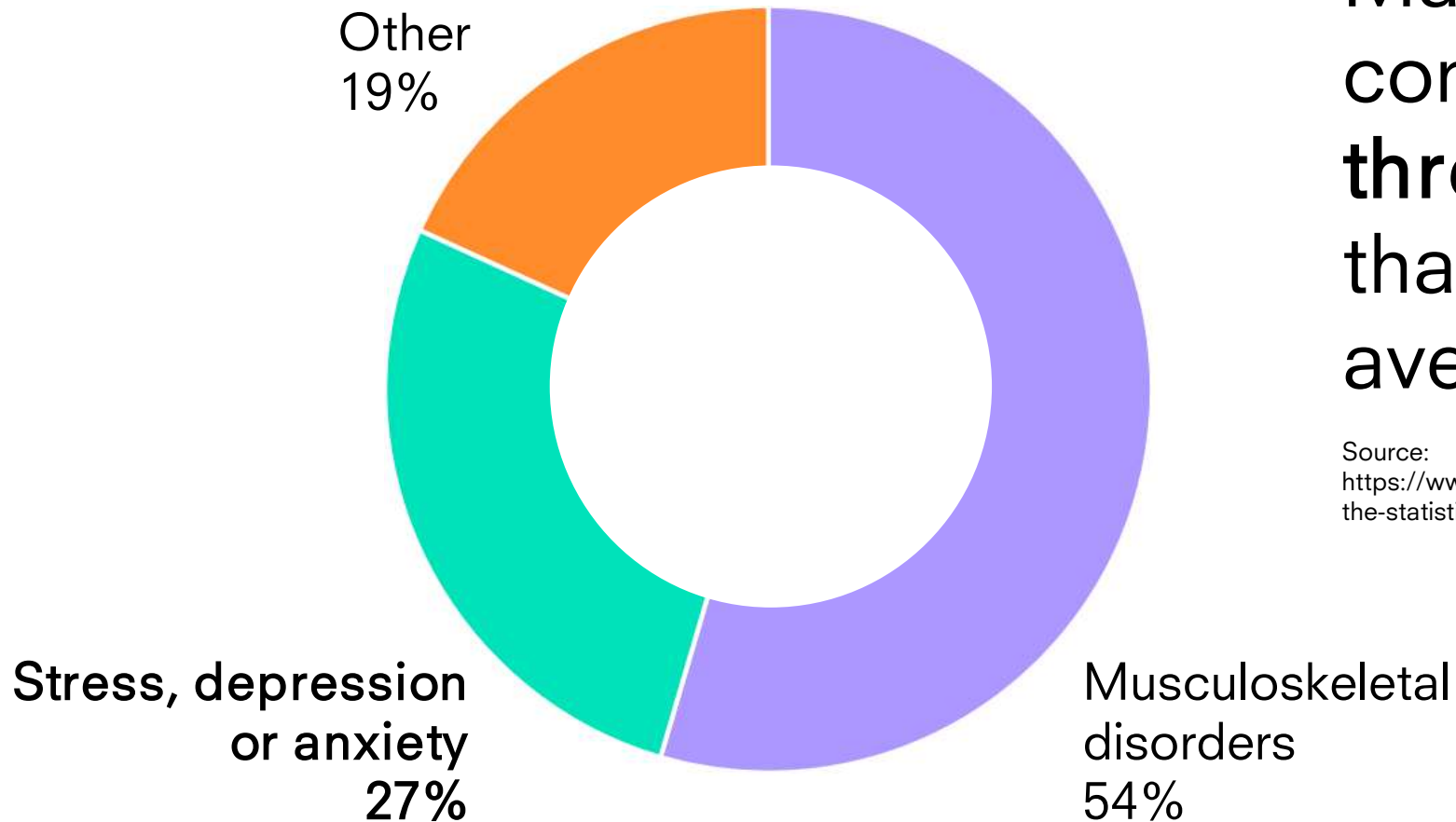
Source: RIDDOR, 2016/17-2020/21. Accident kinds are shown for the top 5 causes of fatal injury.



Source: Health and Safety Executive

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# Mental health



Male suicide rates in construction are **three times** higher than the national average.

Source:  
<https://www.matesinmind.org/news/mental-health-in-uk-construction-the-statistics>

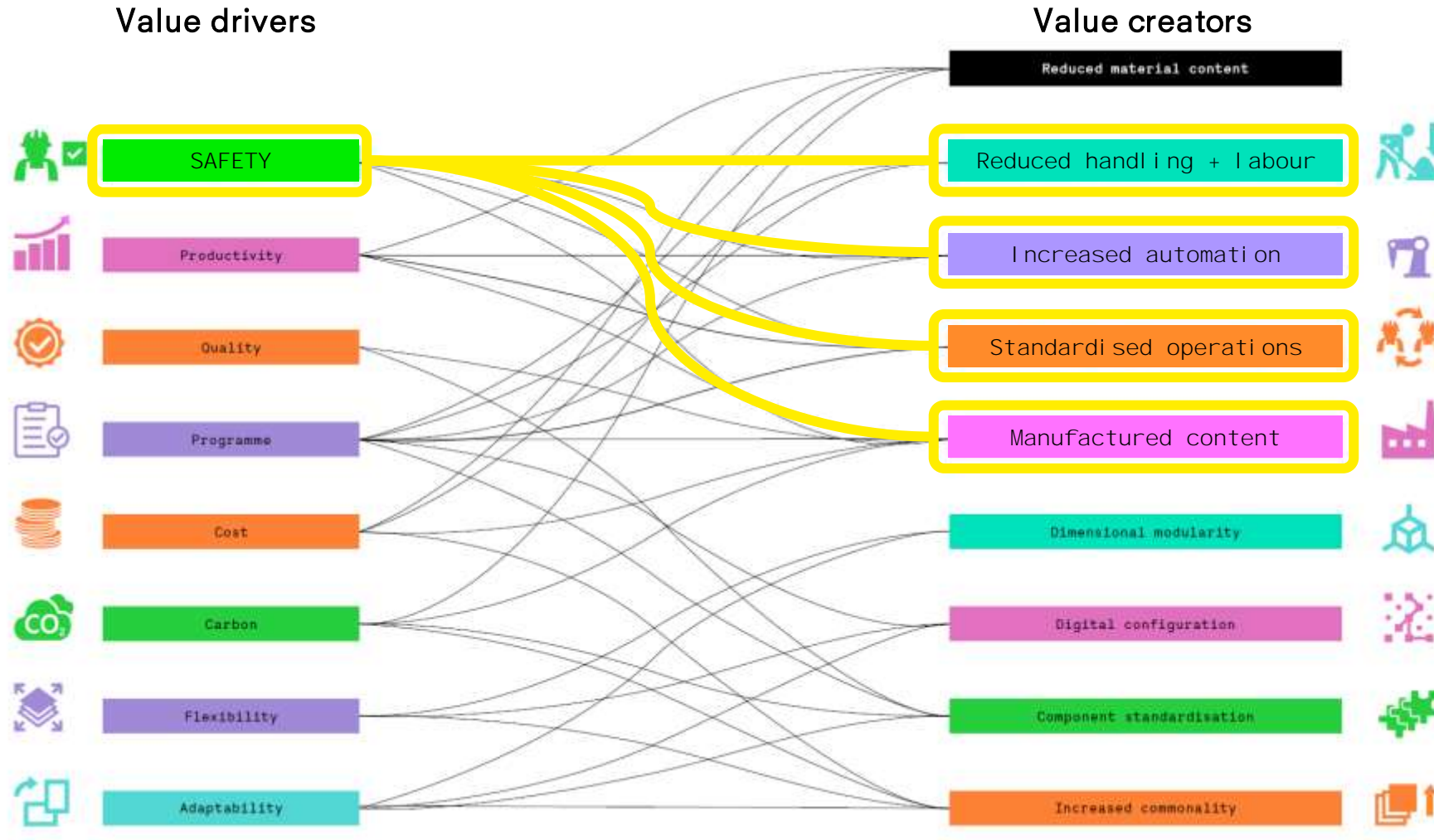


Source: New or long-standing ill-health, averaged over the three-year period 2018/19-2020/21, Health and Safety Executive 2022

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# Considering safety through the design process



Including safety as a traceable value driver to provide continued focus on subject



Design for safety addresses

**key challenges...**



- Diversity
- Productivity
- Sustainability



# Diversity





- Age (~45% are 45+)
- Demographics (~90% male)



# Design for diversity



Heathrow / Gatwick Pier segregation

- Assembled by low skilled labour from local Job Centre



GSK 'Factory in a Box'

