

Data Centres

July 2024



Contents

Who we are	5
Design to Value	8
Our approach	10
Apps and configurators	15
The future of data centres	18
Drivers of value & innovation	19
Sustainable data centres	20
Select Projects	23
Data centre in Madrid	25
Dublin DC campus	28
Data centre in London	33
Data centre in Barcelona	36
Data centre in Milan	38
DC campus in London	42
Data centre in Manchester	44
CODC EMEA	47
Optimised reference design	49





Office Locations



- Architecture
- Structural Engineering
- Civil Engineering
- Mechanical and Electrical Engineering
- Process Engineering
- Creative Technology
- Systemisation
- DfMA and MMC

Who we are

Innovative approach, exceptional ideas

We've spent 25 years developing the approach we bring to every project.

We deliver exceptional results and save our clients money, time, resources and frustration by applying our expertise, technology, and the full breadth of our integrated team to:

- understand our clients' value drivers
- interrogate and clarify the brief
- agree the best possible outcomes – before designing the best way to achieve them.

We question everything. We will always pursue the solution that adds most value, even if that means something quite different from the solution initially envisaged.

Application of technology and data

Everything we do is supported by the creative and rigorous application of technology and data. We model every aspect of every project, which means predictable outcomes, accuracy in programme and cost, and transparency of risk. This allows us to see, at every step, what improvements we can make, where we can drive value and efficiency.

Working with us

We work in an open, integrated and cross-disciplinary way with energy and rigour. It's not always easy, and it's not to everyone's tastes, but most people find it refreshing and highly effective.

From strategy to delivery. Proven results

The range and depth of our expertise means we can take projects from inception to completion – or add value at any point along the way. We work conceptually and on high-level strategy, as well as on minute detail and the practicalities of delivery and project completion.

We're creative thinkers and solution finders who get things done.

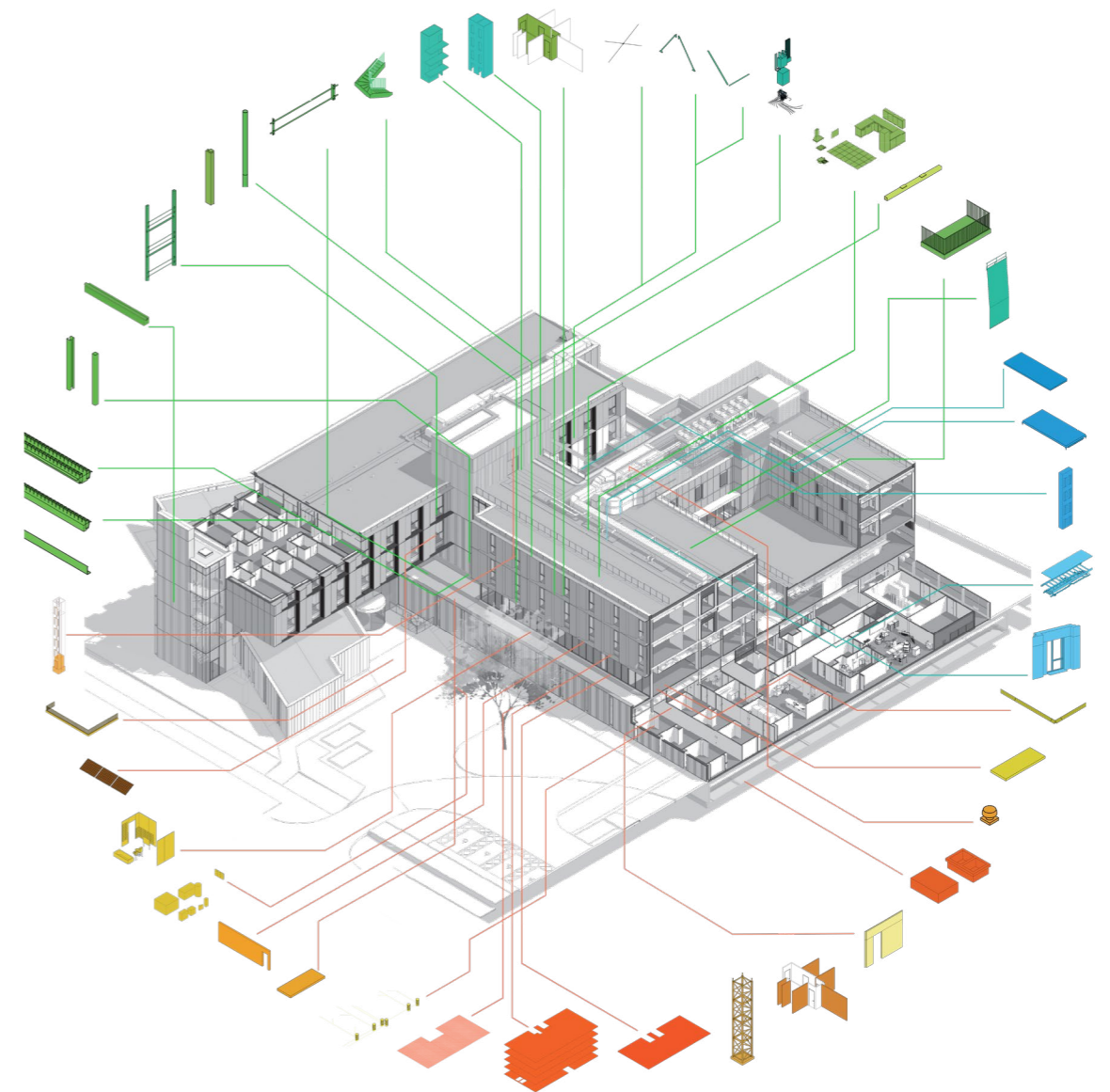
Whatever the scale and sector, we apply the same approach to every project. It's an approach that is proven to deliver better outcomes for your business and a better built environment for us all.



We question everything.
We are pursuers of value, in all its forms.

We bring together architecture, structure and building services, to create a complete design. Our multiple specialists work together to give you seamless delivery from a single, integrated design team.

Working with a single team means a coherent, comprehensive and balanced response to your requirements that considers value, quality, and aesthetics.



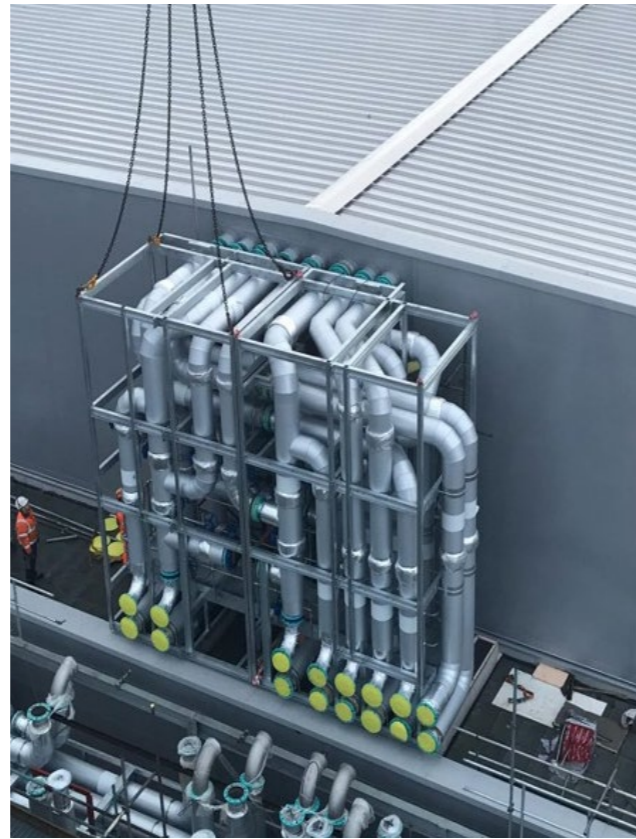
Design to Value

The most efficient route to the most efficient solution is achieved by analysing and understanding a project from every angle.

Maximising the value of an asset is finding the right balance between a wide range of criteria.

Design to Value is well understood and applied in the manufacturing industries. It leads to objective analysis of every aspect of a process, every element of resource requirement, energy consumption, knowledge, and cost. It leads to testing the value parameters that each of these elements is being measured against. It is rigorous, logical and data-driven. Its application in construction is transformational.

Design to Value may lead to a solution that is very different to the one initially conceived, but it will be a solution that is fully thought through, appropriate and complete.



A built asset that delivers value across the piece.



Learn more about Design to Value on our website.



Our approach

We always **analyse, challenge and develop the brief** through a deep stakeholder engagement process, to ensure it is the best base for an efficient design.



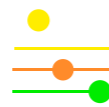
Challenge

Challenge given or developed brief requirements.



Brief

Analyse the brief, collate data. Develop brief.



Measure

Measure design options efficiency by collating and comparing data.

We measure every option we design to ensure it is the best possible response to our client needs, **using a data driven approach** wherever possible.



Kit of Parts

Identify common parts, translate into a kit of repeatable components.



Validate

Further develop and test the most efficient design option.

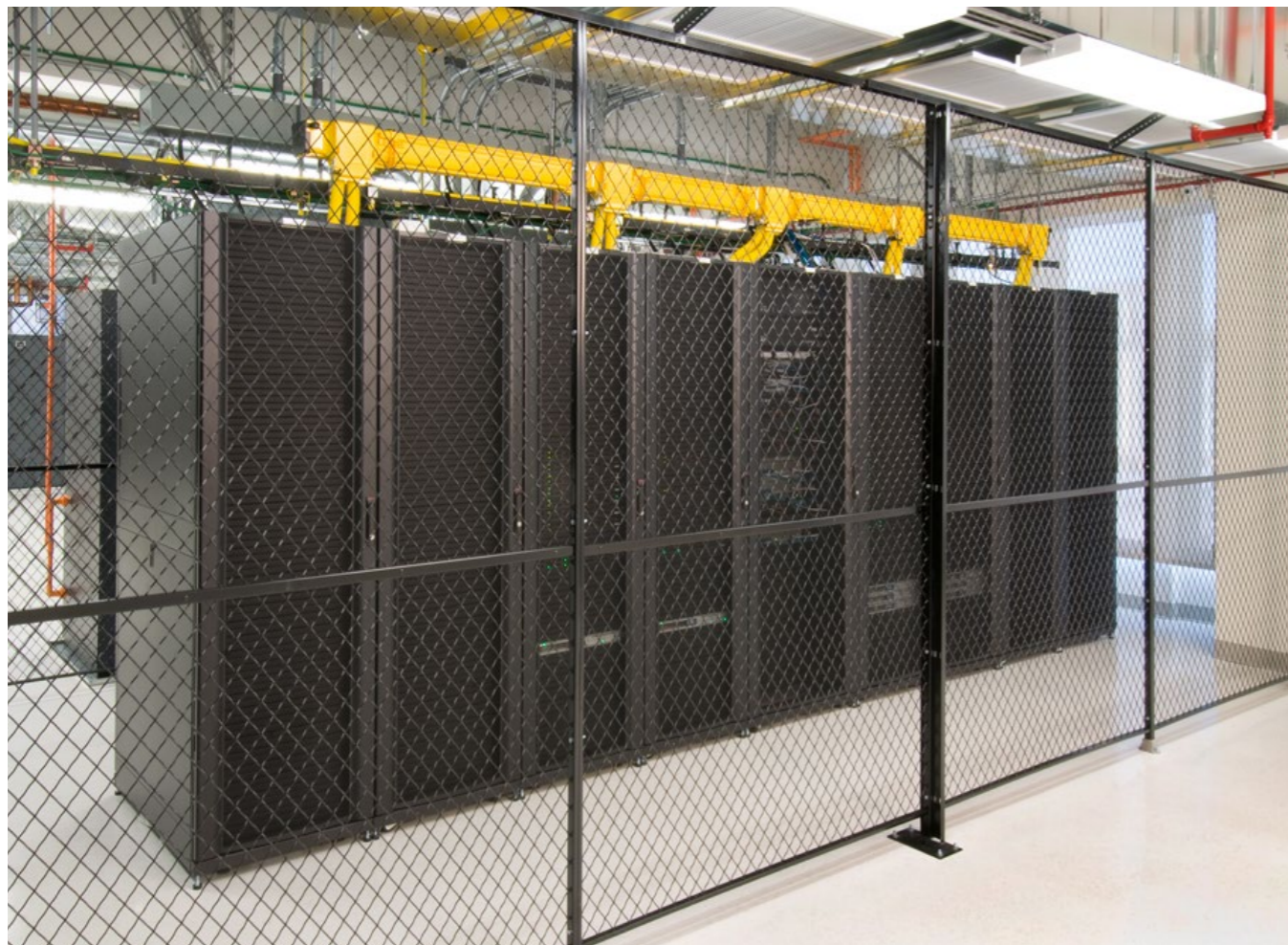
We develop a kit of parts to assist procurement, reduce time and waste during construction, improve safety and **ultimately reduce project costs.**

