# Making MMC Work

## The End of the Beginning

BTR Forum

12 October 2022

# Increasing Change in Geopolitical & Economic Conditions

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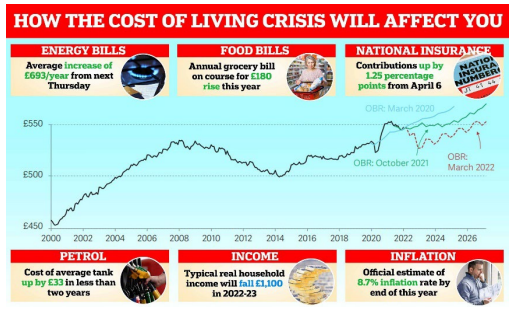


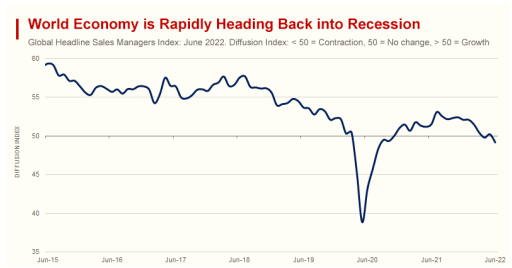




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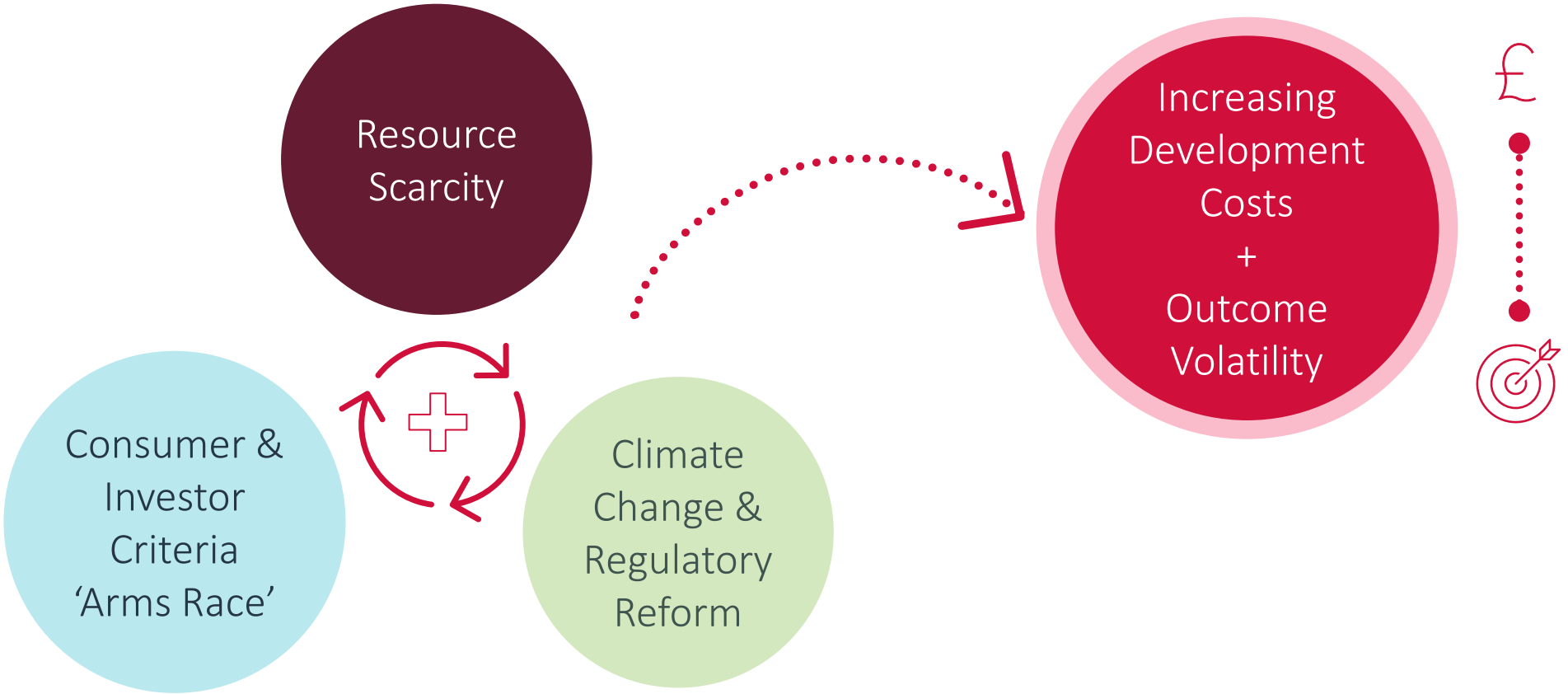
# Impacts on Development Projects

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# Key Construction Drivers for BTR Projects

## Commercial

**Programme**

Certainty & Duration

**Commercial**

Value and certainty

**Risk Profile**

Defined & Managed Risks

## Quality

**Environmental**

Carbon Performance

**Social & Community**

Placemaking & Social Value

**Asset Management**

Quality & Operation

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# Modern Method of Construction?

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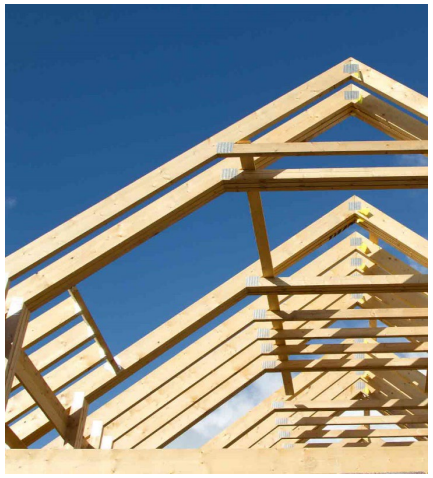
# Modern Methods of Construction?