- Constructed by Ex-Gurkhas



Ministry of Justice prisons

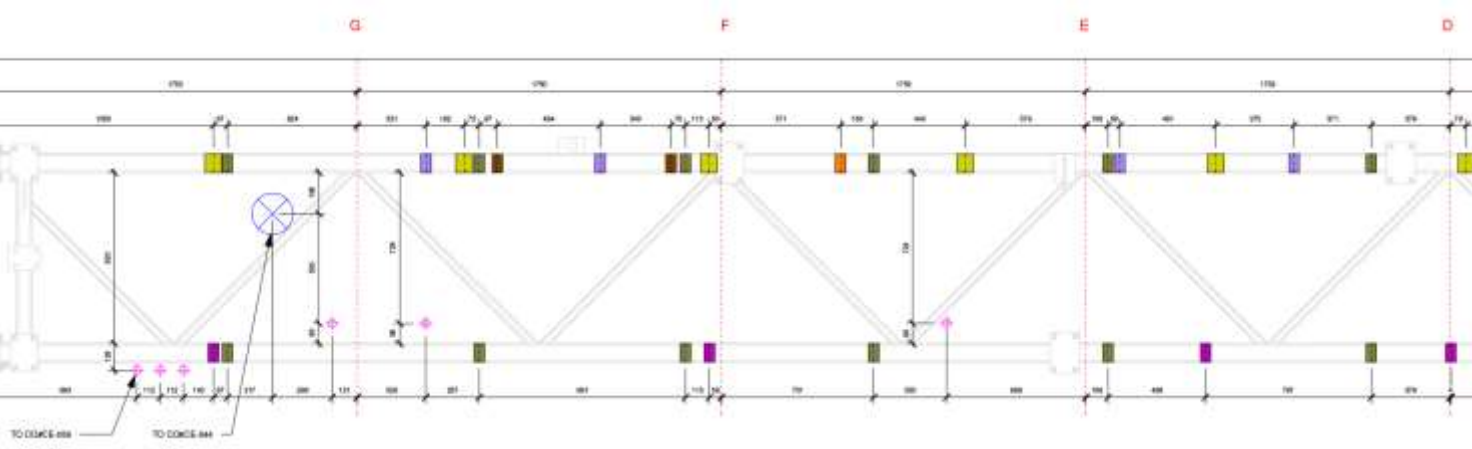
- 'Platform' kit of parts manufactured and assembled using Prison Industries





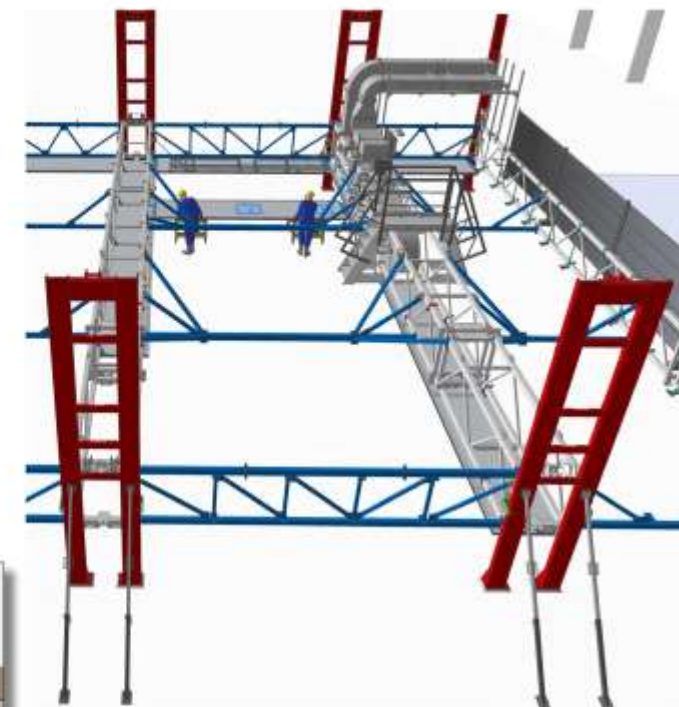
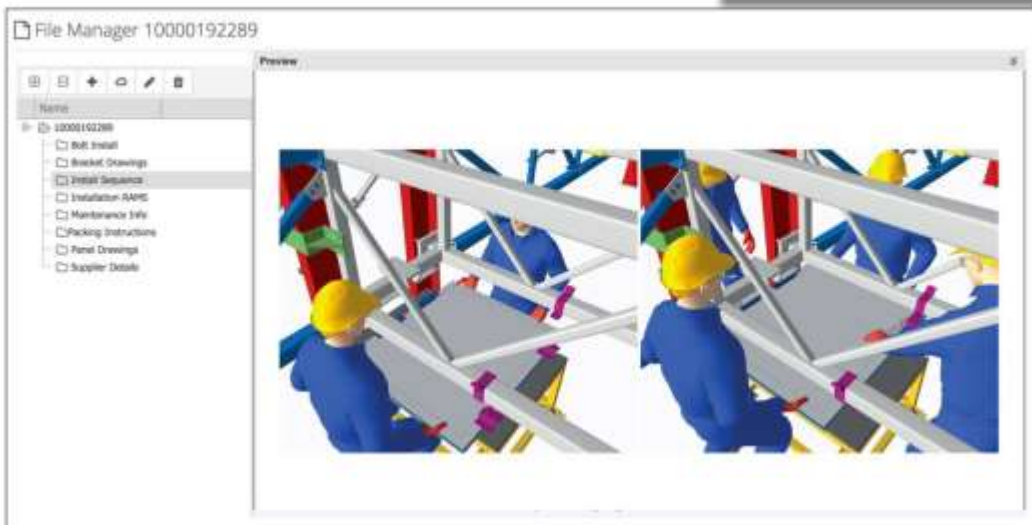
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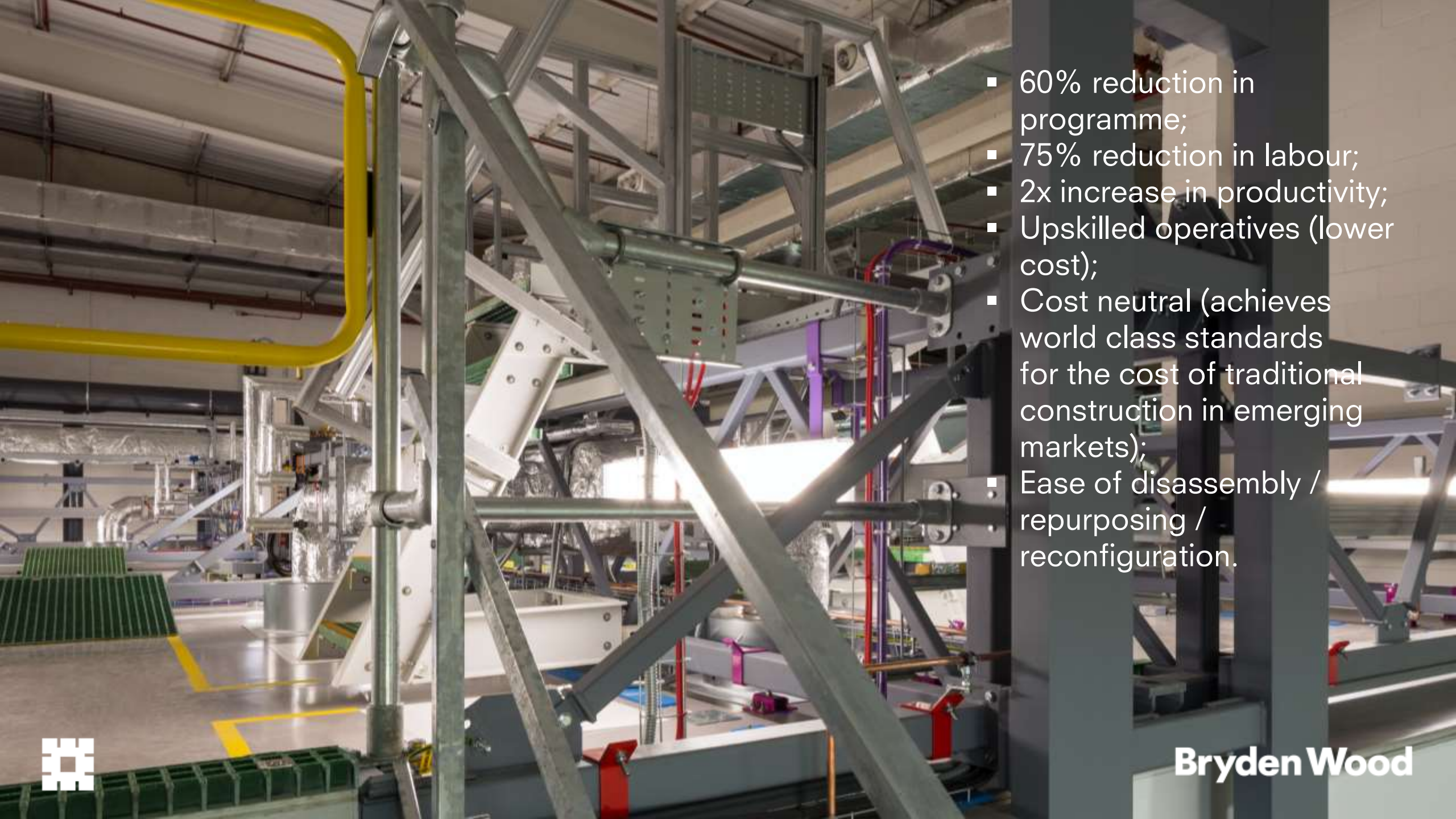


