





# Creating the Next Generation of Integrated Teams

Construction Clients Group - Auckland  
25 September 2012





-  **Introduction**
-  **IPD – Process Outline**
-  **Culture – Change Management**
-  **The Future**

# What is Integrated Project Delivery?

**IPD – is a project delivery approach that:**

- **integrates people, systems, business structures and practices** through all phases of design, fabrication, and construction
- **Harnesses talents** and insights of all participants
- **Optimizes project results:**
  - increases value to the owner,
  - reduces waste,
  - maximizes efficiency

# What is Integrated Project Delivery?

	Traditional	"IPD-ish"	"Pure" IPD
Team Organization	<ul style="list-style-type: none"> <li>• Hierarchical</li> <li>• Sequential addition "as needed": architect, then engineer, then contractor, then fabricator, etc</li> </ul>	<ul style="list-style-type: none"> <li>• Collaborative</li> <li>• Earlier hiring / participation of some expertise</li> </ul>	<ul style="list-style-type: none"> <li>• All key expertise on-board at start</li> <li>• Includes "life cycle" stakeholders</li> <li>• Multi-Party Agreement or Single Purpose Entity</li> </ul>
Contracts	<ul style="list-style-type: none"> <li>• Establish liability protection</li> </ul>	<ul style="list-style-type: none"> <li>• Encourage shared information and resources</li> </ul>	<ul style="list-style-type: none"> <li>• Guide team activity</li> <li>• Mandate joint decision making</li> <li>• Eliminate or strictly limit ability to sue</li> </ul>
Risk / Reward	<ul style="list-style-type: none"> <li>• Entities pursue and protect individually</li> </ul>	<ul style="list-style-type: none"> <li>• Optional shared profit/bonus pool</li> </ul>	<ul style="list-style-type: none"> <li>• Pooled profit in; distributed with team success</li> <li>• Based on project value</li> </ul>
Decision Control	<ul style="list-style-type: none"> <li>• Hierarchical</li> </ul>	<ul style="list-style-type: none"> <li>• Team, with final decision by Owner</li> </ul>	<ul style="list-style-type: none"> <li>• Key Project Decisions by Single Purpose Entity</li> </ul>
Collaboration Tool	<ul style="list-style-type: none"> <li>• Meetings</li> </ul>	<ul style="list-style-type: none"> <li>• Charettes</li> </ul>	<ul style="list-style-type: none"> <li>• Detailed process design at star</li> <li>• Pull scheduling</li> <li>• Metro-based, informed decisions</li> </ul>
Process	<ul style="list-style-type: none"> <li>• Linear information</li> <li>• Resides in "silos" controlled per discipline</li> </ul>	<ul style="list-style-type: none"> <li>• Concurrent information</li> <li>• BIM</li> <li>• Charettes</li> </ul>	<ul style="list-style-type: none"> <li>• Integrated information</li> </ul>
Estimating	<ul style="list-style-type: none"> <li>• After design and publication of documents, per phase</li> </ul>	<ul style="list-style-type: none"> <li>• Contractor participation during preconstruction</li> </ul>	<ul style="list-style-type: none"> <li>• Budget first; then design to budget</li> <li>• Target Design Values (TDV)</li> </ul>

# Managing Time, Cost & Quality

## IPD – It's all about Design Management / Strong Leadership

- Design management of **all** stakeholders
- BIM as the repository for:
  - a. Information
  - b. Collective design decisions - transparency
  - c. Constantly testing value
  - d. 'Buildability' – Virtual construction
- Constant evaluation of:
  - Construction cost – best value incl. quality assessment
  - Procurement methodologies / fabrication
  - Life cycle costs
  - Sustainability

**What sort of team can achieve all of this?**

# Achieving Successful Integrated Project Delivery

Successful Integrated Project Delivery requires a team that is

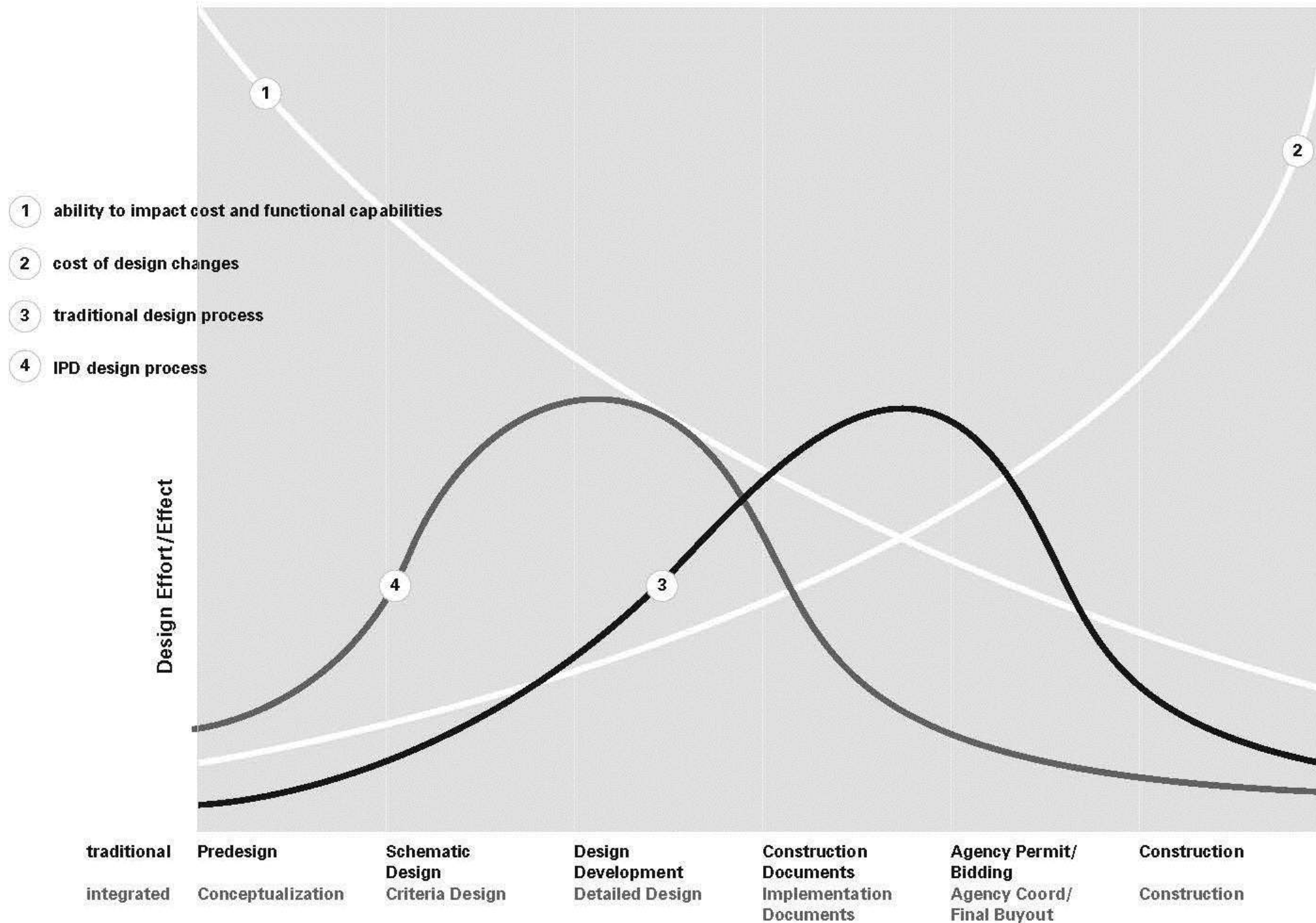
- committed to **collaborative processes**
- **capable of working together** effectively

Key steps:

1. Identify most important team roles early
2. Pre-qualify members (firms and individuals)
3. Consider and / or seek involvement of others – e.g. building officials, insurers
4. Clearly define team values, goals and interests
5. Identify organizational and business structure most suited to IPD **and** consistent with team members' needs and constraints
6. Define and agree roles and accountability of team members.

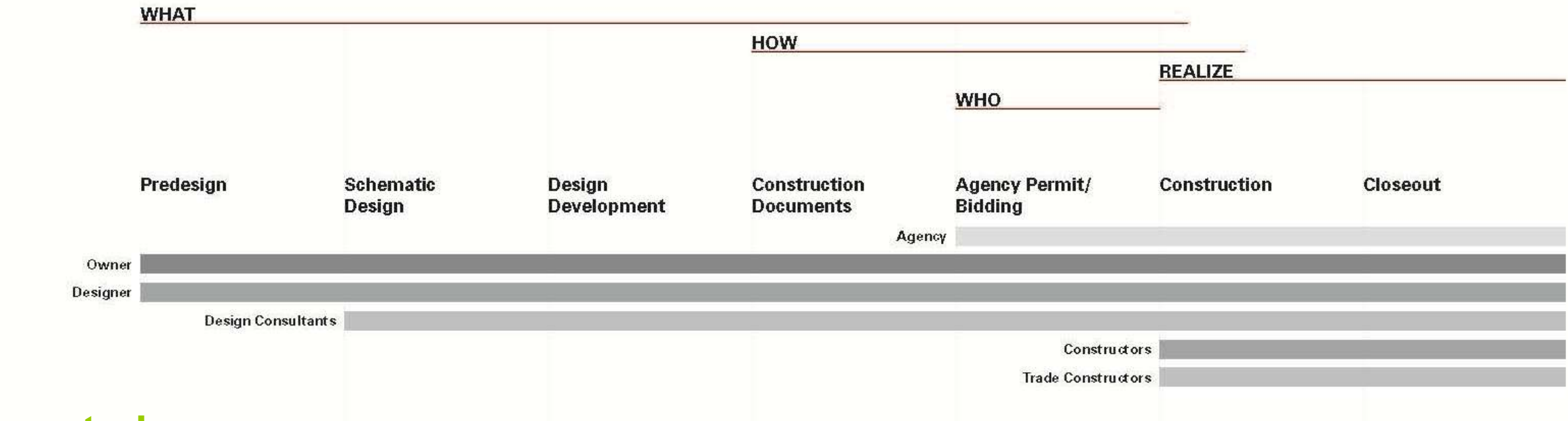


# Where is our Design Effort? How is it managed?

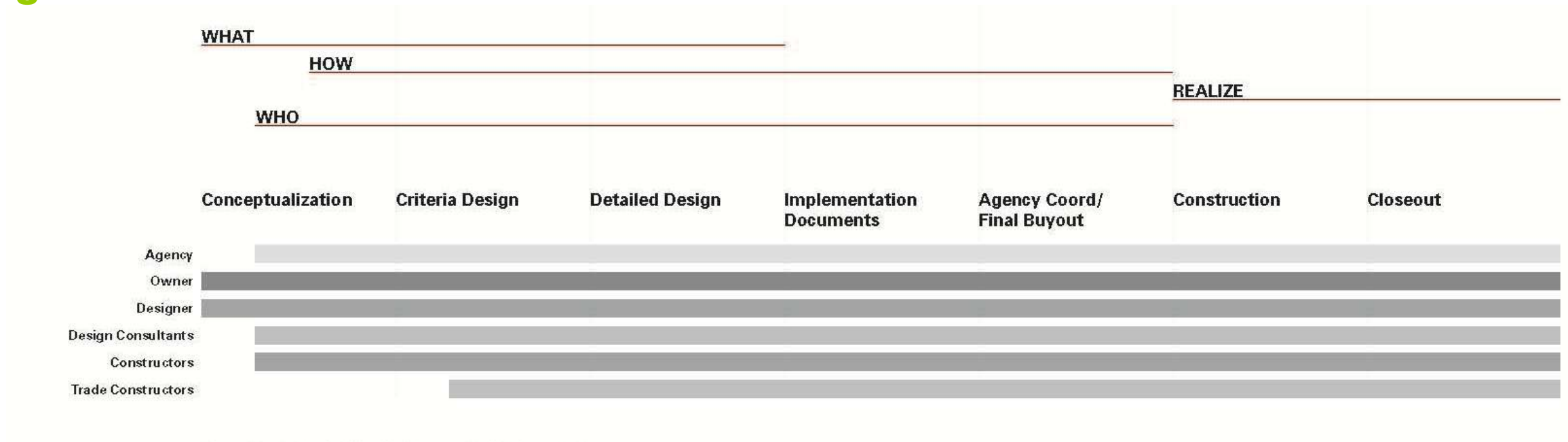


# Traditional vs. Integrated Design Processes

## Traditional



## Integrated





# Who are the participants of an Integrated Team?



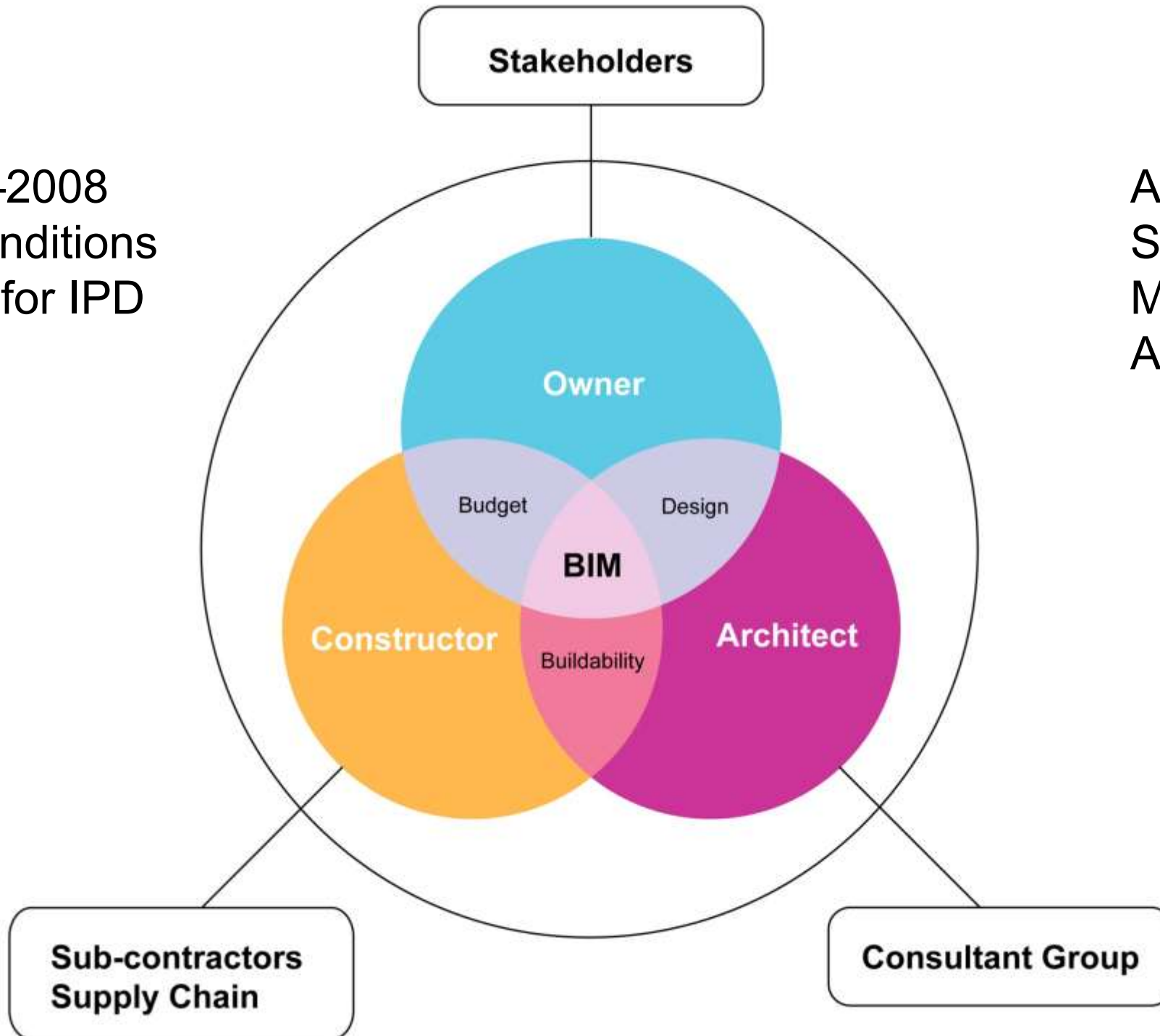
## Main Parties Involved

- Owner
- Integrated Project Coordinator
- Prime Designer
- Design Consultants
- Prime Constructor
- Trade Contractors
- Suppliers
- Agencies / T.A.s

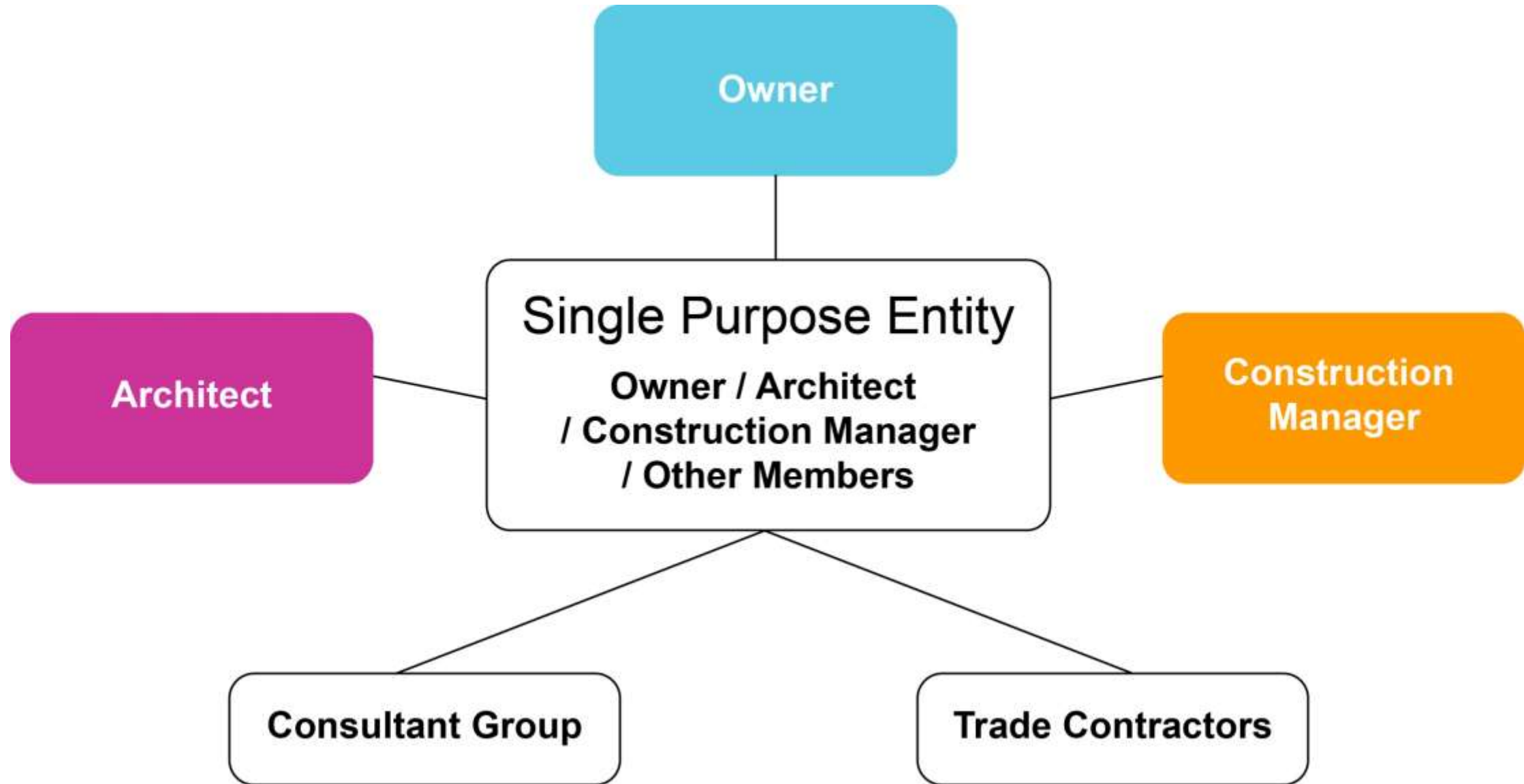
# Multi-Party Agreement Contract Relationships

AIA - A295–2008  
General Conditions  
of Contract for IPD

AIA–C191–2009  
Standard Form  
Multi-Party  
Agreement for IPD



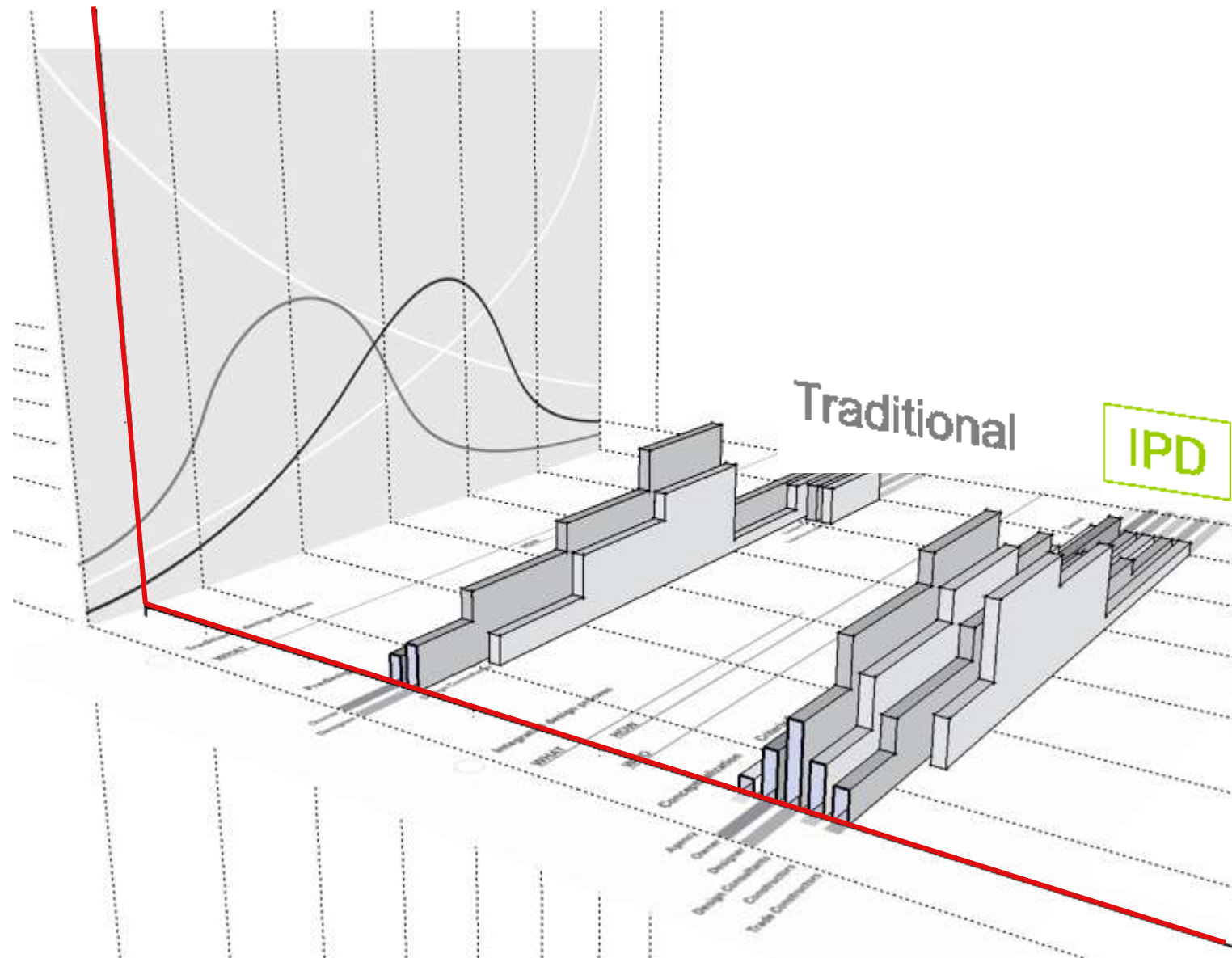
# Single Purpose Entity Agreement Contract Relationships



Project holds P.I. insurance – not individual groups



# Conceptualization



Conceptualization begins to determine **WHAT** is to be built, **WHO** will build it and **HOW** it will be built...

