

SMART BY DESIGN:
Implementing Intelligence During Design & Construction

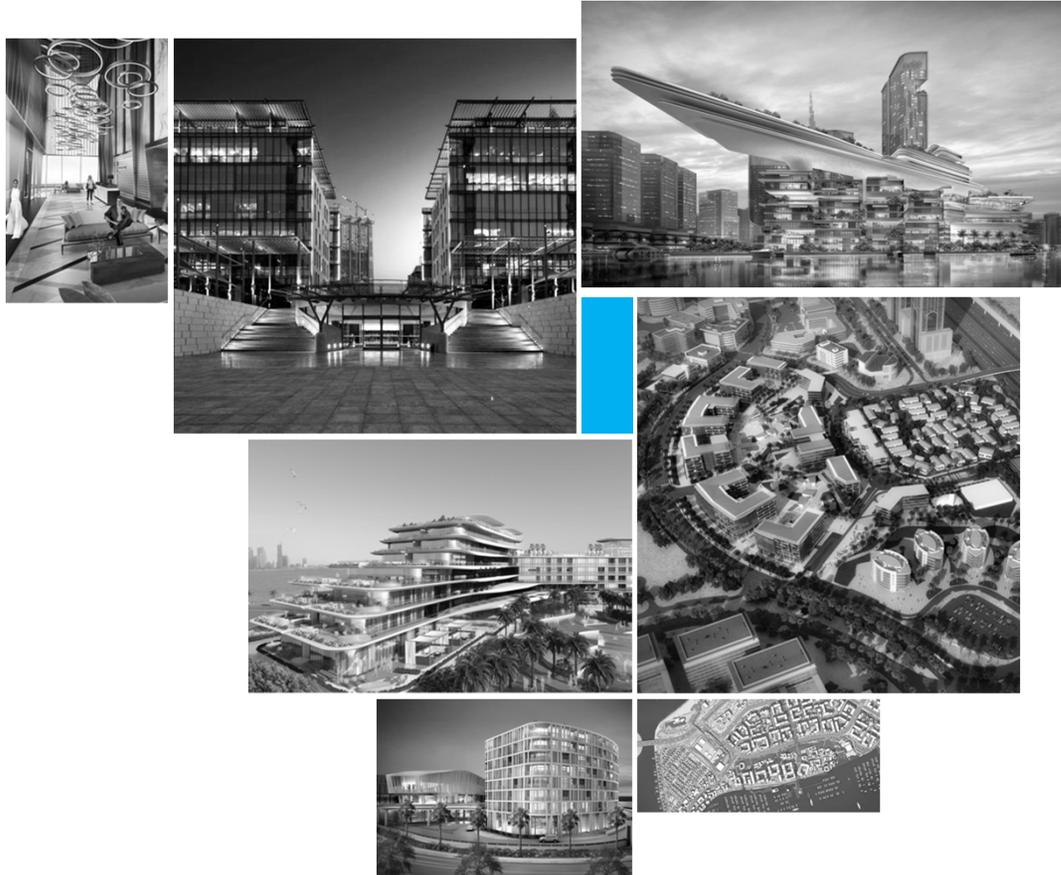


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PROJECT

LIFE CYCLE

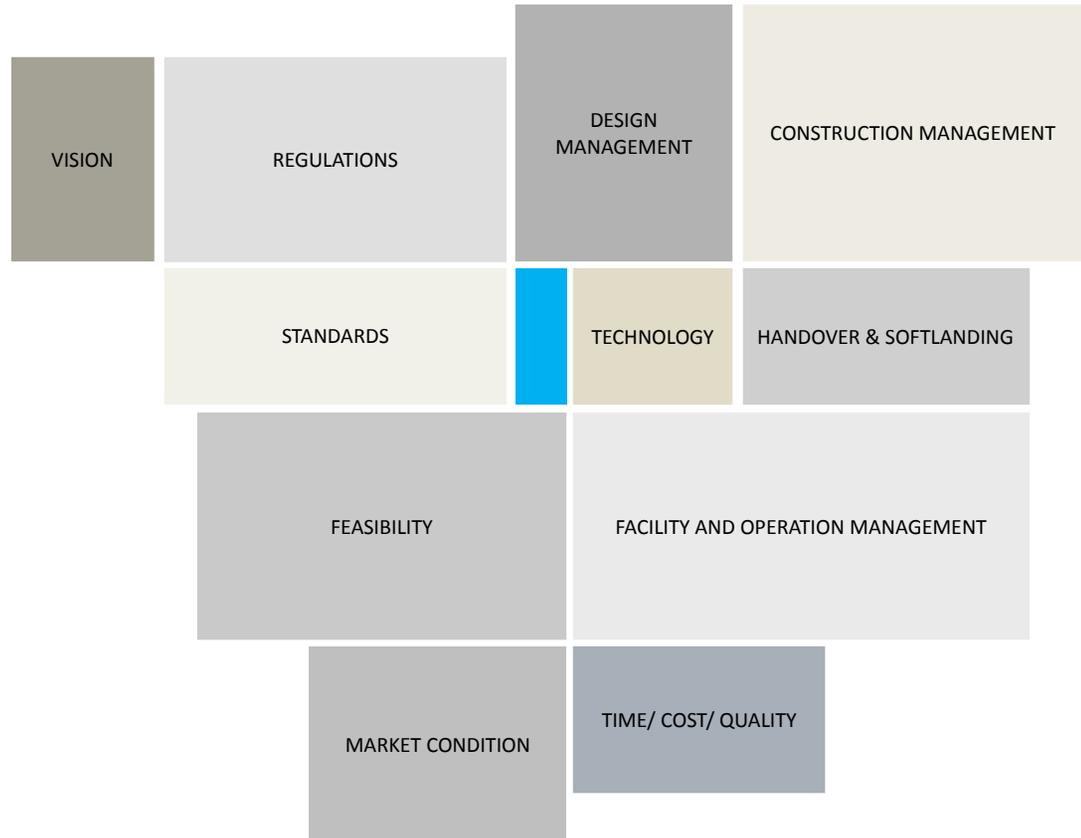


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PROJECT

LIFE CYCLE

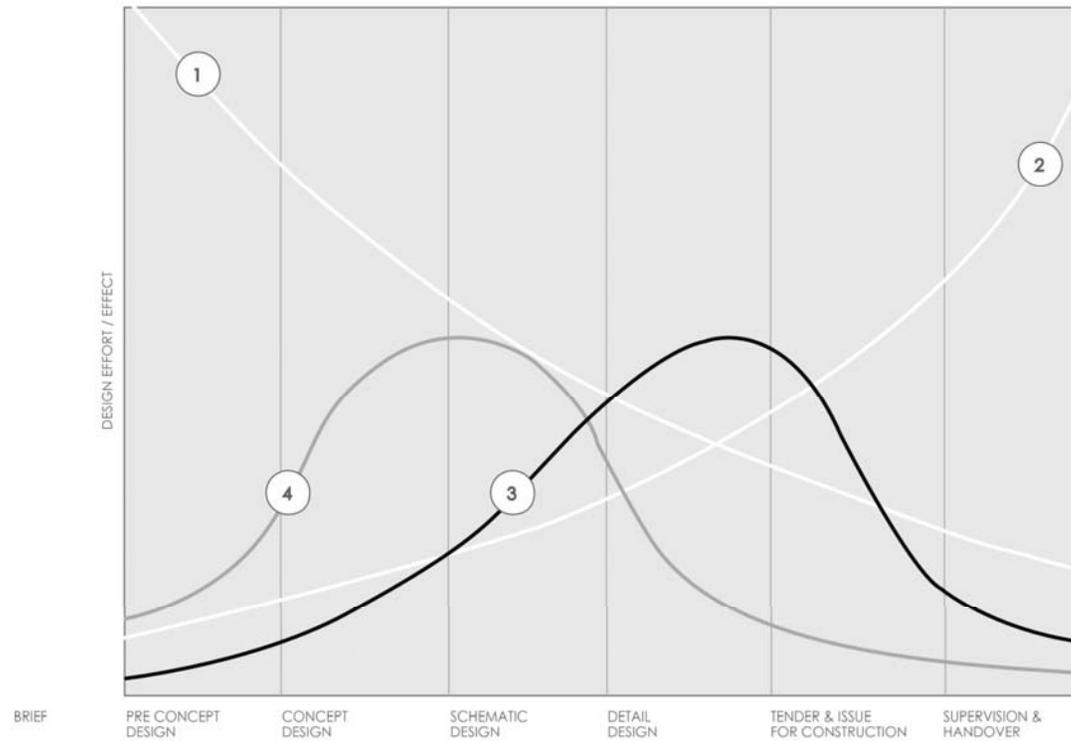


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DESIGN STAGES

- 1 Ability to impact cost & functional capabilities
- 2 Cost of design changes
- 3 Traditional design process
- 4 IPD design process



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DESIGN STAGES

- 1 Ability to impact cost & functional capabilities
- 2 Cost of design changes
- 3 Traditional design process
- 4 IPD design process
- 5 PIM



