

# Facility Management Best Practices in Super Tall Building

Dec 5th, 2023, by  
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# Driven by 25 years of FM evolution



- Executive Director – FM /Imdaad Group
- MEFMA Vice President
- Global FM Vice Chair
- IAAPA Board Member- Entertainment industry
- Stints at leading corporations – asset owner + service provider
  - Advisor & Consultant for various GCC government and private organizations
  - Sr Director Burj Khalifa
  - COO, Global Village
  - Dubai Parks & Resorts | SAM | Idama | Emaar | du | Etisalat



# The concept of Impactful FM

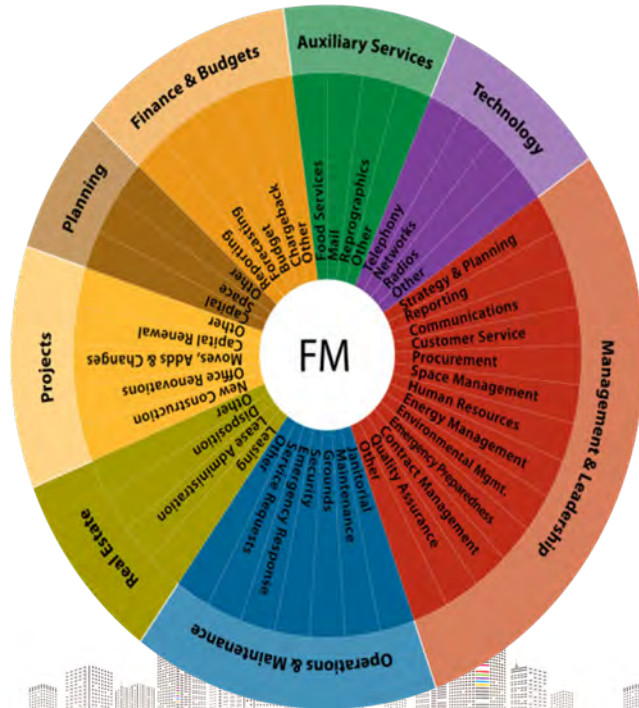


Impactful FM is my formula for the practice of Facility Management in acknowledgement of the impact it has – commercial, economic, social, environmental and more – beyond the apparent and immediately visible



## Facilities Management – Snap Shot of the Core Competencies

# Introduction about the FM

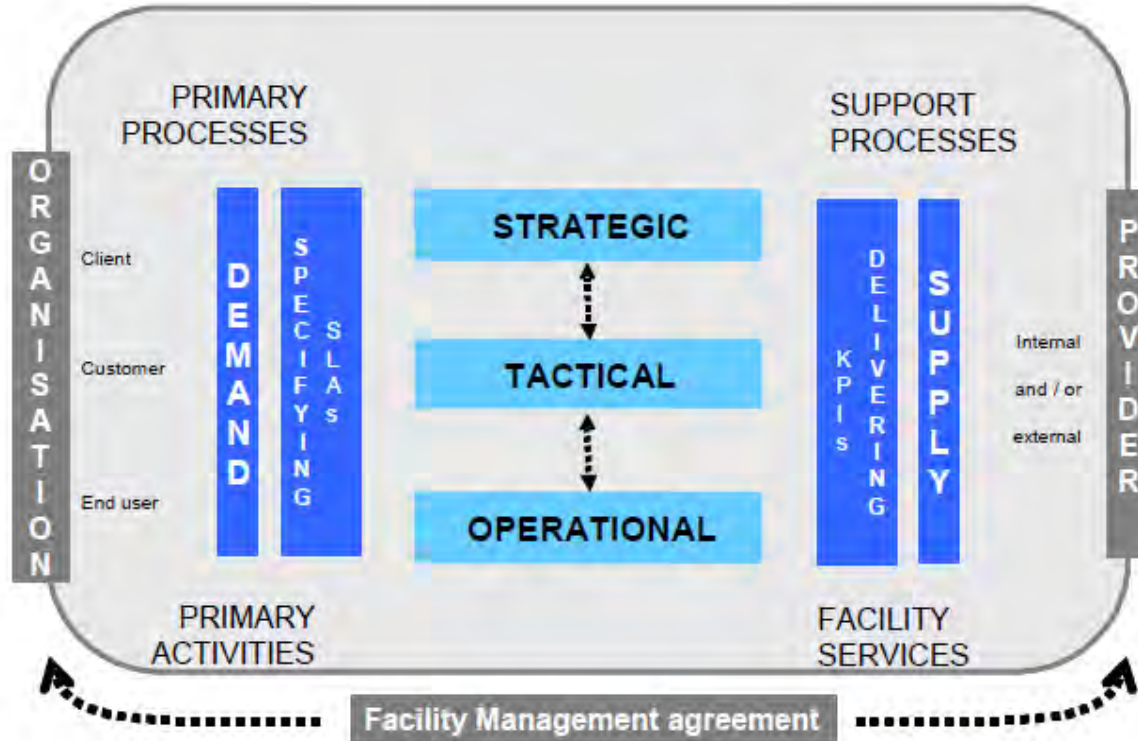


**Facility management (FM)** encompasses multiple disciplines to ensure functionality, comfort, safety and efficiency of the built environment by integrating people, place, process and technology.

To adapt to the **dynamics of client** requirements and **uphold our vision**, all the below 11 core competencies need to be well balanced and managed:

1. Leadership & Strategy
2. Finance & Business
3. Operations & Maintenance
4. Technology
5. Occupancy & Human Factors
6. Environment Stewardship & Sustainability
7. Emergency Preparedness & Business Continuity
8. Communication
9. Quality
10. Project Management
11. Real Estate & Planning





The FM-model of EN 15221-1 is shown.

# Old Dubai

1990



**View from ?**





# Burj KHALIFA





# Burj Khalifa History Rising - 2004



# Holders of the Title of “World’s Tallest Building”



Singer Bld	Met Life	Woolworth Building	Trump Bld	Chrysler Bld	Empire State	World Trade	Sears Tower	Petronas Towers	Taipei 101	Burj Khalifa
187m	213 m	241m	283m	319m	381	417	442m	452m	Taiwan 508m	2008
1908	1909	1913	1930	1930	1931	1972	1974	1998	2004	