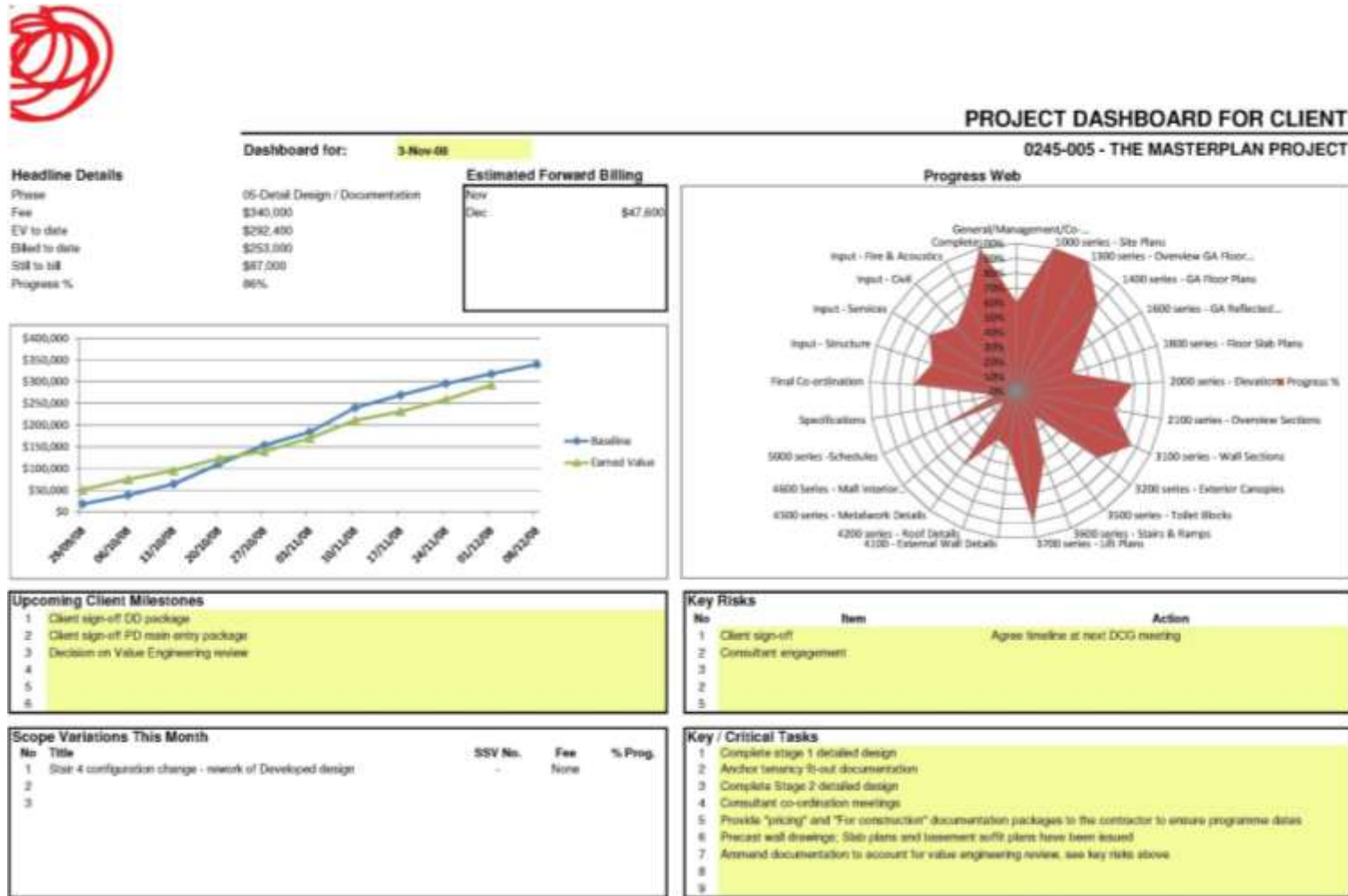
## Outcomes

### Develop:

- Performance goals
- Cost structure (earlier & in greater detail)
- Preliminary Schedule & link to model
- Communication methods
- LODs 00 & 01

### Set up project systems

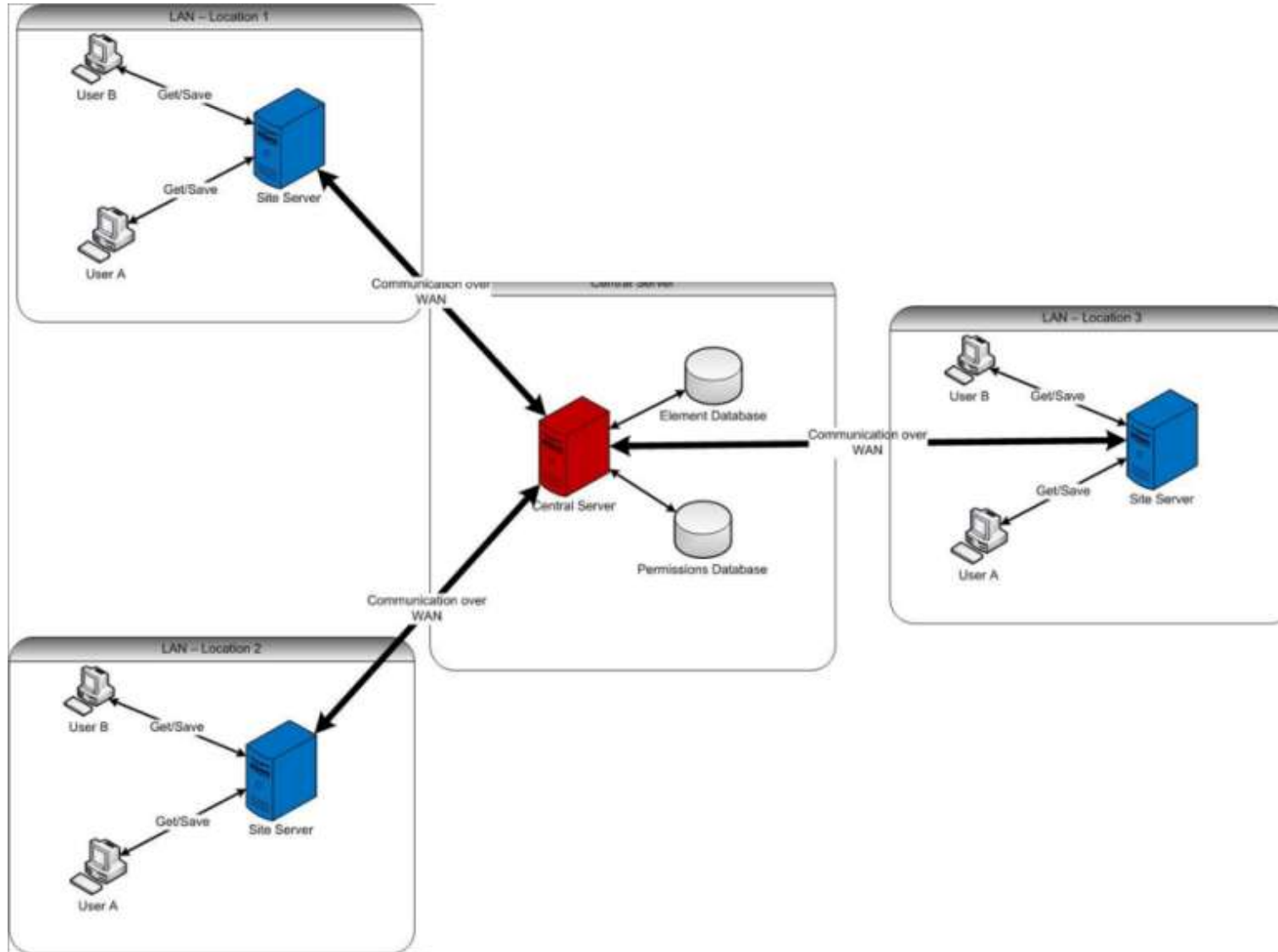
# Conceptualization – Project System Setup



## 1. Set up Strong Leadership / Project Governance Team

- Strong Project Manager
- Strong Design Manager
- Educated Client
- Project Quality Plan
- Project Briefing Document
- Web-based reporting / management
- Set up TDVs

# Conceptualization – Project System Setup

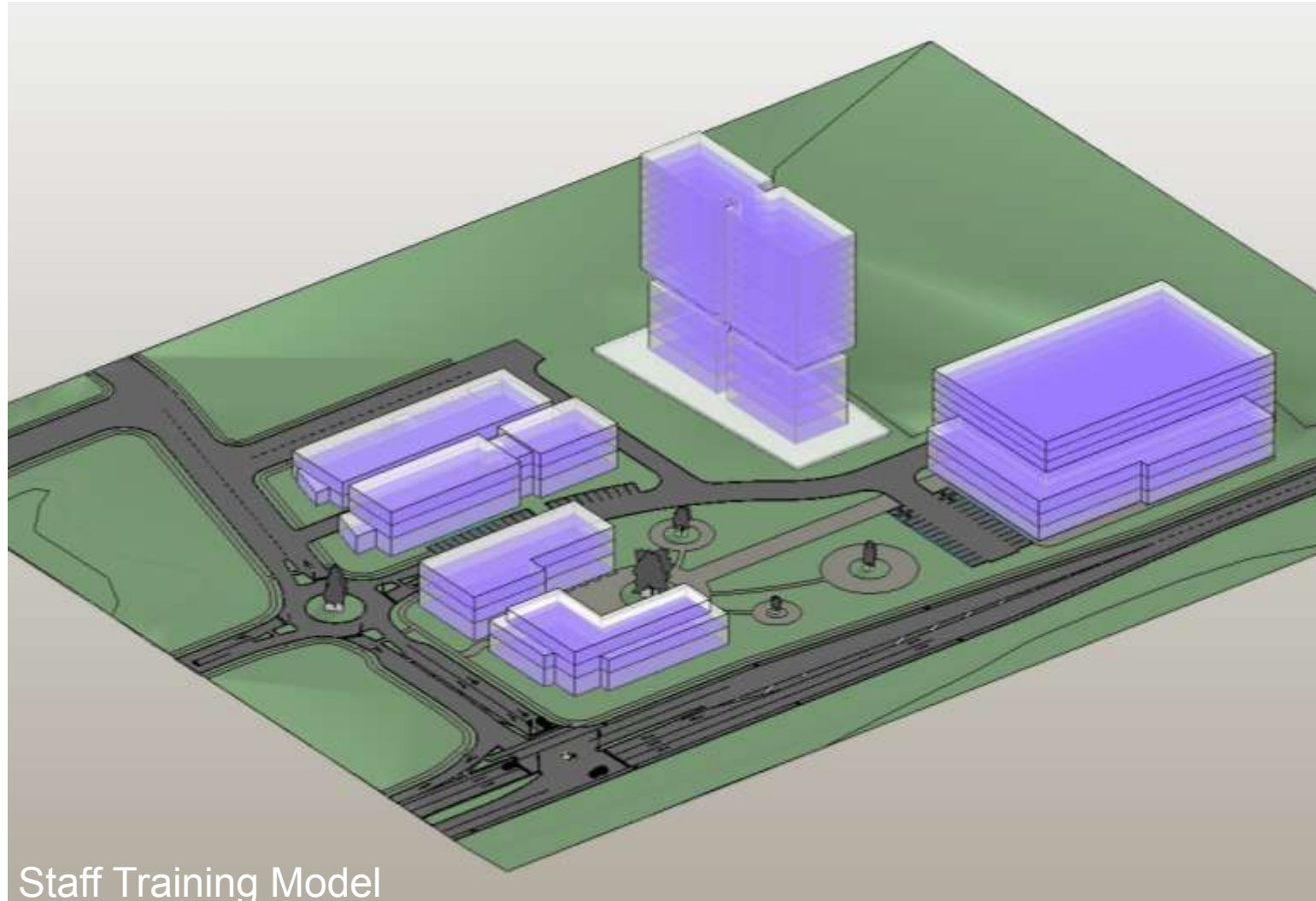


## 2. Set up centralised BIM infrastructure

- Agree model progression specifications (MPS) or Levels of Detail (LOD)



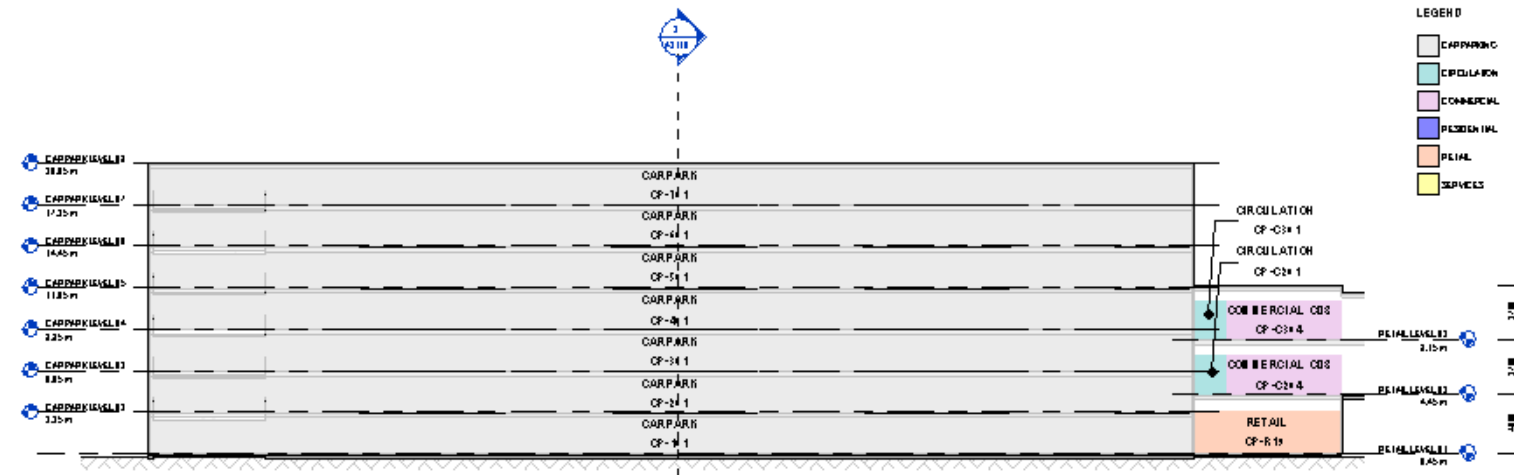
# Level of Detail (LOD) 000



## The Finished Article

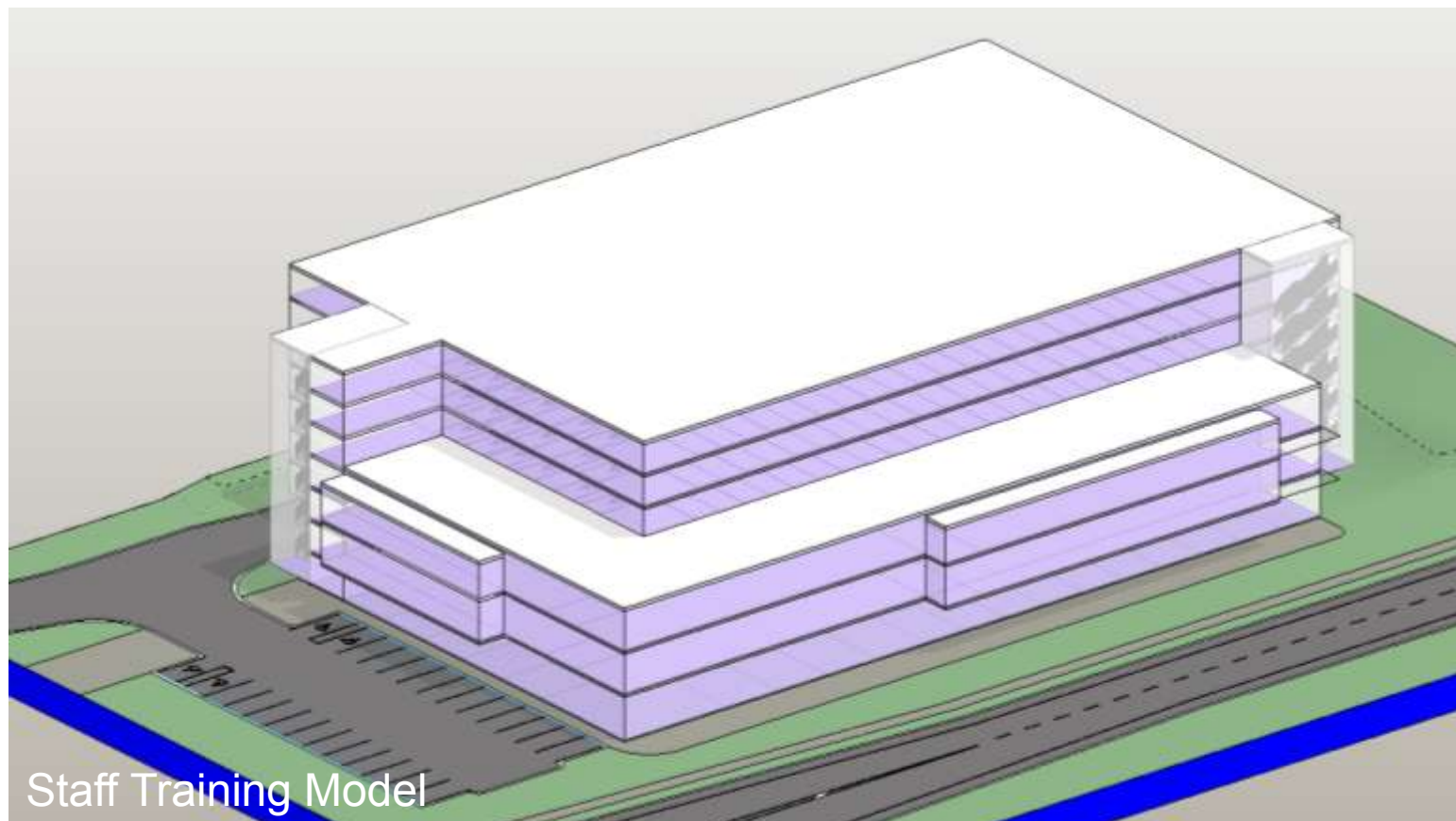
- Topography
- Boundaries
- Roads
- Footpaths
- Landscaping Zones
- Boundary Setbacks
- Mass Form Buildings
- Levels
- Mass Floors for Gross Area
- Mass Floor Areas scheduled

# Level of Detail (LOD) 100



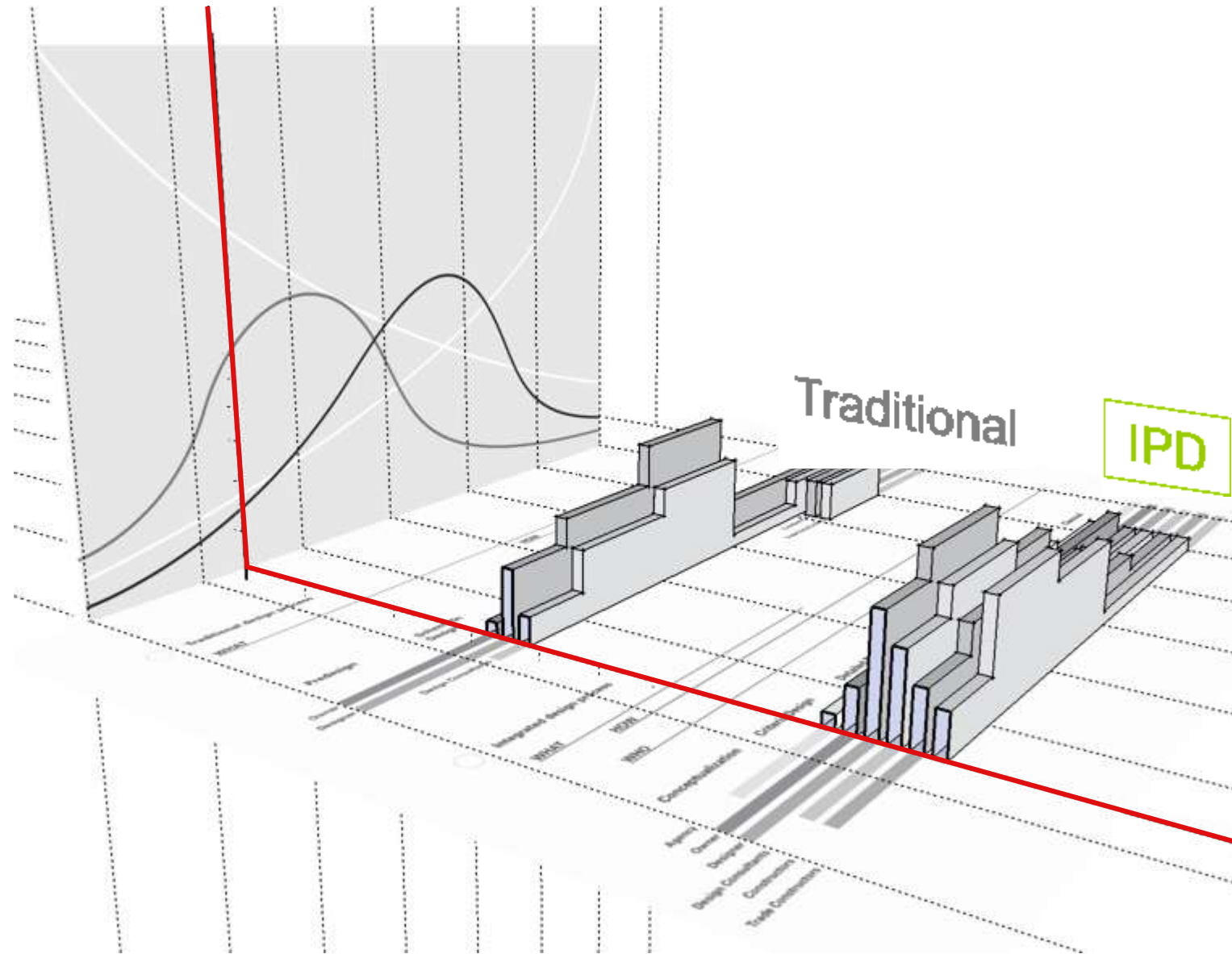
## The Finished Article

- Car parking schedules
- Mass Floor schedules (Gross Floor)
- Room schedules (Net Lettable)
- Typical floor plans
- Sections
- Elevations
- Cores & circulation defined
- Vehicle & pedestrian traffic clearly defined
- Car parking first cut established
- Mass to preliminary architectural form



Staff Training Model

# Criteria Design



In Criteria Design the project begins to take shape. Major options are evaluated, tested and selected...

## Outcomes

### Finalise:

- Scope
- Form
- Initial selection & design of structure, skin, HVAC
- Cost estimate\*
- Schedule\*

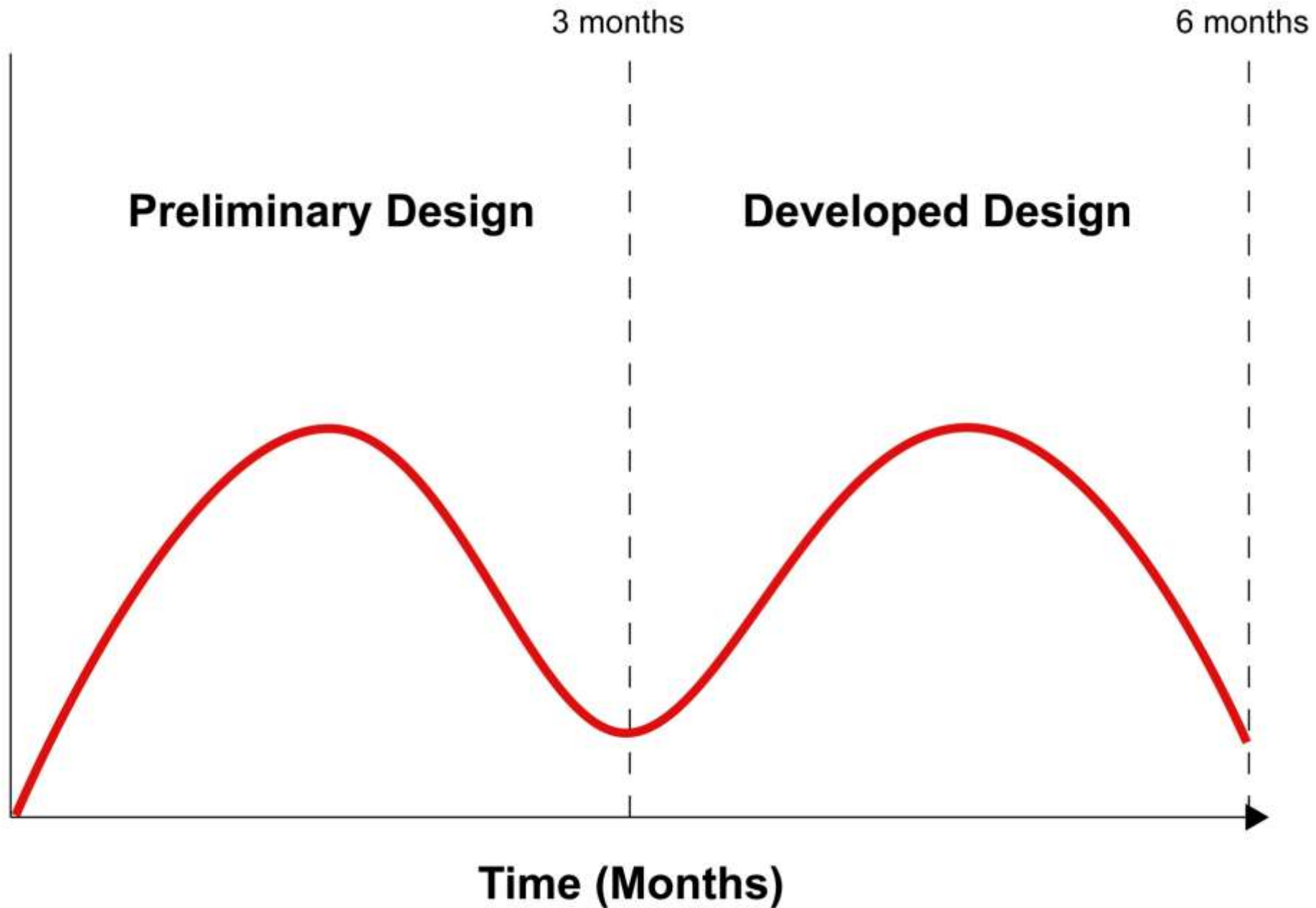
**Agree** tolerances between trades for prefabrication

\*at appropriate precision – TDVs

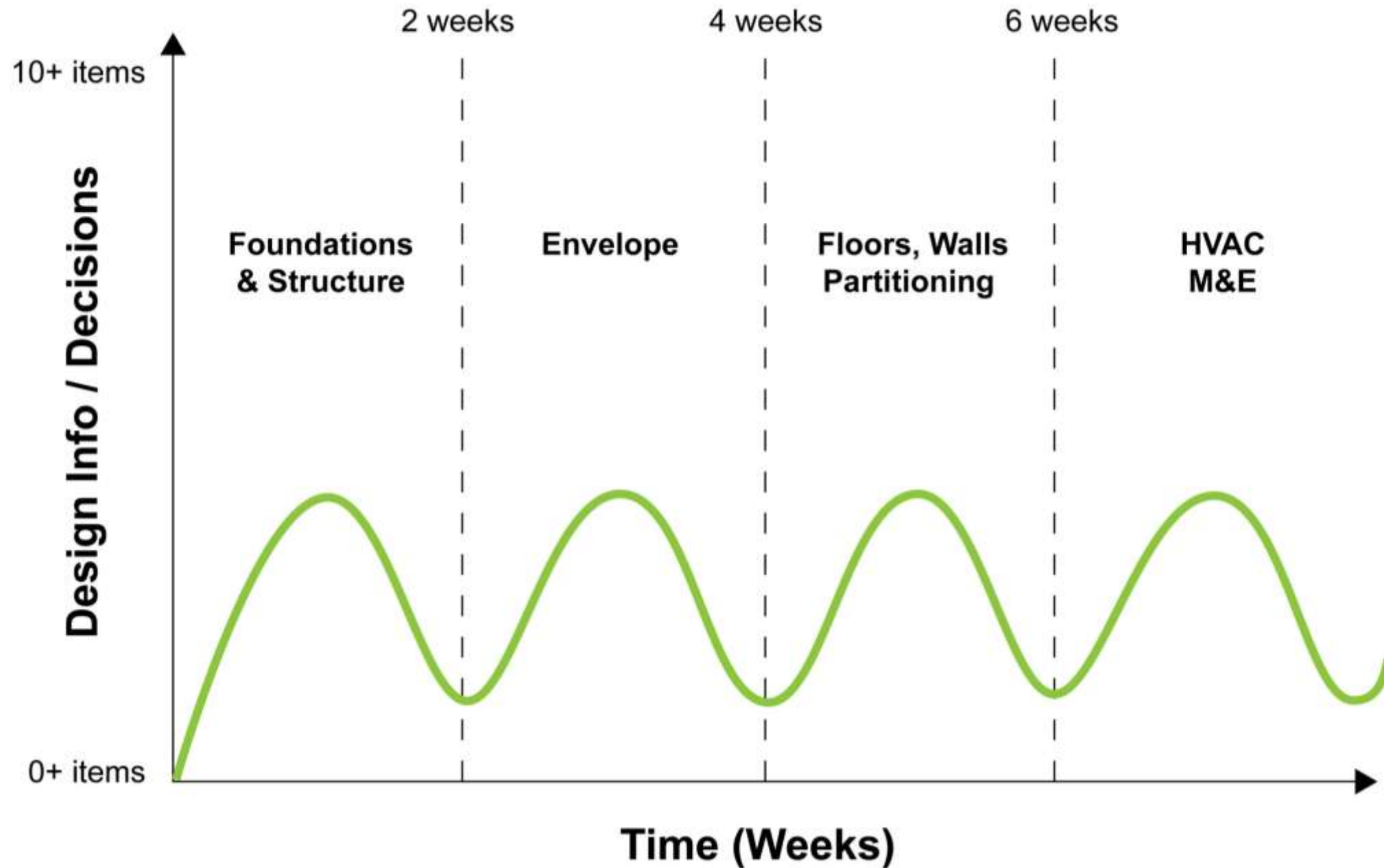


# Traditional VE Cycle

## Time impact / Abortive design work



## BIM Model locks in design decisions to TDVs



# Construction-Calibre Quantities from BIM Model

Vico

### Quantities & Formulas

- Rudimentary Quantities

Count

Volume

Surface Area

Length

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Integrating Construction

Tuesday, June 16, 2009

### Quantities & Formulas

- Construction-Caliber Quantities: Walls

Gross Volume

Net Volume

Gross Area Ref Side

Gross Area Non Ref Side

Net Area Ref Side

Net Area Non Ref Side

Thickness Length & Height

Sum of Gross Vertical Area

Sum of Net Vertical Area and more...