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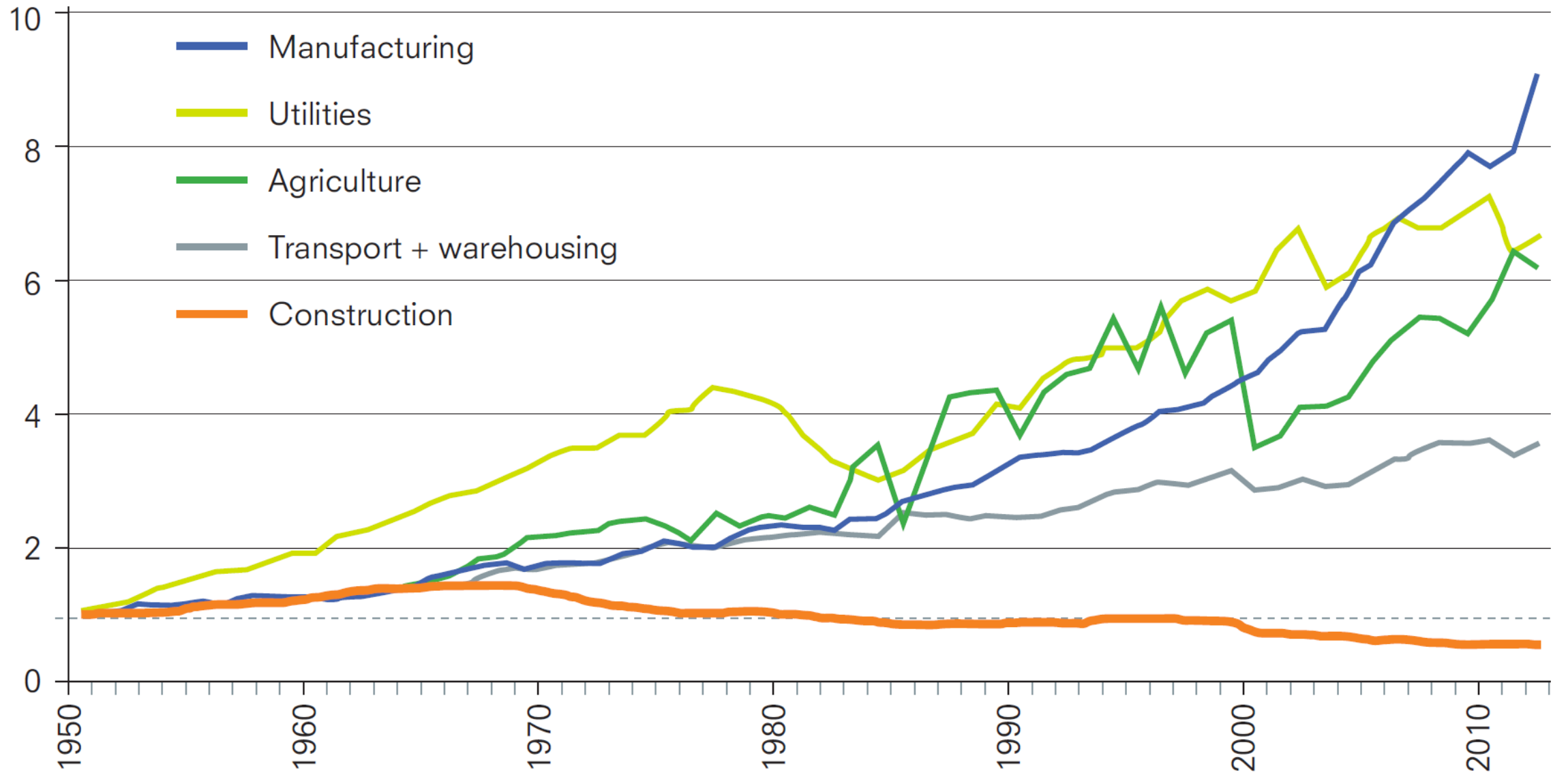
- 60% reduction in programme;
- 75% reduction in labour;
- 2x increase in productivity;
- Upskilled operatives (lower cost);
- Cost neutral (achieves world class standards for the cost of traditional construction in emerging markets);
- Ease of disassembly / repurposing / reconfiguration.





# Productivity





Construction productivity 1950 - 2012  
 Real productivity (GDP value-add per employee) by industry in the US  
 Indexed; 1950 = 1.0  
 Source: Bureau of Economic Analysis (BEA), Hideyuki (2011)



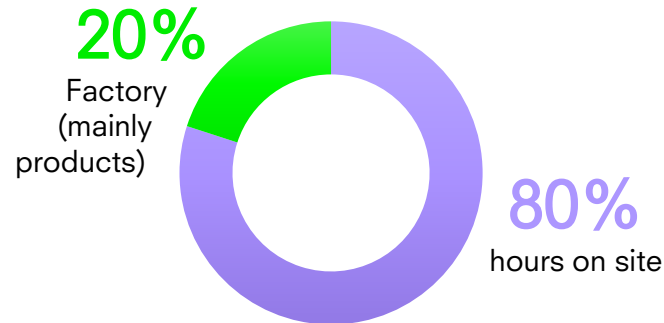
# Higher productivity equates to higher safety

Historical



Material  
+ Labour

Current State



Material  
+ Products  
+ Labour

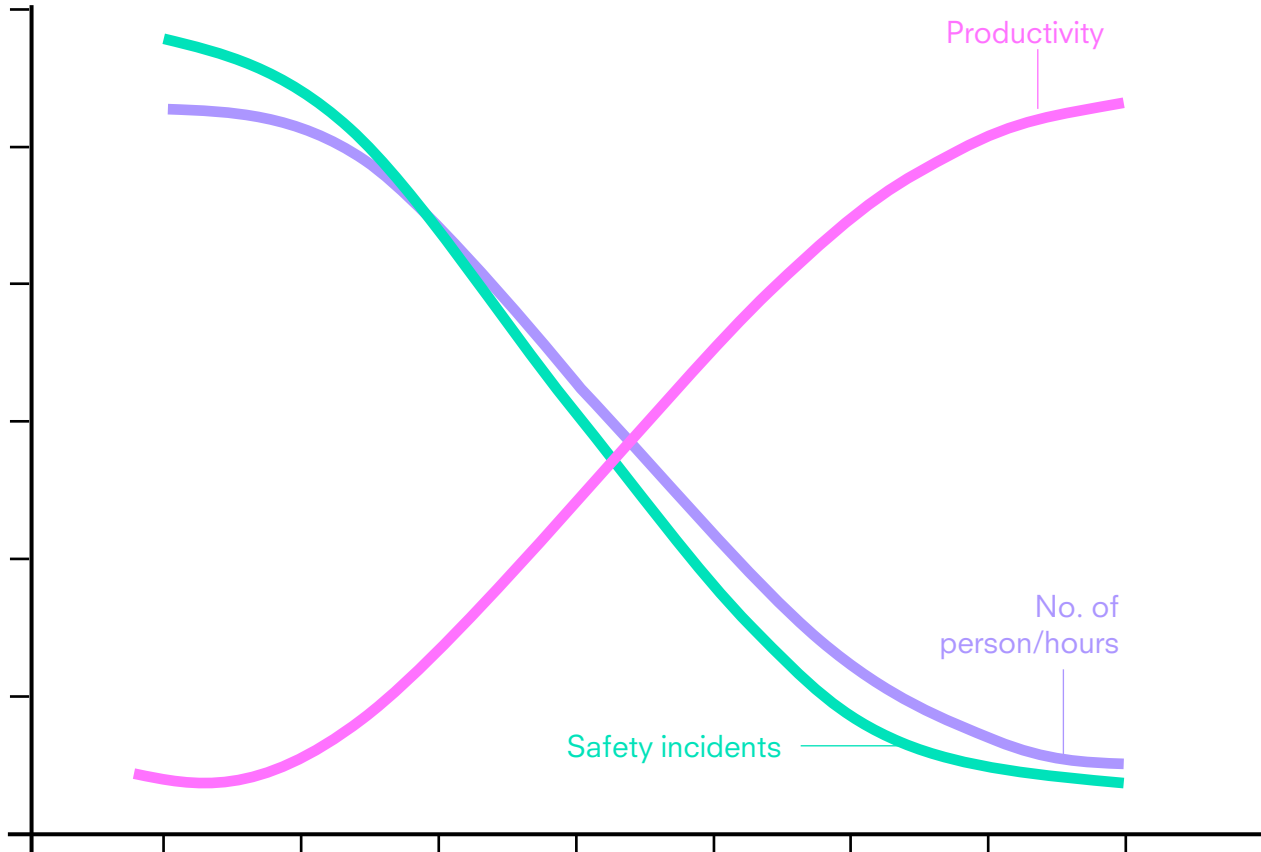
DfMA



Components  
+ Sub-assemblies  
+ Products  
+ Assembly Labour



# Safety incidents reduce with higher productivity



By raising productivity while maintaining (or increasing) safety levels, we can build at the same rate with less worker/hours, leading to a corresponding reduction in **reportable incidents**.



