

# Design Review

401.649 Cost Planning for Construction Projects

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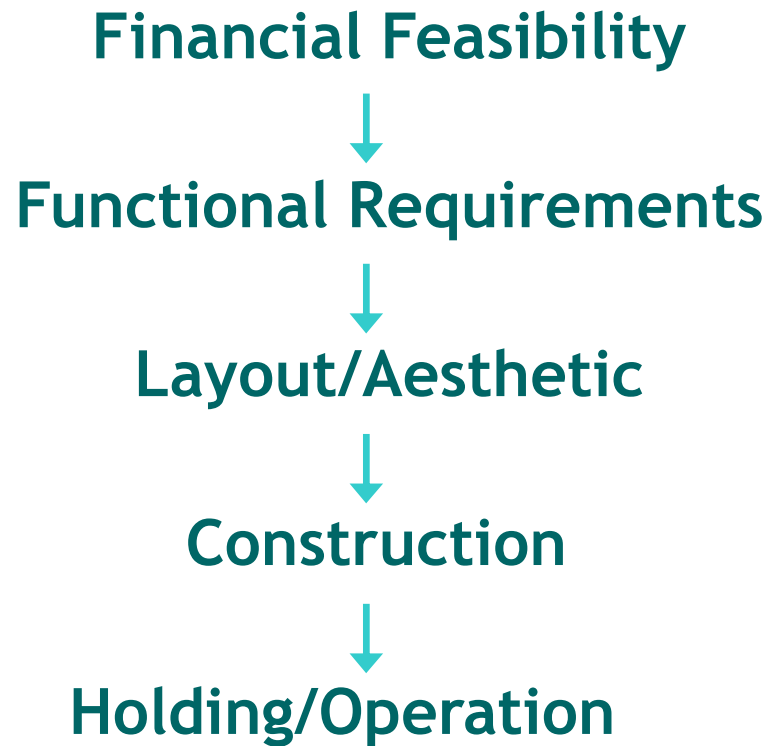


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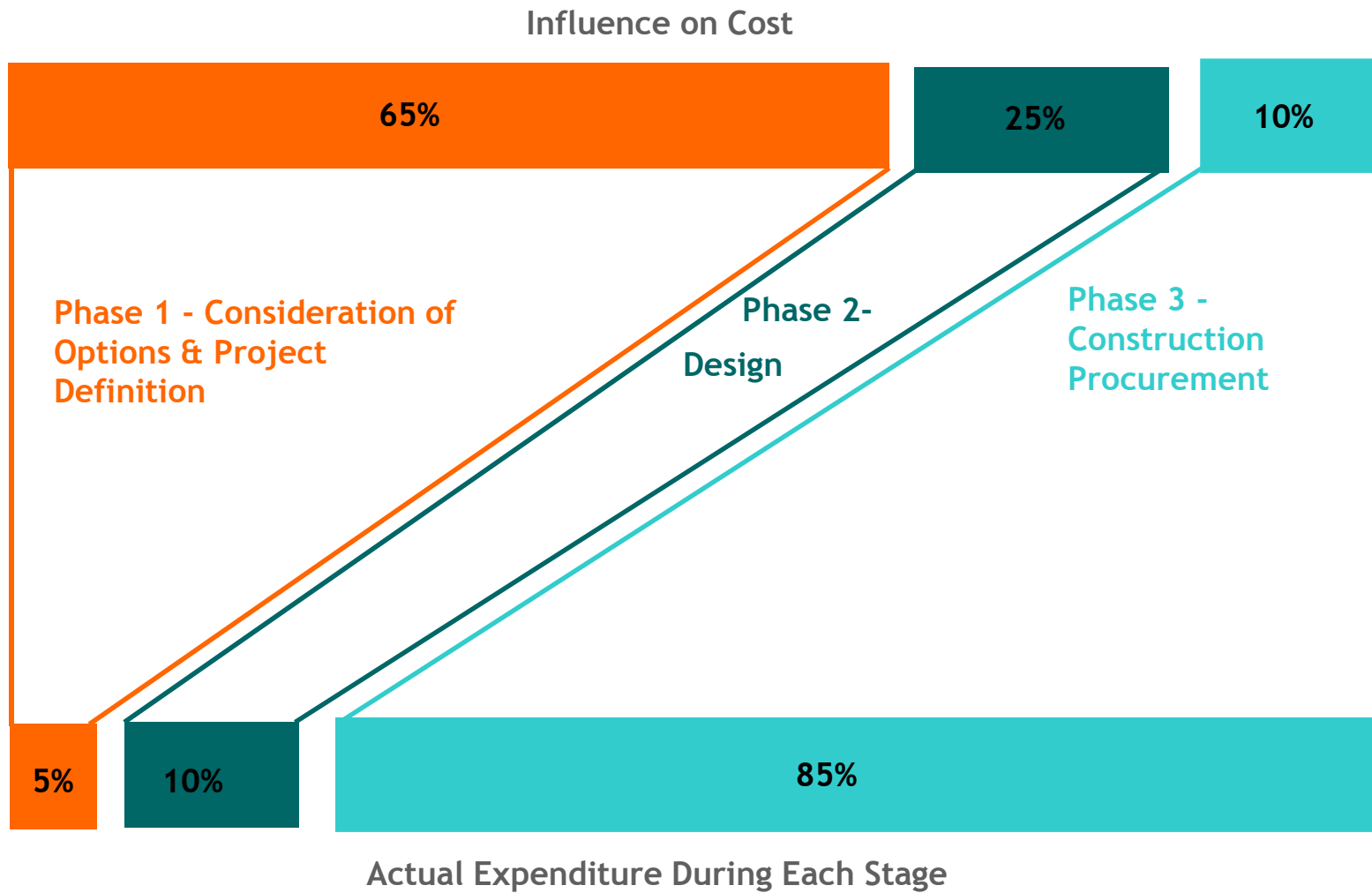
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# Design Flow Chart