Span of 100 years



# BURJ KHALIFA - DEVELOPMENT MASTER PLAN



Burj  
Dubai

The Residences

The Park

Old Town

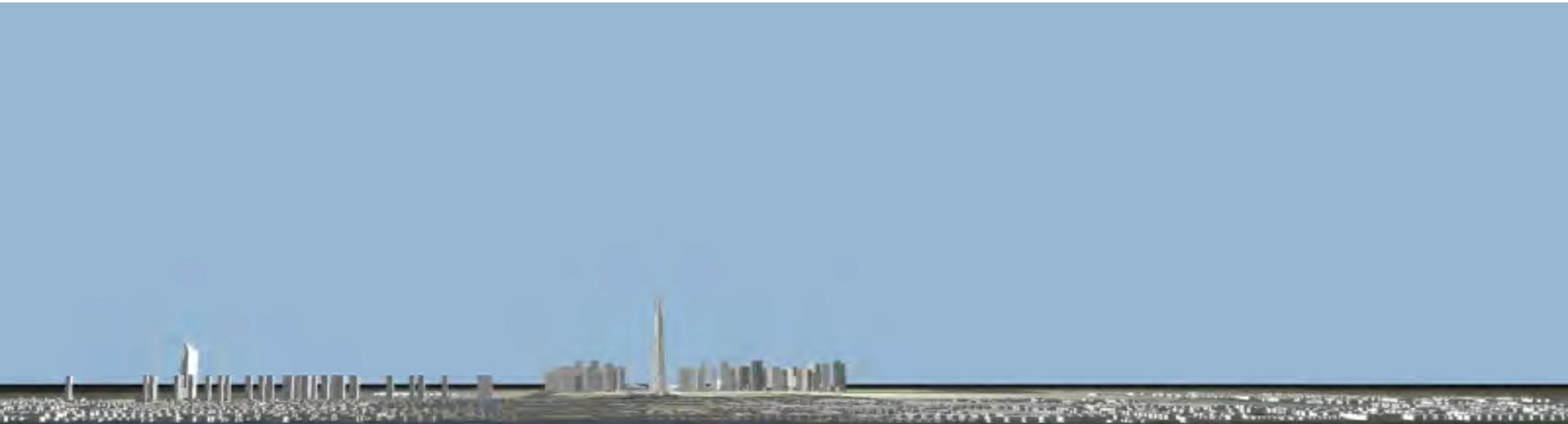
The Dubai Mall



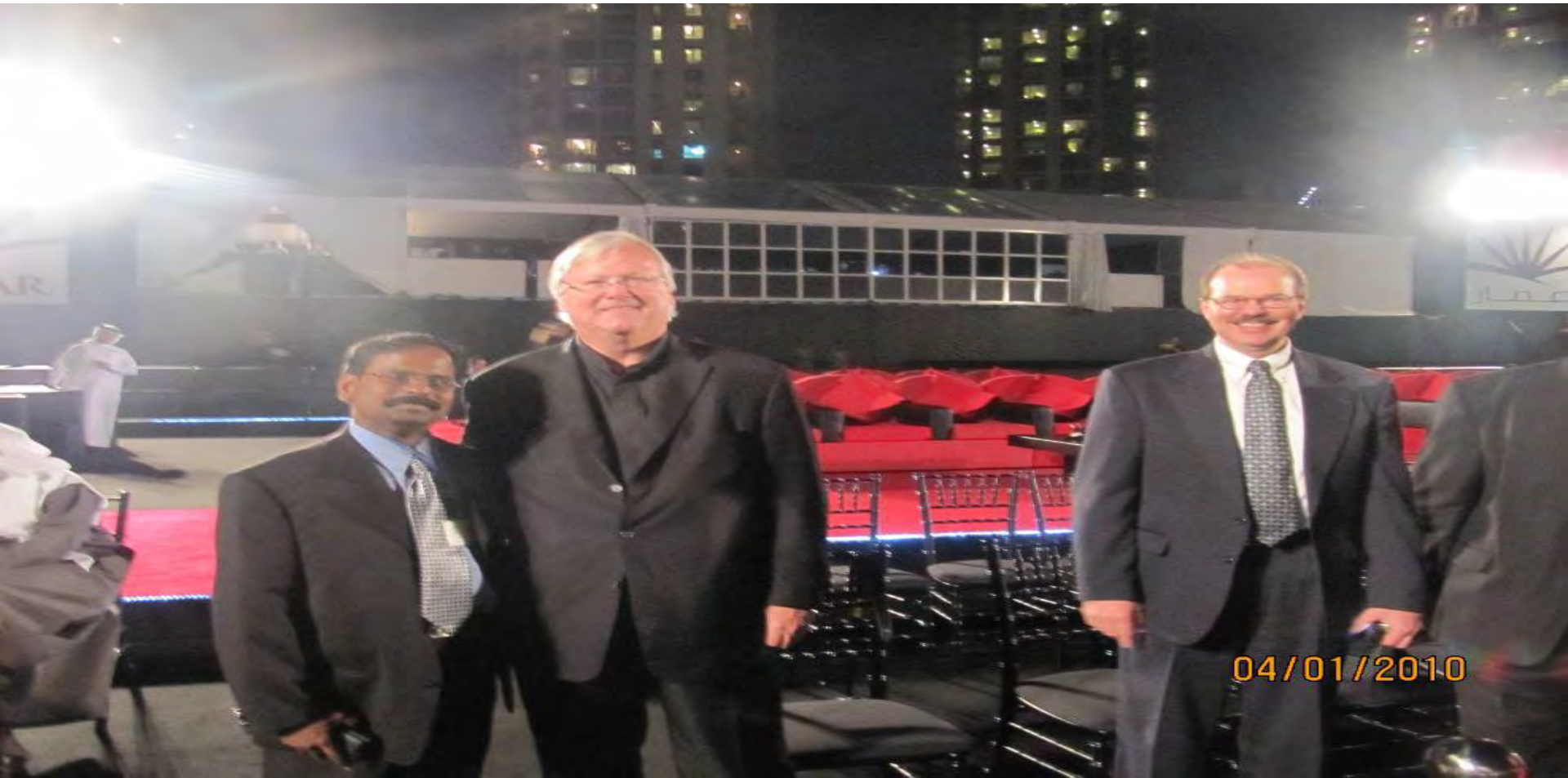
# The Burj Khalifa Team



# Burj Khalifa – Architects Impression Bird View



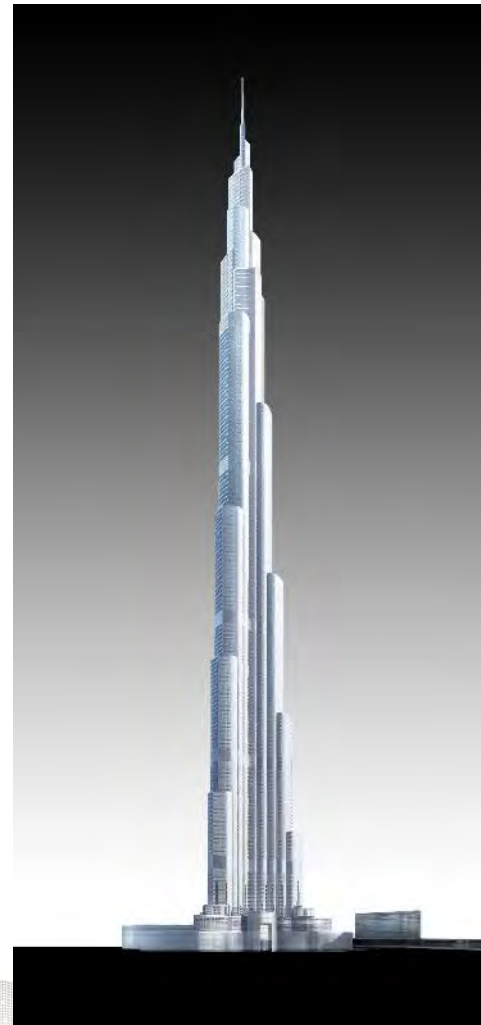
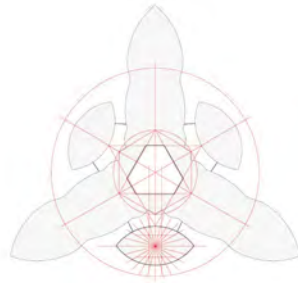
# Architect Adrian Smith



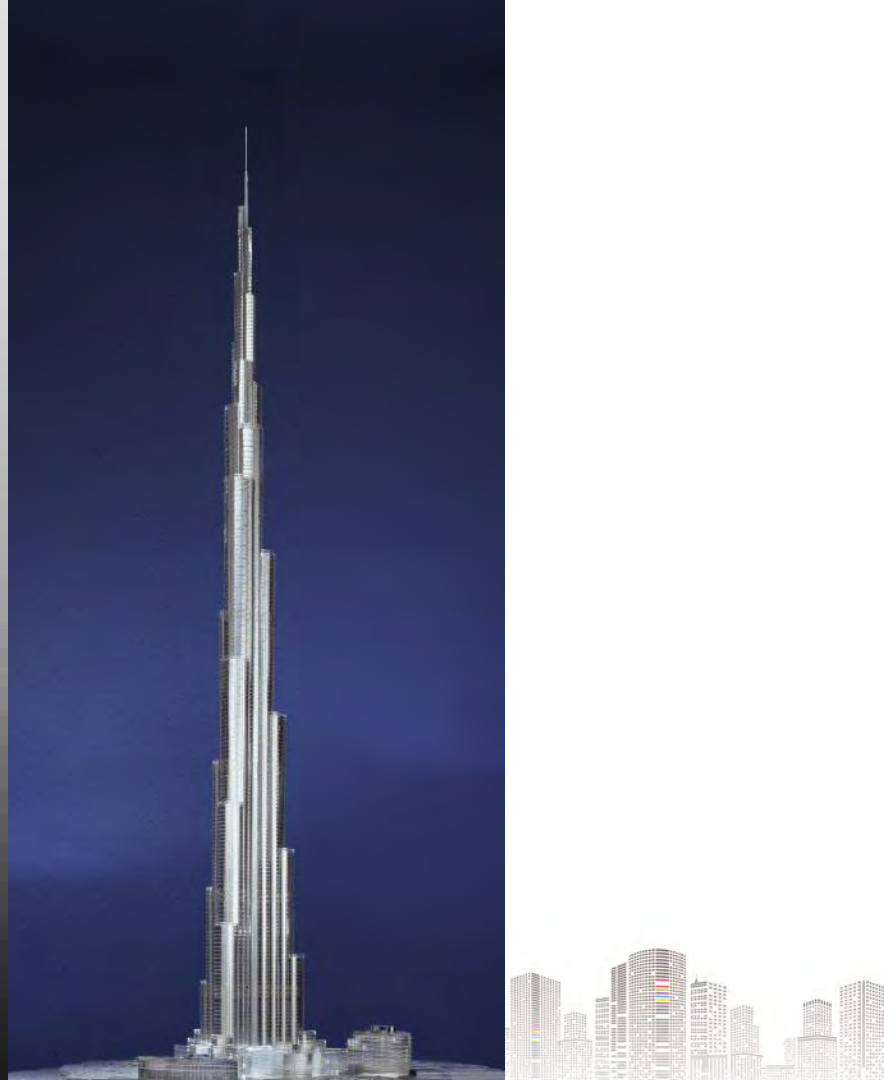
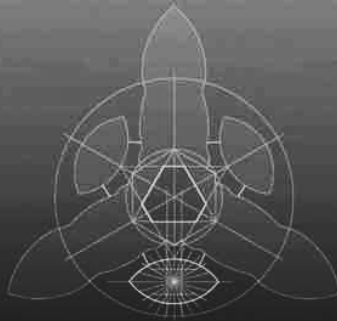
04/01/2010



