



4 Arbour Street

Hybrid Frame System



Client Vision.

Flexible by design. Sustainable by ambition. Distinctive by character.

A **world-class commercial** building capable of accommodating everything from education and emerging businesses to major corporate occupiers



Statement structure

One of Europe's tallest precast/CLT hybrid structures



Diverse Occupiers

Office, education, start-ups and corporate tenants



Built for change

Flexible floorplates and multiple tenancy configurations



A new destination

High-quality workplace, ESG and wellbeing ambitions



Project Team



The **client**



The **architect**



The **structural engineer**



The **main contractor**



The **DfMA specialist**



The **services engineer**



PCE Ltd.

National DfMA specialist contractor for structural systems and façades.



Systemised

Platform-based solutions built around proven details, standardisation and repeatability.



Integrated

Structure, façades and key building elements coordinated into one offsite solution — with design, manufacture, logistics, assembly and quality under one accountable team.



Digital + Offsite

Digitally coordinated delivery supported by flexible, scalable offsite manufacturing.

170+ Employee Partners | £140m Turnover | 100% Employee Owned

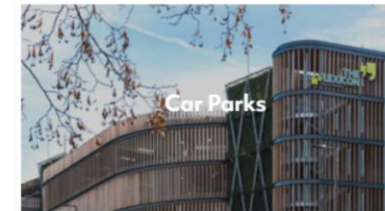
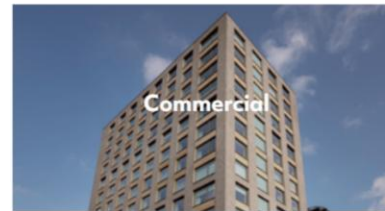


Hybrid Frame System.

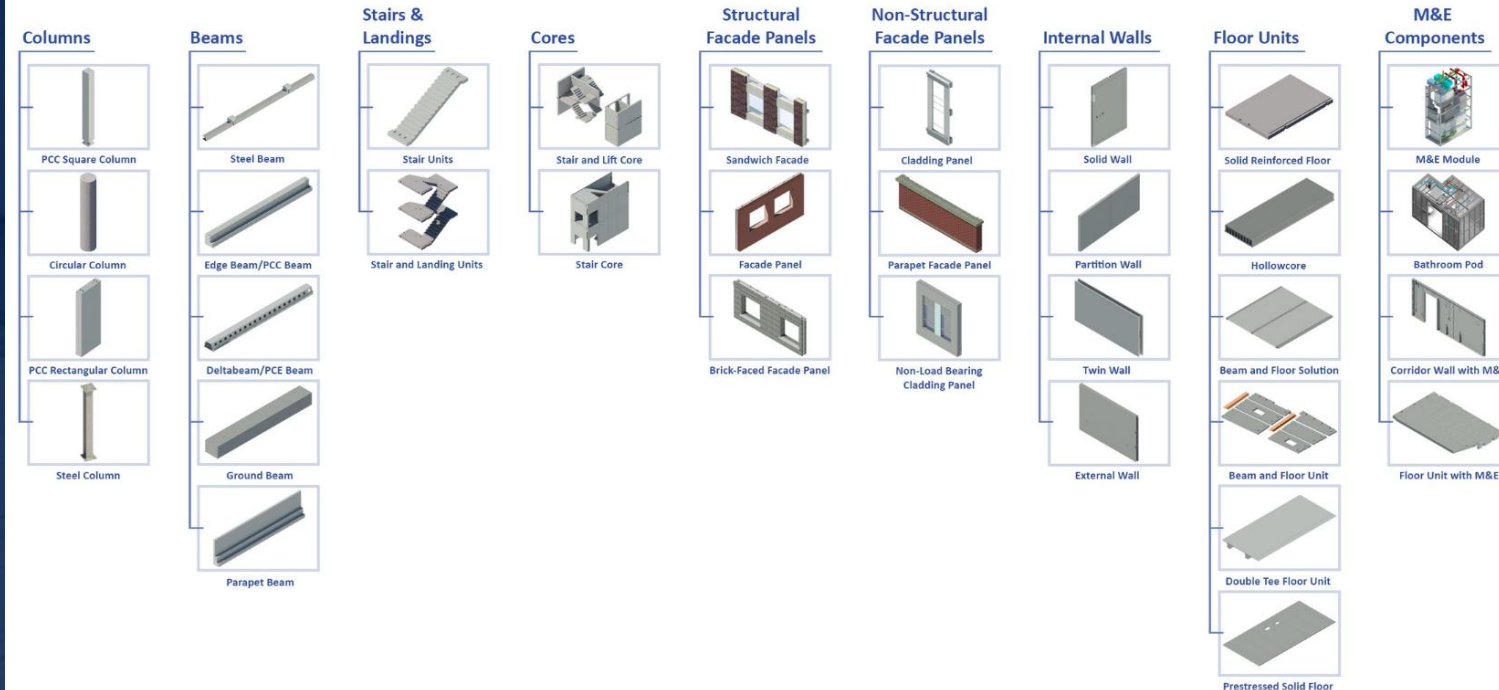
Systemised DfMA delivery of hybrid structural frames and façades.

- ✓ Existing designs **easily and efficiently configurable** utilising PCE's Frame system approach
- ✓ **Optimised structural grid** through the use of long span solutions and shallow-floor construction
- ✓ **Seamless integration** of façade and M&E systems
- ✓ **Industry leading quality** and predictable tolerances due to systemised approach

System Sectors.



Repeatable Components.



Configurator Principle.

Turning PCE's system knowledge into faster, better-informed building decisions.

Built from **50+ years of structured project knowledge**, the PCE Configurator uses established component libraries, engineering rules, DfMA logic and performance data to generate buildable structural options in real time.



Define

Building parameters, spans, layouts, façades, MEP provisions and integrated elements.



Optimise

Cost, programme, carbon, logistics, manufacture, assembly and QA requirements.



Improve

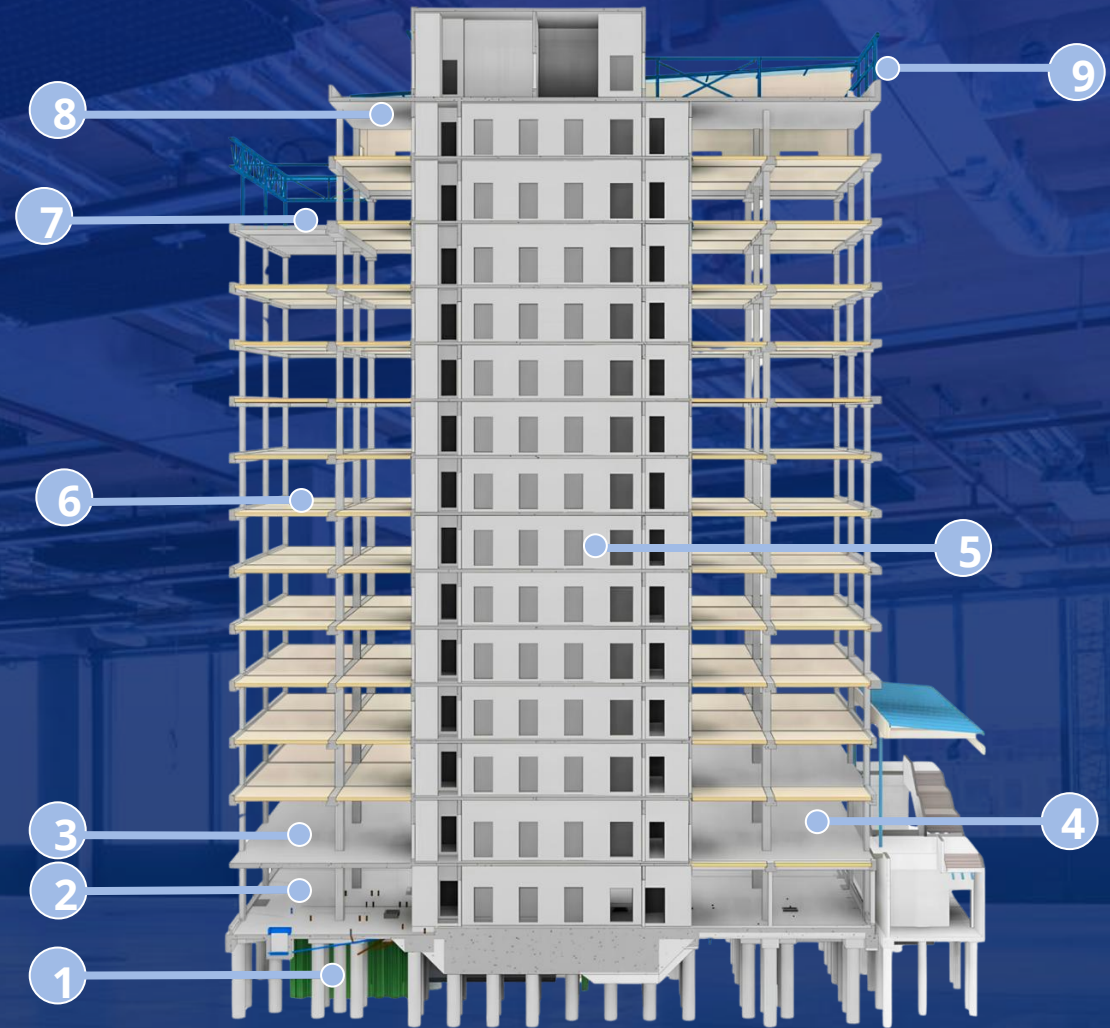
Project outcomes feed back into the system, strengthening future configurations.



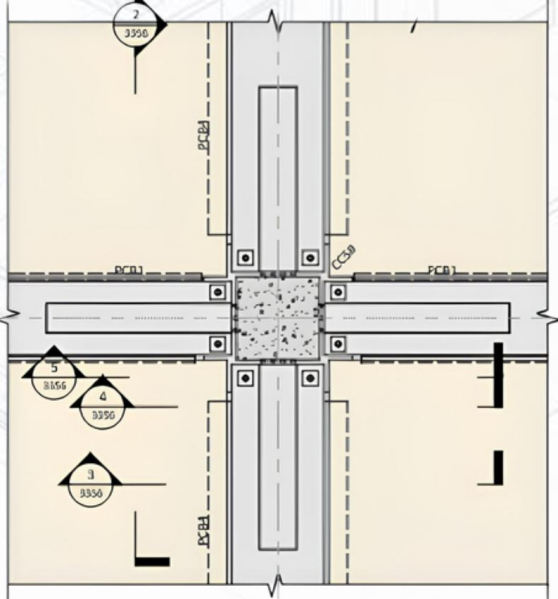
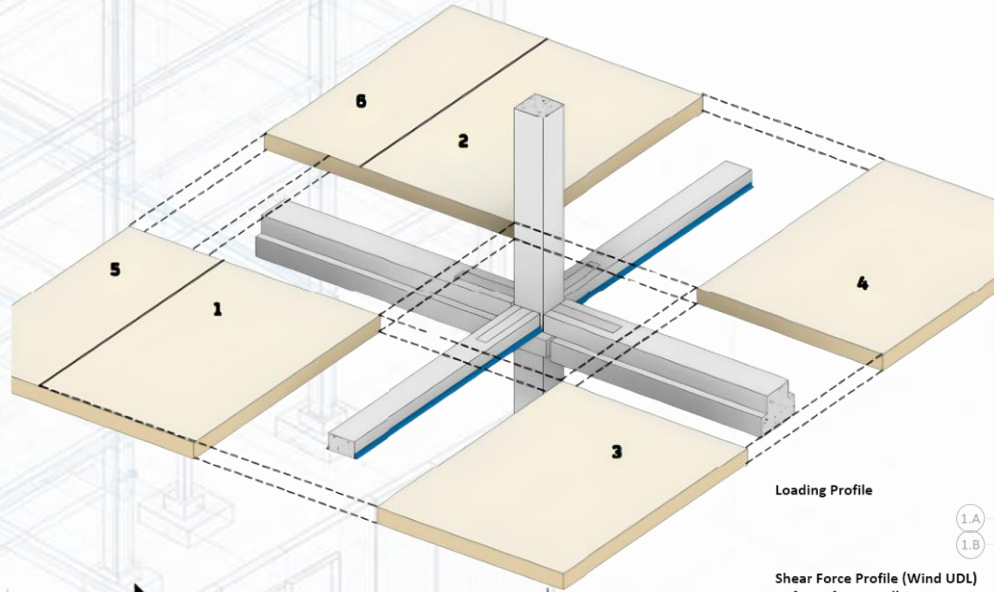
Structural Philosophy

