GREEN BUILDINGS

Innovation in Green Building Designs

an

Integrated Approch

By
V. Vishwanath
Principal Architect
Vishwannath Associates

25th Nov '2011

PRESENTATION TO COVER FOLLOWING PROJECTS OF VA

HUDA CITY CENTER METRO STATION WITH PROPERTY DEVELOPMENT – FOR DMRC @ GURGAON / NCR.

SOPHIA HIGH SCHOOL AUDITORIUM INTERIORS, BANGALORE.

ECO VALLEY

GATED COMMUNITY @ MYSORE.

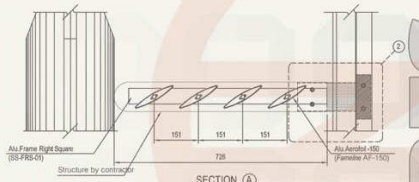
INTENT : WAS TO DESIGN INTEGRATED HUDA CITY CENTRE METRO STATION WITH PROPERTY DEVELOPMENT - AS A **GREEN** BUILDING

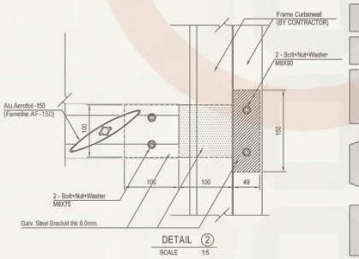
To Achieve :

- **Water & Waste Water Treatment & Management.**
- **Optimize Heat gains of the Building & maximize Daylight Harvesting.**
- **Explore Energy saving options in HVAC Systems**
- **Integration of Renewable Energy Sources to Generate Energy on Site.**

To overcome the conflict between the concept of an eco-friendly edifice and the contemporary nature of its architectural style, the Architect invited **TERI** to seek its expertise to make the building energy efficient to a large extent.

GREEN BUILDING CONCEPTS





1. ENERGY LOAD AND PERFORMANCE OPTIMISATION

AIM TO REDUCE THE LOAD REQUIREMENT AND ENERGY CONSUMPTION FOR OPERATION OF THE BUILDING.

A) PARAMETERS TO REDUCE LOAD REQUIREMENT ARE:

(I) MITIGATION OF HEAT ISLAND IMPACT:
- VEGETATED PERGOLAS WITH PLANTERS
- ROOF AND OTHER PAVED AREAS TO BE TOPPED WITH FINISH HAVING SOLAR REFLECTANCE OF 0.5 OR HIGHER.

(II) EFFICIENT ENVELOPE:
- ROOF: OVER DECK INSULATION
- WALL: INSULATION
- FENESTRATION: DOUBLE GLASS UNIT (DGU) USED ALONG WITH HORIZONTAL AND VERTICAL LOUVERS FOR NE & SW FACADE.

(III) DAYLIGHT INTEGRATION: MIRRORED SURFACE INSIDE THE BUILDING FOR REFLECTION OF LIGHT TO RECEIVE DAYLIGHT IN THE PERIMETER ZONE.

(IV) EFFICIENT INDOOR AND OUTDOOR LIGHTING.

(V) PRE-COOLING OF FRESH AIR BY ENERGY RECOVERY VENTILATORS.(ERV)

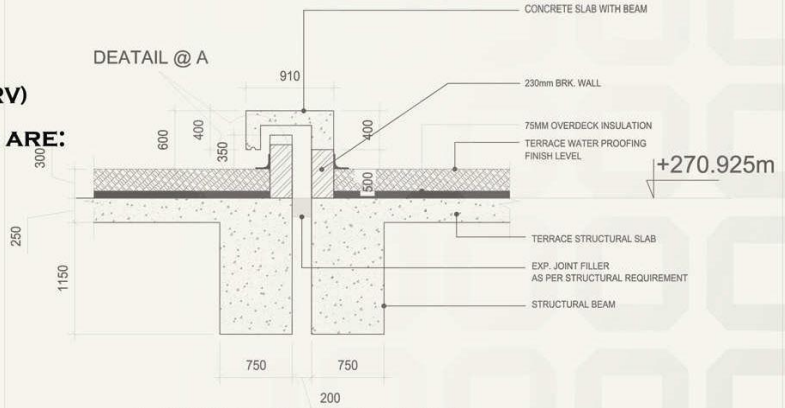
B) PARAMETERS TO REDUCE ENERGY CONSUMPTION ARE:

(I) AHU FAN WITH VARIABLE FAN DRIVE (VFD)

(II) SECONDARY CHILLED WATER PUMPS WITH VFD

(III) ENERGY EFFICIENT SCREW CHILLERS

(IV) EFFICIENT COOLING TOWER



TYPICAL EXPANSION JOINT COVERING
DETAILS AT TERRACE LEVEL

SALIENT FEATURES

GREEN BUILDING CONSULTANT :
THE ENERGY AND REASOURCES INSTITUTE, NEW DELHI.

DMRC SUSHANT LOK METRO STATION
WITH PROPERTY DEVELOPMENT

ARCHITECTS:
VISHWANNATH ASSOCIATES
Bangalore-Chennai
(www.vishwannathassociates.com)

Green Building Concepts

2. Use of renewable energy

- A solar farm and surface above parking canopies shall generate 28 KW of electricity . This solar energy shall be used for street lighting with the remaining to be fed back to the grid.

3. Water demand and supply optimisation

a) The water demand shall be optimized by integration of the following parameters:

(i) Efficient water fixtures: More than 50% of building water use could be saved by use of proposed efficient fixtures and faucets.

(ii) Use of native species planters shall require less water.

(iii) Drip irrigation shall be used.

b) Recycle and reuse of water

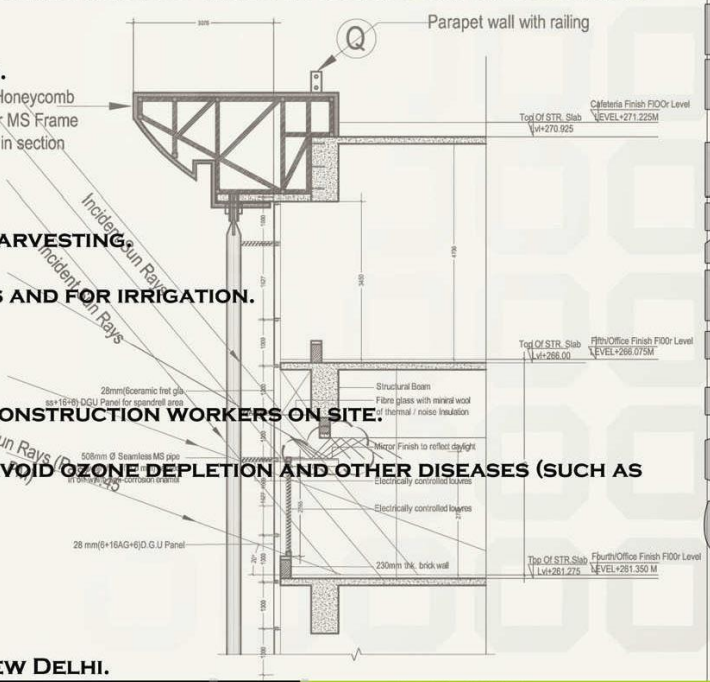
(i) Recharge of ground water by implementing rain water harvesting.

(ii) Reuse of treated water from STP for flushing in toilets and for irrigation.

4. Health and well being

a) DMRC has provided sanitation and safety facilities for construction workers on site.

b) Usage of low VOC paints, adhesives and sealants shall avoid ozone depletion and other diseases (such as skin and respiratory diseases).



SALIENT FEATURES

teri Green Building Consultant :
The Energy And Reasources Institute, New Delhi.

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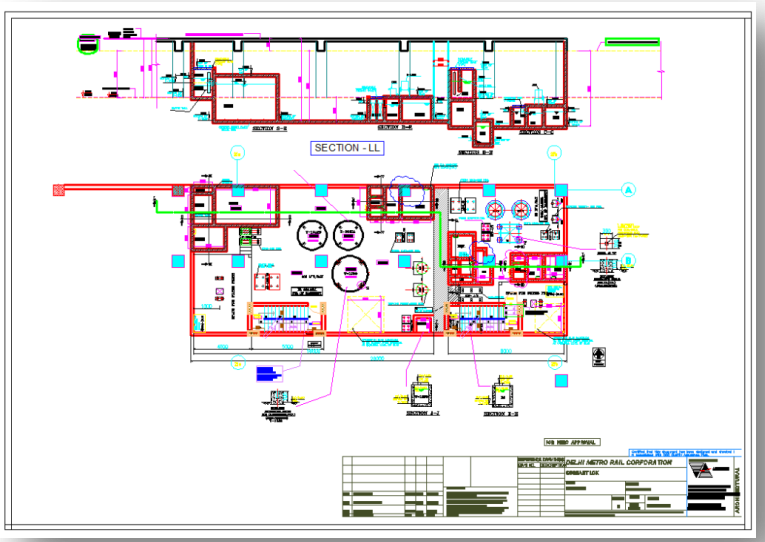
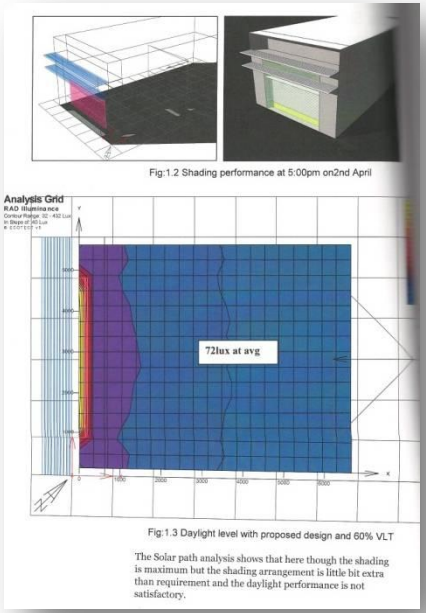
WATER AND WASTE WATER TREATMENT & MANAGEMENT.