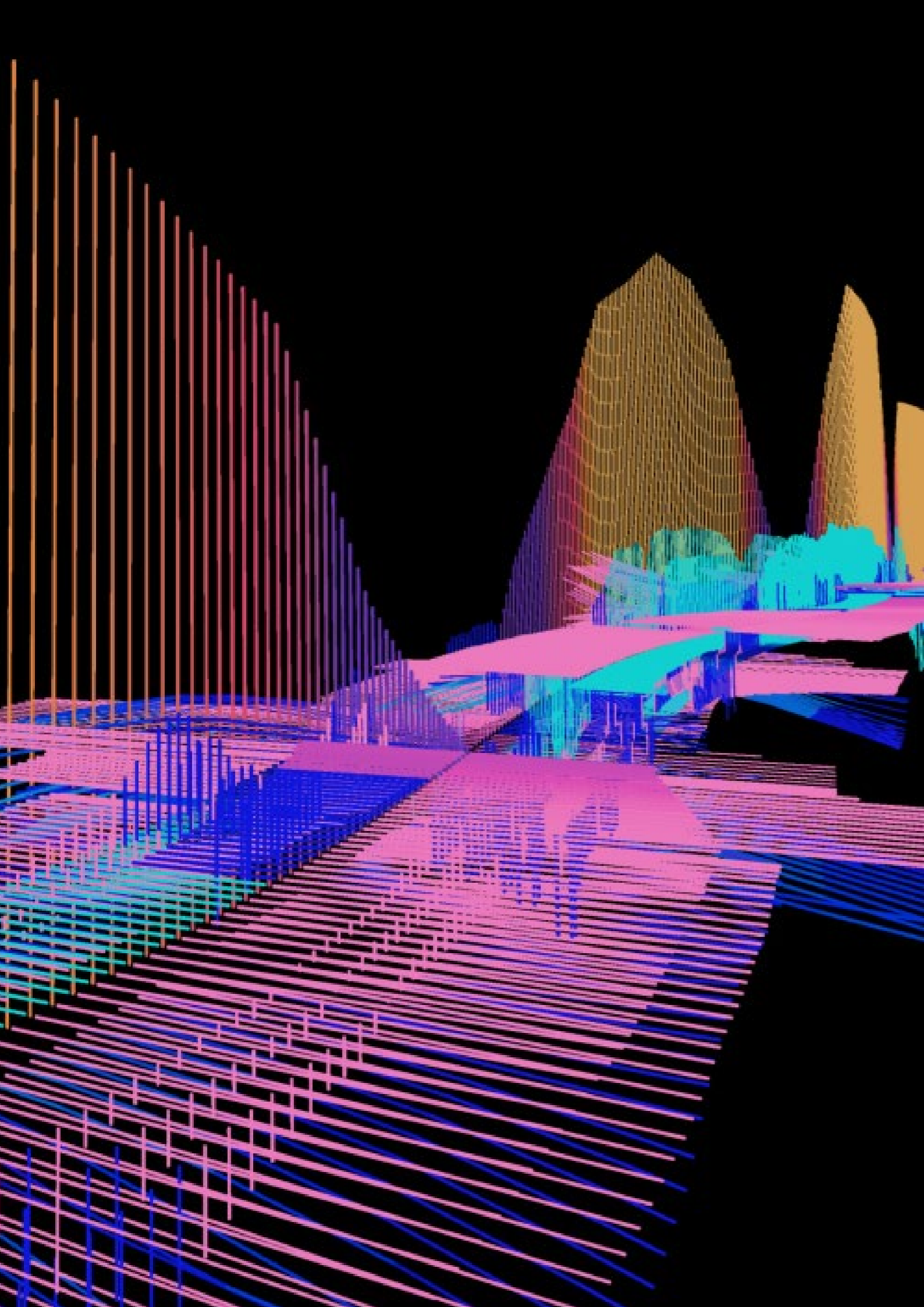




We deliver exceptional results for our global co-location and hyperscale data centre clients, including:

- 30-40% reduction in capital build cost per KW
- 40% increase in IT yield/sqm





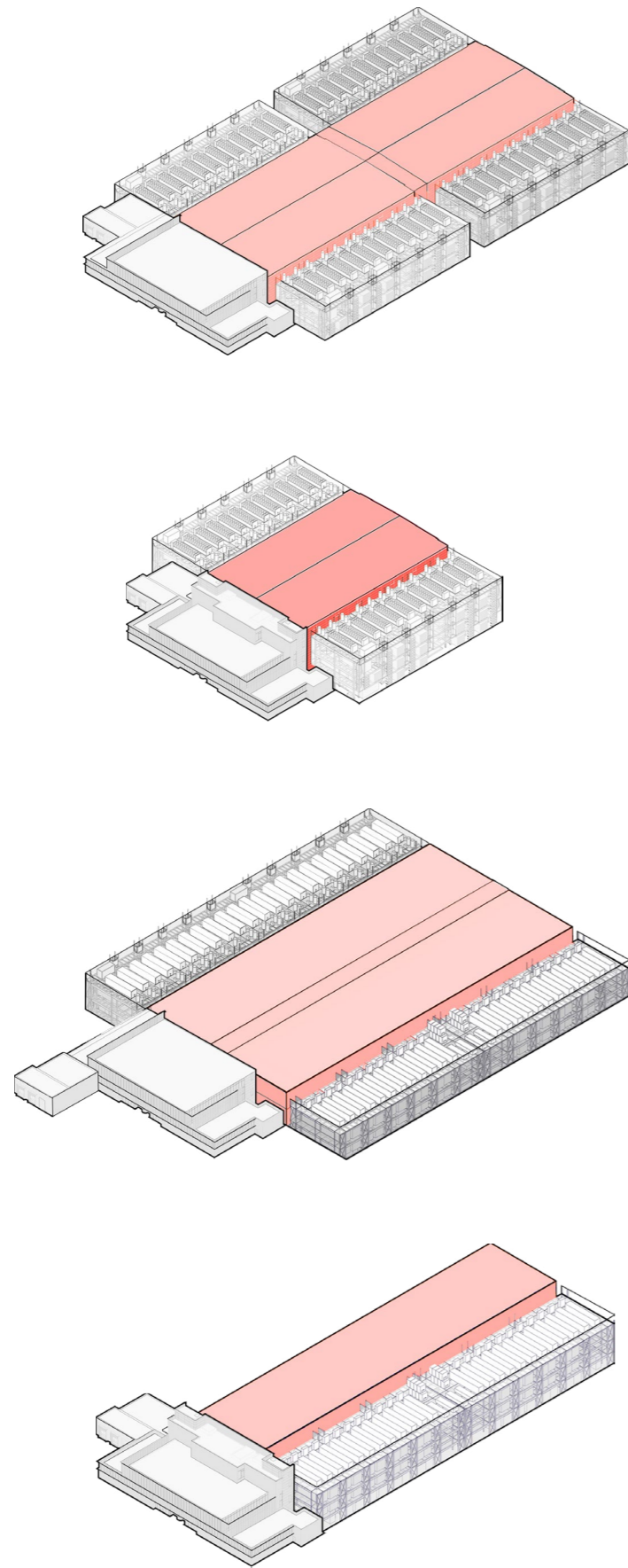
Apps and configurators

We build configurator apps to give users the ability to configure a building in minutes – using pre-engineered components and according to pre-determined assembly rules – rather than design it in weeks or months. They allow users quickly and intelligently to develop designs that have different aspects of compliance built in – in terms of regulations, but also in terms of delivery, safety and ultimately quality.

We are not software developers, but we do make software. We don't want our design automation technology to be used only by us – we want it to be available to as many people as possible. That means we build computational design apps that aren't just for architects and engineers. We make construction technology that is available for use by people who would not usually engage directly in the design process – whether that is our clients, or the wider public. We do this because we want to share the intelligence that we embed into our apps.

From our design configuration apps you can automatically generate your detailed design models that go beyond industry standards – for both Building Information Modelling (BIM) and fabrication – in minutes.





Standard building massing configurations that could respond to different site requirements

The benefits of Reference Design

Many of our major clients have national or global rollouts that are happening at a rapid pace. Often a bespoke design is procured for every site, introducing unnecessary design cycles and complexity that adds cost and time. Yet, from our experience, clients have a very well-informed view on how their asset needs to perform and which layouts and designs deliver the desired operational outcomes. This knowledge and understanding lends itself to a repeatable solution. We call this a 'Reference design': a highly optimized, site agnostic 'core design'. Typically, a reference design will contain a number of repeated elements that can be configured in a number of different ways.

An increasing number of our clients are choosing to develop 'reference designs', that meet their needs across a range of sites, conditions and markets. From hyperscale to retail facilities, these data centre designs can adapt and meet any business requirements. Although, such a concept might still come with challenges, it is a starting point where each business case can be based on something tangible.

The idea of standardised, data centre designs across multiple sites does bring conditions and challenges. A robust and repeatable concept design needs to be flexible enough to work across varying geographic and climate conditions, local and social restrictions, or legal considerations.



What is reference design?

[click above to play video](#)

The future of Data Centres

The emergence of hyperscale data centres and the demand to reduce \$ per MW to service the rapidly increasing cloud computing, ecommerce, and social media market has led us to pioneer an approach to data centre design and construction.

For the last 25 years, we have been helping to deliver value-driven data centres where facilities are designed to optimise the deployment of their servers as quickly and efficiently as possible.

Pioneering DfMA

We're experts in manufacturing-led construction for reduced project time and risk.

Scalability made simple

Our modular, repeatable design approach ensures maximum flexibility with significant cost & time benefits.

As architects and engineers, we are inventors and makers, explorative and inquisitive. We love to research, speculate, and innovate.



Drivers of value & innovation



Geographical Location

Connectivity, availability of power (or risk of power outage), weather conditions, environmental laws and local planning regulations are only some of the variables that should be considered before investing in the construction of such a facility. In addition, the social and economic impacts of investments of such magnitude attract attention from local media, sometimes in positive ways, but not every time.



Local Context

Proximity to urban areas and the need for a data centre sometimes even to be located within the urban fabric, makes construction even more challenging. In addition to that, local council restrictions, acoustic impact, fire regulations and many other considerations require developers and data centre designers to think carefully about how these facilities will blend into, and co-exist with, their surroundings.



Technology

Data center operators are continuously exploring and innovating new techniques to operate sustainable data centers that will reduce the size and energy consumption of the buildings without reducing their yield.



Sustainability

The impending global environmental catastrophe has everyone re-evaluating their carbon footprints, water usage, and other consumption habits. Data centres have massive resource requirements, making them prime targets for improvements in sustainability.

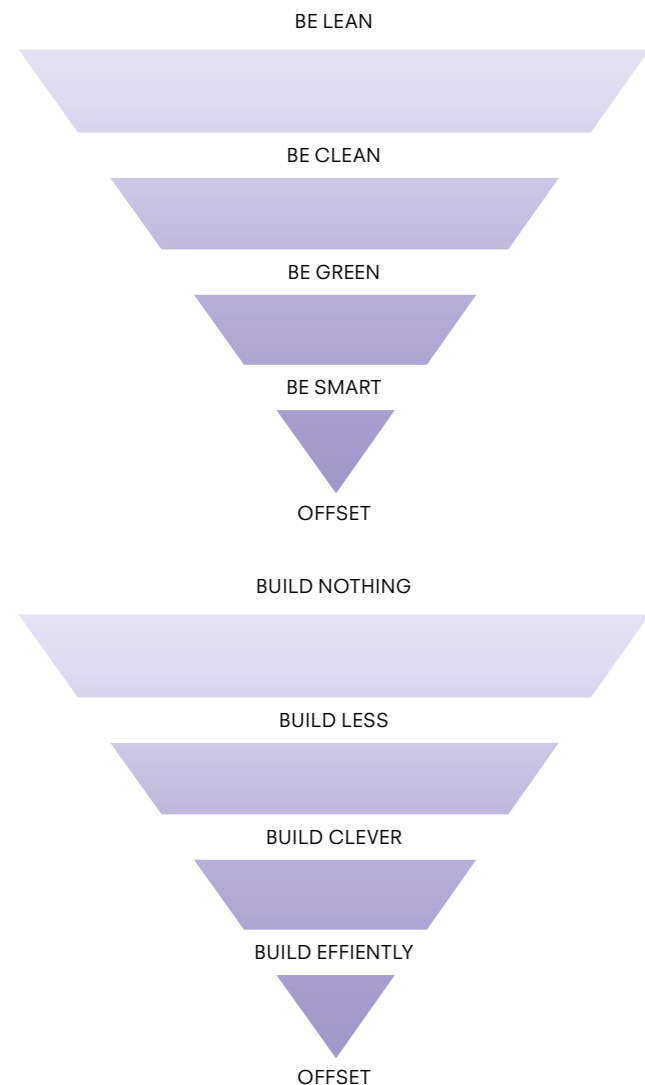
Sustainable Data Centres

The design and construction of data centres has environmental impacts related to carbon, energy and water. The largest data centres demand over 100MW of energy, which is enough to power 80,000 homes and its cooling process can potentially use approximately 255 million litres of water each year.