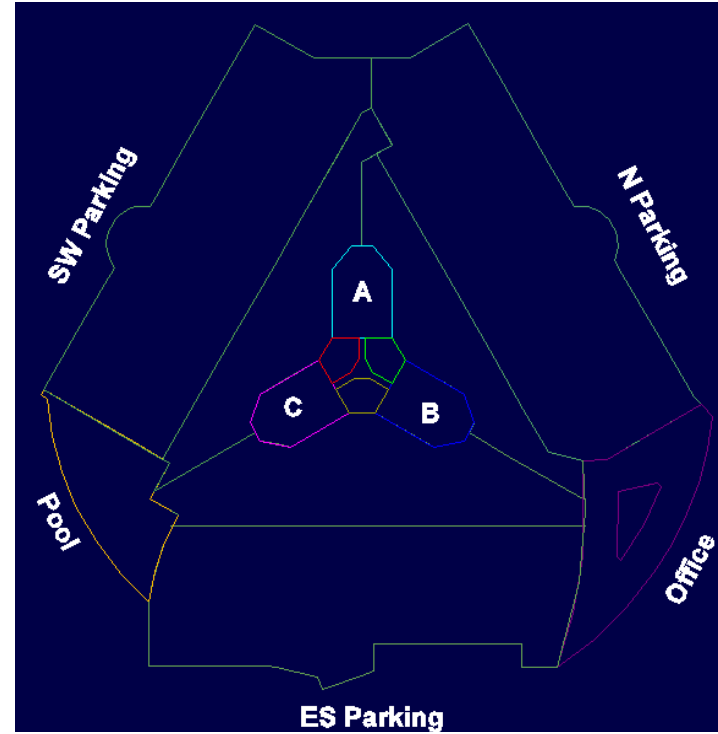
# Design Concept :The Desert Flower



- **Patterns**
- **Traditional Islamic Architecture**
- **Arabic Geometry**



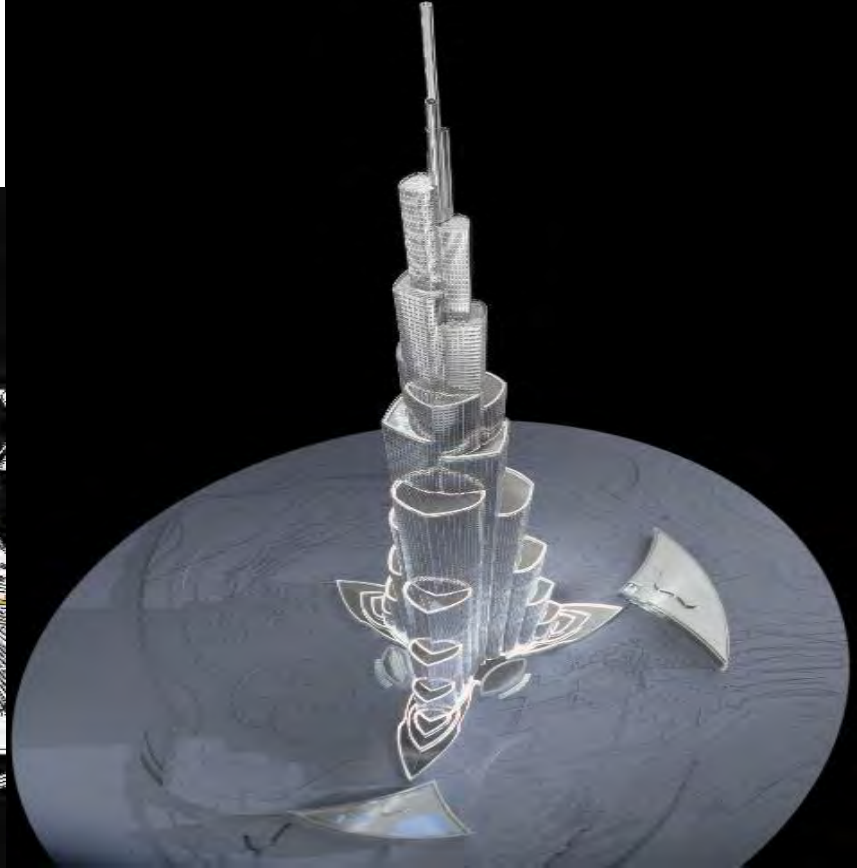
# Tower Plan View





# Burj Khalifa

## Aerial Perspective



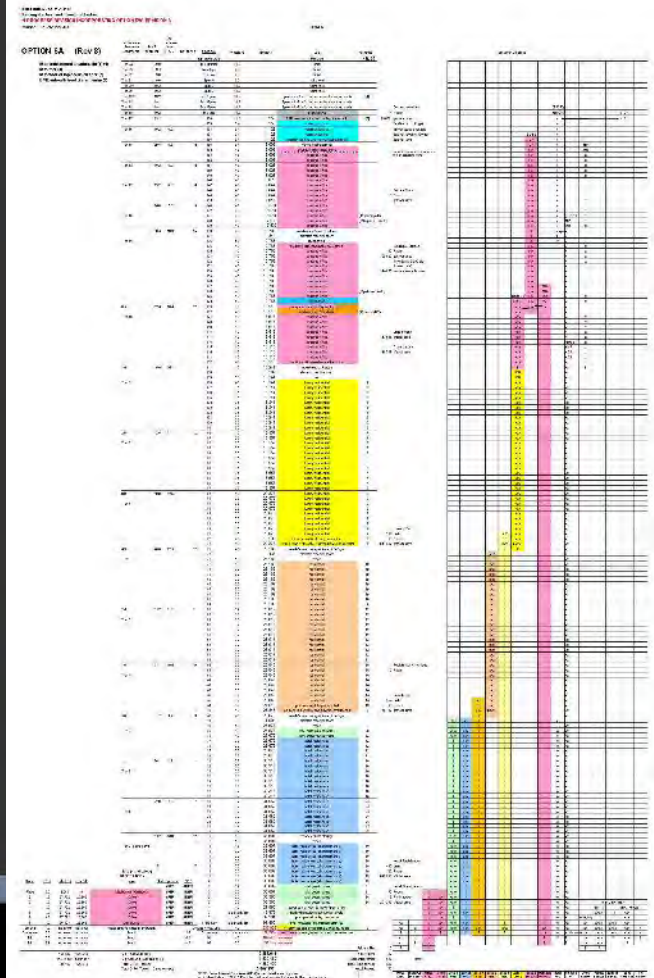
# Building Mixed Use Program

Total Tower Area:  
3,000,000 sqft  
279,000 m<sup>2</sup>

Total Podium Area:  
2,000,000 sqft  
186,000 m<sup>2</sup>

Tower Usage:  
172 Hotel Guestrooms  
492 Hotel Residences  
354 Residences  
232 Luxury residences  
Total Units 1250  
37 Boutique offices  
4 Communication  
Floors  
1 Observatory  
3,000 Parking Spaces

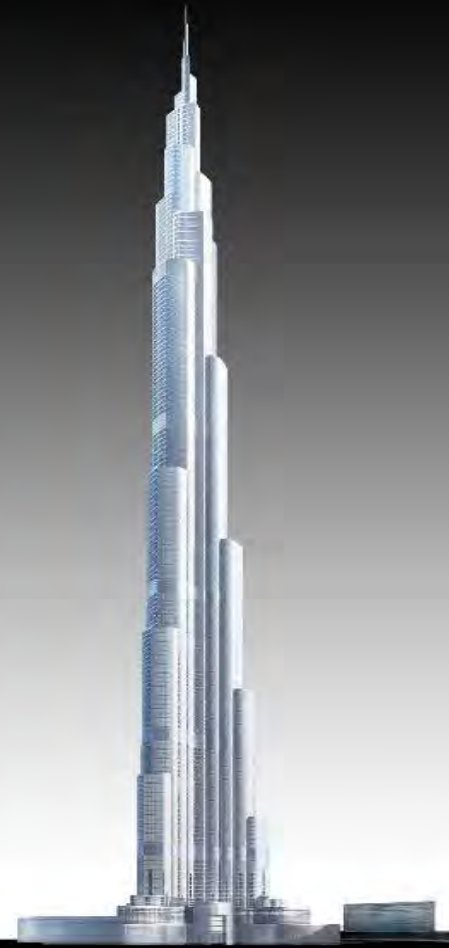
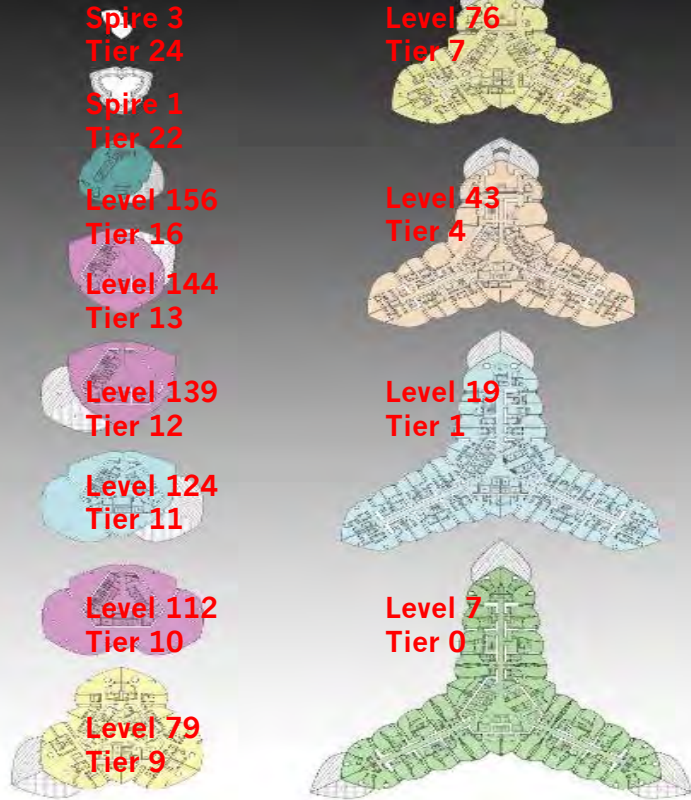
- Communication
- Boutique Offices
- Luxury Residential
- Residential
- Hotel Residences
- Hotel