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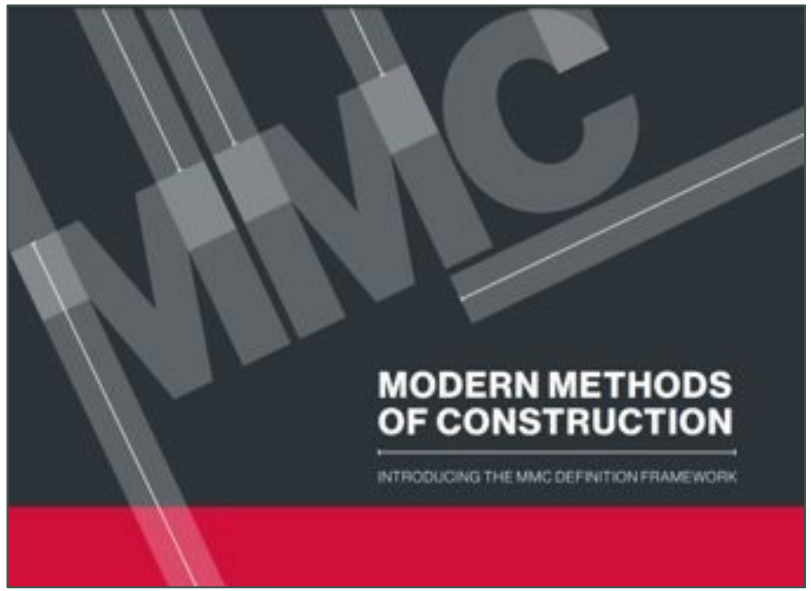
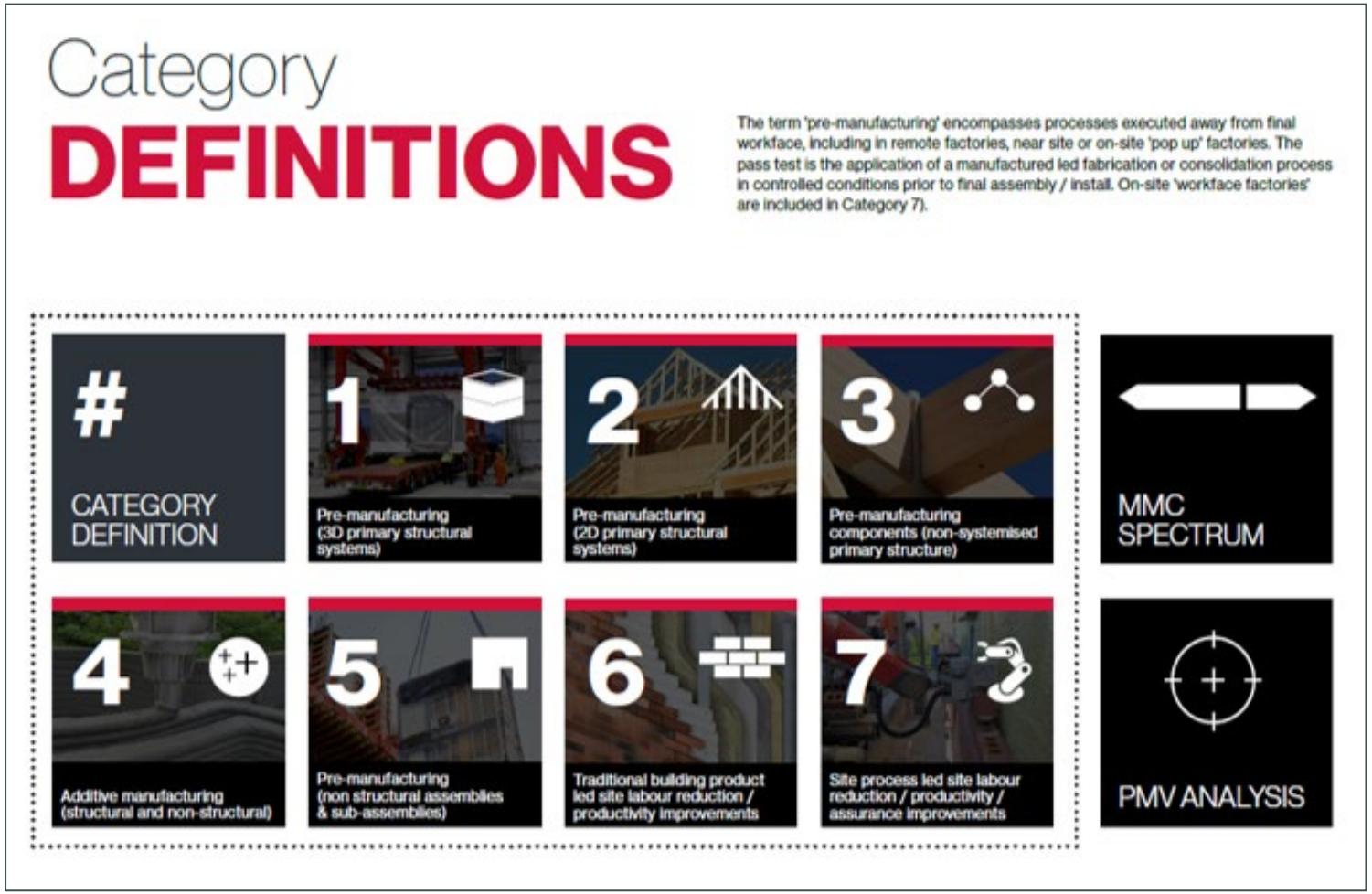
# MMC has been formally defined…

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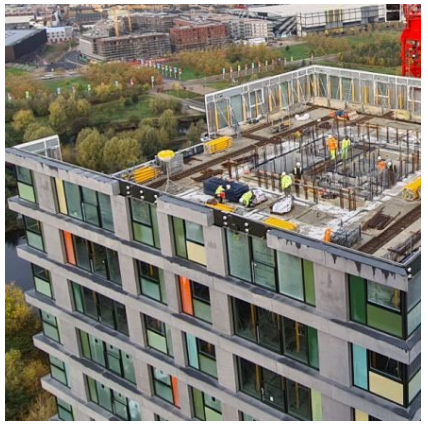
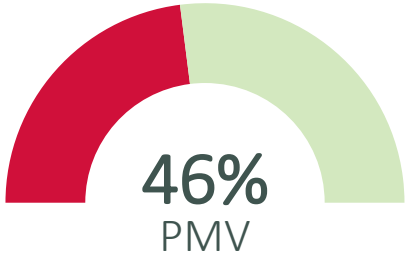
# …and PMV can now be accurately measured for comparison

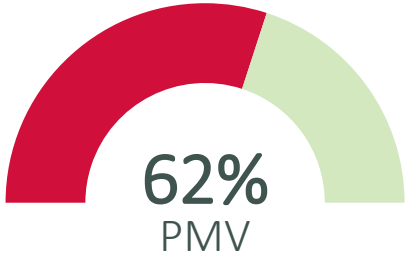
Pre-Manufactured Value (PMV) (£)

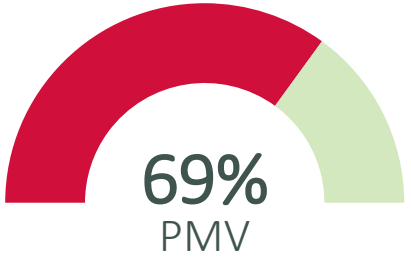
x 100

Gross Construction Cost (£)



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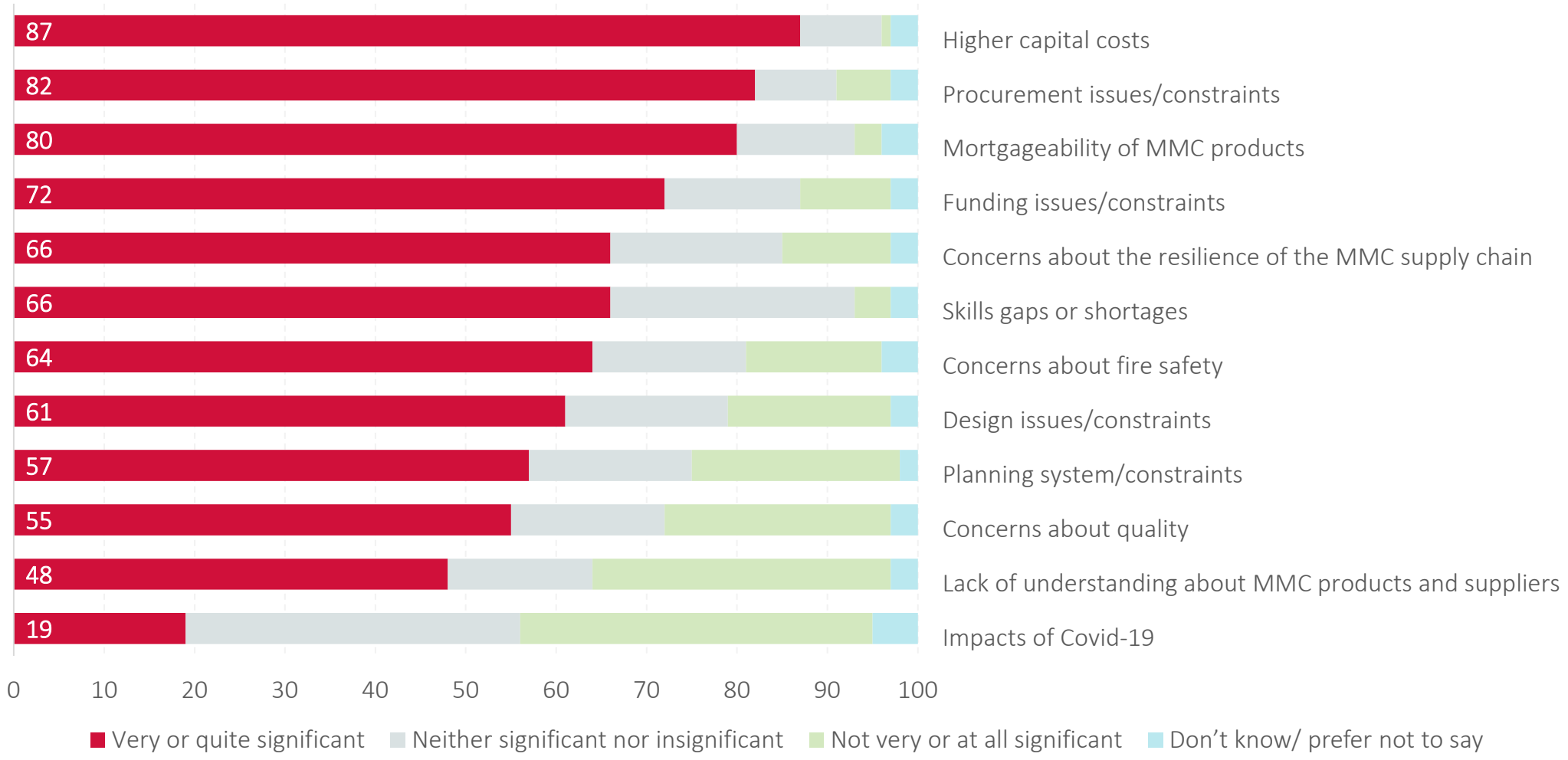
# Developers' Key Concerns with using MMC