We strongly believe in a science-based approach to building design and the use of innovative technologies, supported by validated numeric calculations and simulations from in-house specialists.

This includes detailed analysis to provide strong technical advice to our clients:

- Power Usage Effectiveness (P.U.E).
- Detailed HVAC modelling.
- Thermal comfort analysis.
- Free cooling feasibility analysis.
- Overshadowing analysis.
- Whole life cycle carbon analysis (WLCA).
- Water balance calculations.



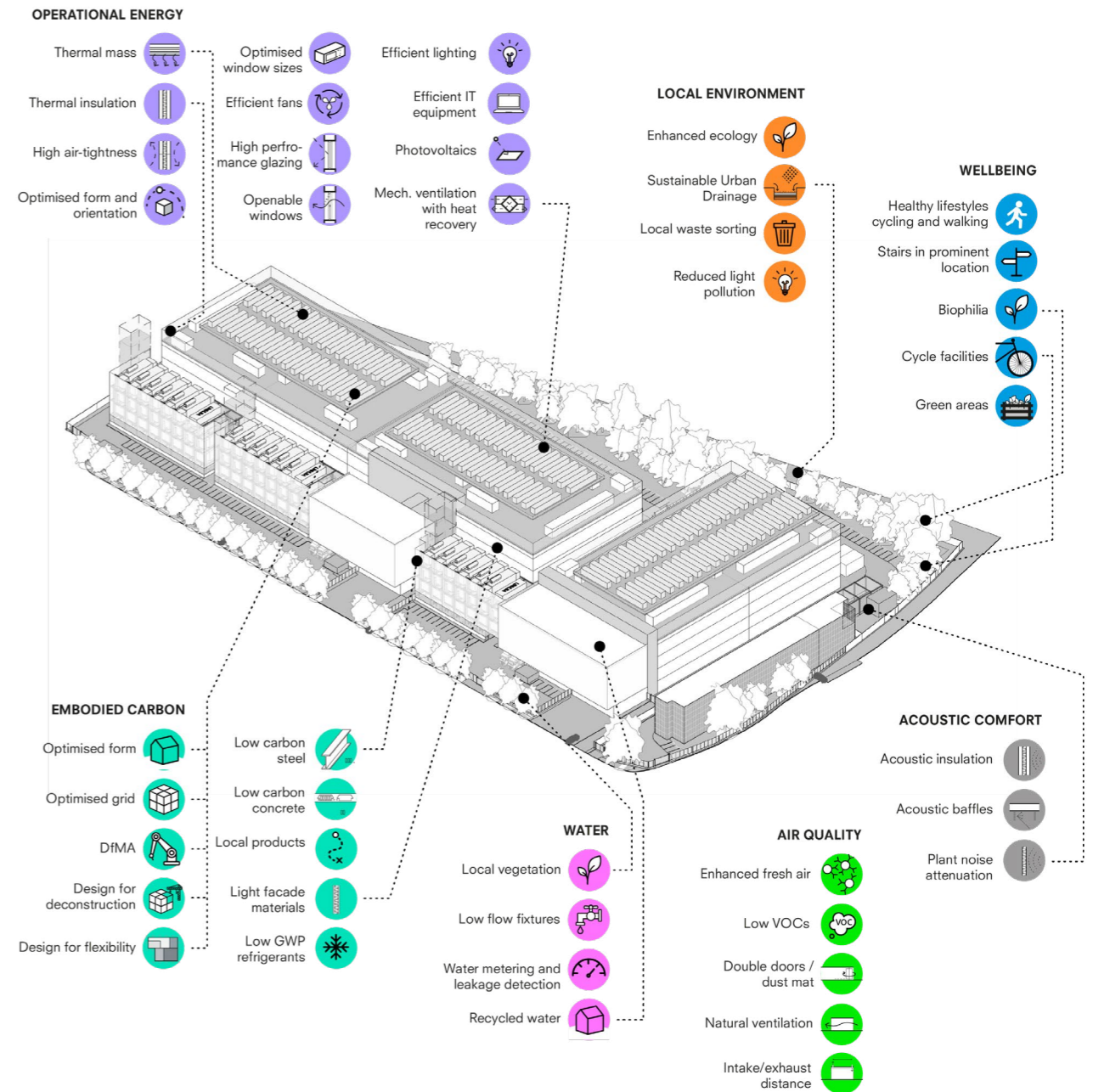
Net Zero Carbon

WIP

Bryden Wood's strategy to achieve net zero carbon data centres is based on the adoption of a clear hierarchy for operational and embodied carbon.

In order to substantially reduce operational carbon, we give priority to passive design measures first, followed by active measures (be lean), then we explore the feasibility of connecting to district heating networks (be clean), we analyse the feasibility of adopting of renewable technology (be green) and finally the use of renewable power purchase agreements.

To reduce embodied carbon, we prioritise the opportunities to reuse existing building assets (build nothing), then optimise the design of the building using DfMA (build less), explore the use of low carbon materials and efficient use of products (be clever), implement modern methods of construction (be smart) and finally, any remaining carbon is offset via recognised high quality carbon schemes.





Select Projects



Data Centre in Madrid

Built in two phases, between 2020 and 2023. Based on a reference design developed by BWT for the same client.

In summary, this data centre project in Alcobendas, a city north of Madrid, has been developed from Stage 2 to Construction as “Direccion Facultativa”. The project consists of two buildings of 14.4 MW and 9.6 MW, office spaces, and ancillary structures to allocate water treatment and energy supply equipment.

Planning comprised shell and core for two double-storey buildings and the internal fit out of a single megaCHIP (MD3.1) with its associated plant, as well as the groundwork for the whole development.

Each of these buildings consists of data halls, mechanical and electrical rooms, office spaces, storage areas, logistic hubs, and security. A central area with ancillaries serving both buildings and a new substation was planned within the same site to support the facilities. To enable the site to potentially operate as two separate ones, a fence splitting the site into two was included in the design. In line with this, a single common pedestrian access and two vehicular ones were provided. While the customer type and capacity are different for each of these data centres, the site remains a single campus from an environmental impact point of view, and it has been treated as such in the permitting with the authorities.

Client: **Confidential**
Location: **Alcobendas, Madrid**
Type: **Data Centre**
Area: **18,300m²**
Stage: **Stage 2 to Construction as “Direccion Facultativa”**

BIM coordination by 3D detailing modelling and automatic clash detection due high density of services inside data centre buildings was key for the successful delivery of the project.



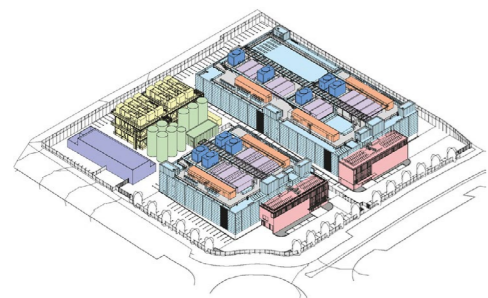
Facade visualisation



External Gantry



Reception



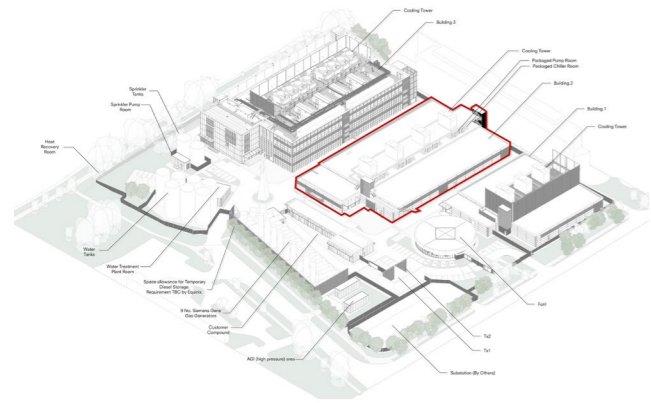
- Legend**
- Data Hall
 - Front of House
 - Generators / Loadbank switchrooms / Fuel pump rooms
 - HV substation and MV rooms
 - Water treatment and Storage / Fire Suppression
 - eWall / me Wall / rBlock
 - Cooling Towers
 - Packaged Plant Rooms (PPR / PCR)

Dublin DC Campus

Bryden Wood was appointed by the client to design this data centre facility as part of a larger site in a business park on the outskirts of Dublin.

The scheme comprises three hyperscale data hall buildings with separate supporting office facility areas. The site yield has been maximised by providing a mix of multi-level and single level data hall buildings, due to existing site constraints on overall height and massing.

The scheme deploys the standard data centre reference design concept developed by Bryden Wood. Construction commenced on the site in January 2021.



Client: **Confidential**
Location: **Blanchardstown, Dublin, Ireland**
Type: **Data Centre**
Area: **14,000 m²**
Stage: **RIBA Stages 0 to 7**

