



BIM & Bullets

Royal Artillery Barracks Shooting Range – London 2012 Olympics

James Middling - Divisional Director

Kan Wong – BIM Manager



Presenters

James Middling is a Divisional Director at Mott MacDonald. A chartered structural engineer by profession, he has detailed experience of stadia and arena design, tall buildings, and construction pertaining to building structures.



James has over ten years continuous experience of working across a niche portfolio of BIM projects, is BIM Champion for the company's Buildings & Infrastructure Unit and also fronts its Sports Stadia business

Kan is the BIM Manager for the Buildings and Infrastructure Unit of Mott MacDonald, UK and has 25 years' experience as a Structural Technician including 10 years continuous experience of modelling complex 3D projects ranging from stadia to airports.

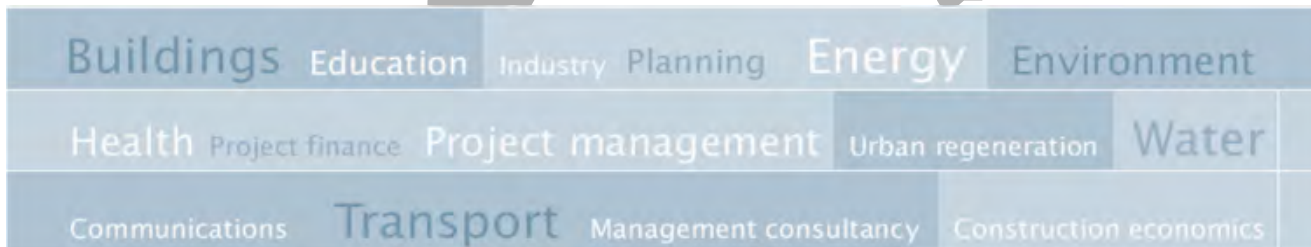
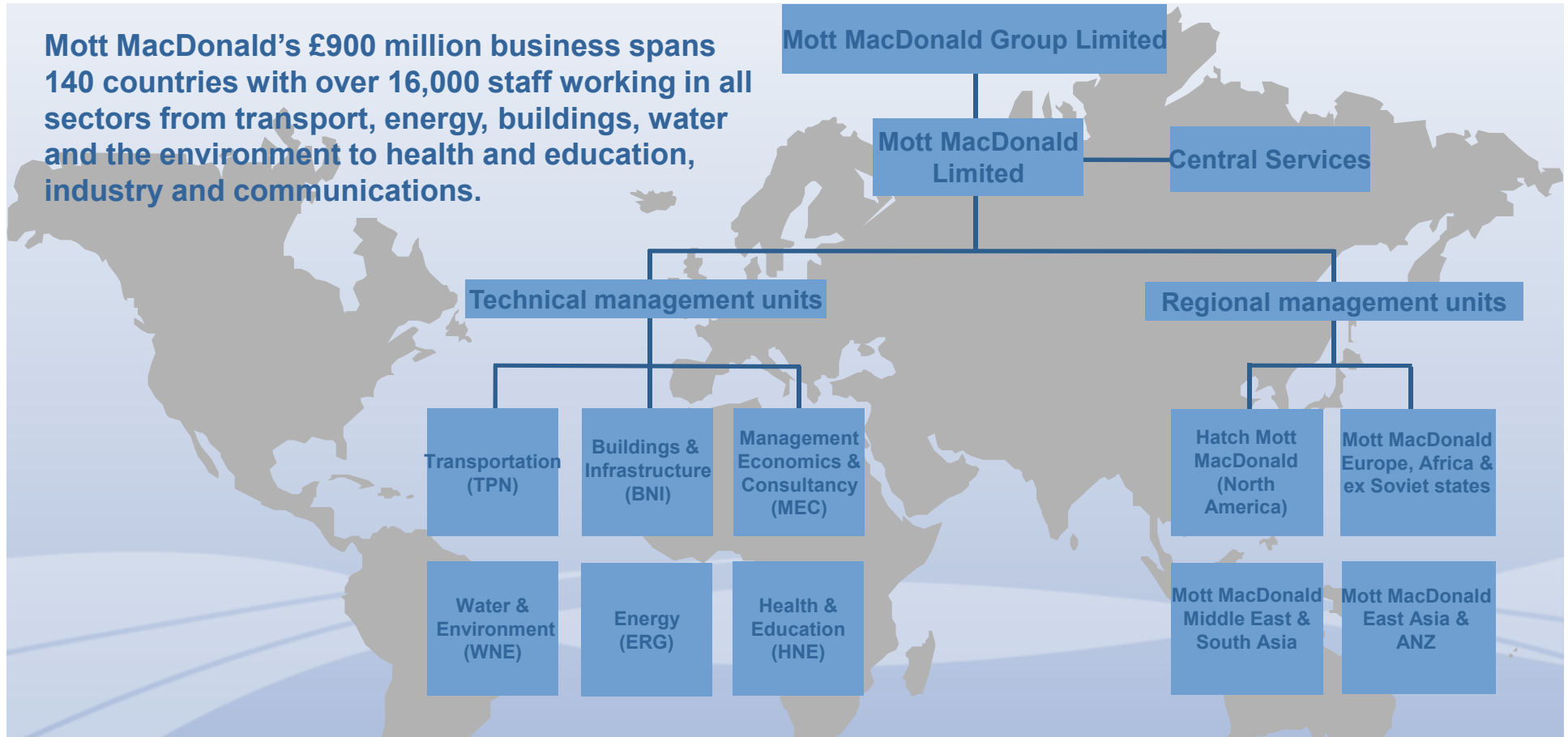


As well as managing a team of CAD/BIM technicians; Kan has provided BIM implementation, training, support to projects in various offices around the group. He is actively involved in group standards such as Revit templates and BIM Protocols, Kan is a certified Revit Architecture 2013 professional



Engineering Consultant of the Year

Mott MacDonald's £900 million business spans 140 countries with over 16,000 staff working in all sectors from transport, energy, buildings, water and the environment to health and education, industry and communications.



Overview

- Project Background and Context
- Delivering RAB through BIM
 - Design workflows
 - Multidisciplinary input and coordination
 - Scheduling and costing
- Legacy
- Discussion

The Royal Artillery Barracks



Project Team

- **Client:** Olympic Delivery Authority (ODA)
- **Lead Consultant:** Mott MacDonald
- **Architect:** Magma Architecture
- **Ballistic Consultancy:** Entec/AMEC
- **All Engineering, PM, Acoustics, Fire:** Mott MacDonald
- **Principal Contractor:** John Sisk and Son
- **Temporary Structures:** ES Global

The Brief



The Brief

- Temporary venues to host Olympic Shooting events & Paralympic Archery
- Meets the requirements of the ISSF 'the sports body'
- Cost effective – 'we are not paying a penny for iconic'
- Acceptable to the planners and local community
- Design, supply, construction, erection, testing and commissioning, maintenance, decommissioning and reinstatement
- oh.....and don't make a mess

Shooting Competition Disciplines

Rifle Discipline

50m Rifle 3 Positions Men
50m Rifle Prone Men
10m Air Rifle Men
50m Rifle 3 Positions Women
10m Air Rifle Women

Pistol Discipline

50m Pistol Men
25m Rapid Fire Pistol Men
10m Air Pistol Men
25m Pistol Women
10m Air Pistol Women

Shotgun Discipline

Trap Men
Double Trap Men
Skeet Men
Trap Women
Skeet Women



Respectful & Functional Design - Not Iconic



1952



1932



1972



2008

Enclosures & structure

Farnborough public facing

Beckham Academy – simple



Farnborough BOH



Temporary Accommodation (LOCOG Scope)

Off the peg solutions with overlay to accord with the “look of the games”



Temp Cooling / Heating solutions



Processes, Tools and Communication

Design Systems and Tools

- CAD Standards
- Drawing and layer numbering
- 3D collaboration etc.

Design Standards and Procedures

- Design requirements
- Design process and deliverables
- Procedures for designers

Design Collaboration

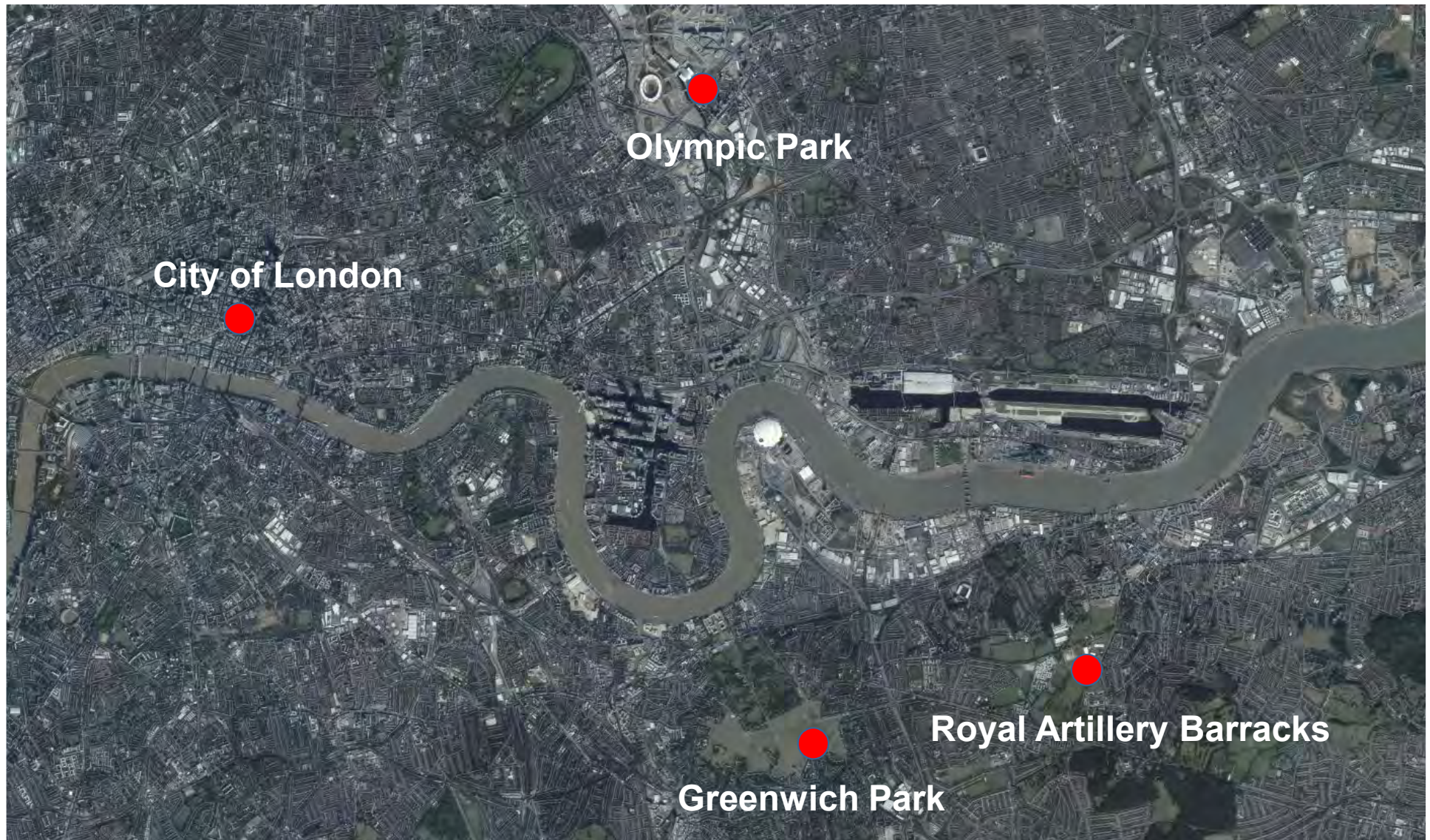
- ProjectWise

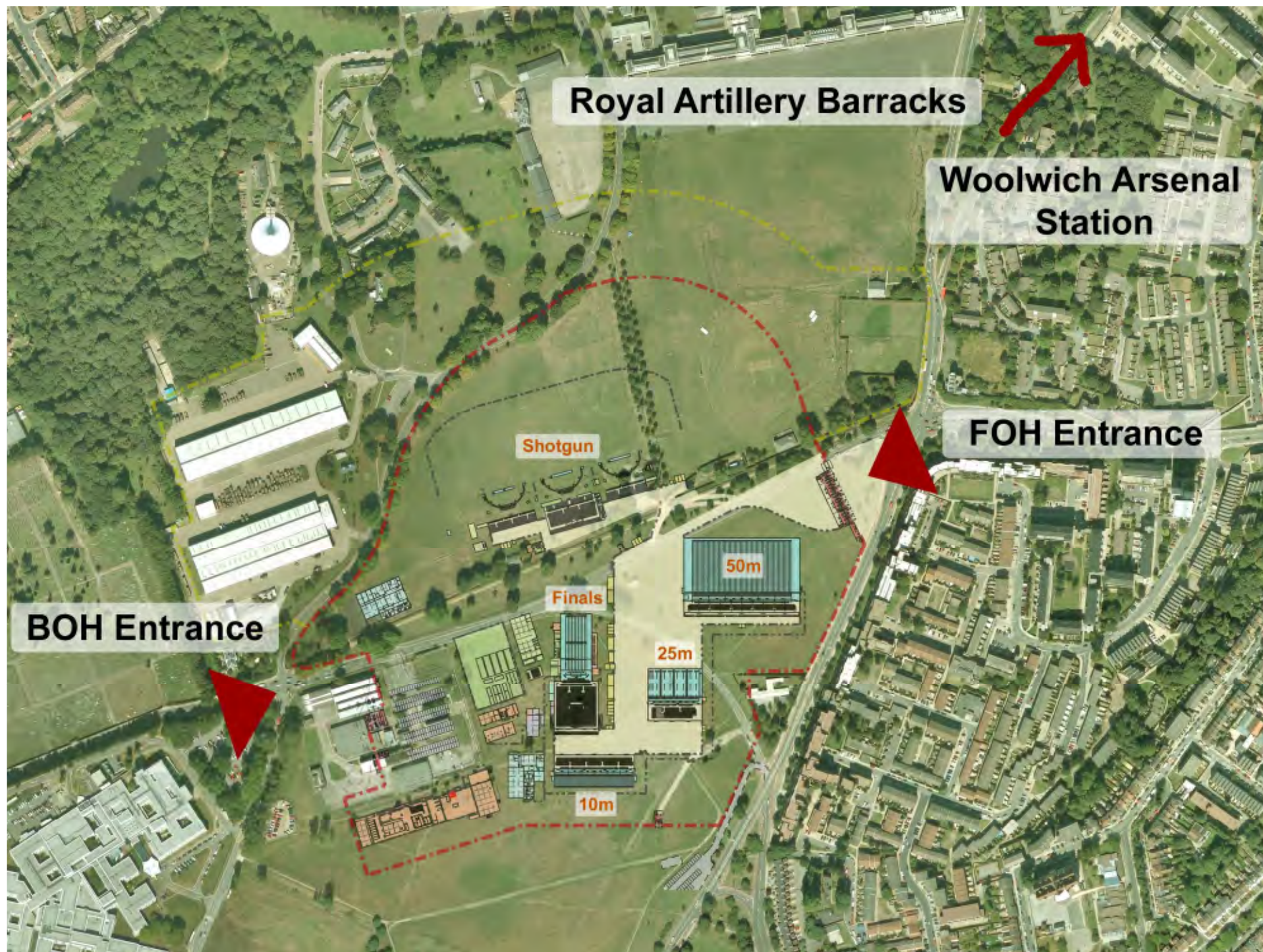
Client Review

The Royal Artillery Barracks









ODA Priority Themes

- Design and Accessibility
- Employment and Skills
- Equality and Inclusion
- Health and Safety
- Security
- Sustainability (Reduce – Reuse – Recycle)
- Legacy