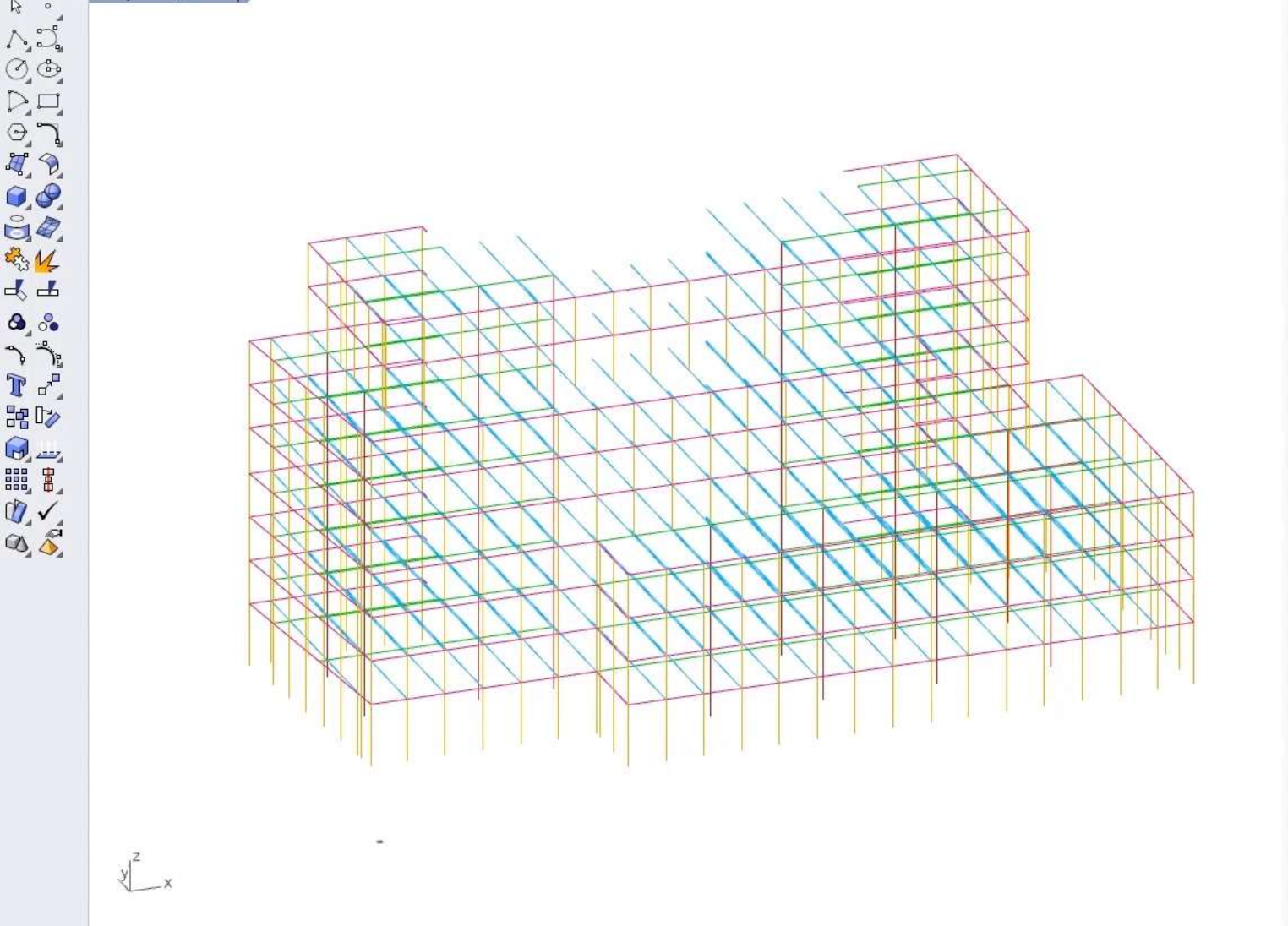
# The Forge, London

Landsec

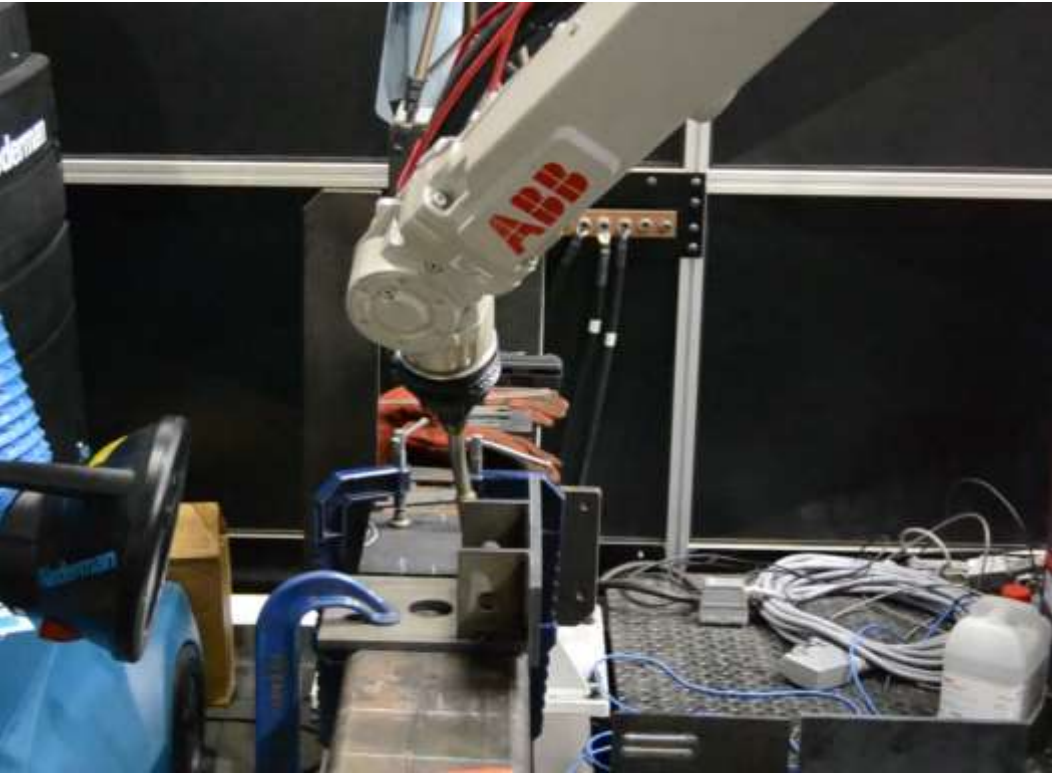


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easi space

Environmentally And Socially Impacting Spaces



UK Research  
and Innovation



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<https://vimeo.com/394805860>







