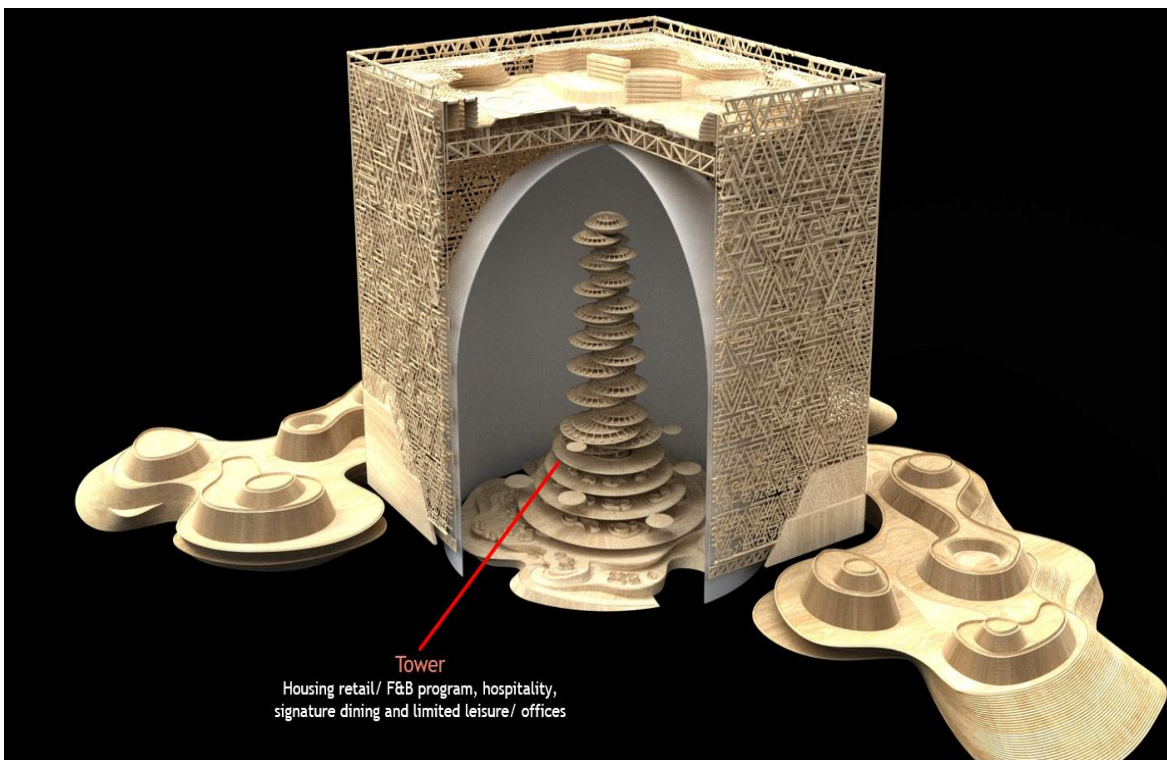
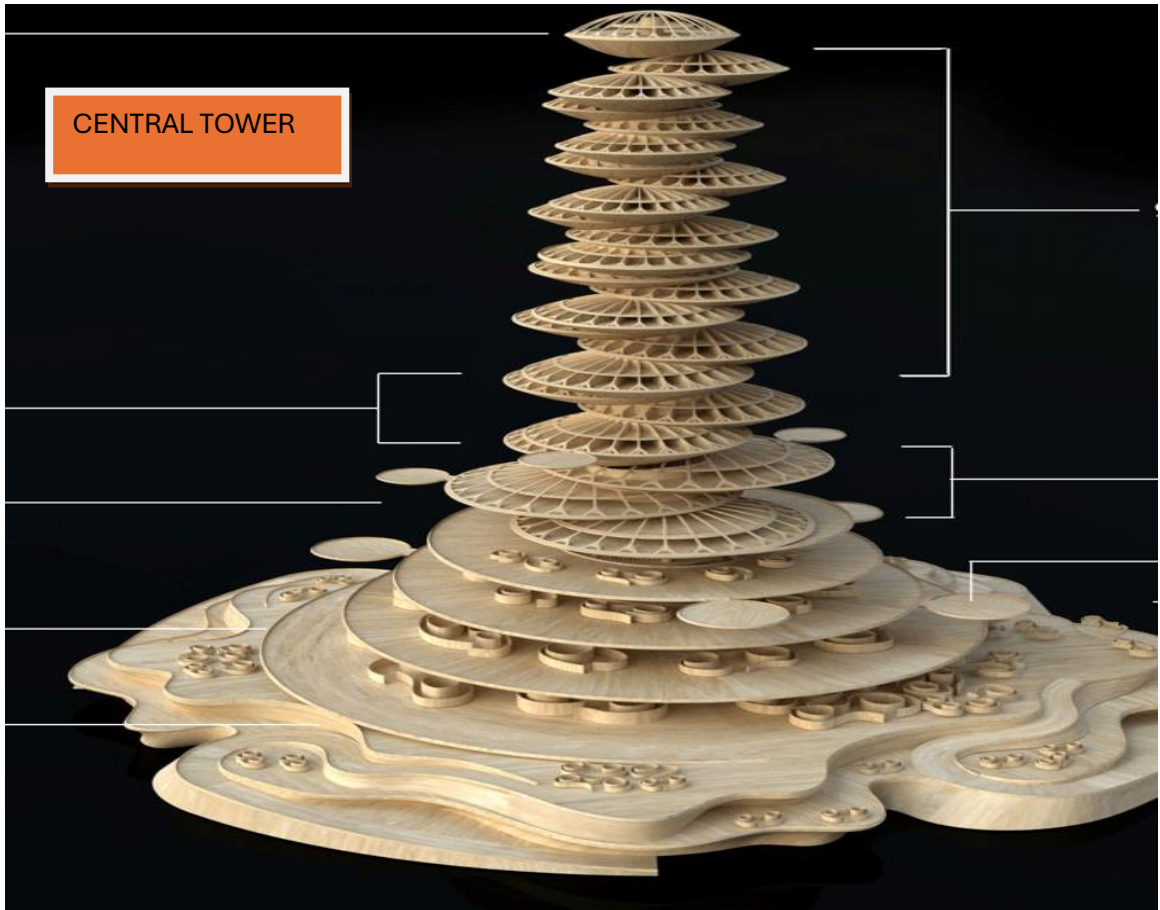