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# Maturing market and emergence of new business models…

**Mace unveils 'next generation' construction method**

ISG buys majority stake in modular specialist ESS Group

**BAM acquires stake in Irish modular homes specialist MHI**

JRL snaps up stricken modular housing firm

**John Sisk & Son acquires off-site construction company Vision Built**

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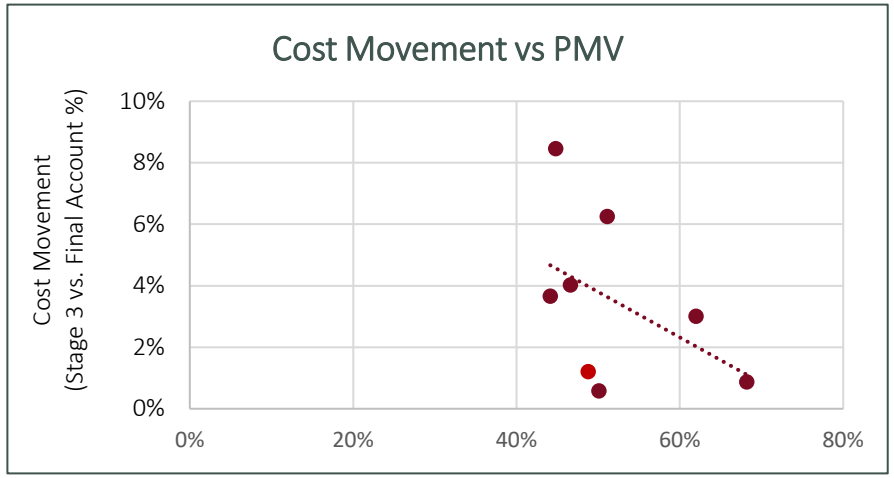
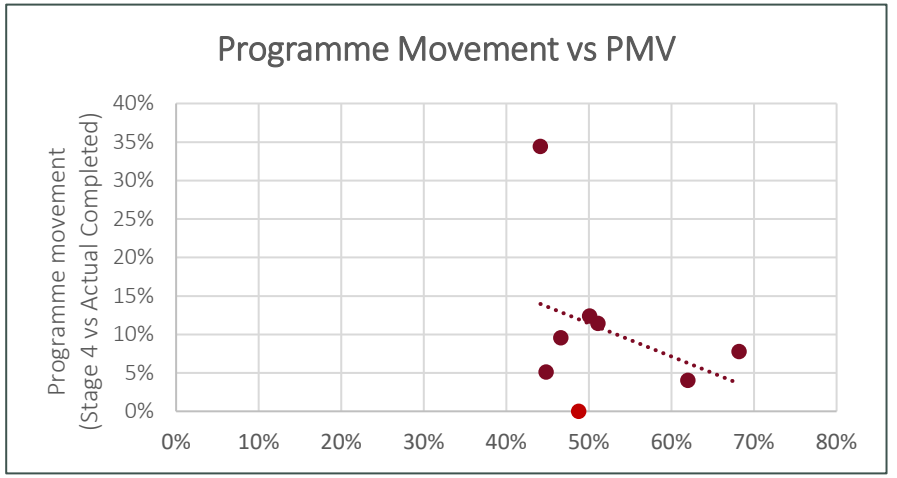
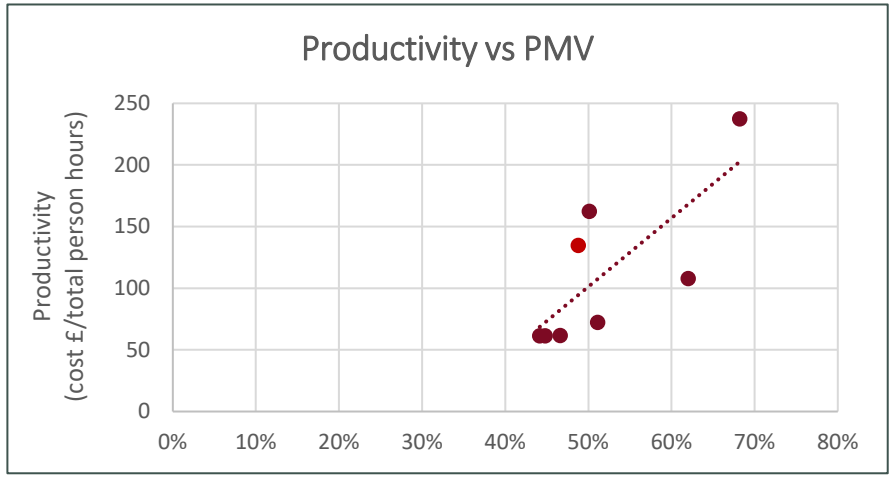
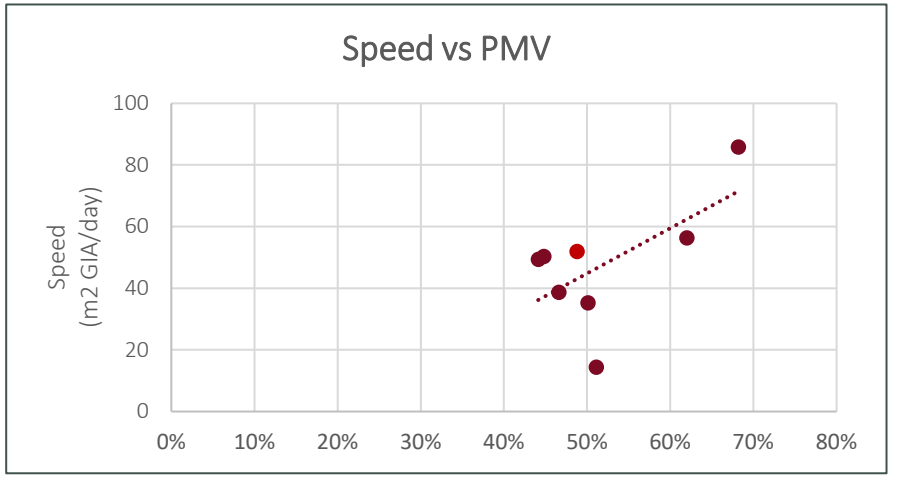
# …and more evidence that increasing PMV can give better outcomes

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# Portfolio Continuous Development

**Plot N08**

Completed 2018

481 homes

**Plot N06**

Completed 2021

524 homes

**Plots N18 & N19**

(Planning TBC)