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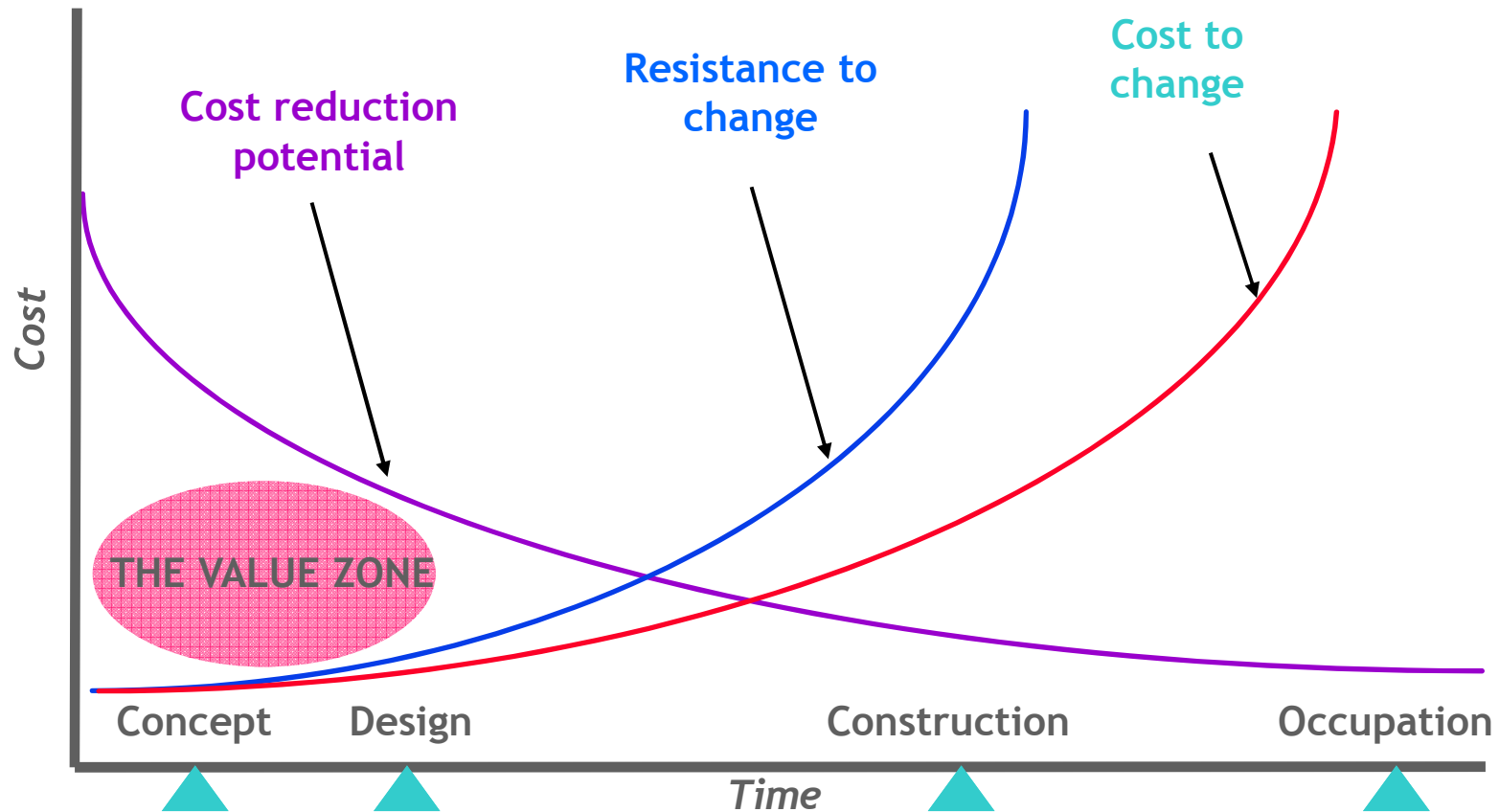
# Design & Cost Commitment