PROJECT PHOTOS AND LOAD CALCULATIONS





DESIGN BASELINE, BASIS OF DESIGN, COOLING LOAD & CHILLED WATER LOAD CALCULATIONS

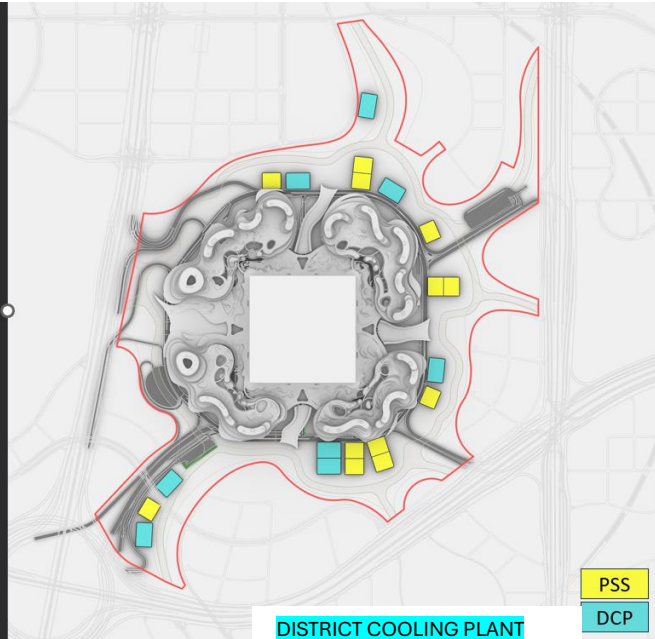
BASELINE DESIGN

Locating PSSs and DCPs (hybrid of single plus twinned) around the Mukaab at B3

The layout proposed is based on MEP Technical Note TN1 Rev 05 where the total Load is 1.853 GW (12nr PSS's & 8nr DCP's).