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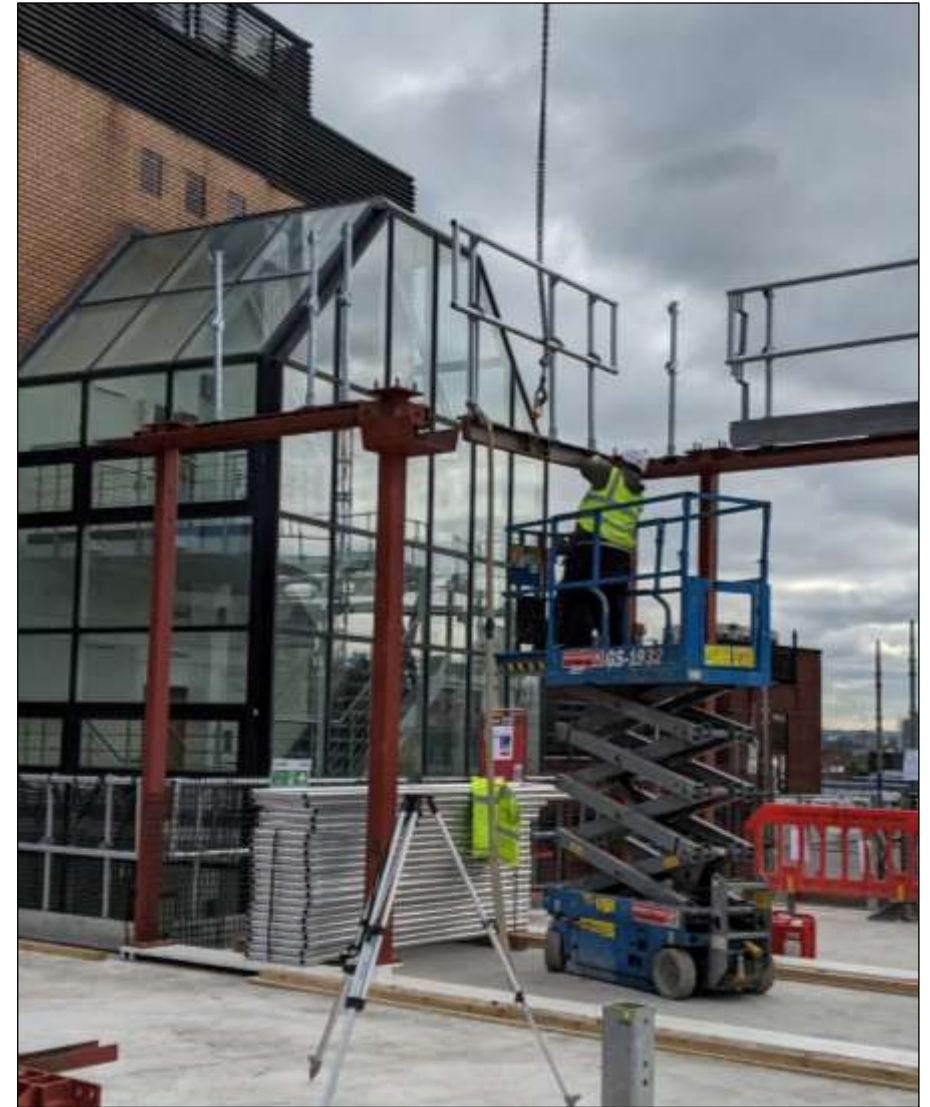
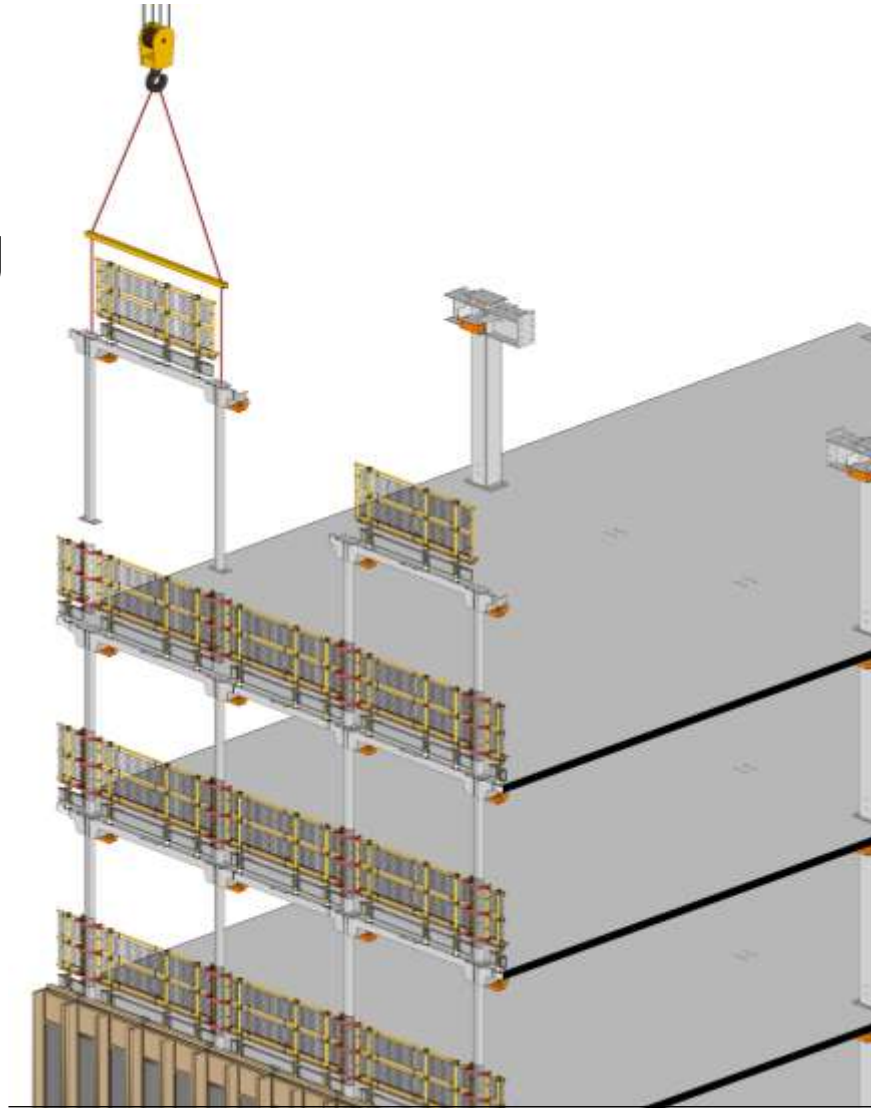
# Temporary handrail

Safety integrated into building structure at design stage enables a safe site + consistency across all project stages.