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# Construction-Calibre Quantities from BIM Model

## Vico Cost Planner

Cost Planner - Spread Footings, Vertical Surface Area

Code	Description	Quantity	Consumption	Units	Amount	Unit	Cost/Unit	Price	Variance
A1010.01	Continuous Footing	0.00	0.00	0.00 sf	0.00		0.00	0.00	0.00
03 11 00 0311...	Formwork - Cont...	0.00	0.00	0.00 sf	0.00		0.00	0.00	0.00
L-01	Carpenter	0.00	0.15	sfHR	38.10		0.00	0.00	0.00
M-01	Formwork Mater...	0.00	2.00	sf/ft	2.89		0.00	0.00	0.00
03 21 00 0321...	Reinforcement - Cont...	0.00	0.00	0.00 cy	0.00		0.00	0.00	0.00
L-06	Reinforce	0.00	0.53	cyHR	43.00		0.00	0.00	0.00
M-58	Reinforcement S...	0.00	0.06	cyft	890.00		0.00	0.00	0.00
03 31 00 0331...	Placing Concrete - Cont...	0.00	0.00	0.00 cy	0.00		0.00	0.00	0.00
L-02	Building Laborer	0.00	0.40	cyHR	30.25		0.00	0.00	0.00
M-29	Ready Mix Conc...	0.00	1.00	cy	100.00		0.00	0.00	0.00
E-01	Gas Engine Vibra...	0.00	0.05	cyDay	80.00		0.00	0.00	0.00
E-02	Concrete Pump	0.00	0.05	cyDay	782.30		0.00	0.00	0.00
A1010.01	Spread Footings	0.00	0.00	0.00 sf	0.00		0.00	2,758.38	0.00
03 11 00 0311...	Formwork - Spre...	0.00	0.00	0.00 sf	0.00		0.00	0.00	0.00
L-01	Carpenter	248.51	0.08	sfHR	18.80		38.10	760.51	157.19
M-57	Formwork Mater...	248.51	1.00	sf/ft	248.51		0.63	157.19	0.00
03 21 00 0321...	Reinforcement - Spre...	0.00	0.00	0.00 cy	0.00		0.00	2,172.78	0.00
L-06	Reinforce	28.58	0.53	cyHR	18.00		43.00	648.50	0.00
M-58	Reinforcement S...	28.58	0.06	cyft	1,771		890.00	1,525.27	0.00
03 31 00 0331...	Placing Concrete - Spre...	0.00	0.00	0.00 cy	0.00		0.00	4,646.62	0.00
L-02	Building Laborer	28.58	0.40	cyHR	11.47		30.25	345.61	0.00
M-29	Ready Mix Conc...	28.58	1.00	cy	28.58		0.00	3,113.37	0.00
E-01	Gas Engine Vibra...	28.58	0.05	cyDay	48.60		0.00	70.84	0.00
E-02	Concrete Pump	28.58	0.05	cyDay	782.30		0.00	1,117.10	0.00
A1032.01	Slab on Grade	0.00	0.00	0.00 sf	0.00		0.00	0.00	0.00
03 11 00 0311...	Formwork - Slab	0.00	0.00	0.00 sf	0.00		0.00	0.00	0.00
L-01	Carpenter	0.00	0.08	sfHR	38.10		0.00	0.00	0.00
M-01	Formwork Mater...	0.00	1.00	sf/ft	0.00		2.89	0.00	0.00
03 21 00 0321...	Reinforcement - Slab	0.00	0.00	0.00 cy	0.00		0.00	0.00	0.00
L-06	Reinforce	0.00	0.83	cyHR	43.00		0.00	0.00	0.00

Cost Planner - Spread Footings, Vertical Surface Area

Formula Editor

Code	Description/Q...	Value	Unit
A1032.01	Slab on Grade Isolation Edge, 0'-8"-STR		
A1032.01	Slab on grade Brick Exterior, 1'-6"-STR		
A1032.01	Slab on grade Brick Exterior, 1'-0"-STR		
C1011.01	Drywall, sngl skin, 6" Thk, Sound Insulated		
Count		0.00	
Length		0' feet and inches	
Reference Side S...		0.00 square foot	
Opposite Referen...		0.00 square foot	
Top Surface Area		0.00 square foot	
Bottom Surface A...		0.00 square foot	
Ends Surface Area		0.00 square foot	

Spread Footings, Vertical Surface Area

Evaluated: 248.5104305377

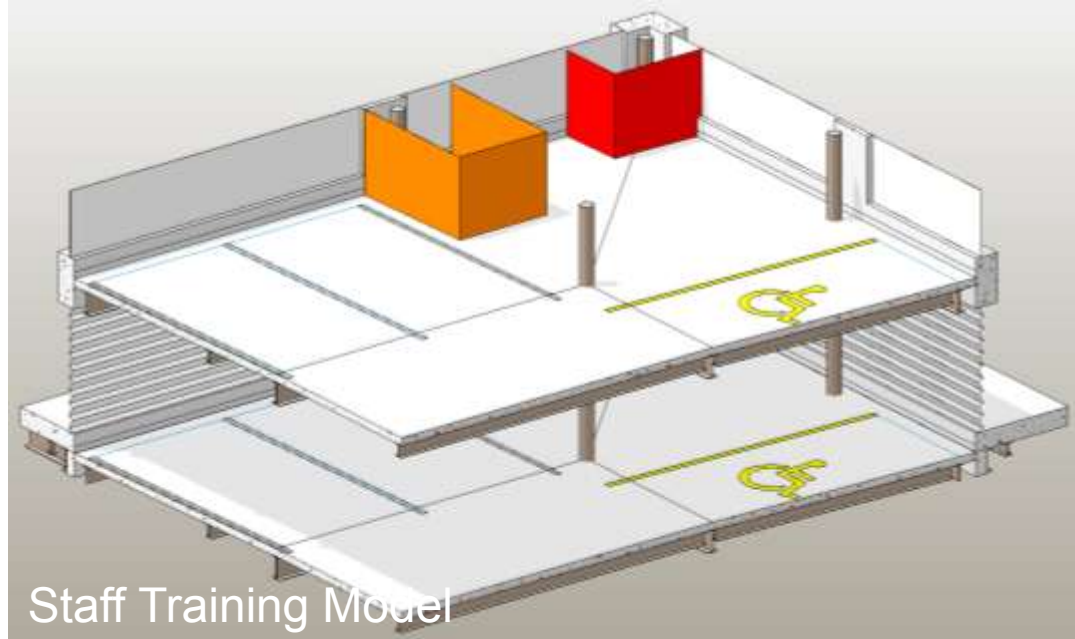
Cost Planner - Concrete Box Slab, Net Volume

Code	Descr	Quant	Cons	Units	Amount	Unit	Cost	Price	Variance
L-06	Reinforce	0.00	0.53	cyHR	43.00		0.00	0.00	0.00
M-17	Reinfor...	0.00	0.06	cyft	890.00		0.00	0.00	0.00
03 31...	Placing...	0.00	0.00	cy/ft	0.00		0.00	0.00	0.00
L-02	Building...	0.00	0.38	cyHR	30.25		0.00	0.00	0.00
M-29	Ready...	0.00	1.00	cy	100.00		0.00	0.00	0.00
E-01	Gas En...	0.00	0.04	cyDay	48.60		0.00	0.00	0.00
E-02	Concre...	0.00	0.04	cyDay	782.30		0.00	0.00	0.00
03 11 01	Concret...	0.00	0.00	0.00 sf	0.00		0.00	0.00	0.00
03 11...	Formwo...	0.00	0.00	0.00 sf	0.00		0.00	0.00	0.00
L-01	Carpent...	0.00	0.09	sfHR	38.10		0.00	0.00	0.00
M-01	Formwo...	0.00	1.00	sf/ft	0.00		2.89	0.00	0.00
03 11...	Edge F...	0.00	0.00	0.00 sf	0.00		0.00	0.00	0.00
L-01	Carpent...	126.90	0.09	sfHR	11.77		38.10	485.57	0.00
M-08	Formwo...	126.90	1.00	sf/ft	126.90		1.42	184.40	0.00
03 21...	Reinfor...	0.00	0.00	0.00 cy	0.00		0.00	0.00	0.00
L-06	Reinfor...	37.38	0.62	cyHR	22.12		43.00	953.70	0.00
M-21	Reinfor...	37.38	0.06	cyft	1,241		830.00	3,097.79	0.00
03 31...	Placing...	0.00	0.00	0.00 cy	0.00		0.00	0.00	0.00
L-02	Buildi...	37.38	0.41	cyHR	15.97		30.25	463.00	0.00
M-28	Ready...	37.38	1.00	cy	37.38		0.00	3,963.70	0.00
E-01	Gas En...	37.38	0.05	cyDay	48.60		0.00	99.04	0.00
E-02	Concre...	37.38	0.05	cyDay	782.30		0.00	2,921.92	0.00
03 11 02	Concret...	0.00	0.00	0.00 sf	0.00		0.00	0.00	0.00
03 11...	Formwo...	0.00	0.00	0.00 sf	0.00		0.00	0.00	0.00
L-01	Carpent...	0.00	0.14	sfHR	0.00		38.10	0.00	0.00
M-01	Formwo...	0.00	1.00	sf/ft	0.00		2.89	0.00	0.00
03 21...	Reinfor...	0.00	0.00	0.00 cy	0.00		0.00	0.00	0.00
L-06	Reinfor...	0.00	1.11	cyHR	43.00		0.00	0.00	0.00
M-22	Reinfor...	0.00	0.09	cyft	830.00		0.00	0.00	0.00
03 31...	Placing...	0.00	0.00	0.00 cy	0.00		0.00	0.00	0.00
L-02	Buildi...	0.00	0.71	cyHR	30.25		0.00	0.00	0.00

Cost Planner - Spread Footings, Vertical Surface Area

Code	Description	Qty	Consum	Units	Amount	Unit	Cost/Unit	Price	Variance
A1010.01	Continuous Footings	0.00	0.00	0.00 sf	0.00		0.00	0.00	0.00
03 11 00 03...	Formwork - Continuous Footing	0.00	0.00	0.00 sf	0.00		0.00	0.00	0.00
L-01	Carpenter	0.00	0.15	sfHR	38.10		0.00	0.00	0.00
M-01	Formwork Mater...	0.00	2.00	sf/ft	2.89		0.00	0.00	0.00
03 21 00 03...	Reinforcement - Continuous Footing	0.00	0.00	0.00 cy	0.00		0.00	0.00	0.00
L-06	Reinforce	0.00	0.53	cyHR	43.00		0.00	0.00	0.00
M-58	Reinforcement S...	0.00	0.06	cyft	890.00		0.00	0.00	0.00
03 31 00 03...	Placing Concrete - Continuous Footing	0.00	0.00	0.00 cy	0.00		0.00	0.00	0.00
L-02	Building Laborer	0.00	0.40	cyHR	30.25		0.00	0.00	0.00
M-29	Ready Mix Conc...	0.00	1.00	cy	100.00		0.00	0.00	0.00
E-01	Gas Engine Vibra...	0.00	0.05	cyDay	48.60		0.00	0.00	0.00
E-02	Concrete Pump	0.00	0.05	cyDay	782.30		0.00	0.00	0.00
A1010.01	Spread Footings	0.00	0.00	0.00 sf	0.00		0.00	2,758.38	0.00
03 11 00 03...	Formwork - Spread Footing	0.00	0.00	0.00 sf	0.00		0.00	0.00	0.00
L-01	Carpenter	248.51	0.08	sfHR	18.80		38.10	760.51	157.19
M-57	Formwork Mater...	248.51	1.00	sf/ft	248.51		0.63	157.19	0.00
03 21 00 03...	Reinforcement - Spread Footing	0.00	0.00	0.00 cy	0.00		0.00	2,172.78	0.00
L-06	Reinforce	28.58	0.53	cyHR	18.00		43.00	648.50	0.00
M-58	Reinforcement S...	28.58	0.06	cyft	1,771		890.00	1,525.27	0.00
03 31 00 03...	Placing Concrete - Spread Footing	0.00	0.00	0.00 cy	0.00		0.00	4,646.62	0.00
L-02	Building Laborer	28.58	0.40	cyHR	11.47		30.25	345.61	0.00
M-29	Ready Mix Conc...	28.58	1.00	cy	28.58		0.00	3,113.37	0.00
E-01	Gas Engine Vibra...	28.58	0.05	cyDay	48.60		0.00	70.84	0.00
E-02	Concrete Pump	28.58	0.05	cyDay	782.30		0.00	1,117.10	0.00
A1032.01	Slab on Grade	0.00	0.00	0.00 sf	0.00		0.00	0.00	0.00
03 11 00 03...	Formwork - Slab on Grade	0.00	0.00	0.00 sf	0.00		0.00	0.00	0.00
L-01	Carpenter	0.00	0.08	sfHR	38.10		0.00	0.00	0.00

# Level of Detail (LOD) 200



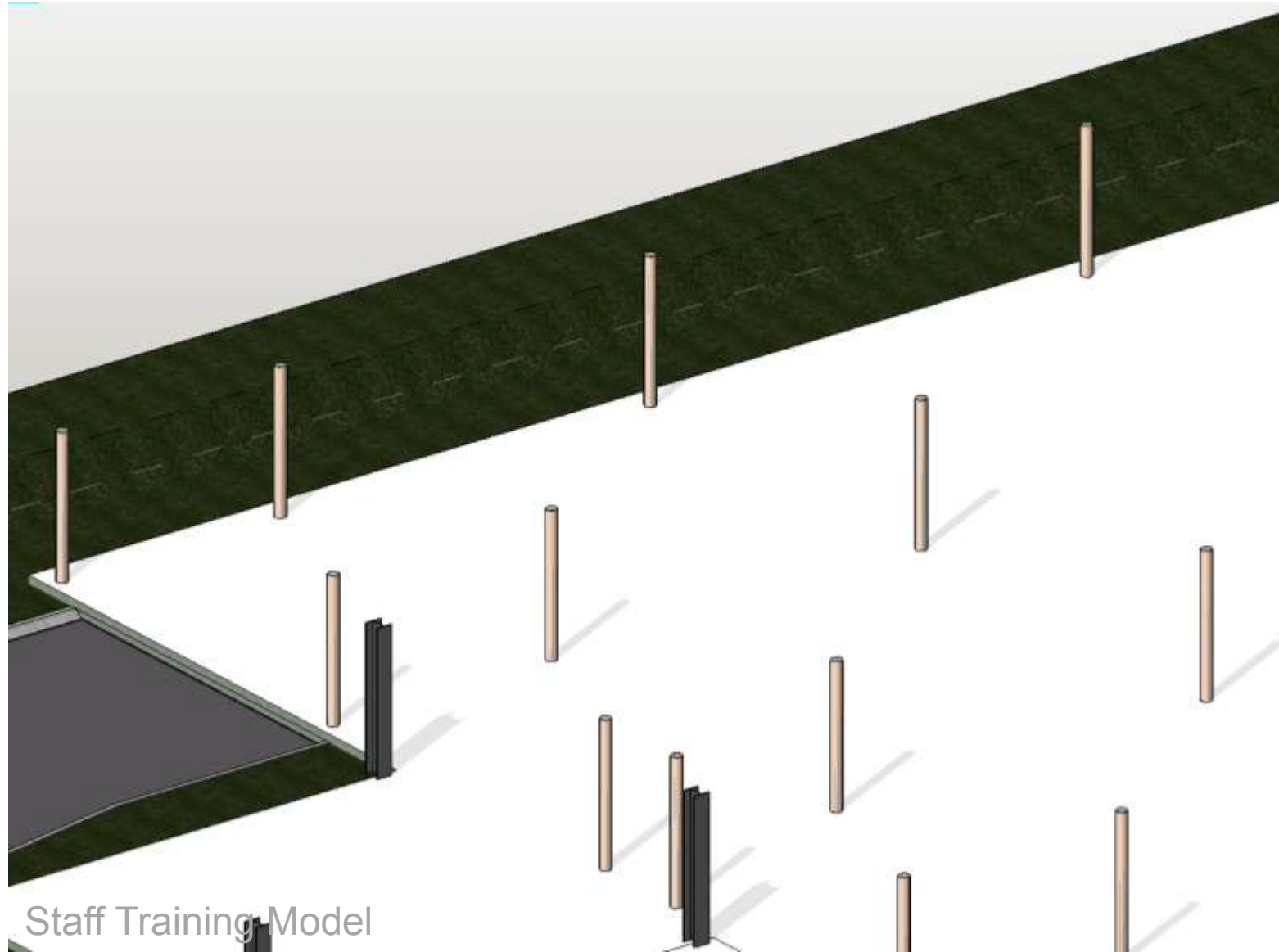
## Material Choices

- Made during geometry placement
- Preliminary only
- Keep Generic

## A Zonal Approach

- Keep geometry generic
- Use experience to make decisions early
- If you lack experience use others
- More speed less haste

# Level of Detail (LOD) 200



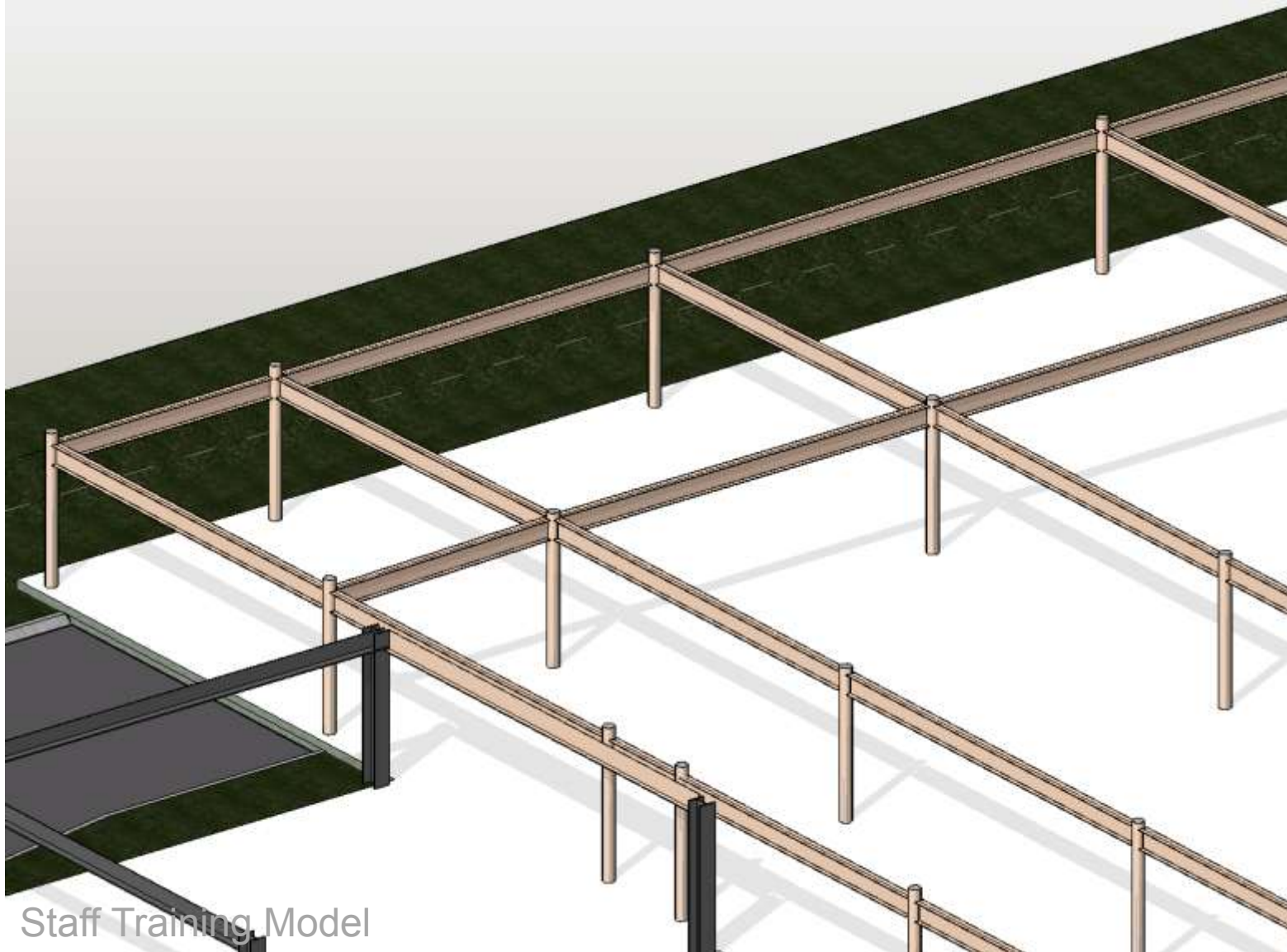
Staff Training Model

## Preliminary Structure

- Place grids
- Use grids to place columns
- Move grids not columns
- Careful with constraints