At early Stage 3, the principles of the structure were as follows –

1. CFA Piles
2. Insitu Concrete Ground Bearing Slab and semi-Basement
3. RC Frame and Slab to & 1F
4. Part RC Frame and Slab to 2F, part Precast Frame & CLT Slabs
5. RC Cores & Lobbies
6. Precast Frame & CLT Floor Plates
7. Insitu Concrete Terrace Slabs
8. Insitu Concrete Plantroom Slab
9. Steel Framing to Plant Screens & Terraces



Key Structural Principles



Loading Profile

Shear Force Profile (Wind UDL)
at face of core wall

Bending Moment Profile (Wind UDL)

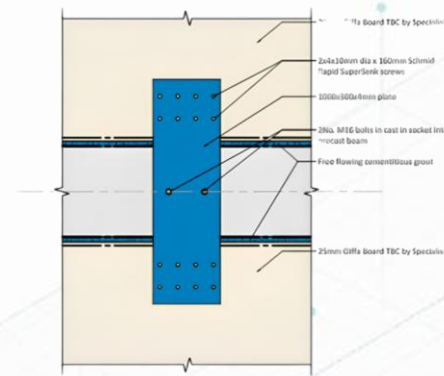
Forces at core:
Compression from perimeter wind load = 12kN/m
Shear generated from diaphragm = 11kN/m

Wind Load = 5kN/m

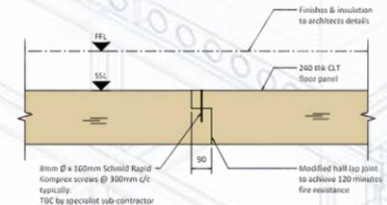
Stress = 0.005N/mm²
Effective Force = Stress x Depth of CLT = 11.0kN/m
(to be transferred from CLT to precast beam)

Stress Profile
(Elastic)

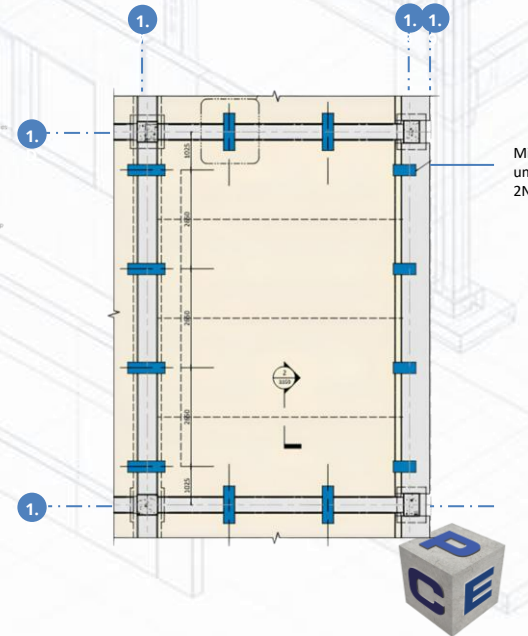
South Elevation - Typical Level - Scale 1:200
Load Case 1



Restrain Plate - Typical Detail 1



CLT Panel Joint Typical Detail 2



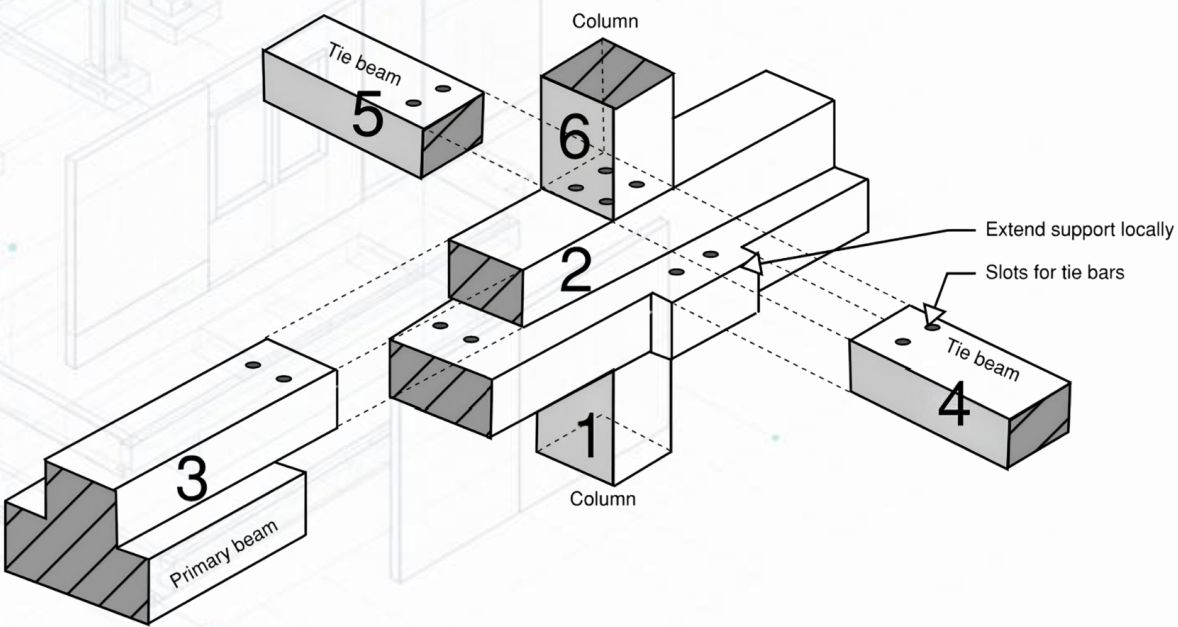
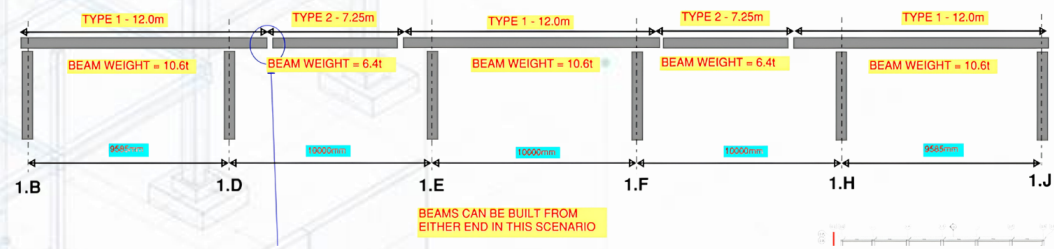
Details courtesy of HTS