848 homes

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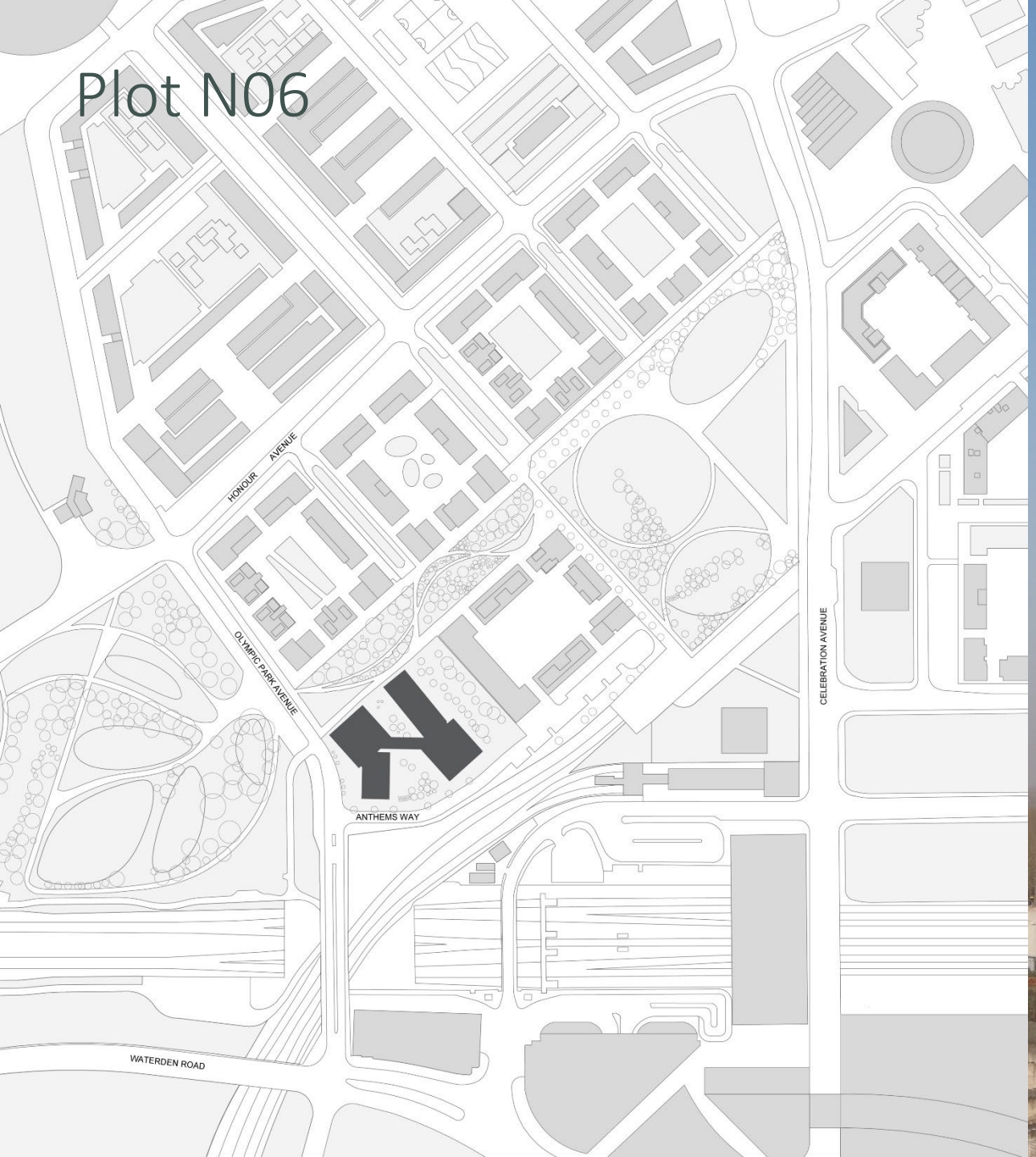
# Plot N06

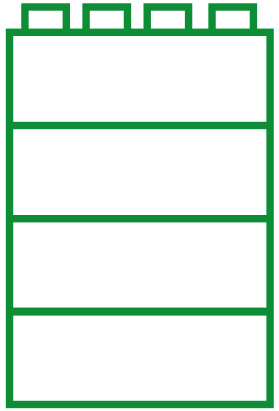

HONOUR AVENUE
OLYMPIC PARK AVENUE
CELEBRATION AVENUE
ANTHEMS WAY
WATERDEN ROAD

# Design for Manufacture & Assembly (DfMA)

Where are we now?

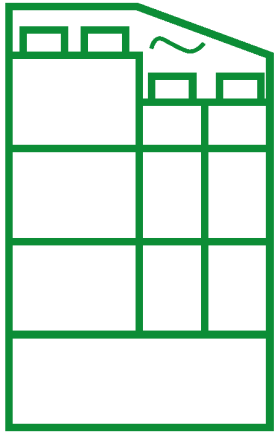
Starting each project with a fresh ball of clay

Where some are scared DfMA and standardisation takes us



Stacking rigid Lego Blocks

Where should we be?



Bringing the two together

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# Set goals early

## 01. Reduce

On-site activity

Environmental impact

Impact on Students and the wider campus

Risk

Redesign

Whole Life Cost  & Whole Life Carbon

## 02. Improve

Quality

Certainty

Overall design

Facilities management processes

Site Health & Safety

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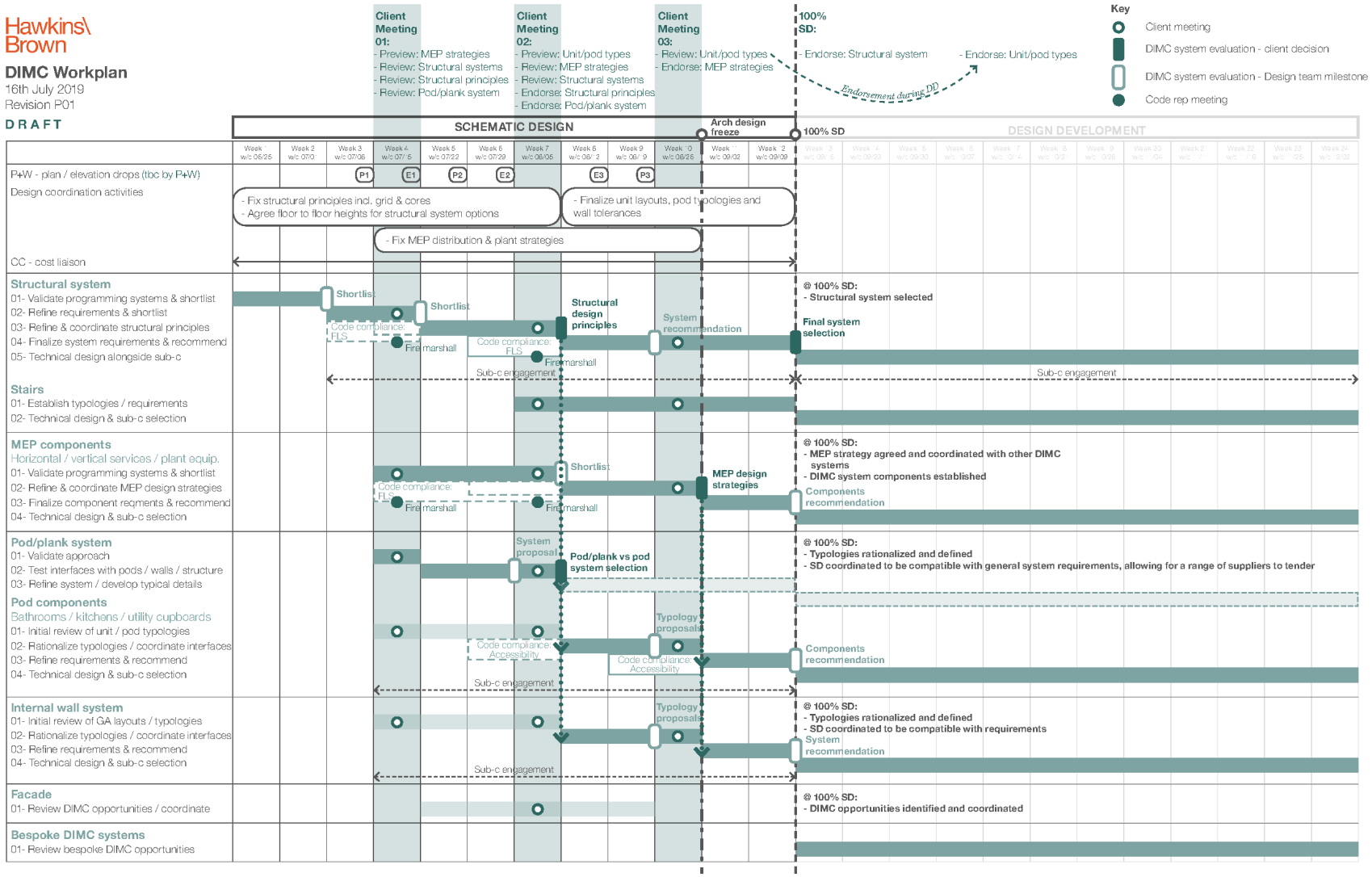
# Understand programme implications