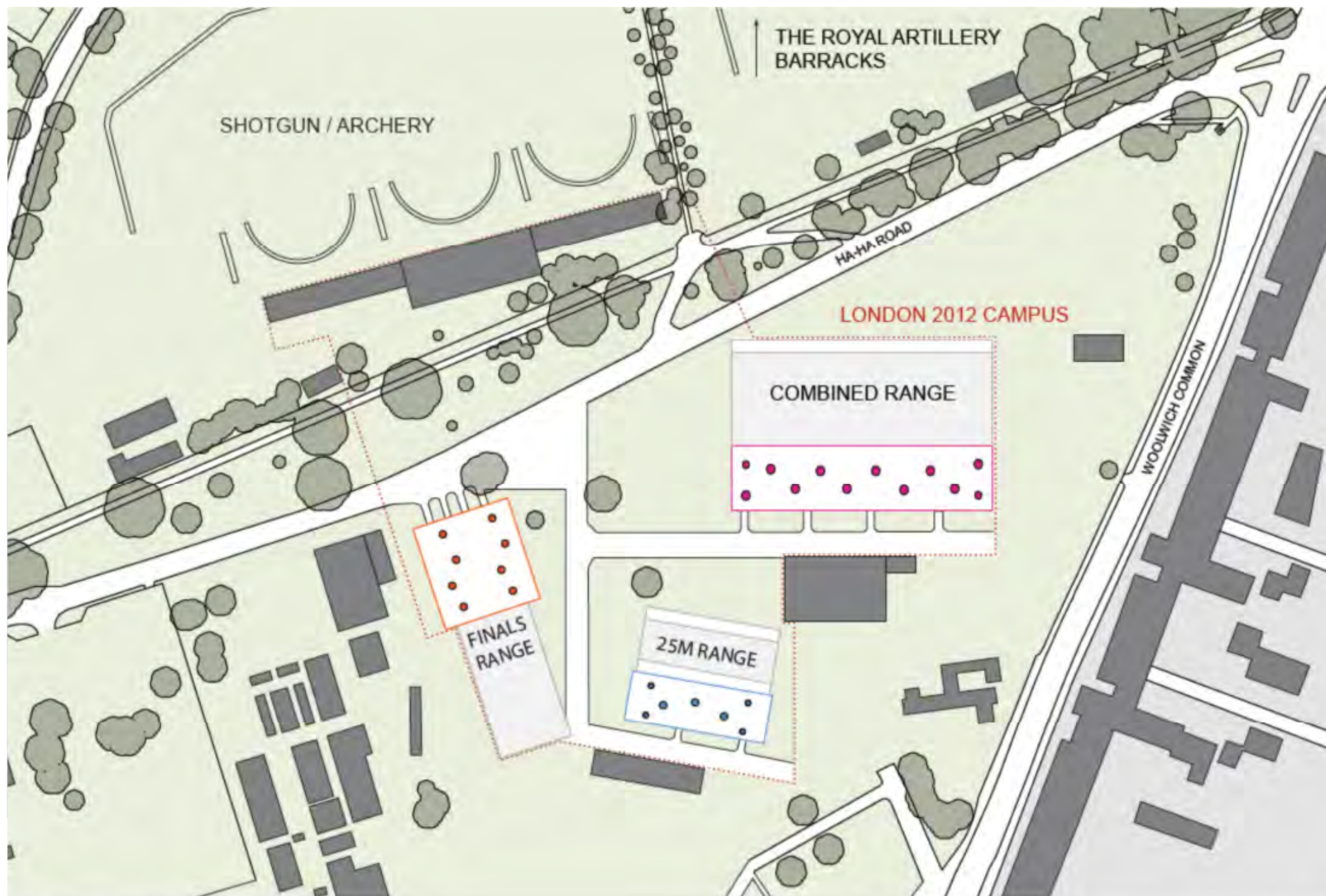
Sustainability & Legacy

"We are only committed to building permanent venues in the Olympic Park where there is a long term legacy use for them. That means adopting an innovative approach to temporary venues. We are looking for solutions that combine design flair and innovation with practicality and cost efficiency."