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# Opportunities reduce with time


*80% of costs are committed at Concept Stage*



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# Design Fee & Cost

- Design Fee = % of Construction Cost

Construction Cost  = Design Fee 

- Lump Sum Fee

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# 20% account for 80%

20% of Design → 80% of Construction Cost

- Structural System
- Architectural Concept
- M&E Systems

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# Typical Construction Cost

	<u>%</u>
■ Structural	23% - 28%
■ Architectural	25% - 30%
■ M&E	23% - 30%
■ External Works	5% - 8%
■ Preliminaries	8% - 12%

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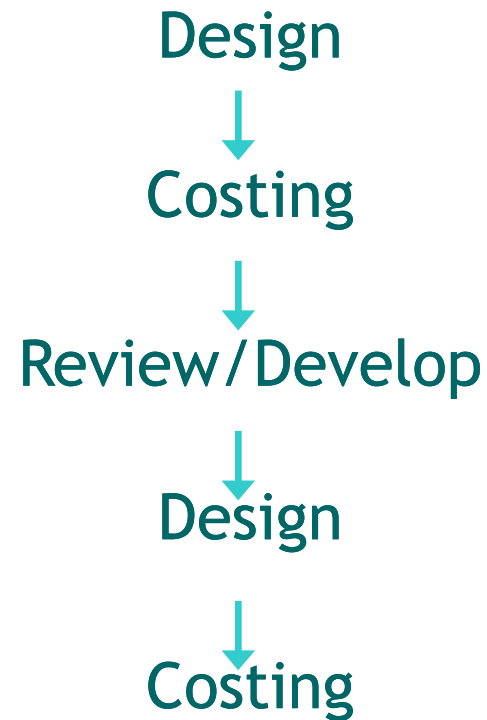
# Indicative Breakdown of Construction Costs