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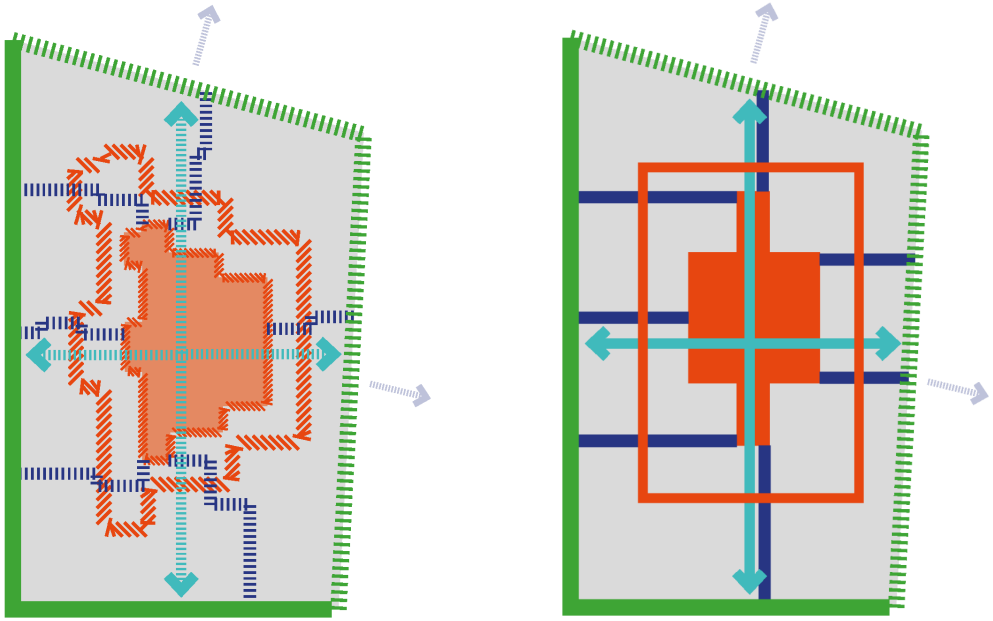
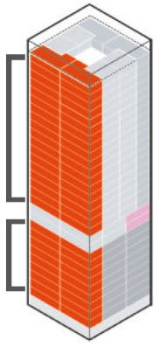
# DfMA starts with good design



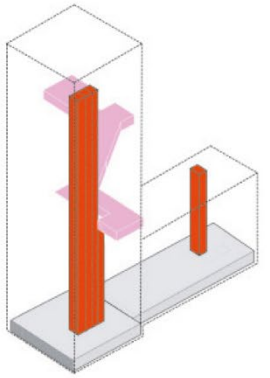
**Stacking of apartments**



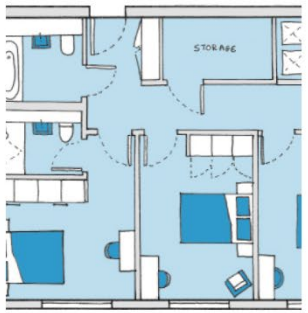
**Limited number of apartment types**

15 x Unit Types

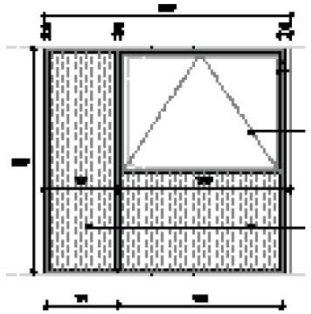
**Efficiency in cores and number of lifts**



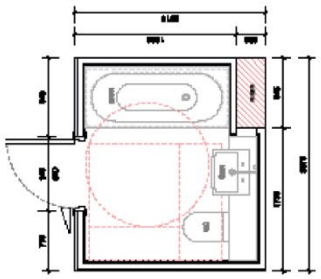
**Prioritisation of key facade design elements**