**Alison Nimmo, Director of
Design and Regeneration (ODA)**

Sustainability & Legacy

- Reduce
- Reuse
- Recycle

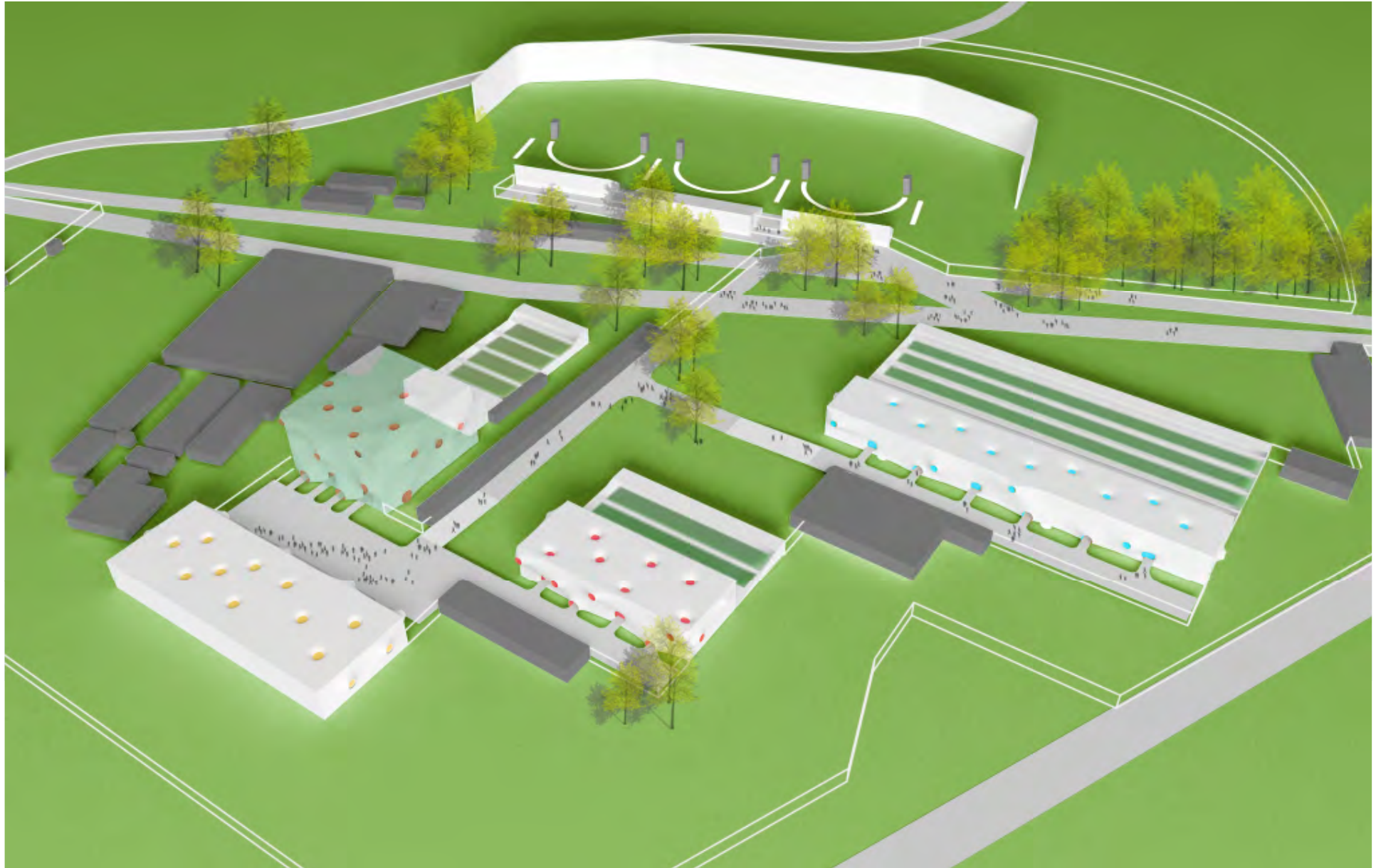


Siteplan

0 25 50 75 100m



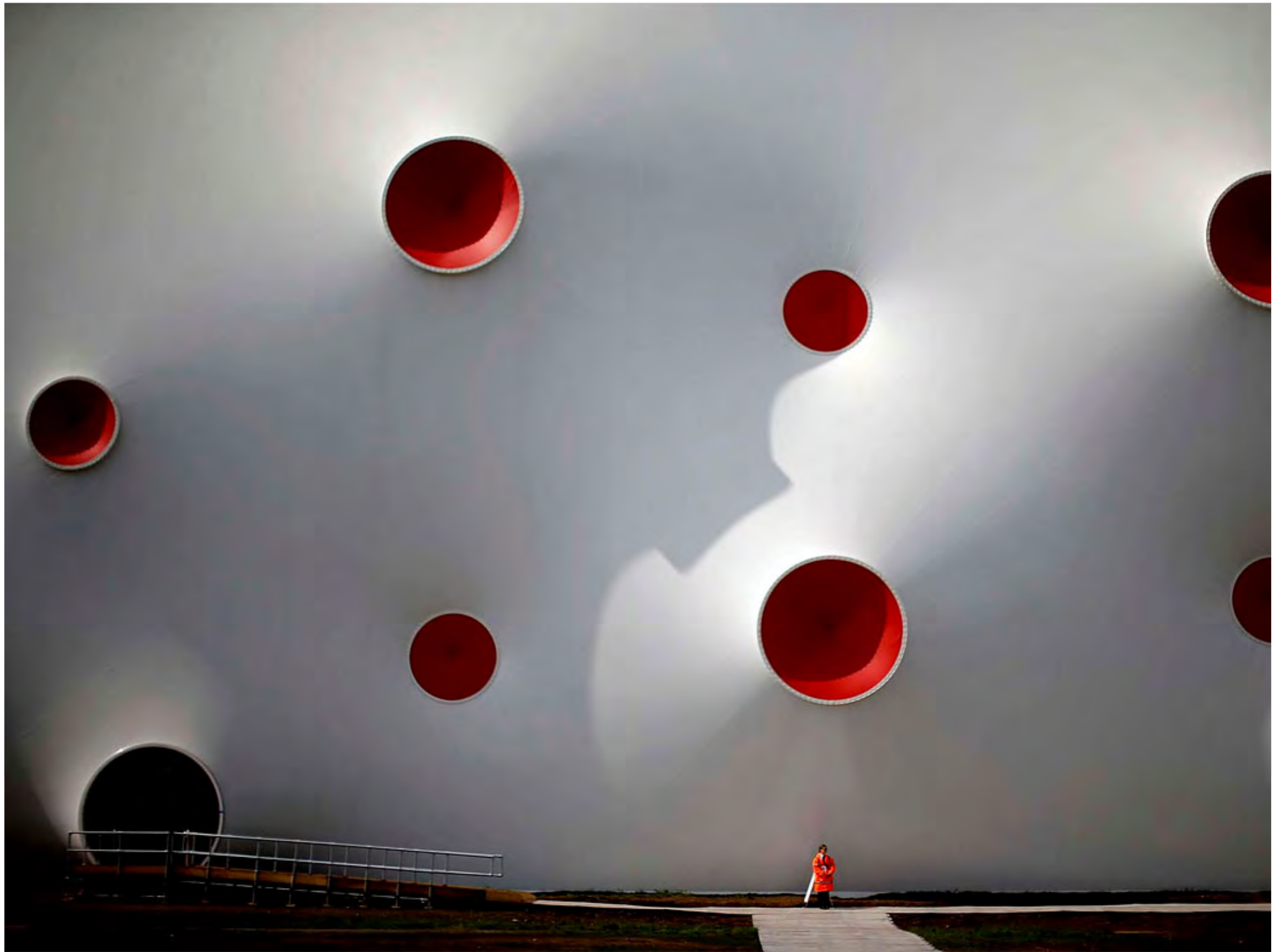
The Royal Artillery Barracks

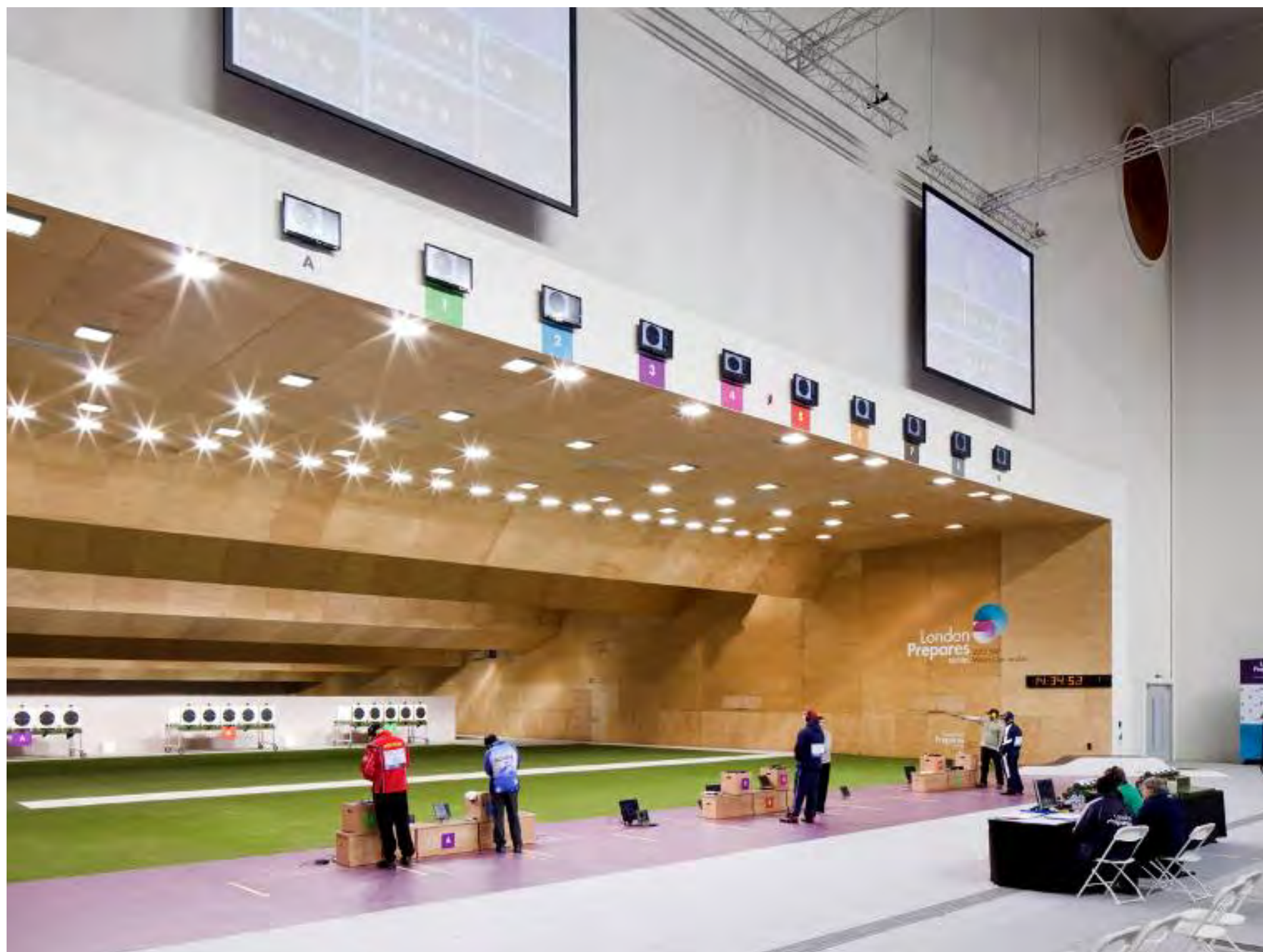




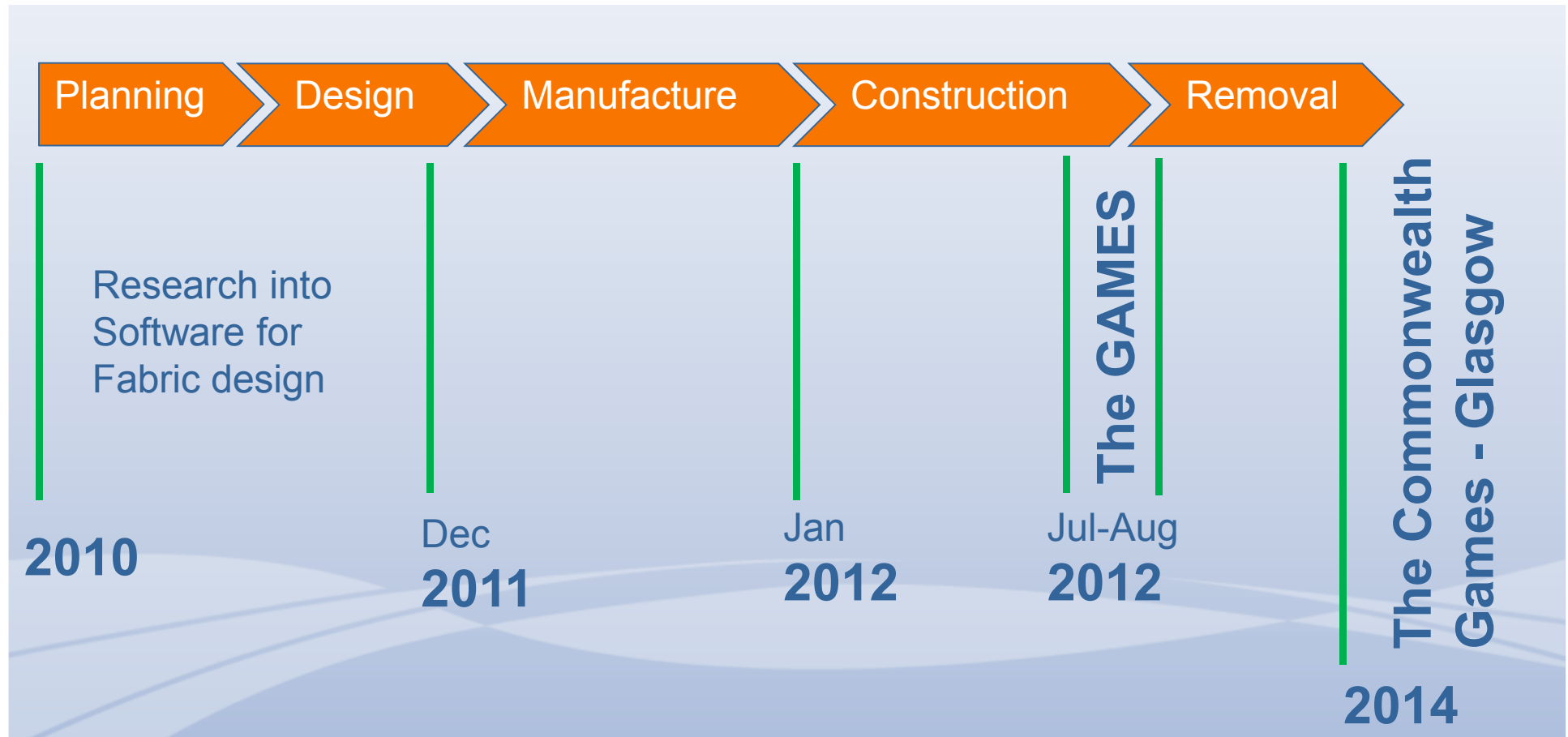


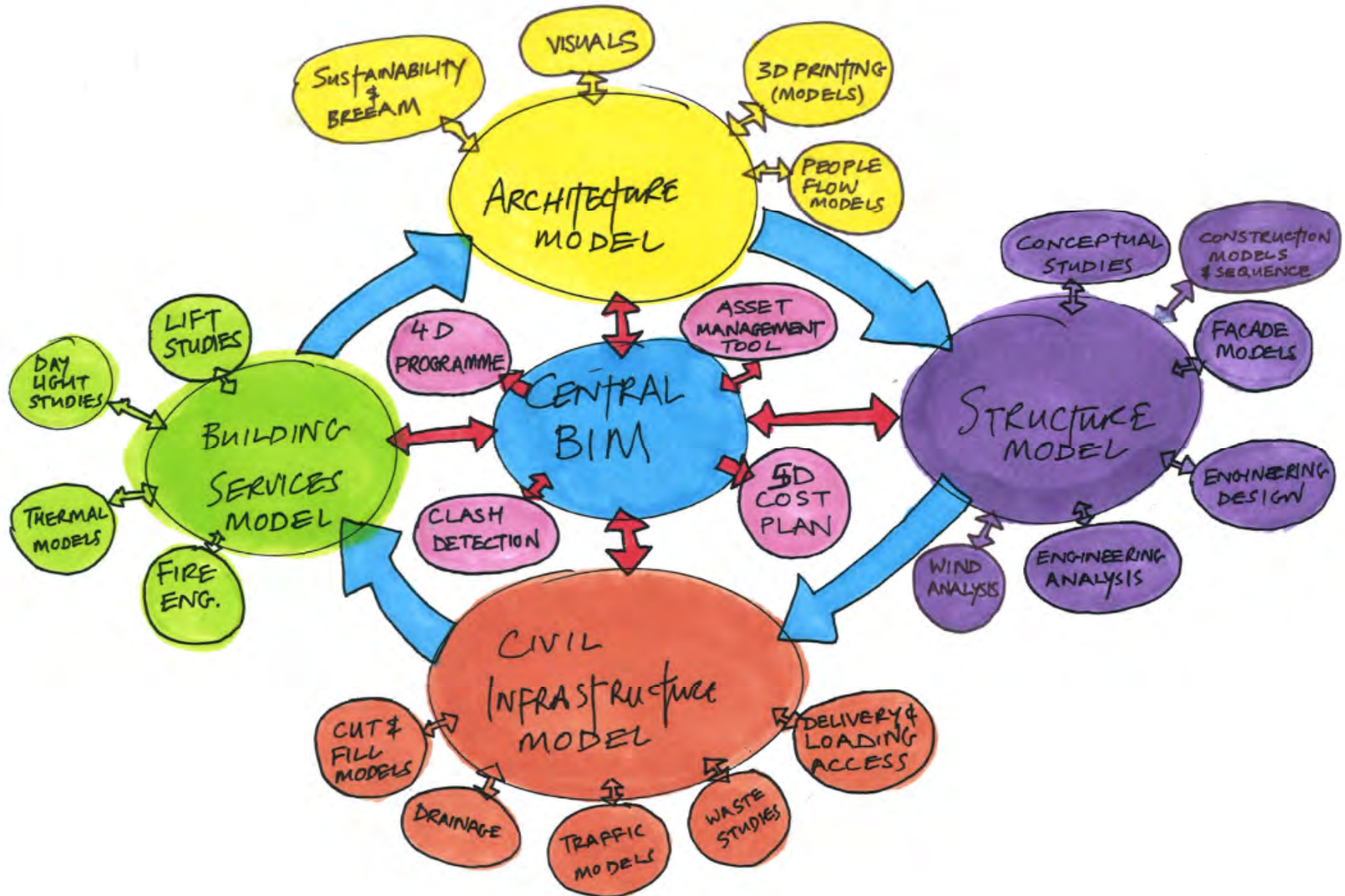