Architectural/Landscape considerations:

- Due to increased utility blocks the additional DCP's and the PSS's need to be located in the Wahaa.
- 8nr PSS's have been combined to create 4nr larger PSS's – located within the larger buffer areas between the plot boundary and the basement.
- Similarly, 2nr DCPs have been combined to create 1nr larger DCP.
- The Wadi Channel & Wadi Podiums will need to be revised to accommodate these assets, and certain locations will limit landscape development.
- No car parking spaces lost in Wadi Podiums



building services design team is responsible for determining the criteria the following can be used. Any space not covered should be discussed and suitable design criteria agreed based on recognised standards.

2. Basis of Design

2.1 Mechanical

2.1.1 HVAC – Design

The following software will be used for the design of mechanical services to enable mechanical and associated technical schedules to be completed as part of all design stages.

Calculation Type	Applicable Software/Calculation Methodology
Heat gain calculations	HAP or IES (complete project) Excel spreadsheet tool (based on W/sgm) for initial design stages
Ductwork system pressure loss for primary systems	Excel spreadsheet Tool
Pipework system pressure loss for primary systems	Excel spreadsheet Tool (in case of chilled water pipes only)
Room ventilation calculation	Excel spreadsheet tool (procedure as per ASHRAE 62.1)
Specialist Room ventilation calculations (fire pump room etc.)	Excel spreadsheet tool based on ASHRAE or local Standard

Table 2-1 HVAC Design

2.1.2 HVAC – Design Criteria of Internal Conditions

Internal design conditions should be based on project specification. Where this information is not available, or the

Room	Winter Design Temperature (°C) (1)	Summer Design Temperature (°C) (1)	Relative Humidity (%)	Noise Level (NC/ NR) (4)
Apartment bedroom	18°C +/- 1°C	24°C +/- 1°C	40%-60% (3)	NR 25
Apartment living room	22°C +/- 1°C	24°C +/- 1°C	40%-60% (3)	NR 30
Apartment kitchen / pantry	18°C +/- 1°C	24°C +/- 1°C	40%-60% (3)	NR 40-45
Lobbies / Lounge	20°C +/- 1°C	23°C +/- 2°C	40%-60% (3)	NR 35-40
Retail	20°C +/- 1°C	23°C +/- 2°C	40%-60% (3)	NR 35-40
F&B Dining	22°C +/- 1°C	23°C +/- 2°C	40%-60% (3)	NR 35
F&B Food Prep	17°C +/- 1°C	26°C +/- 3°C (2)	40%-60% (3)	NR 40-45
F&B Kitchen	17°C +/- 1°C	26°C +/- 2°C (2)	40%-60% (3)	NR 40-45
Corridors	20°C +/- 1°C	23°C +/- 2°C	40%-60% (3)	NR 40
Stores - General	26°C Max	26°C Max	Uncontrolled	NR 45
Locker Rooms	22°C +/- 1°C	24°C +/- 1°C	40%-60% (3)	NR 35-45
Gym	22°C +/- 1°C	24°C +/- 1°C	40%-60% (3)	NR 45
Plant / Mechanical Rooms	28°C Max	28°C Max	Uncontrolled	NR 50
Toilets Common Areas	21°C +/- 1°C	26°C +/- 1°C	40%-60% (3)	NR 45
Server Room / MDF Room	20°C +/- 1°C	22°C +/- 1°C	40%-60% (3)	NR 50
PABX/GSM Room	20°C +/- 1°C	22°C +/- 1°C	40%-60% (3)	NR 50

COOLING REQUIREMENT

- Considering the size and scale of the project, we understand that NMDC has planned to have multiple Water-Cooled Plants that would be interconnected with an integrated network that would be laid across MC.
- Total connected load for Phase 1 is expected to be 185k RT which is planned to be met by four DCPs within the utility centers that are expected to be built within proximity to Mukaab Development.