# Level of Detail (LOD) 200

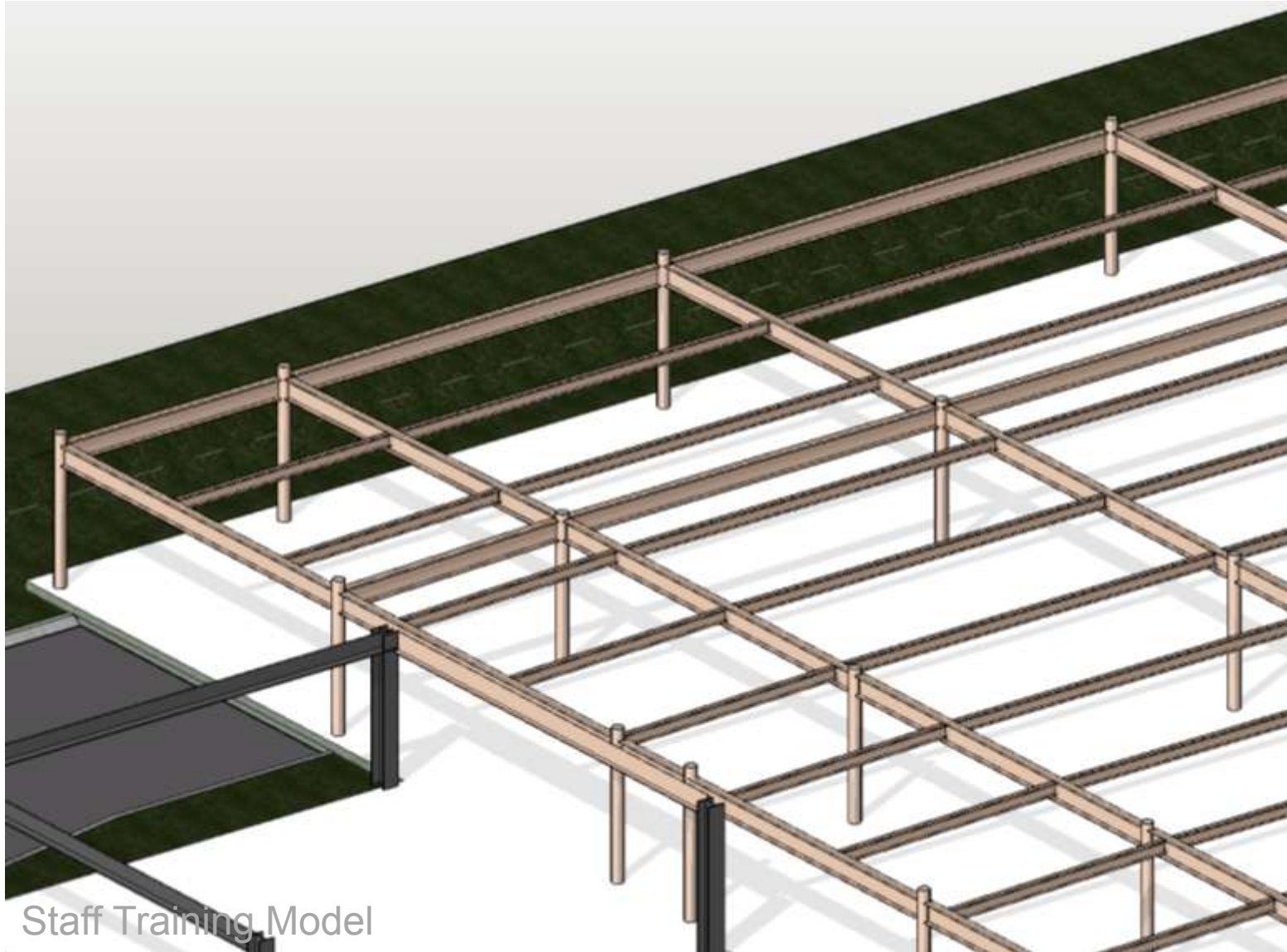


Staff Training Model

## Primary Structure

- Use grids to place beams
- Move grids not beams
- Keep generic
- Model primary structure as a worst case scenario

# Level of Detail (LOD) 200



Staff Training Model

## Secondary Structure

- Primary structure as necessary
- Secondary structure optional at this point

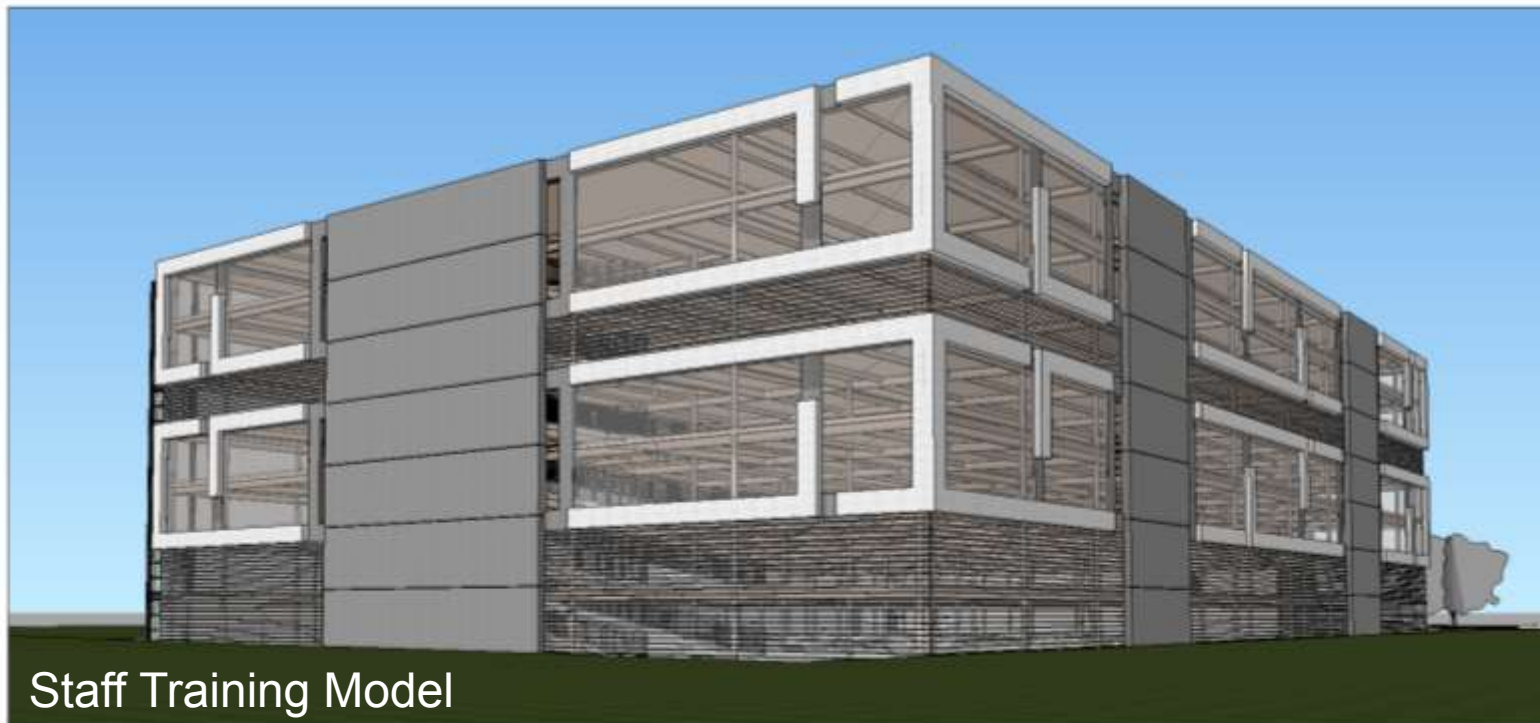


# Level of Detail (LOD) 200



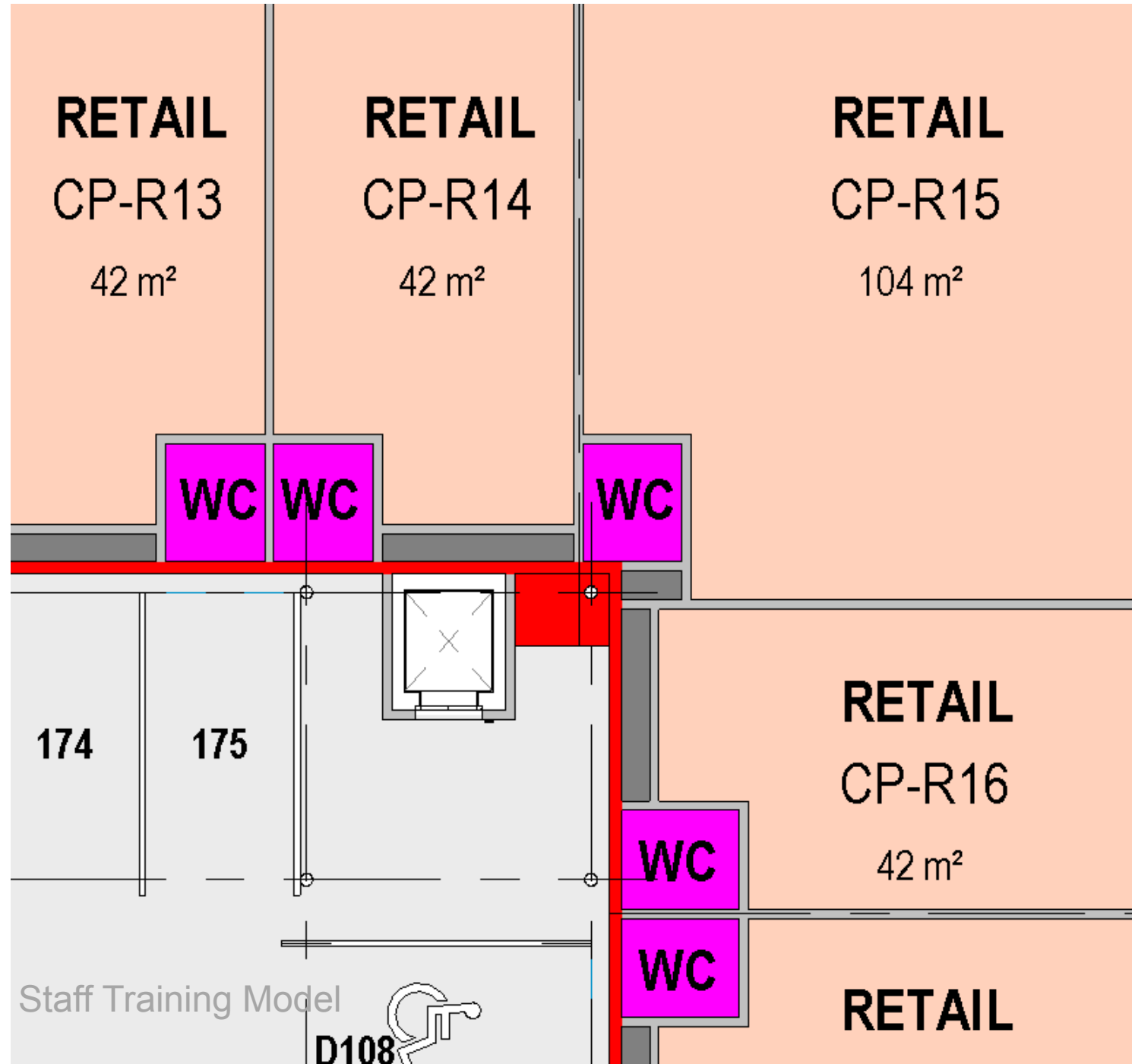
## Envelope Design

- Keep generic
- Zonal approach
- Make material choices





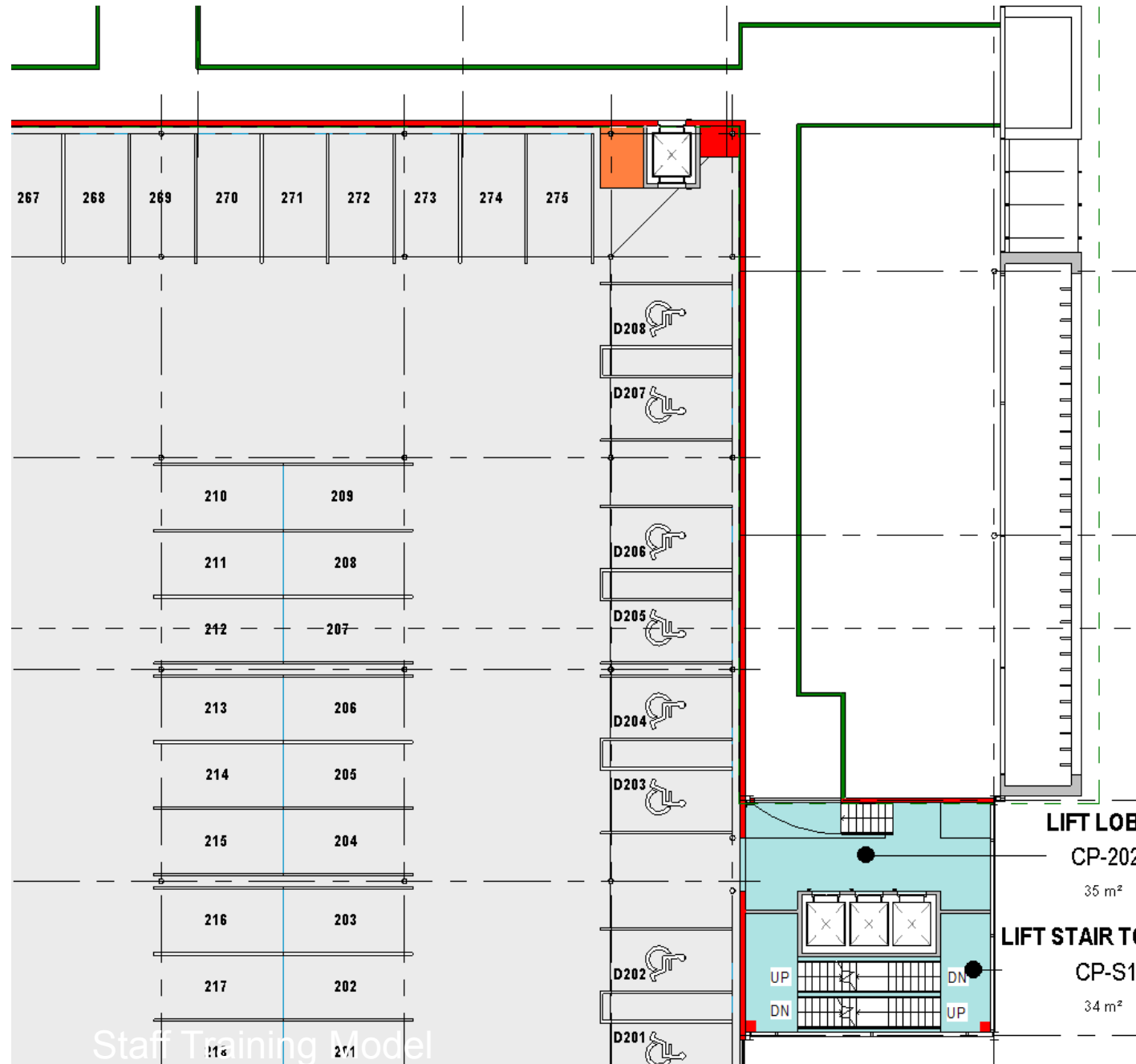
# Level of Detail (LOD) 200



## Preliminary Services

- Keep generic
- Zonal approach
- Mechanical
- Electrical
- Plumbing
- Fire
- Acoustic
- Consider horizontal as well as vertical

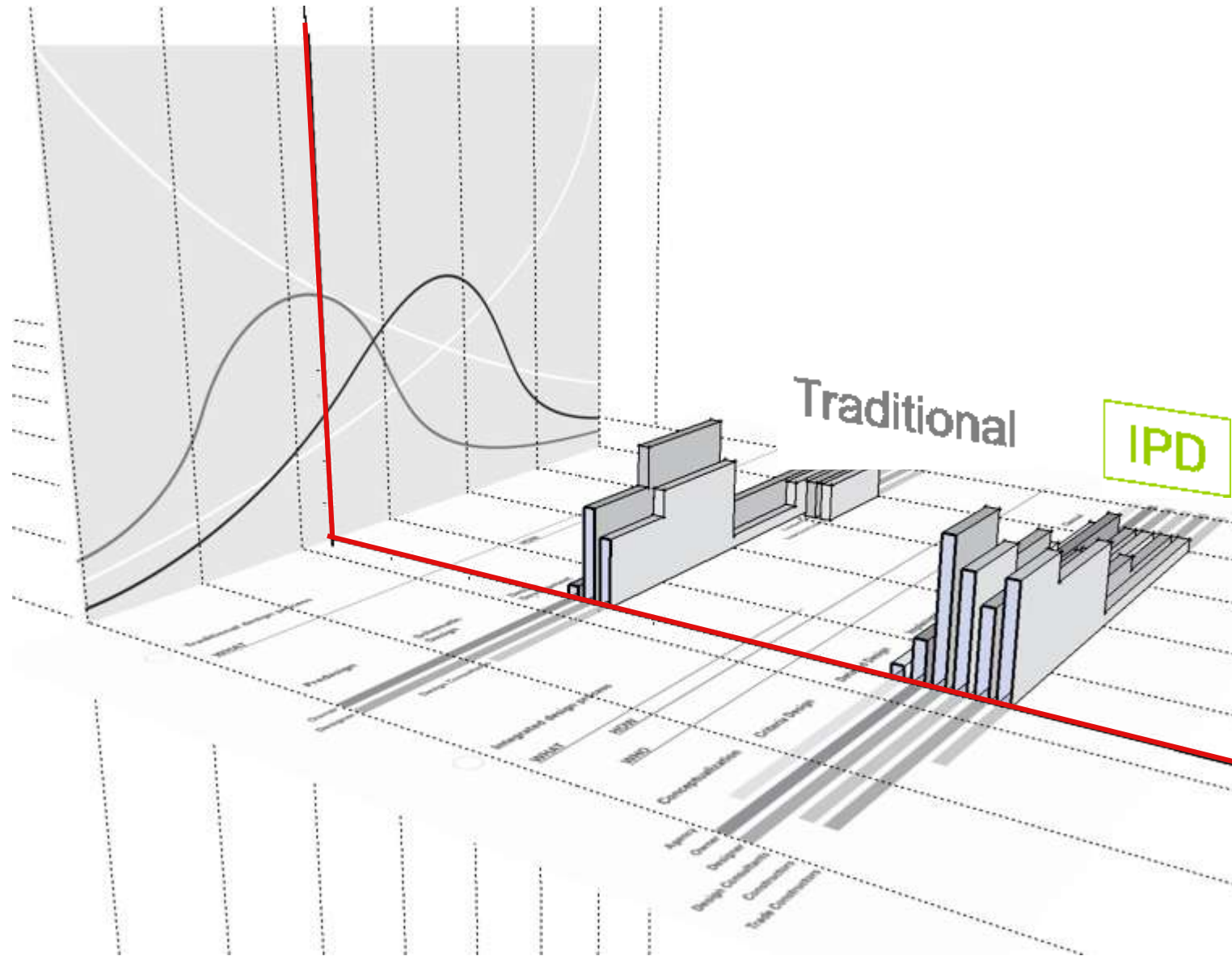
# Level of Detail (LOD) 200



## The Finished Article

- Circulation assessed and meets brief
- Preliminary Structure complete
- Preliminary Services zones established
- Preliminary Acoustic zones established
- Preliminary Fire zones established
- Consultants schematics complete
- Consultant modelling underway

# Detailed Design



Detailed Design concludes the **‘WHAT’** phase. All key design decisions are finalised...

## Outcomes

**Clearly define, coordinate & validate:**

- Major building systems
- All building elements
- Quality levels

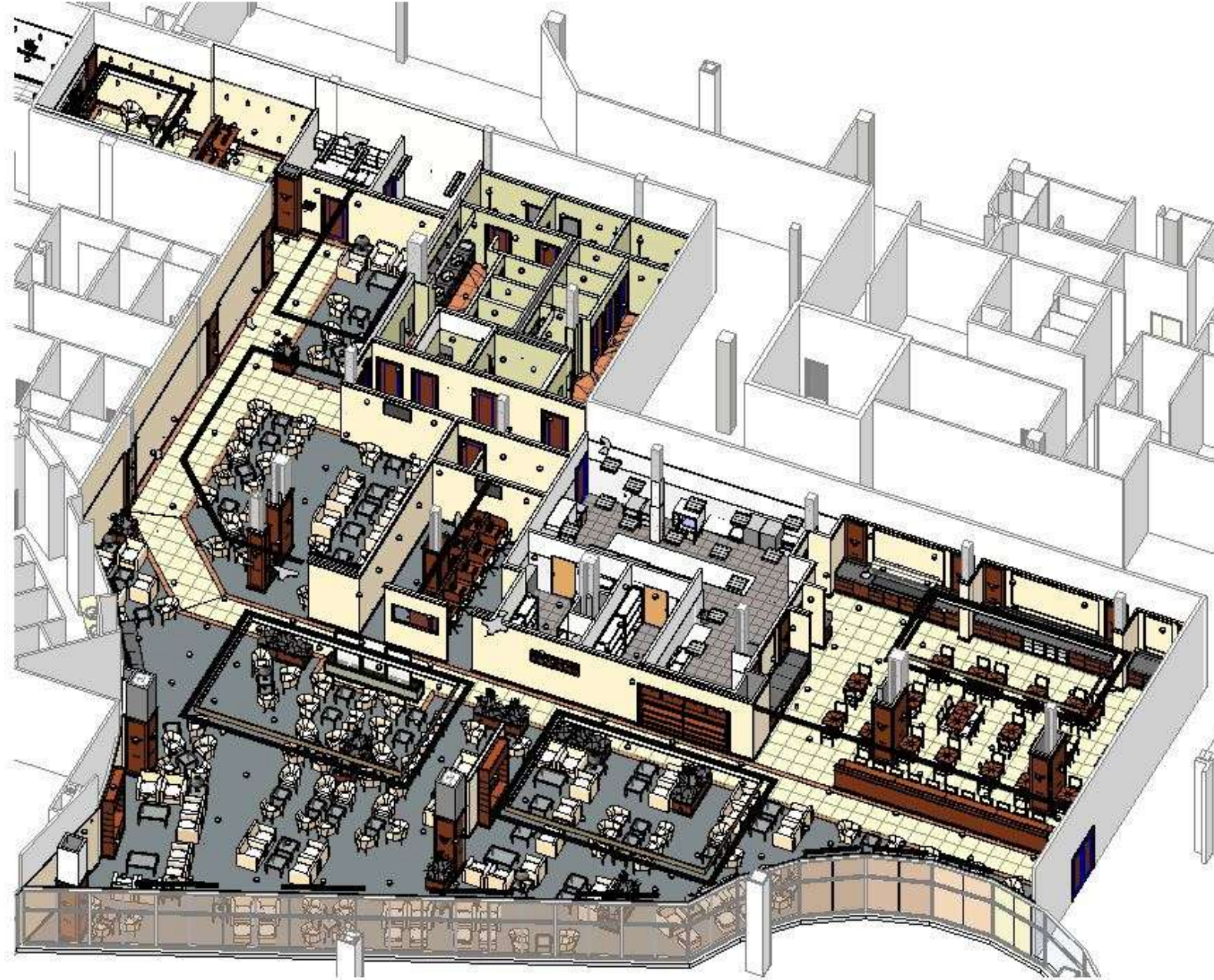
**Complete** specifications

**Establish** precise cost

**Establish** precise construction schedule

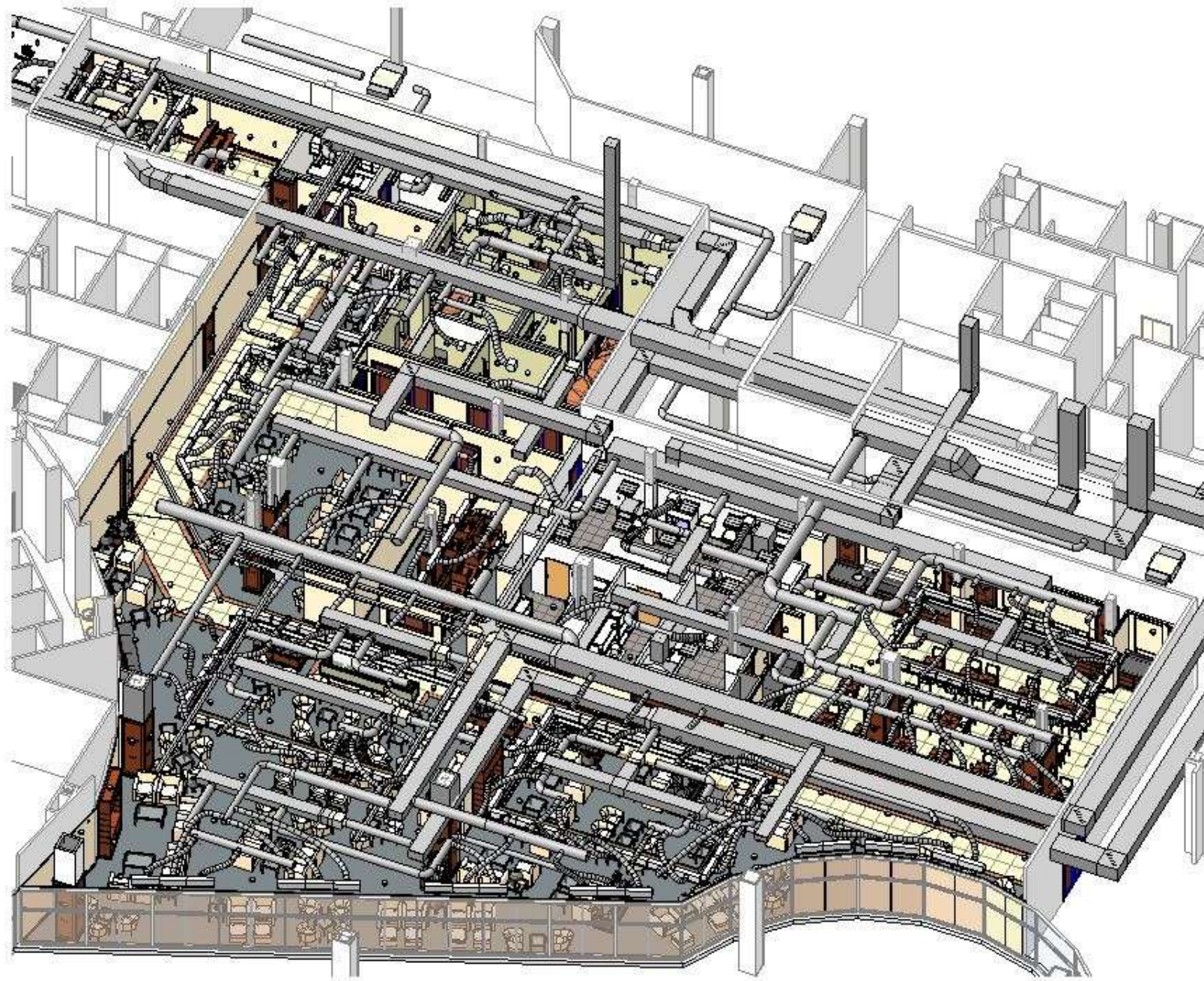


## Emirates Lounge – Auckland International Airport





## Emirates Lounge – Auckland International Airport





## Emirates Lounge – Auckland International Airport



CODE	TYPE	COUNT
01	Art Wall Downlight	20
02	Art Wall Downlight	10
03	Art Wall Downlight	10
04	Art Wall Downlight	10
05	Art Wall Downlight	10
06	Art Wall Downlight	10
07	Art Wall Downlight	10
08	Art Wall Downlight	10
09	Art Wall Downlight	10
10	Art Wall Downlight	10

CODE	DESCRIPTION	AREA
001	PLASTER	1000
002	WOOD	1000
003	GLASS	1000
004	CONCRETE	1000

CODE	TYPE	COUNT
01	Art Light	20
02	Art Light	10
03	Art Light	10
04	Art Light	10
05	Art Light	10
06	Art Light	10
07	Art Light	10
08	Art Light	10
09	Art Light	10
10	Art Light	10

CODE	DESCRIPTION	COUNT
01	COILING	1000
02	COILING	1000

NO.	DESCRIPTION	DATE
1		
2		
3		
4		
5		
6		

- 1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROVISION OF ALL NECESSARY MATERIALS AND FITTINGS FOR THE LIGHTING FIXTURES TO BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROVISION OF ALL NECESSARY MATERIALS AND FITTINGS FOR THE LIGHTING FIXTURES TO BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS.
- 2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROVISION OF ALL NECESSARY MATERIALS AND FITTINGS FOR THE LIGHTING FIXTURES TO BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS.
- 3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROVISION OF ALL NECESSARY MATERIALS AND FITTINGS FOR THE LIGHTING FIXTURES TO BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS.
- 4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROVISION OF ALL NECESSARY MATERIALS AND FITTINGS FOR THE LIGHTING FIXTURES TO BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS.
- 5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROVISION OF ALL NECESSARY MATERIALS AND FITTINGS FOR THE LIGHTING FIXTURES TO BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS.
- 6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROVISION OF ALL NECESSARY MATERIALS AND FITTINGS FOR THE LIGHTING FIXTURES TO BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS.
- 7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROVISION OF ALL NECESSARY MATERIALS AND FITTINGS FOR THE LIGHTING FIXTURES TO BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS.
- 8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROVISION OF ALL NECESSARY MATERIALS AND FITTINGS FOR THE LIGHTING FIXTURES TO BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS.
- 9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROVISION OF ALL NECESSARY MATERIALS AND FITTINGS FOR THE LIGHTING FIXTURES TO BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS.
- 10. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROVISION OF ALL NECESSARY MATERIALS AND FITTINGS FOR THE LIGHTING FIXTURES TO BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS.