Components	Condo	Offices	Shopping Centres	Warehouses	Schools
	%	%	%	%	%
Piling	3	4	4	4	4
Lowest slab & Foundation	4	3.6	3	6	4.6
Columns	1	1.4	1	1.4	1.5
Upper Floors	8	9	9	14	12
Roof Structure	0.1	0.2	0.2	0.4	0.4
Roof Finishes & Drainage	3.1	2.5	3	6.7	8.7
Staircases	0.7	1.3	1.3	0.6	0.7
External Walls	6	17.5	9	12.5	6
Windows	6	2.5	4	5	8.7
Internal Walls	4	3	3.7	2.2	2.2
Doors	5	1	2	0.6	1
Wall Finishes	5.8	3.8	3.8	3	5
Floor Finishes	6	4.4	4.7	3	7
Ceiling Finishes	2.5	2.1	2	1.5	5
Fittings	5	0.9	2	1	3.5
Sanitary Fittings & Access	1.8	1.2	1.9	1	1.4
Plumbing & Sanitary	7	2.2	4	3	3
Air Conditioning and Ventil	6	9.6	9.9	4.6	2
Electrical Installation	6.5	8.9	8	9	6
Lifts and Escalators	3	7.4	8	4.3	1
Fire Protection	1.2	2.7	2.5	5.2	0.8
External Works	6.3	1.8	5	4.5	9
Preliminaries	8	9	8	6.5	6.5
TOTAL %	100	100	100	100	100

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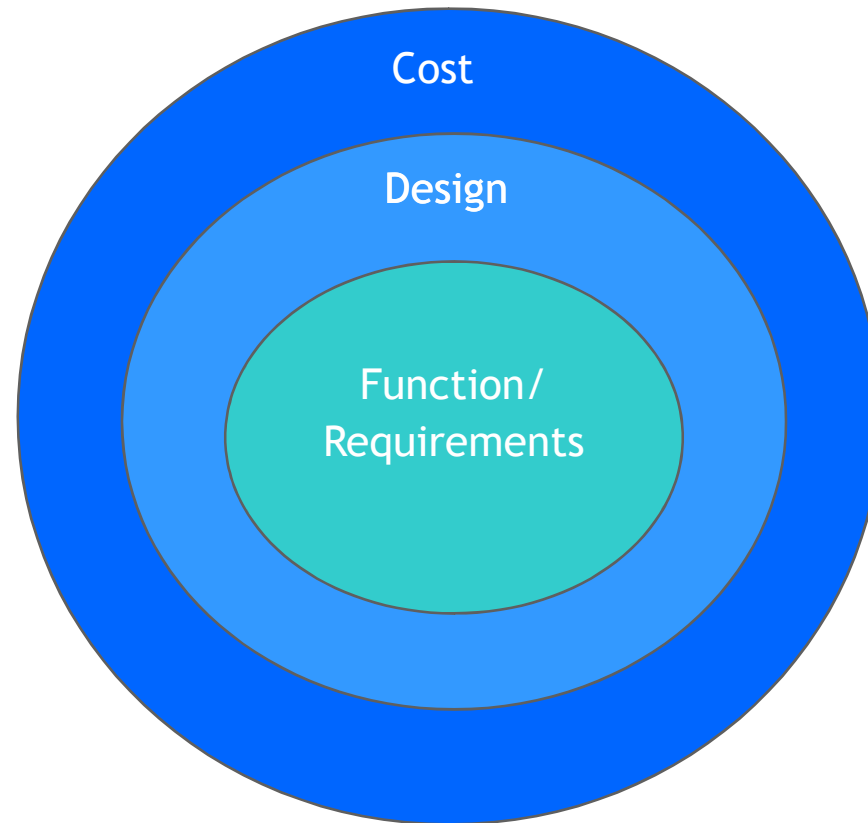