# Tower Vertical Organization

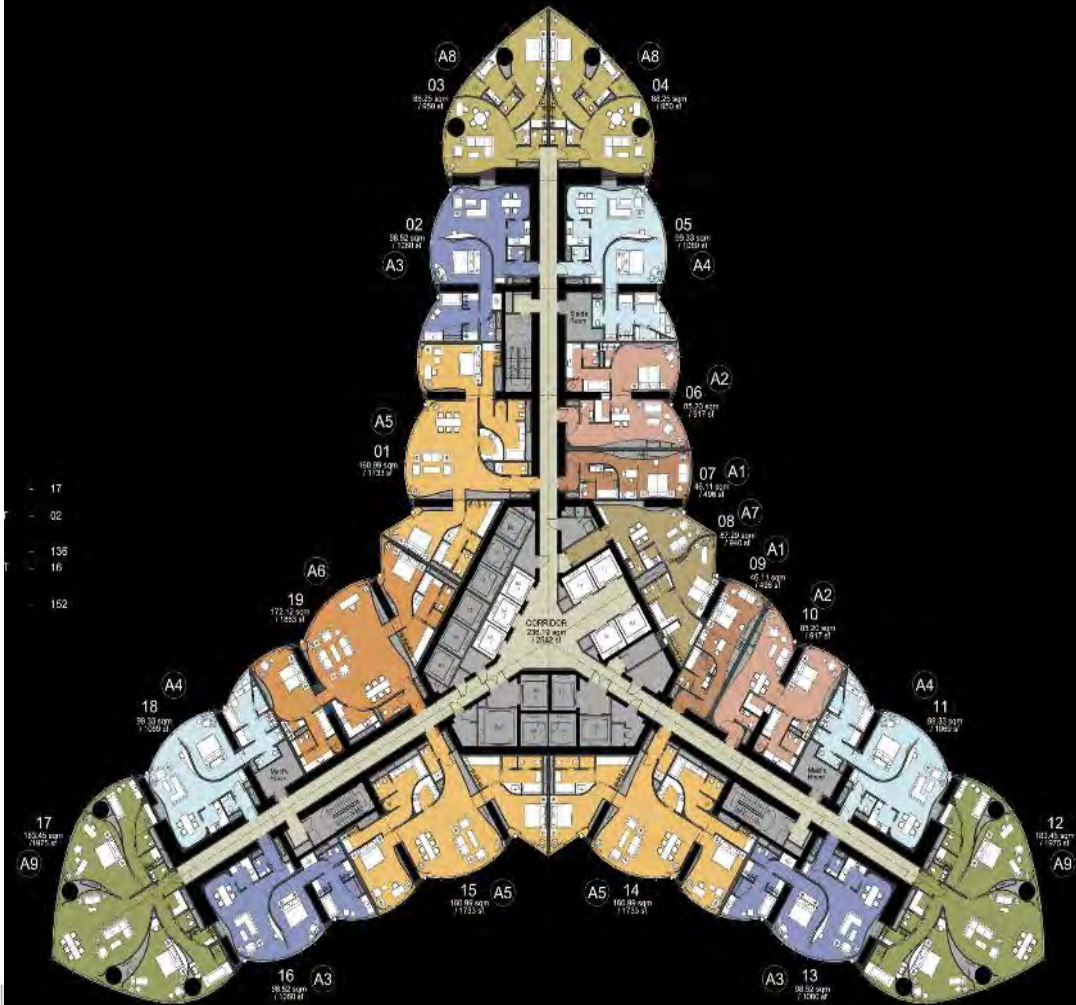
## Tiers and Plans



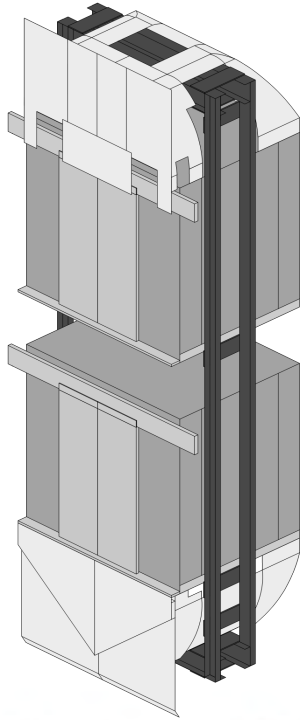


# Hotel Residential Floor Plan

Level 9  
Tier 0



# Vertical Transportation



Double-Deck  
Elevator

## Elevators:

- no. of elevators: 59
- longest travel: 504m (1,635 ft)
- fastest double deck elevator: 10 m/s (600 mpm or 1,969 fpm)
- Single deck elevator: 9 m/s (540 mpm or 1,772 fpm)
- capacity of the largest service elevator:  
4,500 kg (9,921 lb)

## Escalators:

- no. of escalators: 8



# Residential Lobby





# Office Entrance



## FM as high potential business unit



# FM as high potential business unit

Linking the FM service to assist deliver the strategy of the overall organization; covering:

- Facility goals, needs and priorities
- Facility plans, funding and performance measures
- FM systems, structures and processes

Key elements:

- FM Strategy
- FM Service Delivery Model
- Performance Management System

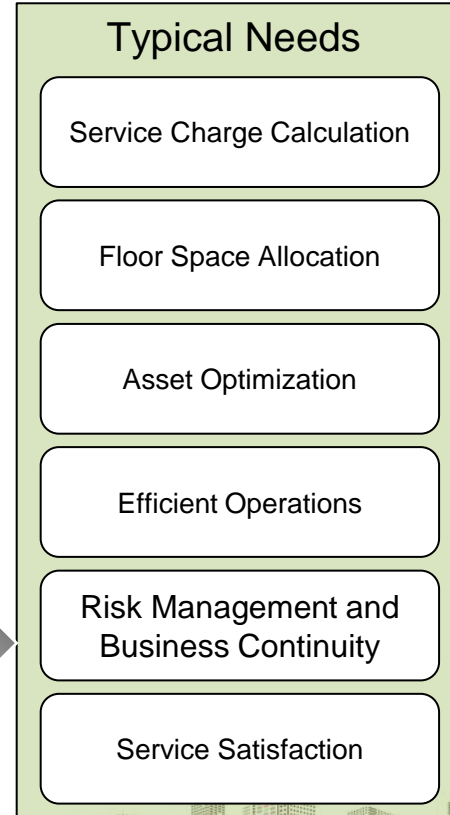
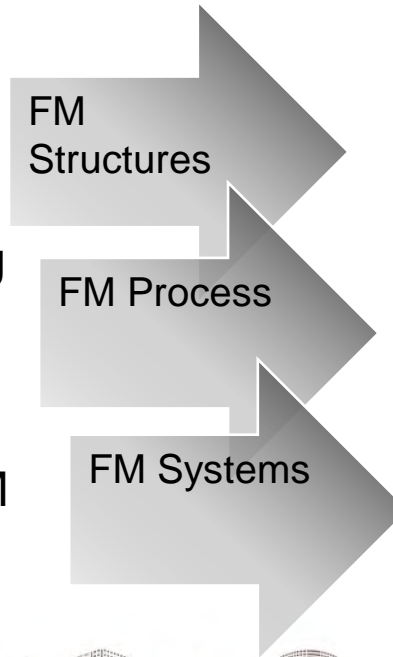
# FM as high potential business unit