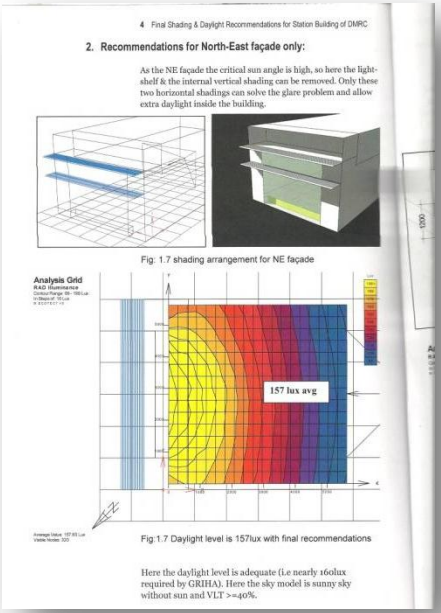
Huda does not allow bore wells to be dug at the site and supplies water to the building and expects the recycling of used water for the usage in toilets and landscape areas. Adequate STP, Rainwater Harvesting & Collection pits were provided to meet the water supply demand.

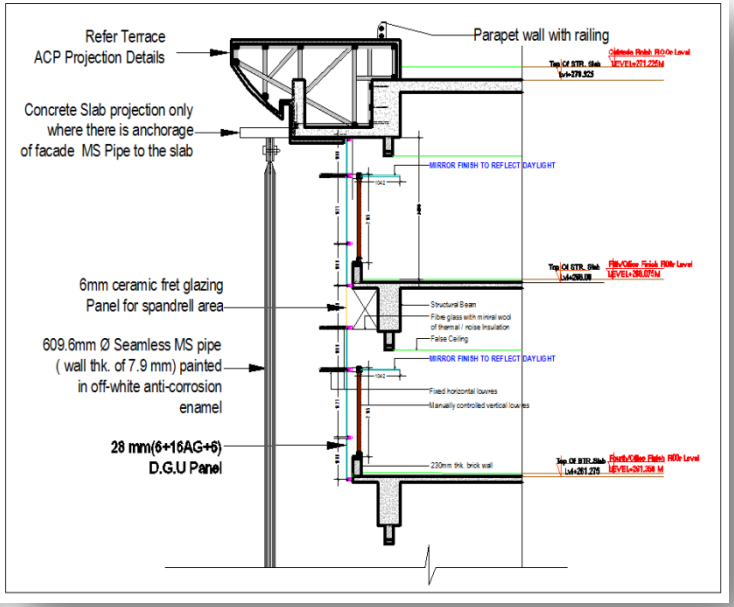


OPTIMIZE HEAT GAINS OF THE BUILDING & MAXIMIZE DAYLIGHT HARVESTING.

Shading devices to minimize heat gain and incorporation of light shelves to maximize daylight Harvesting in Huda City Center







EXPLORE ENERGY SAVING OPTIONS IN HVAC SYSTEM.

Conventional Huda City Center building would require **1500 TR** of Air-conditioning as against **875 TR** achieved for a Green building design, with the following parameters.

- ERV for fresh air cooling
- Efficient screw chillers
- VFD’s on AHU’s
- Efficient cooling tower.

INTERGRATION OF RENEWABLE ENERGY SOURCES TO GENERATE ENERGY ON SITE.

For Griha certification we are required to provide 1% of the total lighting and HVAC load of the building by renewable energy.

Hence, a solar PV system of 21 kWatt capacity is being provided in the Solar farm at the premises.

SITE PLAN

4

DMRC SUSHANT LOK METRO STATION

WITH PROPERTY DEVELOPMENT

ARCHITECTS:

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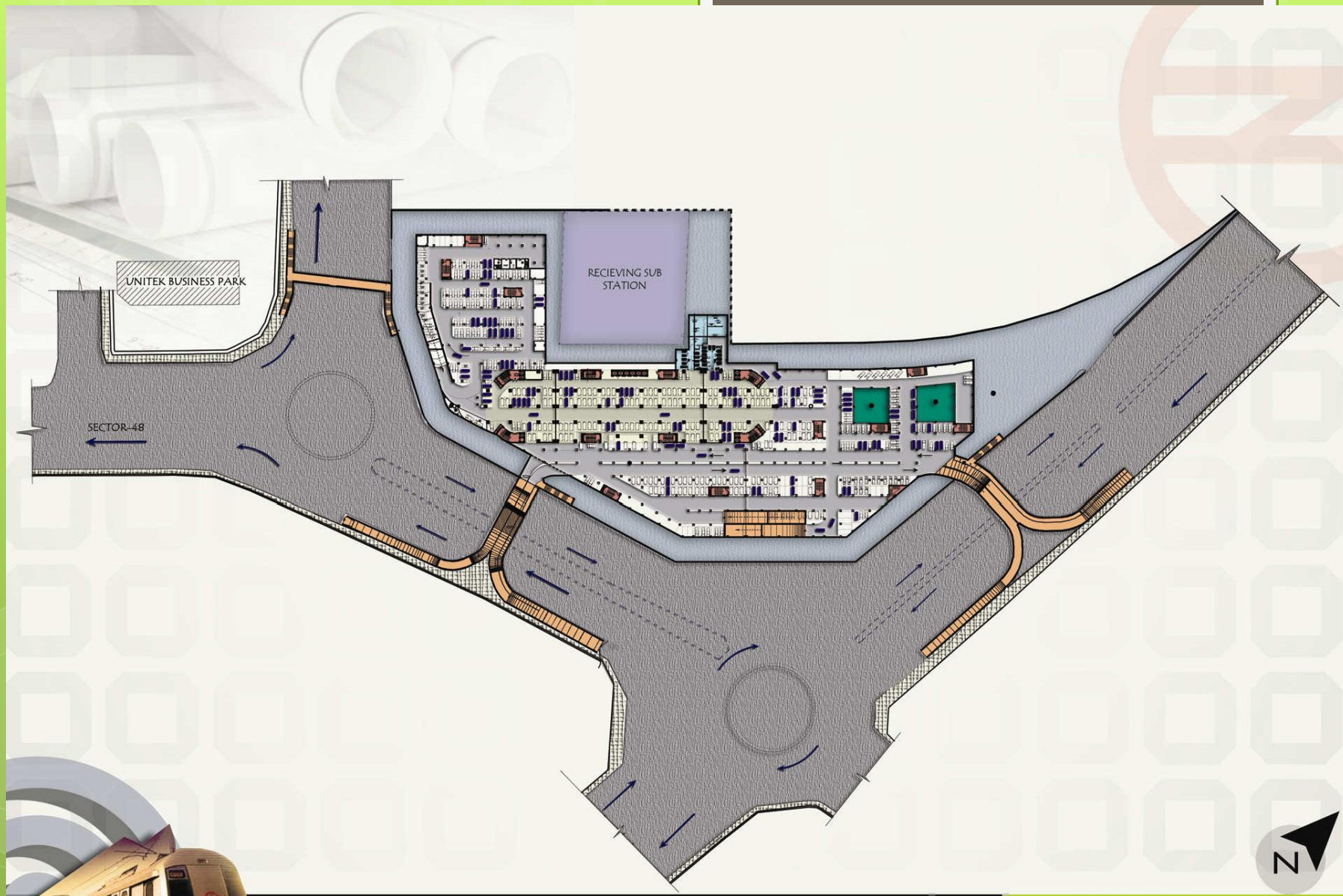

BASEMENT PLAN

DMRC SUSHANT LOK METRO STATION
WITH PROPERTY DEVELOPMENT

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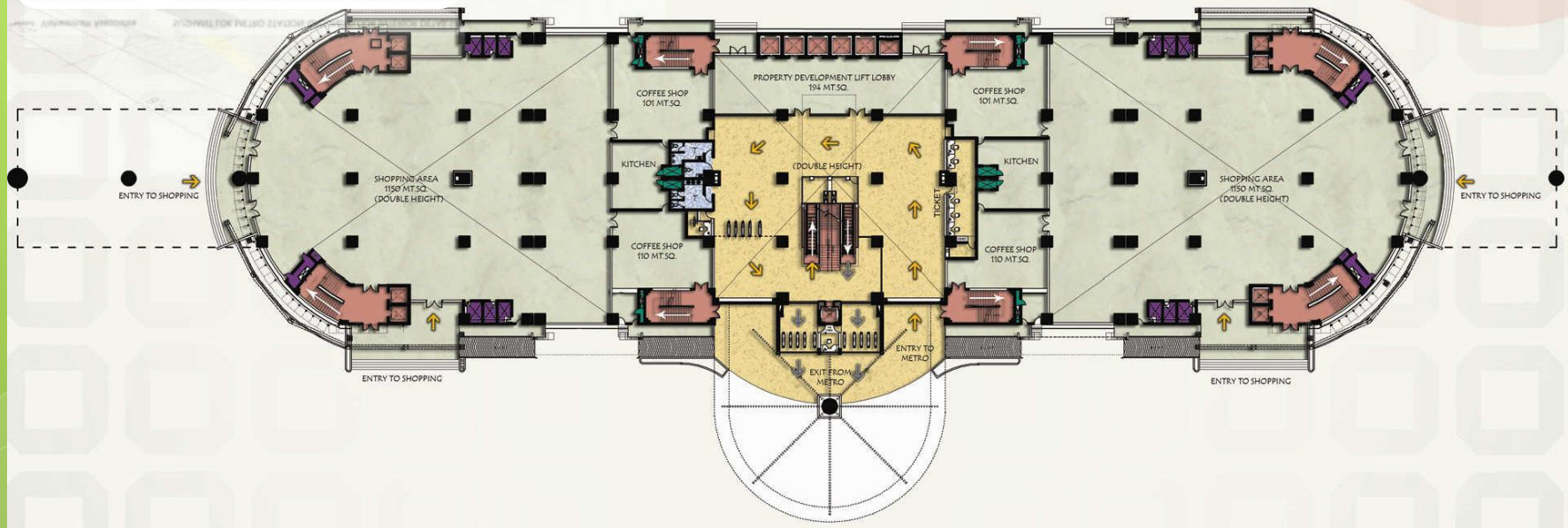
Vishwannath Associates SUSHANT LOK METRO STATION-GROUND FLOOR INTERIOR DETAILS.