NO.	DESCRIPTION	DATE
1		
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6		

NO.	DESCRIPTION	DATE
1		
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ALL WORKS SHOWN ON THIS DRAWING ARE THE PROPERTY OF THE CLIENT AND SHALL BE KEPT IN CONFIDENCE AND NOT TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM, WITHOUT THE WRITTEN PERMISSION OF THE CLIENT.

GENERAL NOTES:  
1. CONSULT YOUR DESIGNER FOR ANY COMMENTS ON THIS DRAWING.  
2. CONSULT YOUR DESIGNER FOR ANY COMMENTS ON THIS DRAWING.  
3. CONSULT YOUR DESIGNER FOR ANY COMMENTS ON THIS DRAWING.

**AS BUILT**

**AS BUILT**



IGNITE  
1000 002



EMIRATES LOUNGE AUCKLAND

COORDINATED SERVICES RCP

COORDINATED SERVICES RCP

NO.	DESCRIPTION	DATE
1		
2		
3		
4		
5		
6		

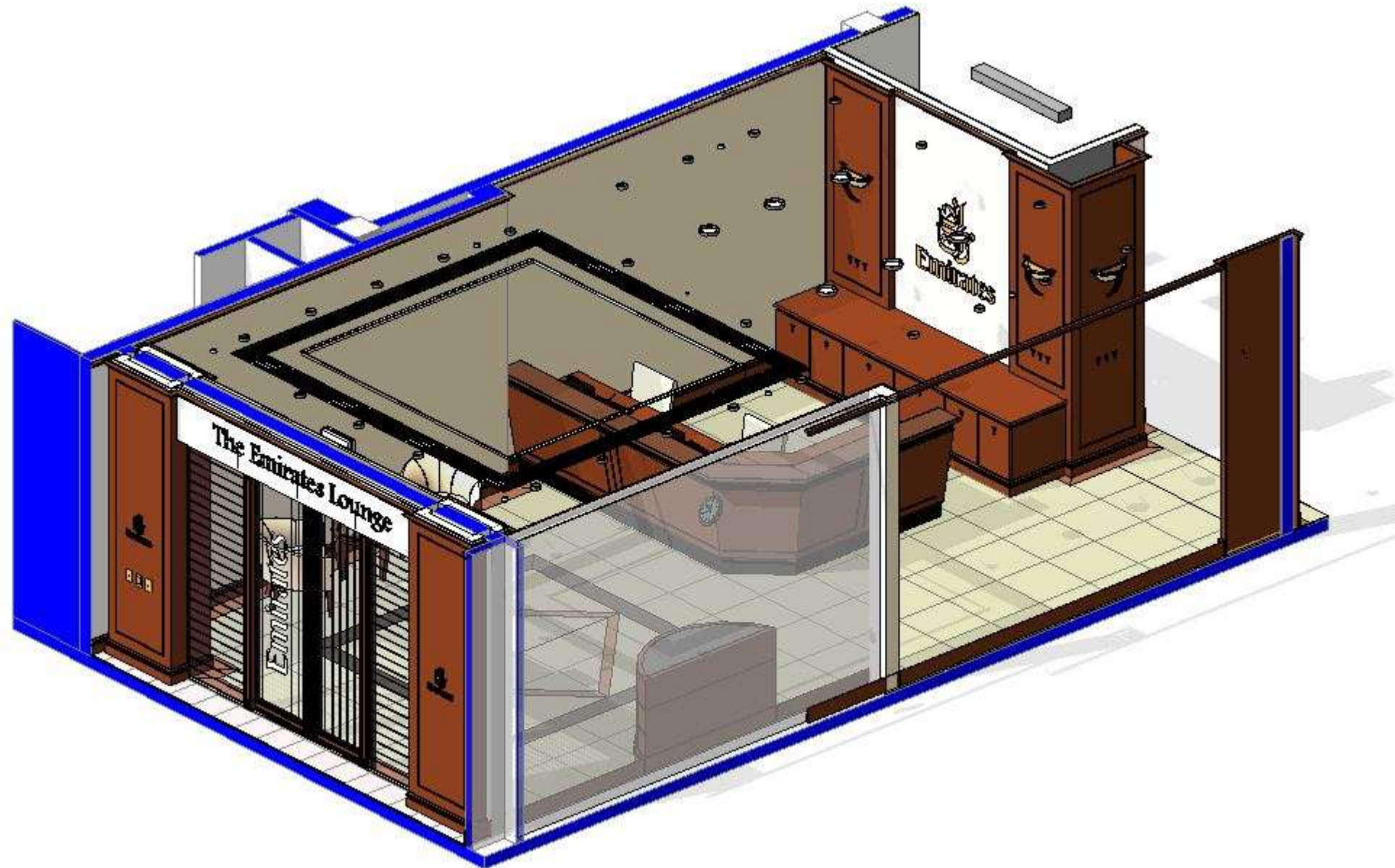
© 2008-2010 Ignite  
1000 002





# Detailed Design

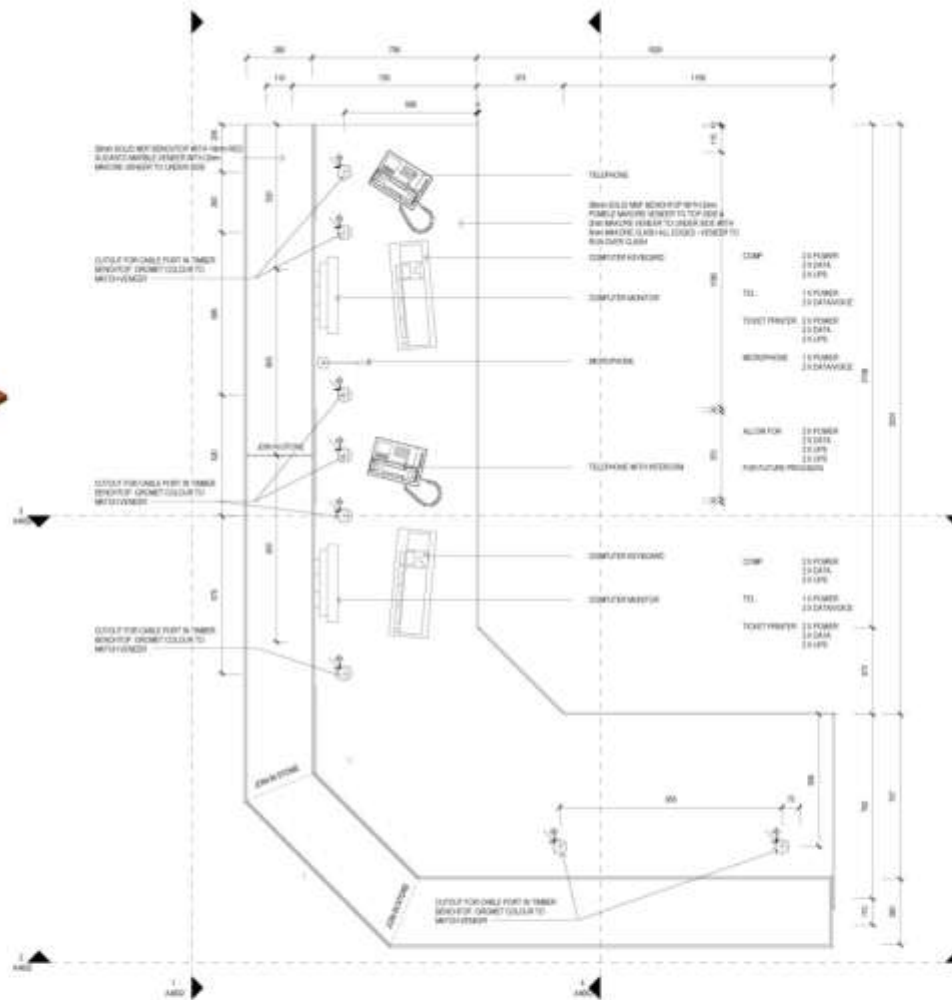
## Emirates Lounge – Auckland International Airport



# Detailed Design

## Emirates Lounge – Auckland International Airport

MATERIAL SCHEDULE		
CODE	NAME	KEYNOTE
M1	Concrete, Polished, Polished, 20mm	2000-000000
M2	Concrete, Polished, 20mm	2000-000000
M3	Concrete, Polished, 20mm	2000-000000
M4	Concrete, Polished, 20mm	2000-000000
M5	Concrete, Polished, 20mm	2000-000000
M6	Concrete, Polished, 20mm	2000-000000
M7	Concrete, Polished, 20mm	2000-000000
M8	Concrete, Polished, 20mm	2000-000000
M9	Concrete, Polished, 20mm	2000-000000
M10	Concrete, Polished, 20mm	2000-000000



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GENERAL NOTES:  
 1. DO NOT SCALE OFF DIMENSIONS.  
 2. CONTRACTOR SHALL VERIFY ALL DIMENSIONS FOR ALL ITEMS ALL DIMENSIONS SHALL BE IN METERS UNLESS OTHERWISE SPECIFIED.  
 3. ARCHITECTS TO BE ADVISED OF ANY VARIATIONS BETWEEN SETS PRIOR TO THE START OF WORK.

REVISIONS	
1	FOR CONSTRUCTION
2	FOR CONSTRUCTION
3	FOR CONSTRUCTION
4	FOR CONSTRUCTION

**AS BUILT**

**JOINERY LEGEND**  
 1. MATERIAL TO MATCH ALL JOINERY TO BE SUPPLIED BY OTHER CONTRACTORS.  
 2. MATERIAL TO MATCH ALL JOINERY TO BE SUPPLIED BY OTHER CONTRACTORS.  
 3. MATERIAL TO MATCH ALL JOINERY TO BE SUPPLIED BY OTHER CONTRACTORS.  
 4. MATERIAL TO MATCH ALL JOINERY TO BE SUPPLIED BY OTHER CONTRACTORS.

1 3D ORTHOGRAPHIC VIEW

2 PLAN 1:10



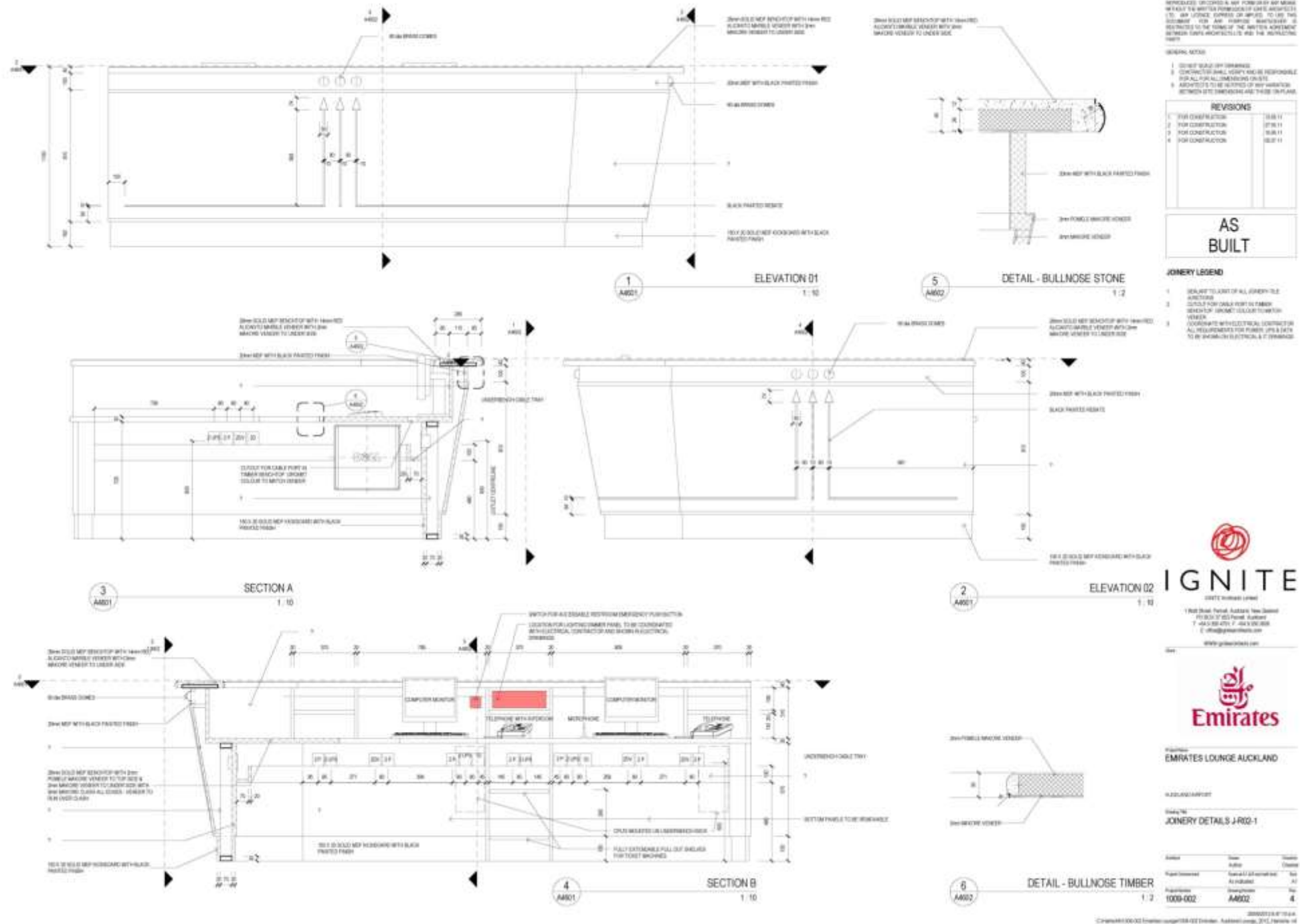
EMIRATES LOUNGE AUCKLAND

Working for  
**JOINERY DETAILS J-R02-1**

Author	Date	Status
Author	10/06/2010	Issue
Check	10/06/2010	Issue
Approval	10/06/2010	Issue
1000-002	A4001	4

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## Emirates Lounge – Auckland International Airport



ALL NOTES, SPECIFICATIONS, THIS BEING INCLUDING THE REVISIONS TO THESE DRAWINGS, SHALL BE THE PROPERTY OF THE ARCHITECT AND SHALL REMAIN SO UNLESS OTHERWISE STATED BY THE ARCHITECT. THE ARCHITECT SHALL BE RESPONSIBLE FOR THE DESIGN AND CONSTRUCTION OF THE WORK. THE ARCHITECT SHALL BE RESPONSIBLE FOR THE DESIGN AND CONSTRUCTION OF THE WORK. THE ARCHITECT SHALL BE RESPONSIBLE FOR THE DESIGN AND CONSTRUCTION OF THE WORK.

GENERAL NOTES

1. VERIFY ALL DIMENSIONS
2. VERIFY ALL DIMENSIONS
3. VERIFY ALL DIMENSIONS
4. VERIFY ALL DIMENSIONS

NO.	DESCRIPTION	DATE
1	FOR CONSTRUCTION	18/11
2	FOR CONSTRUCTION	17/11
3	FOR CONSTRUCTION	16/11
4	FOR CONSTRUCTION	15/11

**AS BUILT**

**JONERY LEGEND**

1. SEALANT TO JUNCTION OF ALL JOINABLE SURFACES
2. CHECK FOR GAPS AND FILL WITH TIMBER GRAIN MATCHING JOINTS TO MATCH JOINTS
3. COORDINATE WITH ELECTRICAL CONTRACTOR ALL REQUIREMENTS FOR PIPES & DATA TO BE INSTALLED IN ELECTRICAL & DATA



EMIRATES LOUNGE AUCKLAND

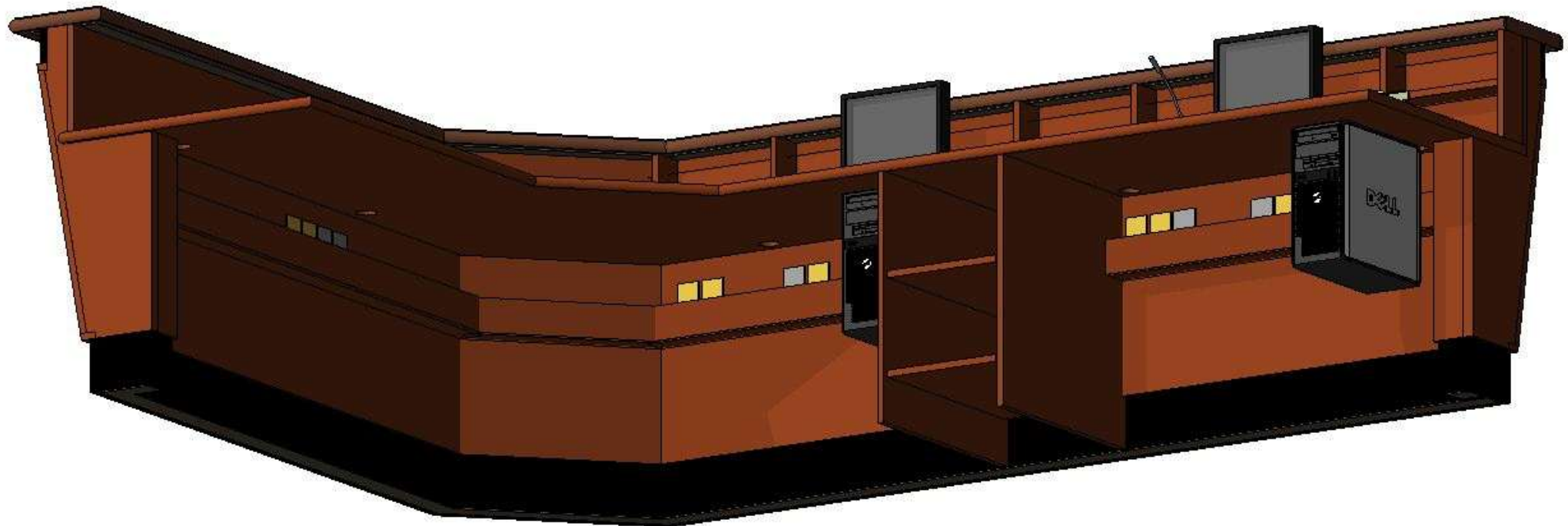
WORKING TITLE: JONERY DETAILS J-R02-1

Author	Date	Status
Ignite	18/11/2018	Final
Ignite	17/11/2018	Approved
Ignite	16/11/2018	Approved
Ignite	15/11/2018	Approved