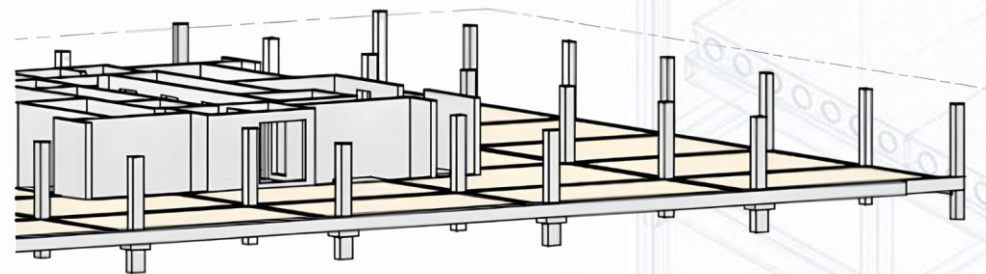
PCE Structural Philosophy

Primary Beams

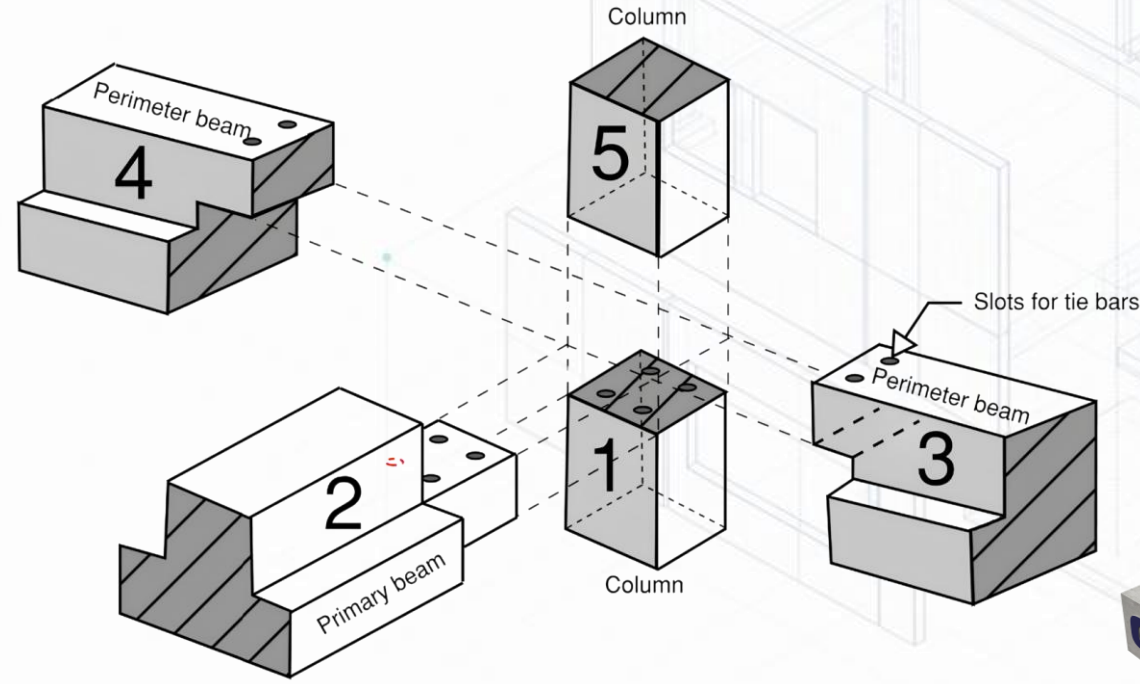
OPTION 2 - 3 NUMBER OF 12m LONG BEAMS TO BE INSTALLED PRIOR TO SHORTER PC BEAMS



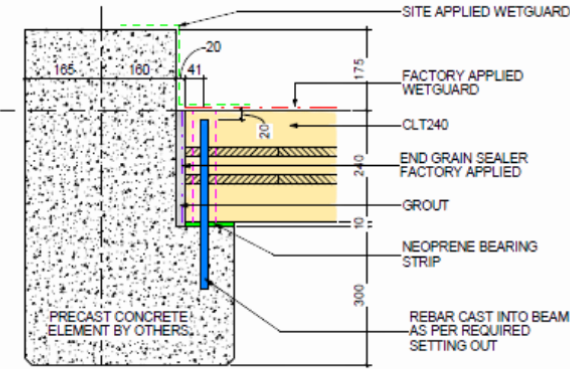
Edge Beams



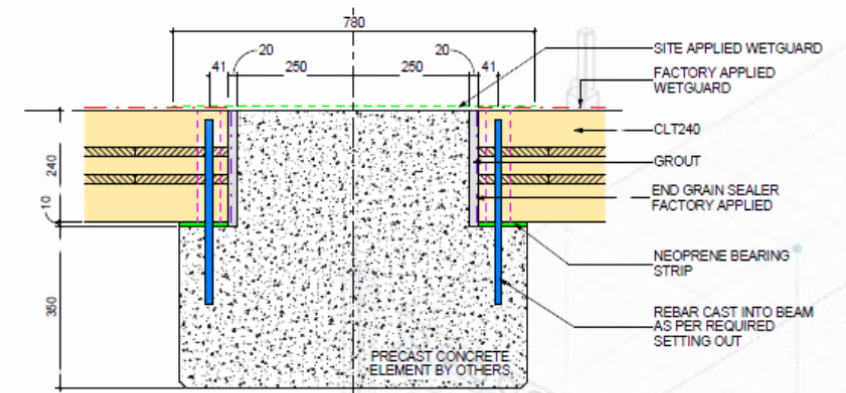
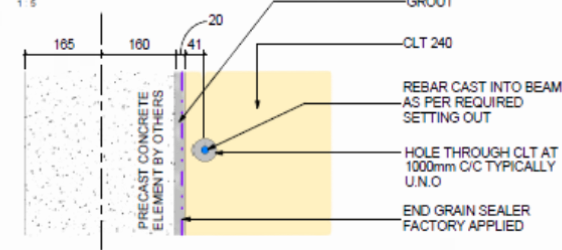
Corbels along NE Facade



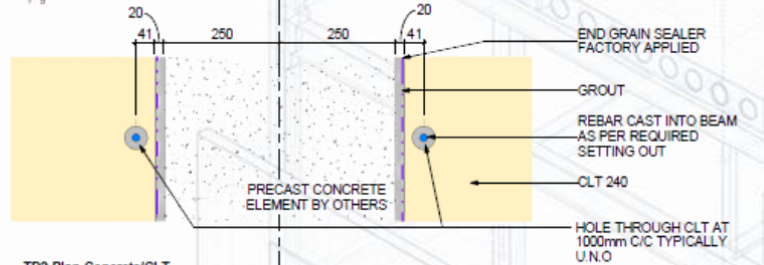
PCE Structural Philosophy



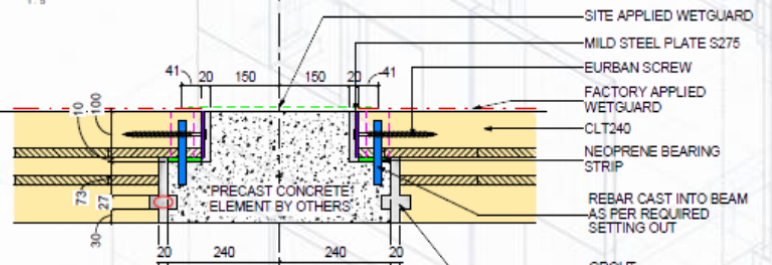
TD1-Section-Concrete/CLT



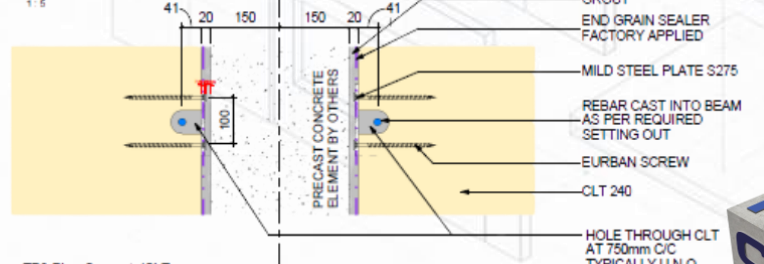
TD2-Section-Concrete/CLT



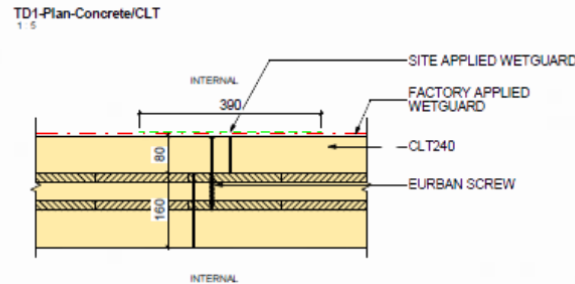
TD2-Plan-Concrete/CLT



TD3-Section-Concrete/CLT



TD3-Plan-Concrete/CLT



FD1-CLT/CLT Halfap

CLT Floors



Project Timeline.

Concept Design

RIBA Stage 2

2022 Q2 - Q4

Clear viability and collaborative design route

Early-stage feasibility advice and costings

Viability assessment

PCSA agreement for collaborative design development

Developed Design

RIBA Stage 3

2023 Q1 - Q3

Optimised, coordinated and commercially assured design

Design optioneering and optimisation

Detailed cost schedule, programme and logistics

Preferred Principal Contractor identification

Offsite component testing

Technical Design

RIBA Stage 4

2023 Q3 - Q2 2024

Production ready design

Coordinated design completion

Design freeze for production

Manufacturing design development

Offsite component manufacturing

Construction

RIBA Stage 5

2024 Q2 - Q2 2025

Fast, safe assembly

Factory quality assurance checks

Component delivery to site

On-site assembly

Handover

RIBA Stage 6

2026 JAN

Verified quality

Quality verification

Project completion and handover



The Solution

One structural system. Multiple materials. Each optimised for its role.

A **systemised hybrid DfMA frame** combining precast concrete, structural steel and CLT to balance performance, flexibility and architectural intent.



Performance

Engineered around the building's structural requirements.



Flexibility

Adaptable floorplates supporting changing occupier needs.



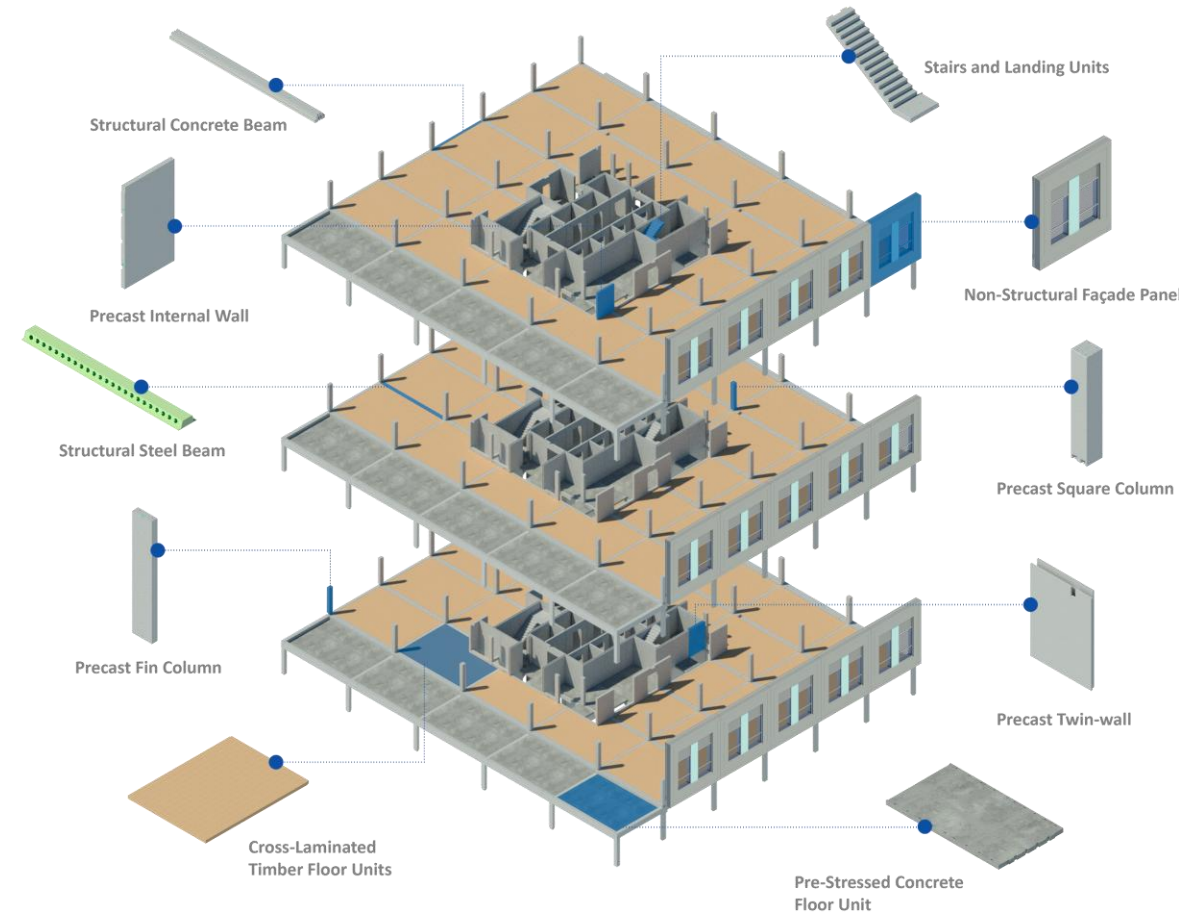
Architecture

Exposed structure forms part of the finished character.



Delivery

Offsite-manufactured components designed for efficient assembly.





Structural Components.