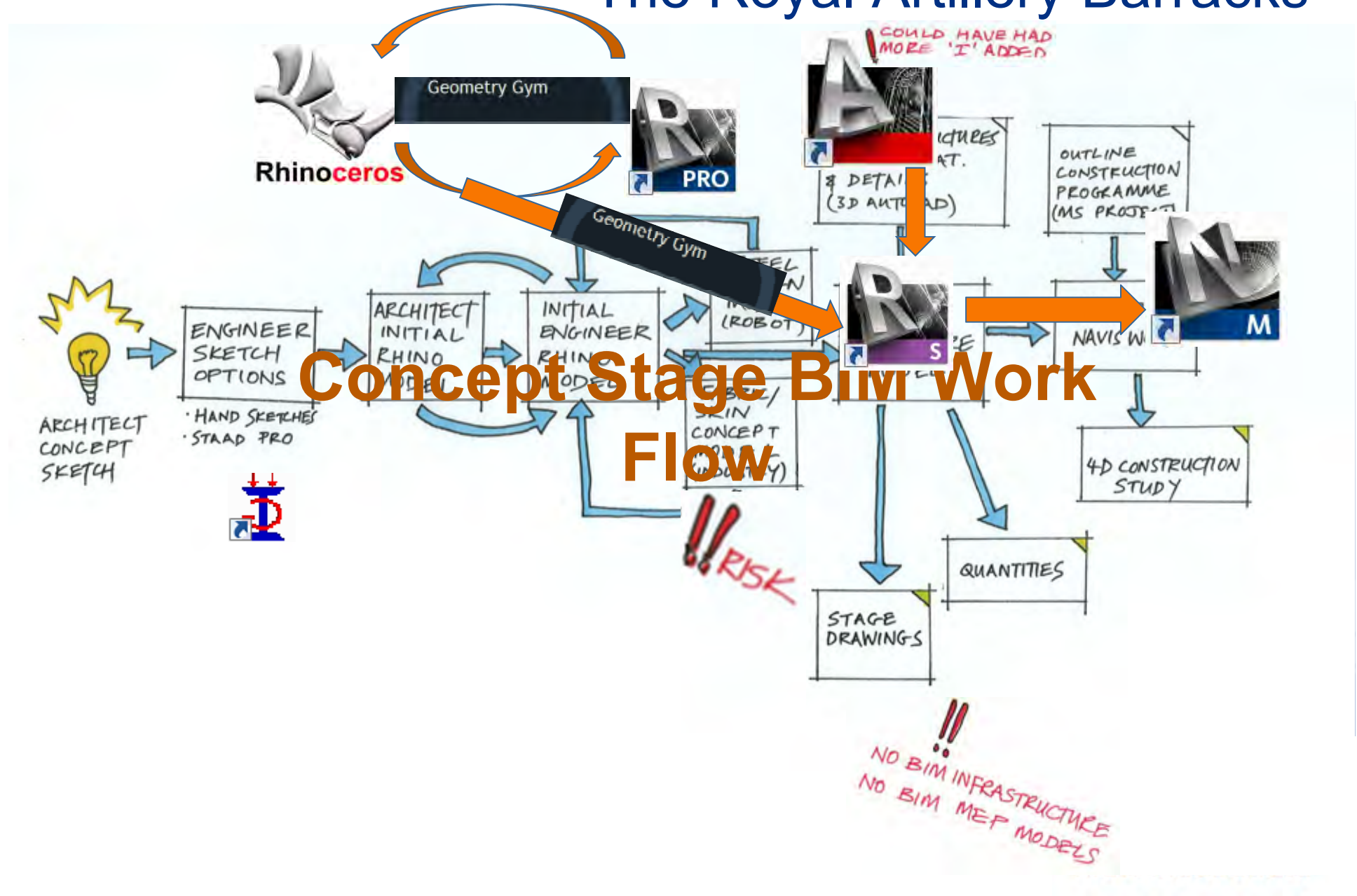


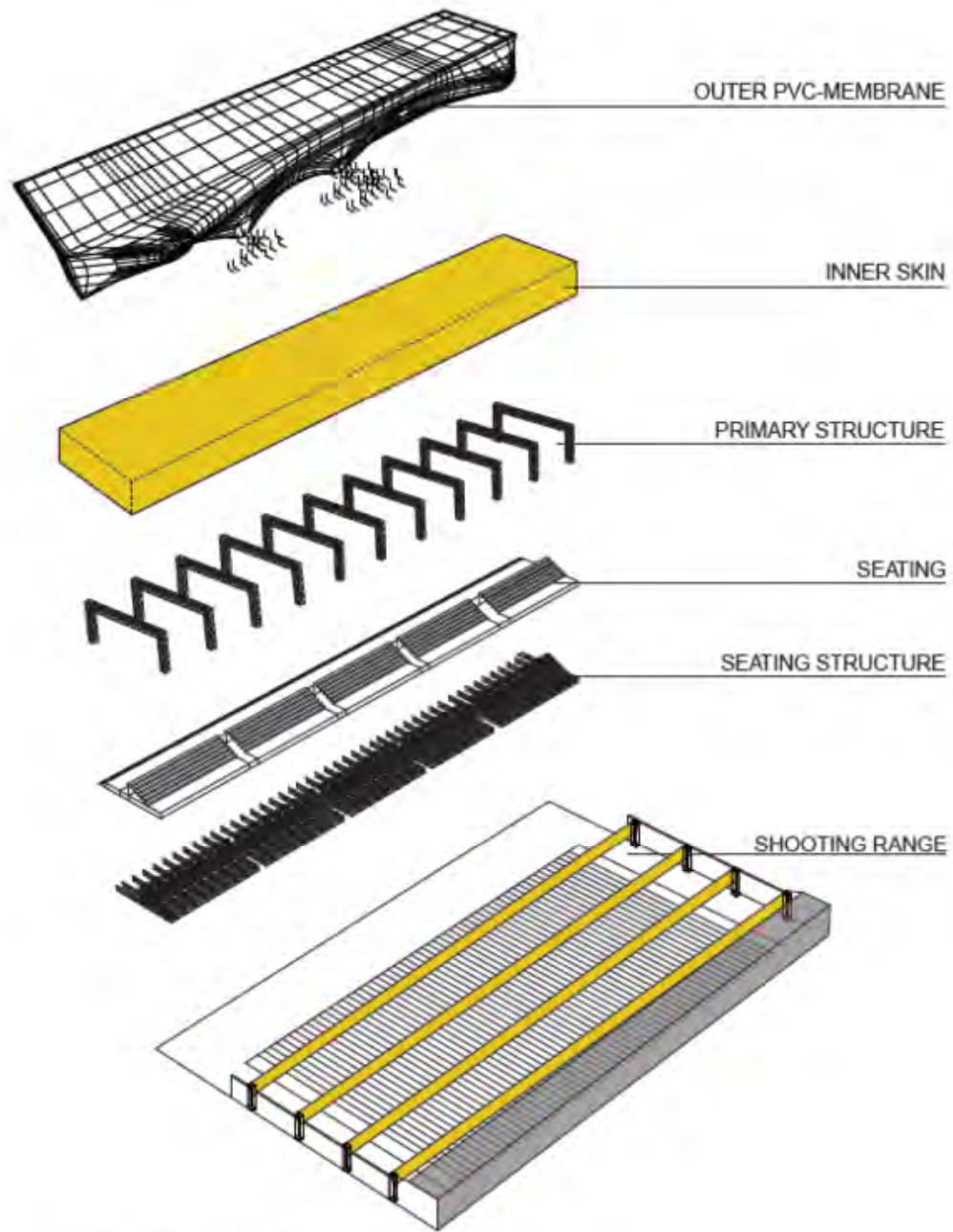
Successful delivery underpinned by BIM



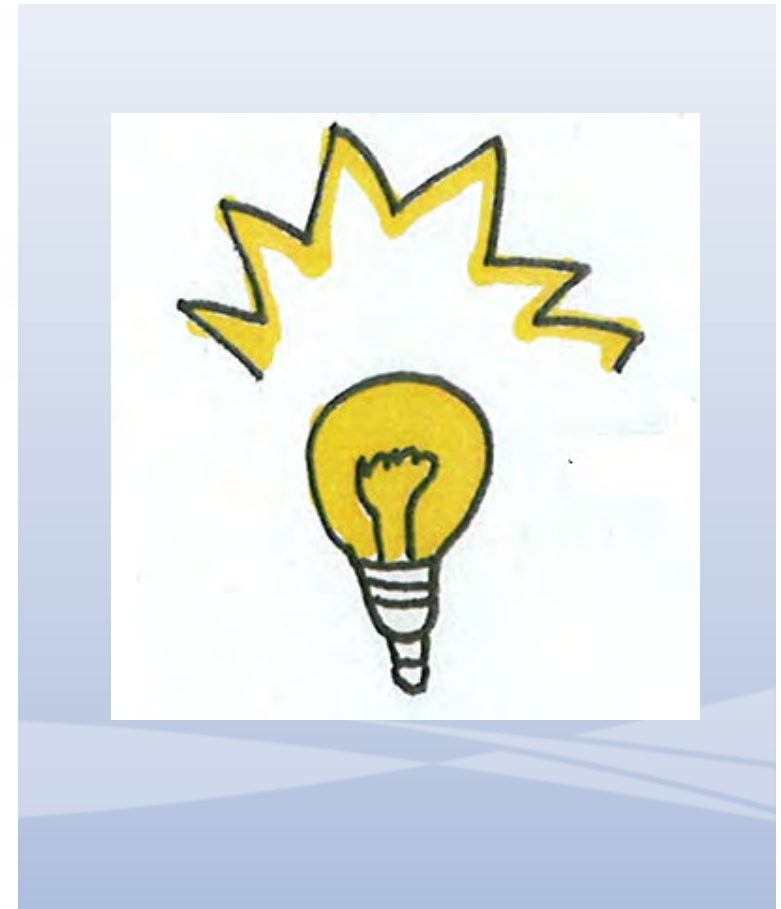


The Royal Artillery Barracks





AXONOMETRY



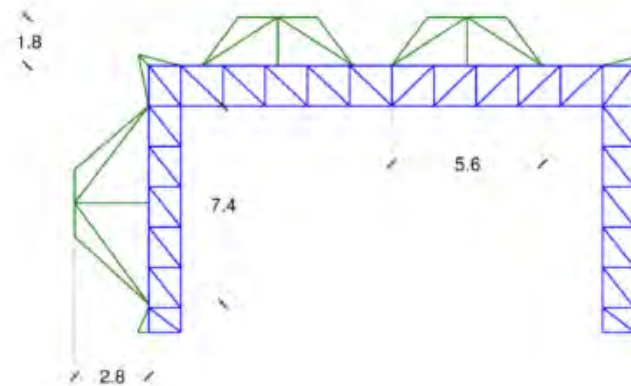
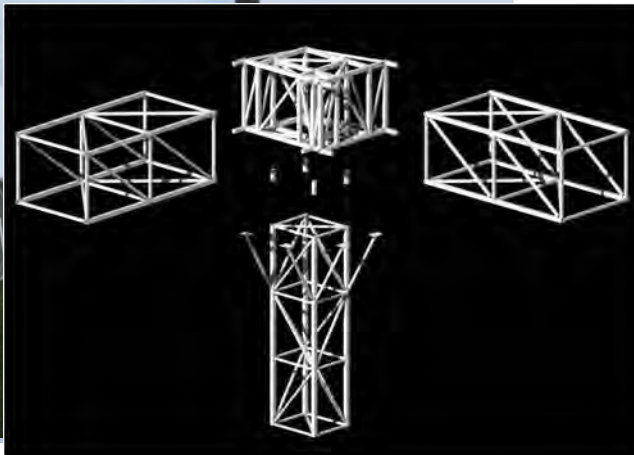
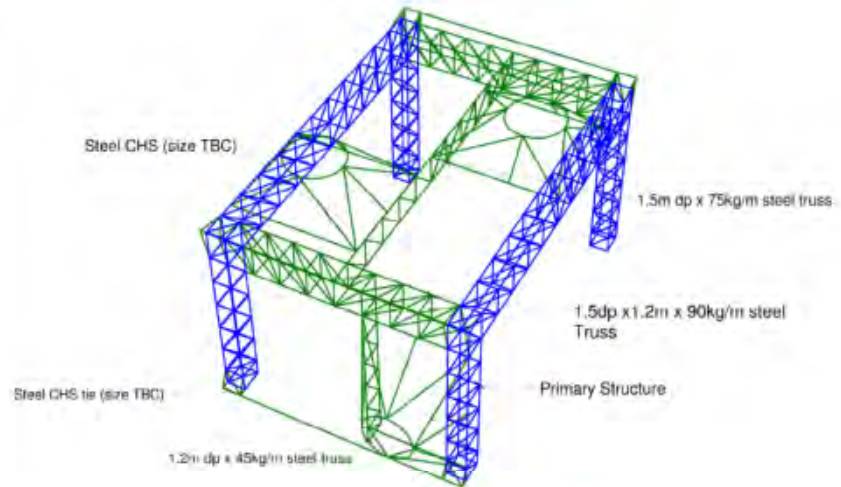
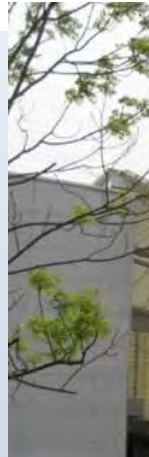
The Royal Artillery Barracks