## Drivers:

- Increased accountability
- Increased change
- Service outsourcing

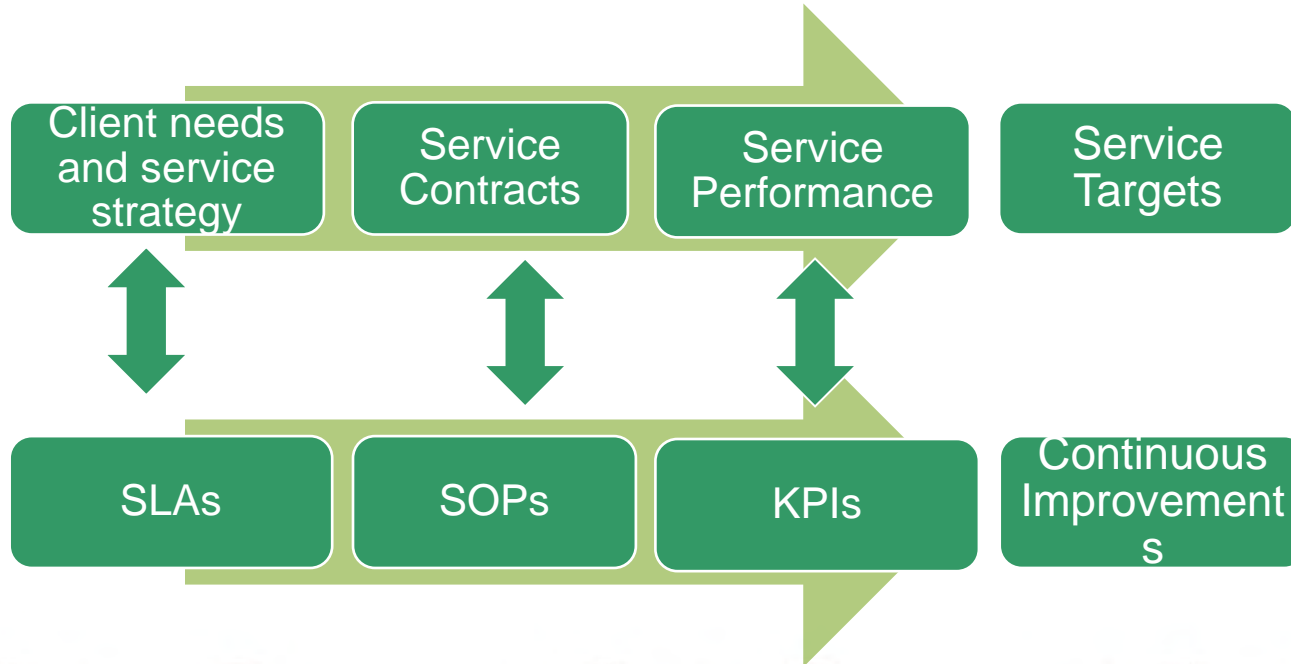
## Enablers:

- Computer aided FM systems





# FM as high potential business unit



Innovative, Client-focused Strategic FM



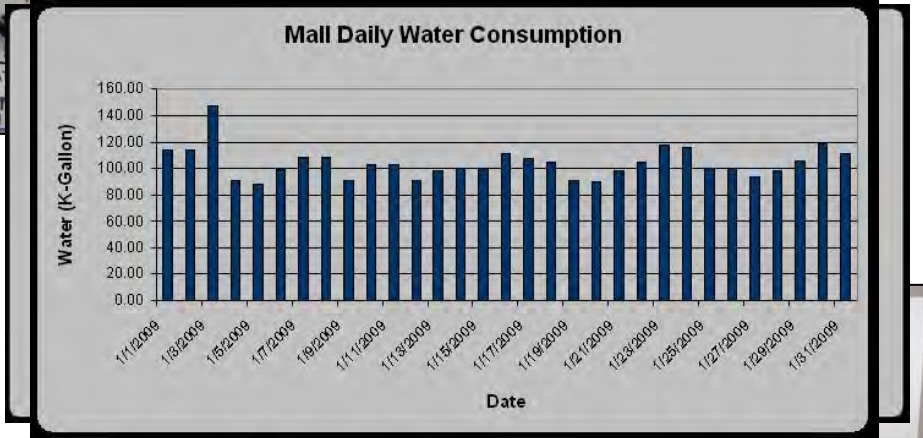
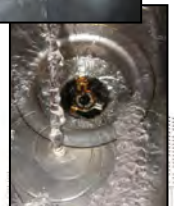
Partnered  
Energy  
Management



Waste Management



Water Conservation



# Super Tall Building Handover tasks - Operations, Work Flow Process

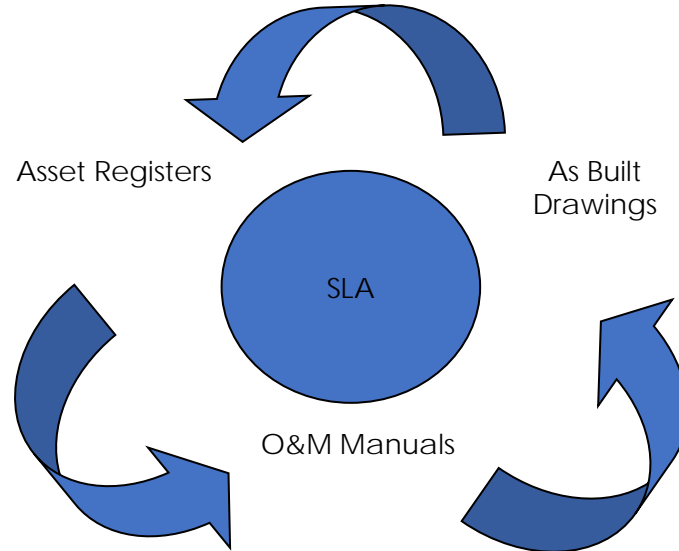




# Super Tall Building TECHNICAL MEP DESIGN



# CYCLE OF INFORMATION



# CONSIDERATIONS FOR MEP SYSTEMS

Building System	Supertall – Unique Considerations
Chilled water, condenser water, hot water, domestic water, fire water systems	Hydraulic pressure
Supply air, exhaust air, life safety, smoke control	Shaft sizes, louvers, plant room location, stack effect
Electrical systems	Voltage drop
Lightning systems	Coordination with structure
Stack effect	Very high