# Traditional Cost Control



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# Design vs. Cost



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# New Approach

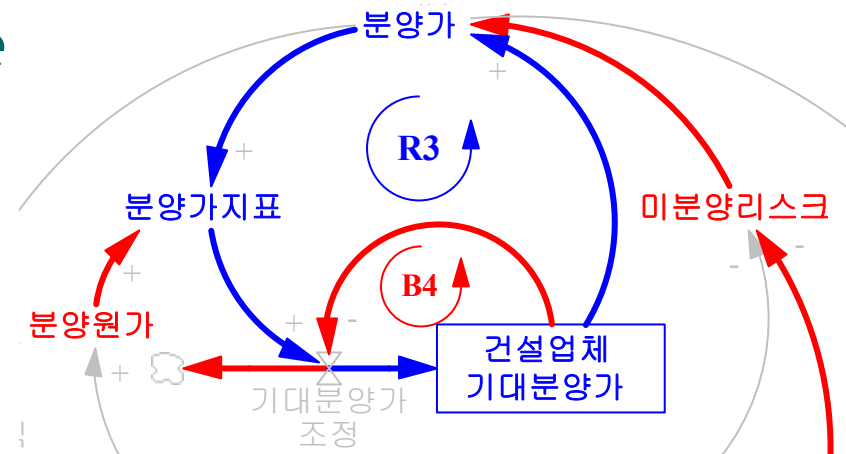
- Bench Marking
- Value Appraisal
- Team Work
- Cost Development
- Risk Management

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# Bench Marking

Compare with:

- Similar projects
- Industry norms
- Geographical practice
- Expectations



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# Value Appraisal

Compare:

- Cost  $\uparrow\downarrow$  = Value  $\uparrow\downarrow$
- Cost  $\Rightarrow$  Alternative solutions

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# Team Work

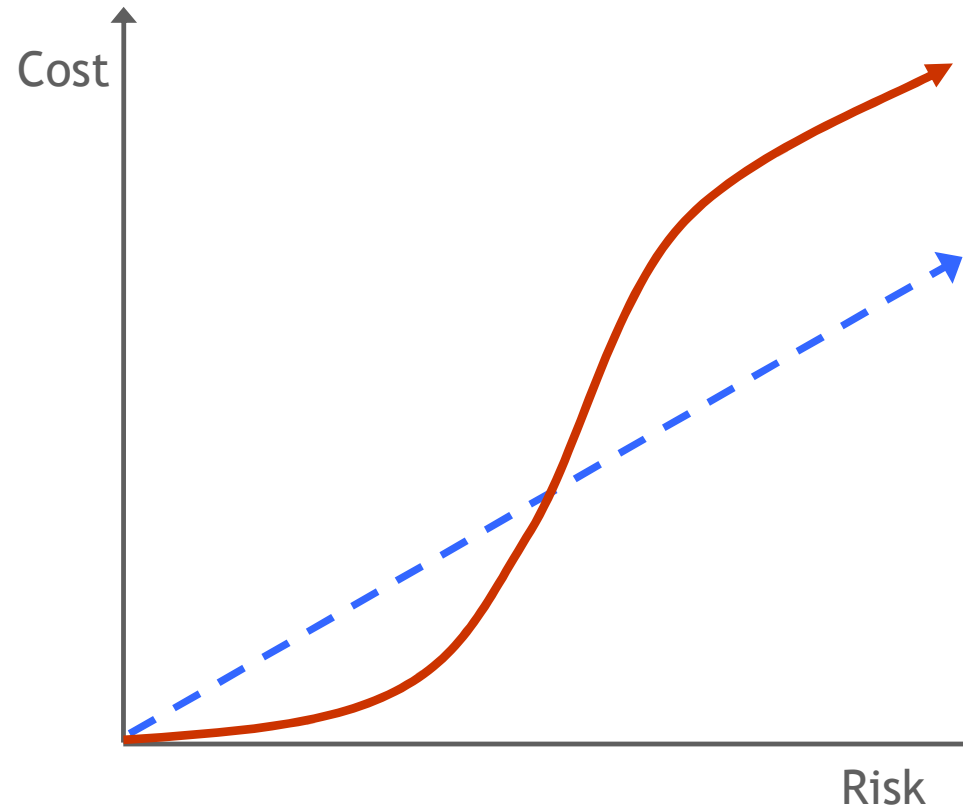
- Working as a team vs. working as individuals
- Working towards the project objectives
- Dynamic of team work

# Cost Development

- Re-define the estimate
- Identify cost significant items
- Update cost data base
- Propose alternative materials & designs
- Estimate vs. budget

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# Risk Management



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# Principles

- Identify risks:
  - . Contractor
  - . Developer
- Balance risks & cost implications
- Look for ways to reduce risks