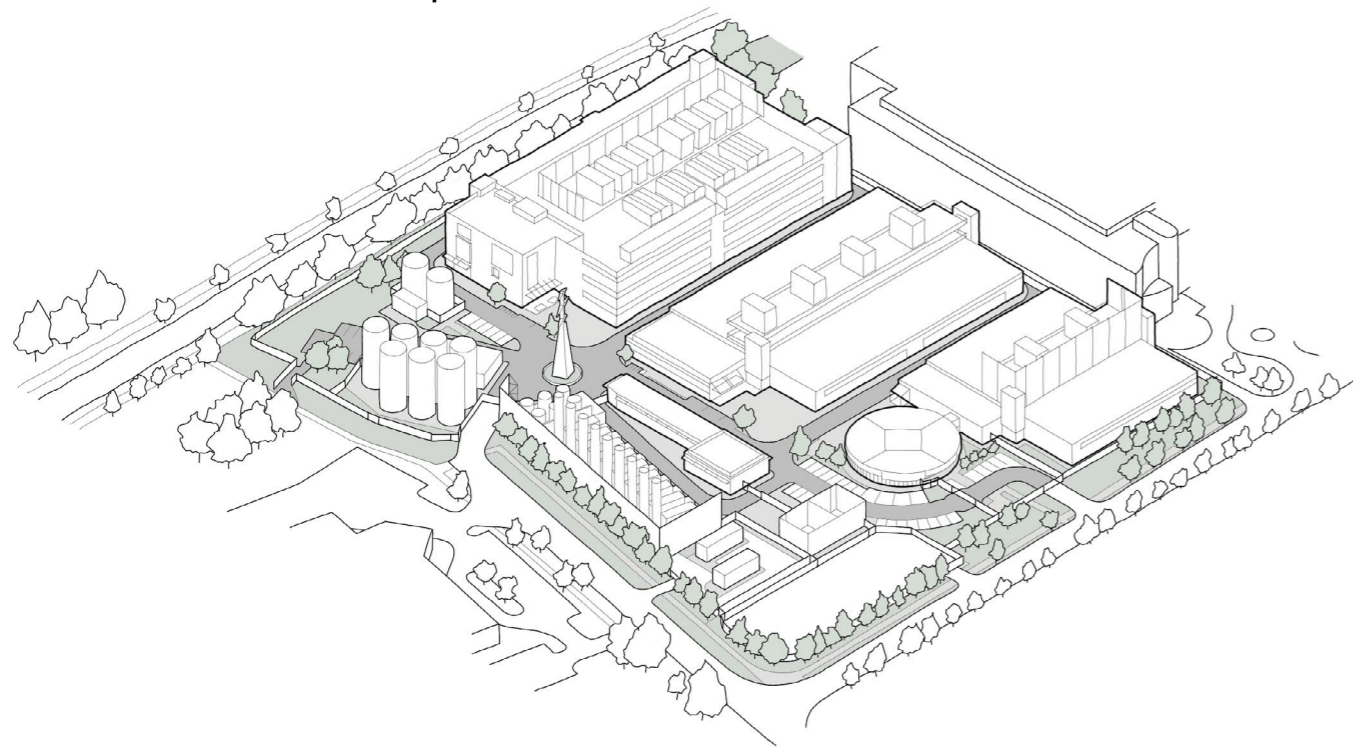


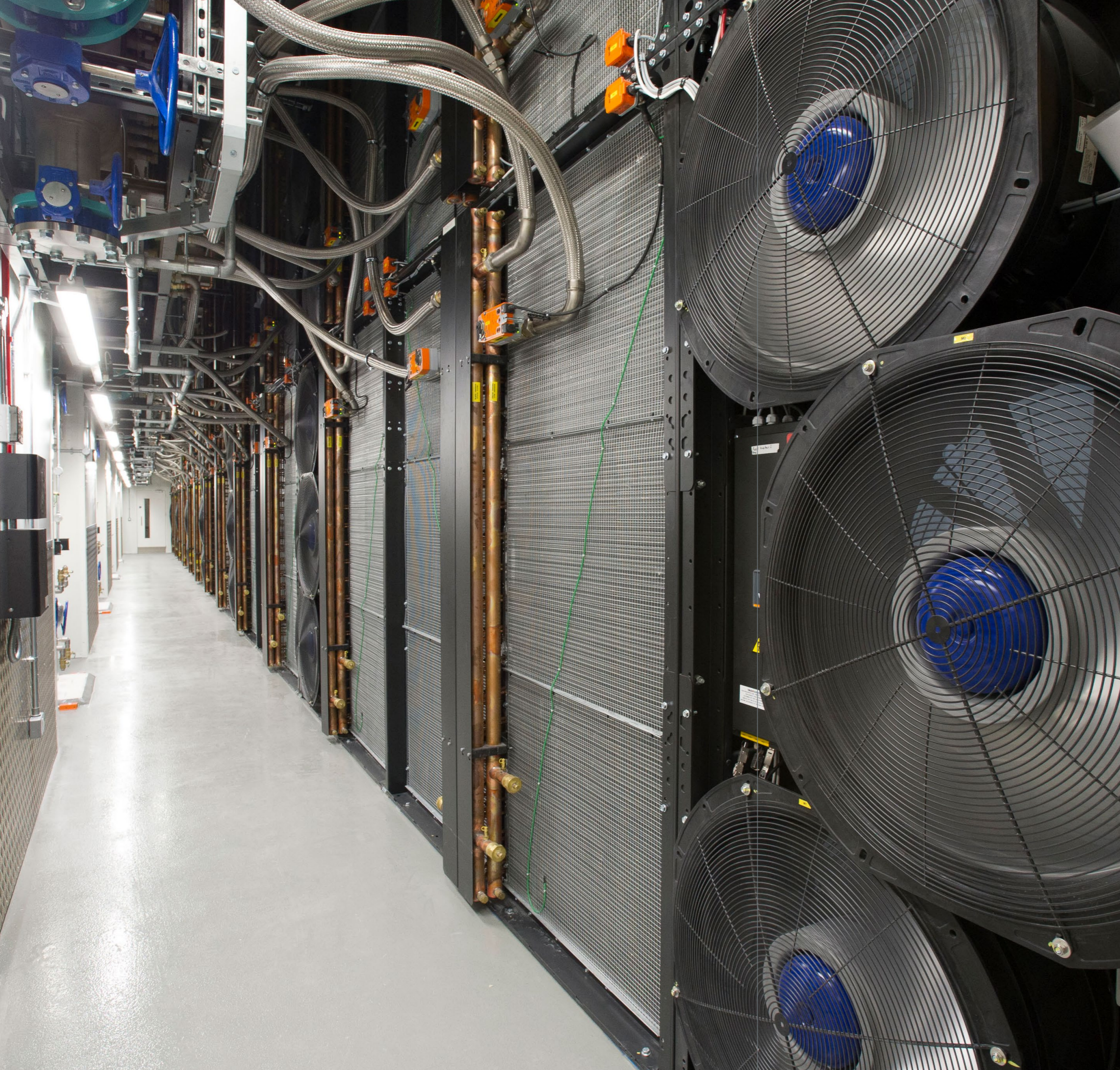


This project was BWT's first European Campus to follow a variation of the reference design.

The capacity for each data hall varies, however the strategy to manage the environmental requirements including the mechanical and electrical plant remains similar across the scheme. Security is a key component in the development as there are sensitive technologies that are not shared with the public.

Axonometric sketch of the DC Campus





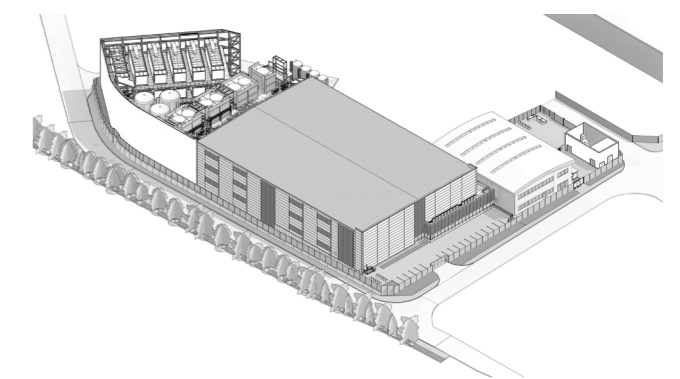
Data Centre in London

Bryden Wood's participation spanned from RIBA Stage 0 to RIBA Stage 7, showcasing its comprehensive involvement across all project stages.

The facility is a three story data centre with external ancillary plant area to the West and a link corridor connection to an existing adjacent building.

The project involved a multidisciplinary team overseeing architecture, civil engineering, structural engineering, and MEP services. Adaptations to the client's reference design were made to ensure compliance with regulations while optimizing space utilization.

Implemented in two phases, with a total investment of £102m, the facility included Front of House (FOH), Back of House (BOH), and Substation facilities within an adjacent building. Effective communication ensured seamless collaboration with stakeholders throughout the project lifecycle, facilitating innovation and operational efficiency.



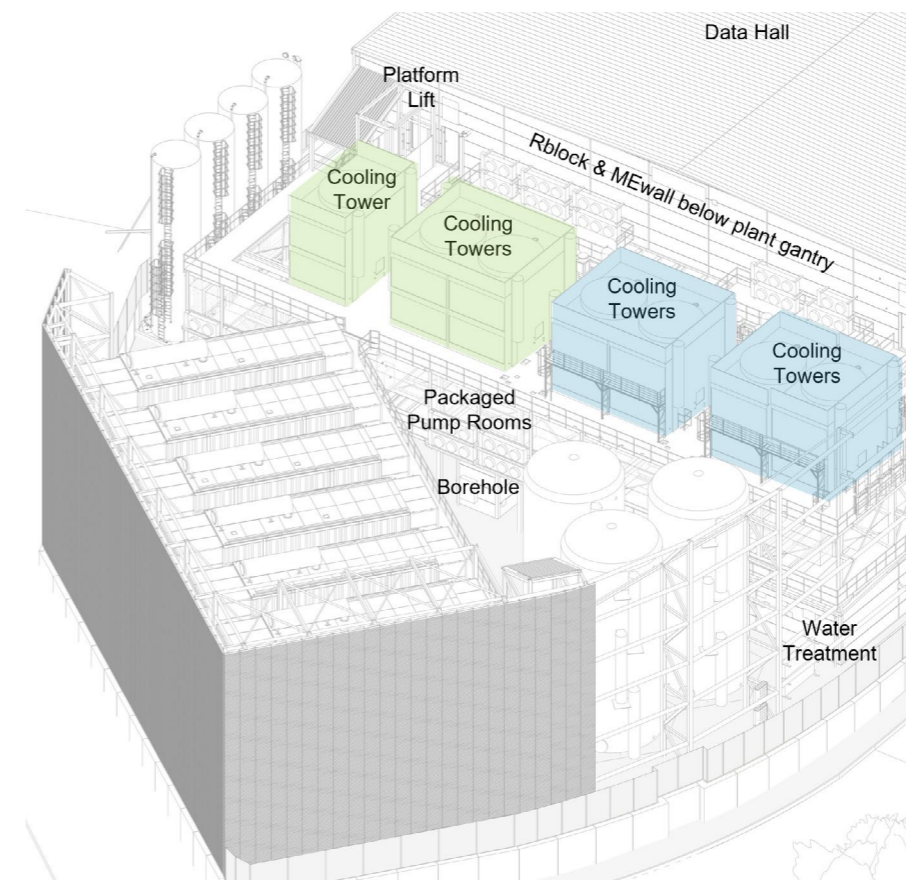
Client: **Confidential**
Location: **London, UK**
Type: **Data Centre**
Area: **Confidential**
Stage: **RIBA Stages 0 to 7**



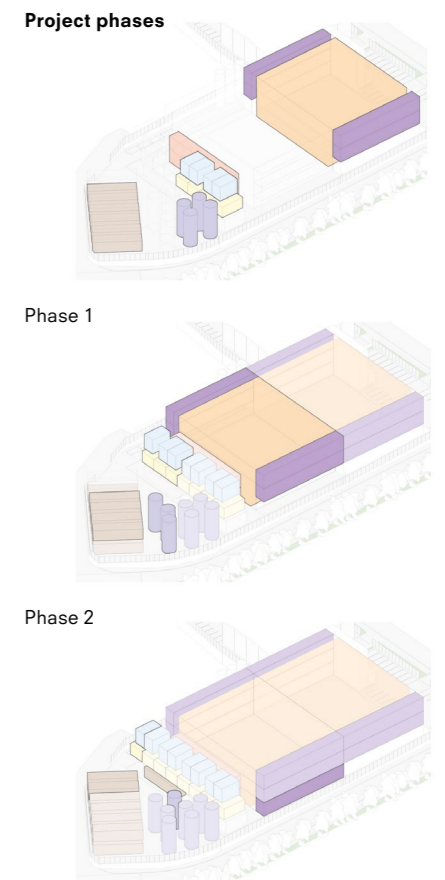
Use of standard array of repeatable components. The reference design as a baseline enables a fast approach to the early stages.



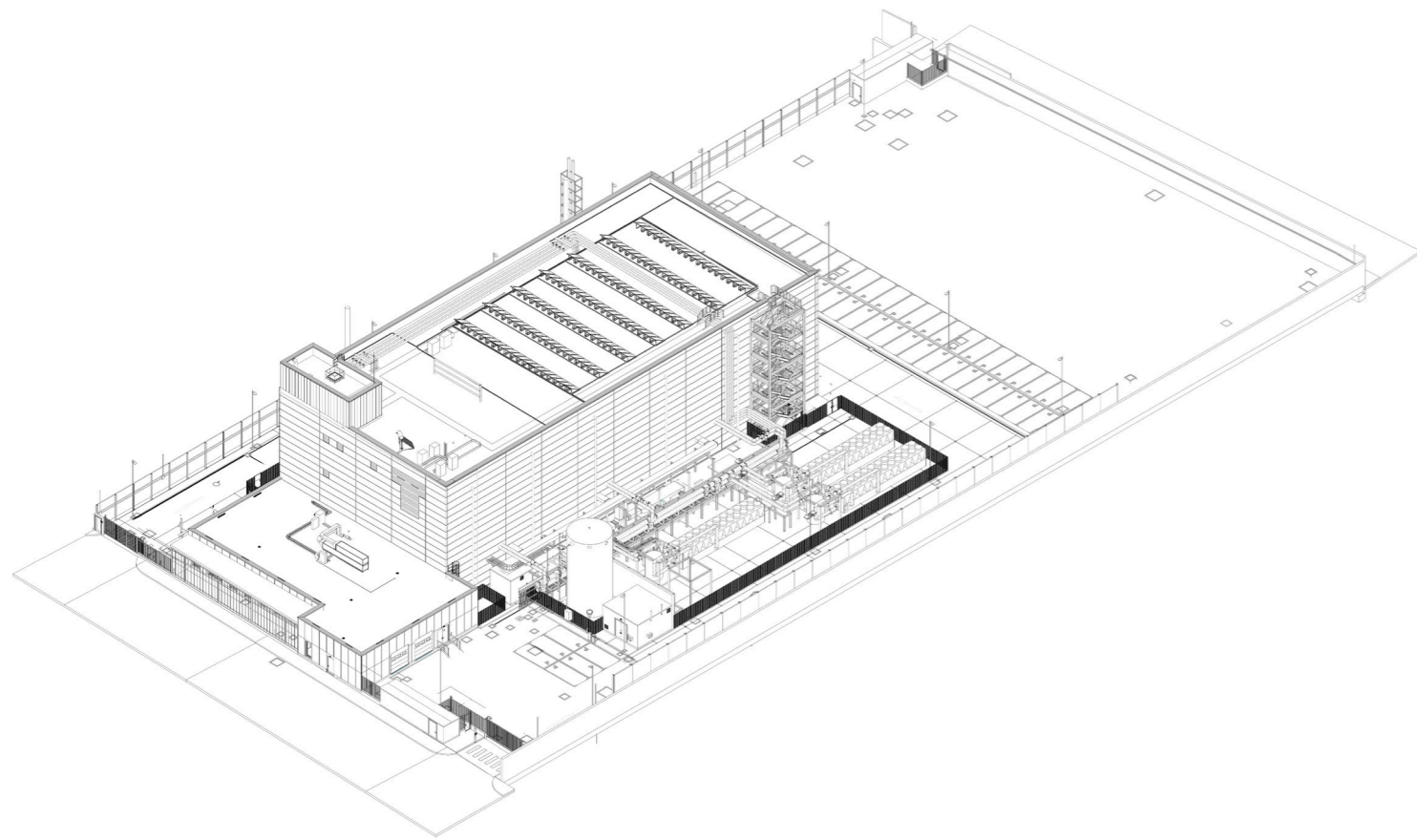
Construction site progress



Axonometric view indicating MEP elements



Phase 3



Data Centre in Barcelona

BWT future-proofed the project by implementing an optimised phasing ability.