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1

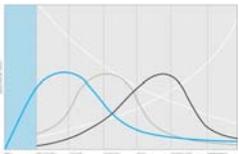
BRIEF



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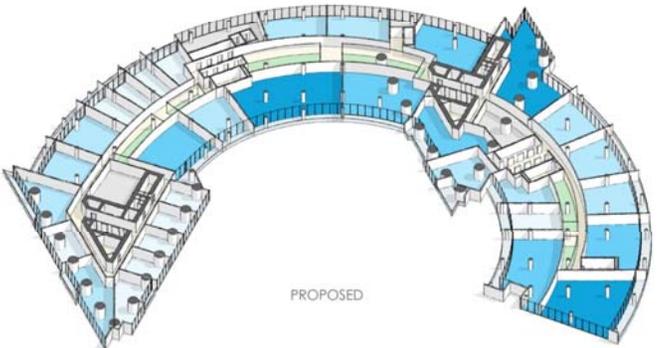
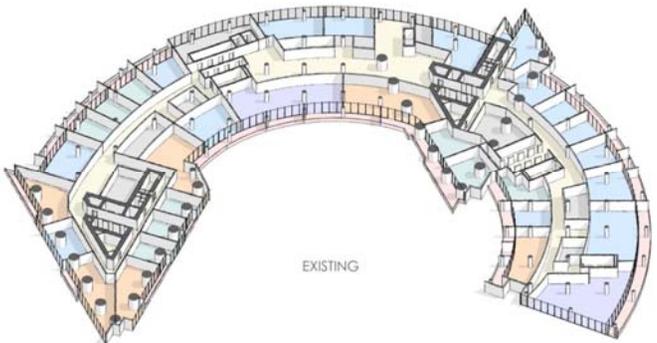
DESIGN STAGES



BRIEF

LAMAR INVESTMENT, KSA

- Typical floor plate study



LEGEND EXISTING

- | | |
|--|---|
| 1 BED UNIT | CIRCULATION |
| 2 BED UNIT | SERVICES |
| 3 BED UNIT | BALCONY |
| 4 BED UNIT | |

LEGEND PROPOSED

- | | |
|--|--|
| 1 BED UNIT | CIRCULATION |
| 2 BED UNIT | SERVICES |
| 3 BED UNIT | BALCONY |
| 4 BED UNIT | PUBLIC FACILITY (COURTYARDS) |



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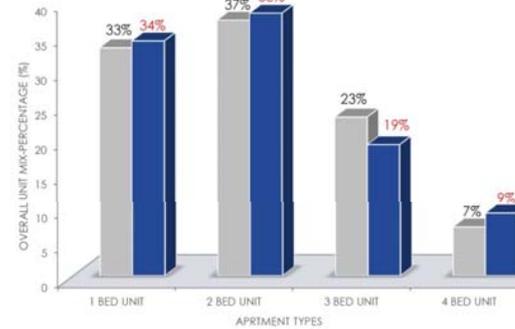
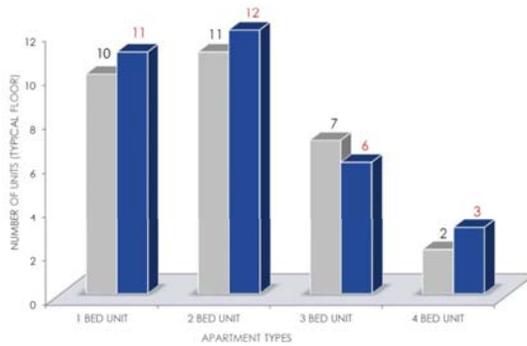
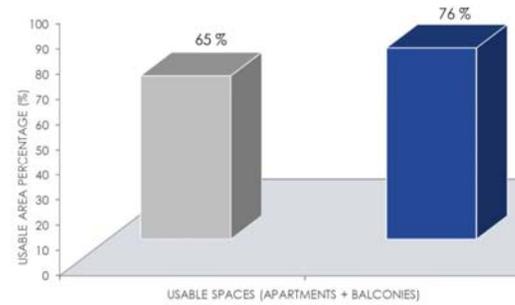
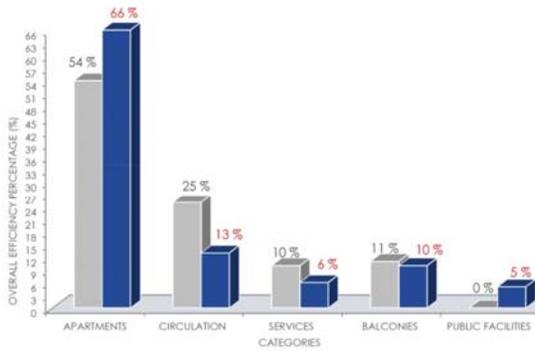
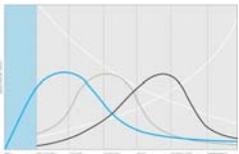
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BRIEF

LAMAR INVESTMENT, KSA

- Areas and efficiency analysis

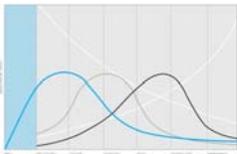


LEGEND
 EXISTING
 PROPOSED



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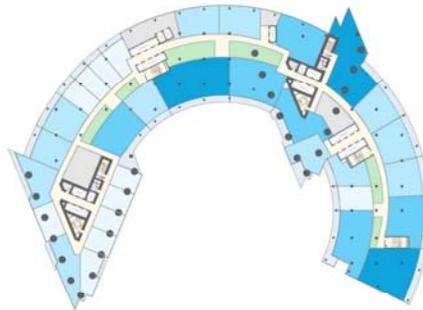
BRIEF

LAMAR INVESTMENT, KSA

- Typical floor plate development and area summary

CATEGORIES	EXISTING	PROPOSED
OVERALL EFFICIENCY PERCENTAGE (%)		
APARTMENTS	54% <	66%
CIRCULATION	23% >	13%
SERVICES	10% >	6%
BALCONIES	11% >	10%
PUBLIC FACILITIES	0% <	8%
USABLE AREA PERCENTAGE (%) APARTMENTS + BALCONIES		
USABLE AREA	65% <	76%
OVERALL UNIT MIX - PERCENTAGE (%)		
1 BED UNIT	33% <	24%
2 BED UNIT	37% <	36%
3 BED UNIT	23% >	19%
4 BED UNIT	7% <	9%
NUMBER OF UNITS (TYPICAL FLOOR)		
1 BED UNIT	10 <	11
2 BED UNIT	11 <	12
3 BED UNIT	7 >	8
4 BED UNIT	2 <	3
AREA RANGE FOR UNITS IN (SQ.M)		
1 BED UNIT	72 - 103 <	71 - 107
2 BED UNIT	88 - 145 <	118 - 170
3 BED UNIT	100 - 253 <	181 - 264
4 BED UNIT	219 - 309 <	304 - 348
AVERAGE UNIT AREA IN (SQ.M)		
1 BED UNIT	83 <	85
2 BED UNIT	109 <	131
3 BED UNIT	190 <	228
4 BED UNIT	296 <	338

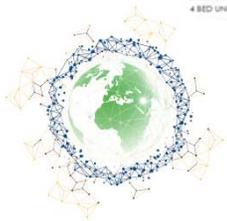
OVERALL SUMMARY



PROPOSED FLOOR PLATE



COURTYARD REFERENCE IMAGES



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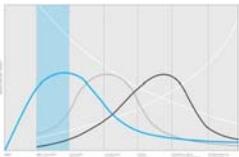
PRE-CONCEPT DESIGN



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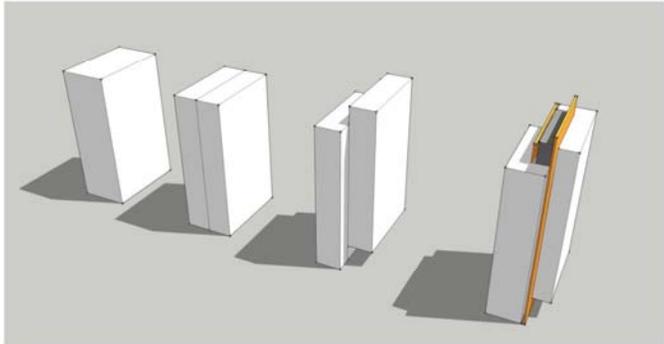
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DESIGN STAGES