ARCHITECT
CONCEPT
SKETCH

ENGINEER
SKETCH
OPTIONS

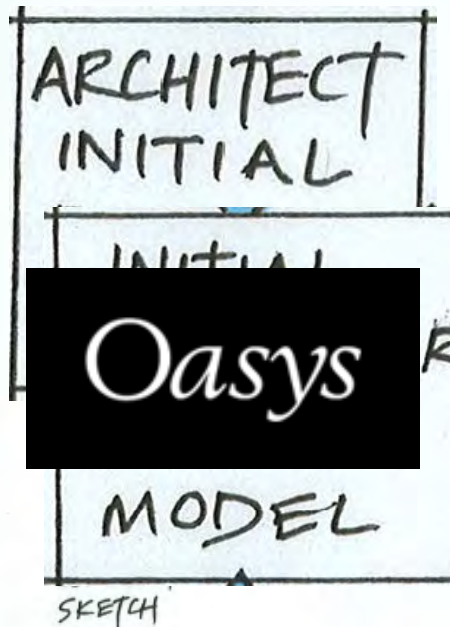
- HAND SKETCHES
- STAAD PRO



**DEMOUNTABLE / REUSABLE
STRUCTURE**



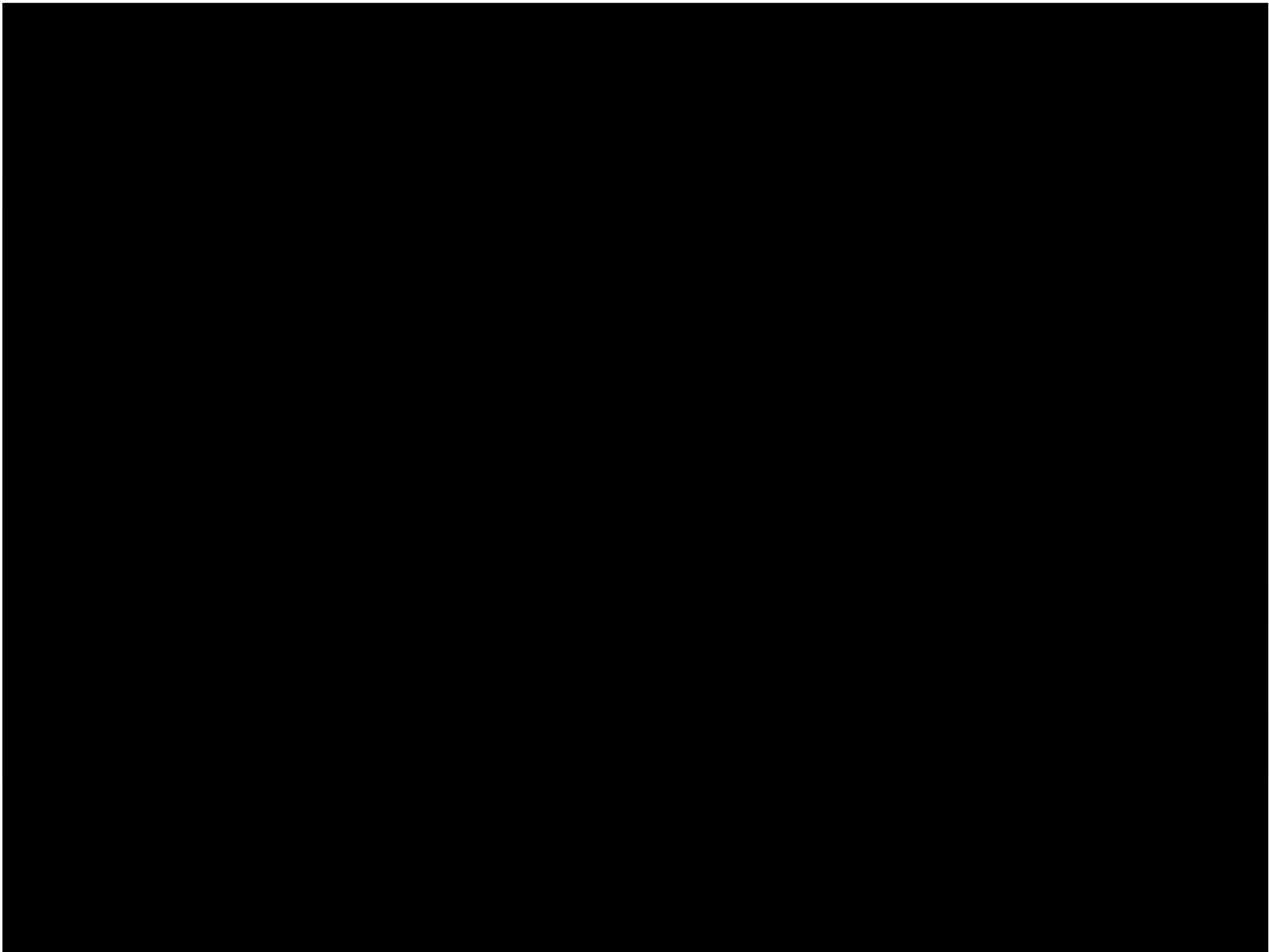
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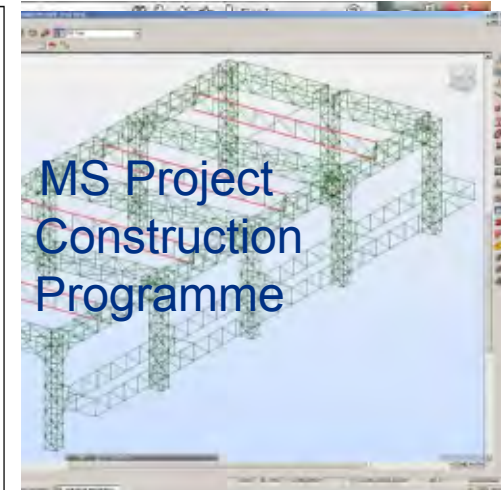
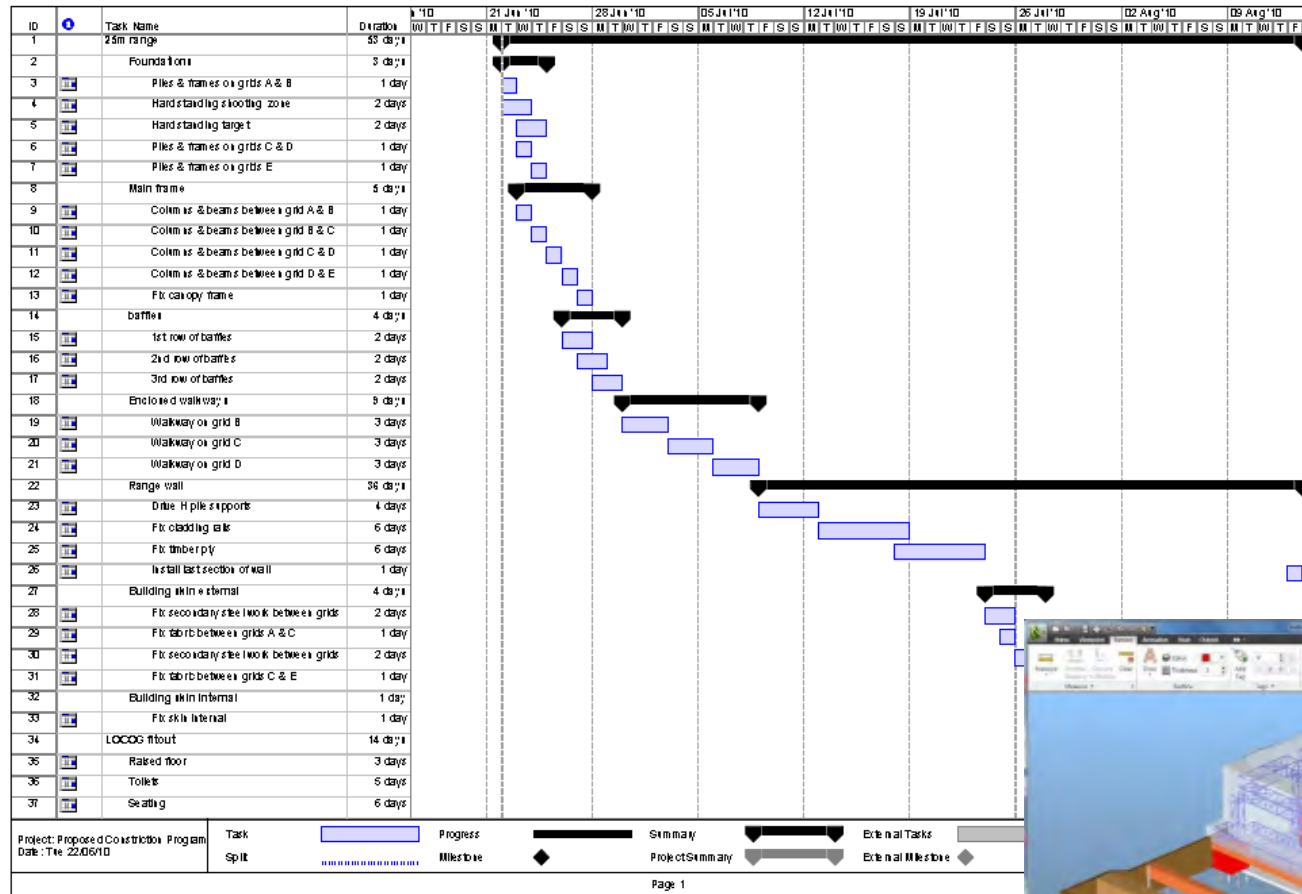
Rhino



Concept Stage BIM Work Flow



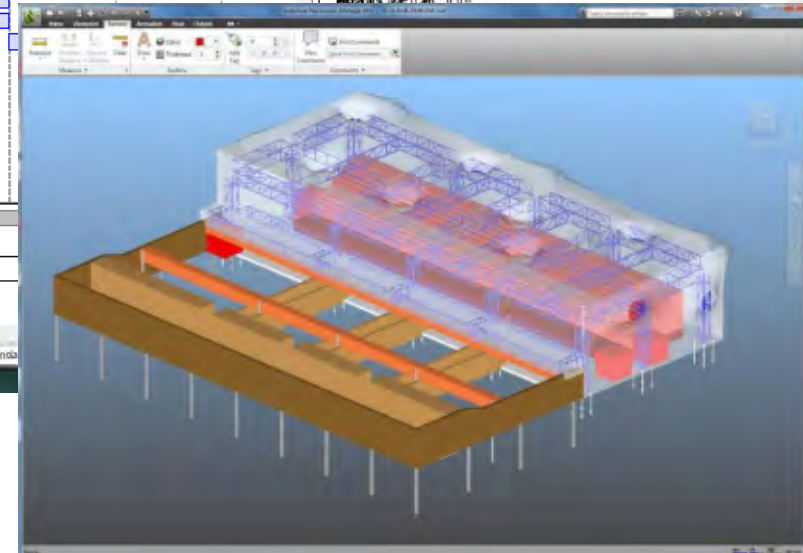
Concept Stage Workflow



MS Project
Construction
Programme



Exported to Robot

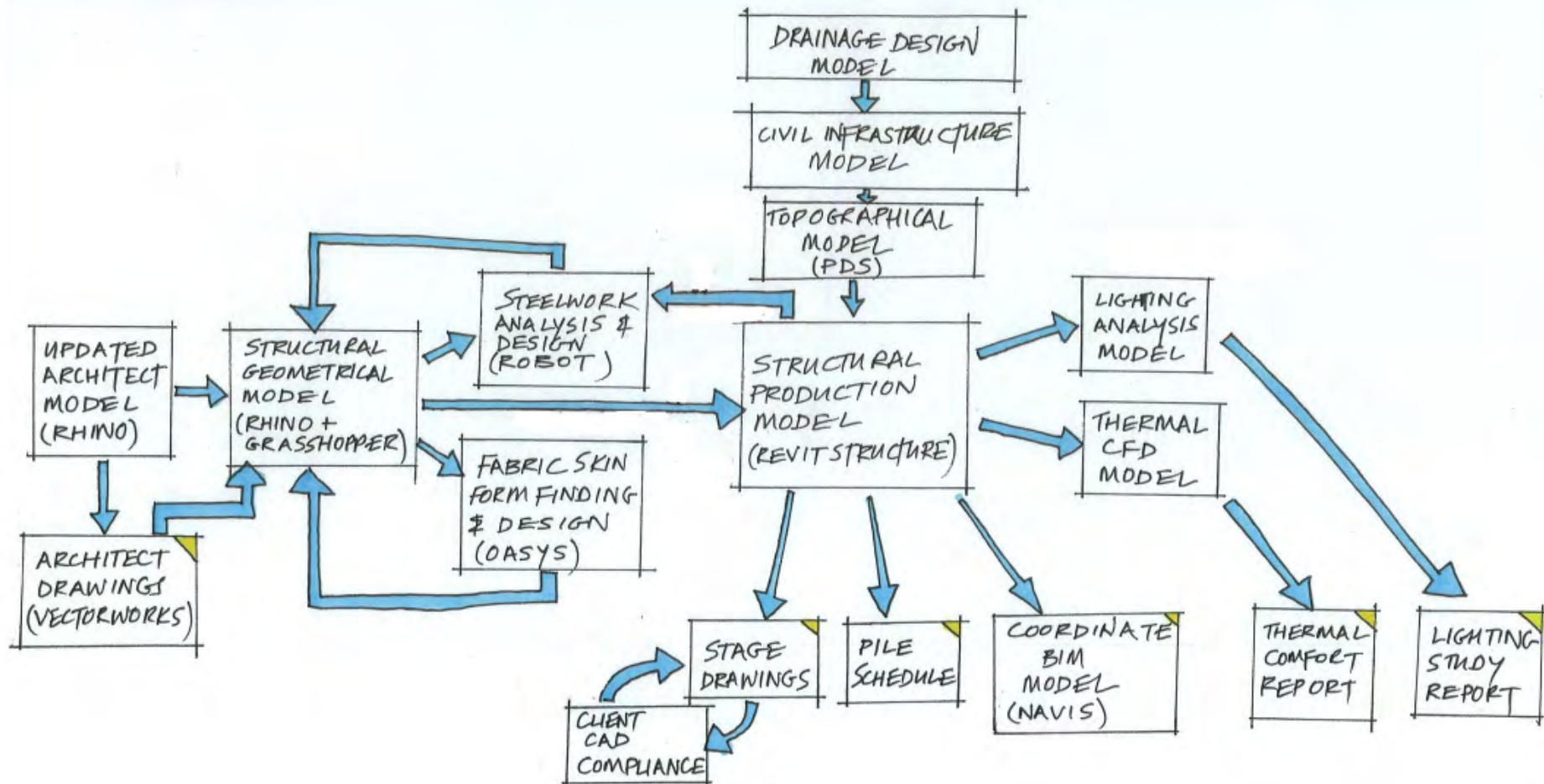


Revit

0.02215	0.02215 m³	194
2600mm Diameter	0.047 m³	367
2600mm Diameter	0.045 m³	512
3800mm Diameter	0.066 m³	518
3800mm Diameter	0.188 m³	849
L90x90x8	0.137 m³	1074
L100x100x10	0.036 m³	285
PFC288x88x38	0.018 m³	143
U/C152x152x23	0.018 m³	127
U/C203x203x60	1.483 m³	11482
U/C305x305x67	1.585 m³	12444
Grand total 3431	9.989 m³	78259