**Modularisation / prefabrication of facade elements**



**Modularisation / prefabrication of building elements**



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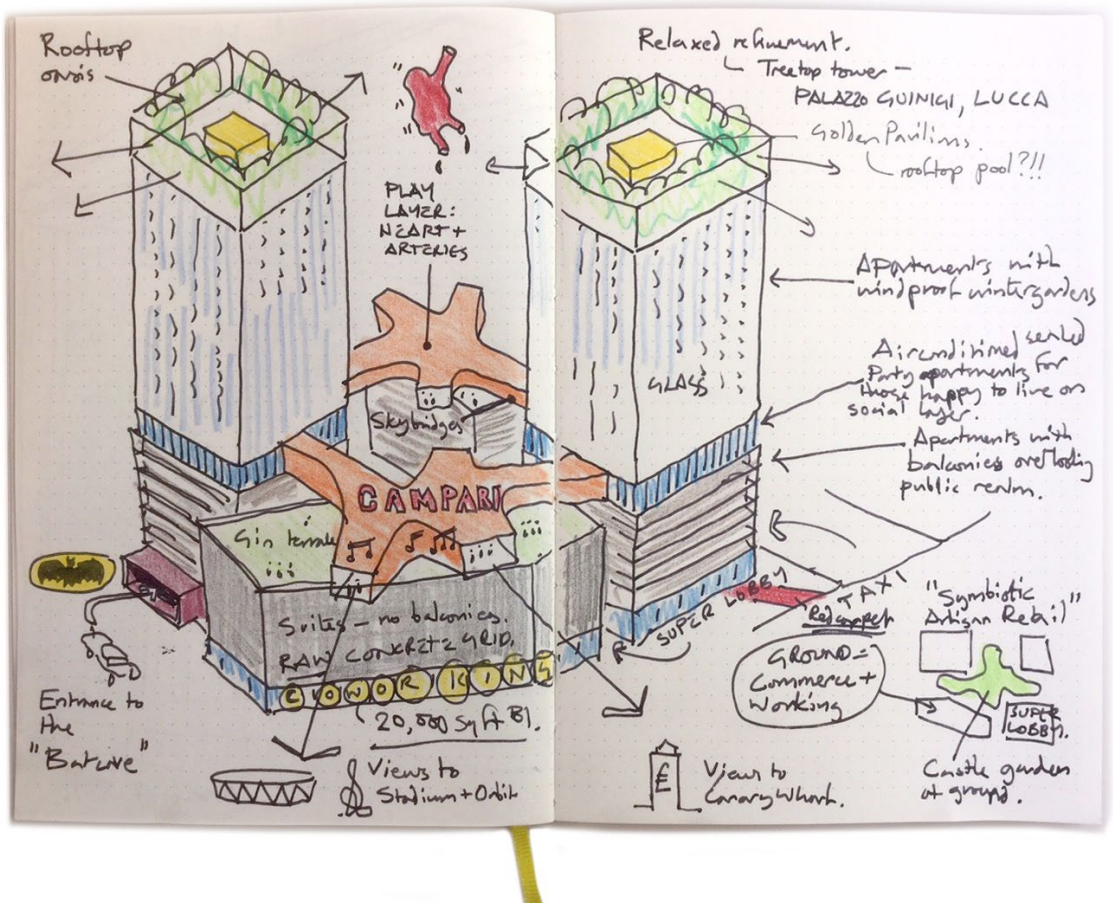
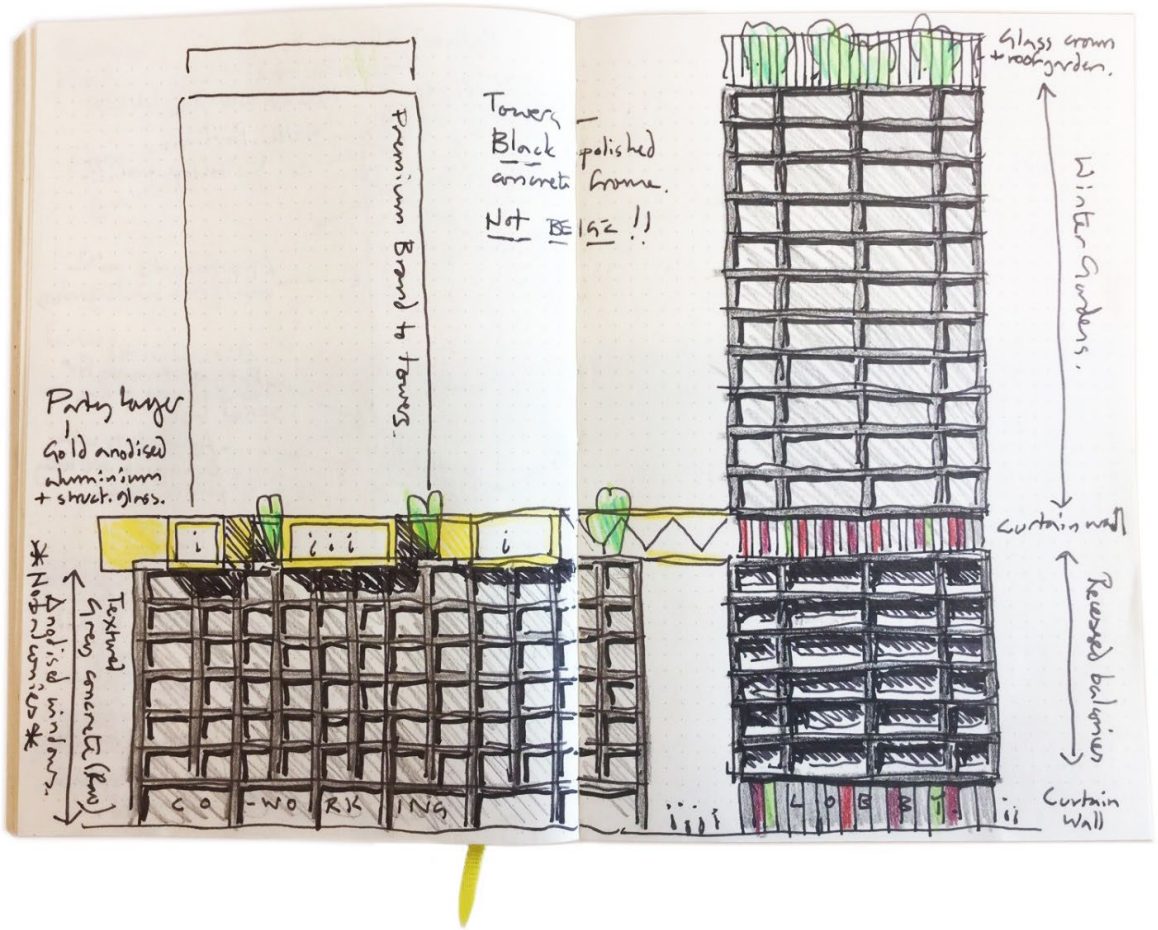
# Stifling creativity?

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# Planning implications?

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# Design ambition

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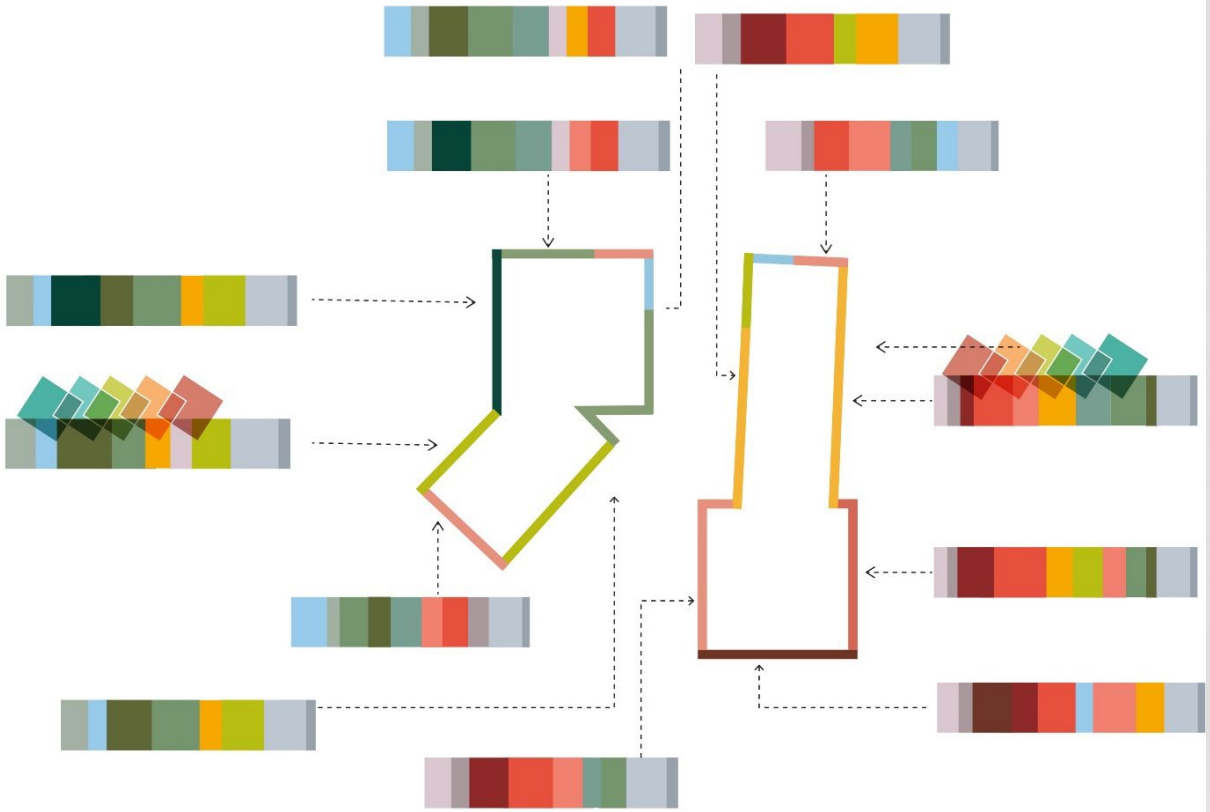
# Translating design to manufacture