PROPERTY DEVELOPMENT AREA

METRO AREA

CIRCULATION

METRO SERVICES

NON-METRO SERVICES

N

GROUND FLOOR PLAN

6

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WITH PROPERTY DEVELOPMENT

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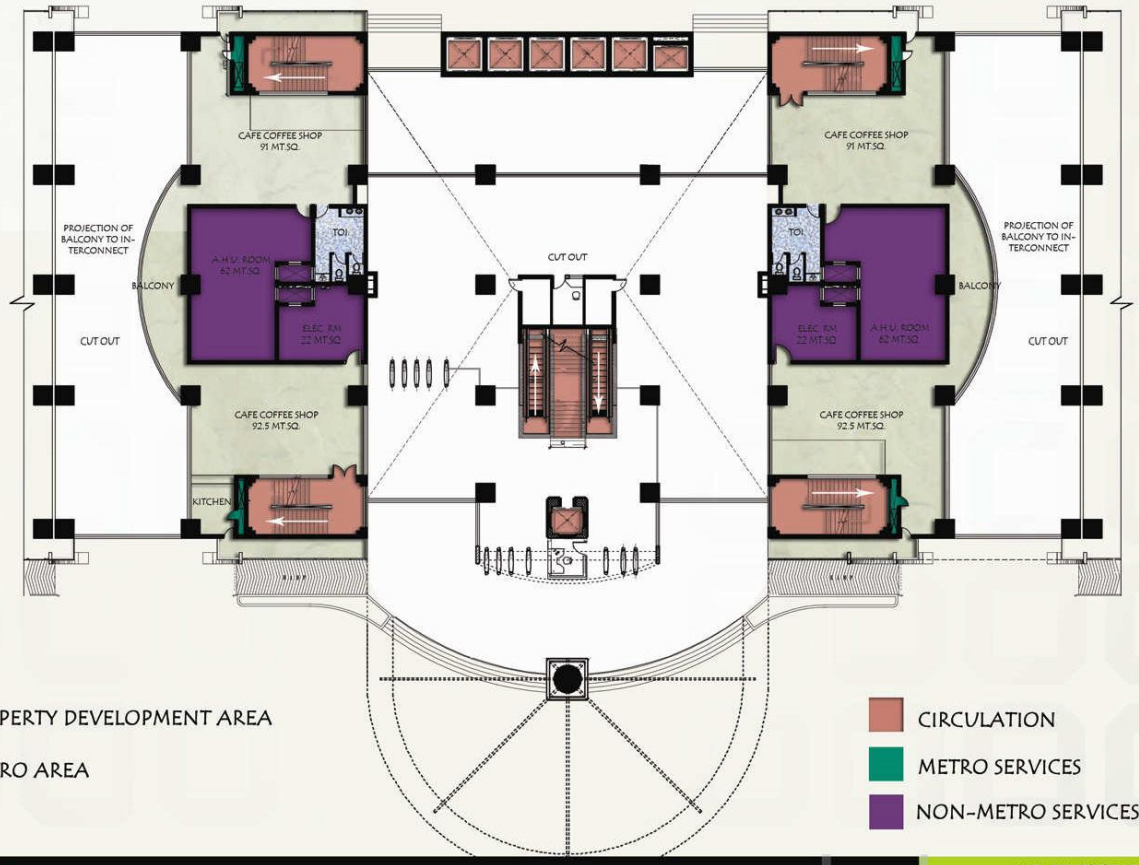
MEZZANINE FLOOR PLAN



PROPERTY DEVELOPMENT AREA

METRO AREA

CIRCULATION

METRO SERVICES

NON-METRO SERVICES

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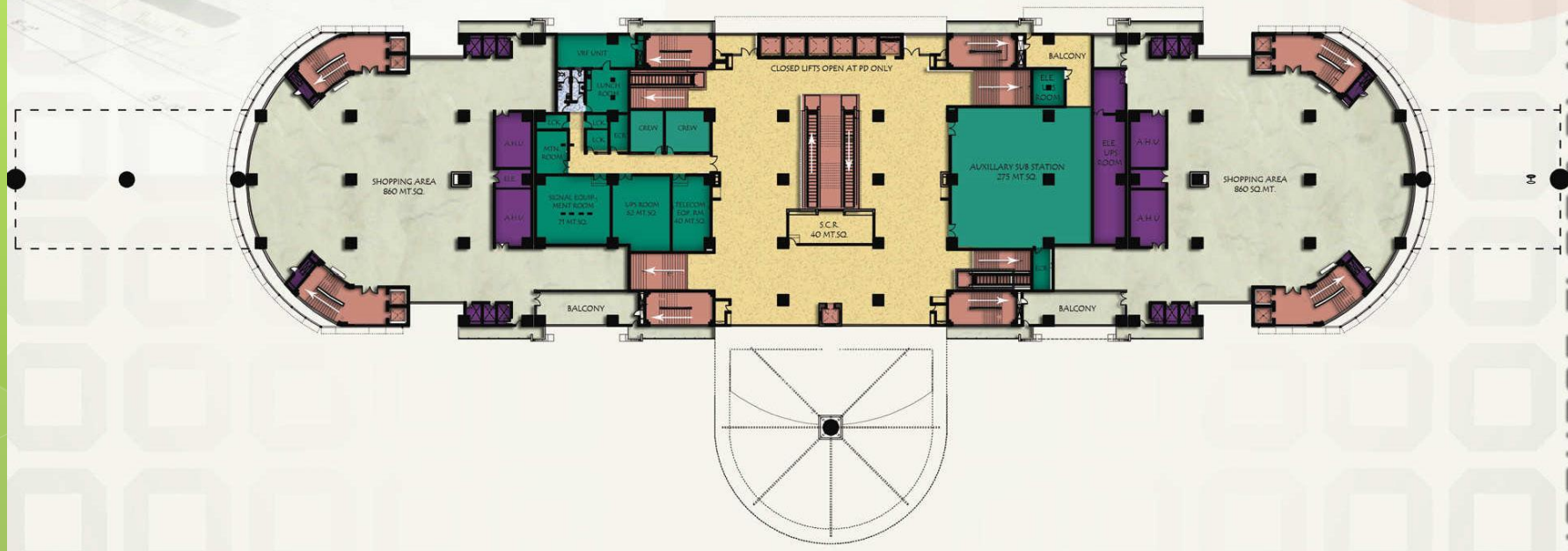
CONCOURSE FLOOR PLAN



PROPERTY DEVELOPMENT AREA

METRO AREA

CIRCULATION

METRO SERVICES

NON-METRO SERVICES

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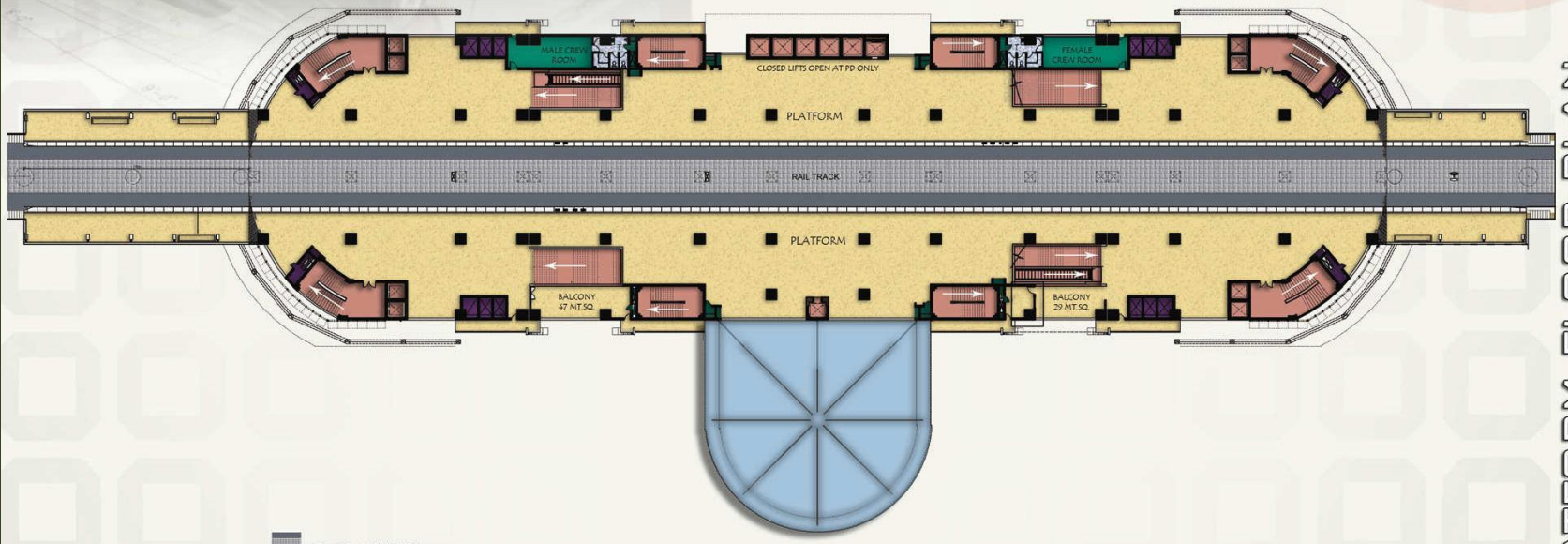