1000-002 AM02 4



## Emirates Lounge – Auckland International Airport

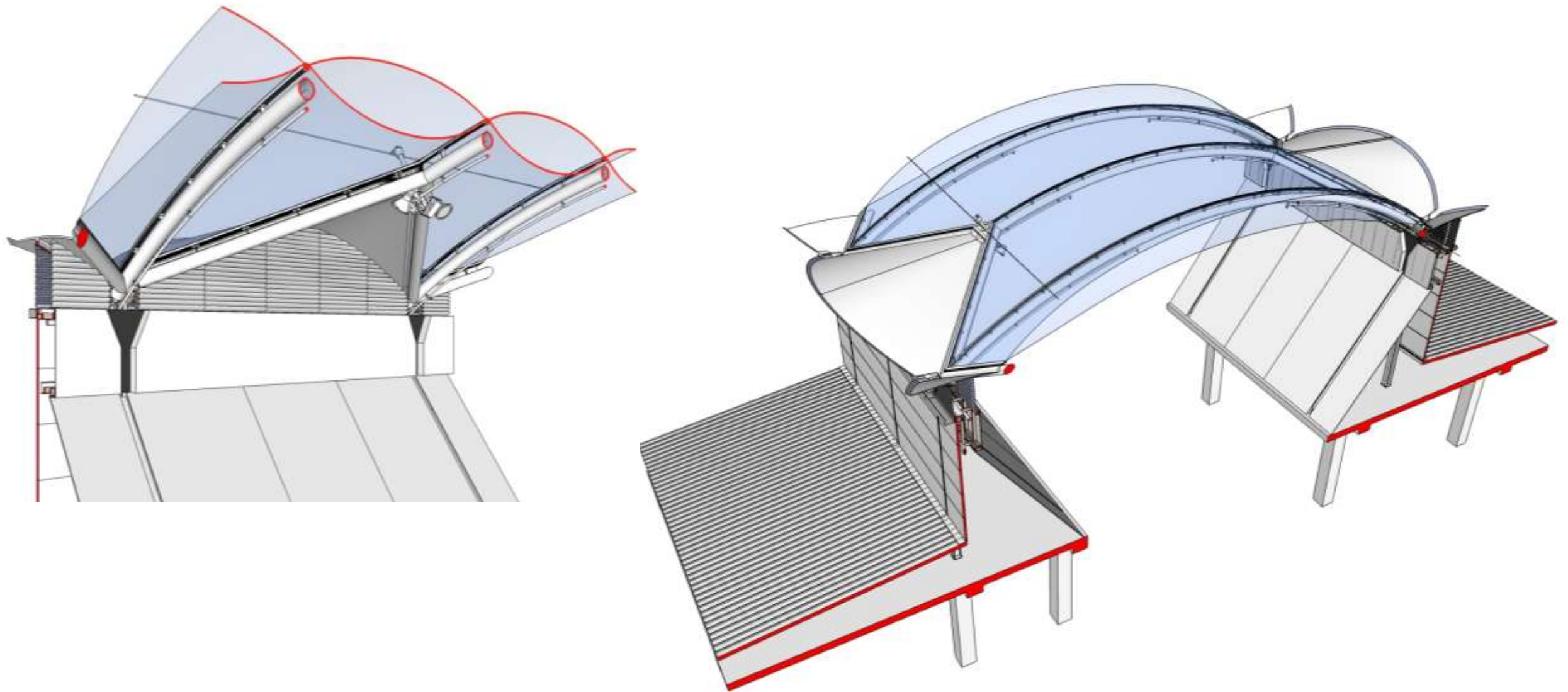


## Emirates Lounge – Auckland International Airport



# Detailed Design

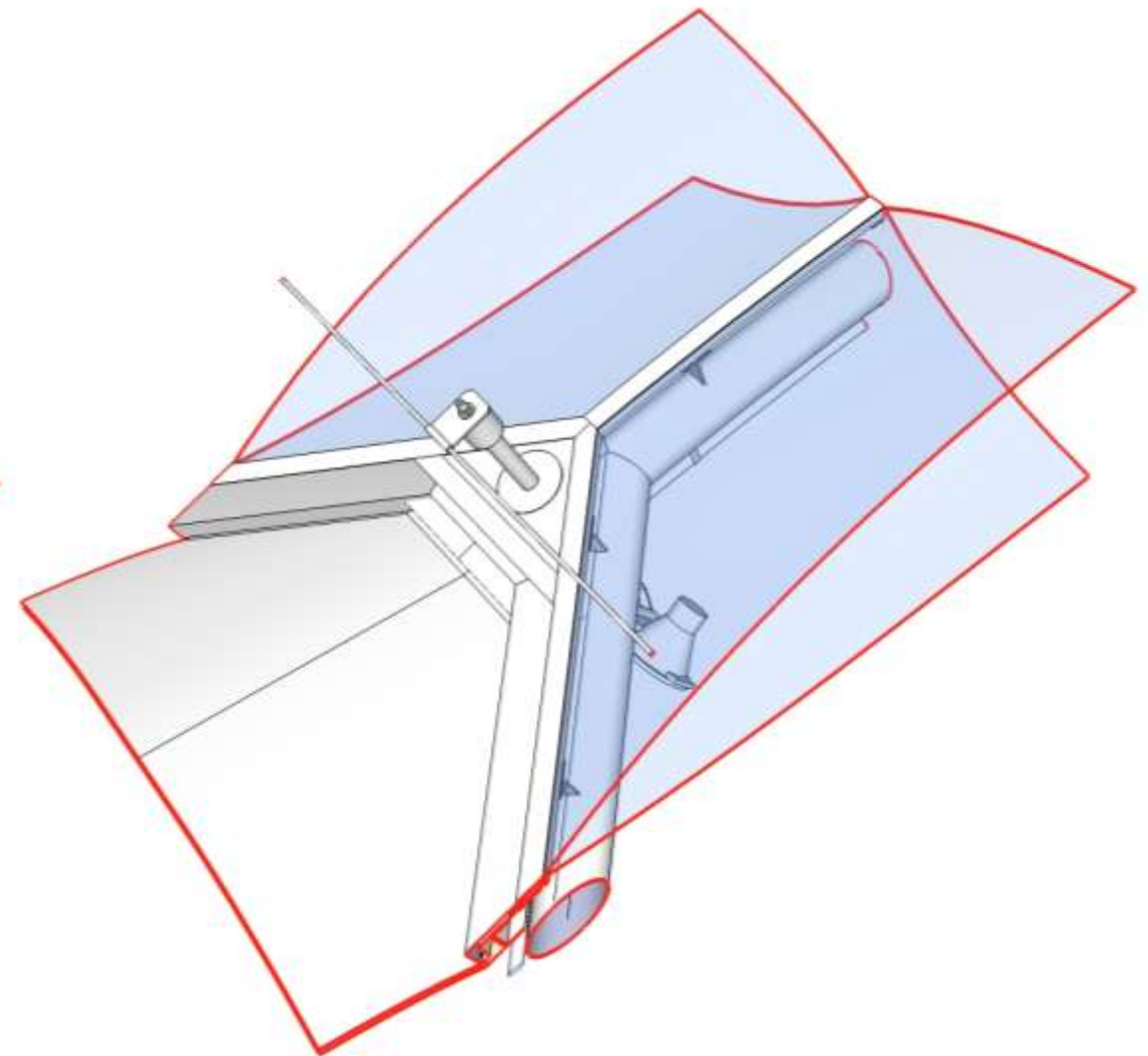
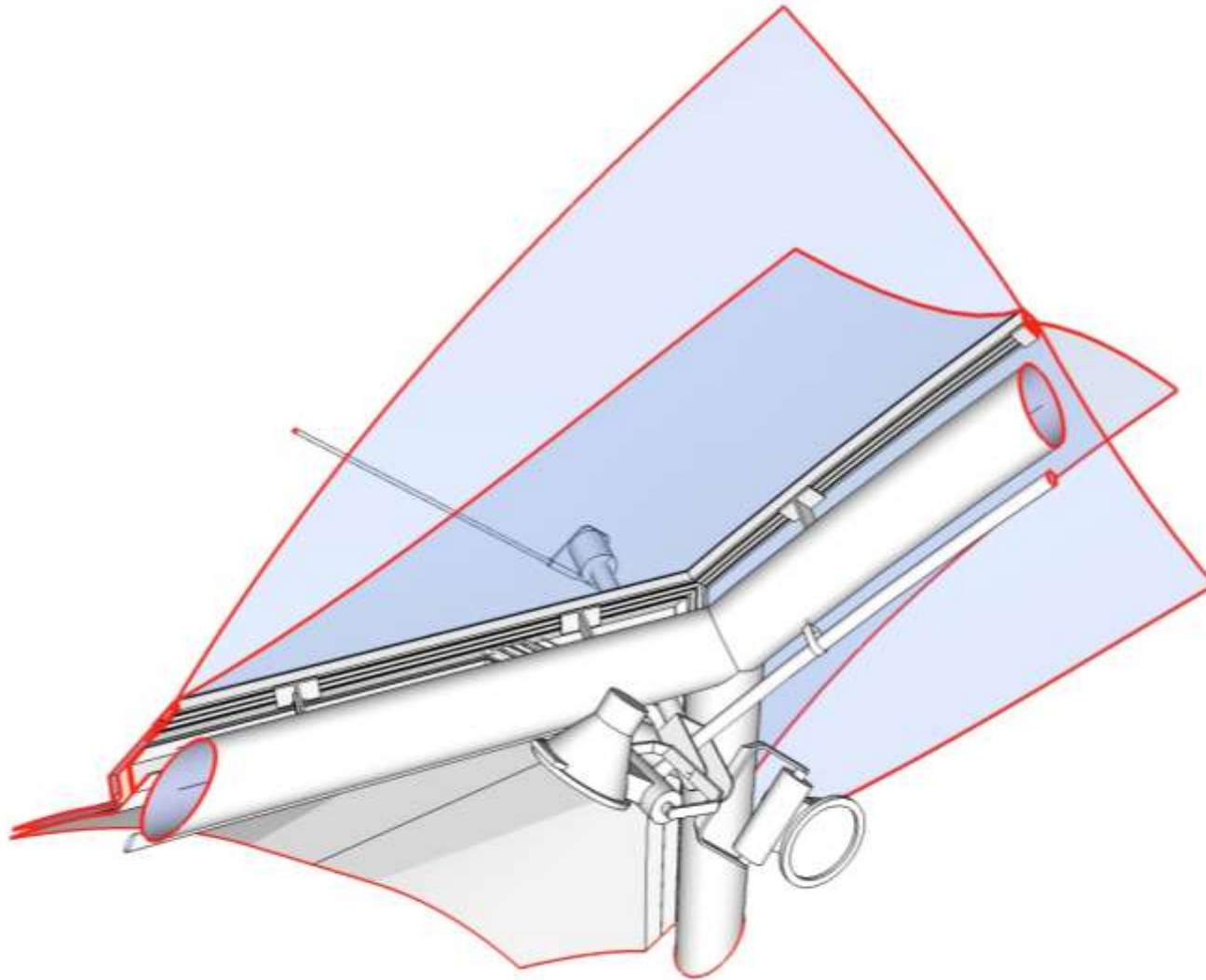
## Te AWA, The Base - ETFE Roof





# Detailed Design

## Te AWA, The Base - ETFE Roof





# Detailed Design

## Te AWA, The Base - ETFE Roof





# Detailed Design

## Te AWA, The Base - ETFE Roof

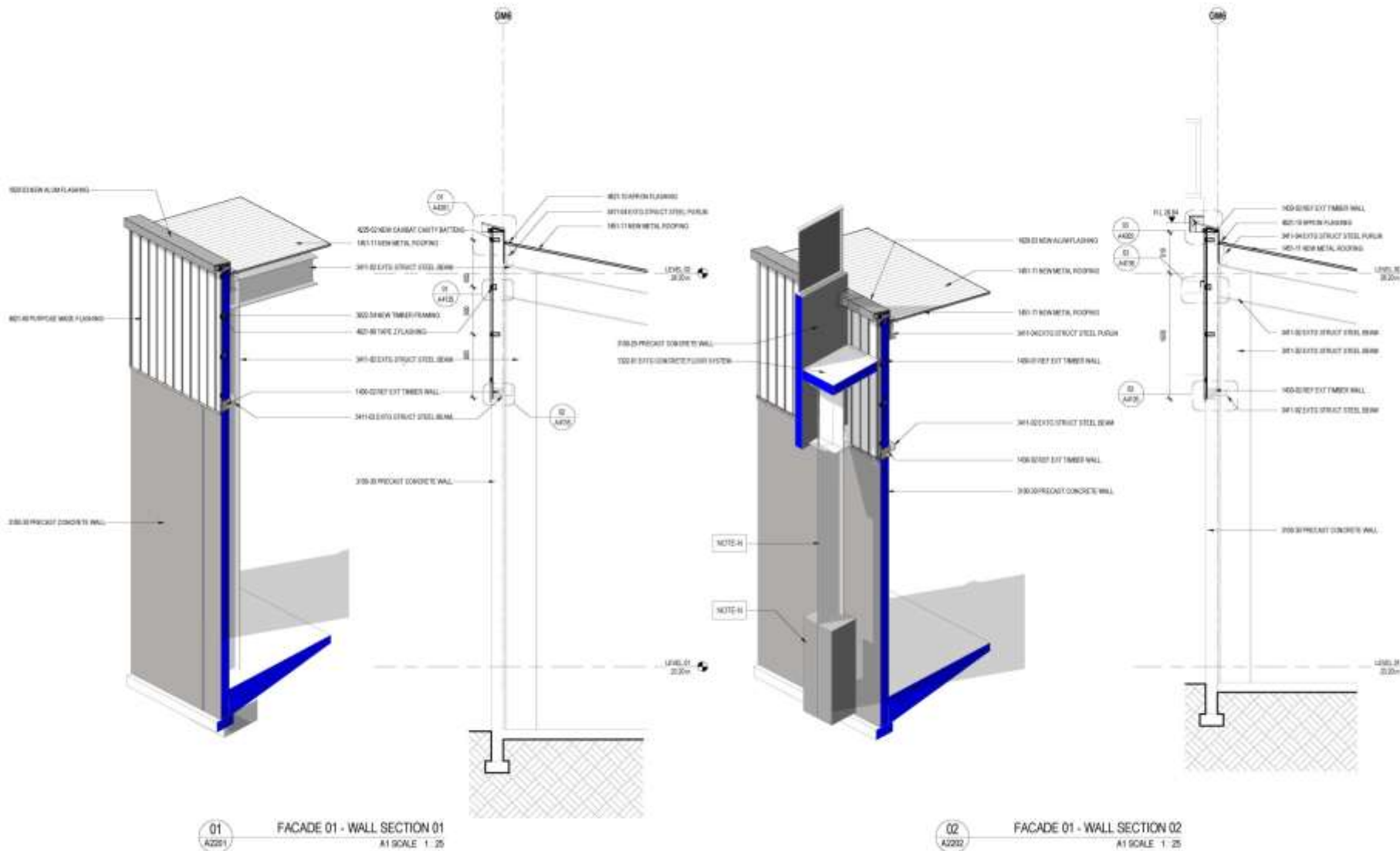






# Detailed Design

## Presentation of Information



KEY	KEYNOTE LEGEND	DESCRIPTION
100-00 EXT CONCRETE FLOOR SYSTEM	EXISTING SUSPENDED CONCRETE FLOOR TO REMAIN	
100-01 REF EXT TIMBER WALL	EXISTING 100-01 4x4 TIMBER FRAMED LEAD BEARING WALL, STUDS @ 24" O.C. TO BE CONFIRMED ON SITE. ALL DAMAGED AND/OR AFFECTED TIMBER FRAMING REPLACES WITH MATS AND WITH 1/2" BRATTLE TIMBER. REMAINING EXISTING TIMBER FRAMING TO BE APPLIED WITH TWO APPLICATIONS OF FRAME-GUARD TREATMENT	
100-02 REF EXT TIMBER WALL	EXISTING 100-02 4x4 TIMBER FRAMED LEAD BEARING WALL, STUDS @ 24" O.C. TO BE CONFIRMED ON SITE. ALL DAMAGED AND/OR AFFECTED TIMBER FRAMING REPLACES WITH MATS AND WITH 1/2" TREATED TIMBER. REMAINING EXISTING TIMBER FRAMING TO BE APPLIED WITH TWO APPLICATIONS OF FRAME-GUARD TREATMENT	

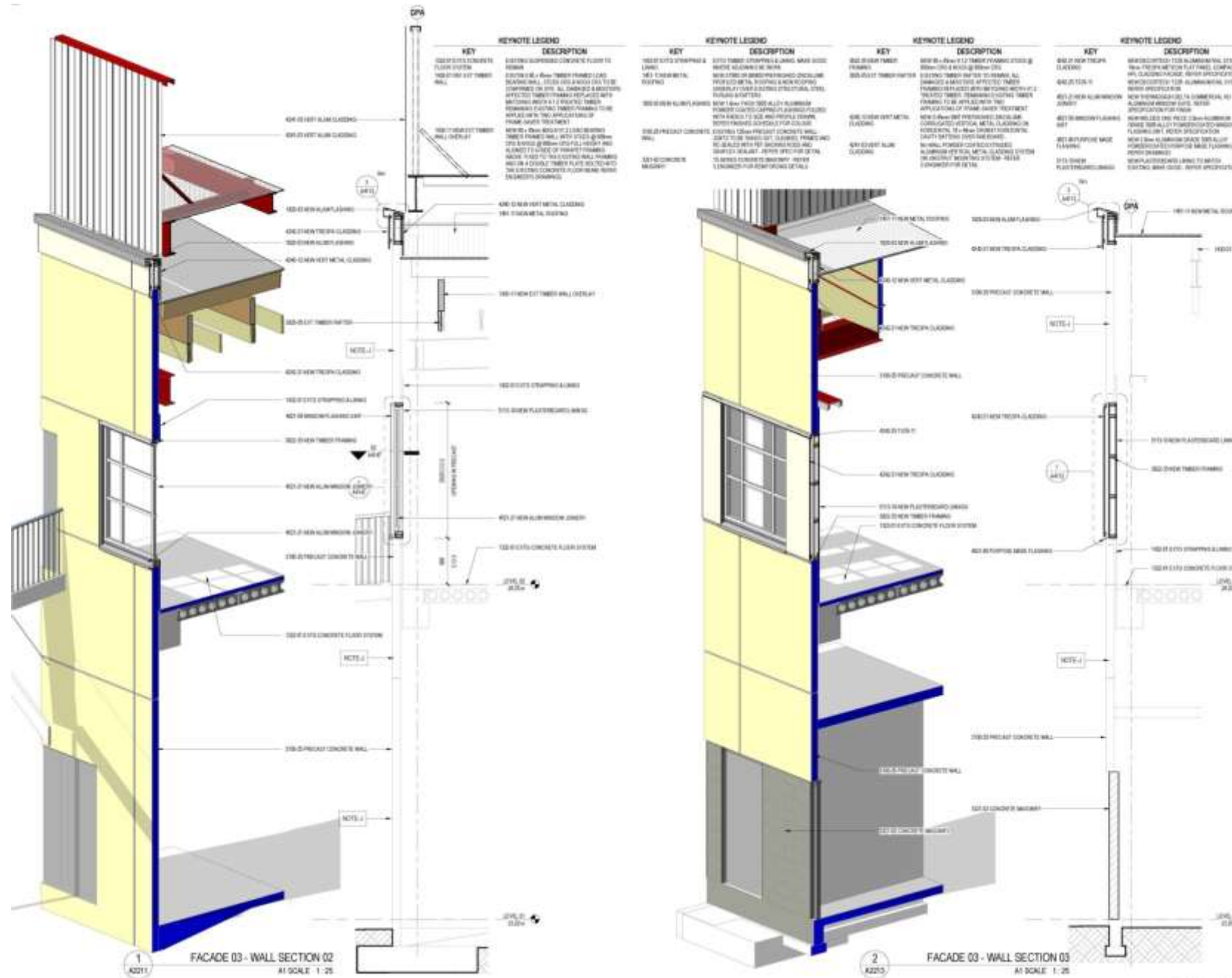
KEY	KEYNOTE LEGEND	DESCRIPTION
100-01 NEW METAL ROOFING	NEW 100-01 18" GALVALUM METAL ROOFING WITH 18" GALVALUM METAL ROOFING UNDERLAY OVER EXISTING STRUCTURAL STEEL PURLIN & RAFTERS	
100-02 NEW ALUM FLASHING	NEW 100-02 1/2" THICK 3003 ALUMINUM ANODIZED FLASHING. REFER DRAWING FOR COLOR	
100-03 PRECAST CONCRETE WALL	EXISTING 100-03 PRECAST CONCRETE WALL, JOINTS TO BE BASED-OUT, CLEANED, PRIMED AND RE-SEALED WITH PEP BACKING FEED AND DAMPERS. REFER SPEC FOR DETAIL	
100-04 PRECAST CONCRETE WALL	EXISTING 100-04 PRECAST CONCRETE WALL, JOINTS TO BE BASED-OUT, CLEANED, PRIMED AND RE-SEALED WITH PEP BACKING FEED AND DAMPERS. REFER SPEC FOR DETAIL	

KEY	KEYNOTE LEGEND	DESCRIPTION
300-01 EXT STRUCT STEEL BEAM	EXISTING STRUCTURAL STEEL BEAM TO REMAIN. MAKE GOOD AND PAINTED	
300-02 EXT STRUCT STEEL PURLIN	EXISTING STRUCTURAL STEEL PURLIN TO REMAIN. MAKE GOOD AND PAINTED	
300-03 NEW TIMBER FRAMING	NEW 300-03 2x6x8 TIMBER FRAMING @ 24" O.C. @ 100-01 & 100-02	
400-01 NEW CAVITY SYSTEMS	NEW 400-01 1/2" NEW CAVITY SYSTEMS. REFER DRAWING FOR DETAIL	
400-02 NEW METAL ROOFING	NEW 400-02 18" GALVALUM METAL ROOFING WITH 18" GALVALUM METAL ROOFING UNDERLAY OVER EXISTING STRUCTURAL STEEL PURLIN & RAFTERS	

KEY	KEYNOTE LEGEND	DESCRIPTION
400-03 PURPOSE MADE FLASHING	NEW 400-03 1/2" THICK 3003 ALUMINUM ANODIZED PURPOSE MADE FLASHING. REFER DRAWING	
400-04 EXT FLASHING	NEW 400-04 1/2" THICK 3003 ALUMINUM ANODIZED FLASHING. REFER SPEC FOR DETAIL	

# Detailed Design

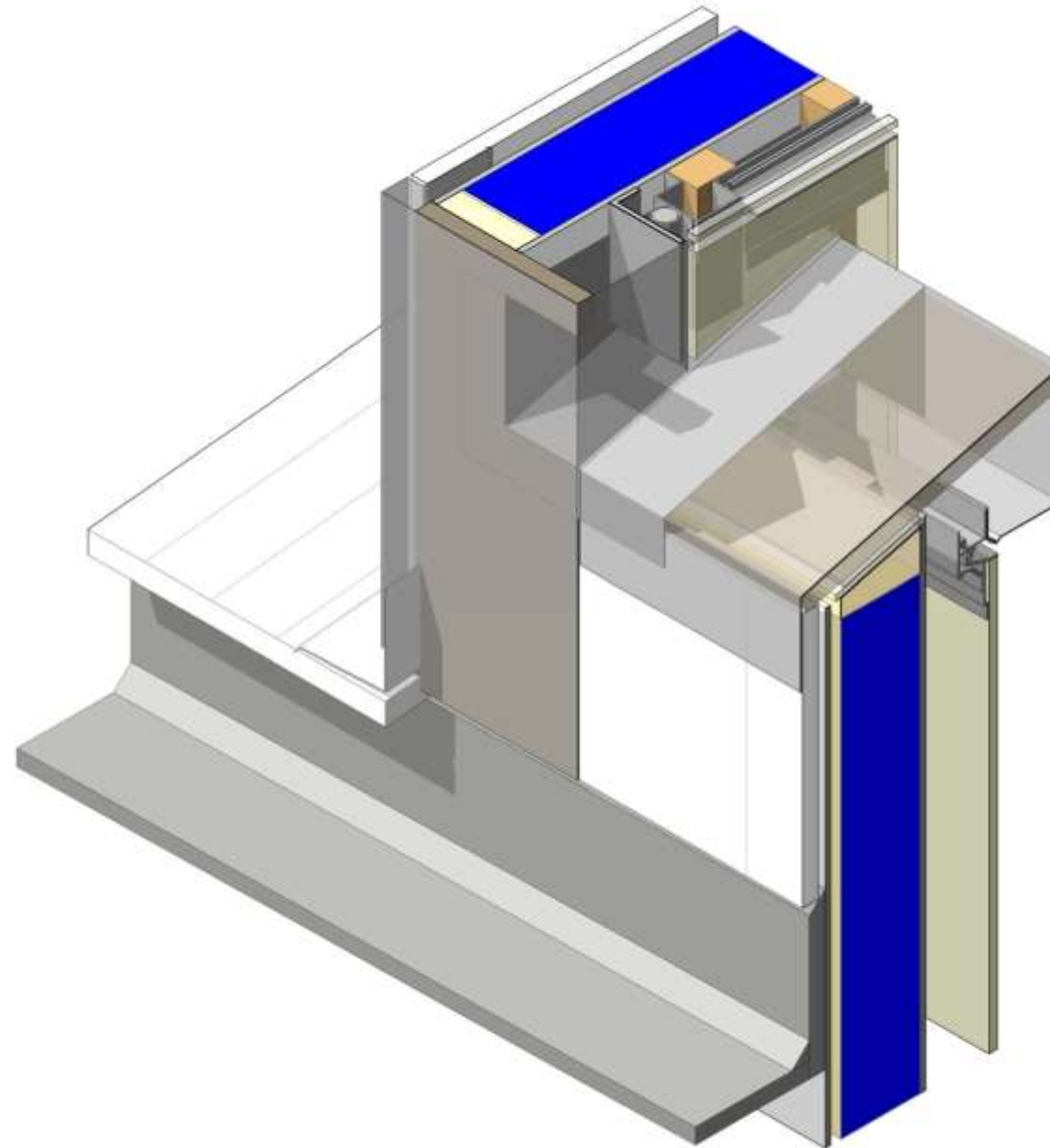
## Presentation of Information



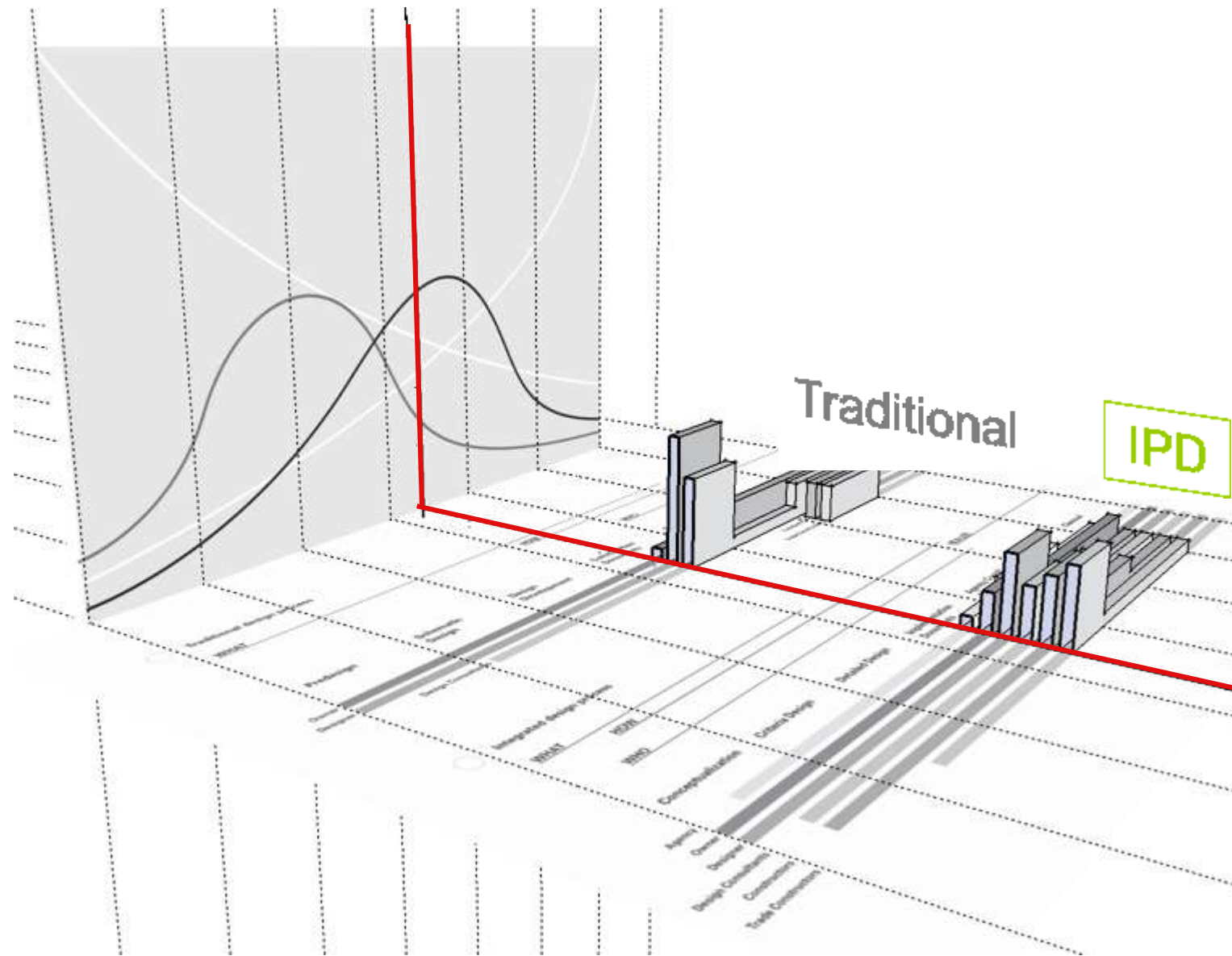


# Level of Detail (LOD) 500 – Full Virtual Construction

## Complex junctions resolved



# Implementation Documents



During the Implementation Documents phase emphasis shifts to **HOW** the systems and structure will be created...