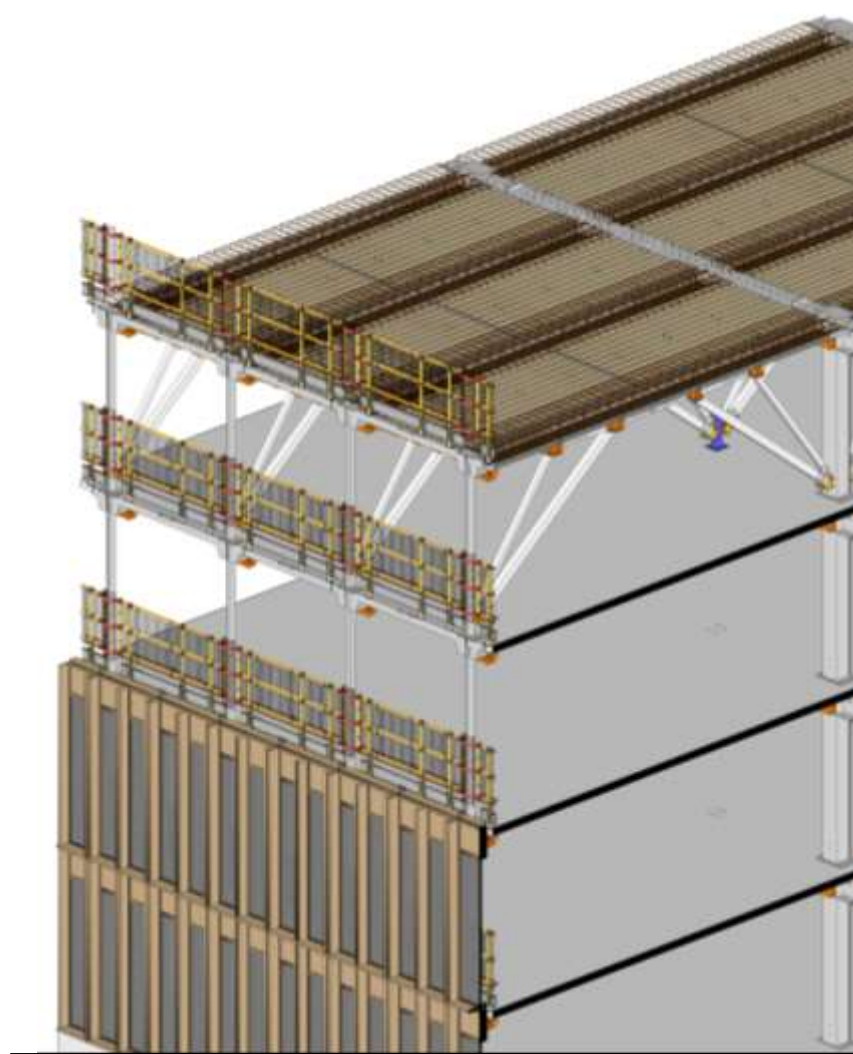


Handrails pre-installed to structure during steel erecting



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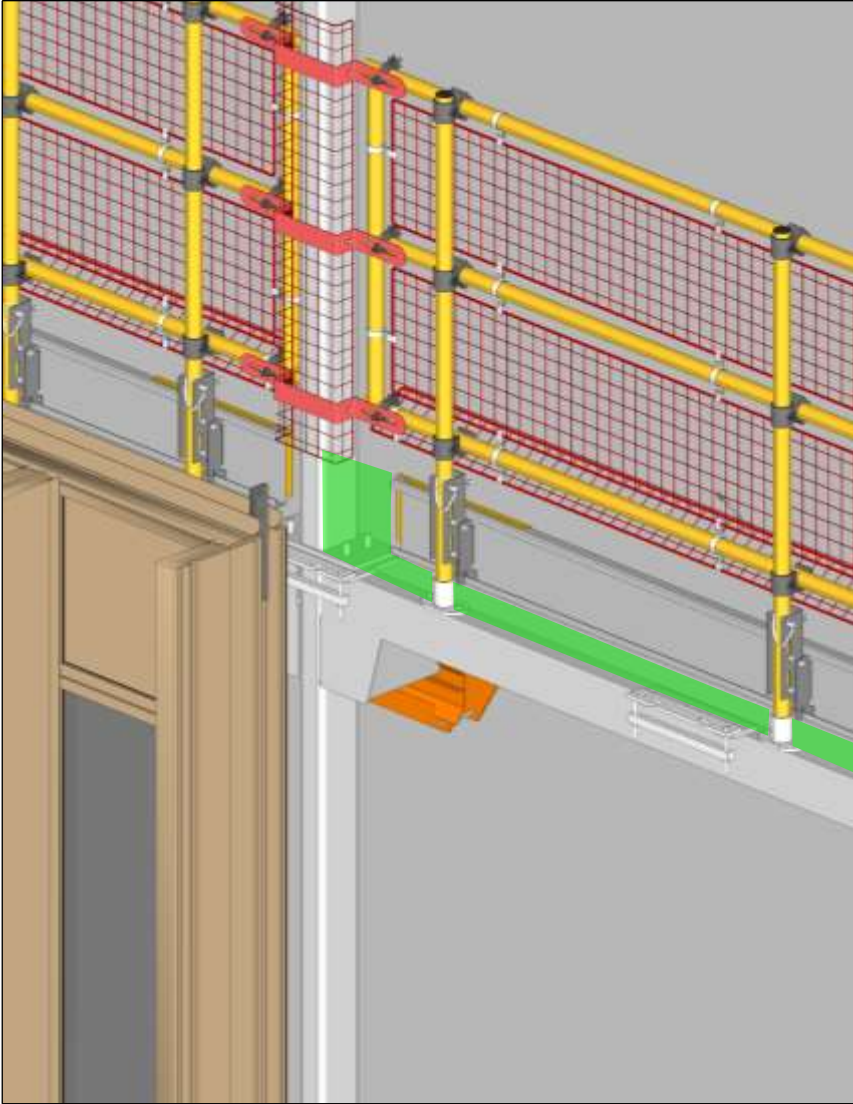
Handrail  
remains in  
place during  
concrete pour



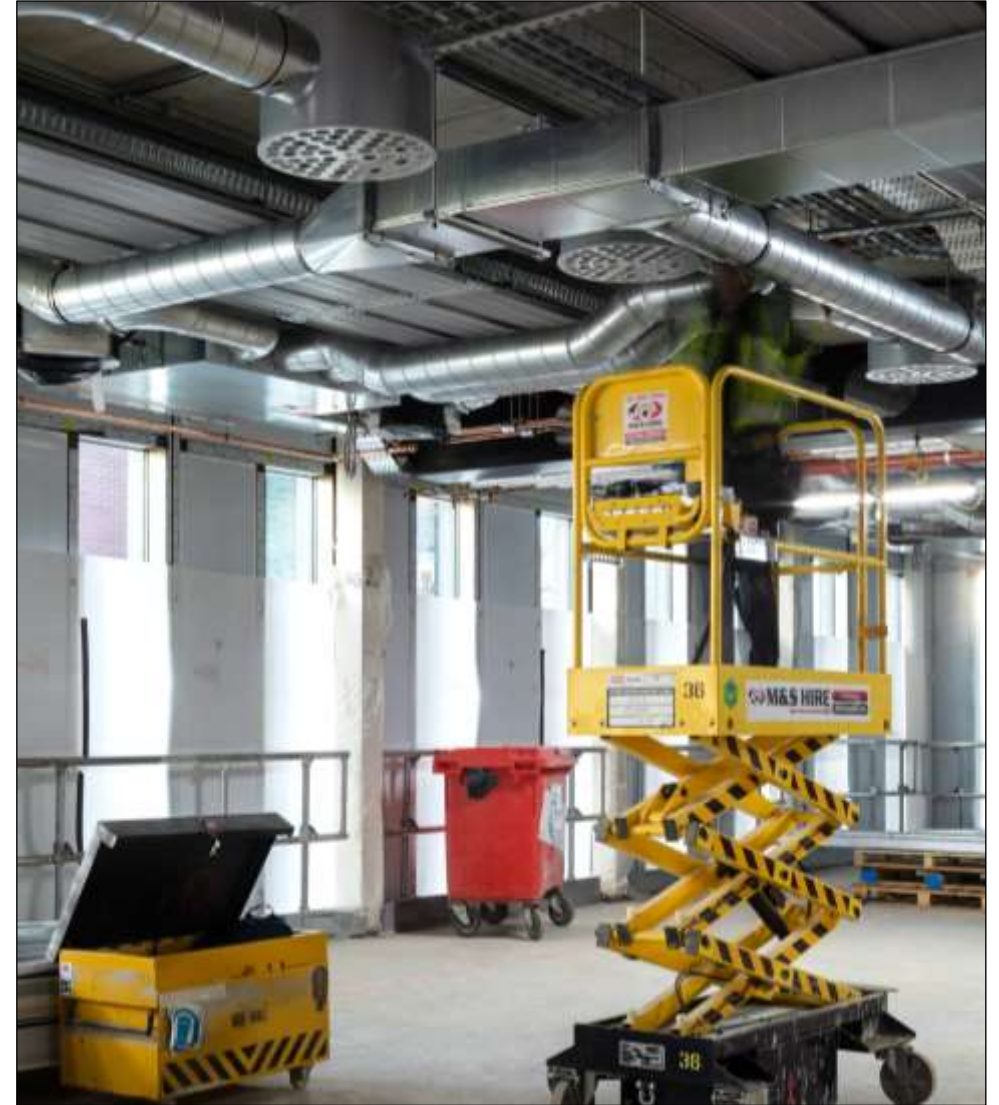
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Elements of handrail locally retract to allow access for façade install

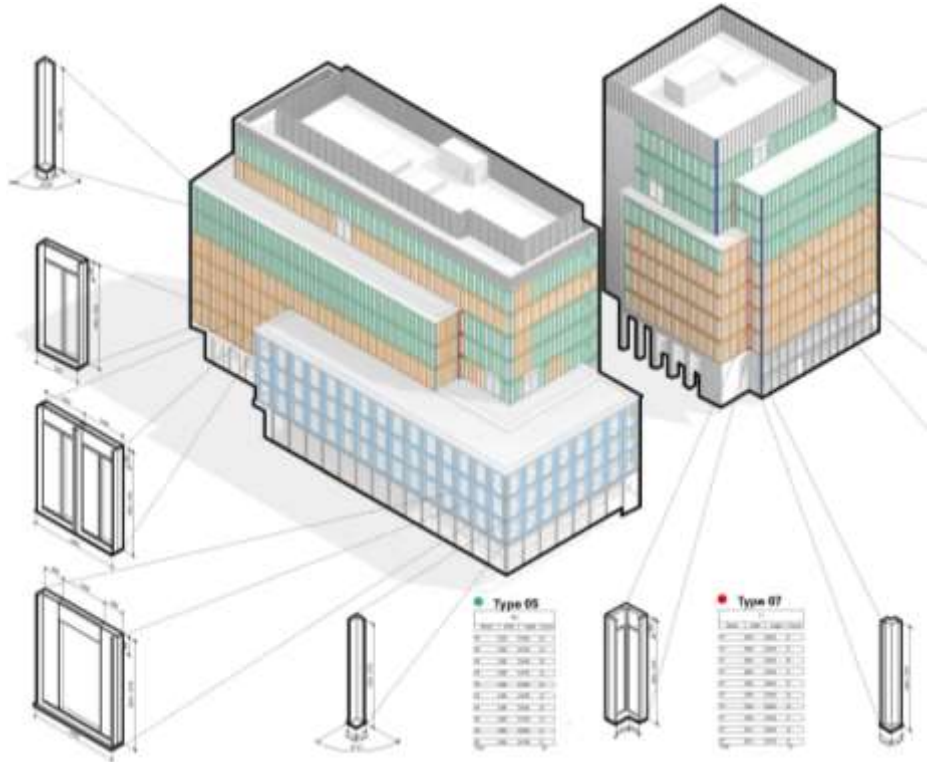


Handrail can remain in place post façade install to act as protection during on-going processes