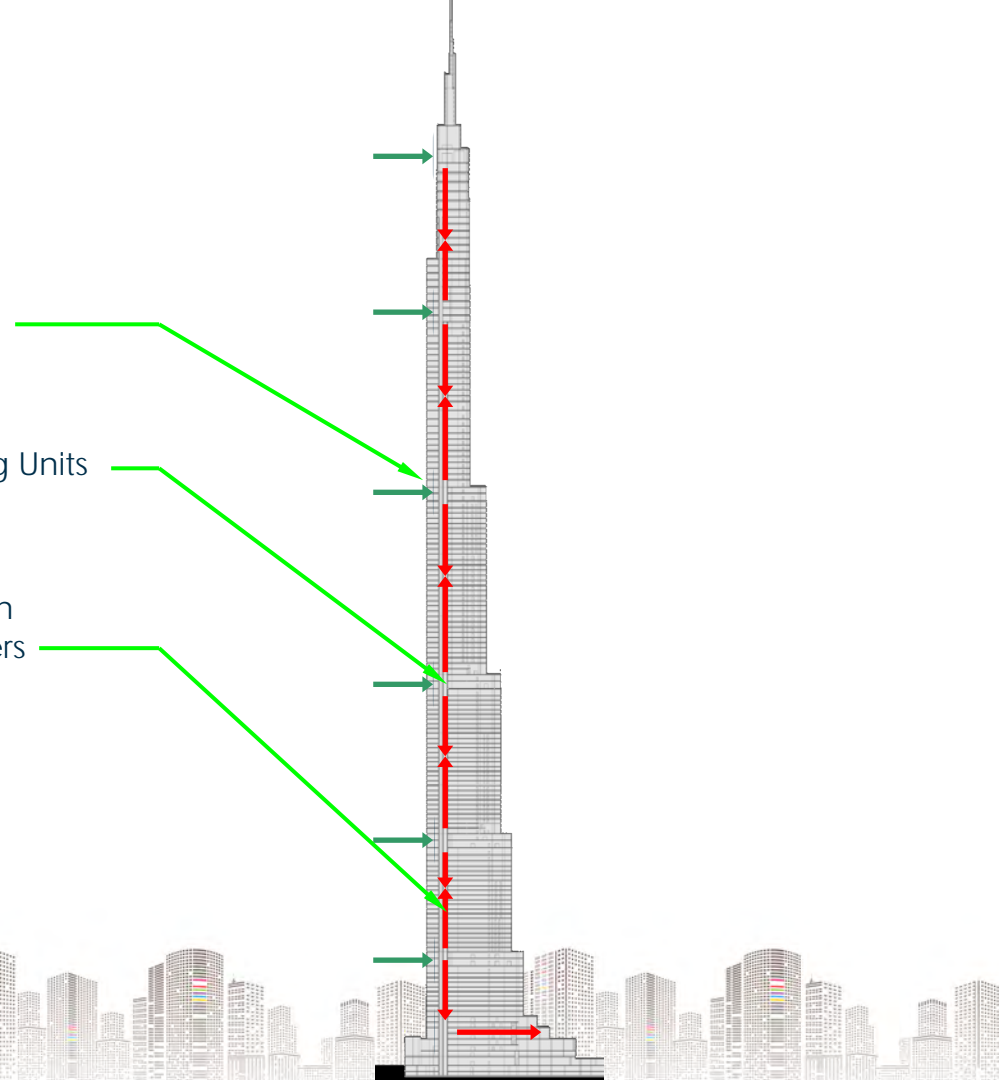


# SUPPLY AIR SYSTEM

Fresh Air Intake through Slots or Louvers

Supply Fans and Air Handling Units

Vertical Supply Air Distribution through Ducted Vertical Risers



# DOMESTIC WATER SUPPLY

High Level Tank

Gravity Express Down – High Pressure

Local Zones Gravity Down –  
Low Pressure through PRV's

Intermediate Tank

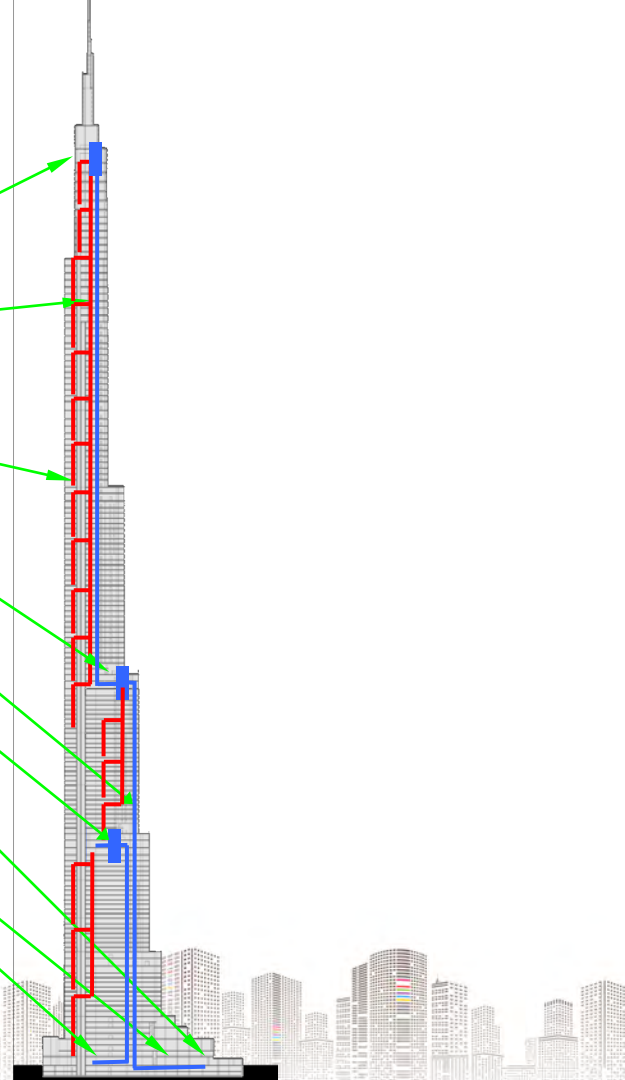
Express Fill Line Up

Hotel Tank

Main Water Storage Tanks  
Fire and Residential

Transfer Pumps

Hotel Main Storage Tank



# CHILLED WATER SYSTEM

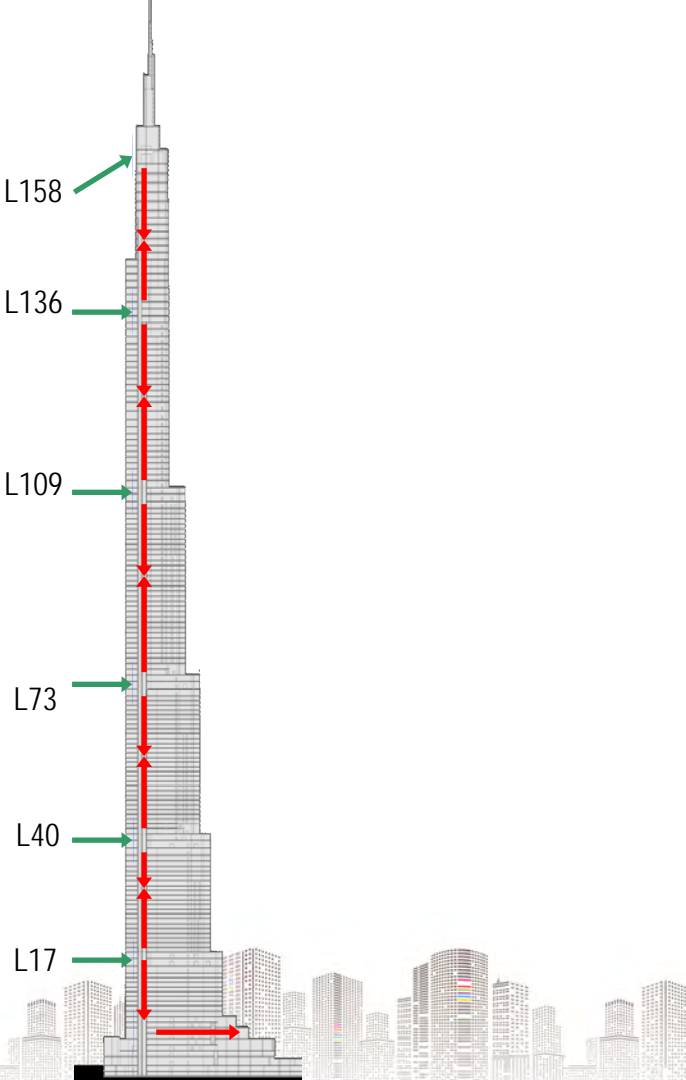


Tower HEX at L40, L42 & L73

Tower Pumps at L40, 73 & 109

Main Tower circulating pumps at L17

Main DCP Connection and HEX at LB2





# PLUMBING SYSTEMS

High Level Domestic/Fire + Hot water Tanks

L136

Gravity Express Risers

Local Zones Gravity Down –  
Low Pressure through PRV's

Intermediate Tank Domestic/Fire + Hot water Tanks  
Transfer Pumps

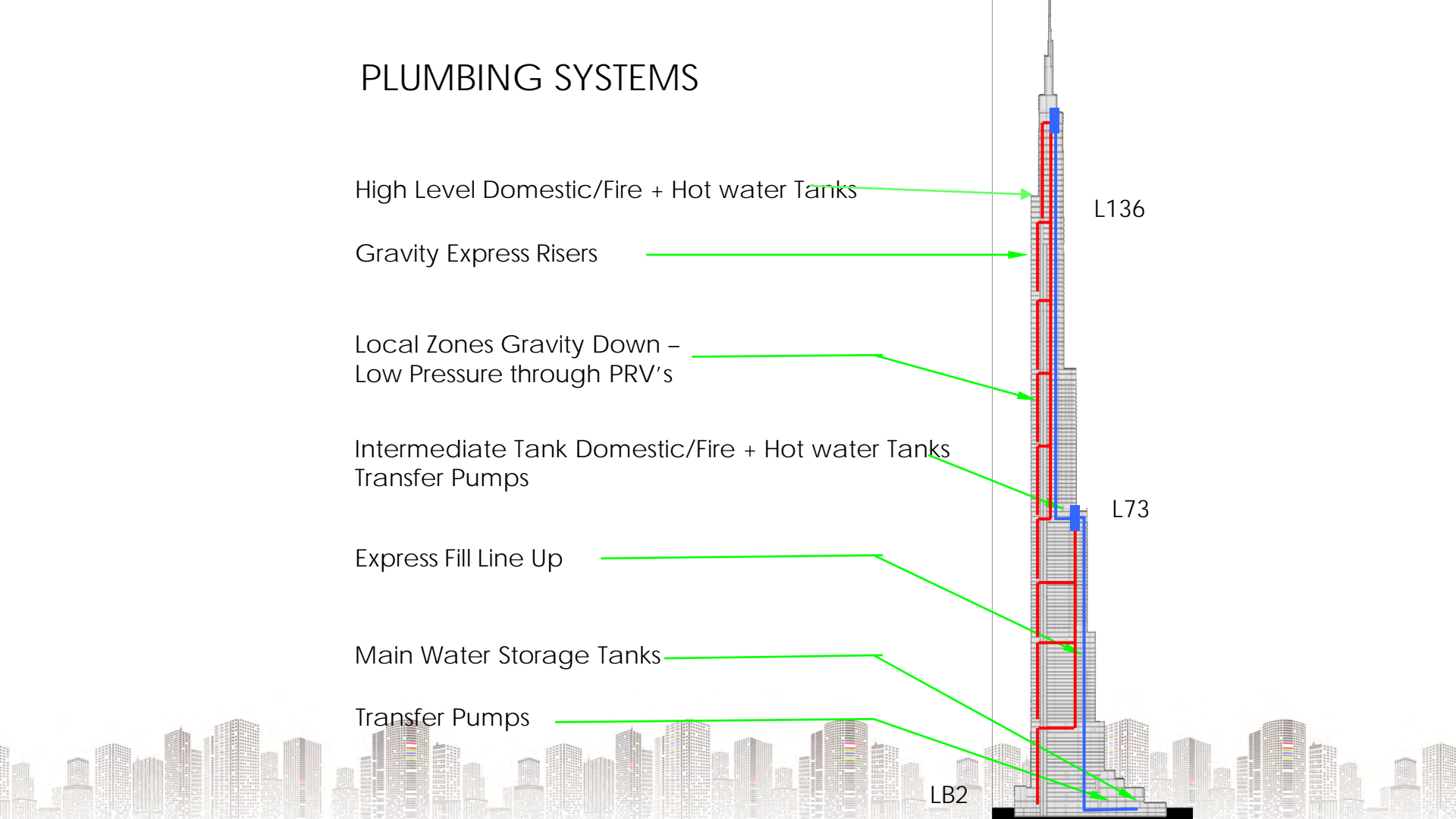
L73

Express Fill Line Up

Main Water Storage Tanks

Transfer Pumps

LB2

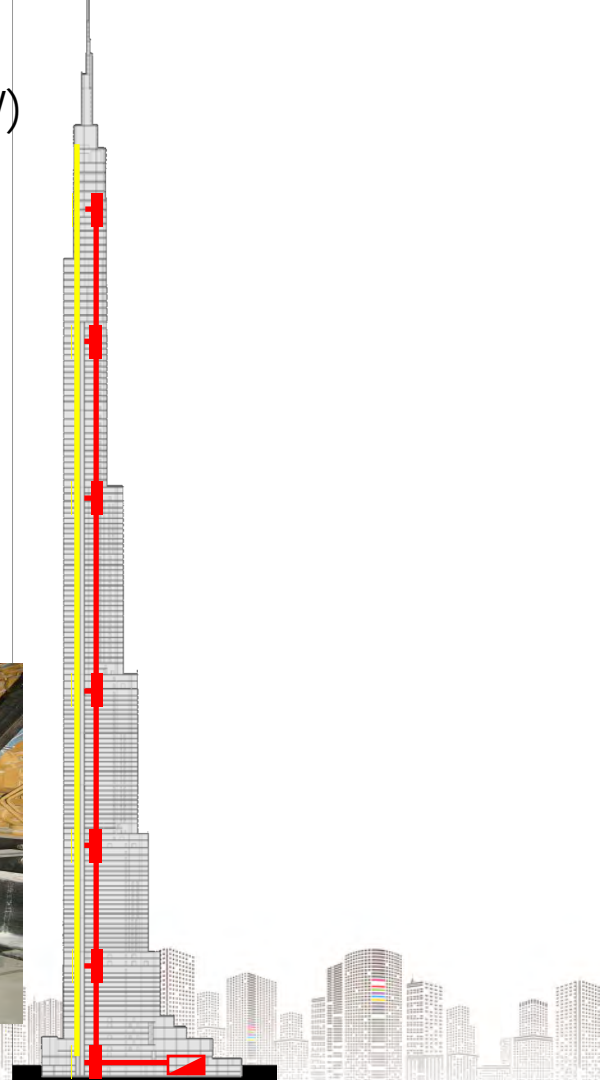


# EMERGENCY POWER SYSTEMS (11MW)

11 KV Multiple Owner Feeds up the Building

130 ATS distributed around the building  
SCADA system controls which ATS operate  
based on EM power available and power  
failure scenario

5 x 2.2 MW 11 KV Diesel Fired Generators  
In Office Annex



# LIGHTNING PROTECTION

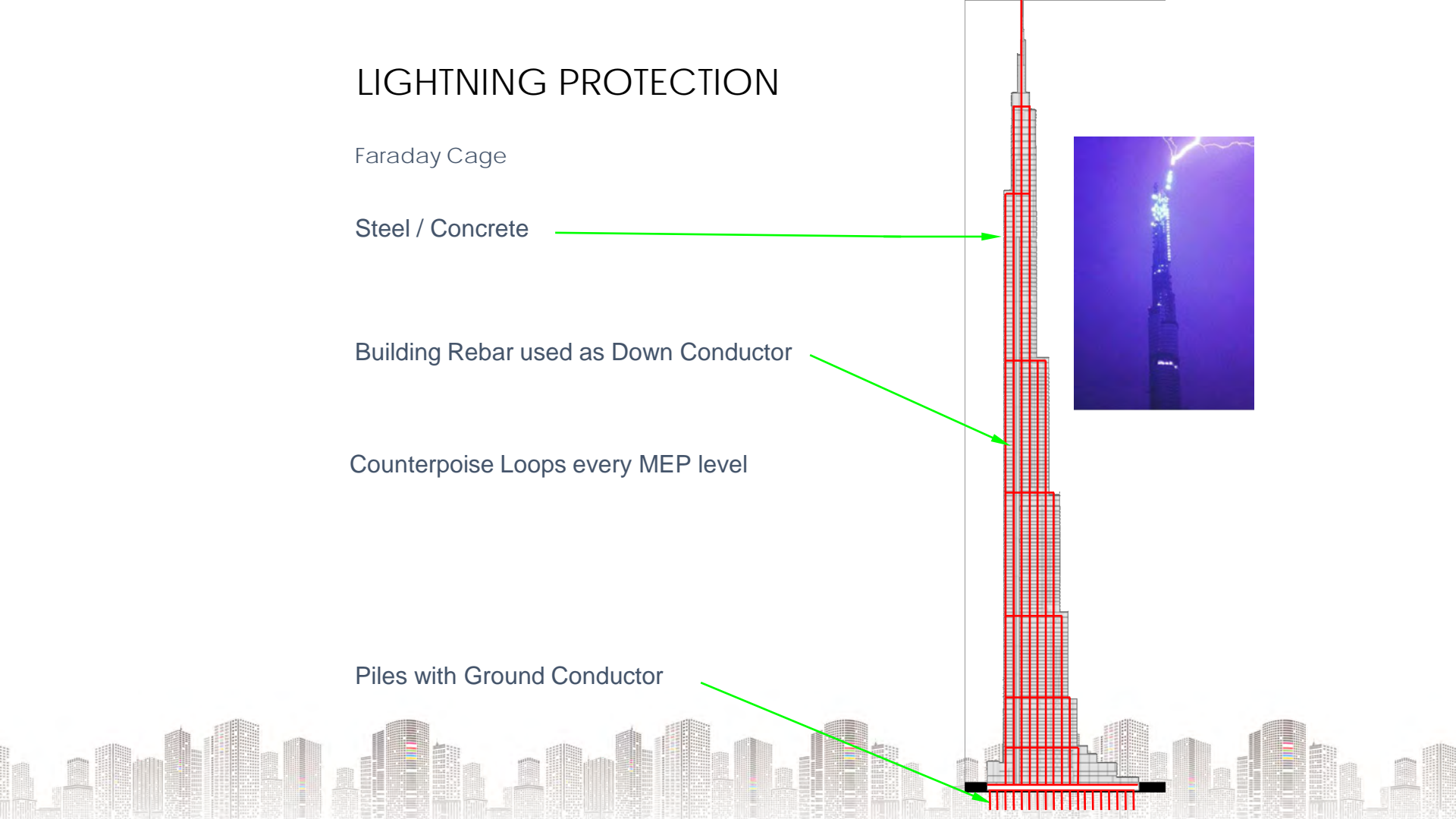
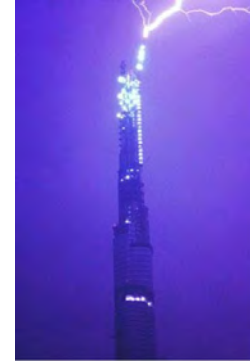
Faraday Cage

Steel / Concrete

Building Rebar used as Down Conductor

Counterpoise Loops every MEP level

Piles with Ground Conductor





# BUILDING SERVICES MATRIX

Common spaces were marked  
for Building Services ... proposed to  
be used for all common room / area fixtures  
and fittings

FM FACILITIES																								
Facilities	Room Reference	Work Stations	PC / Telephone Centralised Security System	Power - Mains	Power - 3Phase DB Isolator	Wall Power sockets (double)	Dust / Fume Extraction	Fresh Air Ventilation	Water	Hot Water	Belfast sink	Kitchen sink and bench	Floor Drainage (water)	Oil Separator pit	Grease Pit	Water/damp proofing	Sound Proofing	Fire Protection Systems (as per code)	Emergency Lighting	Lighting	UPS / Emergency Power	Air conditioning	Statutory Signage	Fit Out
Management Centre																								
Open Plan Office Space		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Access to Natural lig
Private Office		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Office For FM Manag
Meeting Room			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Projector, IT comms, and consumables. Tr
Toilets / Washrooms / Cleaners cupboard				<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	To be sized by the ar
Security / BMS Control room - for Console operators / mobile backup		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Needs to be separat communications syst and FACCC. It will rec reviewed when exte