## Outcomes

### Finalize:

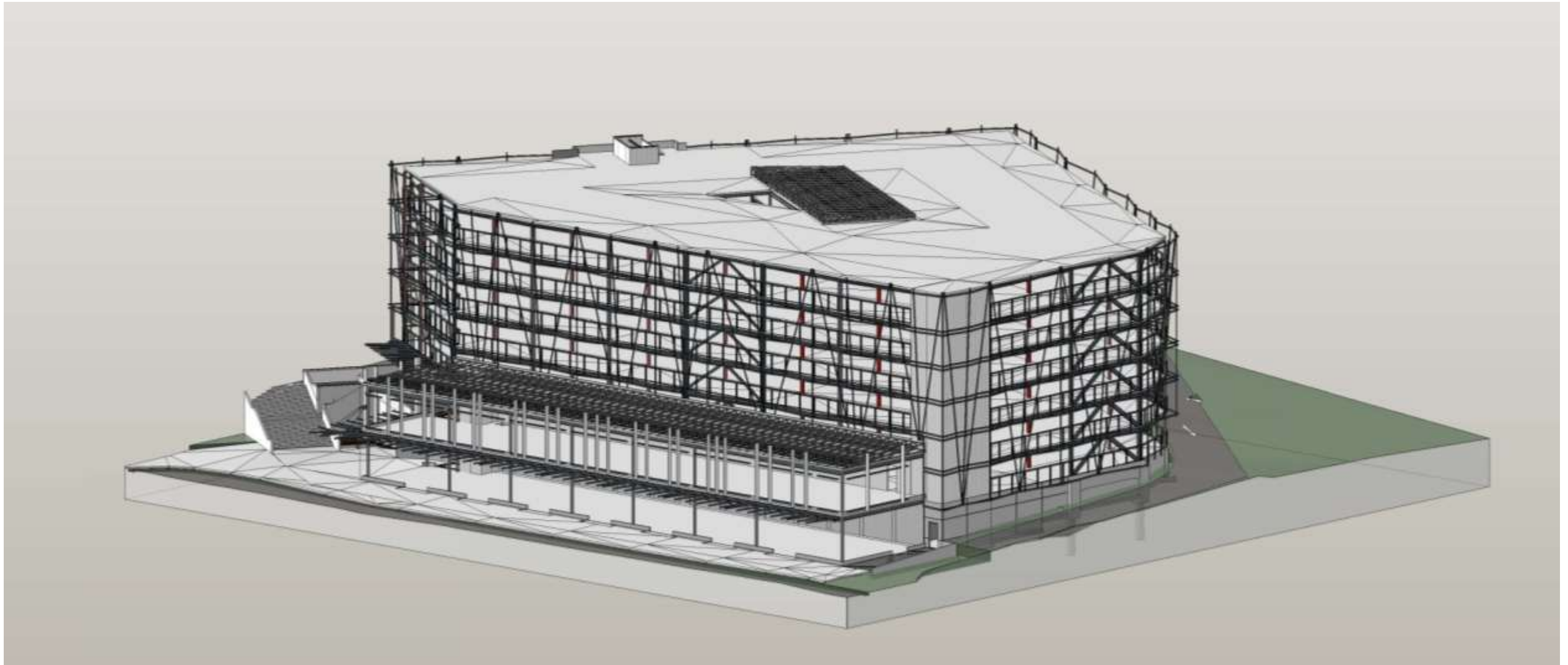
- Construction Means, Methods & Schedule
- Cost
- Specifications

**Visualize** project for the bank, other bidders

**Complete** 'shop drawings'  
**Start prefabricating** some systems

# Implementation Documents

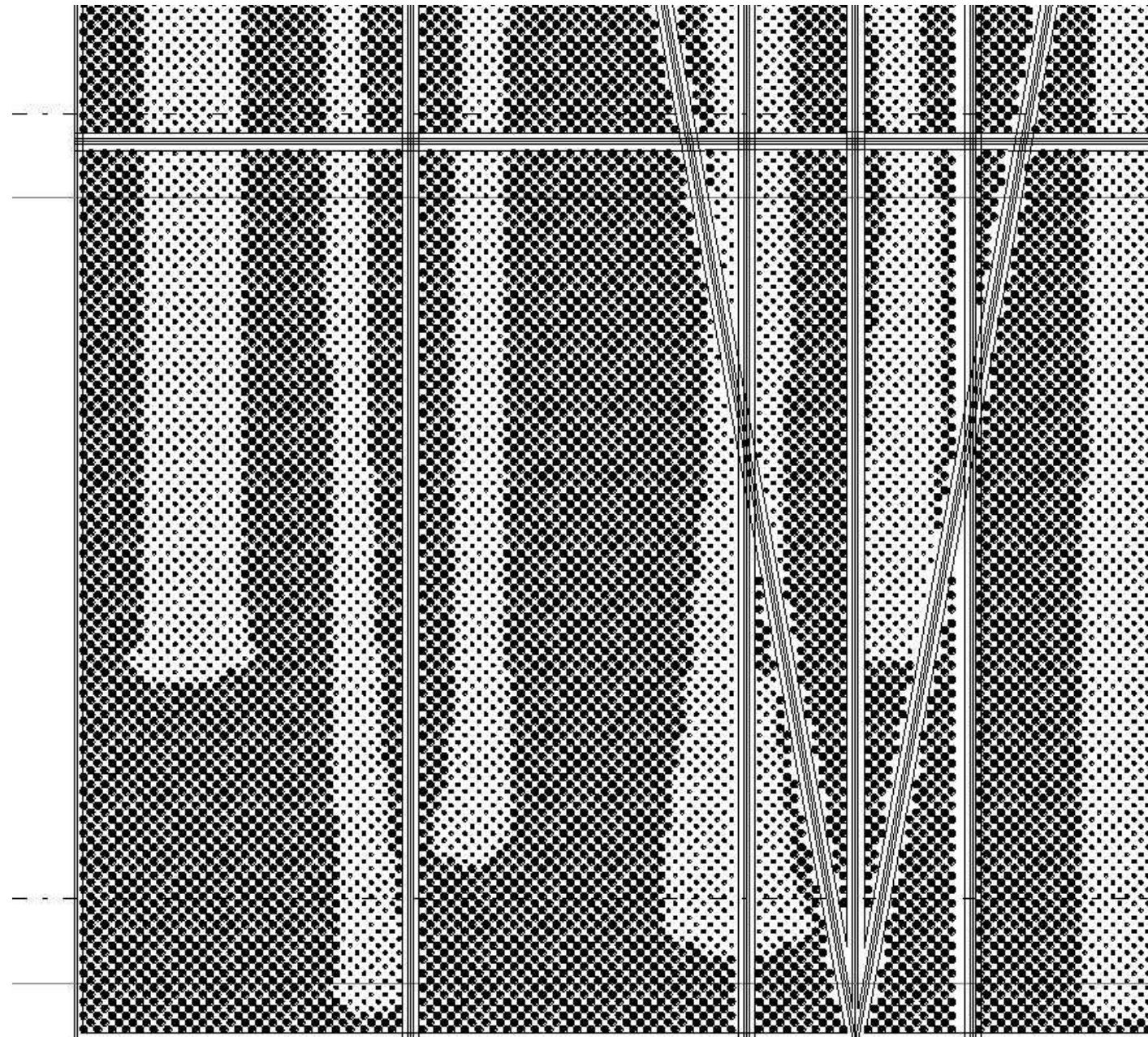
## Auckland Hospital Car Park – Model data to D&H Steel





# Implementation Documents

## Auckland Hospital Car Park – Data to China for CNC manufacture of panels





# Implementation Documents

**Auckland Hospital Car Park – Offsite manufacture: no on-site measure!**





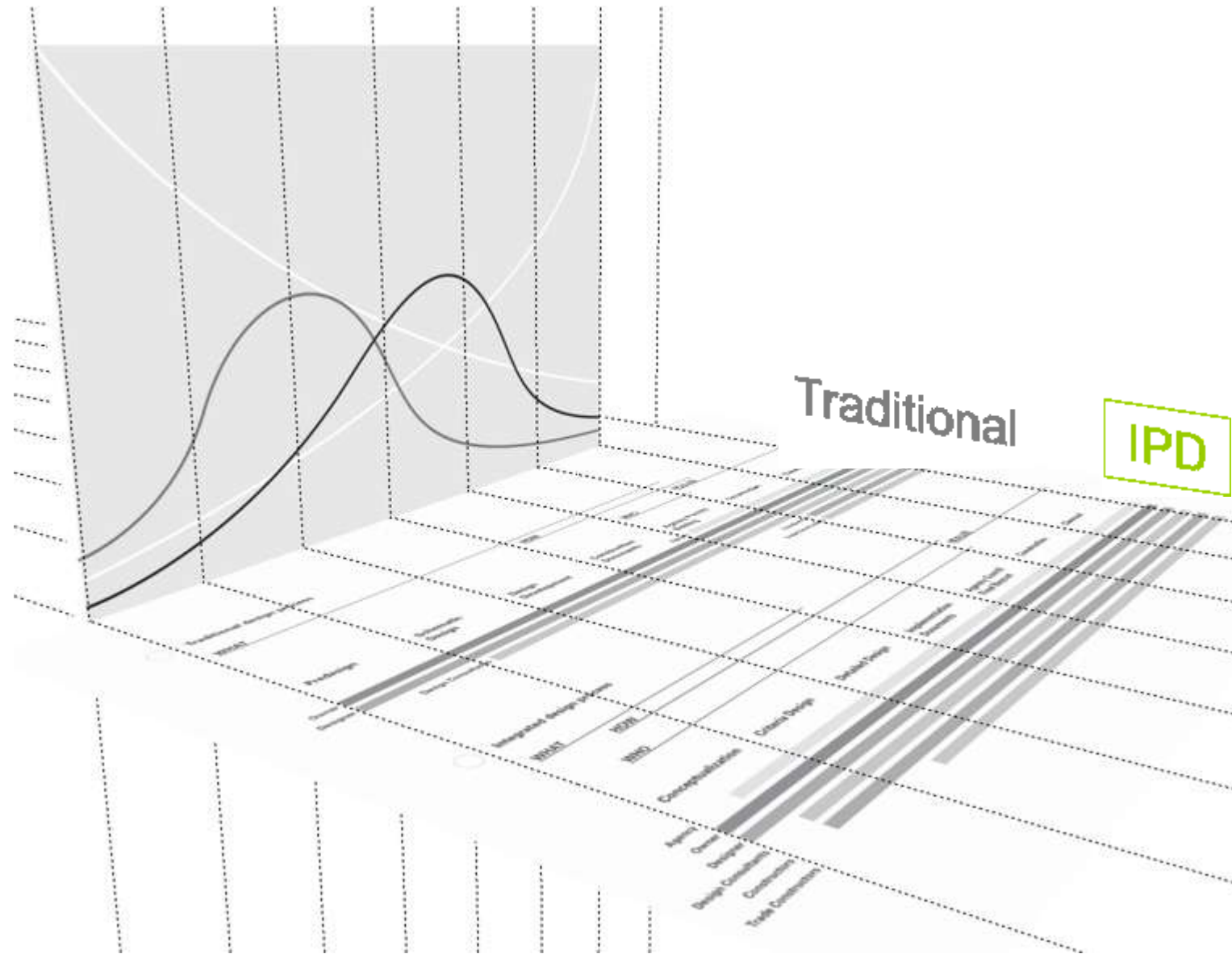
# Implementation Documents

## Auckland Hospital Car Park





# Territorial Authority Review

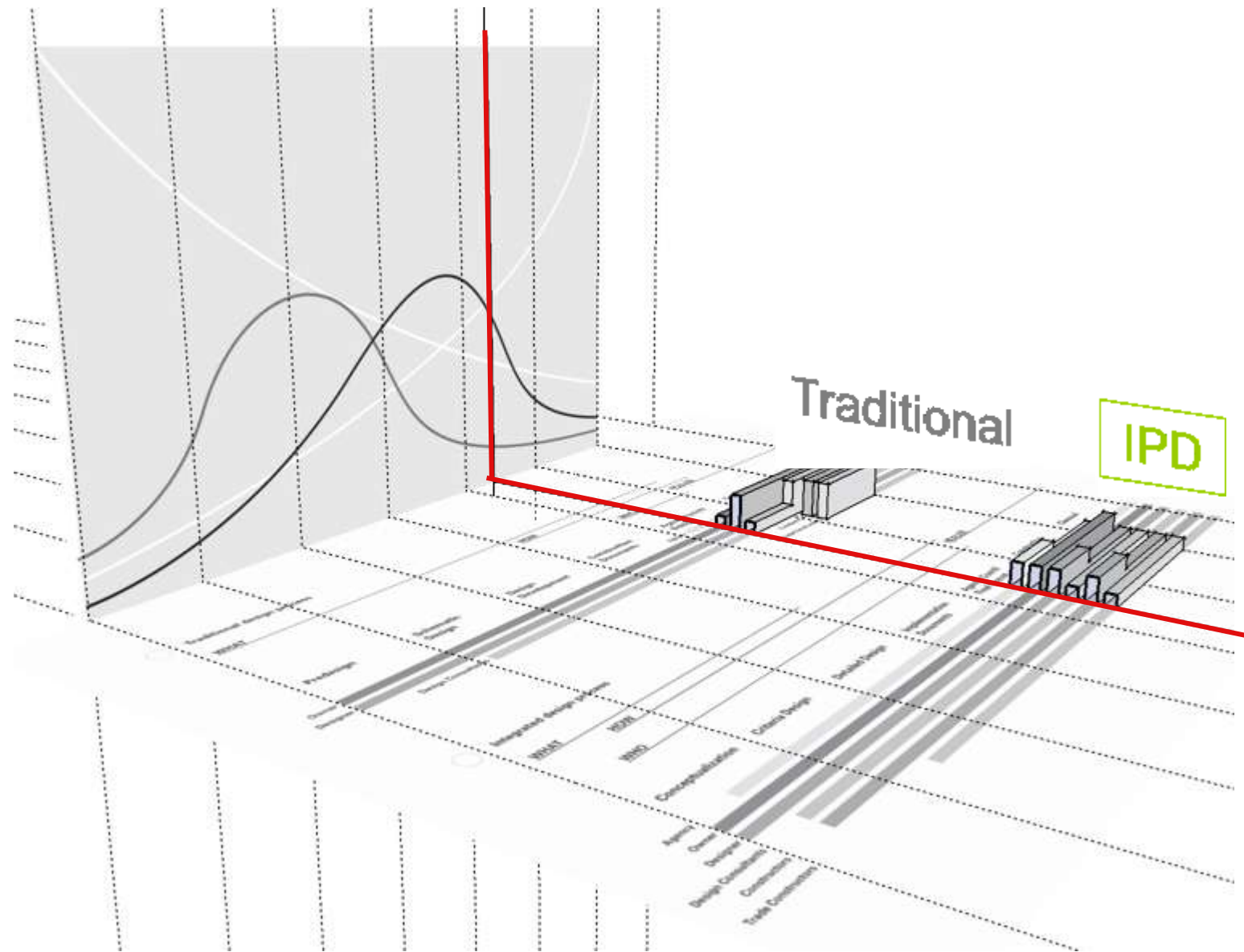


Early involvement and validation by agencies shortens the permitting process...

## Outcomes

**Obtain** all necessary permits and approvals

- Electronic (on-line) lodgement of data streamlines process
- T.A. interrogates BIM model for design



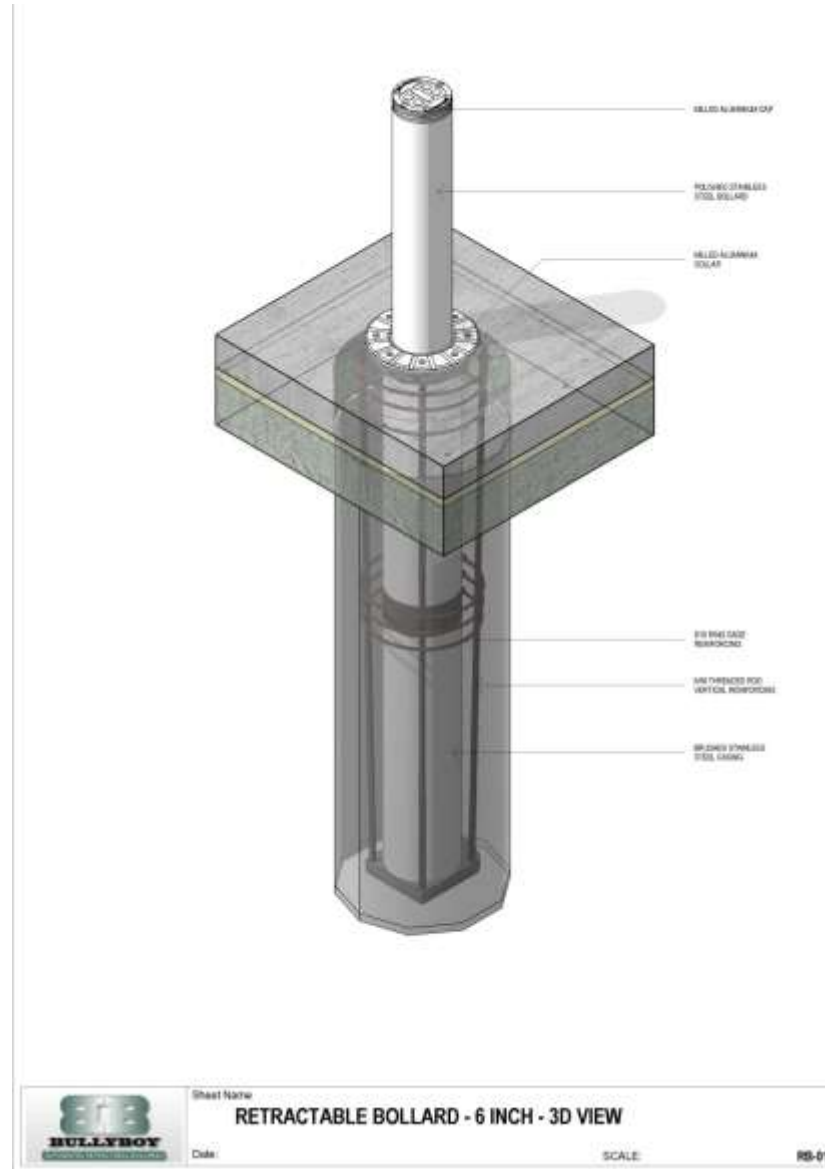
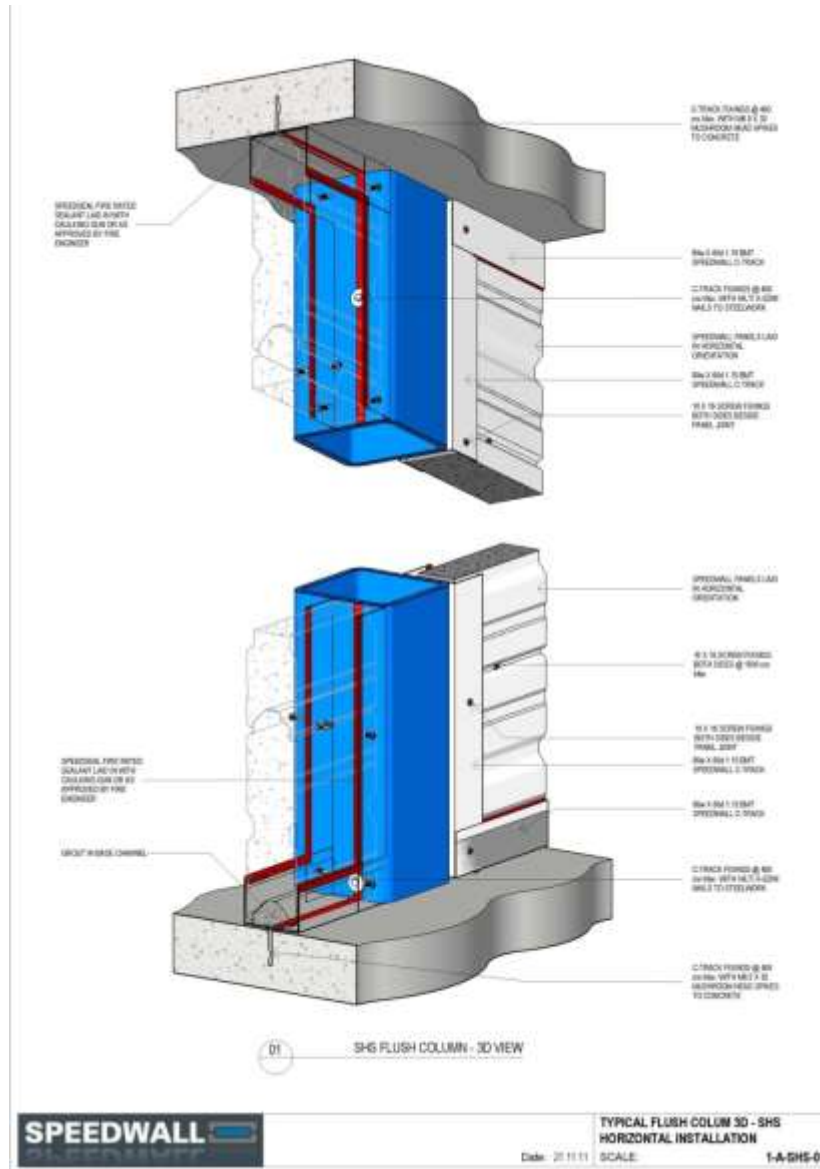
The Procurement phase is much shorter since most work is already contracted for...

## Outcomes

**Put in place** commitments for all work, materials and equipment needed to complete the project

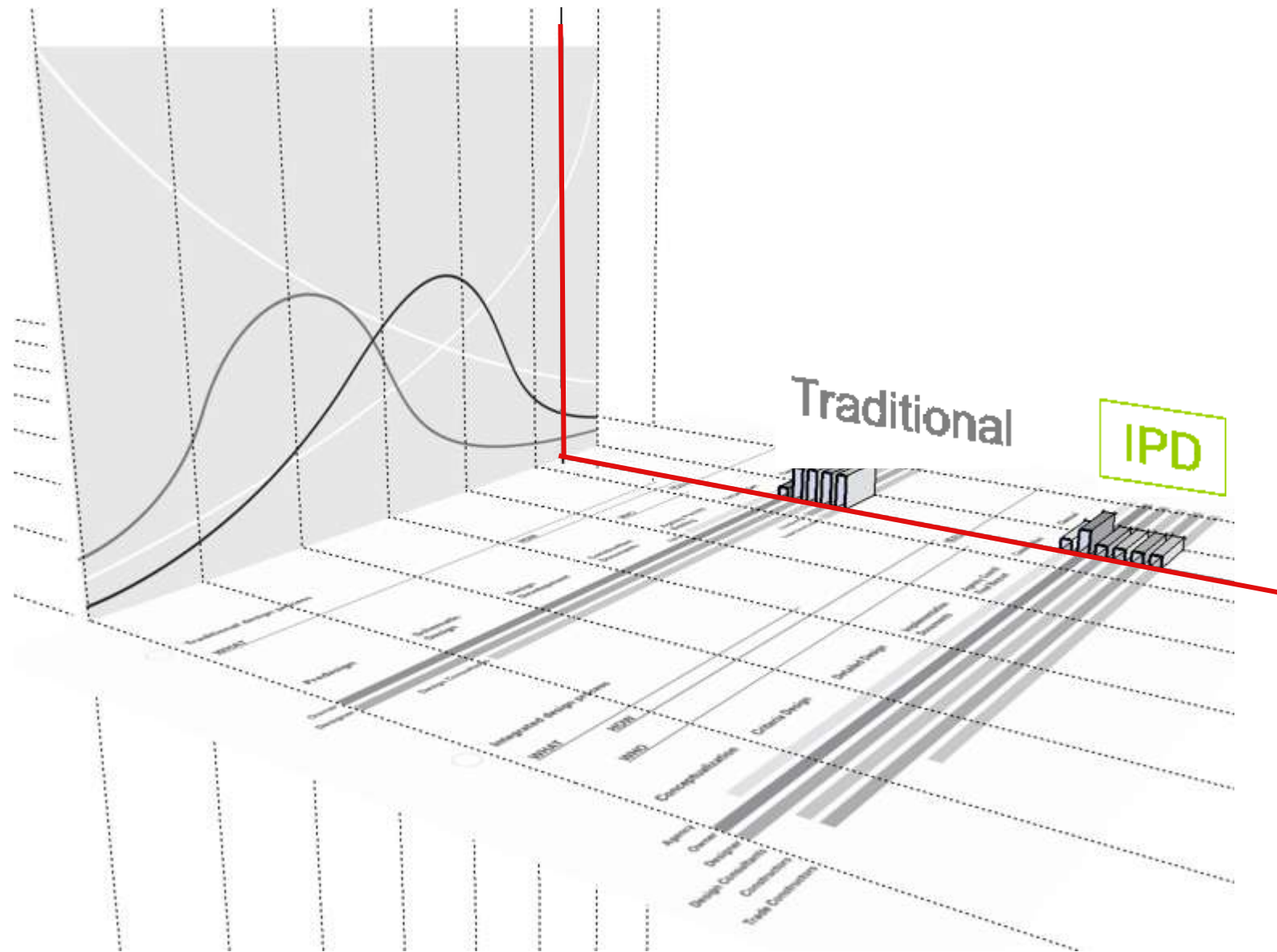
- Off-site manufacture underway
- Greater % of IPD project is constructed off-site = improvement in quality
- Integrated supply chain

## IGNITE's current work with the supply chain



Build national library - Masterspec





The benefits of the integrated process are realised in Construction. This phase is about quality control and cost monitoring.