# Façade



- Planned rate: 7 panels / day
- Peak rate: 6 minutes / panel



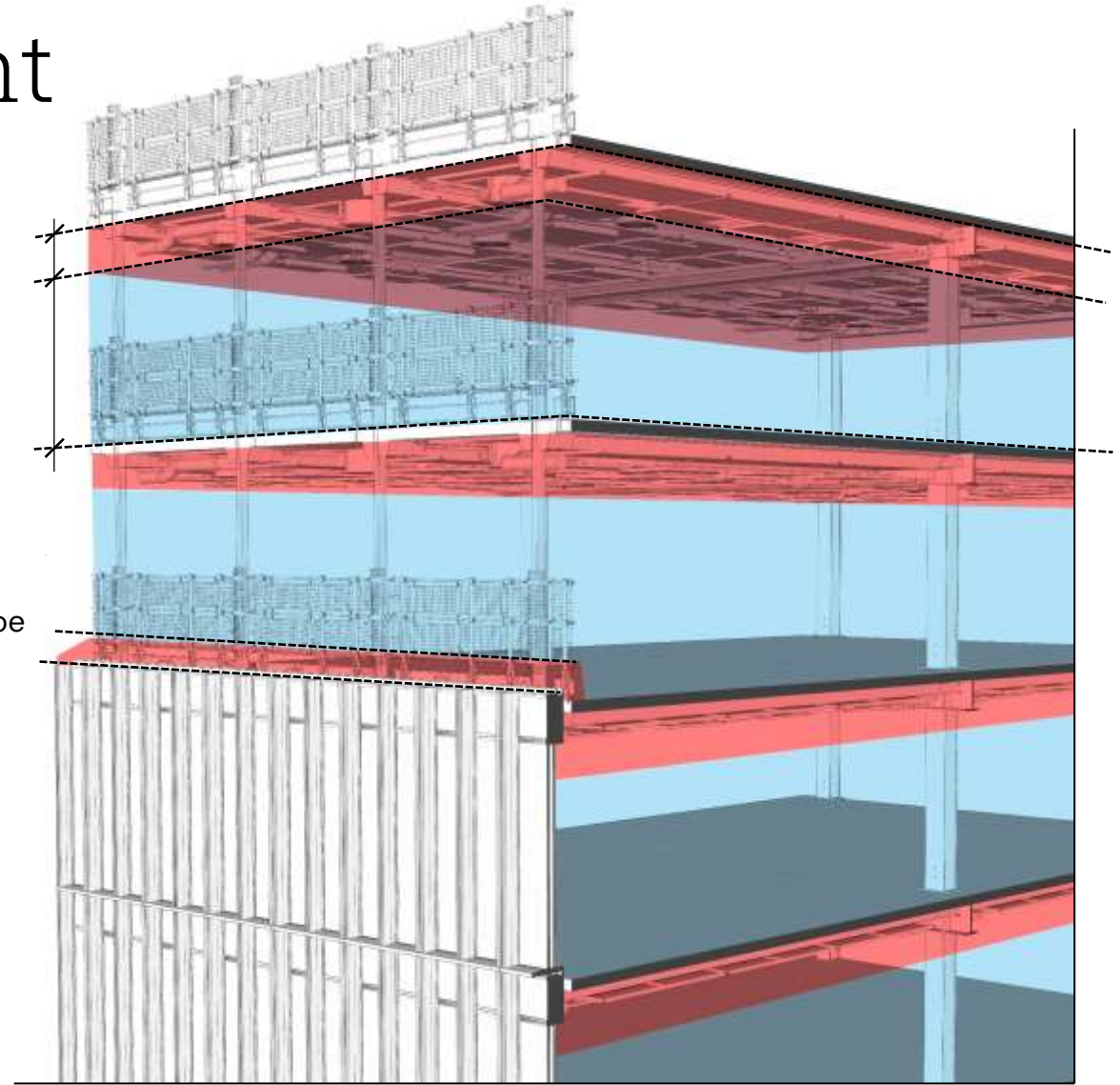
# Eliminating work at height

Analysis of site activities to identify processes occurring at high level, with a high degree of frequency, or in difficult to access locations.

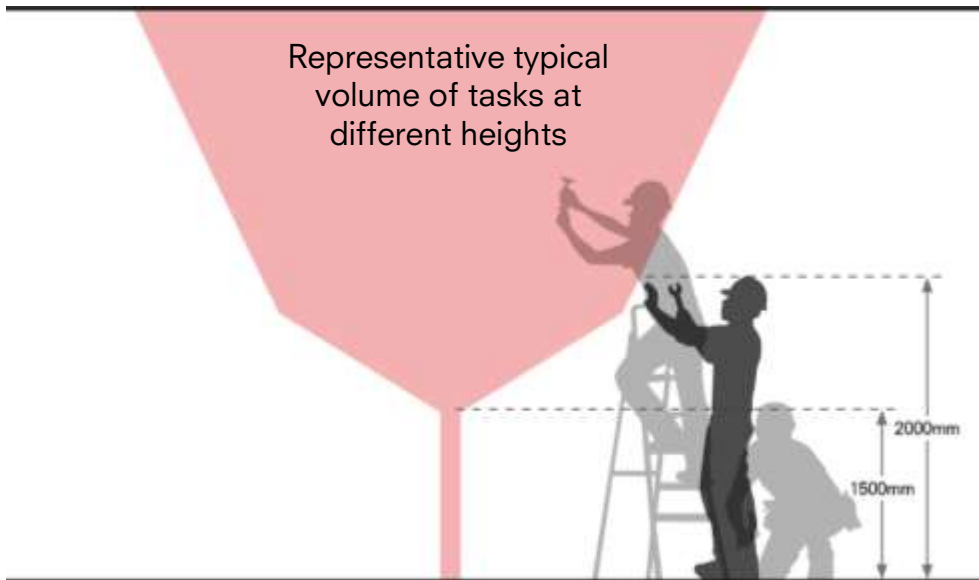
Above 1800mm

Up to 1800mm

Outside envelope



Representative typical volume of tasks at different heights





MEP



Courtesy of NG Bailey

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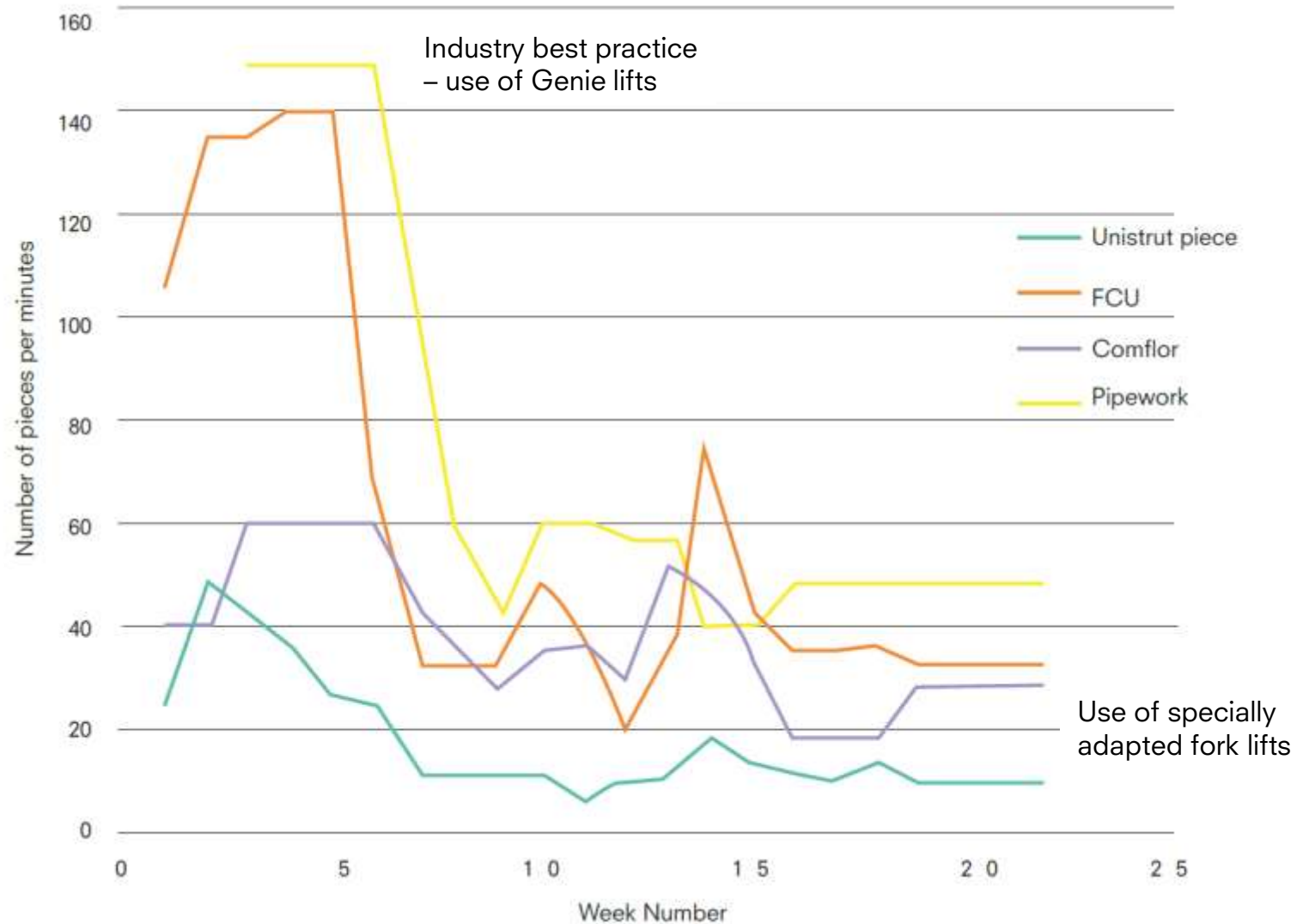