Beams

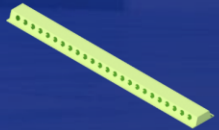
- ☒ Composite Beam
- ☒ Precast Beam
- ☒ Steel Beam
- ☐ Timber Beam
- ☐ Parapet Beam



Structural
Concrete Beam



Structural Steel
Beam



Structural
Composite Beam

Columns

- ☒ Square Column
- ☐ Steel Column
- ☐ Timber Column
- ☒ Fin Column



Precast Square
Column



Precast Fin
Column

Walls

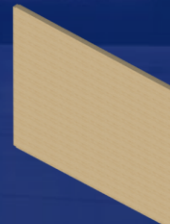
- ☒ Twinwall
- ☒ Solid Wall
- ☐ Corridor Wall
- ☒ Timber Wall
- ☐ Duct Wall
- ☐ External Wall



Precast
Twinwall



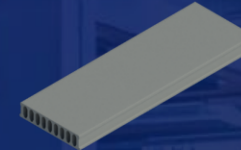
Precast
Solid Wall



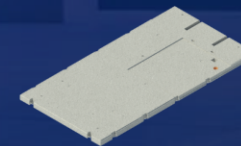
Cross-laminated
Timber Wall

Floors

- ☒ Hollowcore Floor
- ☒ Timber Floor
- ☒ Pre-stressed Solid
- ☒ Reinforced Solid
- ☐ Composite Floor



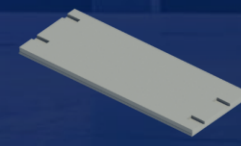
Pre-stressed
Hollowcore Unit



Reinforced
Solid Floor



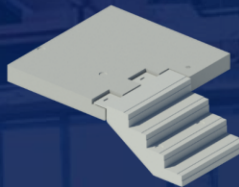
Cross-laminated
Timber Floor Unit



Pre-stressed
Solid Floor

Ancillary

- ☒ Stair & Landing
- ☐ Structural Façade
- ☒ Non-Structural Façade

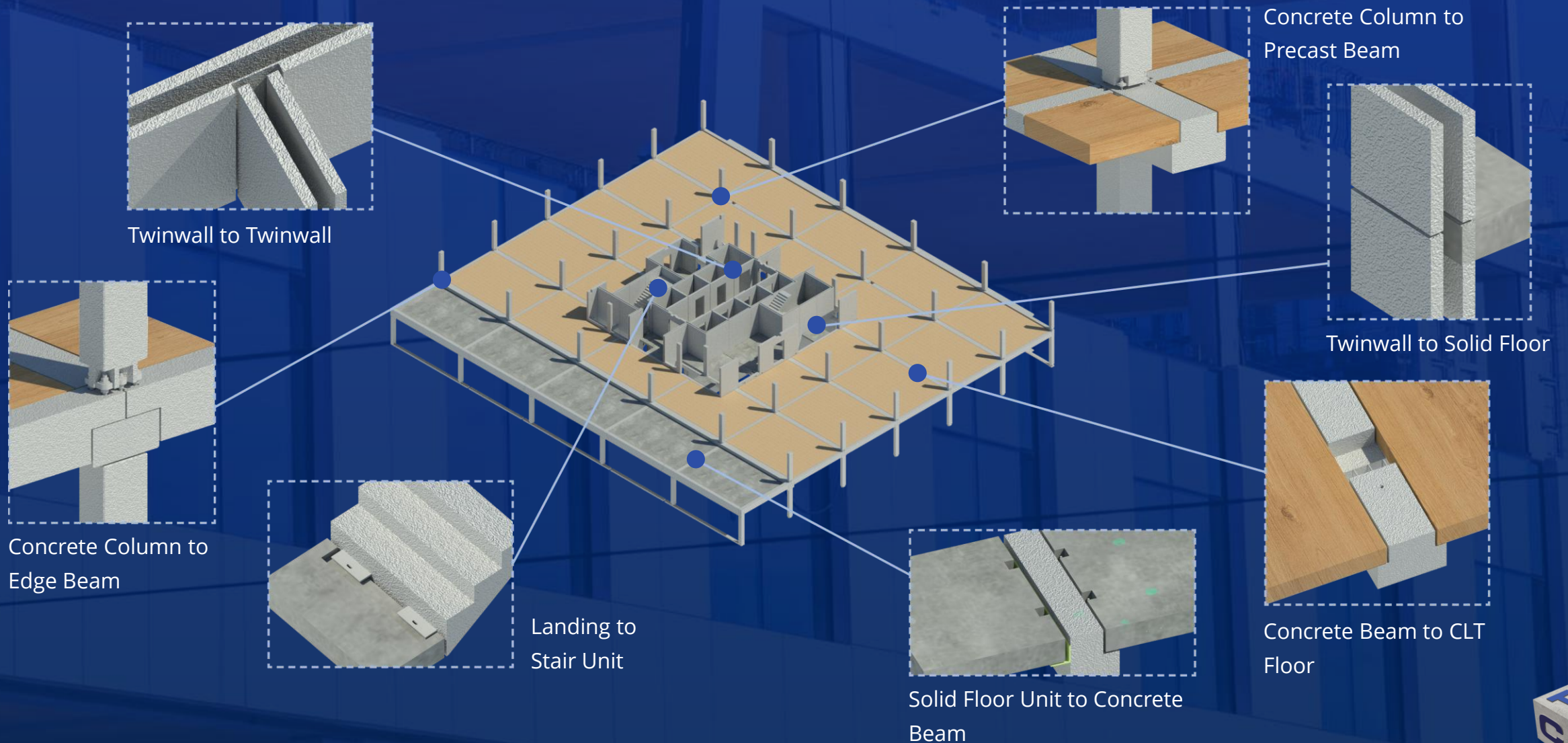


Precast Concrete
Stair & Landing



Non-structural
Façade Panel

Smart Connectivity.



Repeatability.

By designing floor plates and structural systems around optimised, repeatable components, construction becomes faster, safer, and more predictable.