## Outcomes

### Complete the project

- Minimal RFIs from major trades
- Less contract admin effort required
- Lean Planning
- BIM model used for location-based management

# Construction

## Off-site CNC





## Kitset of parts





# Construction

## Highest quality



## Location-based Site Management / Flow-line Scheduling

Seppänen et al: The Combination of Last Planner System and Location-Based Management System

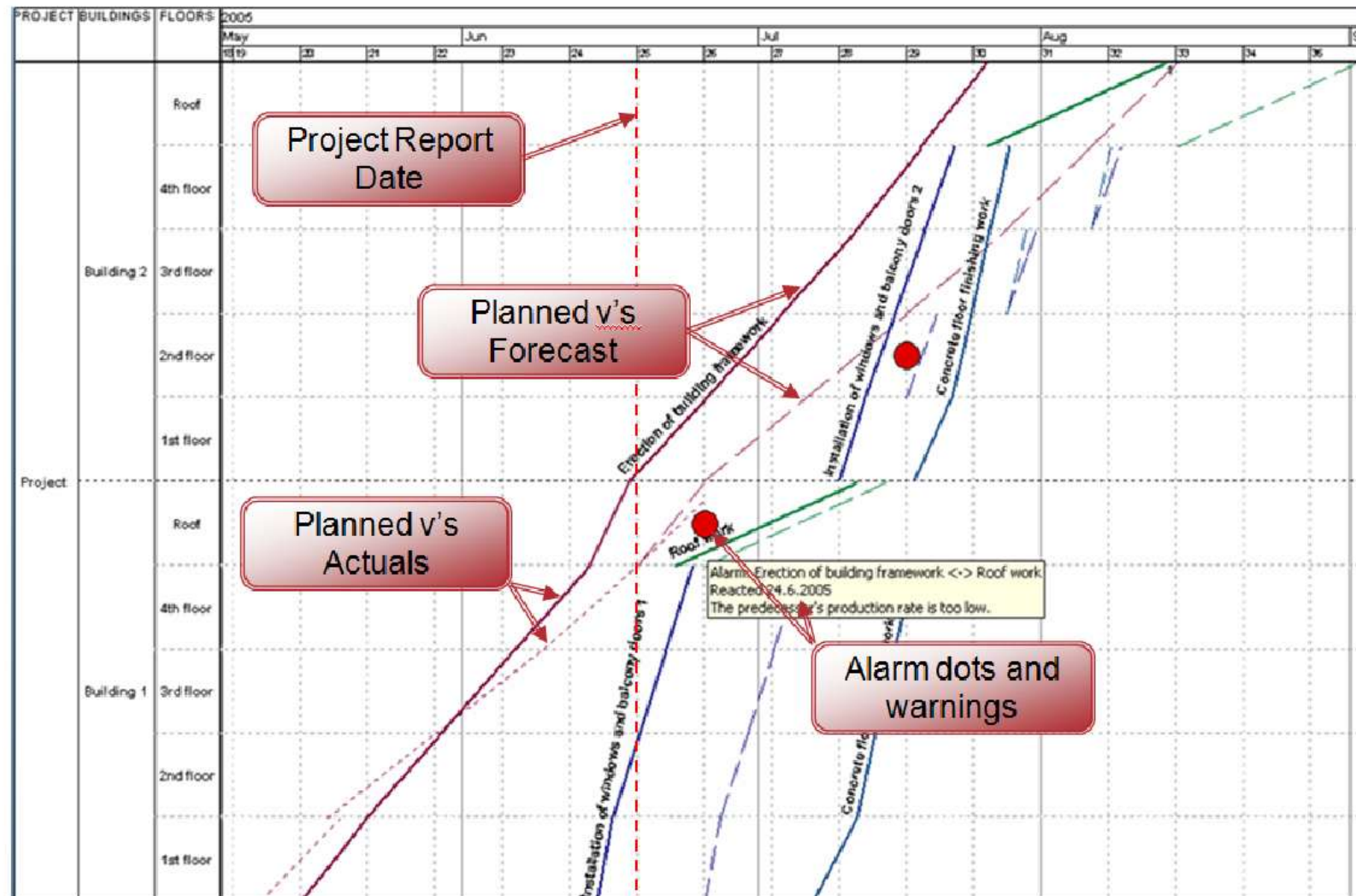


Figure 1: A flowline figure with the plan (solid line), actual (dotted line), forecast (dashed line), and alarms (red dots) shown



## Location-based Site Management / Flow-line Scheduling

Seppänen et al: The Combination of Last Planner System and Location-Based Management System

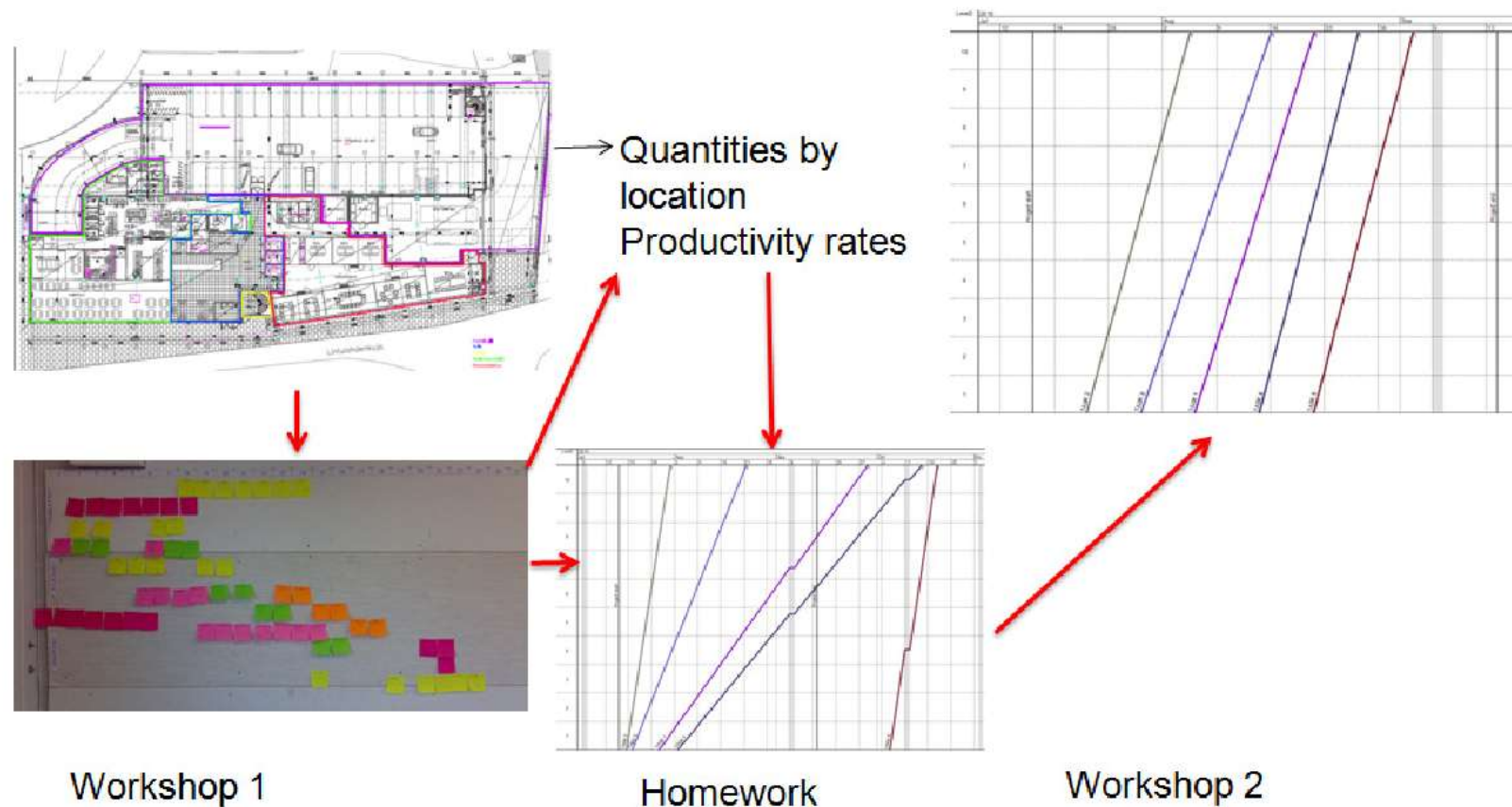
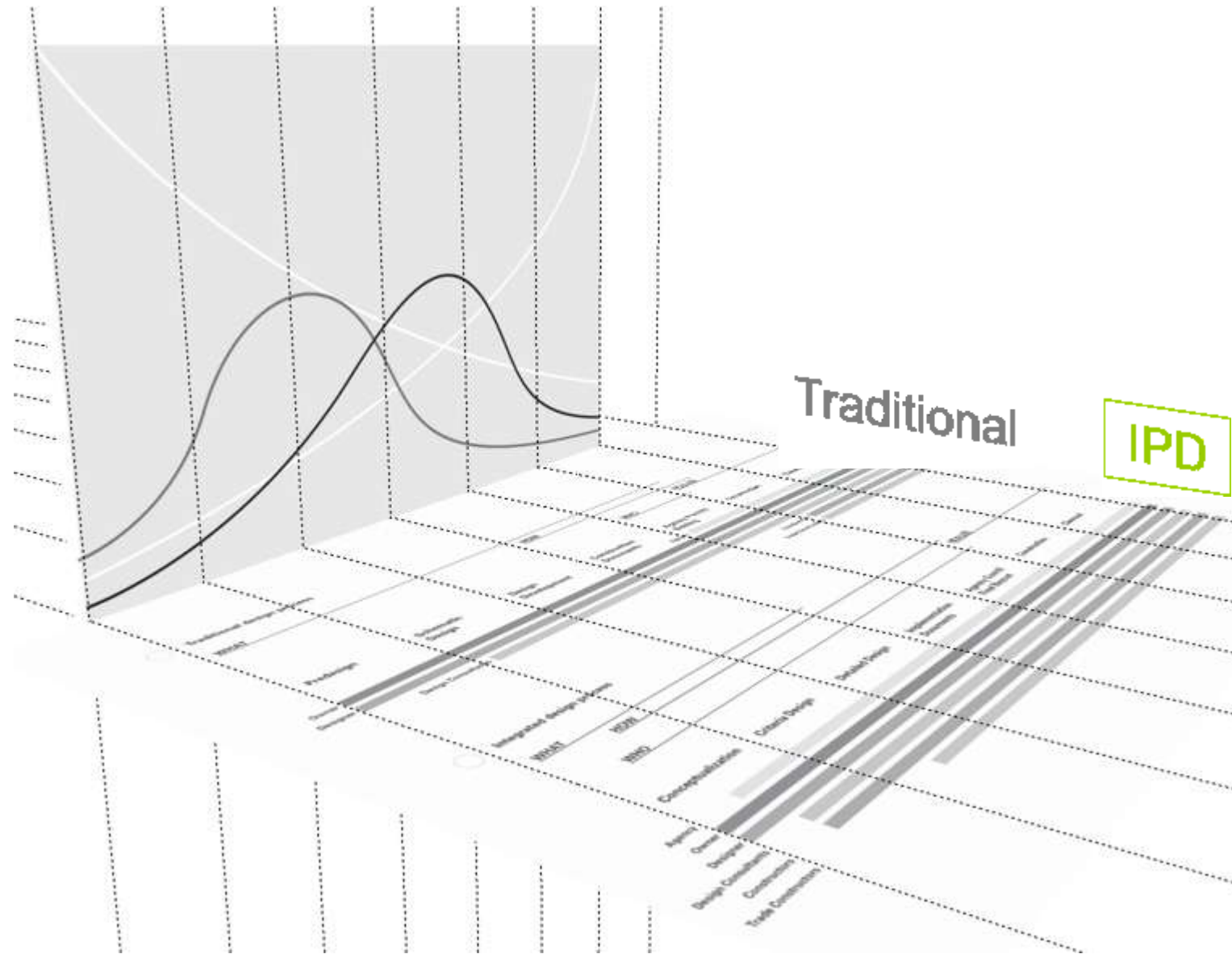


Figure 2: Proposed phase scheduling process. Workshop 1 is a pull scheduling session where Location Breakdown Structure of the phase is defined, and tasks and logic are captured using the familiar Last Planner sticky note method. The second workshop starts with an unaligned schedule with one crew working in each task. Aligning the production rates is done collaboratively in workshop 2. The end result is an aligned schedule capturing production rate commitments of all participants.

# Closeout



An intelligent 3D model is delivered to the owner...

## Outcomes

Deliver a complete 'as-built' model to the owner

- Life-cycle costs embedded in model
- Asset management plan linked to as-built model



# Closeout

## Files linked to Revit Model via SQL Database

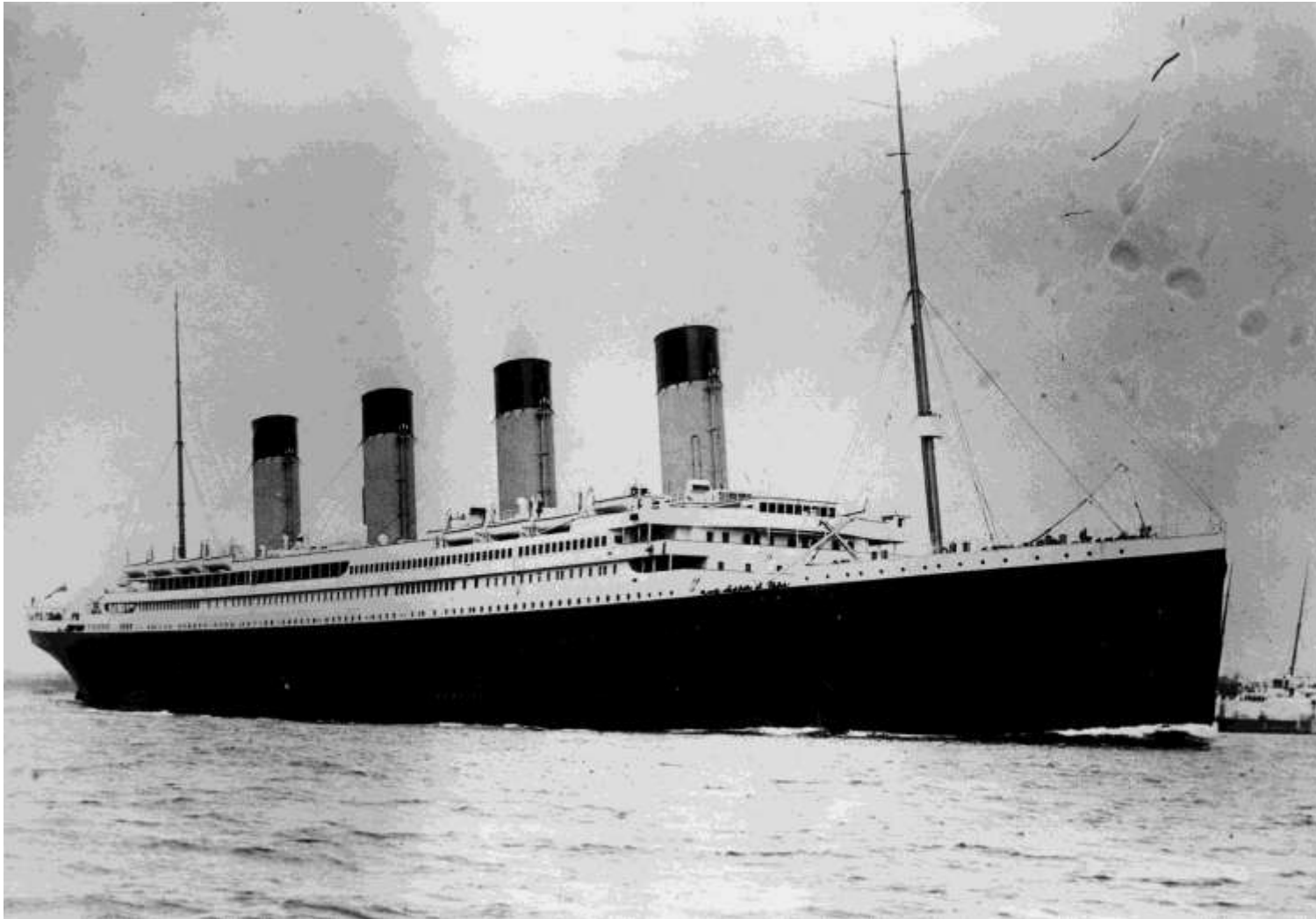
The screenshot displays the SPM ASSETS software interface. At the top left is the SPM ASSETS logo. A navigation sidebar on the left includes options: OVERVIEW, SELECT, VIEW/EDIT, ANALYSIS, REPORTING, ADMIN, HELP, and LOGOUT. Below the sidebar is the IGNITE BUILDING CONSULTANCY logo. The main content area shows a breadcrumb trail: MAINZEAL > CARPARKS > AUCKLAND DHB CARPARK - PARK ROAD. Below this, it indicates '28 PROPERTIES IN SELECTION'. The primary focus is the 'PROPERTY SUMMARY' for '20961-ADHBC - SER-FIRE: ADHB CARPARK - SERVICES-FIRE' (ID #4728). The summary is organized into several sections:
 

- Basic Information:** property code (20961-ADHBC - Ser-Fire), client ref (-), property name (ADHB Carpark - Services-Fire), site type (MAINZEAL), facility type (Carparks), site (Auckland DHB Carpark - Park Road), is part of (20961-ADHBC - Ser[Block] : ADHB Carpark - S), and type - hierarchy (Floor).
- Survey and Ownership:** status, survey date (22/07/2011), ownership (- none -), management (-), and function (- none -).
- Location:** address (2 Park Road), city (Auckland), area - suburb (Grafton), post code (-), and a Google maps link.
- Contact:** contact (Colin Usher), cont. phone or email, and cont. mail address.
- Construction Details:** construction type, floors (5), floor level (0), floor covering (0), room id (0), udf 5 (0), accommodation, floor area (m2) (5357), number of bedrooms (0), paint wear (0), and udf 4 (0).
- Metadata:** data captured by (organisation) (MAINZEAL), data captured by (name) (NULL), and is template property (no).

 At the bottom right of the summary, there are buttons for 'copy', 'delete', 'add new', and 'save'. A 'placeholder image' box is visible on the right side of the summary area.

# Change Management

‘Like turning the Titanic...’



What is IGNITE doing re. change management?

- Canvassing the industry
- Building relationships with:
  - Contractors
  - Suppliers
  - Other consultants
- Building a world-class in-house BIM team
- Committing to becoming a leader in this field
- Committing to R&D



## Challenges to IPD Implementation

1. Fear of change – contractors – Design / Build
2. Weak culture of collaboration
3. Finding like-minded partners
4. Lack of defined liability – AIA Contract, Project Insurance
5. Costs (re. technology)
6. Steep learning curve (and long)
7. Lack of interoperability – single platform vs. Industry Foundation Class (IFC) protocol
8. Ensuring adequate compensation

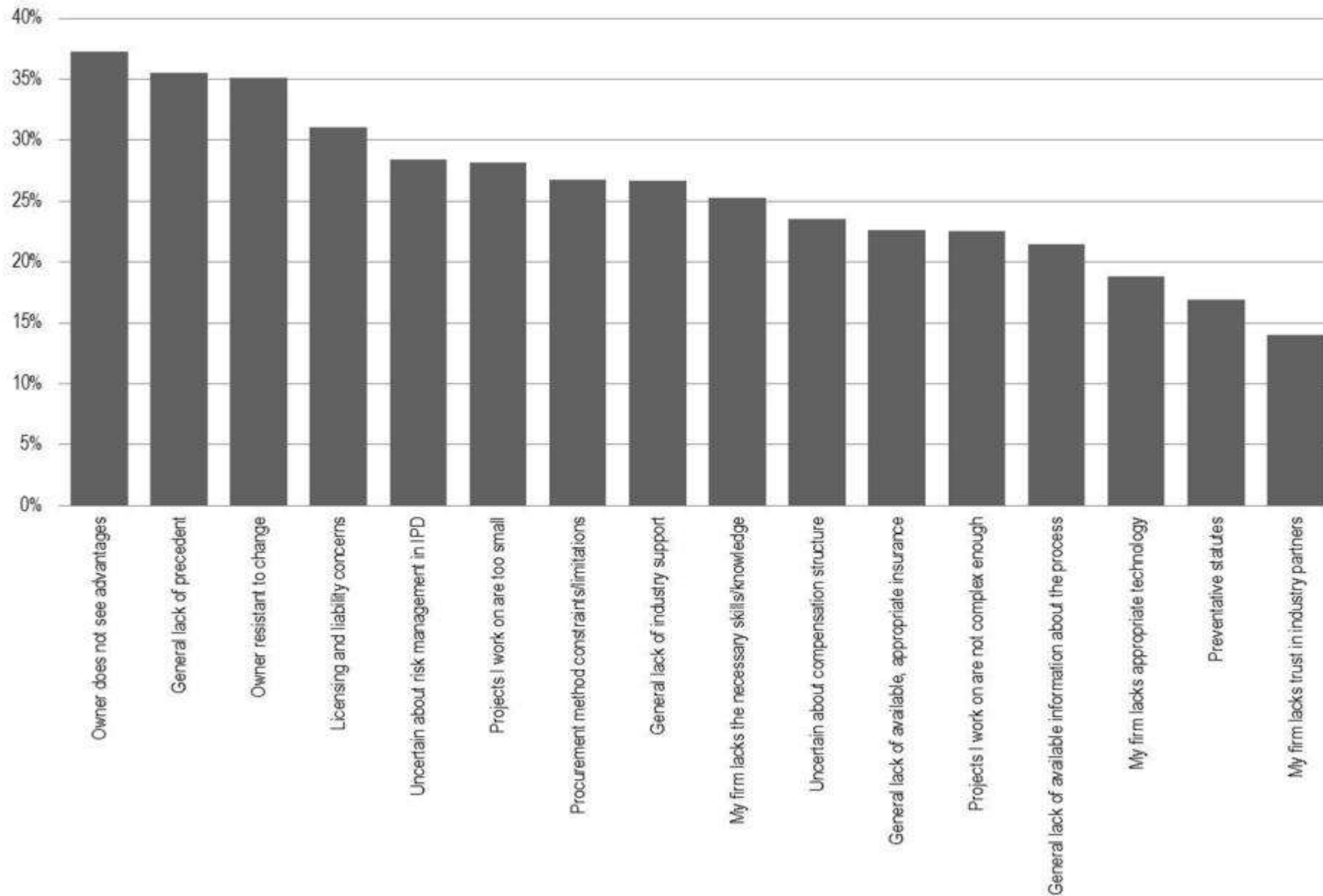
## Nature of IPD Contracts

IPD is more a relational process than an arms-length transaction.

- Create a compensation structure that encourages overall project success
- Structure participant relationships (tri-party, multi-party or single-purpose entity)
- Waivers of liability
- Project management structure which encourages participation in decision-making and conflict resolution from day one
- Use standard form agreements for IPD projects
- Implement project-specific insurances

# Change Management

**AIA members cite lack of owner education, precedent as barriers to IPD**  
Most significant barriers to adopting IPD, all respondents, n=313

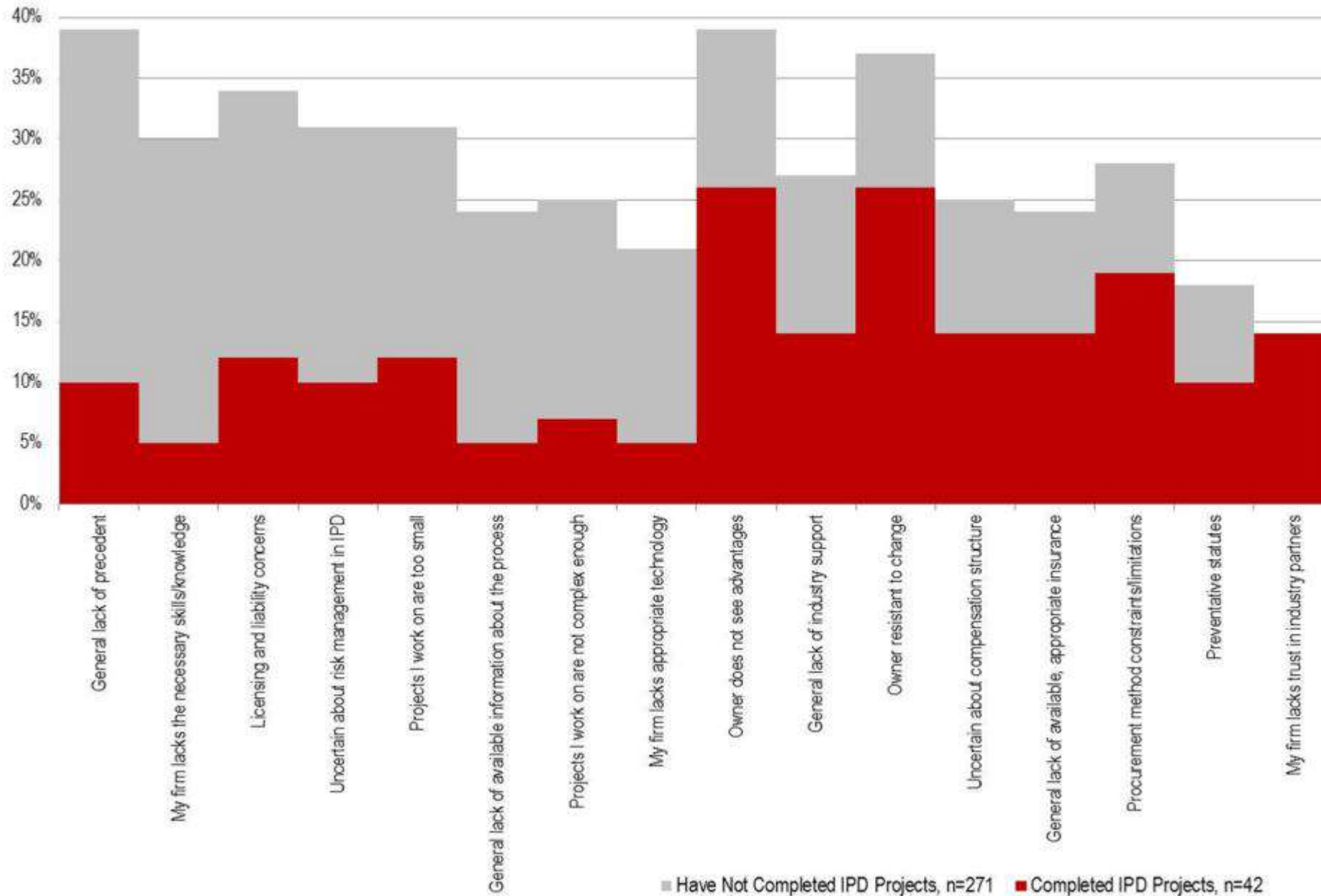


■ All respondents, n=313



# Change Management

**Owner-related barriers persist even with experience**  
 Most significant barriers to adopting IPD by experience



NOTE: "Completed IPD Project," n=42 (\*note small sample base), refers to respondents reporting one or more project underway and/or completed within the last two years using a contractual IPD Model

## Envision a new world, where...

- Facilities managers, end users, contractors and suppliers are all involved at the start of the design process
- Processes are outcome-driven and decisions are not made solely on a first cost basis
- All communications throughout the process are clear, concise, open transparent and trusting
- Designers fully understand the ramifications of their decisions at the time their decisions are made
- Risk and reward are value-based and appropriately balanced among all team members over the life of the project
- The industry delivers a higher quality and sustainable built environment...

**This is the world of Integrated Project Delivery.**