# TECHNICAL MAINTENANCE



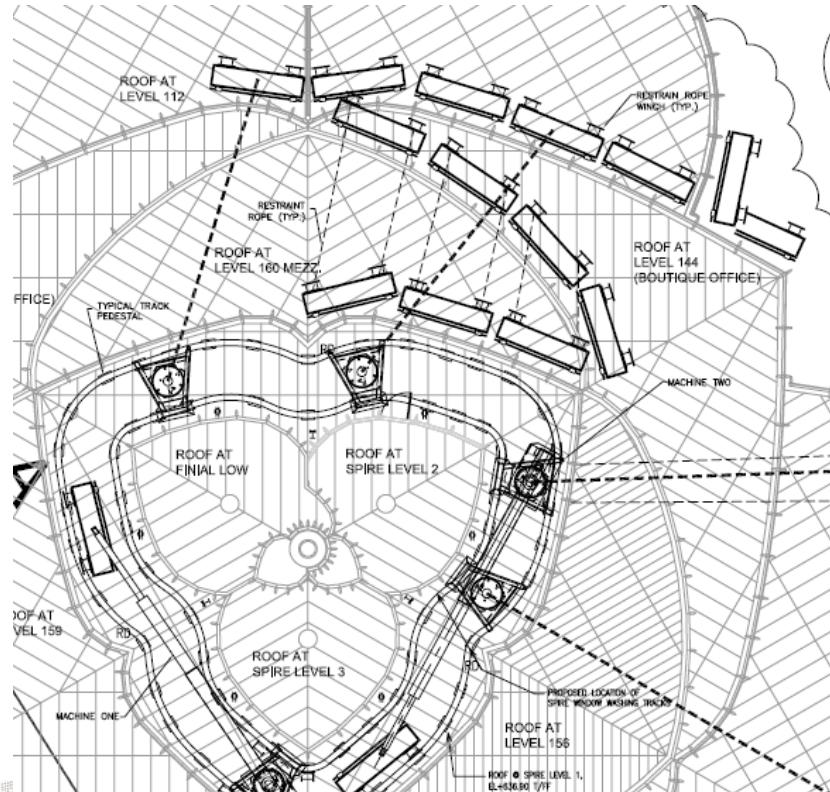
# WINDOW WASHING

Windows to be cleaned 4 to 6 times per annum

Mixed systems - Tower BMUs and Mobile hoists for the Podium



# WINDOW CLEANING AND ACCESS



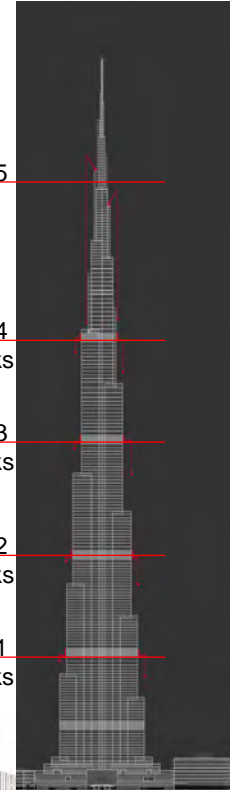
Zone 5  
3 wks

Zone 4  
4.2 wks

Zone 3  
4.3 wks

Zone 2  
4.8 wks

Zone 1  
6.9 wks

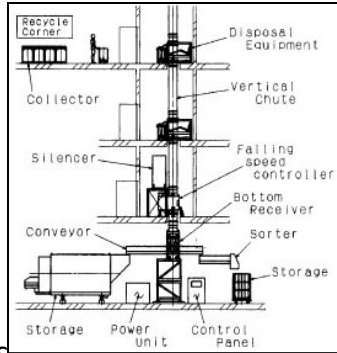




# WASTE MANAGEMENT

Food Preparation areas and pulpers minimise Kitchen Waste throughout the Hotel F&B Areas

Wet and Dry Compactors in the loading dock



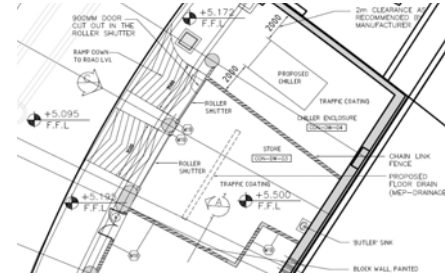
Recycling and logistics under review



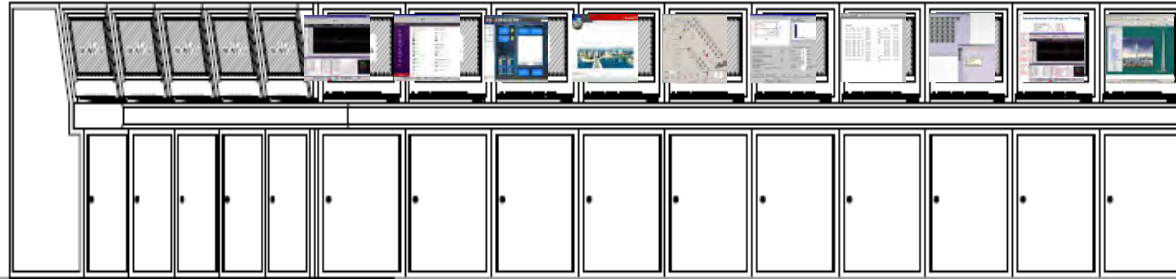
# LANDSCAPING

Based in the Service Tunnel using previously dead space.

High access equipment stored nearby



# BAS MAIN CONTROL ROOM (GRD-C4-004)



# DESKTOP DETAILS – Main BAS Control Room

DESKTOP NO.	SERVICE	DESKTOP NO.	SERVICE
1	<ul style="list-style-type: none"> <li>Monitor &amp; Control -</li> <li>-HVAC equipment</li> <li>-Variable Speed Drive</li> <li>Monitor -</li> <li>-GAS system</li> <li>-Water Treatment system</li> <li>-Air Cooled Condenser &amp; Leak Detection System</li> <li>-Sump pump &amp; Sewage Ejector pump</li> <li>-Plumbing &amp; Fire water storage</li> <li>-Interior Pool &amp; Water feature system</li> </ul>	7	Monitoring of - -Fire Alarm system (FAS)
2	<ul style="list-style-type: none"> <li>Monitoring of -</li> <li>-Hydrant system</li> <li>-Irrigation system</li> <li>-Aircraft Warning Light system</li> <li>-District Cooling Plant points Monitor</li> <li>-Sonimometer</li> <li>-Sump pump &amp; Sewage Ejector pump</li> </ul>	8	Monitoring of - -E-Home system (Home Automation system)
3	<ul style="list-style-type: none"> <li>Monitoring of -</li> <li>-Automatic Transfer Switch (ATS) position</li> <li>-Power Monitoring &amp; Control system (PMCS)</li> <li>-Generator &amp; Fuel Oil system</li> <li>-Power Service &amp; Distribution system</li> </ul>	9	Monitoring of - -Building Property Management -Master Clock
4	<ul style="list-style-type: none"> <li>Monitoring of -</li> <li>-Residential &amp; Hotel Lighting system</li> <li>-Festive Lighting system</li> <li>-FOH Lighting System</li> <li>-Lighting Control System</li> </ul>	10	Periodic Testing of - -Zone Control Valve - Motorised Fire Smoke Damper
5	<ul style="list-style-type: none"> <li>Monitoring of -</li> <li>-Emergency Lighting system (Central Battery system)</li> </ul>	11	Monitoring & Controlling of - -Elevator System
6	<ul style="list-style-type: none"> <li>Monitoring of -</li> <li>-Security system</li> </ul>	12 to 15	For other systems





# BAS CONTROL SCREENS

Station - Default - (BD\_B02A2.htm)

Station Edit View Action Configure Samples Help

100% Command

Back

????? %Rh  
????? °C

Legend

- DDC
- FCU'S
- GR'S
- SEP'S
- ACC/ACU

Key Plan

Level B02, Podium A2

03-Dec-08 09:09:56 System STATION 2 LOGOUT U 00 Failed login attempt

Honeywell

03-Dec-08 09:59:54 Alarm Comms localhost Stn02 Mngr

start Station - Default - (B... Microsoft PowerPoint ... EN 09:59

# Construction – Snap Shot





# Construction – Snap Shot



# Construction – Snap Shot





# New Dubai

2003



# Work Progress – Month of January 2005





# Work Progress – Month of February 2005



# Work Progress – Month of March 2005





# Work Progress – Month of April 2005





# Work Progress – Month of May 2005



# Work Progress – Month of June 2005



JUN 30 2005



# Work Progress – Month of July 2005





# Work Progress – Month of August 2005



# Work Progress – Month of September 2005



SEP 29 2005



# Work Progress – Month of October 2005



OCT 27 2005



# Work Progress – Month of November 2005





# Work Progress – Month of March 2006



2006/03/31 14:31



# Work Progress – Month of April 2006





# Work Progress – Month of May 2006





# Work Progress – Month of June 2006



2006/06/29 13:32

# Work Progress – Month of July 2006





# Work Progress – Month of August 2006





# Work Progress – Month of September 2006



# Work Progress – Month of October 2006



# Work Progress – Month of November 2006





# Work Progress – Month of December 2006



# Work Progress – Month of May 2009



# Work Progress – Month of June 2009







- Burj Khalifa
- Dec 2009

**Burj Khalifa Tower**  
**December 2009**

















































# Dubai - December 2009



**Thank You  
Grand Opening  
Jan 4<sup>th</sup>, 2010**