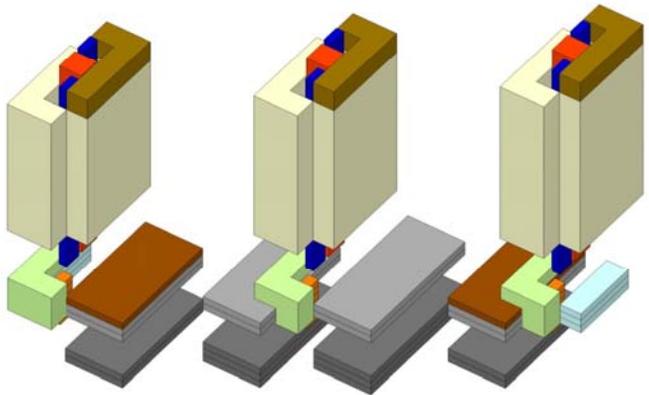
PRE CONCEPT DESIGN

ELITE RETAIL & RESIDENCES, KSA



DEVELOPMENT STUDY

- BASEMENT PARKING
- PODIUM PARKING
- BOH QUARTER
- MAIN LOBBY
- SHUTTLE LIFTS
- BUILDING FACILITY
- APARTMENTS



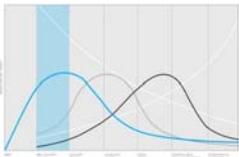
CONCEPT MODEL



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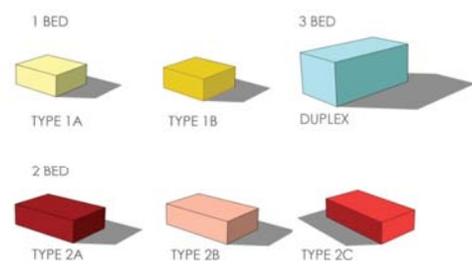
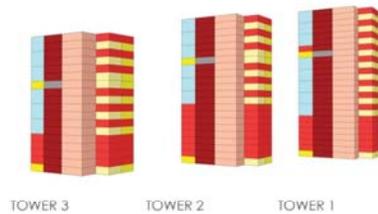
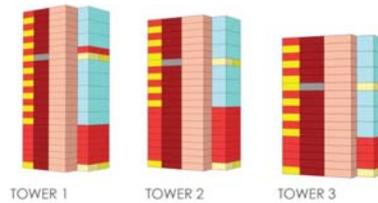
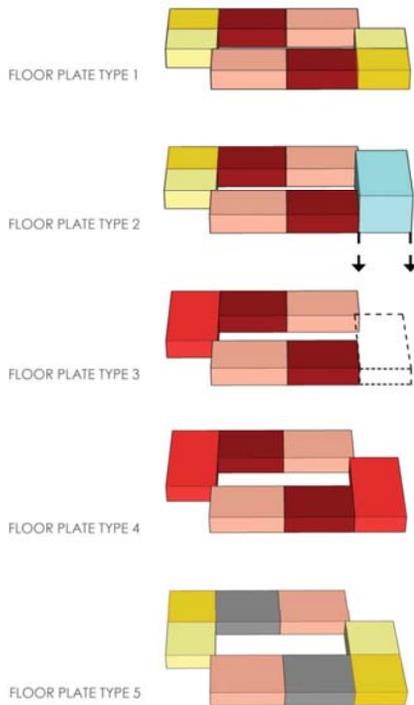
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PRE CONCEPT DESIGN

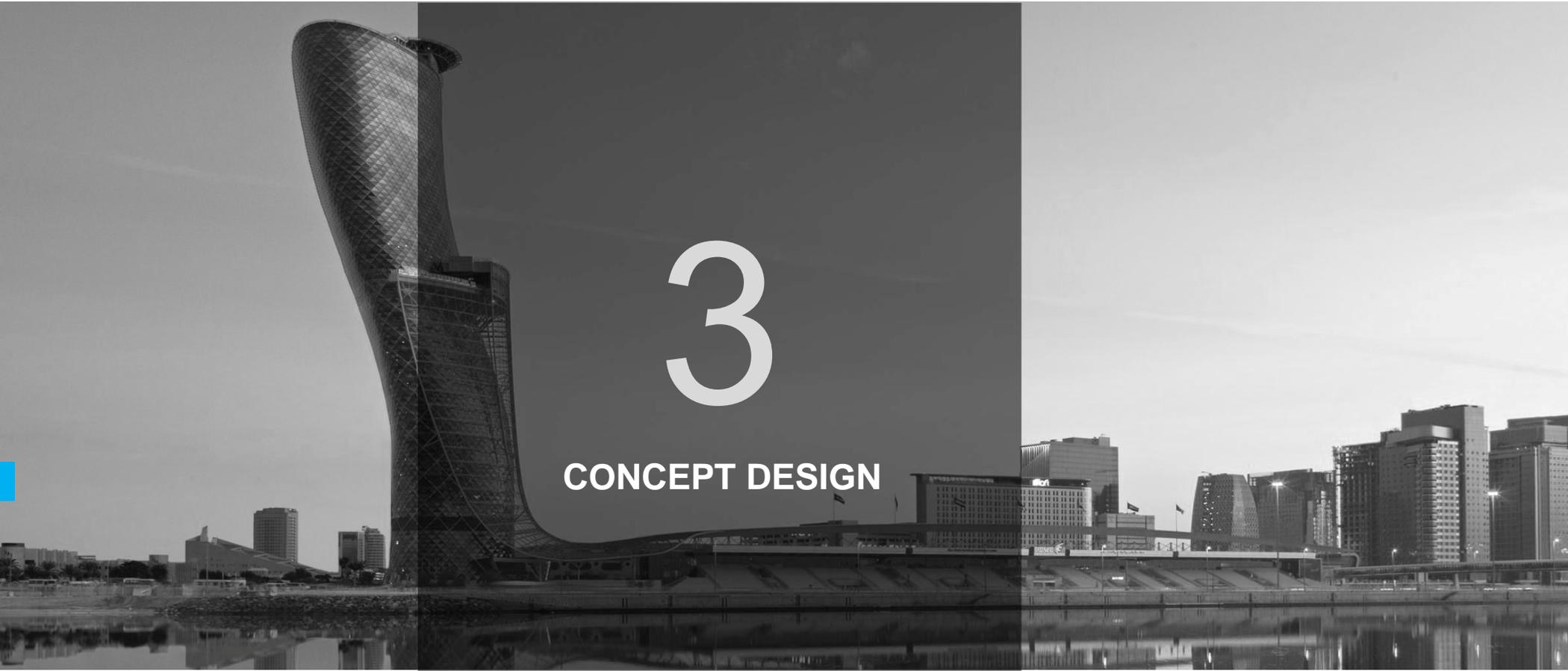
ELITE RETAIL & RESIDENCES, KSA

- Typical floor plate study.
- Unit mix and their arrangement.



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3

CONCEPT DESIGN



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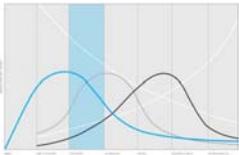
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DESIGN STAGES

CONCEPT DESIGN

TDIC, ABU DHABI

- Typical units plans study
- Unit mix and their arrangement.



UNIT MIX AND ARRANGEMENT



TYPICAL UNIT PLANS

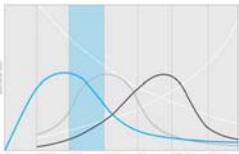


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DESIGN STAGES



CONCEPT DESIGN

TDIC, ABU DHABI

- Typical floor plate development
- Facade study & development
- Analysis



FACADE DEVELOPMENT RENDERS



TYPICAL FLOOR PLANS



RENDERED ELEVATIONS



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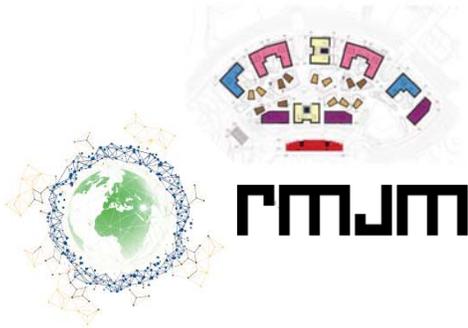
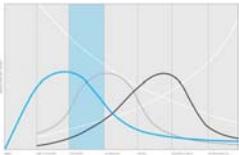
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DESIGN STAGES

CONCEPT DESIGN

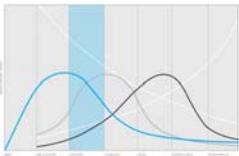
TECOM INNOVATION HUB, DUBAI

- Masterplan development.
- Typical building designs, development and treatment.



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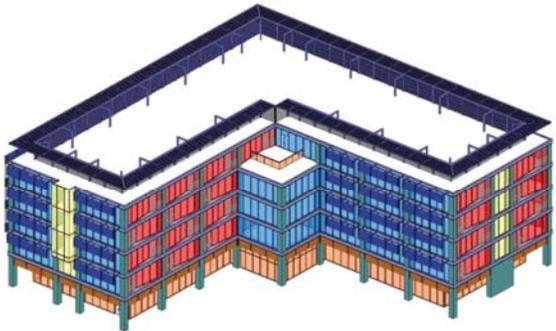
DESIGN STAGES



CONCEPT DESIGN

TECOM INNOVATION HUB, DUBAI

- Facade development
- Facade developed as modulated elements which are further used as repetitive pattern.
- Time saved with effective modelled elements,



FACADE MODEL DEVELOPMENT

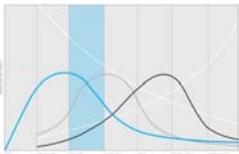


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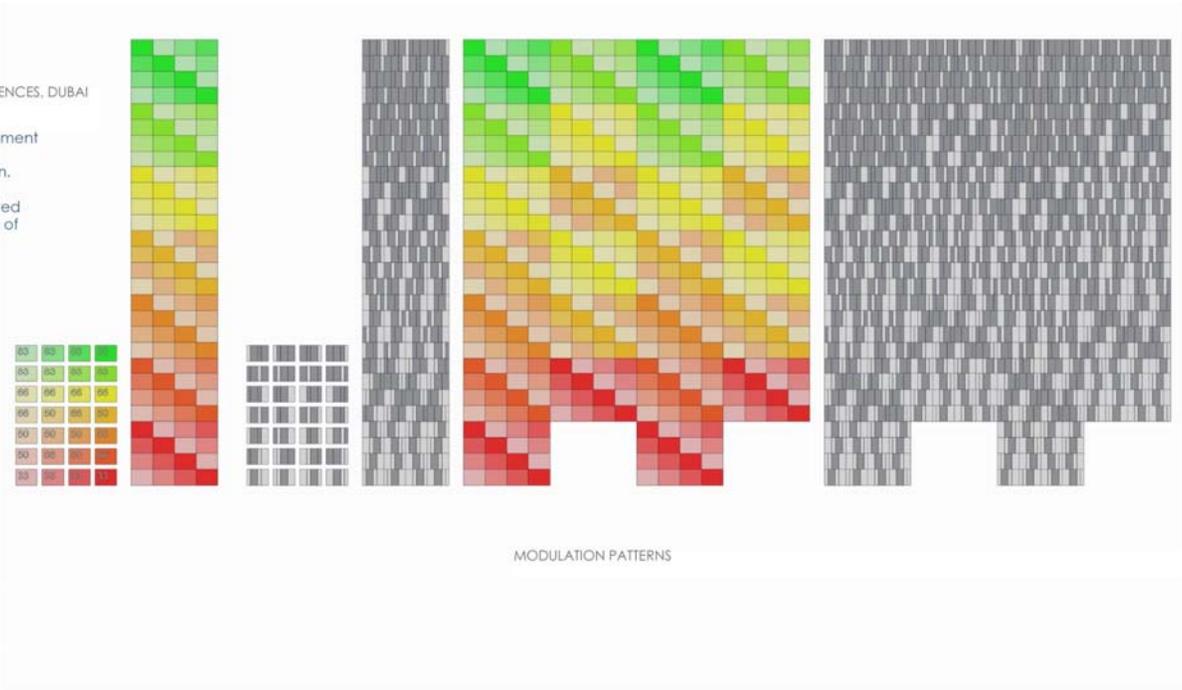
DESIGN STAGES



CONCEPT DESIGN

AL MULLA 5 STAR HOTEL & RESIDENCES, DUBAI

- Facade study & development
- Utilized system modulation.
- Modulation patterns created based on the percentage of clear glass requirement.