RAIL TRACK

PROPERTY DEVELOPMENT AREA

METRO AREA

CIRCULATION

METRO SERVICES

NON-METRO SERVICES

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PLATFORM FLOOR PLAN

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WITH PROPERTY DEVELOPMENT

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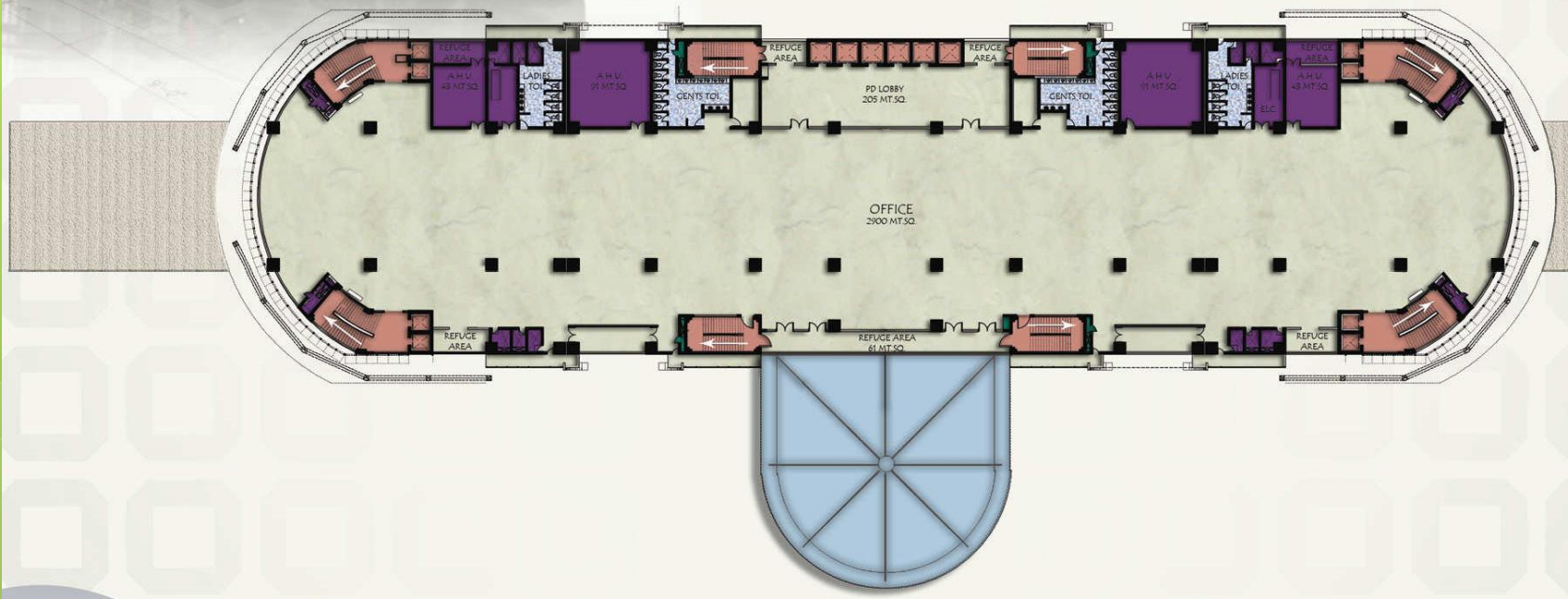

PROPERTY DEVELOPMENT AREA

METRO AREA

CIRCULATION

METRO SERVICES

NON-METRO SERVICES

PROPERTY DEVELOPMENT FLOOR PLAN (TYPICAL-3,4,5)

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10

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WITH PROPERTY DEVELOPMENT

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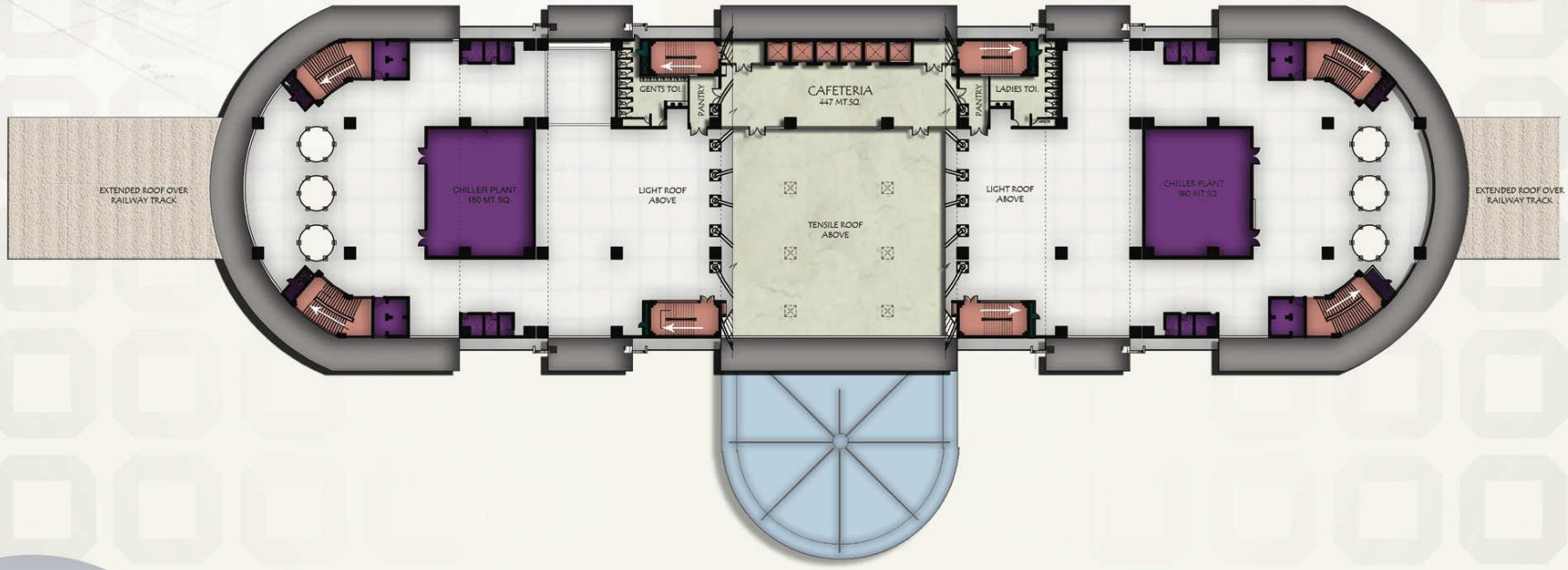
CAFETERIA FLOOR PLAN



PROPERTY DEVELOPMENT AREA

METRO AREA

CIRCULATION

METRO SERVICES

NON-METRO SERVICES

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WITH PROPERTY DEVELOPMENT

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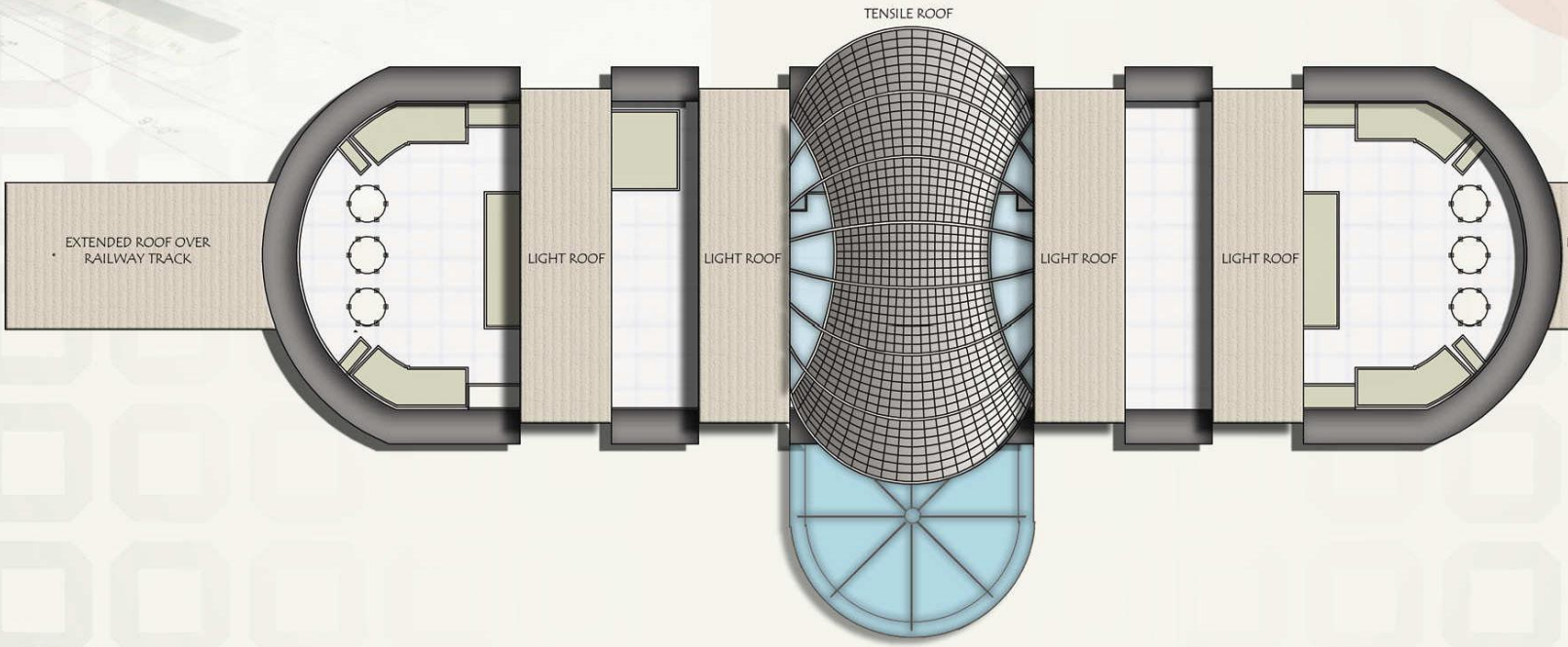