Building Use		Cooling Load (Kw)
Cube Rooftop	Residential	9.58
	Hospitality	11.67
	Leisure	9.72
	Entrance lobbies	0.49
Cube	Residential	113.49
	Leisure	14.83
	Basement	24.89
DCP Hospitality	Hospitality	7.14
	Arrival area	0.93
	Circulation/BOH	3.99
	Restaurant FOH	0.71
	Restaurant BOH	0.23
	Amenities	0.95
Tower Retail	Retail Spiral	18.01
	Retail Base (Cake)	25.83
Screen		159.36
Screen Cooling		
Dome Cooling	Dome	125.62

Total	527.43 MW
	150,316 TonR

Asset	CHW Maximum Demand Load (TonR)
Wadi Podium North	14,820.00
Wadi Podium West	11,878.80
Wadi Podium South	10,123.20
Wadi Podium East	12,973.20
Basement	40,584.00
Dome Screen BOH	53,305.55
Central Tower	16,530.00
Corner Towers North (Resi)	8,892.00
Corner Towers South (Resi)	8,892.00
Corner Towers East (Mixed Use)	9,690.00
Corner Towers West (Mixed Use)	9,690.00
Rooftop	4,446.00

For 50,000 TR Plant:

ITEM	EQUIPMENT	FLOW (L/s)	HEAD (m)	DUTY OUTPUT POWER (kW)	MOTOR EFFICIEN CY (%)	DUTY INPUT POWER (kW)	DUTY	TOTAL DEMAND POWER
							QTY	(kW)
1	CENTRIFUGAL CHILLER (UPSTREAM + DOWNSTREAM)	662				3,549	6.00	21,291.81
2	COOLING TOWER	852				223	6.00	1,338.00
3	PRIMARY CHILLED WATER PUMP	662	36	285	95.8%	297	6.00	1,784.97
4	SECONDARY CHILLED WATER PUMP	730	70	590	94.1%	627	6.00	3,761.96
5	CONDENSER WATER PUMP	852	39	363	95.8%	379	6.00	2,273.49
6	COOLING TOWER MAKEUP PUMP	100	39	51	94.2%	54	2.00	108.71
7	DCP REJECT PUMP (CT Blowdown + RO Reject)	115	50	75	95.2%	79	2.00	158.59
8	SIDE STREAM FILTRATION PUMP - CONDENSER WATER	140	18	33	94.6%	35	1.00	34.97
9	RO PLANT					300	1.25	375.00
10	BUILDING SERVICES					900	0.60	540.00
TOTAL INPUT POWER - kW								31,667
CHILLER CAPACITY (ELECTRIC) - TR								42,000
PEAK DESIGN EFFICIENCY kW/TON								0.75

For 100,000 TR Plant:

ITEM	EQUIPMENT	FLOW	HEAD	DUTY OUTPUT POWER	MOTOR EFFICIENCY	DUTY INPUT POWER	DUTY	TOTAL DEMAND POWER
		(L/s)	(m)	(kW)	(%)	(kW)	QTY	(kW)
1	CENTRIFUGAL CHILLER (UPSTREAM + DOWNSTREAM)	662				3,549	12.0	42,583.62
2	COOLING TOWER	852				223	12.0	2,676.00
3	PRIMARY CHILLED WATER PUMP	662	36	285	95.8%	297	12.0	3,569.94
4	SECONDARY CHILLED WATER PUMP	730	70	590	94.1%	627	12.0	7,523.91
5	CONDENSER WATER PUMP	852	39	363	95.8%	379	12.0	4,546.97
6	COOLING TOWER MAKEUP PUMP	100	39	51	94.2%	54	4.0	217.41
7	DCP REJECT PUMP (CT Blowdown + RO Reject)	115	50	75	95.2%	79	4.0	317.17
8	SIDE STREAM FILTRATION PUMP - CONDENSER WATER	140	18	33	94.6%	35	2.0	69.94
9	RO PLANT					300	2.6	780.00
10	BUILDING SERVICES					900	1.2	1,080.00
TOTAL INPUT POWER - kW								63,365
CHILLER CAPACITY (ELECTRIC) - TR								84,000
PEAK DESIGN EFFICIENCY kW/TON								0.75