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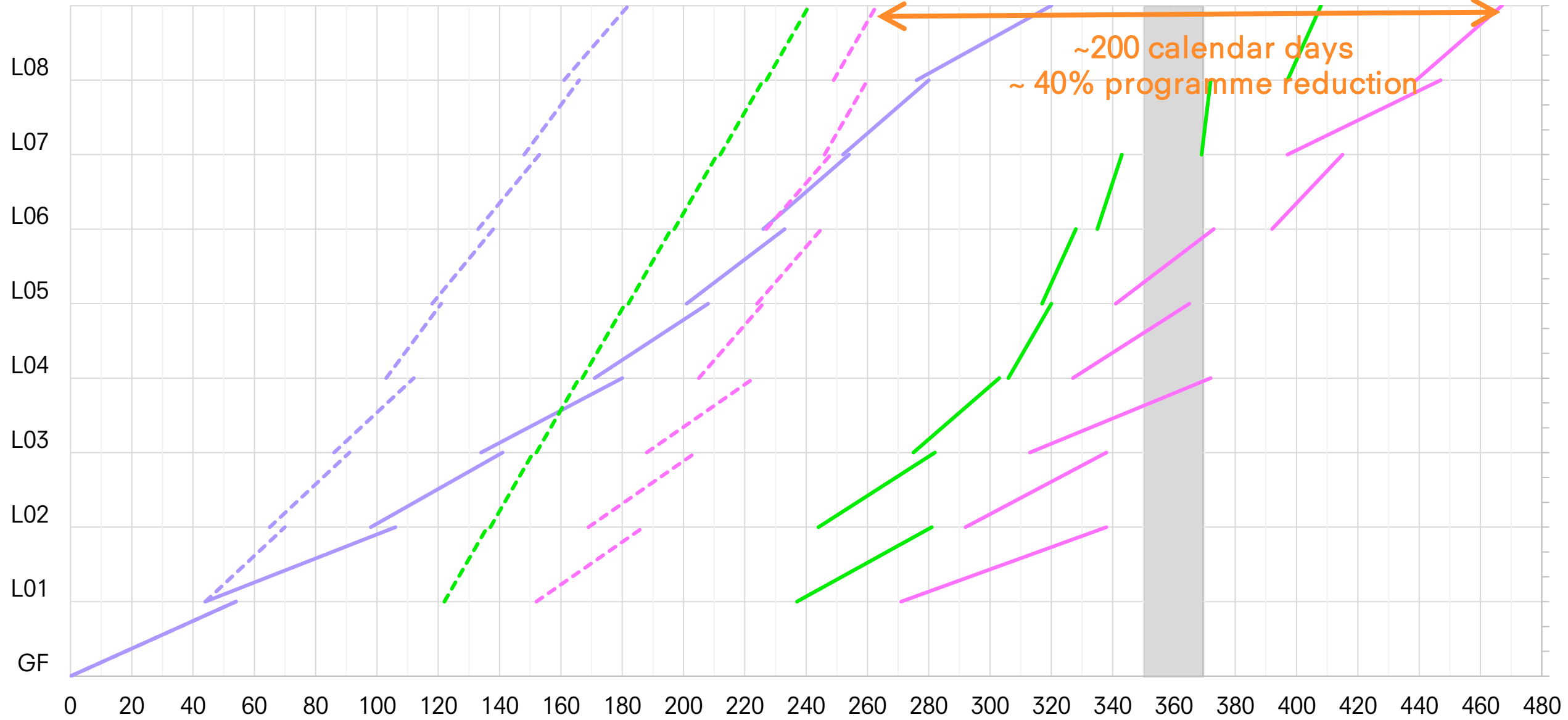


# Weekly module install times

- Install times are shown in the graph on the right
- The dramatic reduction coincides with the introduction of the adapted forklifts in weeks 5 – 6
- **Install times were reduced by 66% - 90%**
- NG Bailey estimate the prefabricated nature of the MEP has resulted in a **reduction of 30,000 hours** of site labour



# Actual vs. Optimised flowlines



Actual Superstructure

Actual Cladding

Actual CAT A Modules

Optimised Superstructure

Optimised Cladding

Optimised CAT A Modules



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# Sustainability



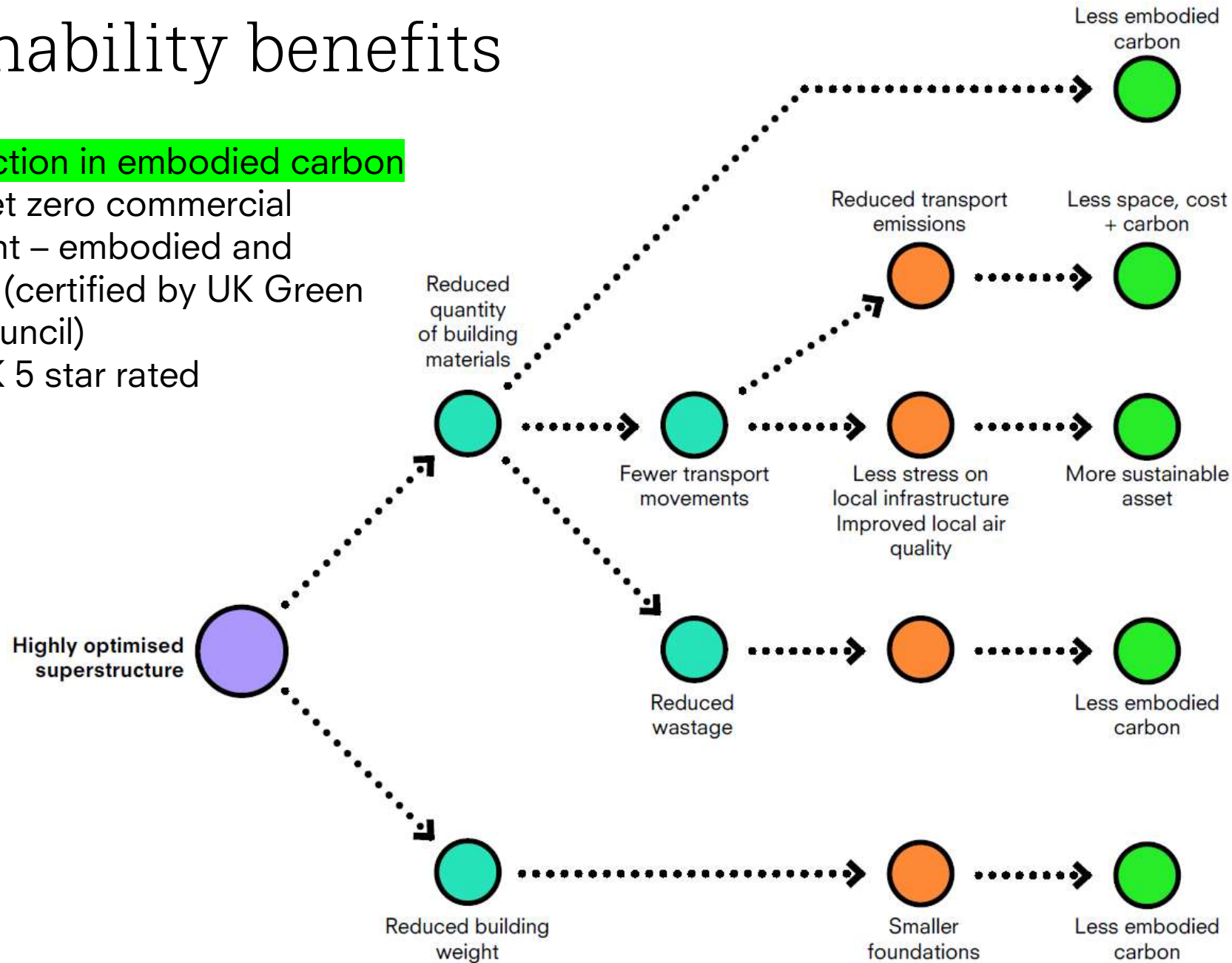


- Building + construction are responsible for 39% of carbon emissions



# Sustainability benefits

- ~30% reduction in embodied carbon
- UK's first net zero commercial development – embodied and operational (certified by UK Green Building Council)
- NABERS UK 5 star rated



Thank you.



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