Accelerated Design

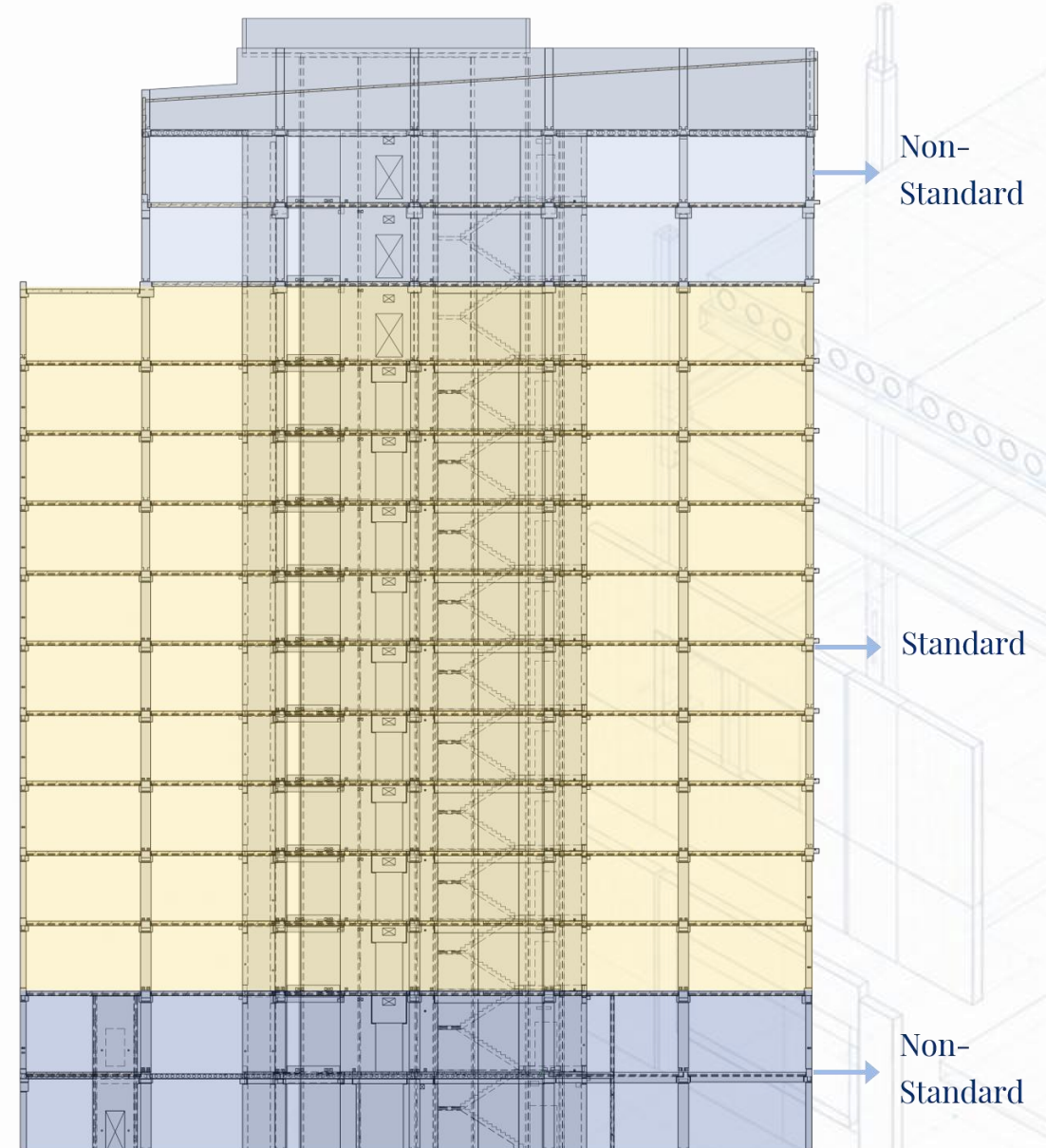
Minimised risk

Standardised Interfacing

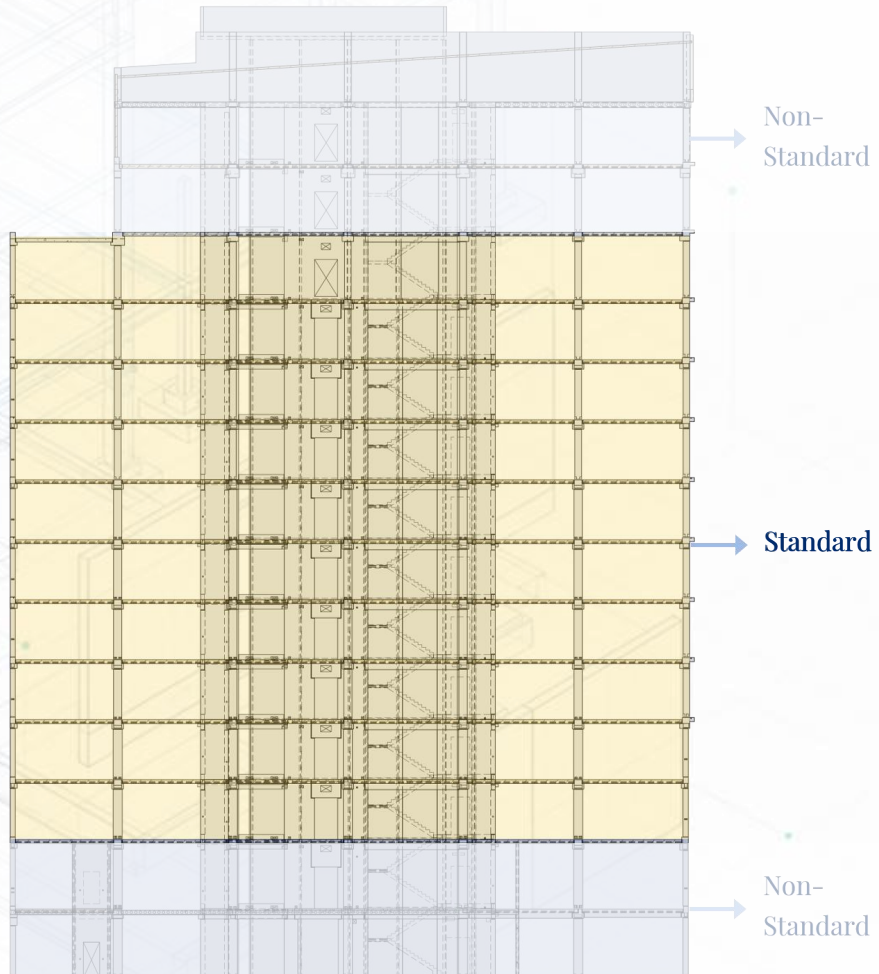
Continuous Improvement

Efficiency & Predictability

Specified
Kit-of-Parts
Components

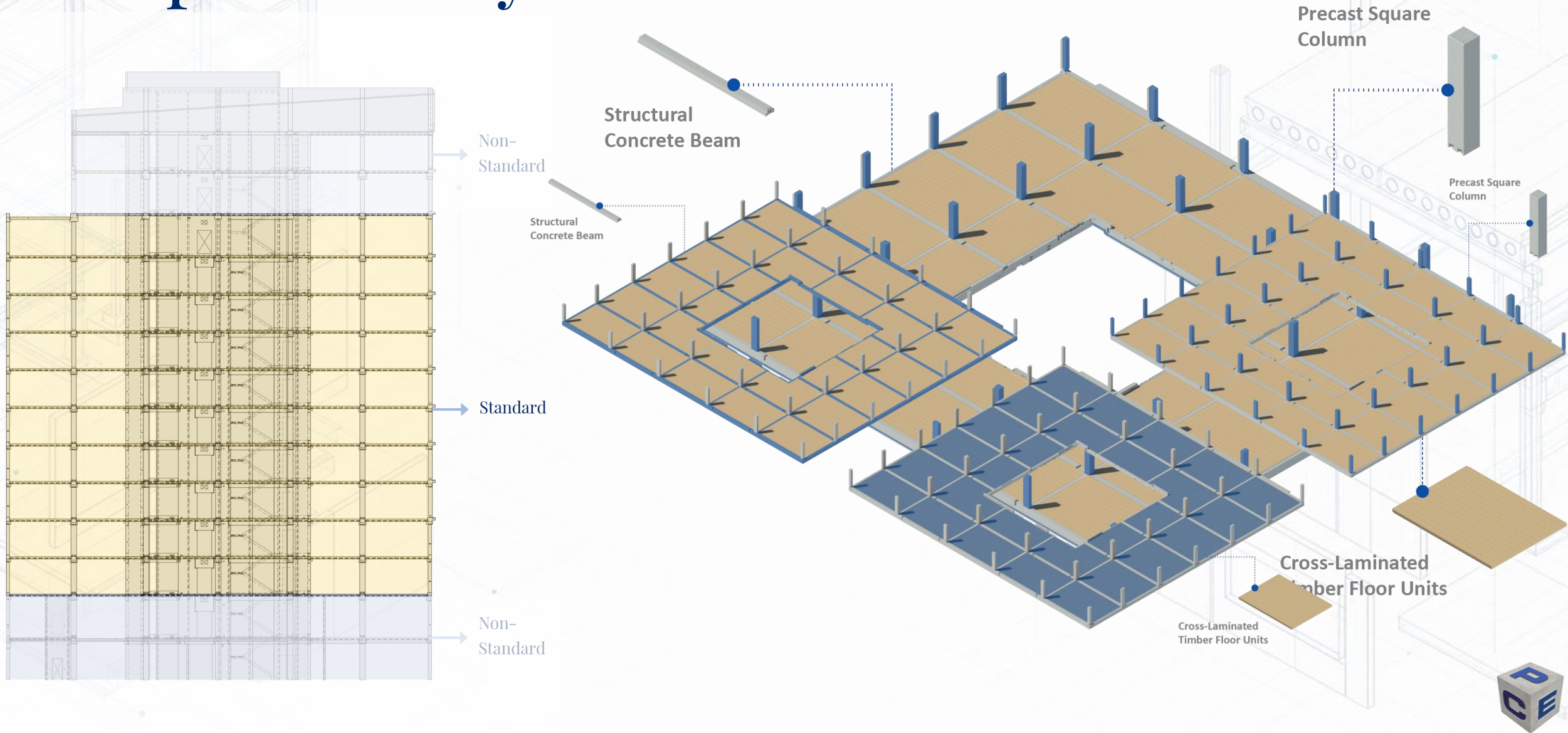


Repeatability.



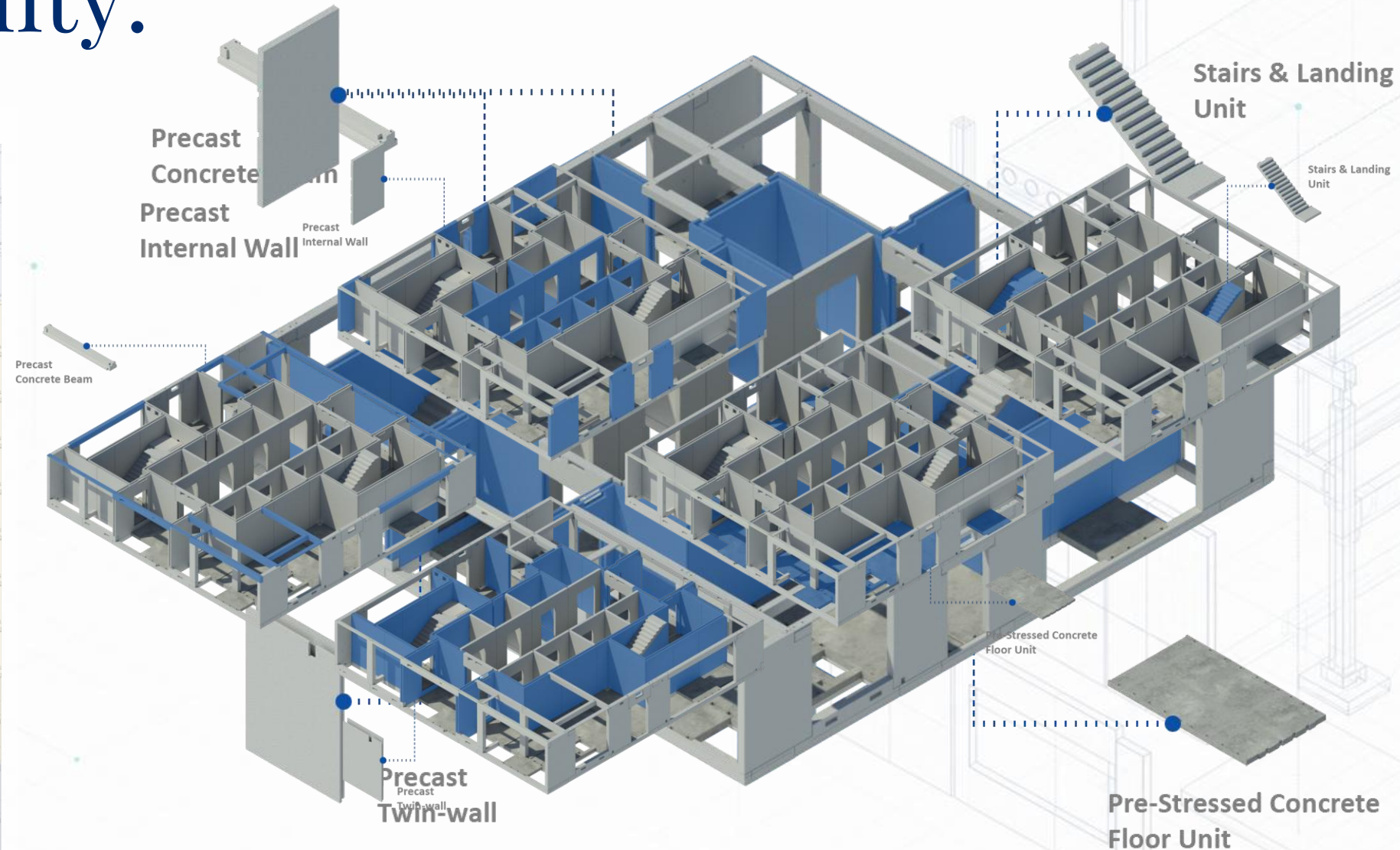
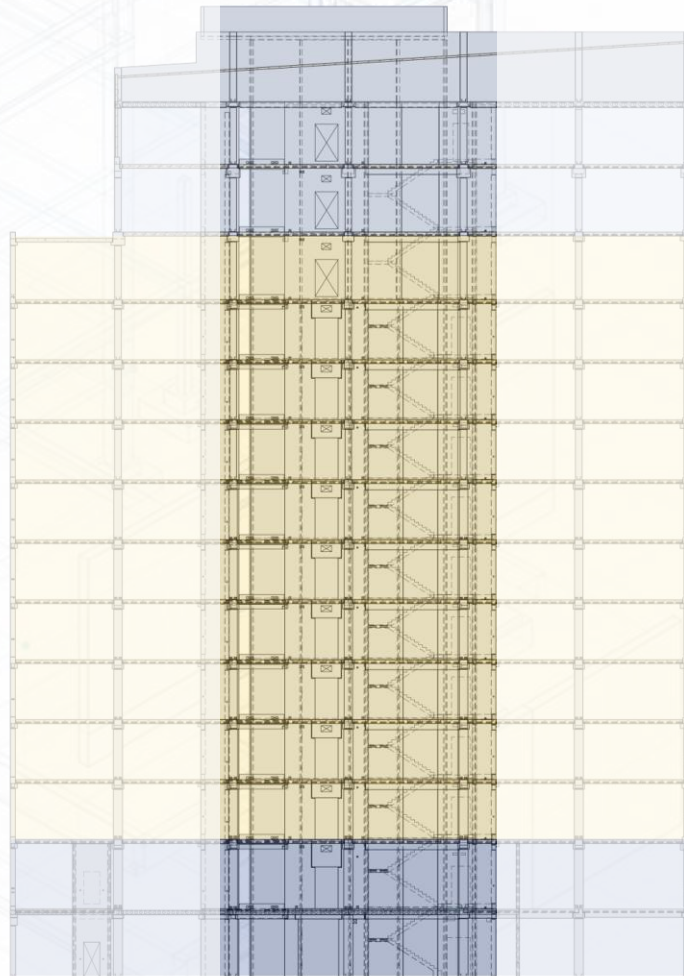
Repeatability.