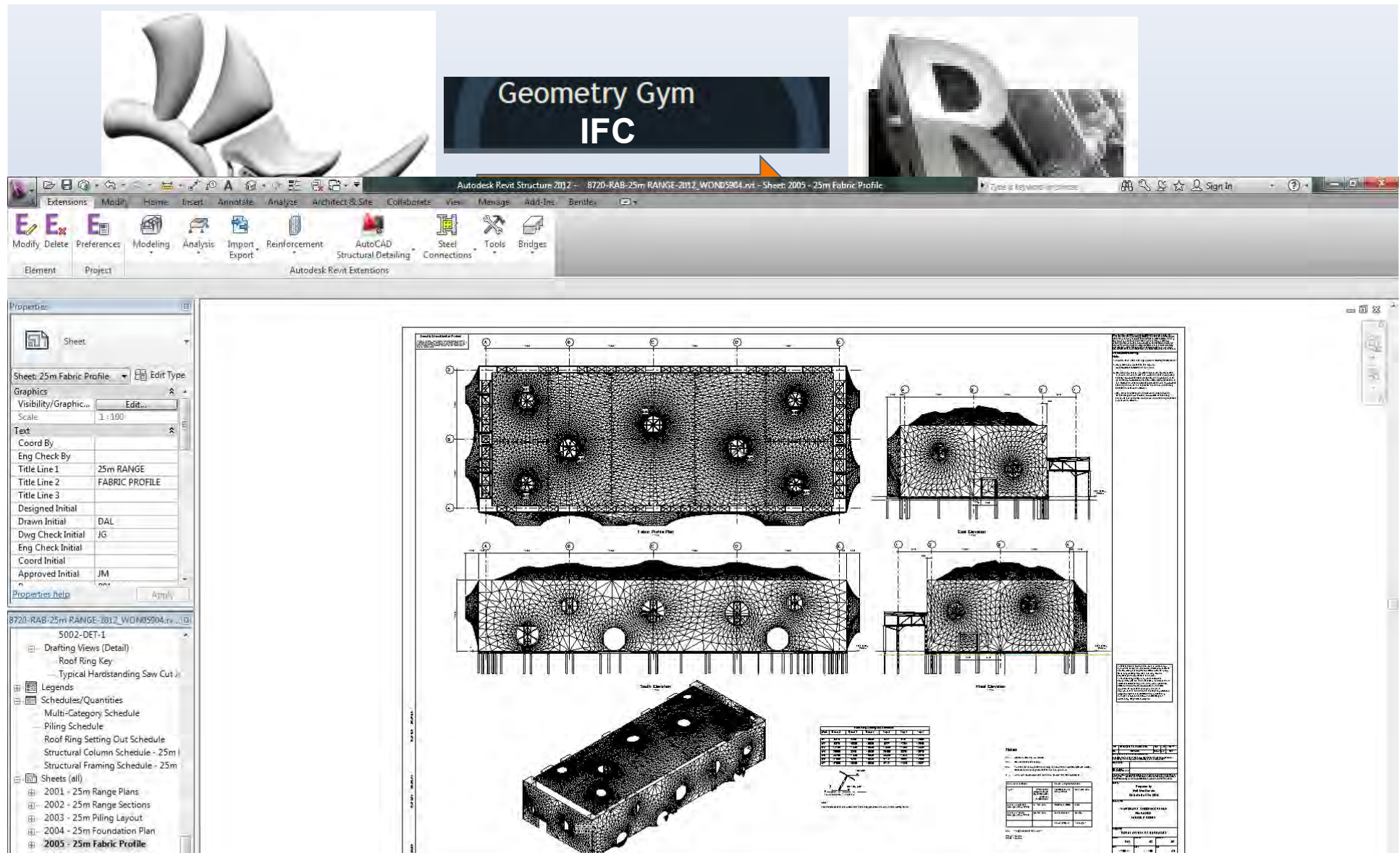


The Royal Artillery Barracks

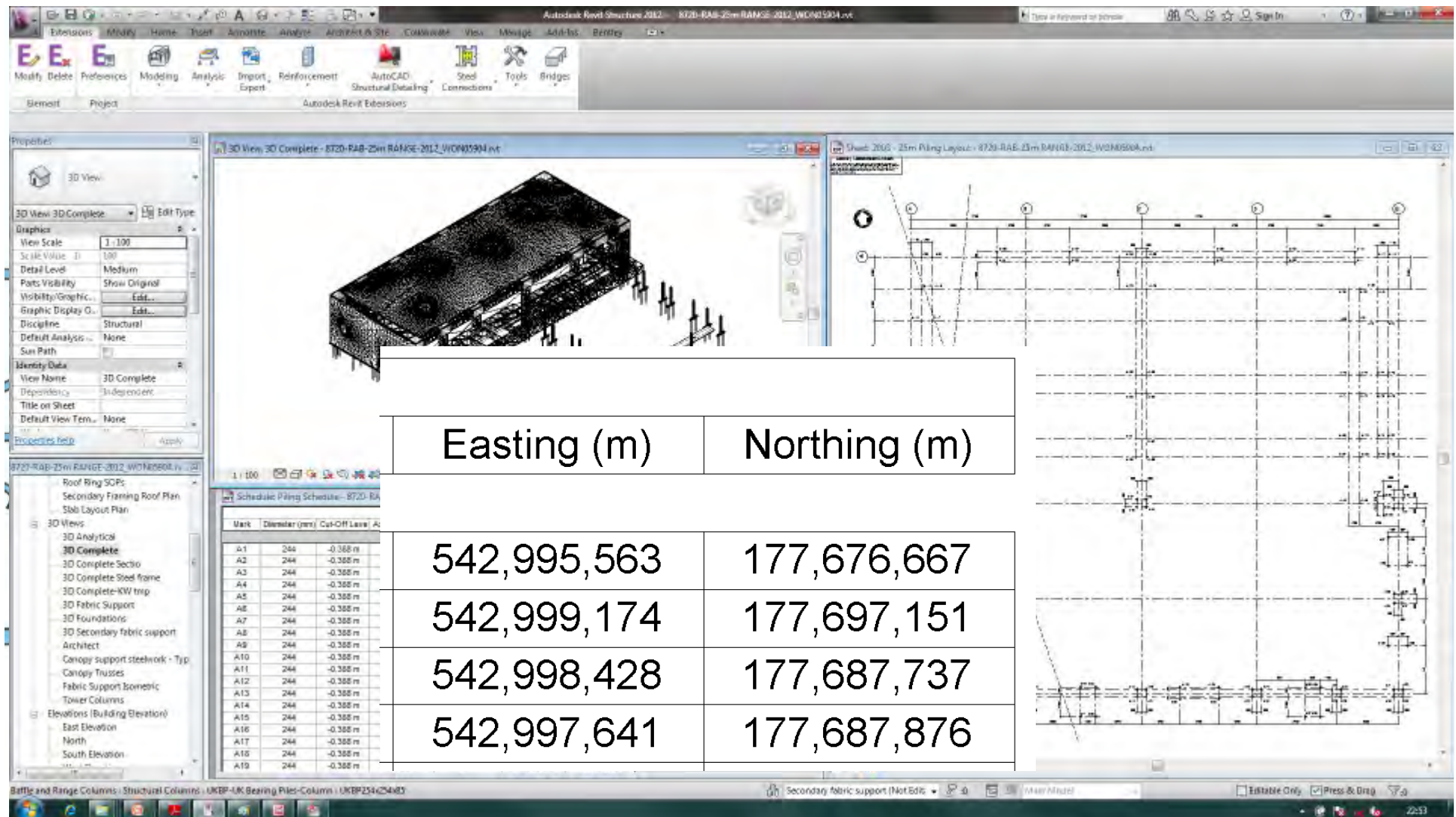


Detailed Design Stage BIM Work Flow

The Royal Artillery Barracks

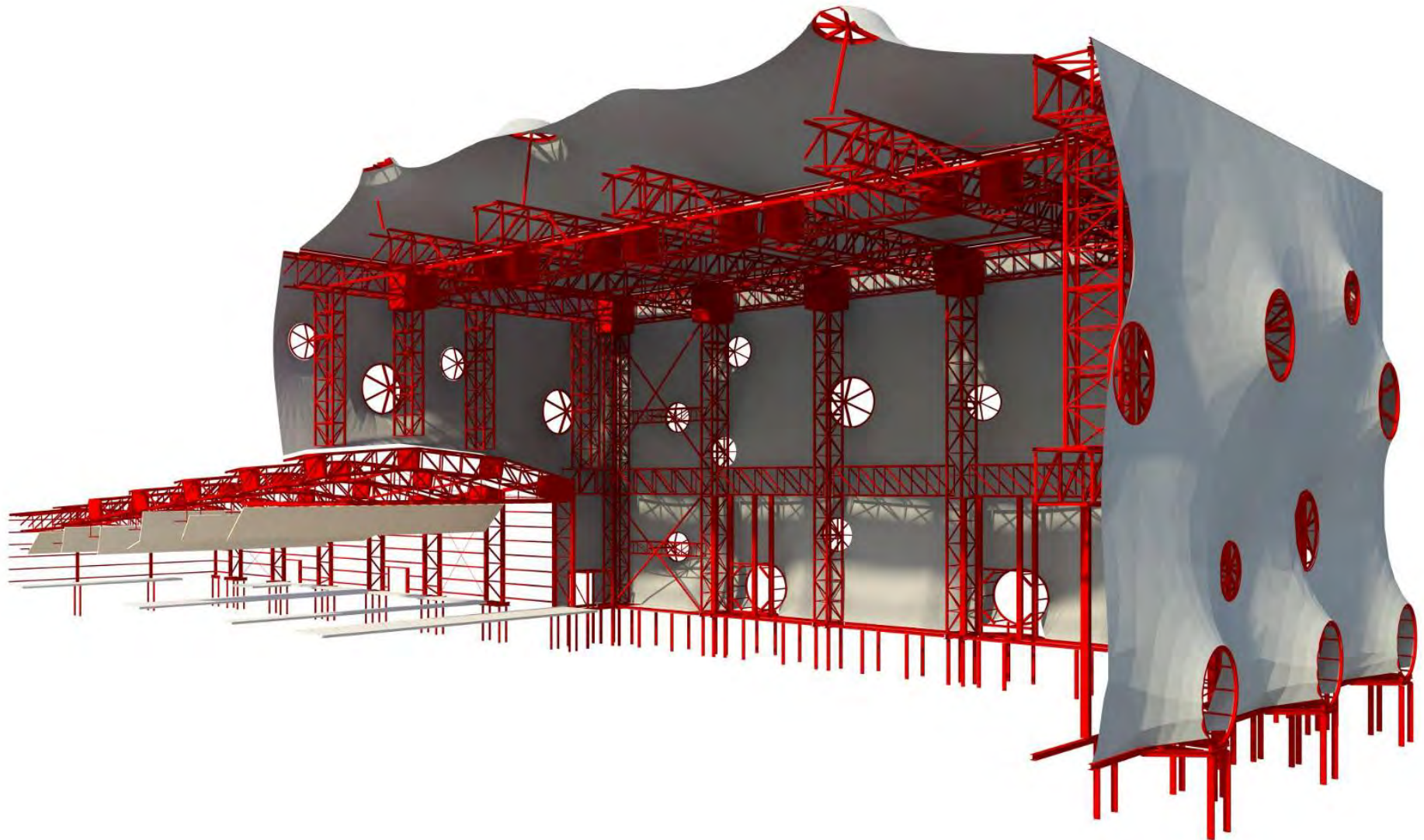


The Royal Artillery Barracks

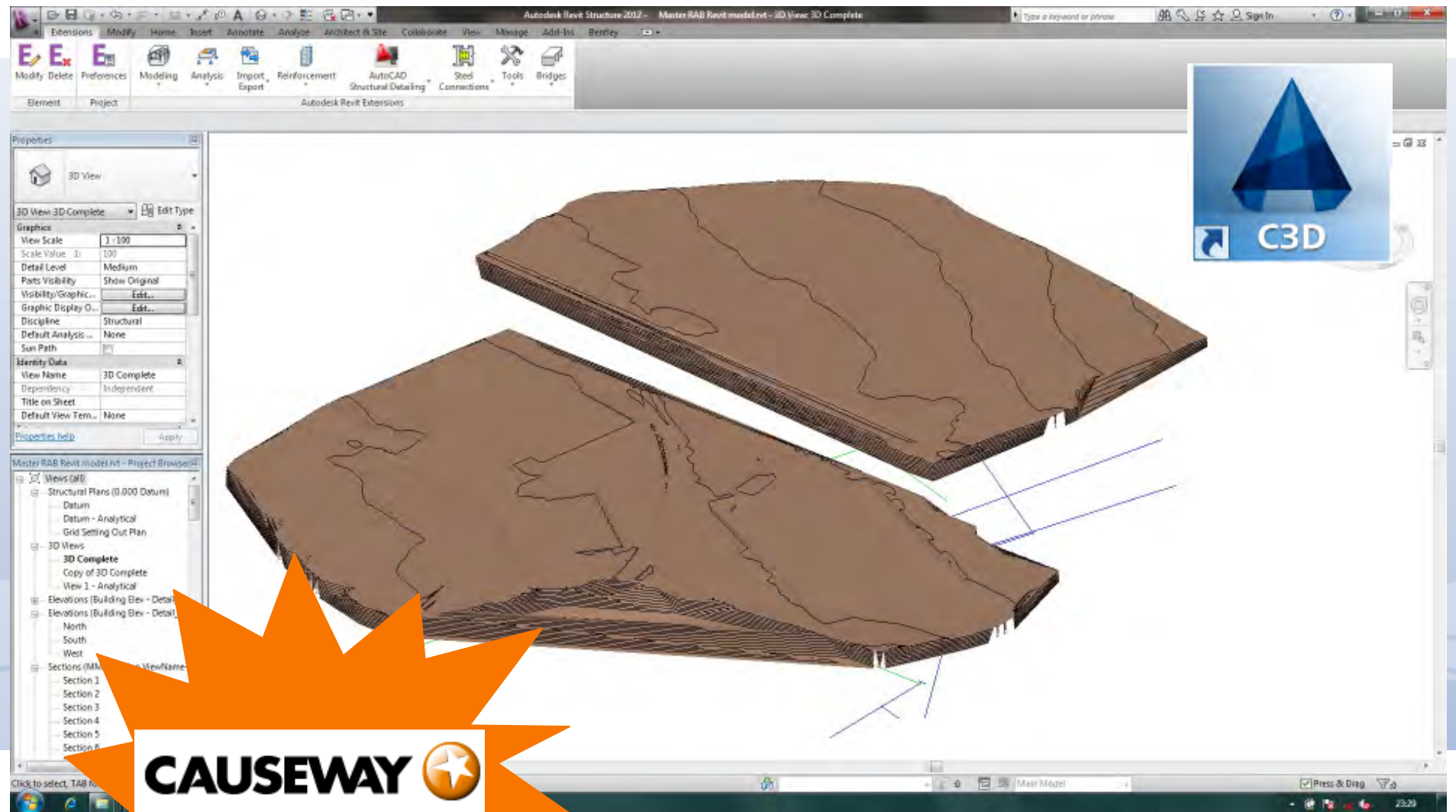


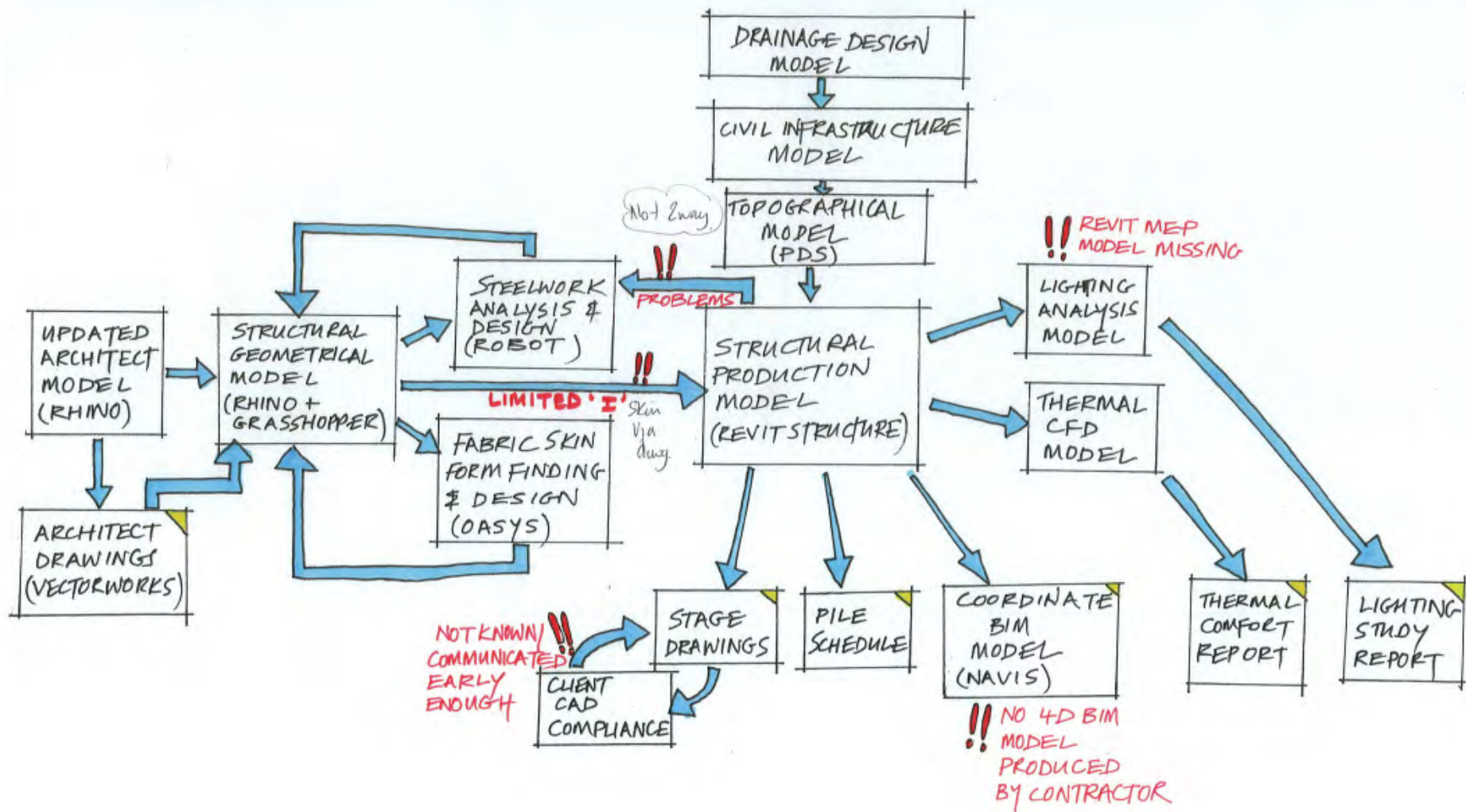
Detailed Design Stage BIM Workflow

Finals Range Revit Structure Model



Topographic Profiling





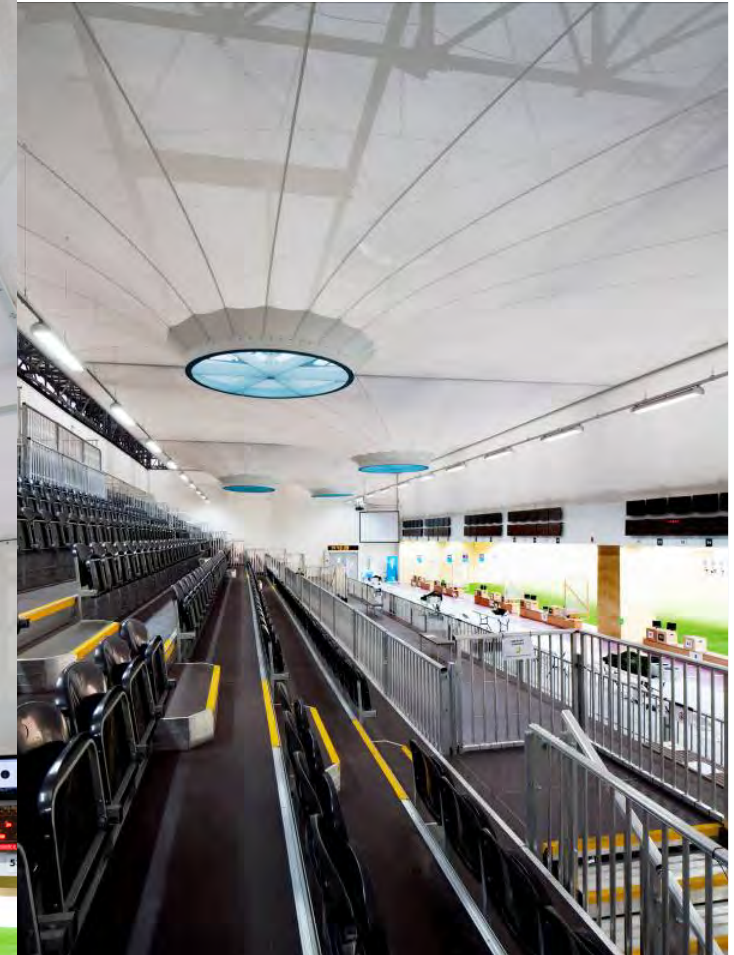
Sustainable Foundation Solution