TERRACE FLOOR (ROOF) PLAN

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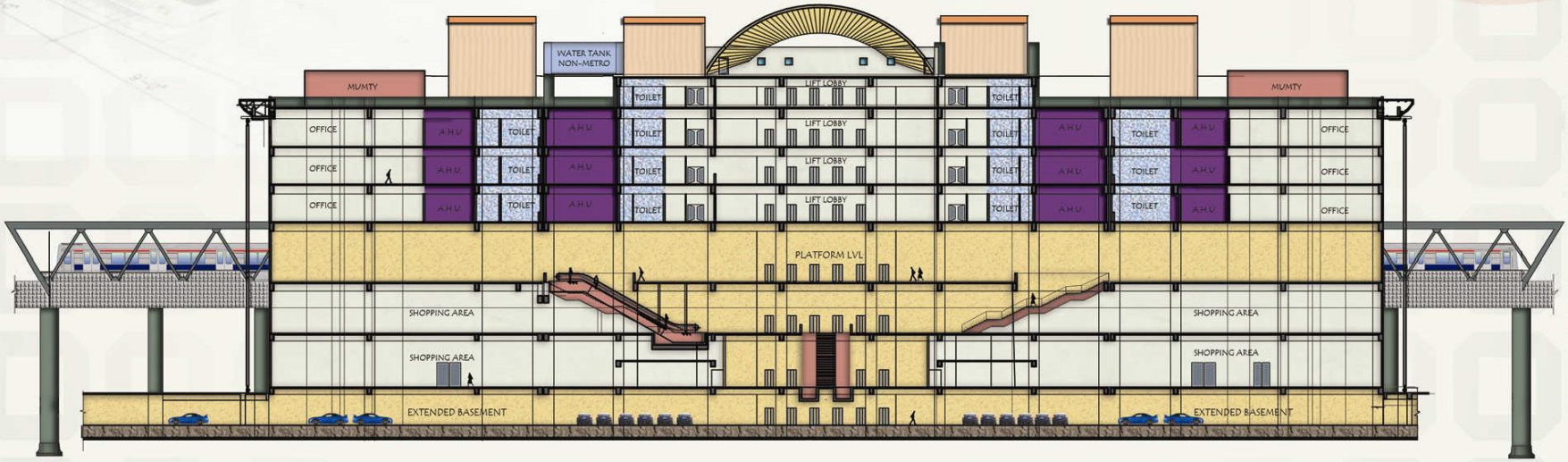

PROPERTY DEVELOPMENT AREA

METRO AREA

CIRCULATION

METRO SERVICES

NON-METRO SERVICES

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LONGITUDINAL SECTION

13

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WITH PROPERTY DEVELOPMENT

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TRANSVERSE SECTION

PROPERTY DEVELOPMENT AREA

METRO AREA

CIRCULATION

METRO SERVICES

NON-METRO SERVICES

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14

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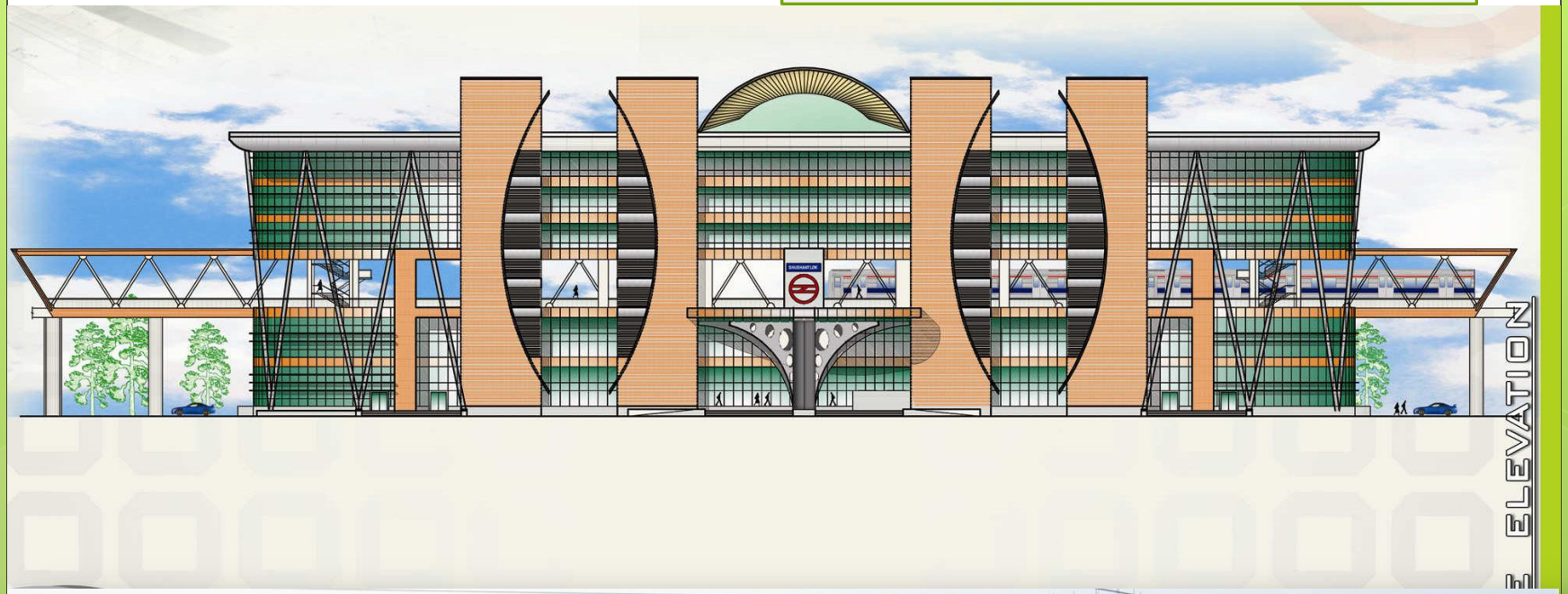
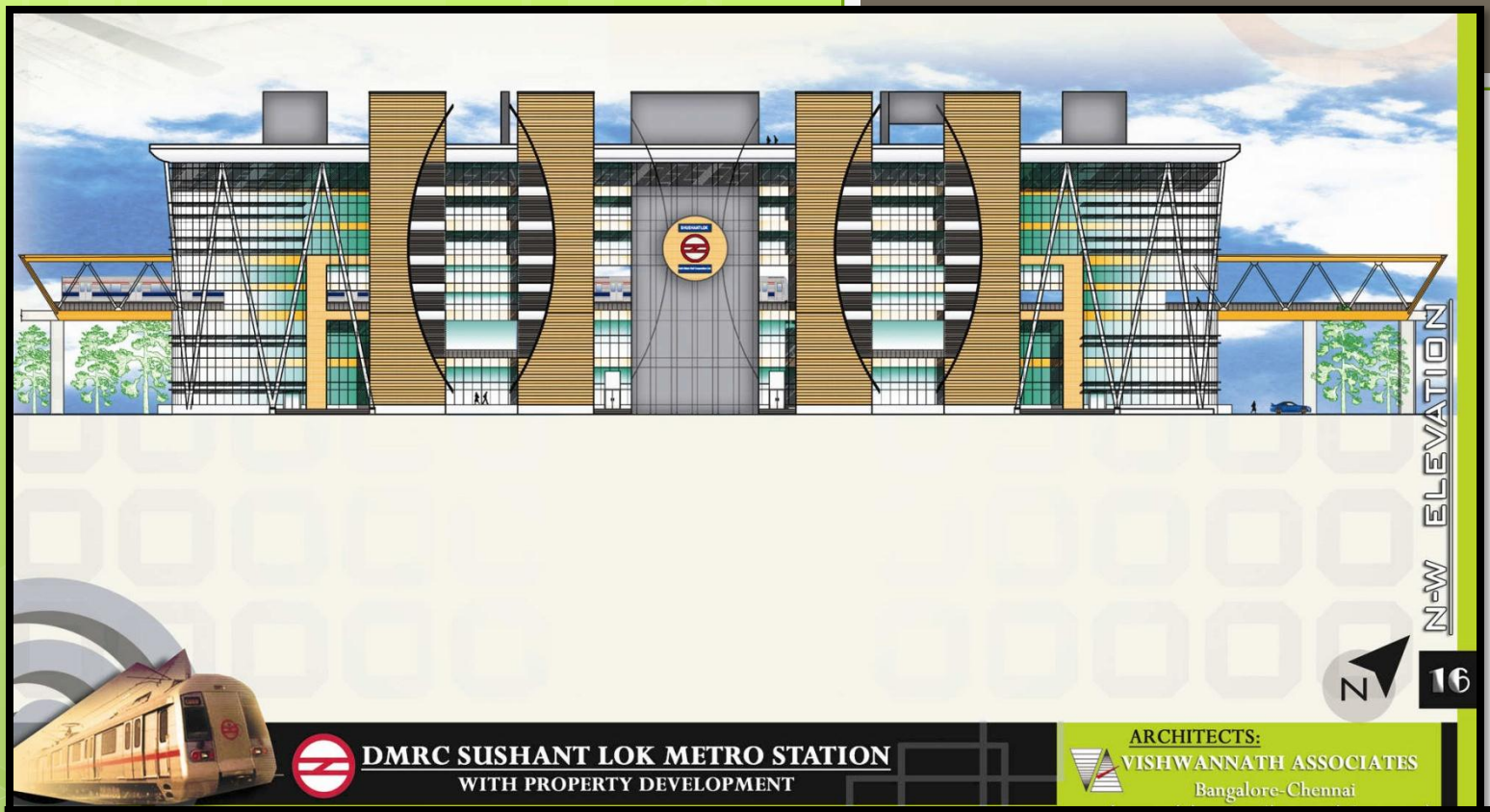