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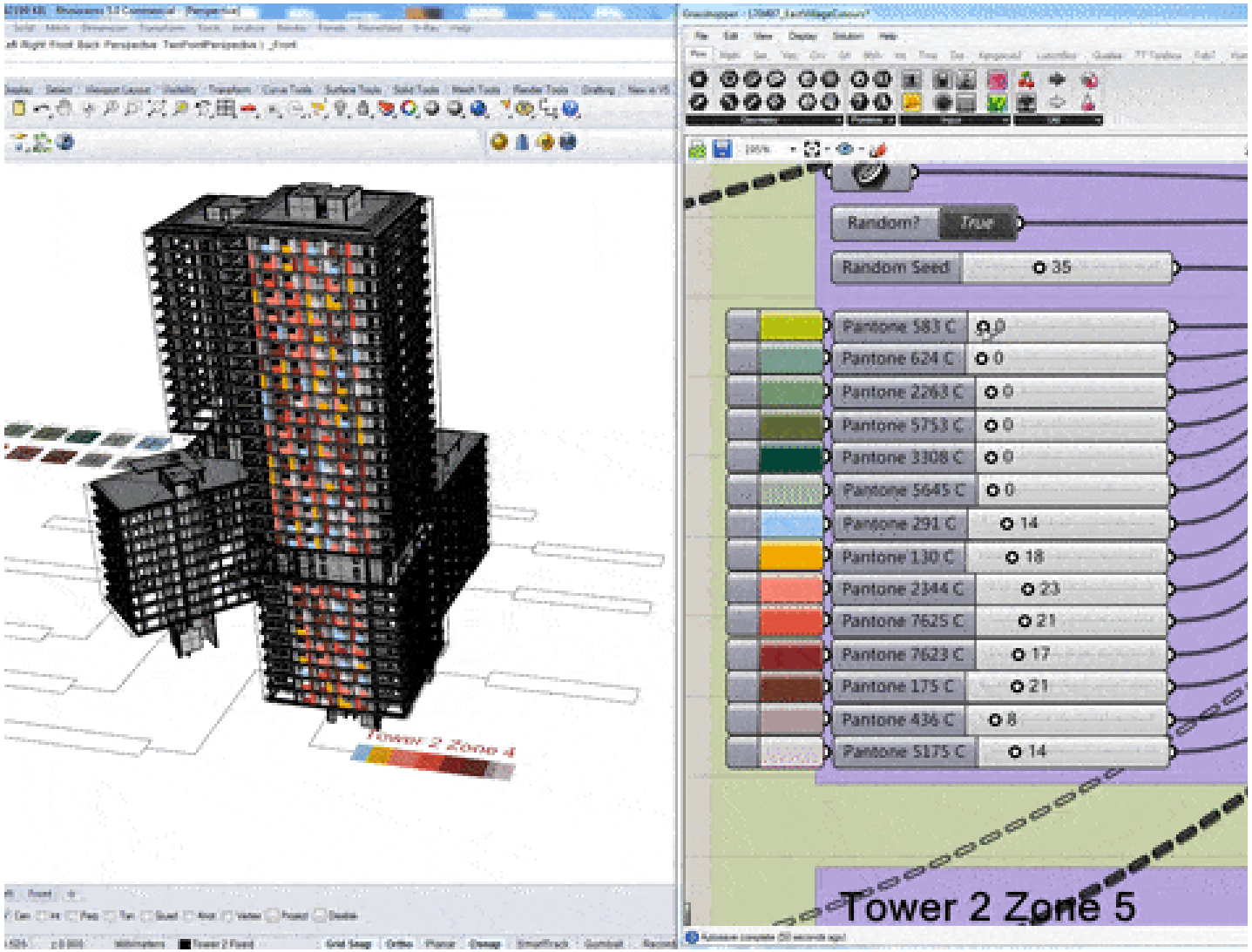
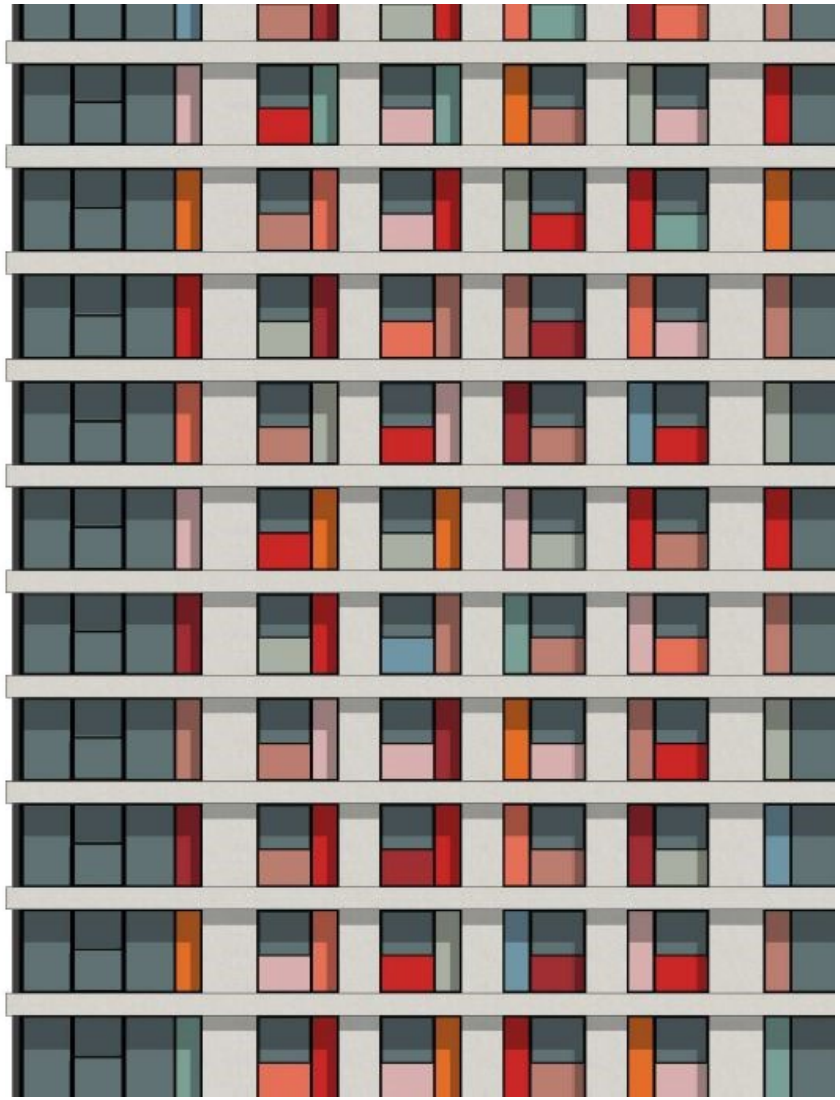
# Translating design to manufacture



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# Standard Chassis – Diverse product

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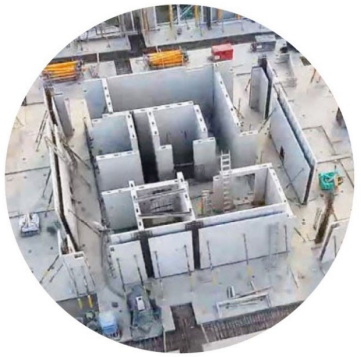
# A project-specific kit of parts

*Pre-cast concrete floor slabs*

*Pre-cast concrete columns*



*Pre-cast concrete shear / core walls*

*Pre-cast concrete stairs*

*Unitised façade*

*Bathroom pods*

*Utility pods*

*Riser and service*

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# Offsite Infrastructure doesn’t need to be a Factory