Internal Environment - Head Rings

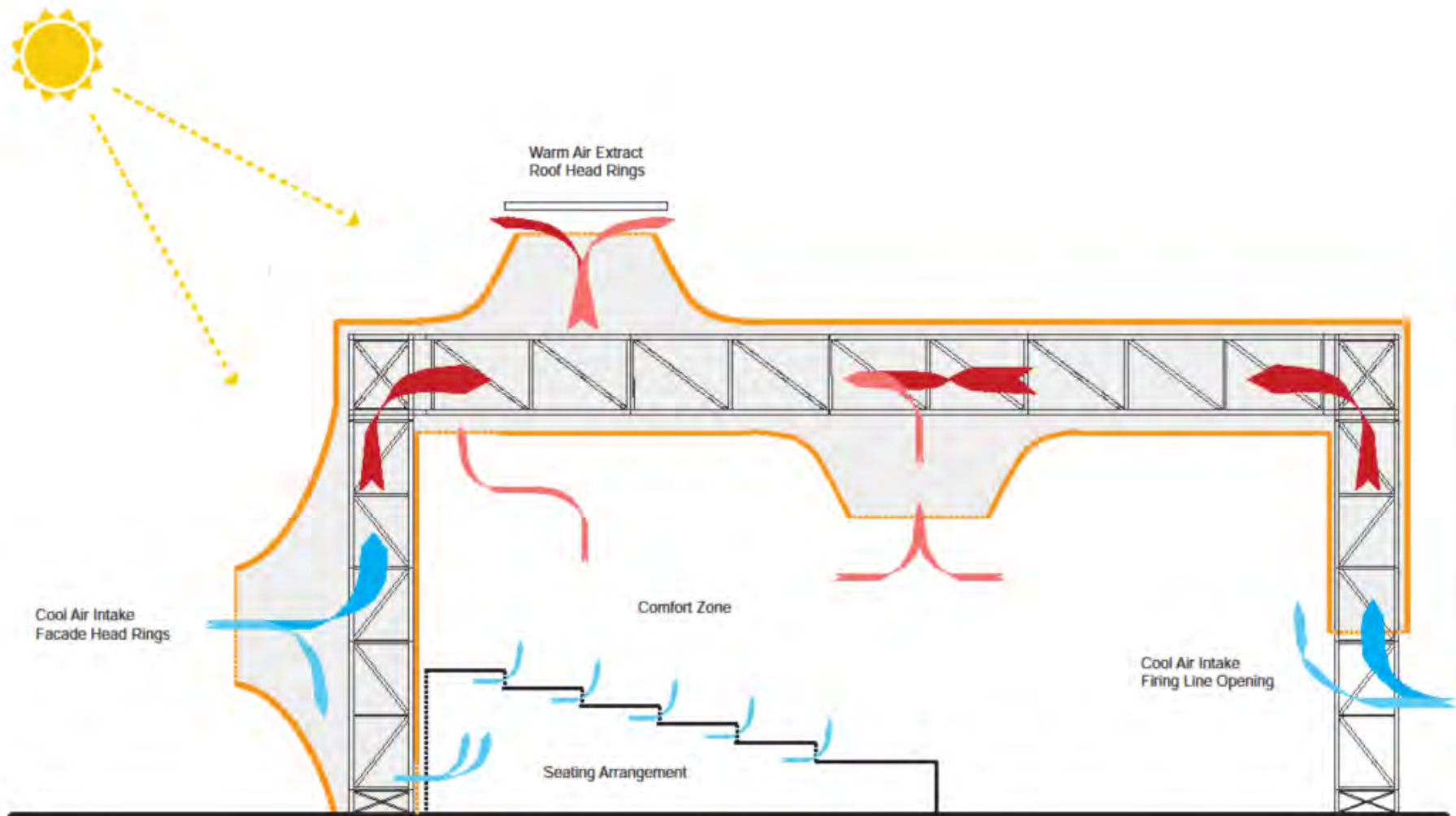


Double Skin




Mott MacDonald

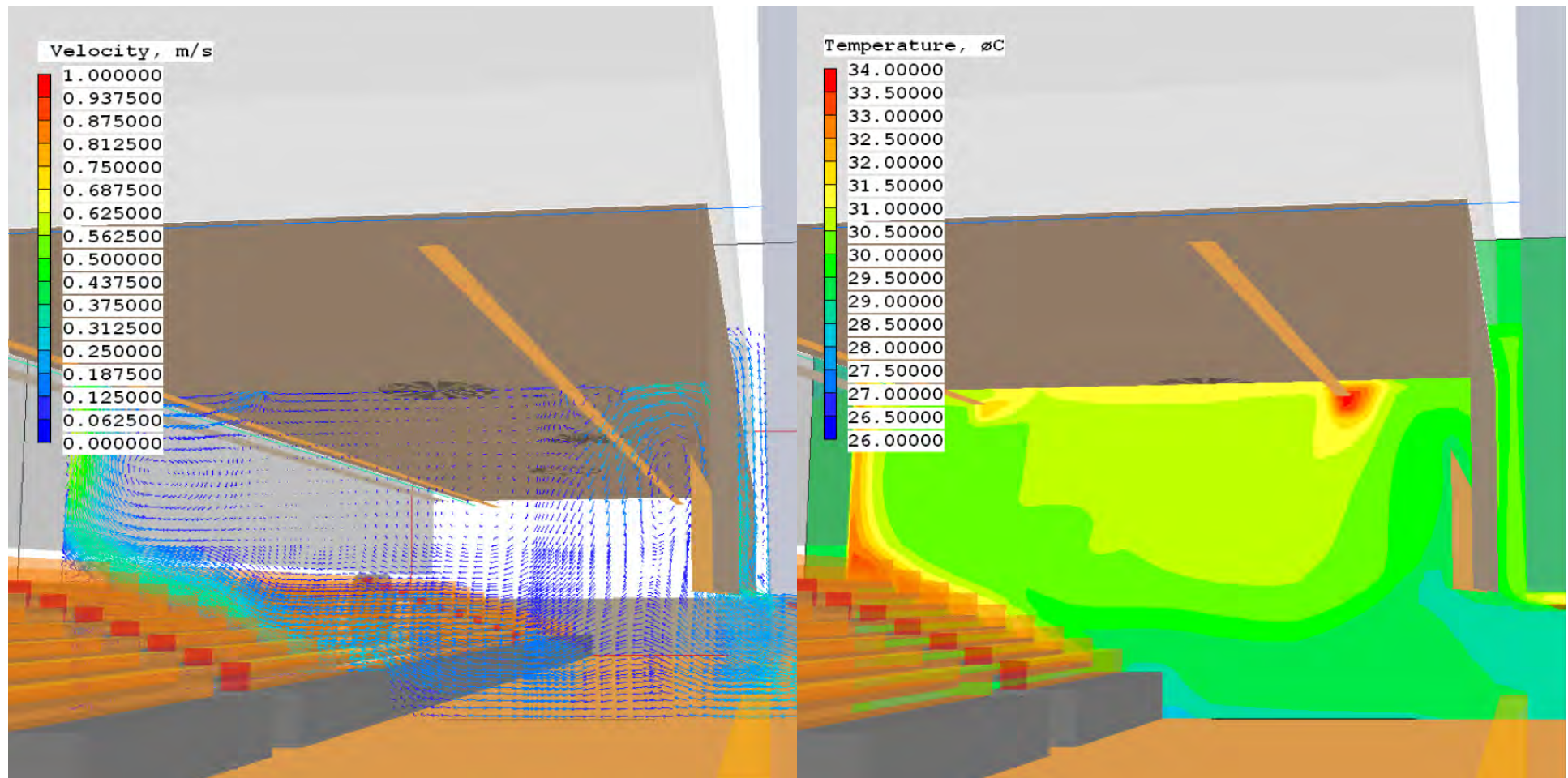
Ventilation



The Royal Artillery Barracks



Ventilation



The Royal Artillery Barracks

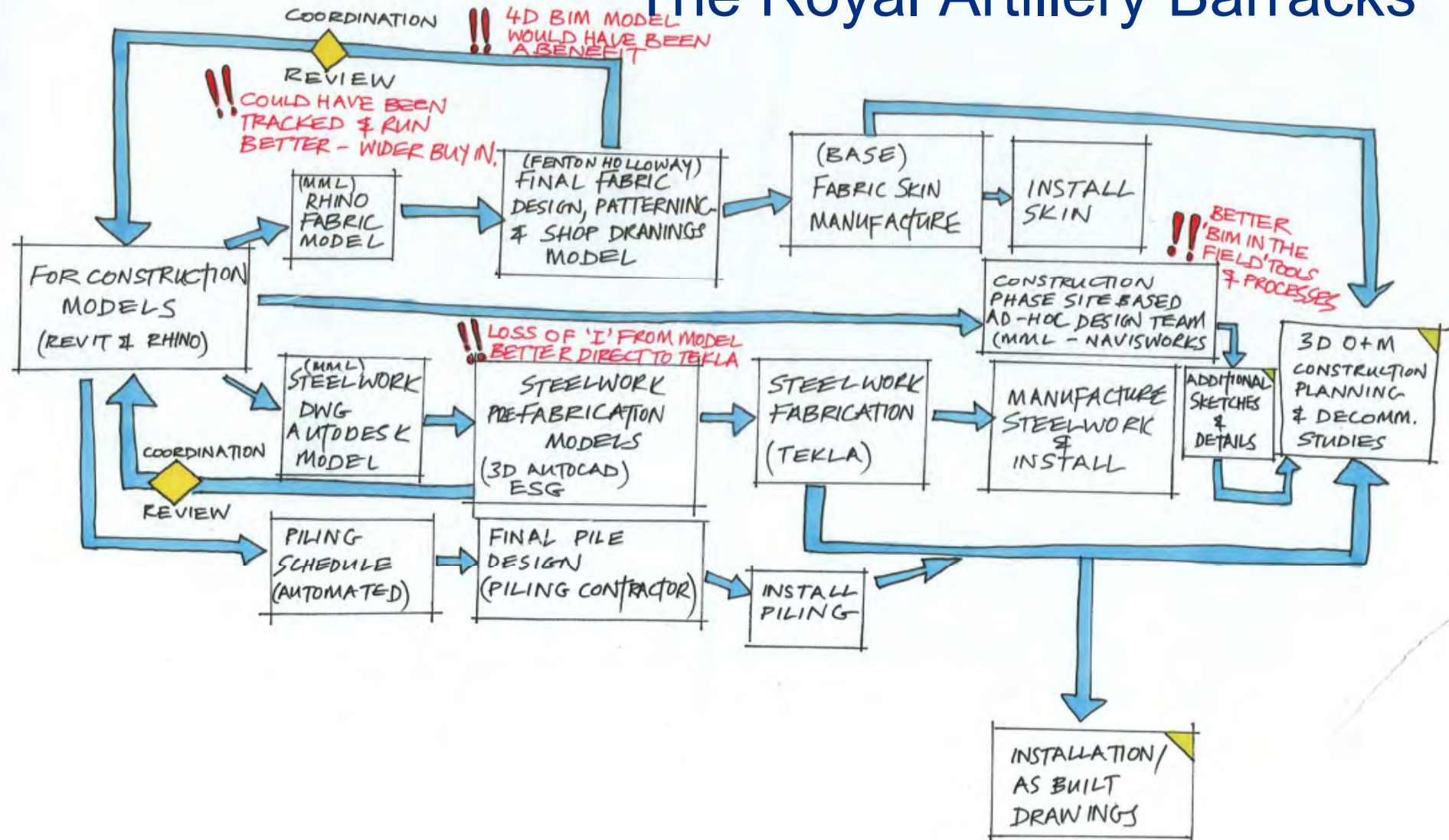


Revit formed the bases for Internal Lighting and visualisations

Detailed Design Stage BIM Work Flow

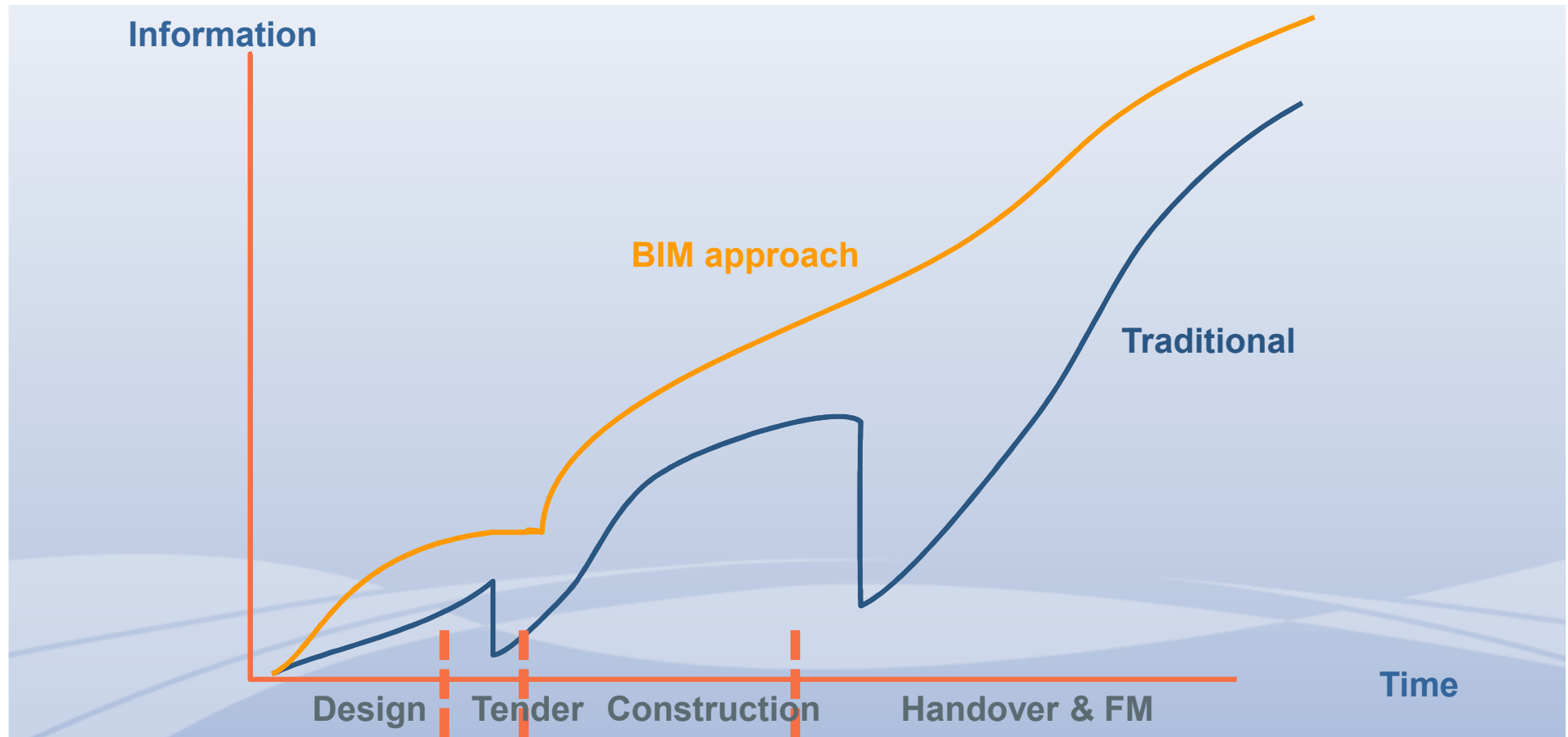


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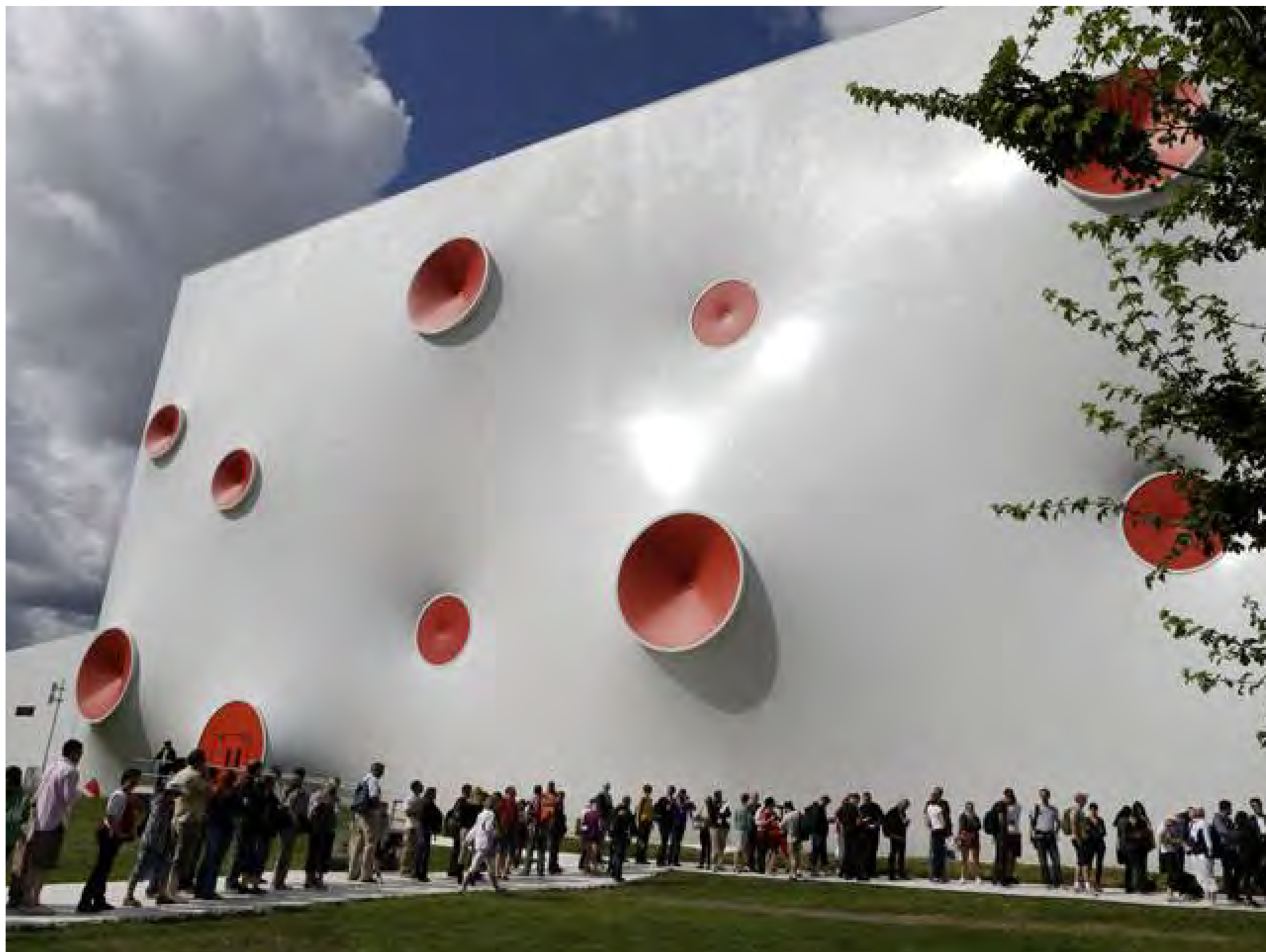