ELEVATION


N-W ELEVATION
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16
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WITH PROPERTY DEVELOPMENT
ARCHITECTS:
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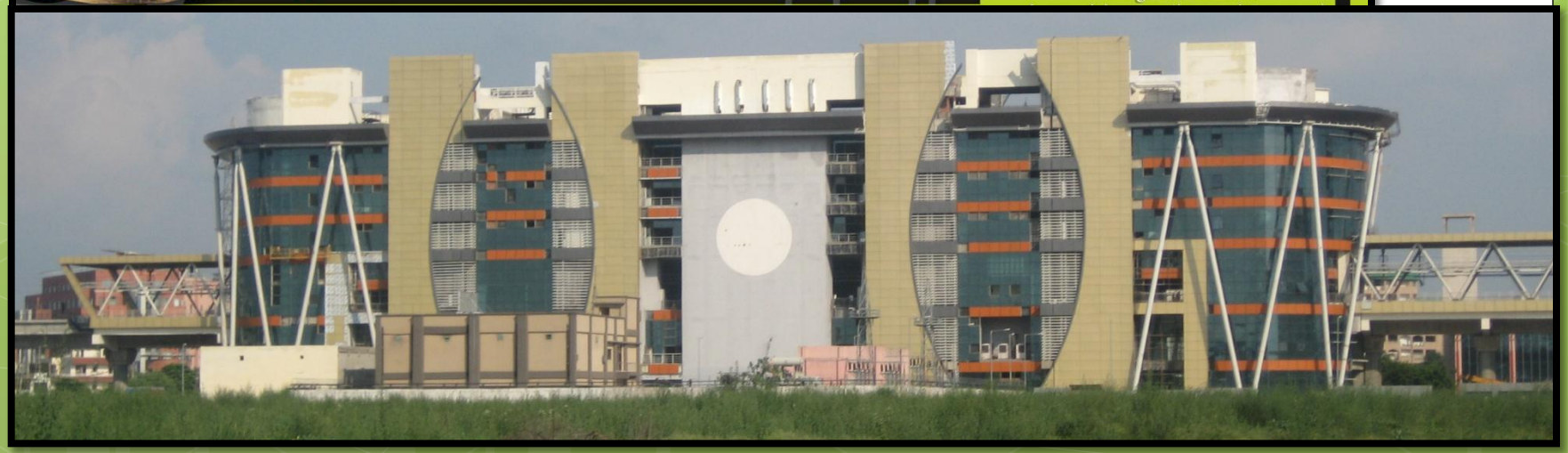


CAFETERIA
OVER DECK INSULATION
SHADING DEVICES (LOUVERS)
PROPERTY DEVELOPMENT FLOORS
SEWAGE TREATMENT PLANT
SUBWAY
SOLAR PANELS
SOLAR FARM
SUBWAY
SUBWAY
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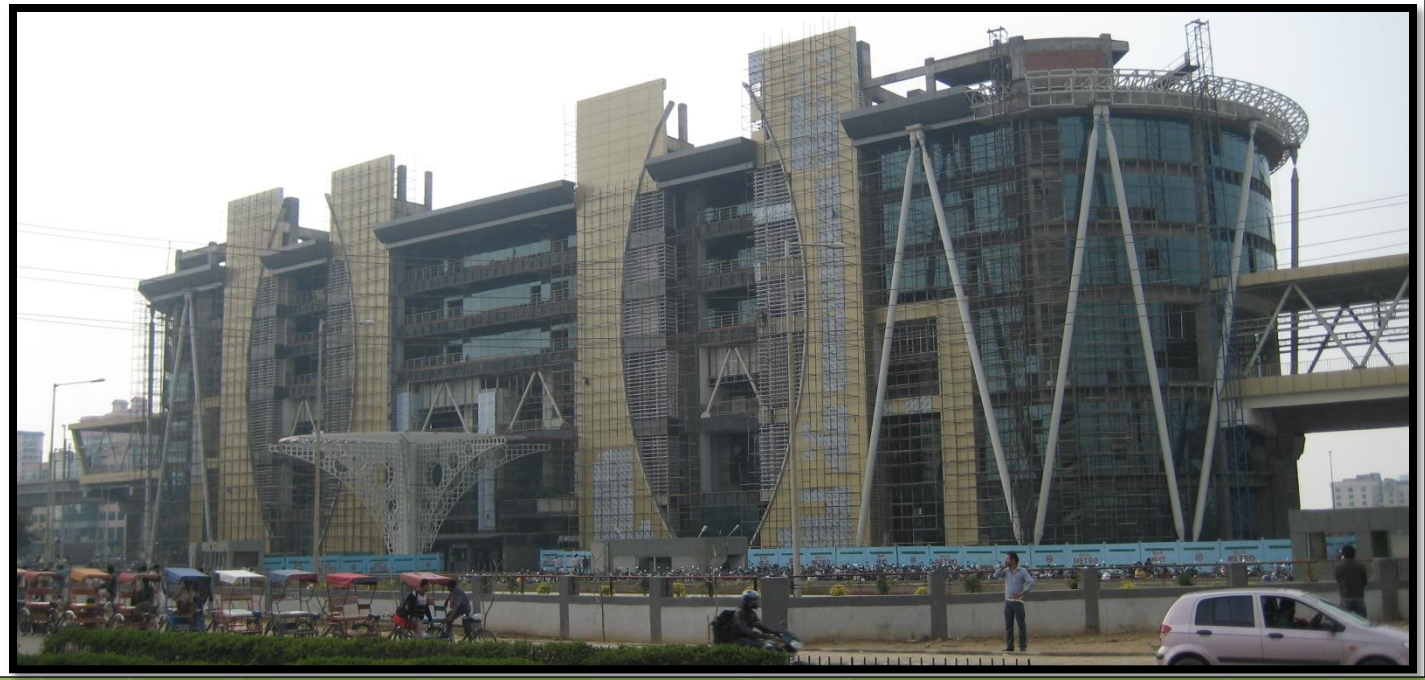
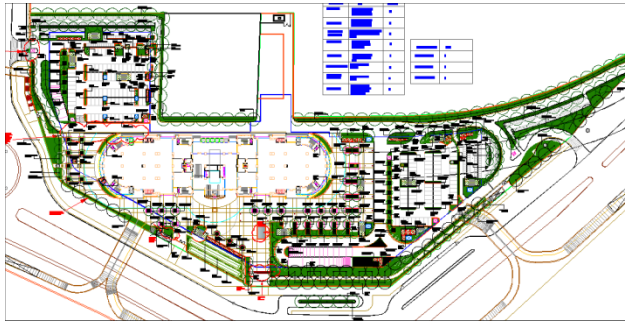


SALIENT FEATURES OF THE DESIGN PROCESS

- CIRCULATION – Minimize Travelling Distance.
- Segregation of Pedestrian & Vehicular movement
- Reduction in hard paving area to minimize the heat load in the basement and increase the green area by creating island landscaped areas.
- Light shaft have been provided to illuminate the basement.
- LIGHT HARVESTING – Maximize use of Natural light.
- UTILITY CORRIDORS - Separate Telephone, Networking, Water lines.
- GRAVITY SEWERS
- ENVELOPE DESIGN – To reduce heat gain, & in turn reduce HVAC load.
- Maximize the reuse, recycling and utilization of renewable re-sources.
- Minimize the demand on Non-renewable re-sources



IMPACTS ON BUILDING CONSTRUCTION & OPERATION

- SOIL CONSERVATION – To protect from degradation during construction.
- Use of recycled water for construction.
- Reduce building water use
- Selection of Plants species to reduce in usage of water for landscape areas.
- Control wastage of curing water.
- Reduction in Power consumption due to details in envelope design.

DESIGN BENEFITS OF ENERGY EFFICIENT BUILDINGS

- **REDUCTION OF HVAC LOAD.**
- **DUE TO REDUCTION IN HVAC LOAD, REDUCTION IN CONSUMPTION OF ELECTRICAL LOAD DURING EVERYDAY USE.**
- **REDUCTION OF DAILY CONSUMPTION OF WATER.**
- **ENHANCEMENT OF INDOOR & OUTDOOR LIGHTING SYSTEM EFFICIENCY.**
- **REDUCTION OF WASTE & POLLUTION DURING CONSTRUCTION**

ECONOMIC BENEFITS OF BUILDING

SAVINGS

- INTEGRATION OF MITIGATION STRATEGIES TO MINIMIZE HEAT ISLAND EFFECT
- COMPLIANCE WITH ECBC
- DAYLIGHT INTEGRATION IN PERIMETER ZONE
- EFFICIENT INDOOR AND OUTDOOR LIGHTING

RESULTS IN REDUCING THE ENERGY PERFORMANCE INDEX (EPI) FROM 214 KWHR/M2/ANNUM TO 128 KWHR/M2/ANNUM.