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SCHEMATIC DESIGN



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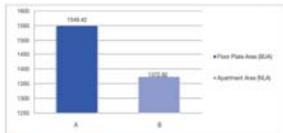
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SCHEMATIC DESIGN

AL MULLA 5 STAR HOTEL & RESIDENCES, DUBAI

- Schematic design development
- Authority code compliant design.
- Efficient, typical design elements



• Efficiency = (B/A)*100
 Floor Efficiency achieved = **88%**



TYPICAL FLOOR PLAN - RESIDENTIAL

- TYPICAL BATH A
- TYPICAL MAIDS RM.
- POWDER RM. B
- TYPICAL M. BATH B
- POWDER RM. A
- POWDER RM. C
- TYPICAL M. BATH C



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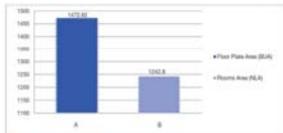
DESIGN STAGES



SCHEMATIC DESIGN

AL MULLA 5 STAR HOTEL & RESIDENCES, DUBAI

- Schematic design development
- Authority code compliant design.
- Efficient, typical design elements



Efficiency = (B/A)*100

Floor Efficiency achieved = **84%**



TYPICAL FLOOR PLAN - HOTEL

LEGEND

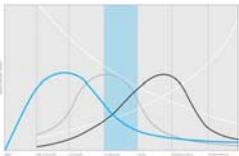
- | | | |
|----------------------|------------------|-------------------|
| STANDARD ROOM TYPE D | TWIN ROOM TYPE B | SUITE ROOM TYPE A |
| STANDARD ROOM TYPE E | TWIN ROOM TYPE C | SUITE ROOM TYPE B |
| | TWIN ROOM TYPE D | |



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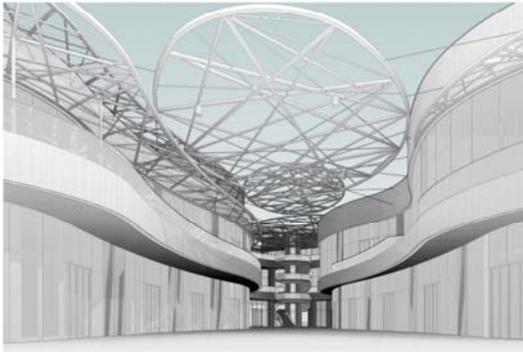
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SCHEMATIC DESIGN

ELITE RETAIL & RESIDENCES, KSA

- Parametric modelling
- Modulation
- Marketing materials



REVIT MODEL VIEW



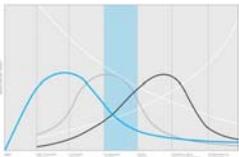
RENDER



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SCHEMATIC DESIGN

- Parametric modelling
- Curved walls modelling
- Pre-cast panel modelling
- Slanted columns modelling
- Curtain system
- Trusses modelling
- Drafting techniques and wall sections

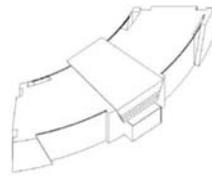


FIG - 1 FACADE MASSES

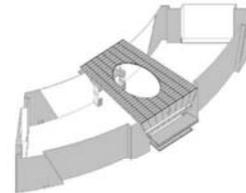


FIG - 2 FACADE MASSES

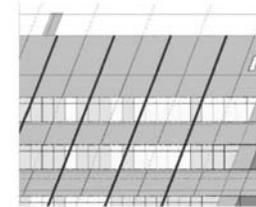


FIG - 3 PRECAST PANELS DIVISION

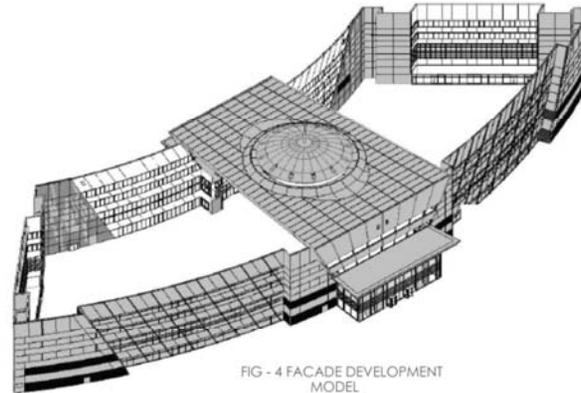


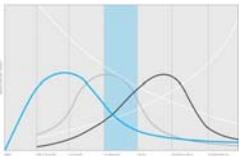
FIG - 4 FACADE DEVELOPMENT MODEL



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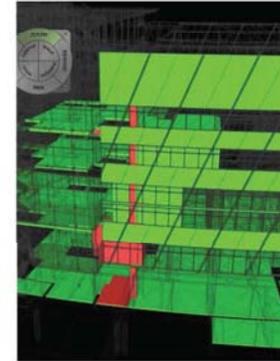
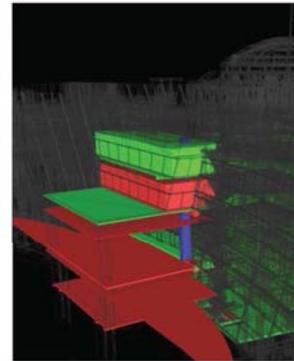
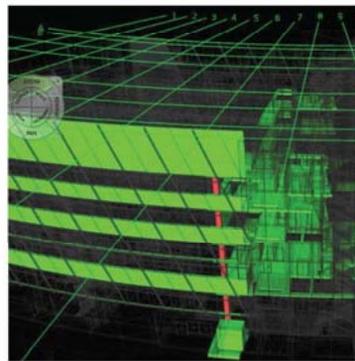
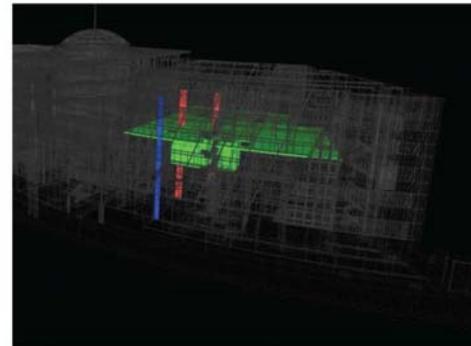
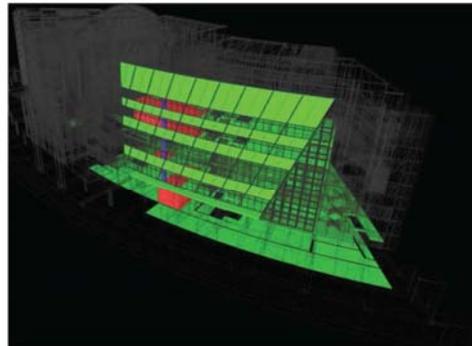
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SCHEMATIC DESIGN

- Clash detection & coordination.
- Detecting collisions during design, in real time.
- Filters and searches saved and used throughout the project.



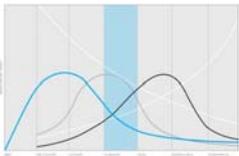
CLASH DETECTIONS BETWEEN ARCHITECTURE AND STRUCTURE



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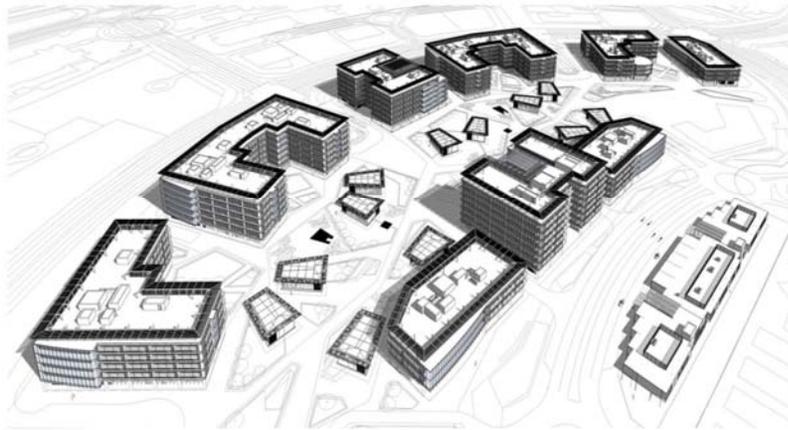
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SCHEMATIC DESIGN

TECOM INNOVATION HUB, DUBAI

- Parametric modelling
- Quicker production of rough layouts.
- 3D views to assist with different design ideas at early stages.