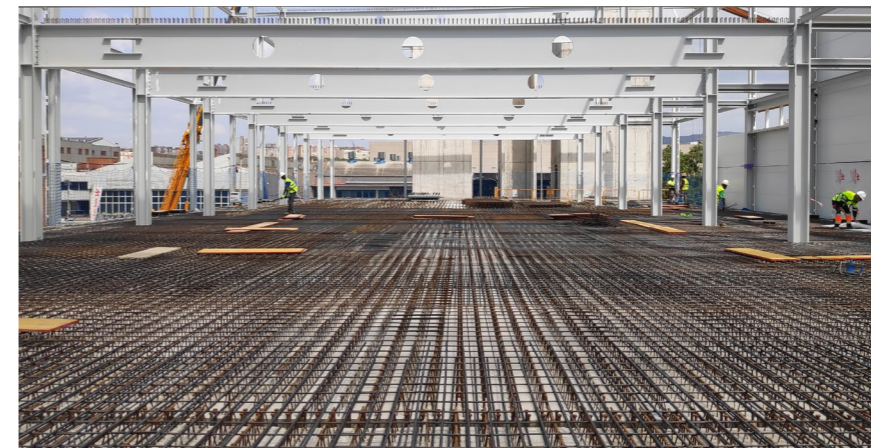
This data centre campus is located in an industrial area of Hospitalet de Llobregat, a city to the south of Barcelona. This project is a facility development compound by a main data hall building to accommodate 3.24MW on its first phase with ancillary external structures.

During the design stage we aimed to standardise the structural details and undertake a high-level coordination between disciplines. BWT is currently assisting the client with the site technical support during the current construction with the "Dirección Técnica" role for the project.

How we added value:

- Design developed based on a reference design developed for the same client.
- Future proofing for building extension potential Phase 2 without interrupting phase 1 operation.
- Value Engineering proposals to reduce cost and programme, during early Stage 5 as soon GC has been broad on board.

Client: **Confidential**
 Location: **Hospitalet de Llobregat, Spain**
 Type: **Data Centre**
 Area: **Confidential**
 Stage: **Phase 1**



Monitoring the Stage 5 Structures coordination by reviewing BIM construction/fabrication models.



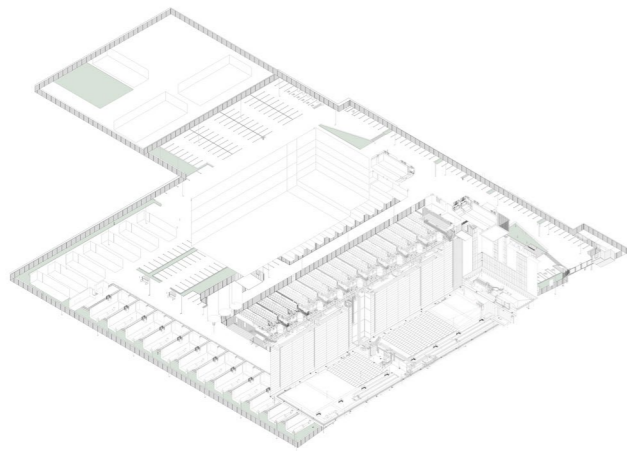
Construction site progress

Data Centre in Milan

This site is in an industrial area on the outskirts of Milan. The project consists of two independent Data Centre buildings (ML7 & ML8) with a combined approximate GIA of 19400m², within a plot of 25900m² and 45MW IT capacity.

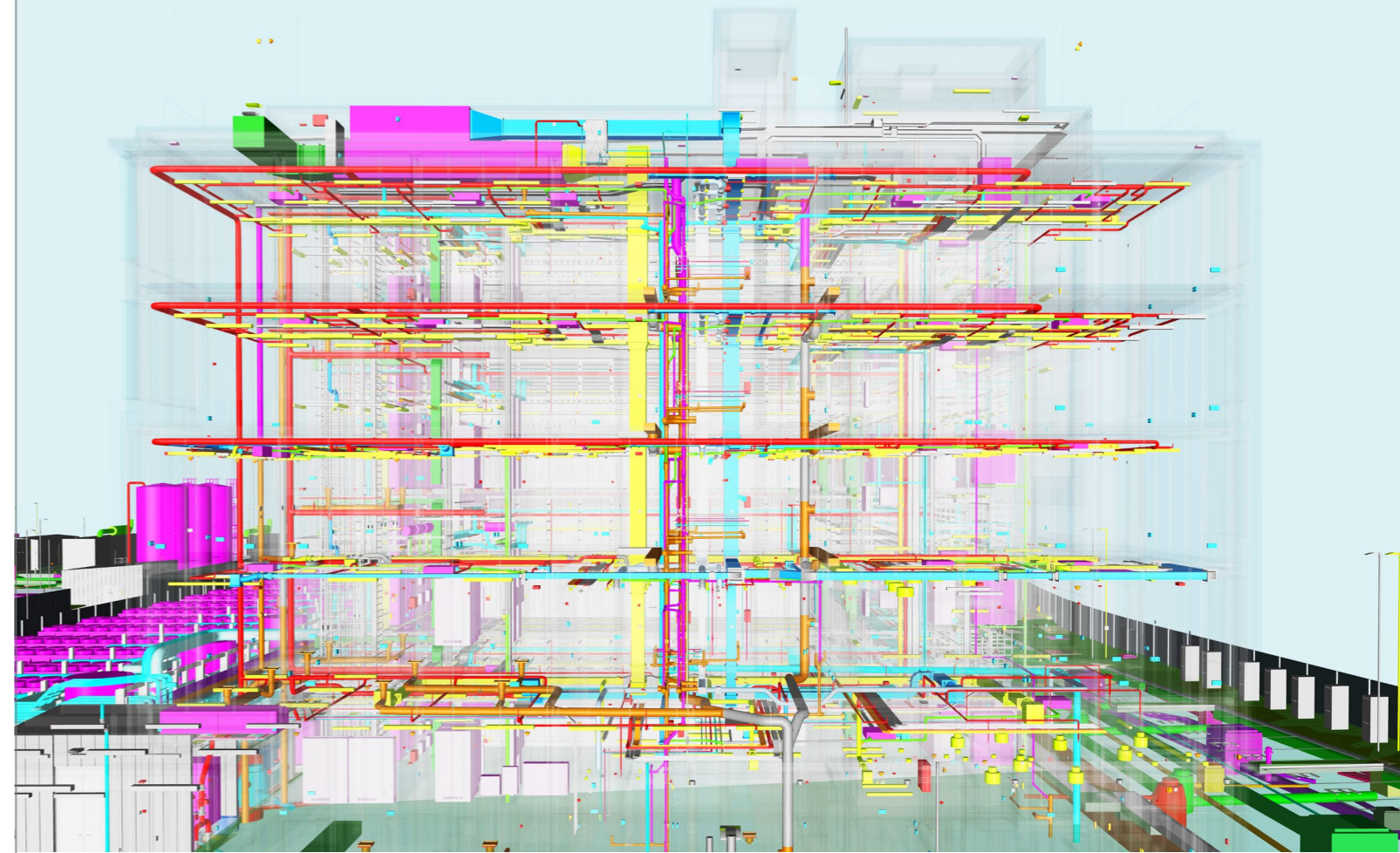
The two data centres are a part of a wider masterplan which has been designed by Bryden Wood, comprising of both data halls, mechanical and electrical rooms, office space, security, storage and loading bays. The first data centre was designed to be constructed in phases and the final phase is set to complete in early 2025.

The first DC building phase was completed in 2023 and the final phases 2,3,4 completed by 2025.

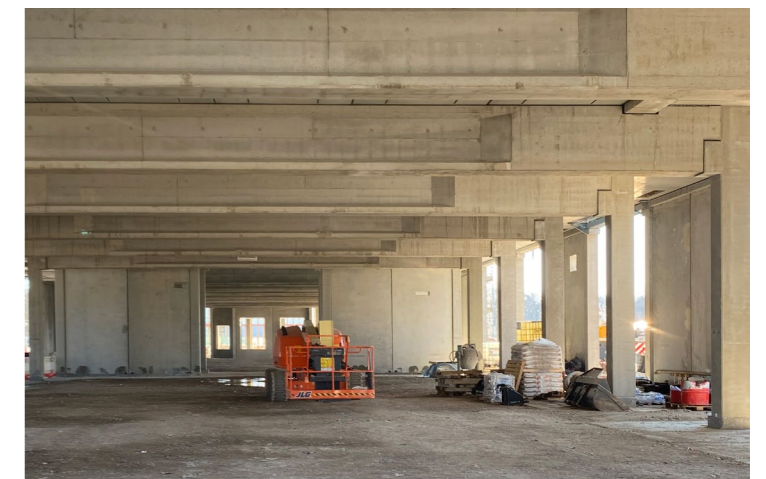


Client: **Confidential**
Location: **Milan, Italy**
Type: **Life Science**
Area: **19,400 m²**
Stage: **RIBA Stages 0 to 7**

BIM coordination by 3D detailing modelling and automatic clash detection due high density of services inside data centre buildings was key for the successful delivery of the project.



Optimised and integrated MEP services



Construction site photos



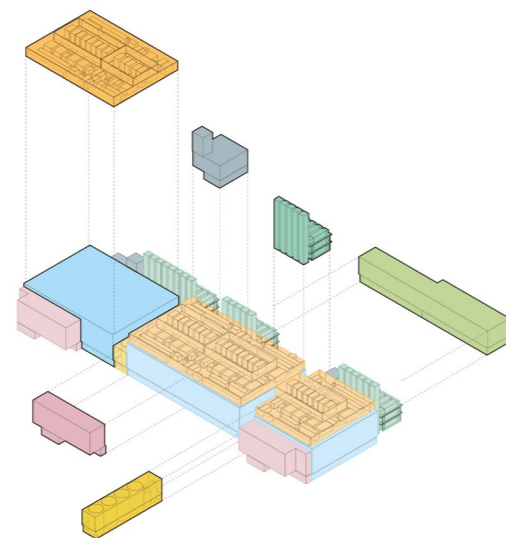
Handsketch of the site's entrance

DC Campus in London

The facility achieves 13% increase in yield by optimising building components.

Bryden Wood has been appointed to develop this data center campus situated in a highly restricted area central to the Slough City Centre. With a projected size between 108 and 120 MW, the project is set to become one of the largest urban data centre campuses in Europe.

The proposal requires a visually attractive and architecturally appealing design to address concerns from local planning authorities and residents from nearby areas. Furthermore, sustainability objectives are integral to the design, aligning with the client's commitment to environmental responsibility.