THIS HELPS ACHIEVE A 40% REDUCTION IN EPI.
APPROXIMATELY, 3,625,126 KWHR UNITS OF ELECTRICITY SHALL BE SAVED, AMOUNTING TO AN ANNUAL SAVING OF RS. 21,750,756/-. (2.175 CRORES)

APPROXIMATE COST FOR IMPLEMENTATION OF GREEN BUILDING CONCEPTS

S.NO.	DESCRIPTION	CONVENTIONAL BUILDING	GREEN BUILDING	ADDITIONAL COST
		IN RS	IN RS	IN RS
1.	AIR-CONDITIONING	97,500,000 (1500TR @ 65,000 Rs/TR)	110,000,000 (875TR @ 125715Rs/TR	12,500,000
2.	SHADING DEVICES (LOUVERS)	-	36,141,994	36,141,994
3.	DGU GLASS	19,310,000	29,080,860	9,770,860
4.	OVER-DECK INSULATION	-	10,873,700	10,873,700
5.	SOLAR ENEGRY	-	6,500,000	6,500,000
	TOTAL	116,810,000	192,596,554	75,786,554

TOTAL ADDITIONAL COST FOR GREEN BUILDING INITIATIVES =75,786,554/- (7.578 CRORES)

NUMBER OF YEARS REQUIRED TO RECOVER ABOVE AMOUNT = 3.4 YEARS

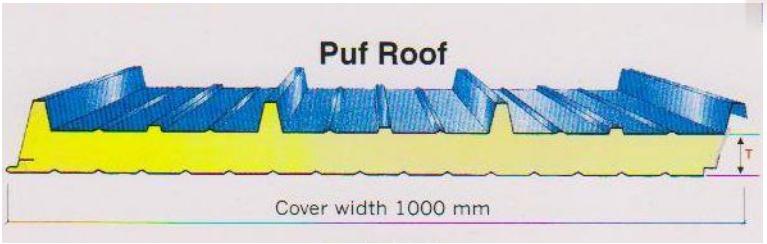
INNOVATION IN DESIGN, CONSTRUCTION & MATERIALS

- **Over deck insulation**
- **Double glazing unit (DGU)**
- **Low VOC paints – to avoid ozone depletion and other skin and respiratory related diseases.**
- **Louvers (both horizontal & vertical) – to mitigate heat island effect & integrate daylight.**
- **Light harvesting – Mirrors.**
- **HVAC**
  - **Building with efficient envelope & efficient lighting.**
  - **Energy Recovery Ventilators (ERV) for pre-cooling fresh air.**
  - **VFD on AHU fans.**
  - **Use of energy efficient screw chillers.**
  - **Efficient cooling tower.**
  - **Reduction in EPI**

SOPHIA AUDITORIUM
GREEN BUILDING PRODUCTS

- Use of recycled Acoustical Slats & Fabric panels for the wall cladding to absorb sound.

- Installed Puff panels in Roof Top of the Auditorium for Acoustical & Thermal Insulation.



Welcome to

Eco Valley

Gated Property, Mysore.