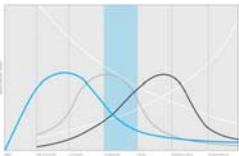


MASTER SITE - REVIT MODEL



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SCHEMATIC DESIGN

TDIC, ABU DHABI

- Parametric modelling
- Facade development



REVIT MODELS



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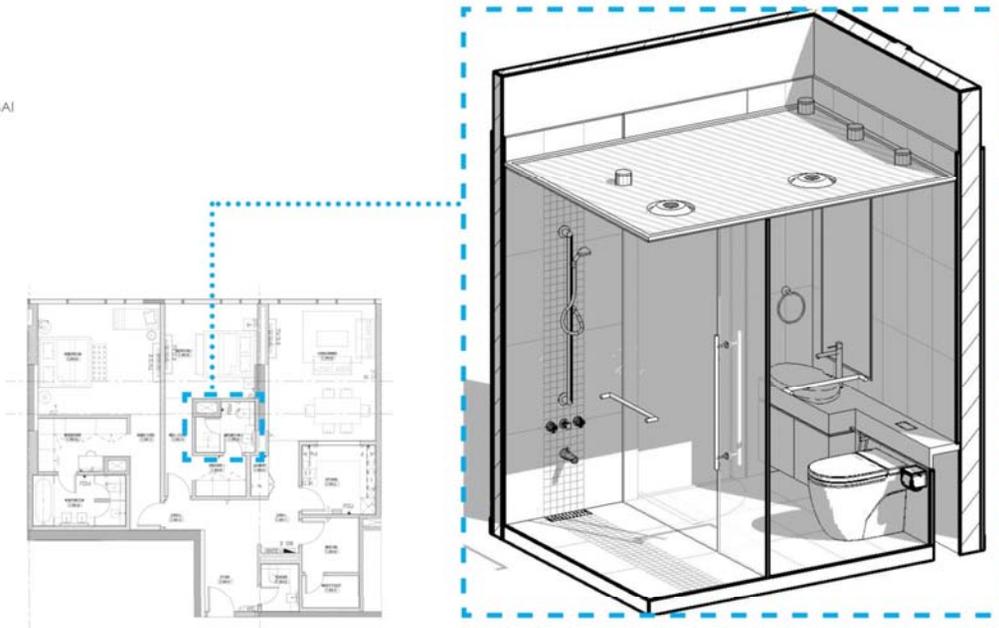
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DETAIL DESIGN

AL MULLA 5 STAR HOTEL & RESIDENCES, DUBAI

- Typical standard details developed for the wet areas.
- Overall time reduced with effective modelling and typical details.



WET AREA DETAIL DESIGN DEVELOPMENT



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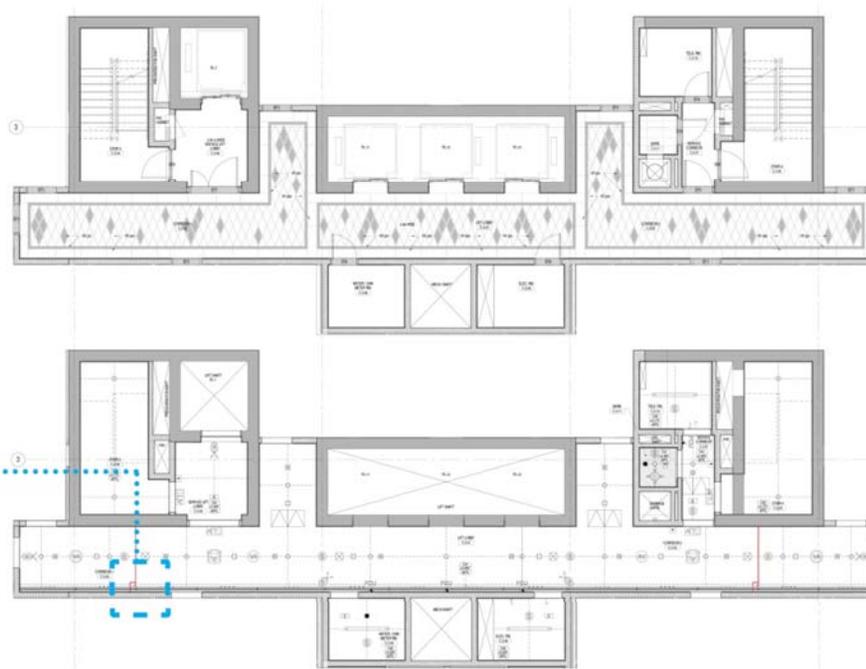
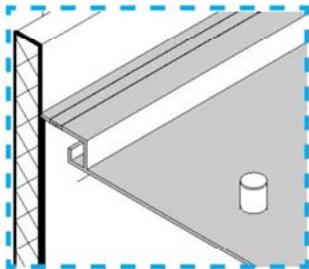
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DESIGN STAGES

DETAIL DESIGN

AL MULLA 5 STAR HOTEL & RESIDENCES, DUBAI

- Clean modulated design development.
- Overall time reduced with effective modelling and typical details.



DESIGN DEVELOPED FOR RESIDENTIAL LOBBY AND CORRIDOR SPACES.



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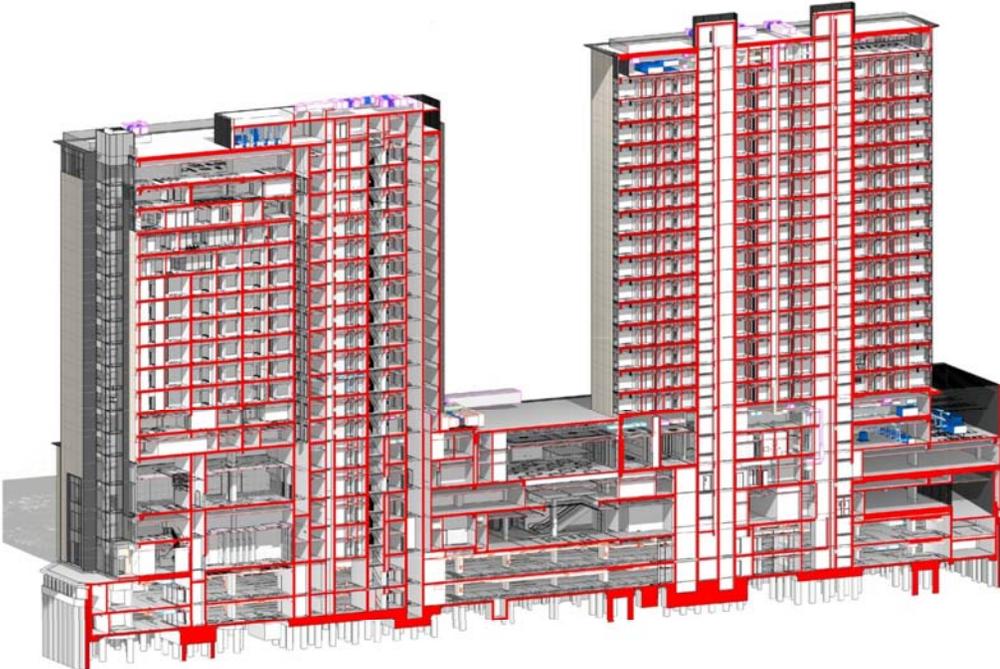
DESIGN STAGES



DETAIL DESIGN

AL MULLA 5 STAR HOTEL & RESIDENCES, DUBAI

- Overall coordination between various disciplines namely : Architecture, Structure and MEP.



COORDINATION BETWEEN VARIOUS DISCIPLINES



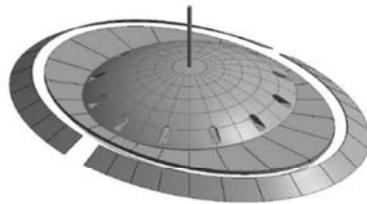
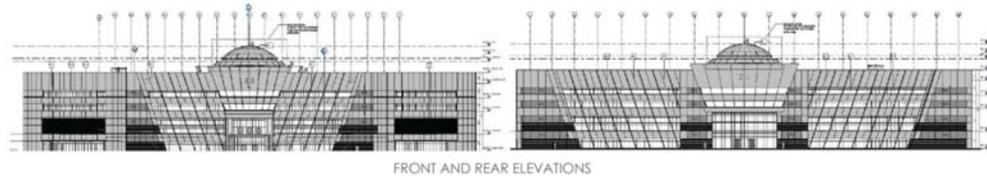
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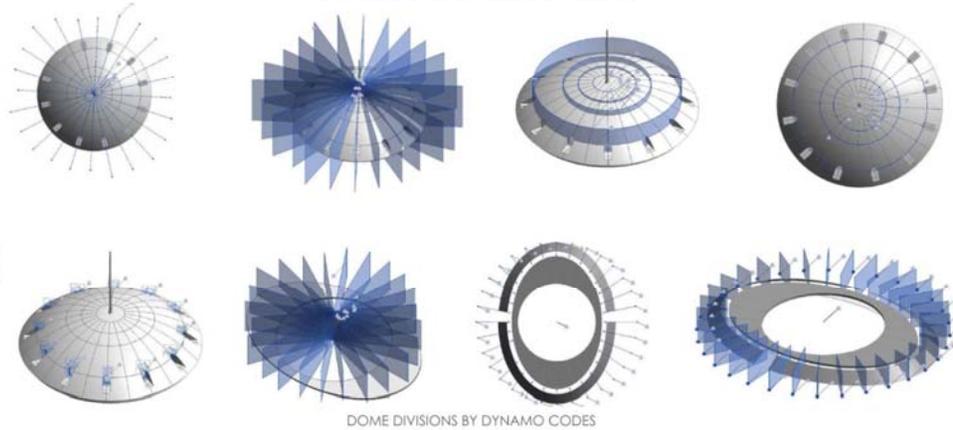
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DETAIL DESIGN