Standard



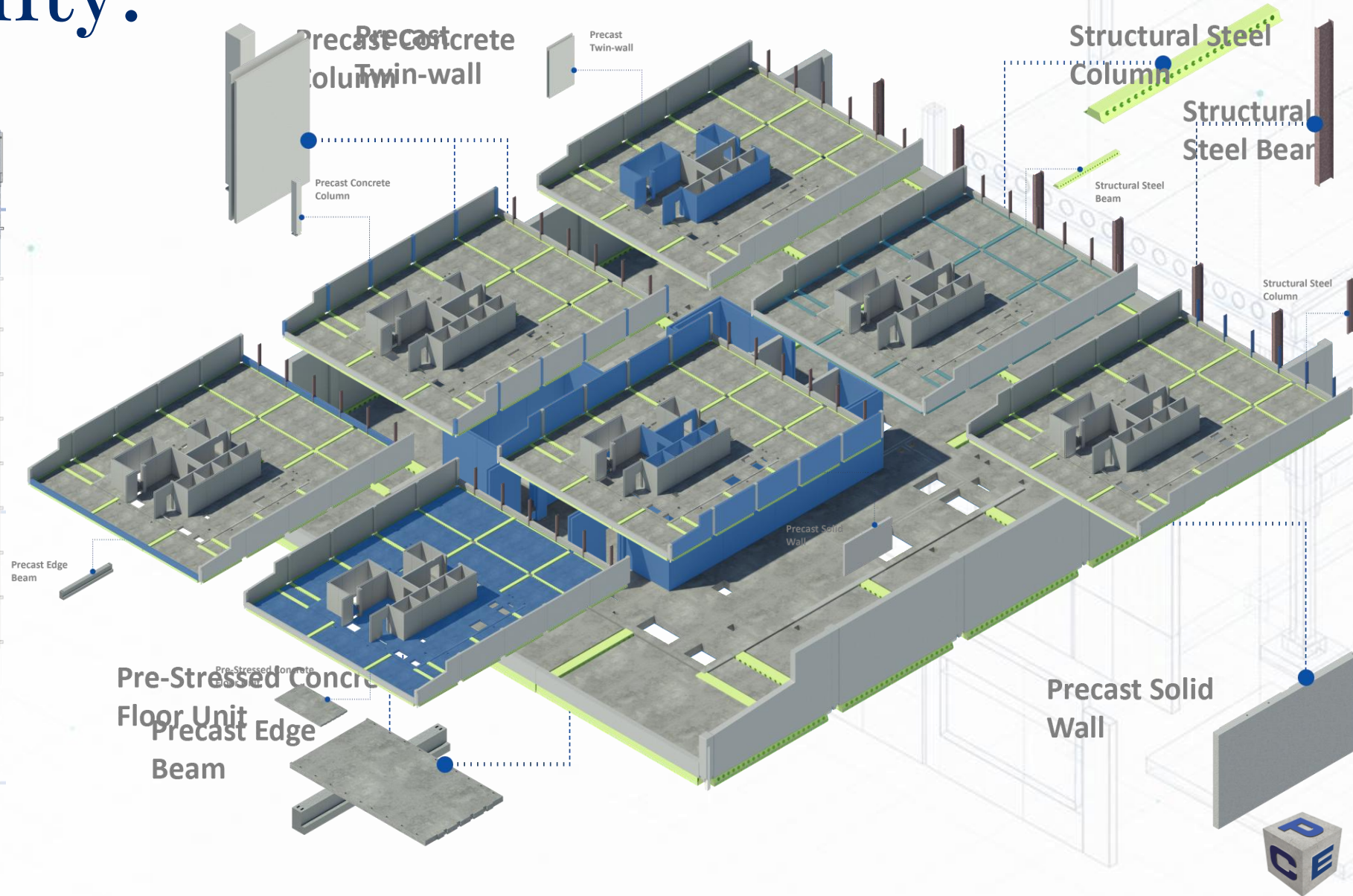
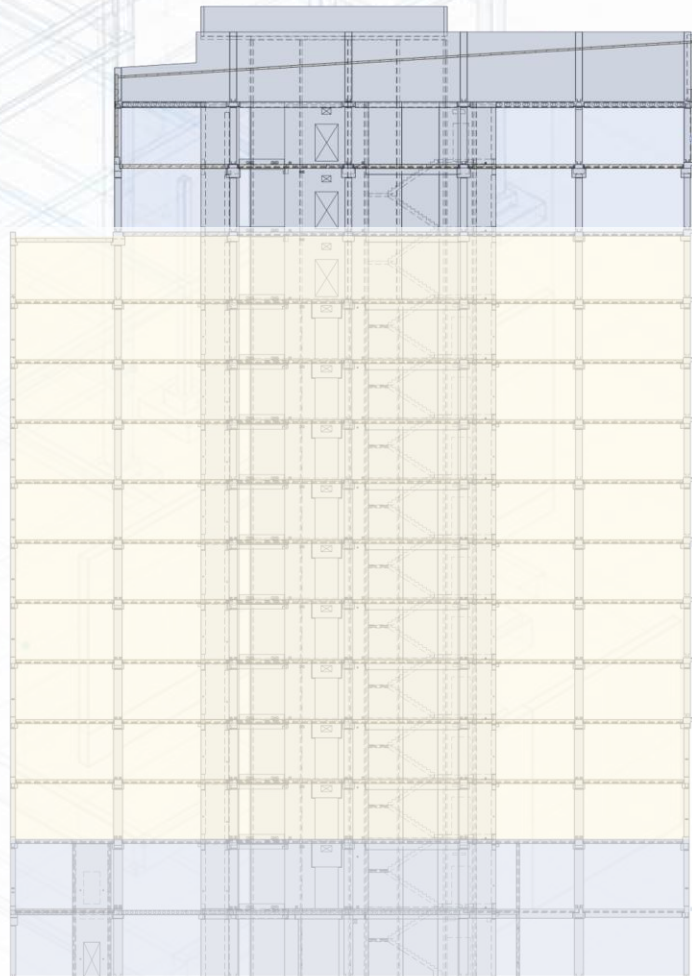
Repeatability.

Core.

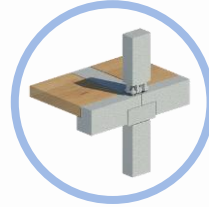
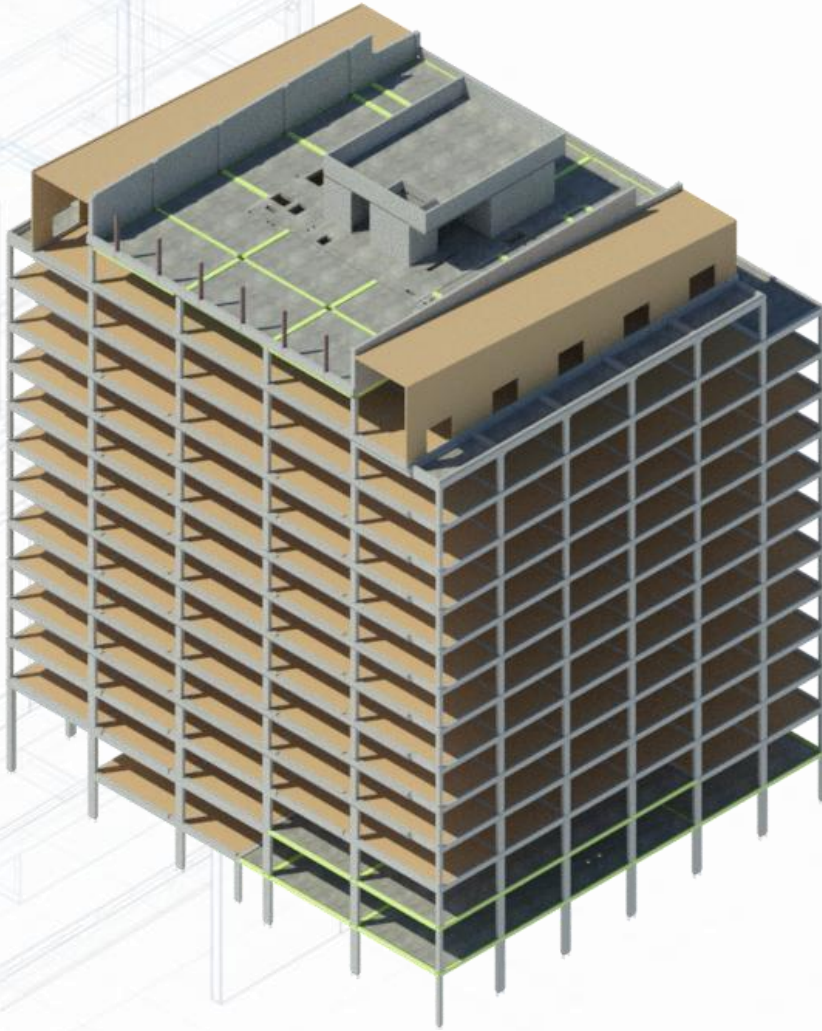


Repeatability.

Non-Standard.

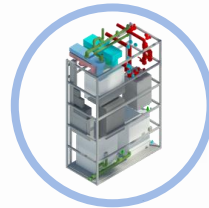


Integrated Solution.



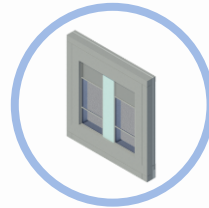
Superstructure Frame

Temporary waterproofing two clear floors below constructing level to facilitate concurrent fit-out.



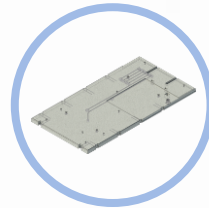
Services Integration

Vertical and horizontal service distribution throughout the structure in pre-formed openings.



Façade Assembly

Offsite manufactured panels installed during the superstructure assembly using a monorail system.



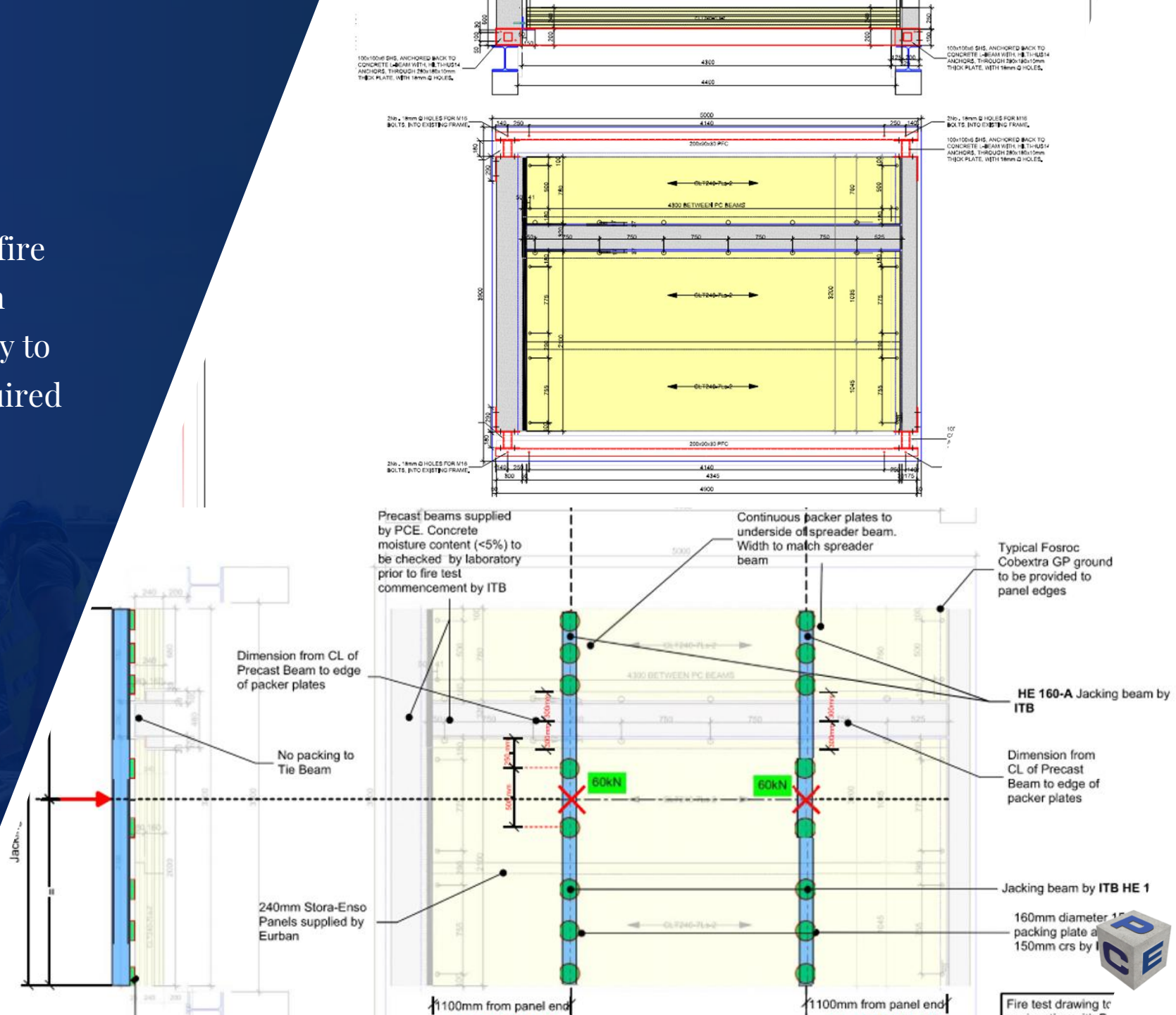
Cast-in Components

Mechanical and engineering elements cast into components during the manufacture process.