- Mechanical and electrical equipment
- Data hall
- Front of House (FOH)
- Water storage
- Back of House (BOH)
- Heat dissipation plenums and back-up plant
- Substation

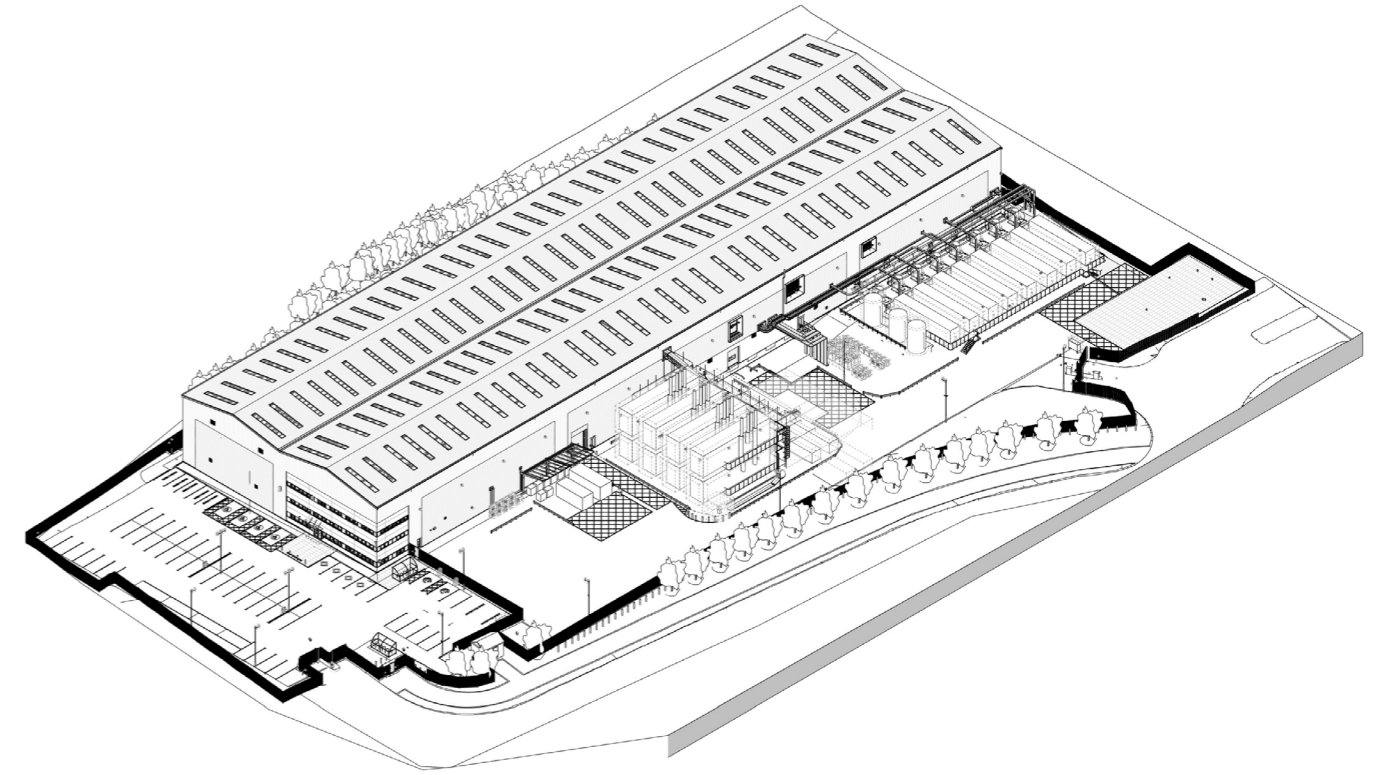
Exploded Axonometric of the building's components

Client: **Confidential**
 Location: **Slough, London**
 Type: **Data Centre**
 Area: **Confidential**
 Stage: **Due Diligence, Enabling Works, Concept and Planning**



CG view of the adjacent boulevard

The project demonstrates how early automated option generation enhances yield and improves the use of land.



Data Centre in Manchester

The development seeks to optimize the site to its maximum available power.

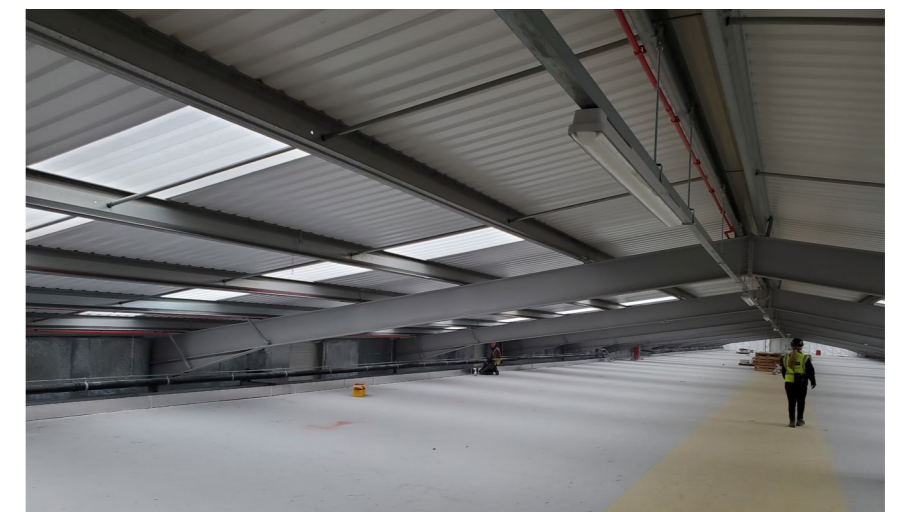
Bryden Wood was appointed to design and build the MA06 data centre facility as part of a larger campus including two data centre buildings (one already operational) in an industrial part of Greater Manchester Area, on the outskirts of Salford.

The facility is utilizing the existing warehouse for Data Hall, Front of House and Back of House facilities with 13,413m² GEA and a total of 30,058m² plot area. The proposed facility consists of single storey data halls intended for multiple customers, two-storey office spaces, storage areas, logistic hubs and associated external ancillary plant area. Following the existing site infrastructure, the proposed site allows for a separate pedestrian access to FOH and two vehicular access points to FOH and external plant area. The development seeks to optimize the site to its maximum available power from the existing substation shared between MA06 and the existing data centre to the south of the plot.

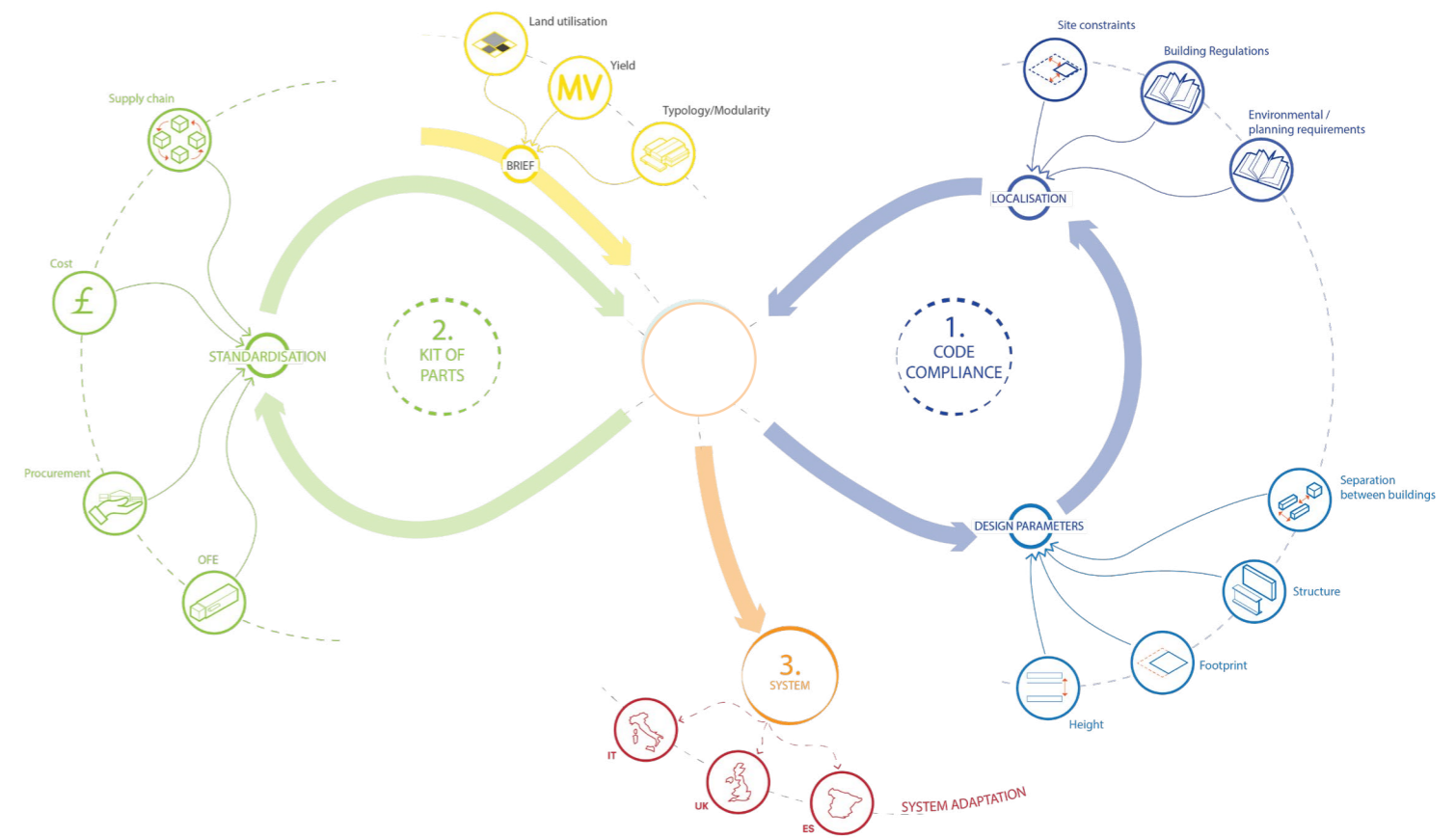
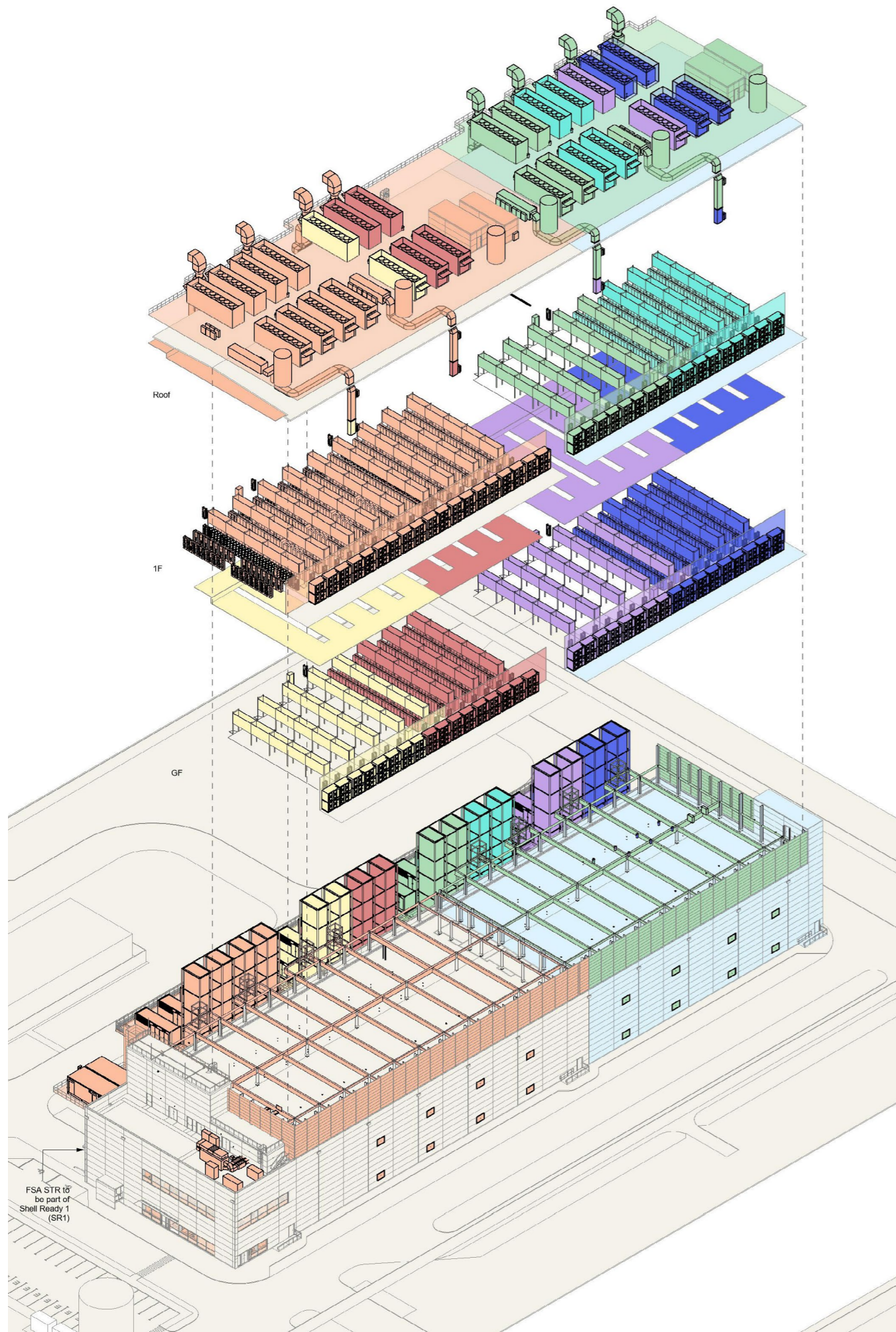
Residential neighbourhoods are predominantly located to the north and west. Numerous green pockets exist locally, including a large strip of landscaping to the north-west part of the site.