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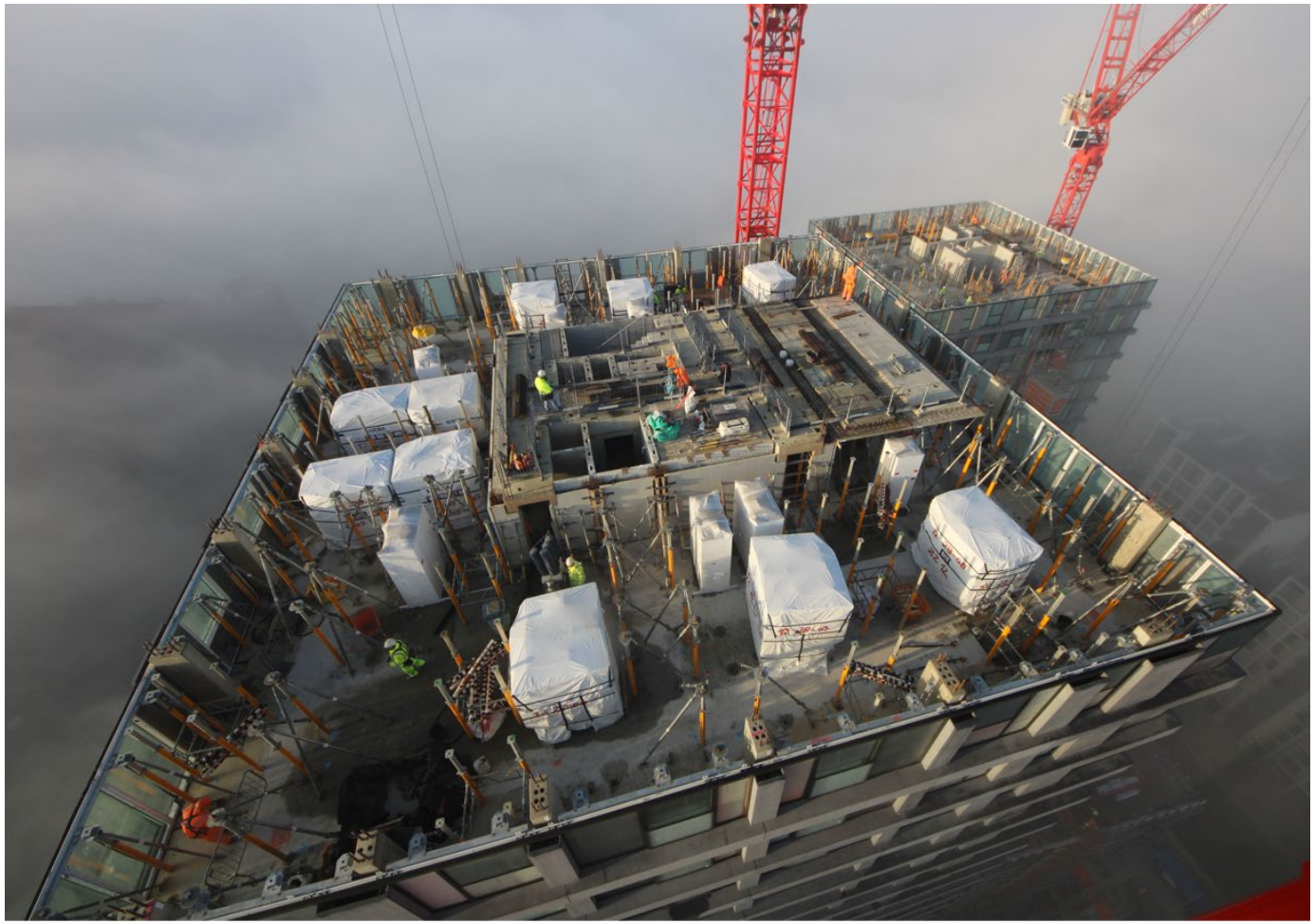
# How did it work?



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# Comparing High and Low PMV Methodology

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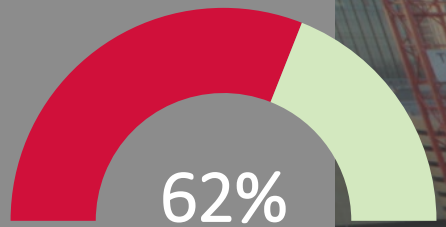
# Comparing High and Low PMV Methodology

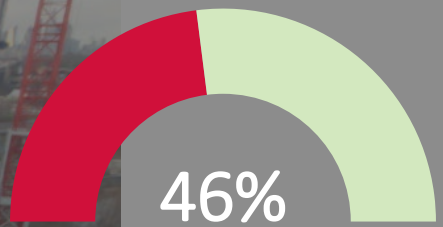


62%
PMV

10 floors:

| | |
|---|---|
| Structure | Complete |
| Façade | Complete |
| Service Distribution | Complete |
| Bathroom Pods | All installed |
| Utility Cupboards | All installed |

52 operatives



46%
PMV

10 floors:

| | |
|---|---|
| Structure | Complete |
| Façade | to Level 1 |
| Service Distribution | None |
| Bathroom Pods | to Level 6 |
| Utility cupboards | to Level 6 |

120 operatives

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# Construction Statistics

## Commercial

### Programme

30% faster to start fit out
18 weeks benefit

### Productivity - GVA

£170/hour – Mace Tech
£60/hour – Trad frame

### Resources/Floor

52no. – Mace Tech
120no. – Trad frame

## Quality

### Waste on Site

75% reduction for offsite activities

### Vehicle movements

40% reduction in HGV
80% reduction in LCV

### Embodied energy

15% reduction through concrete mix design

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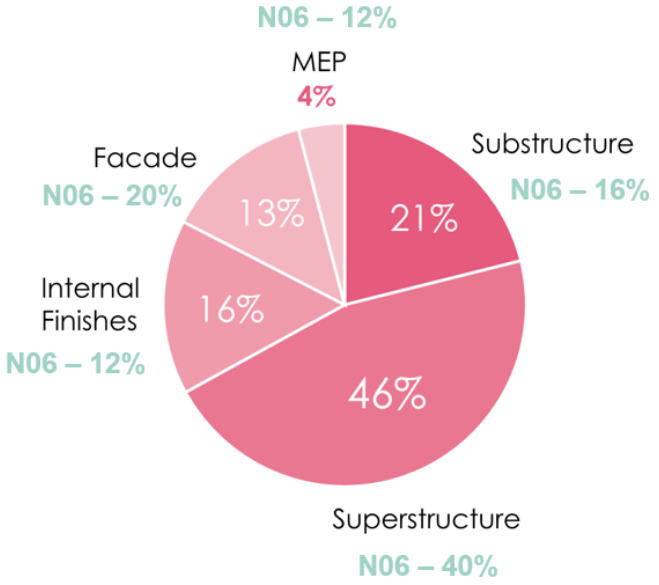
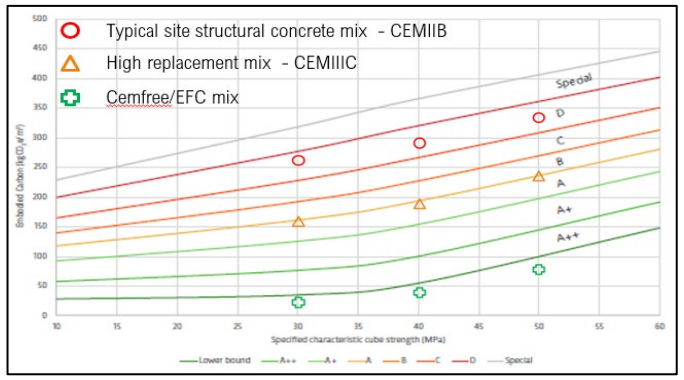
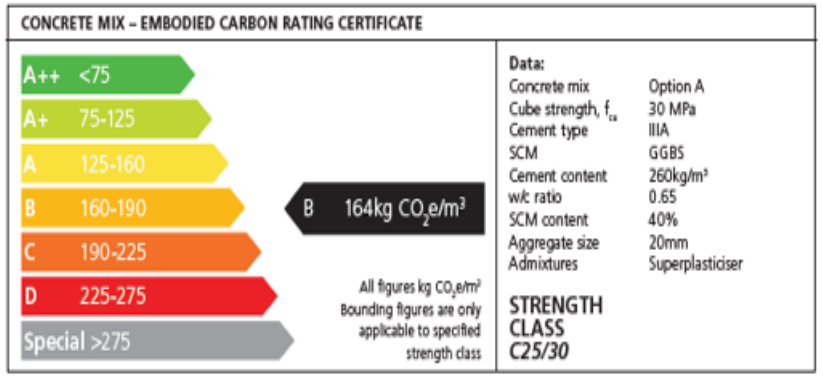
# Vertical integration gives more control and better data

- Retrospective carbon assessment of N06 = 797 kgCO2e/m2 (+/- 15%)
- Optioneering studies for future projects' embodied carbon.
- Smarter use of embodied carbon for concrete structures:



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# Higher PMV Improving Outcomes for BTR Projects

## Commercial

**Reduced Programme**
Faster route to revenue

**Predictable Programme**
Mobilisation & IRR

**Same Contract Value**
…but better outcome

**Limited Cost Movement**
from Contract Award

**Reduced Risk**
Fewer Site Unknowns

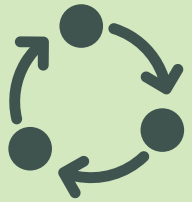
## Quality

**Carbon Measuring**
Better Data

**Fewer Defects**
309 total at PC

**More Standardisation**
Simplified maintenance

**Community**
Reduced Disruption



**Portfolio Learning**
Continuous Improvement

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Where do we go next?

How do we do better?