- Curved walls modelling
- Pre-cast panel modelling
- Slanted columns modelling
- Curtain system
- Trusses modelling
- Drafting techniques and wall sections



DOME MODEL



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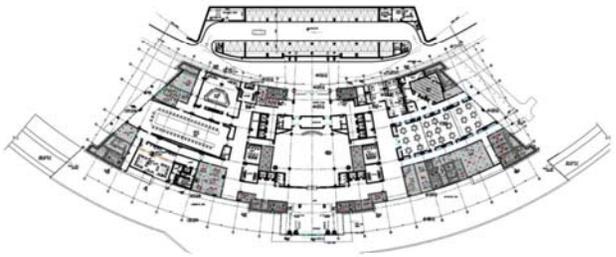
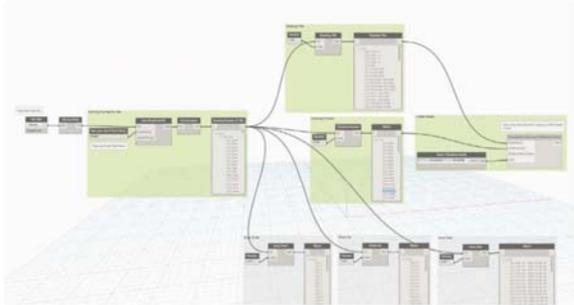
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DETAIL DESIGN

- Parametric modelling and documentation done using dynamo scripts.



ID	Name	Value	Unit	Category
001	CONCRETE	250	mm	Structure
002	STEEL	8	mm	Structure
003	GLASS	12	mm	Structure
004	INSULATION	100	mm	Structure
005	MECHANICAL	100	mm	MEP
006	ELECTRICAL	100	mm	MEP
007	PLUMBING	100	mm	MEP
008	MECHANICAL	100	mm	MEP
009	ELECTRICAL	100	mm	MEP
010	PLUMBING	100	mm	MEP
011	MECHANICAL	100	mm	MEP
012	ELECTRICAL	100	mm	MEP
013	PLUMBING	100	mm	MEP
014	MECHANICAL	100	mm	MEP
015	ELECTRICAL	100	mm	MEP
016	PLUMBING	100	mm	MEP
017	MECHANICAL	100	mm	MEP
018	ELECTRICAL	100	mm	MEP
019	PLUMBING	100	mm	MEP
020	MECHANICAL	100	mm	MEP



DYNAMO SCRIPTS CREATED FOR MODELLING AND DOCUMENTATION



IPM

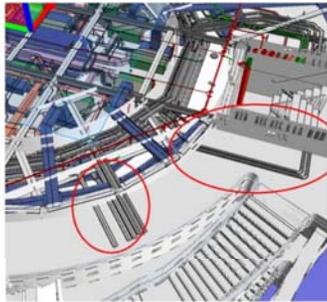
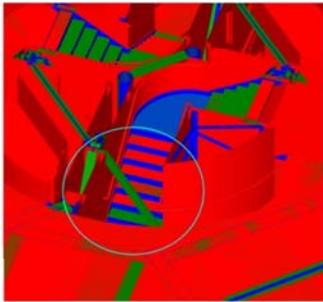
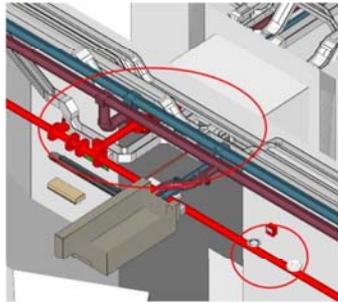
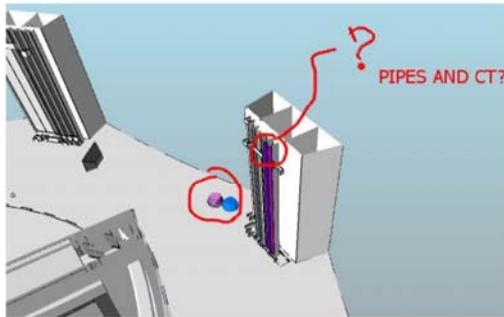
IPM

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DETAIL DESIGN

DUBAI CREEK HARBOUR - THE TOWER, DUBAI

- Multi disciplinary coordination achieved using navisworks for clash detection.



CLASH DETECTIONS BETWEEN ARCHITECTURE AND OTHER DISCIPLINES



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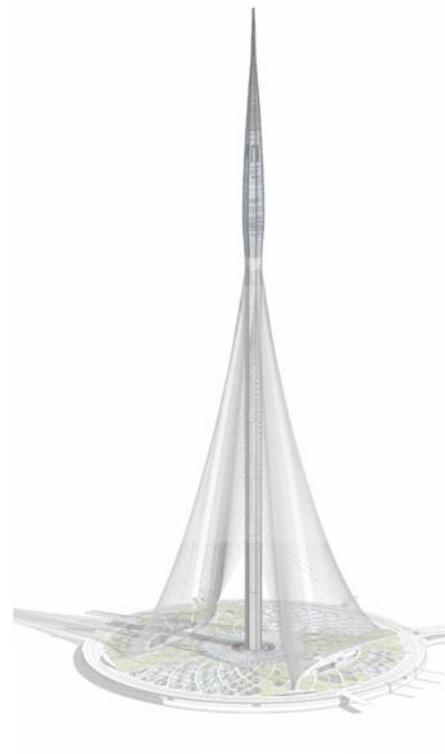
DESIGN STAGES



DETAIL DESIGN

DUBAI CREEK HARBOUR - THE TOWER, DUBAI

- Design developed further from concept stage to the level of IFT.



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6

TENDER & IFC



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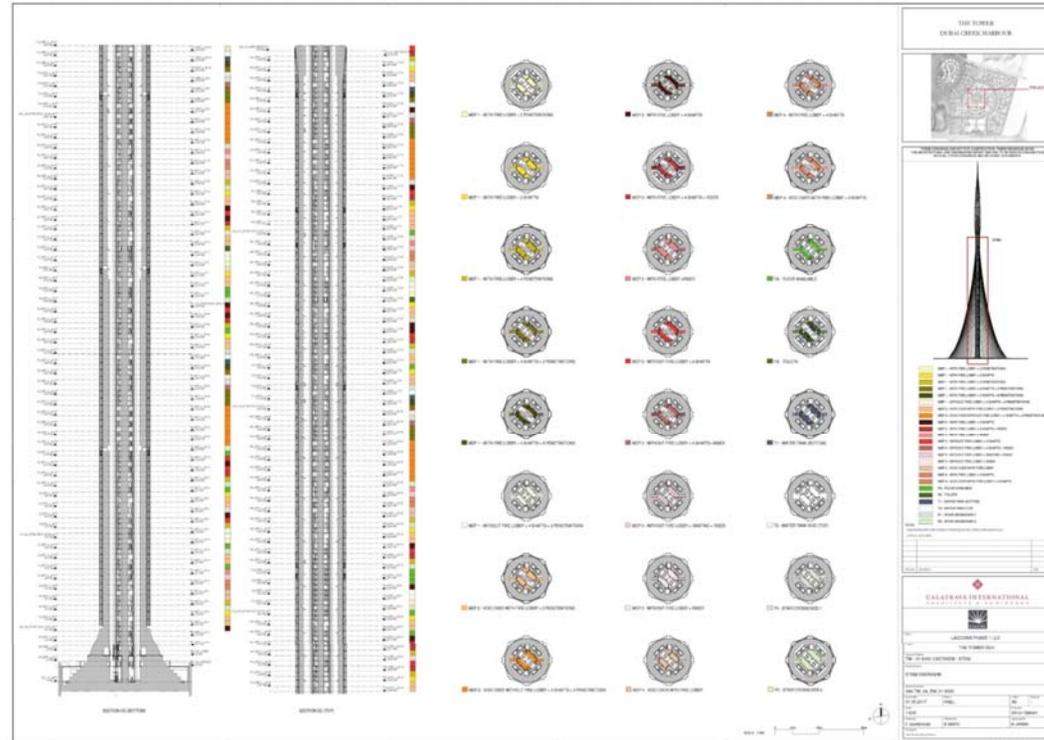
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DESIGN STAGES

TENDER & ISSUE FOR CONSTRUCTION

DUBAI CREEK HARBOUR - THE TOWER, DUBAI

- Coordinated, error-free and high quality construction documentation.