To validate performance, full-scale fire resistance testing was carried out in Poland at the Institute of Technology to ensure all components met the required fire safety standards.

- ✓ The floor/roof supports the design load without premature failure
- ✓ The assembly prevents flames or hot gases from passing through
- ✓ A fire rating given of REI 90



Design Approach.

Connecting design, manufacture, assembly and handover in one coordinated digital environment.



3D Coordination

A coordinated model resolving structure, interfaces and integrated elements through to fabrication information.



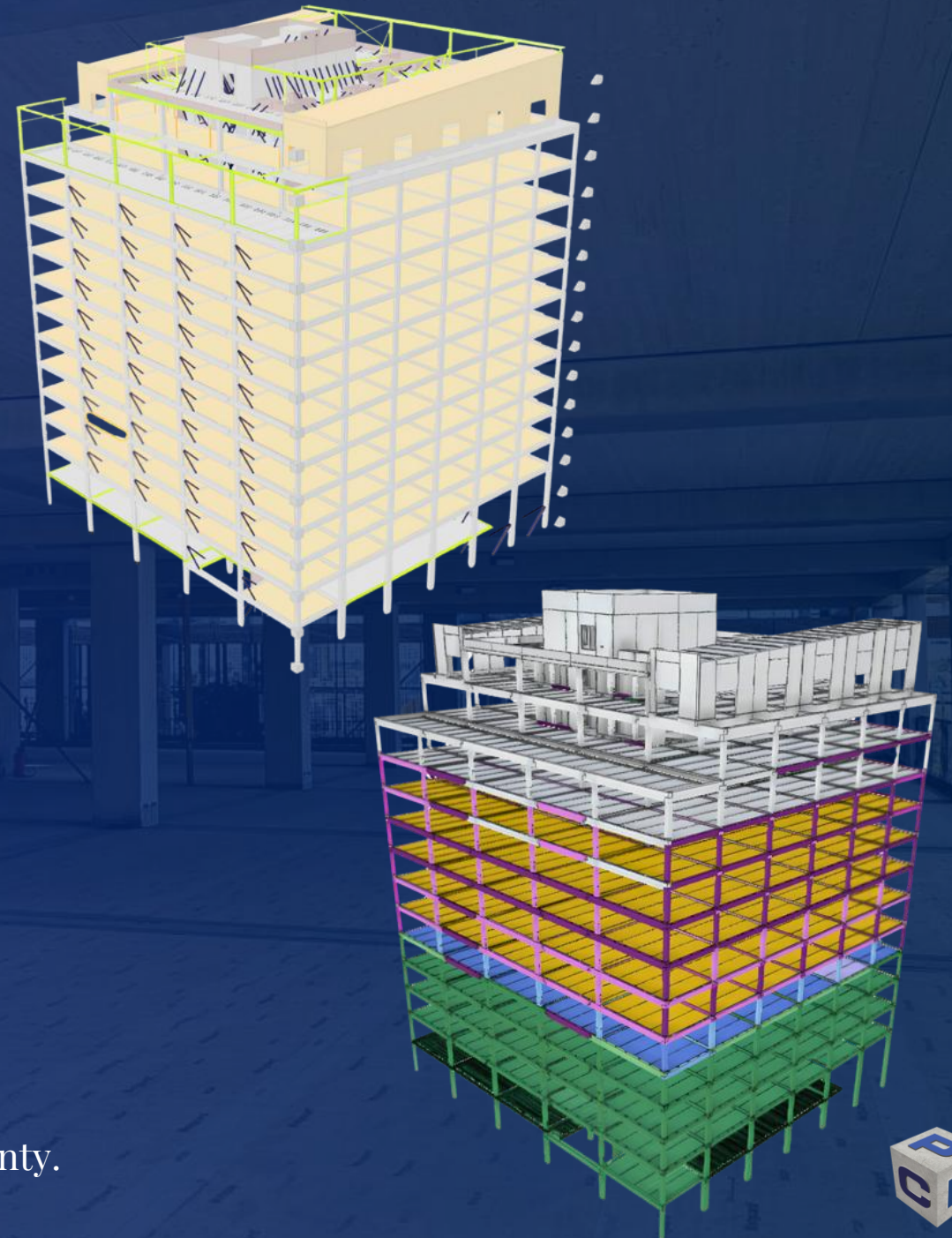
Construction Configuration

Components engineered for efficient offsite manufacture and onsite installation.



Digital Twin

Each component tracked from design to handover, connecting status, quality and project data in real time.



Coordinate earlier. Manufacture accurately. Assembly with certainty.



Supply Chain.

PCE's flexible supply chain model ensures that every project benefits from the best offsite specialists in the UK and Europe.

Overview



7 expert supply chain partners



Integrated M&E, utility, and security components



Automation and digitally enabled production



Just-in-Time deliveries



Offsite Manufacture.

Before production, every element was sampled, tested, and benchmarked to guarantee performance and consistency.



Digitally Tracked



Full QA Transparency



Robotics & Automation



Component Quality

Quality enabled: removal of
internal linings and coatings



Exposed Finishes



Highest Quality Standards



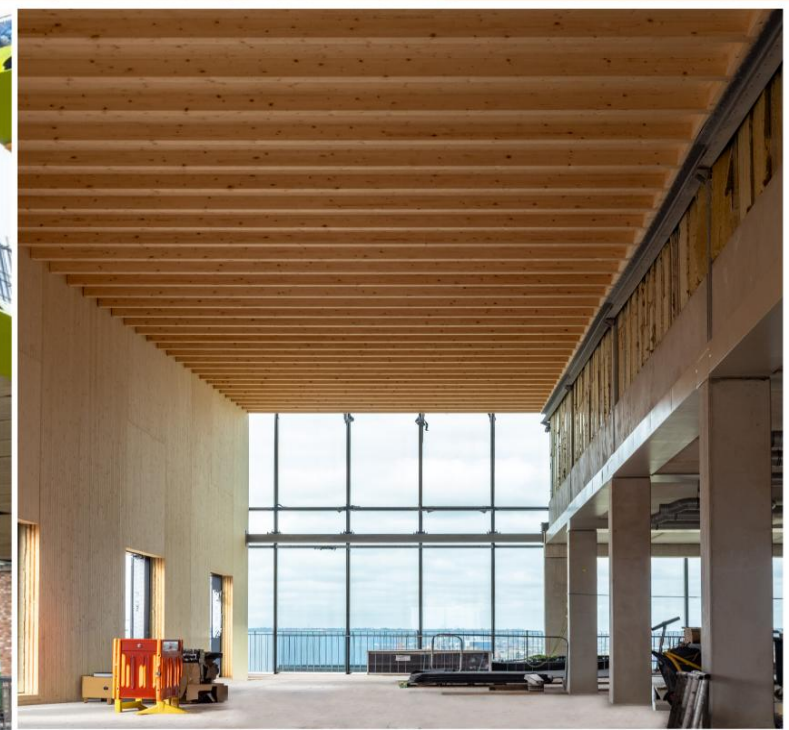
FSC/Responsibly Sourced CLT



Exposed Soffits



Exposed Interfaces



Crane Planning & Coordination.

The building was assembled just inches from Brent Cross West station and metres from the live railway, all while the station remained fully operational and undisrupted.

Just-in-time Strategy

Optimised Construction

Aligned Scheduling



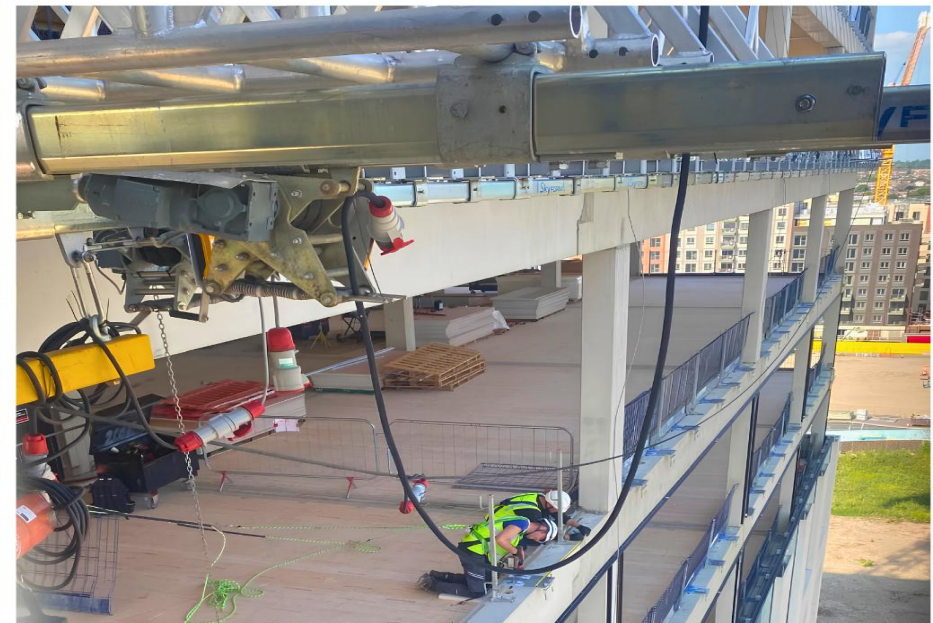
Optimised Logistics.

Programme optimisation was achieved through the repositioning of the crane within the building onto the core, and through integrating a monorail lifting system into the frame for façade installation

Integrated Logistics

Concurrent Construction

Coordinated Logistics



Construction Phase.

Structural assembly was completed in just 54 weeks, demonstrating the speed and reliability of PCE's systemised hybrid approach.



Each level was delivered in an average of **11 days**



Assembled by a skilled site team of **26 operatives**



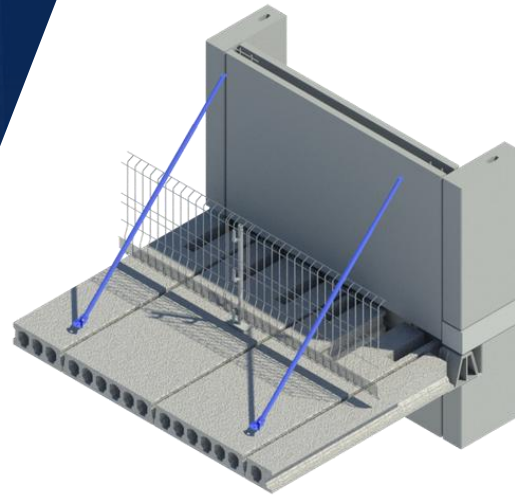
Building services integrated through pre-formed beam openings and beneath raised flooring



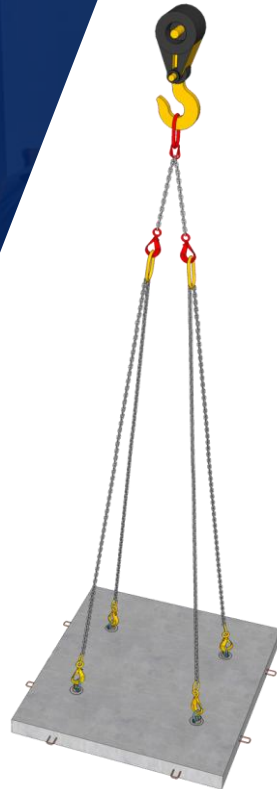
Integrated Safety Systems.