The challenge was to re-use elements of the existing warehouse and site infrastructure as much as possible introducing at the same time the required architectural, structural and MEP design.

Client:	Confidential
Location:	Mantchester, UK
Type:	Data Centre
Area:	13,413m²
Stage:	From Strategic Definition to Construction (RIBA Stages 1-4)



Construction site progress



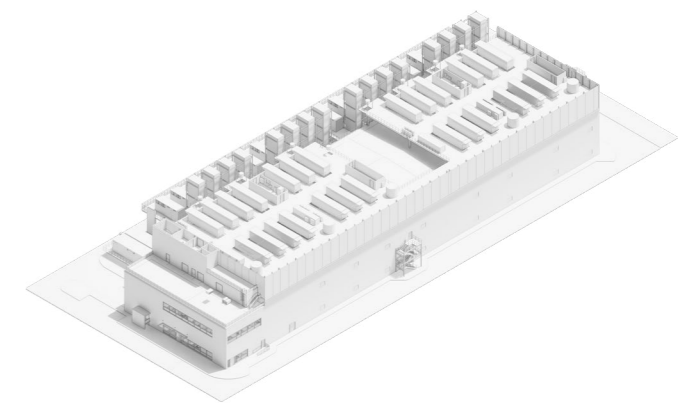
CODC EMEA

The development achieved 30% footprint optimisation oriented to the EMEA market.

The CODC EMEA MS is a cost optimised, site agnostic multi-storey data centre design capable of delivering a data centre for a 2-storey 20MW IT facility, with a program that breaks down into 4 different configurations in relation to the structure and mechanical infrastructure.

Bryden Wood has been commissioned to develop a L2 design template solution that is flexible, incremental and faster to deliver to market, while being capable of localisation as specific site locations are identified.

The agnostic design is for DCH and FSA facility for an overall IT capacity of 20MW over 4No. data centre halls and built out in 7No. fitout phases.



- Client: **Confidential**
- Location: **Multiple locations EMEA**
- Type: **Data Centre**
- Area: **Confidential**
- Stage: **Brief Development, Agnostic Design, Code Analysis, Kit of Parts**

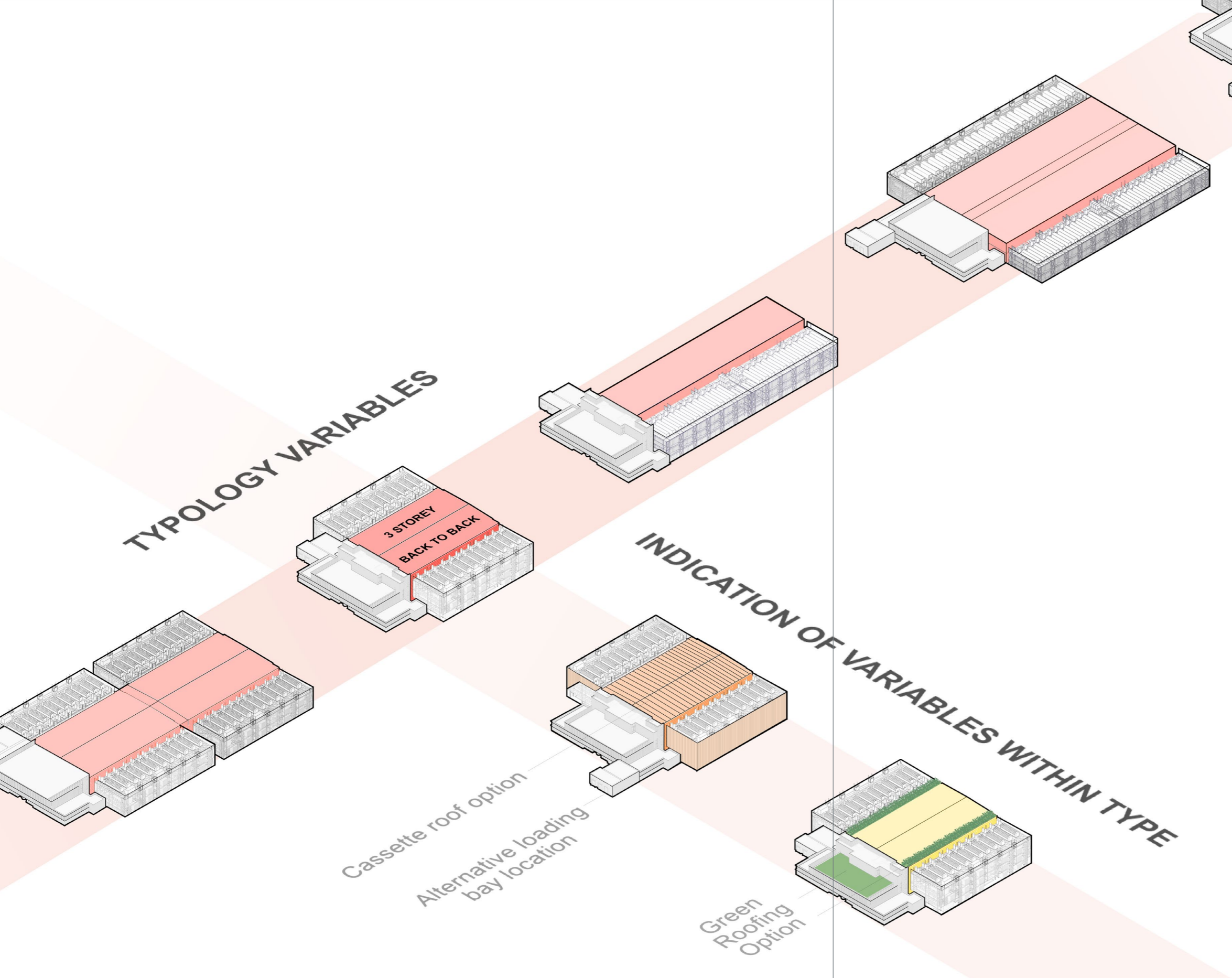
Optimised Reference Design

Bryden Wood have worked on the Reference Design and as a response to various clients.

Typically, a Reference Design will contain a number of repeated elements at varying scales (from key equipment to whole assets) that can be configured in a number of different ways (with more or less flexibility in how these are arranged depending on the asset type). This Reference Design can then be built again and again as a fixed product, by clients who have control over site conditions.

But for those who need flexibility, the Reference Design becomes far easier to configure flexibly into a physical asset when broken down into its 'Chips' (with more or less flexibility in how these are arranged depending on the asset type.) By digitally modelling the design against the given brief/constraints using Chips, we can quickly see how well the design will work, and what we can adapt to fit the wide range of needs and constraints involved. This ability to adapt the configuration of a design would be impossible in a design expressed as 100% single components.

The 'local' design is then focused on ground conditions, utilities, infrastructure, placemaking, flows of people etc.

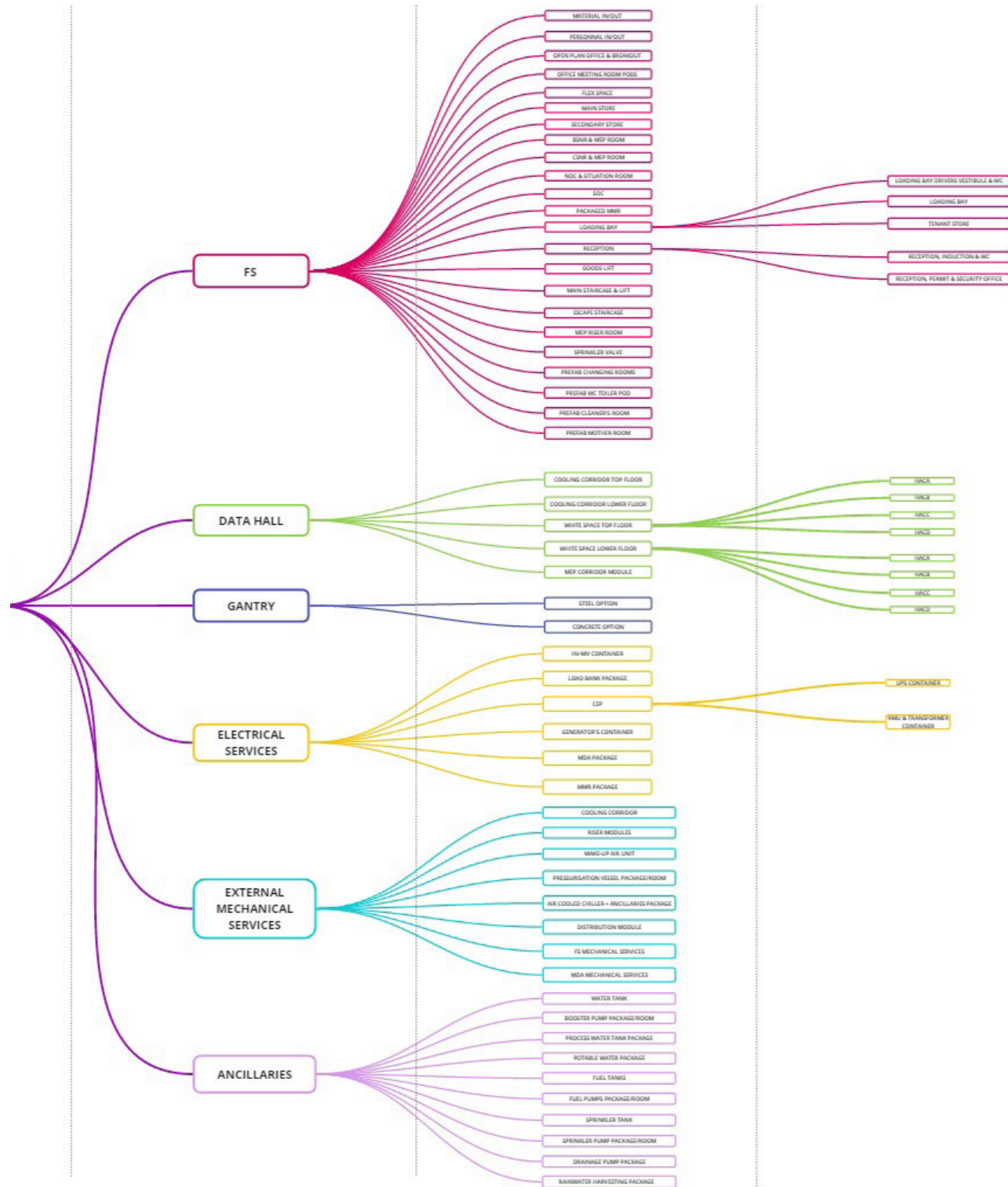


Client: **Various - Confidential**
 Location: **Multiple locations EMEA**
 Type: **Data Centre**
 Area: **N/A**
 Stage: **Reference Design, Test Fits, Deployment on Site**

Commonality/Standardisation

Data centres are a type of building, which offer a large extent of potential commonality between different building configurations and different sites.

It only makes sense once the commonalities have been addressed, that we look to use those to generate rules and components, suitable for deployment across different schemes.