SAMPLE OF PROJECT SHEET - OVERVIEW



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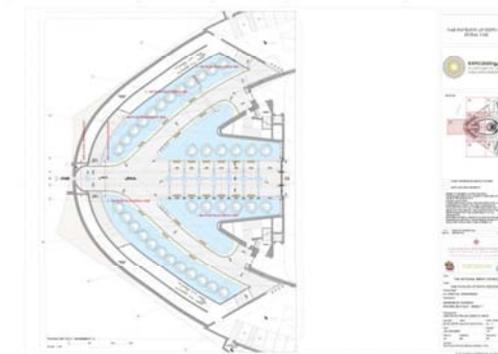
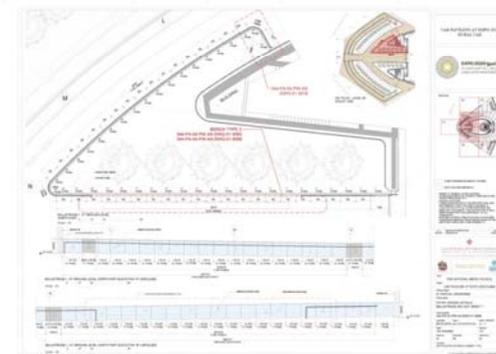
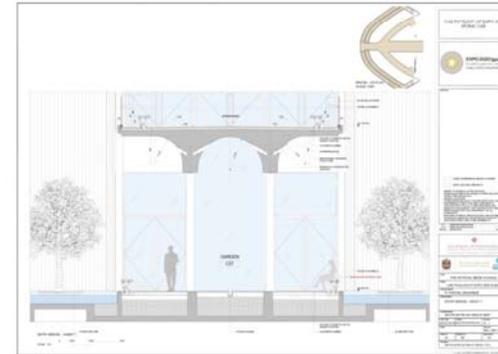
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TENDER & ISSUE FOR CONSTRUCTION

UAE PAVILION - EXPO 2020, DUBAI

- Coordinated, error-free and high quality construction documentation.



SAMPLES OF PROJECT SHEETS



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DESIGN STAGES



TENDER & ISSUE FOR CONSTRUCTION

AL MULLA 5 STAR HOTEL & RESIDENCES, DUBAI

- Coordinated, error-free and high quality construction documentation.



SAMPLES OF PROJECT SHEETS



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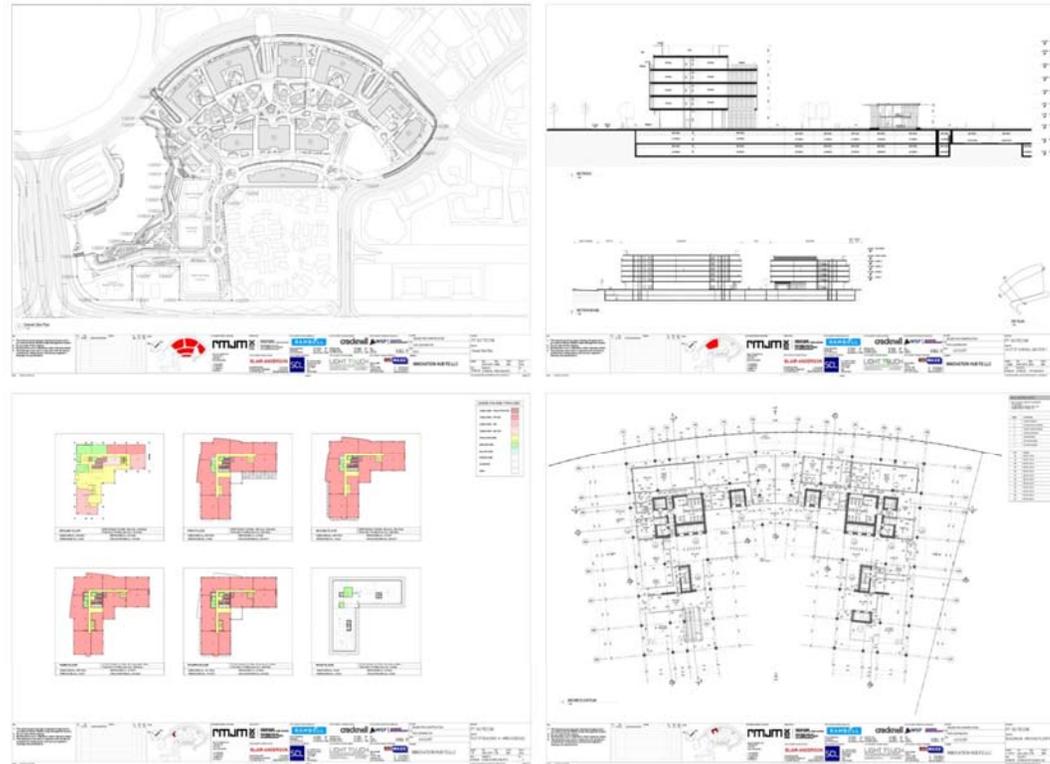
DESIGN STAGES



TENDER & ISSUE FOR CONSTRUCTION

TECOM INNOVATION HUB, DUBAI

- Coordinated, error-free and high quality construction documentation.



SAMPLES OF PROJECT SHEETS



mum

mumPIM

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7 SUPERVISION & HANDOVER



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DESIGN STAGES

SUPERVISION & HANDOVER

TECOM INNOVATION HUB, DUBAI

-CONTRACT ADMINISTRATION: MANAGE THE NEGOTIATION, EXECUTION, PERFORMANCE, MODIFICATION AND TERMINATION OF CONTRACTS WITH VARIOUS PARTIES INCLUDING THE DEVELOPER, SUPPLIERS, DESIGNERS, CONTRACTORS AND SUBCONTRACTORS. IT ALSO INVOLVES ONLINE TRACKING AND RECOGNIZING PERFORMANCE BY MANAGING A COMMON DATA EXCHANGE ENVIRONMENT FOR VALIDATION AND APPROVALS.



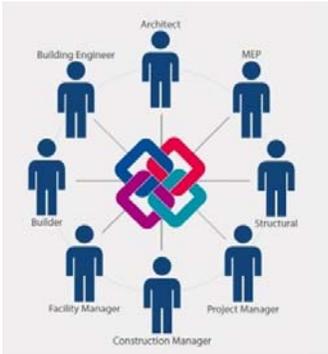
RENDER



IFC REVIT MODEL



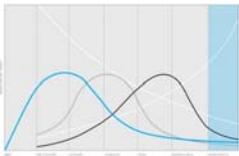
AS BUILT ON SITE



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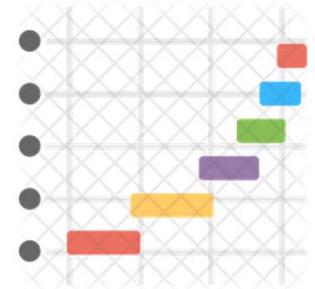
SUPERVISION & HANDOVER

DIFC GATE AVENUE, DUBAI

-PROGRAMME MANAGEMENT: THE OVERALL MANAGEMENT OF CONSULTANTS' AND CONTRACTORS' PROGRAMMES AND SIMULATION IN 4D VISUAL PROGRAMME. IT ALSO INVOLVES THE LINKAGE OF THE OVERALL PROGRESS WITH THE 4D PLANNED PROGRAMME TO TRACK CHANGES, RESOLVE CONFLICTS AND PRIORITIES NEEDFUL PROCESSES TO ACHIEVE BEST PERFORMANCE WITHIN PLANNED TIMEFRAME.



AS BUILT ON SITE



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SUPERVISION & HANDOVER

HOLIDAY INN & STAYBRIDGE, DUBAI

-SHOPDRAWING REVIEW: AS SHOPDRAWINGS FORMS AN ESSENTIAL PART OF THE CONTRACT, WE MANAGE AND CONTROL THE VALIDATION PROCESS WITH SPECS AND PLANS ONLINE WITH DESIGNERS AND ENGINEERS, DETECT CLASHES AND RESOLVE THEM USING E-CONSTRUCTION SIMULATION TO AVOID ANY UNPLANNED CHANGES IN TIME, QUALITY OR COST. SHOPDRAWING MODEL IS LATER VERIFIED WITH THE AS-BUILT STATE OF CONSTRUCTION TO ISSUE A FINAL AS-BUILT MODEL INCLUDING ALL REQUIRED INFORMATION NEEDED BY THE OPERATOR AND FACILITY MANAGER WITH A VALID EXTRACTABLE COBIE INFORMATION AND COMPATIBLE WITH FACILITY MANAGEMENT CAFM.



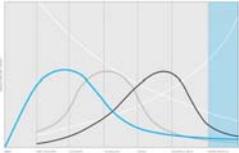
AS BUILT ON SITE



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SUPERVISION & HANDOVER

SOUQ EXTRA MALL DSOA, DUBAI

-VALUE MANAGEMENT: DEFINING AND ADDING MEASURABLE VALUE, FOCUSING ON OBJECTIVES AND VISION, AND CONCENTRATING ON FUNCTION AND EFFICIENCY WITH NO COMPROMISE WITH THE BEAUTY FACTOR. IT IS AN ESSENTIAL PART OF THE VALIDATION PROCESS OF SHOPDRAWINGS WITHIN THE INTEGRATED FRAMEWORK INCLUDING DESIGNERS AND CONTRACTORS AS A VALUE FOCUSED MANAGEMENT STYLE; A POSITIVE APPROACH TO INDIVIDUAL AND TEAM MOTIVATION; AND COMMUNICATES THE NEEDFUL AWARENESS TO PROJECT OWNER TO ACHIEVE BEST OPTIMAL RESULTS.