Manufacture and Construction
BIM Work Flow

Building knowledge











The Royal Artillery Barracks



Where did they go?

Finals Range

- back in rental market

25m and combined range now sold

- in storage for reuse

Fans

- contractor
buyback

Oil pipes (piles)

- contractor
buyback

Plywood

- recycling centre in Hackney / contractor reuse

Lighting

- contractor
buyback

Stone

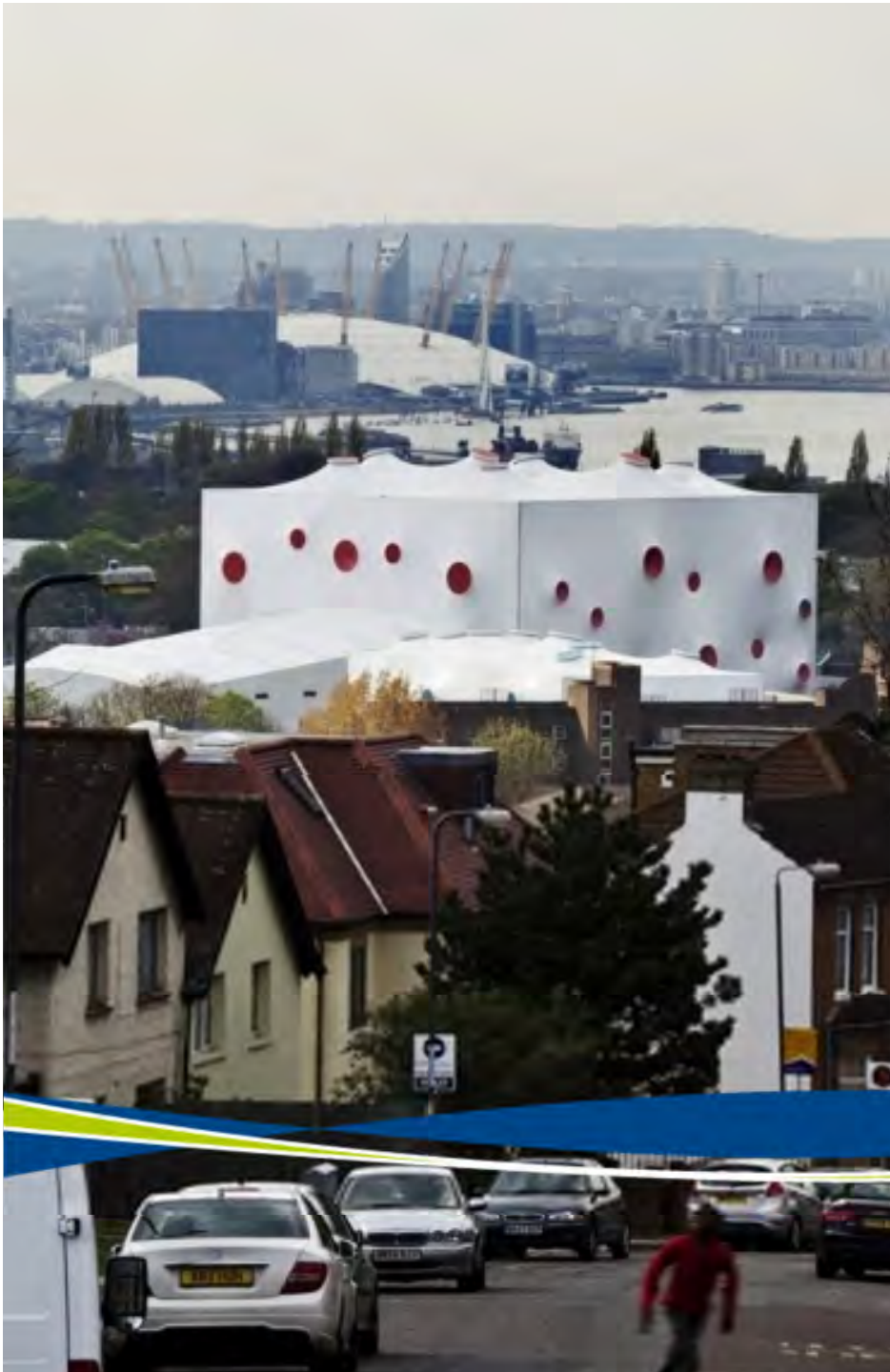
- locally
recycled

All soil

remained on site



Questions and Discussion



Mott MacDonald

www.mottmac.com