To minimise risks, components were pre-fitted with features such as handrails, arriving to site ready for safe and efficient assembly.

- ✓ **Standardised installation methodologies** used by our multi-disciplined teams
- ✓ **Proprietary access systems** through the lift cores
- ✓ **Independent safety auditors** engaged throughout
- ✓ **PCE SlingSafe system** deployed for offloading



Propping attached after assembly



Lifting methodology for solid floor



Safety handrail pre-fitted to beam



Temporary Weathering.

Controlled CLT moisture management during construction



Protect

Factory Wetguard, Rissan tape and LIGNOPRO end-grain treatment reduce moisture ingress at slab tops, joints and exposed grain.



Remove

Puddle pumps, foam rollers, wet vacs, squeegees and winter air blowers actively clear standing water from exposed floors.



Verify

Sealed vertical drainage and moisture readings support floor handover and clear transfer of responsibility.



Ynomia & the Golden Thread.

One connected digital record — from planning through delivery, handover and continuous improvement.

Connects

Design, manufacture, logistics, assembly, quality and handover

Single Source of Truth

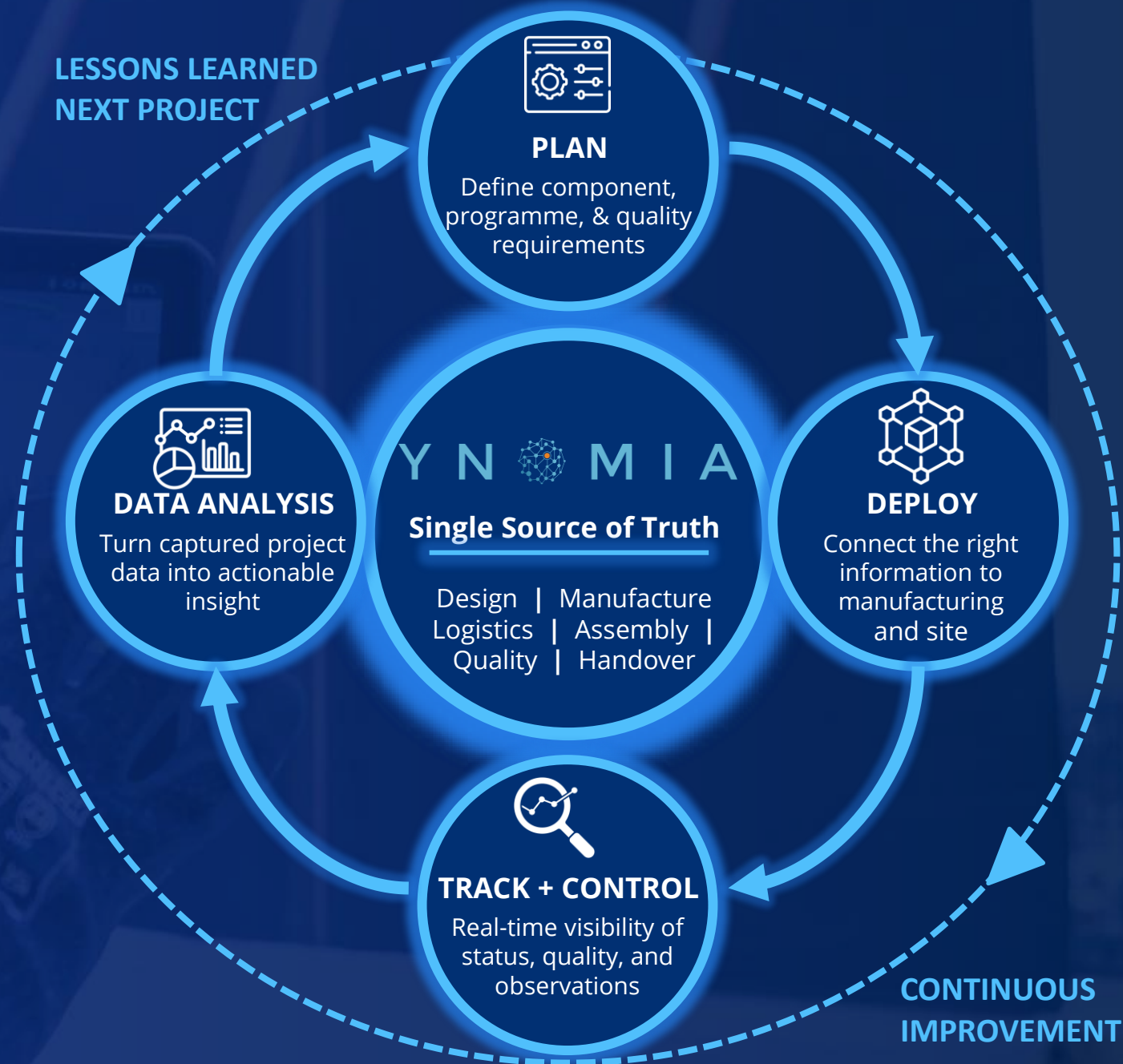
Links documents, models, forms and real-time data across the project.

Enables Better Decisions

Live visibility of progress, quality and performance.

Continuous Improvement

Project outcomes feed lessons learned into future projects.



Digital Delivery.

Summaries

Status Summary

Clear

	Total Currently In Status	Total Completed Status
	% #	% #
Not Yet Tracked	0% 0	100% 2394
Engineering - Complete	0% 0	0% 0
Model / Layouts - Issued for Approval	0.1% 2	32.8% 785
Model / Layouts - Issued for Construction	0% 0	32.8% 785
Unit Set Issued For Approval	0% 0	65.3% 1564
Unit Set Issued For Construction	0% 0	61% 1461
Unit Set Design Hold	0% 0	0% 0
Unit Set Issued for Manufacture	0% 0	58.3% 1395
Unit Cast	3.1% 75	99.9% 2392
Unit Ready for Delivery	2% 49	96.7% 2316
Loaded for Delivery	0.5% 11	94.7% 2268
In Transit	0.6% 15	94.2% 2256
Received on Site	1.1% 26	93.7% 2242
Installed	92.6% 2216	92.6% 2216

View Less

Location Summary

Clear

Supplier Summary

Clear

Unit Type Summary

Clear

Ancillary Actions Summary

Clear

	Yes	No
	% #	% #
Supplier Quality Form Completed (Novade)	49.6% 2394	50.4% 2429
Sample Unit	0.1% 5	99.9% 4818
Unit Issue Report	2.4% 117	97.6% 4706

M I A

Brent Cross (Plot 1)

Precast

Search

Time Travel

11/12/2024

ewing all 4823 Assets

"Single Click" to View Details

"Double Click" to View Details & Zoom

"Shift + Click" to Multi-Select

EUR-13-WK122-001

Not Yet Tracked

BIS-ZZ-BE160-002

Properties

Level (Destination)

TwiniD/Model location Ref

Supplier

Unit Type

Unit Type Code

Unit Reference

Unit Set Reference

Engineering Package Reference

General Layout Reference

Loading Weight (t)

Unit Weight (t)

Unit Height (mm)

Unit Width (mm)

Unit Length (mm)

Soffit Height Left +/- mm

Soffit Height Right +/- mm

L05

MLR-CD0K

BISON

Edge Beam

BE

BE160

BXS-S2001-PRJ001-PCE-ZZ-DR-S-64160

BXS-S2001-PRJ001-X-PCE-CA-XX-1103-03

7.51

7.51

725

450

11250

0

0

History

Supplier Quality Form Completed (Novade)

Received on Site

In Transit

Loaded for Delivery

Add To "BIS-BX1-C1-070"

Unit Ready for Delivery

Tag Linked (E2:FD)

Unit Cast

Unit Set Issued For Construction

Unit Set Issued For Approval

Ynomia

Dec 10, 2024 at 2:52pm

Ynomia

Dec 10, 2024 at 8:25am

Ynomia

Dec 09, 2024 at 5:12pm

Ynomia

Dec 09, 2024 at 11:59am

by Richard Gunton

Dec 09, 2024 at 11:59am

Ynomia

Dec 09, 2024 at 11:59am

by Richard Gunton

Dec 09, 2024 at 11:59am

by Callum Brentnall

Dec 04, 2024

Ynomia

Sep 29, 2024 at 9:45am

Ynomia

Version: 4052da9

Sustainable Delivery.

Key Outcomes



Superstructure upfront Embodied Carbon achieved **LETI A+**



Almost **3,500 tonnes of CO₂** stored within the engineered timber over its lifetime.



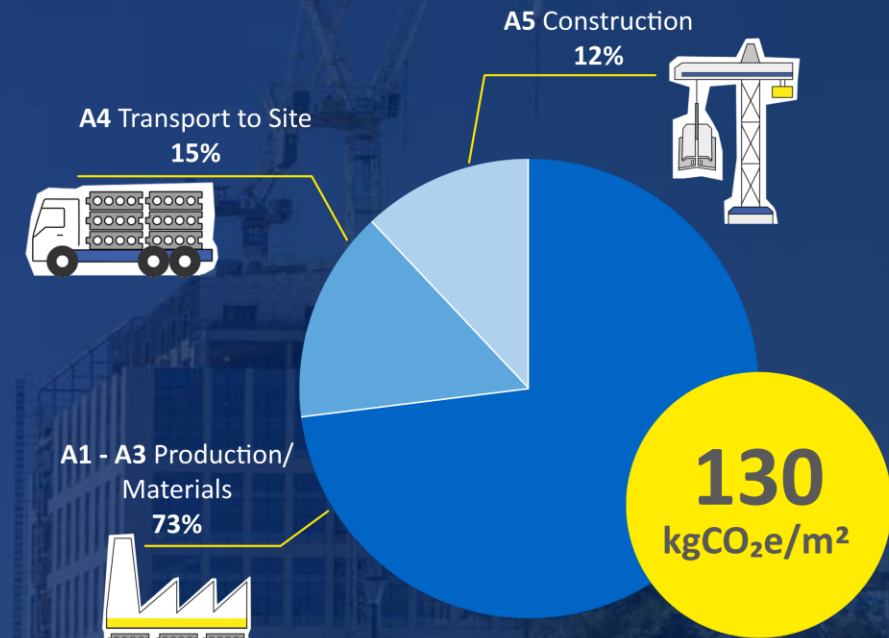
4 saplings planted for every tree harvested - with the timber volume used at 3 Copper Square regrown in just 13 minutes.



Prefabricated steel beams contained **90% recycled content**



All timber was **FSC-certified**, while concrete mixes used up to **40% GGBS**

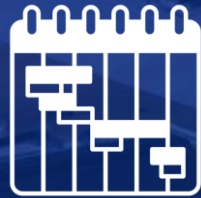


Key Metrics.



4,800

Offsite Manufactured
Components



54

Week
Assembly



11

Days Per Level
Installed



26

Site
Operatives



63m
Tall



845
Deliveries



12
Offsite
Factories



7
Offsite Specialists