RENDER



ON SITE

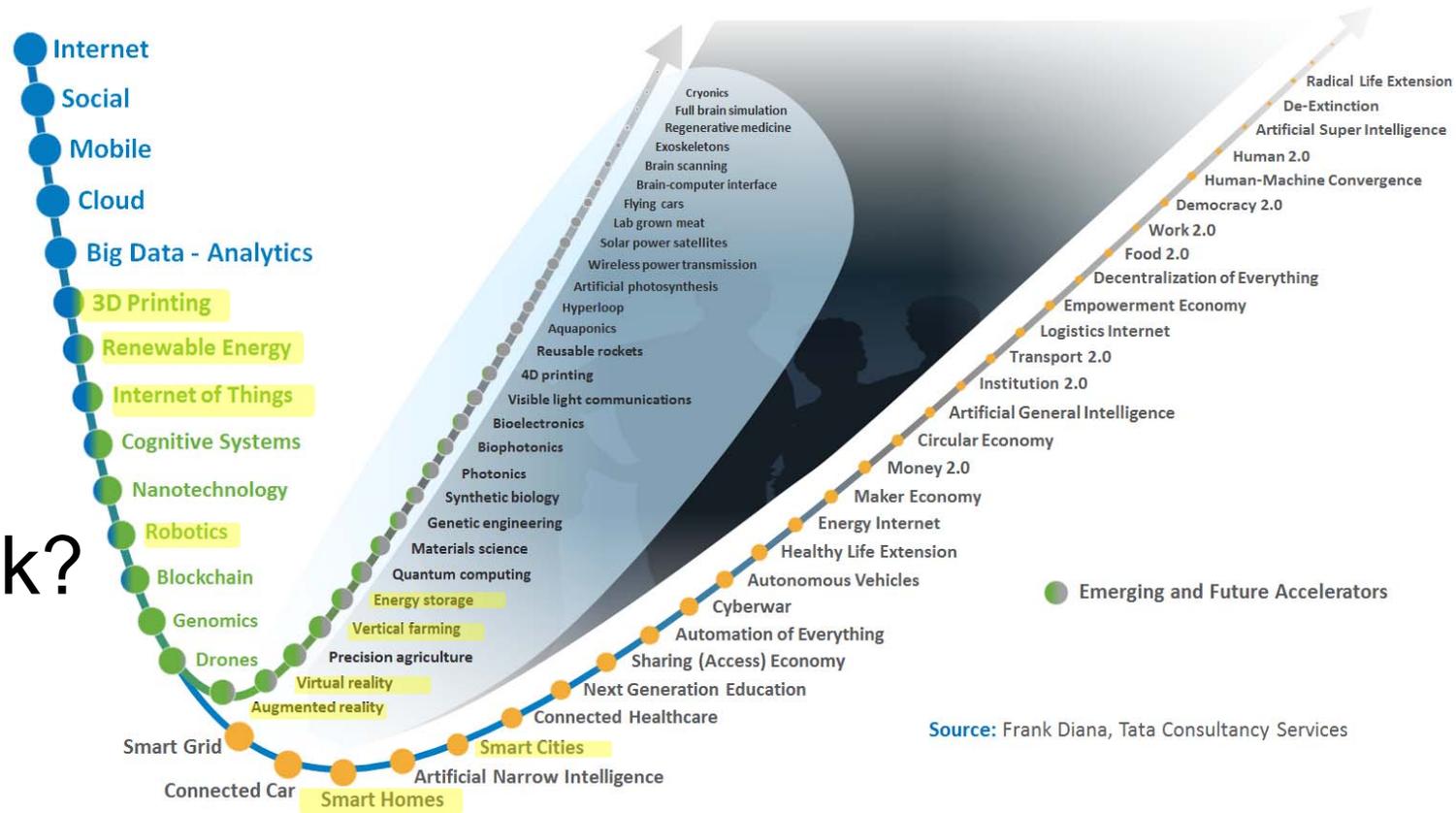


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Are we on track?



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**PROJECT INTEGRATION
MANAGEMENT (PIM)**

**22% SAVING IN
CONSTRUCTION
COSTS**

Following British standard BS 1192 and publicly available specification PAS 1192-2, which have already been shown to help users save up to 22 % in construction costs



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**PROJECT INTEGRATION
MANAGEMENT (PIM)**

**COLLABORATIVE
WORKING**

Integrated design and construction team using BIM edge technology to stimulate time, cost, sustainability and deliver COBie quality graphical and non-graphical information



fig - 1: PROJECT RENDER



سوق الخريف Souq Extra DSOA

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**PROJECT INTEGRATION
MANAGEMENT (PIM)**

**DIGITAL
WORKING**

Electronically engage with all teams using a Unified cloud database to communicate, submit and validate graphical and non-graphical information online with client's team



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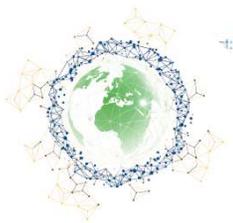
PIM

PIM

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SUSTAINABILITY

Achieve green construction goals, carbon footprint, LEED, BREEAM, energy consumption conclusion and deploy renewable energy solution



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PROJECT INTEGRATION
MANAGEMENT (PIM)

DESIGN INTELLIGENCE

Programmatic architectural smart design based on modular approach and controlled by digital framework of integrated technology to afford cost and time optioneering during design life cycle



AI Mulla Hotel & Residences

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PROJECT INTEGRATION
MANAGEMENT (PIM)

CONSTRUCTION INTELLIGENCE

Digitally engage with the contractor
for validation & approval, supervise
& assure deliverables and deliver
COBie standard asset models the
operator



TECOM Innovational Hub

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E-CONSTRUCTION

Building design is constructed & tested electronically to avoid hidden surprises, solve issues and simulate cost & time to build before starting on construction site

- DEVELOPMENT OF CHALLENGING DESIGN SOLUTIONS WHICH ACCOUNT FOR TIME & COST SIMULATION THROUGH EFFECTIVE BIM INTEGRATION.
- MODULATION TO AID CONSTRUCTION AND INSTALLATION
- PREFABRICATION OF MODELLED COMPONENTS BY UNFOLDING BUILT FORM THROUGH THE USE OF PROGRAMMED DYNAMO SCRIPTS

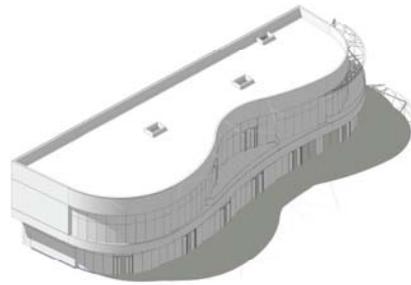


fig - 1: ISOMETRIC VIEW OF RETAIL MALL

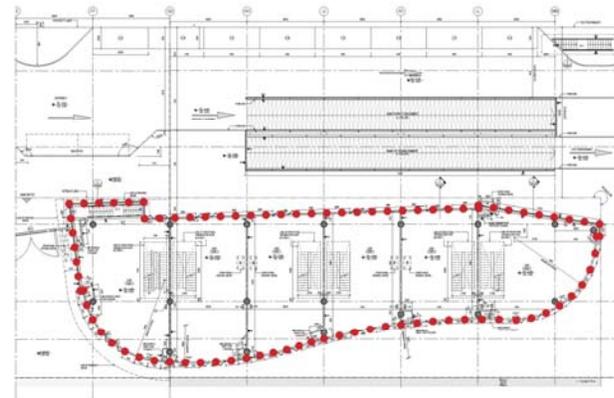


fig - 2: BIM-GENERATED SCHEMATIC DRAWINGS OF RETAIL MALL

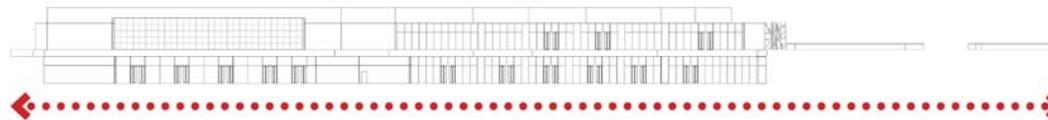


fig - 3: UNFOLDED ELEVATION OF RETAIL MALL
USED FOR PREFABRICATED CONSTRUCTION



Elite Retail Mall

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MITIGATION

Avoid any unplanned variations on the construction site by coordinating and testing graphical and non-graphical inputs before starting work on site

- **PLANNING TO OPTIMIZE DESIGN DEVELOPMENT THROUGH FEASIBILITY STUDIES PRIOR TO CONSTRUCTION**
- **CENTRALIZED MODELLING PRACTICES FOR EASE OF COORDINATION**



Fig - 1: CONCEPTUAL DEVELOPMENT OF MASTERPLAN ON RHINO



Fig - 2: CONSTRUCTION DRAWINGS DEVELOPED ON BIM UTILIZING CONCEPTUAL MODEL AS A BASE



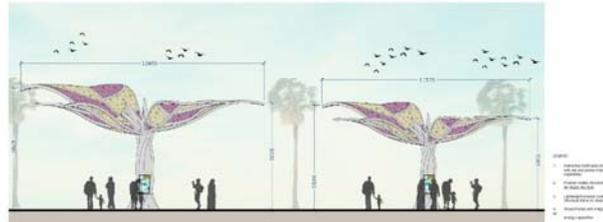
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CONSERVATION

Effective programming and prevention of time wastage to achieve targets within the prescribed time and budget through electronic simulation



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ENGAGEMENT

Engagement with client beyond design and construction providing accurate visuals for sales & marketing, value engineering by providing options and commit passing as-built information to the building operator CAFM

- EFFECTIVE COMMUNICATION OF DESIGN AND ASSOCIATED COMPONENTS IN THE FORM OF GRAPHICAL & VISUALLY AESTHETIC REPORTS, PRESENTATIONS & RENDERS/ ANIMATIONS.
- ENHANCE VALUE ENGINEERING THROUGH THE DEVELOPMENT OF DESIGN OPTIONS, ADHERING TO CLIENT REQUIREMENTS & STANDARDS



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THANK YOU



RMJM

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Chief Technology Officer
Email: m.essam@rmjmd3.com