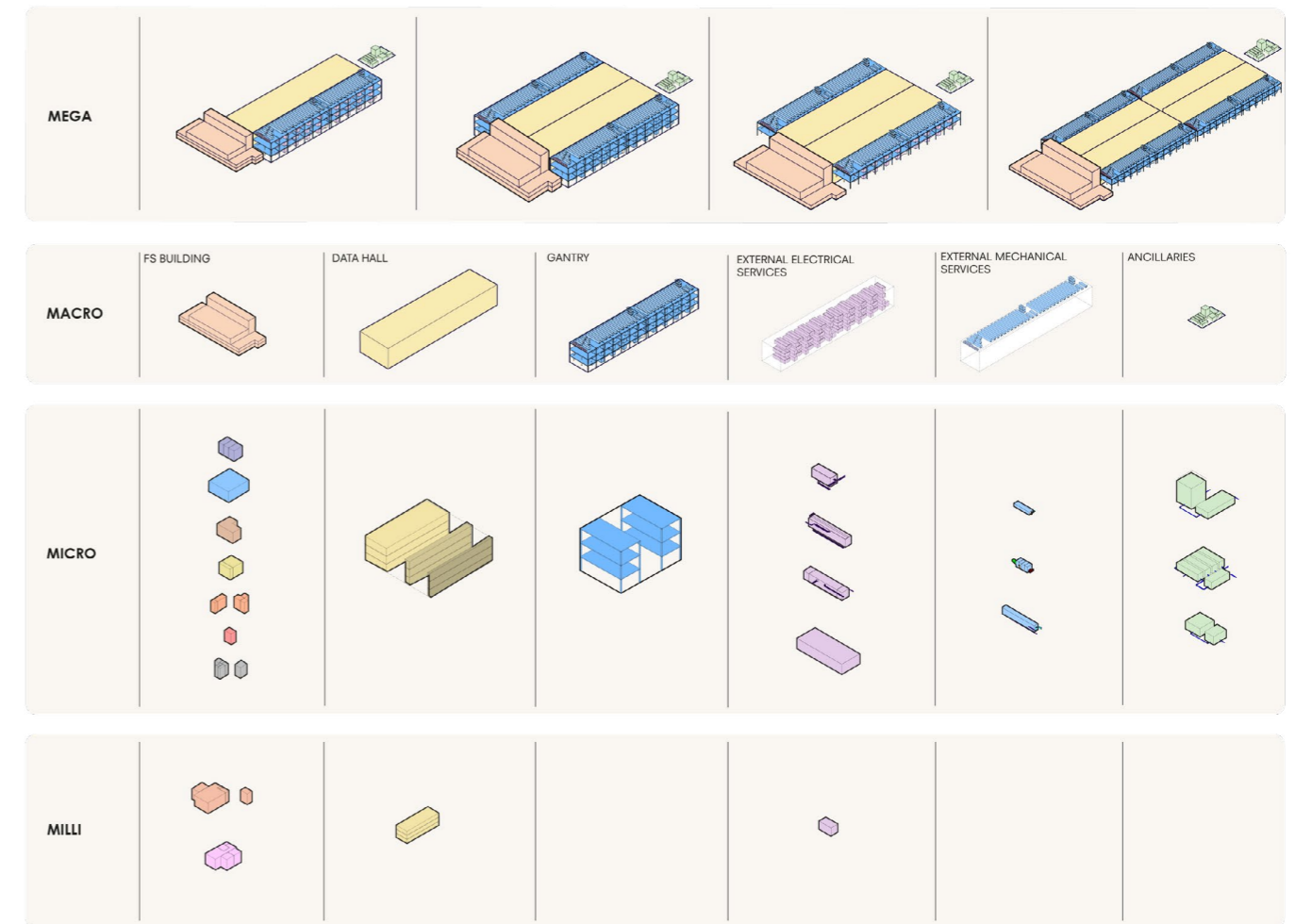


System Flexibility

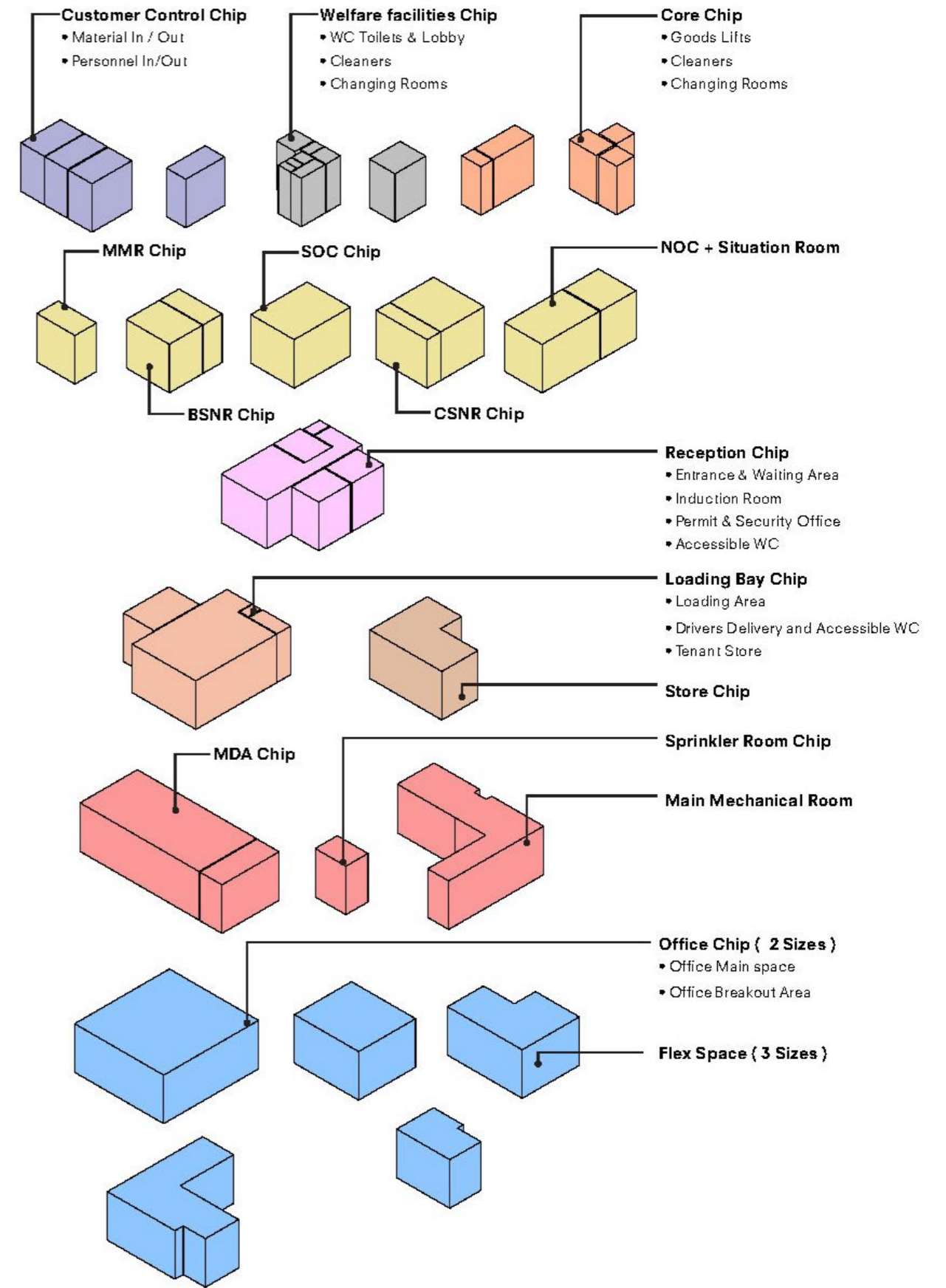
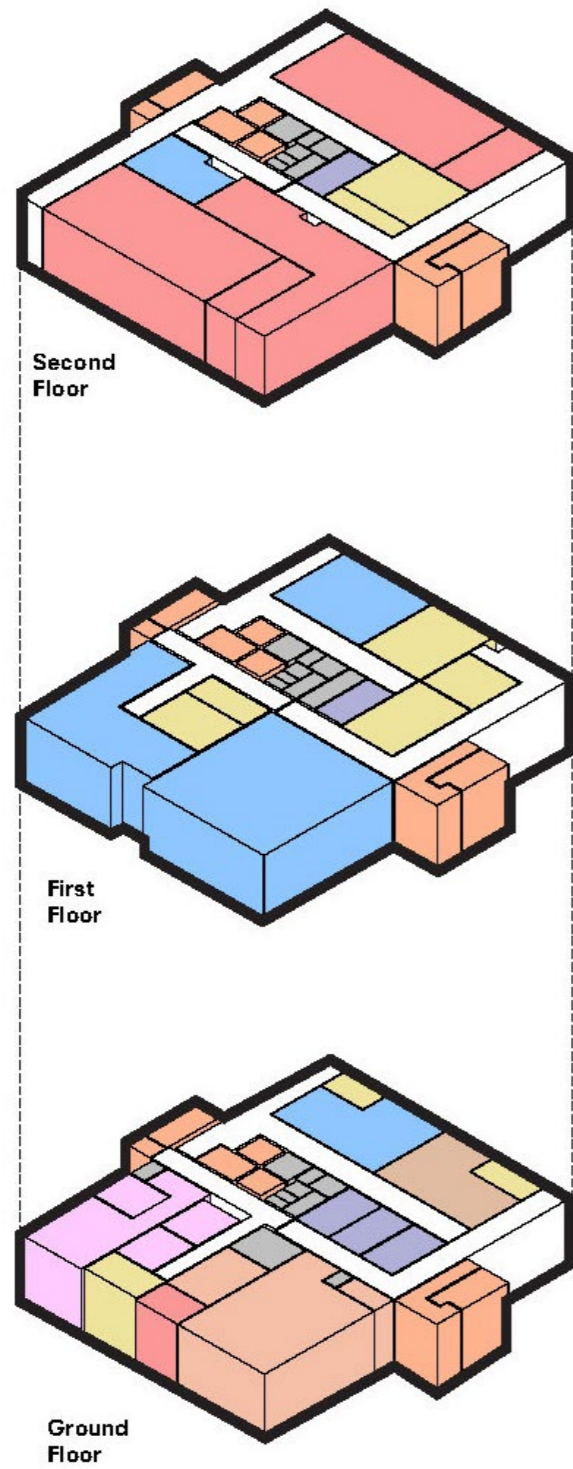
Systems are not conceived on the basis of only being able to deliver prescriptive template buildings, but is intended to provide the right level of flexibility in the right areas, (while keeping other aspects constant) thereby allowing for multiple arrangements to be achievable.

From the building blocks demonstrated here, comes a library from which project specific approaches can be executed.

Options exist within the library depending on phasing requirements and other site based constraints.

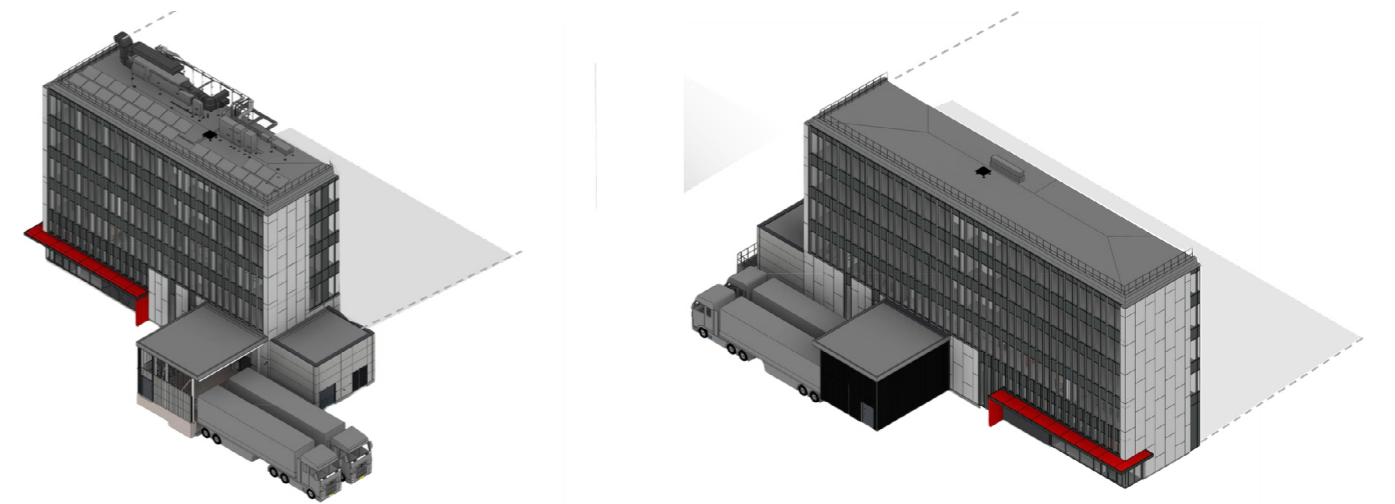


Component library





Facility Support Area - Size Variations



Facility Support Area - Size Variations

Small FOH

Medium FOH



Reference Design Architecture, Front of House areas, Interior design



Reference Design Architecture, Front of House areas, Interior design

Computer generated images and BIM coordination by 3D modelling is key for the successful communication between stakeholders.

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