# Design Review

# Building Efficiency

- Building efficiency =  $\frac{\text{Net Floor Areas (NFA)}}{\text{Gross Floor Areas (GFA)}}$
- Layout - explore ways to increase building efficiency

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# Examples

	Project 1	Project 2	Project 3	Project 4	Project 5
GFA (m <sup>2</sup> )	102,279	10,162	24,921	15,692	10,219
NFA (m <sup>2</sup> )	90,902	8,706	21,149	15,106	8,767
Building Efficiency (%)	89%	86%	85%	96%	86%

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# M&E Spaces to GFA

- M&E spaces
- Ratio of M&E spaces/GFA
- Explore ways to reduce M&E spaces

# Examples

	Project 1	Project 2	Project 3
M&E Spaces (m <sup>2</sup> )	153	214	574
GFA (m <sup>2</sup> )	7,722	10,162	71,874
Ratio of M&E spaces to GFA (%)	1.98%	2.11%	0.80%

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# Car Parking Efficiency

- Car parking areas and driveways
- Number of car parking lots
- Gross areas per lot
- Explore ways to improve car parking efficiency

# Examples

- Car Parking Areas & Driveways: 6,684 m<sup>2</sup>
- Numbers of Car Parking Lots: 144 lots
- Gross Areas per lot: 46.42 m<sup>2</sup>



# Storey Heights

- Proposed floor to floor height  
(First floor, Typical floors)
  
- Proposed floor to ceiling height  
(First floor, Typical floors)

# Considerations

- Average slab thickness
- M&E space requirement above the ceiling
- Cost implication for changes to floor to floor height

# Basement

- Construction method for the basement
- Extent of temporary works required for the basement
- Explore ways to reduce the cost for temporary works

# Structural Framing Systems & Grids

- Propose alternative structural systems and grids  
*Advantages and disadvantages for each system*
- Key and schematic plans for each system
- Precast beams, columns and staircases
- Typical and transfer floors

# Structural Framing Systems & Grids

- Construction method
- Floor to floor cycle time (days)
- Reinforcement/concrete ratio analysis
- Buildability

# Structural Ratio Analysis

- Structural cost: \$ 7,726,000
- Construction floor areas (CFA): 27,025 m<sup>2</sup>
- Cost per m<sup>2</sup> (CFA): \$ 286 / m<sup>2</sup>

# Columns and Structural Walls

- Explore possibility of sizing down column sizes for upper floors
- Explore possibility of sizing down structural wall thickness for upper floors

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# External Facade System

- Review the type of facade system and windows
- Review the extent of glazed areas
- Review the extent of double glazing required
- Explore alternative facade system and windows



# Internal Walls

- Type of internal walls
- Areas for different types of internal wall
- Cost implication

# Examples

	<u>m<sup>2</sup></u>	<u>\$</u>	<u>\$/m<sup>2</sup></u>
➤ Brick wall (one brick thick)	2,506	150,000	60
➤ Brick wall (half brick thick)	15,782	474,000	30
➤ R.C. core walls	1,517	750,000	494
<b>TOTAL</b>	<u>19,805</u>	<u>1,374,000</u>	<u>69</u>

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# “Touch and Feel” Items

- Items which have close relationship to buyers' / tenants' satisfaction such as:
  - Finishes: Floor, wall and ceiling
  - Fittings and Fixtures - Sanitary wares, wardrobes, kitchen cabinets and appliances
- Explore ways to enhance these items
- Cost implication

# Examples: Apartment Floor Finishes

	Project 1	Project 2	Project 3	Project 4	Project 5	Project 6
Living / Dining	300 x 600 x 25mm thk marble slabs	600 x 600 x 20mm thk Crema Arfaz	300 x 600 x 20mm thk Botticino Classico	600 x 600 x 20mm thk Toprak Beige	300-900 x 100 x 15mm thk Golden Teak	300 x 600 x 20mm thk Perlatino Svevo
Supply rate *	\$100/m <sup>2</sup>	\$180/m <sup>2</sup>	\$66/m <sup>2</sup>	\$76/m <sup>2</sup>	\$79/m <sup>2</sup>	\$88/m <sup>2</sup>

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