Vishwannath Associates
Bangalore ~ Chennai
www : vishwannathassociates.com

Eco Valley

A Presentation

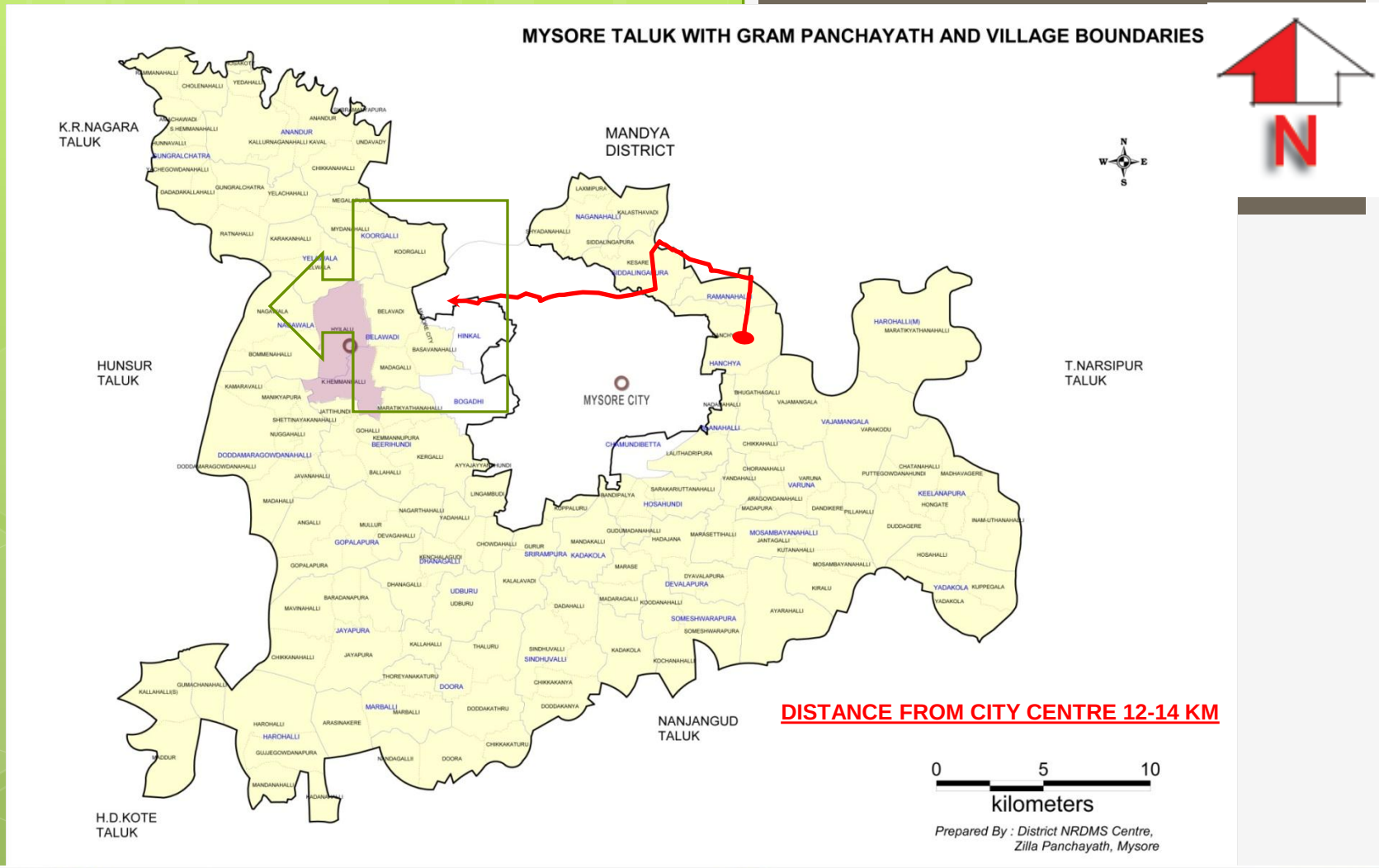
VBN ARCHITECTS

ca architects

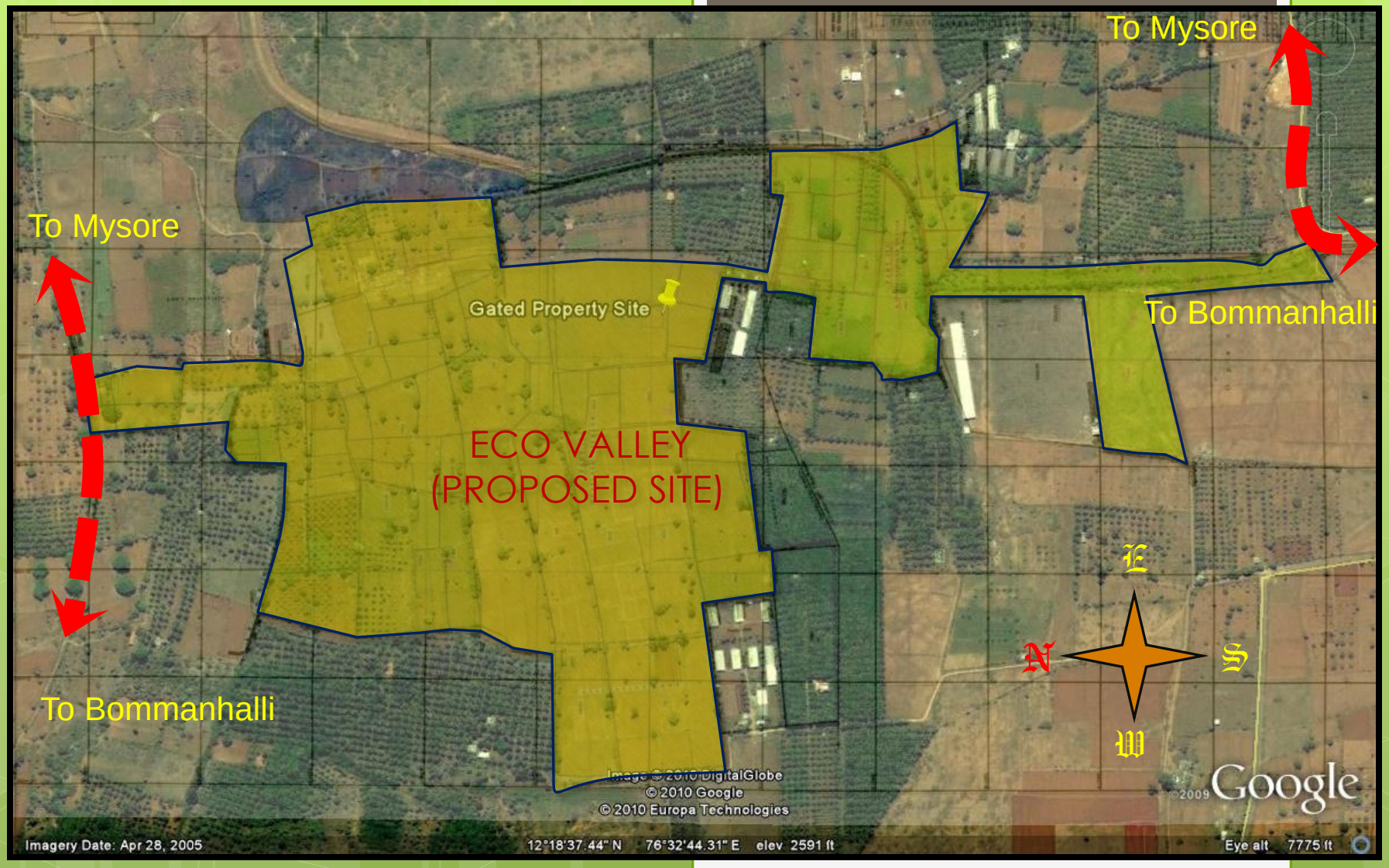
ARCHITECTS

1. SITE STUDY

Eco Valley location with respect to city centre

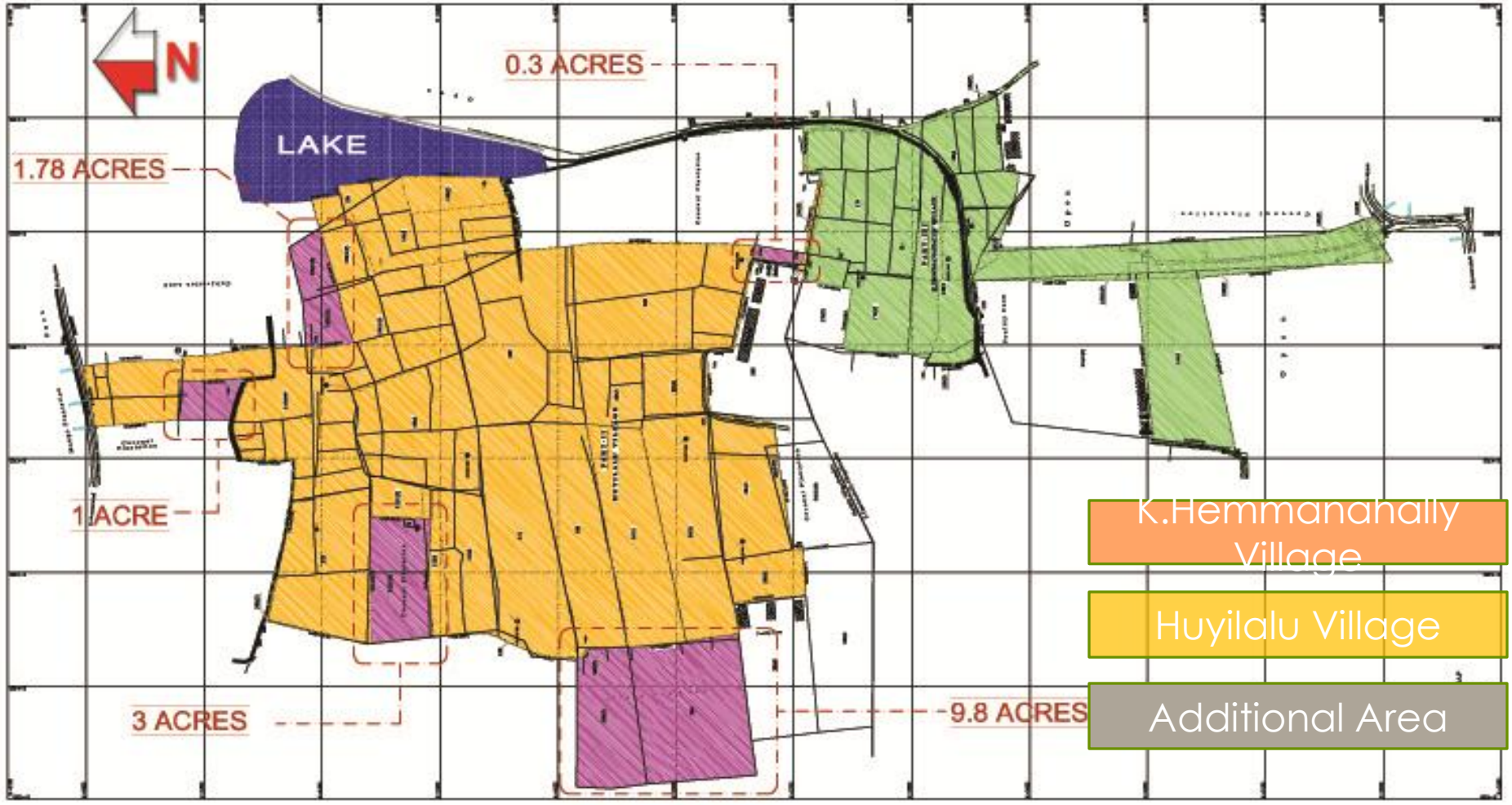


Location

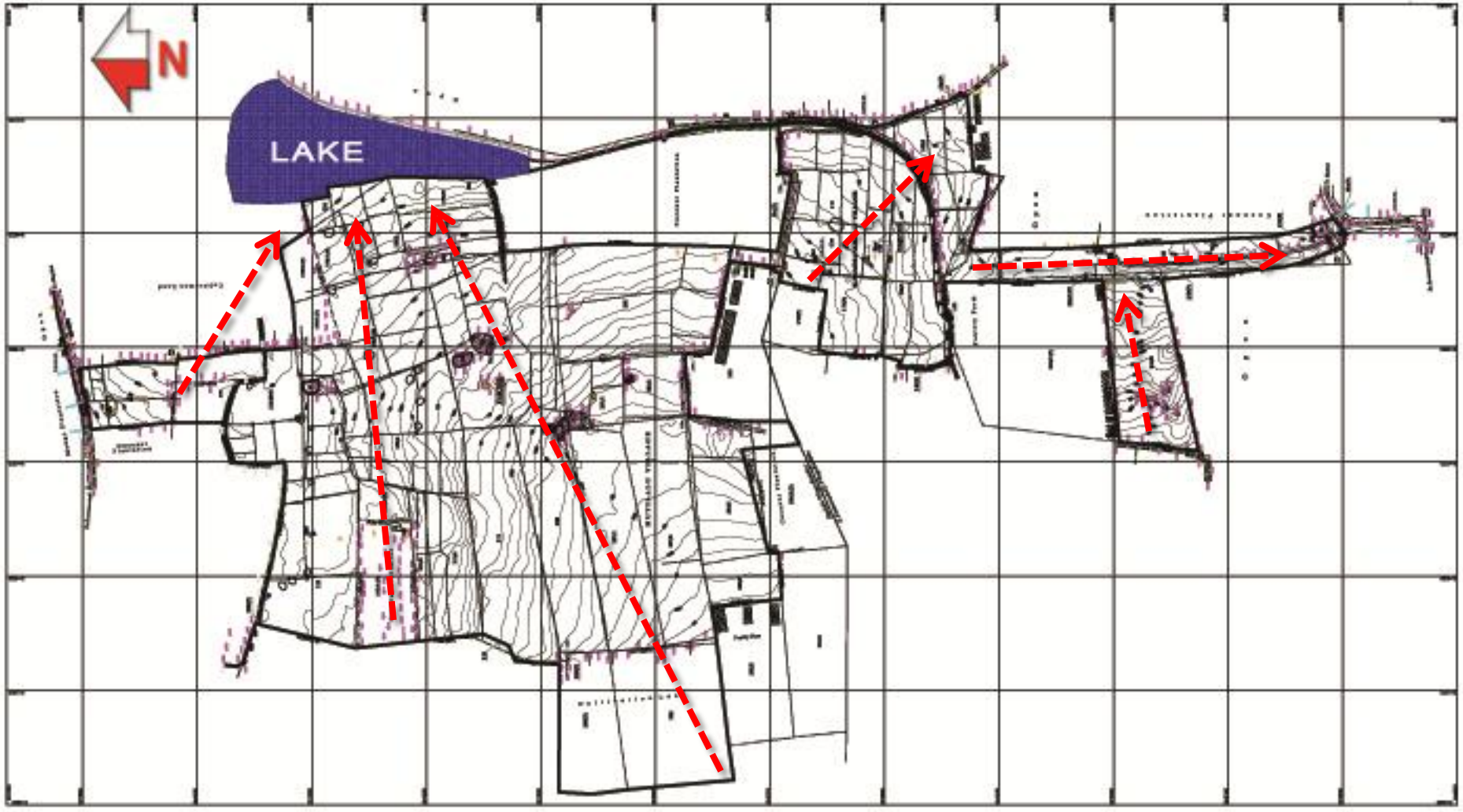

To Mysore
To Mysore
Gated Property Site
To Bommanhalli
ECO VALLEY
(PROPOSED SITE)
E
N
S
W
To Bommanhalli
Image © 2010 DigitalGlobe
© 2010 Google
© 2010 Europa Technologies
©2009 Google
Imagery Date: Apr 28, 2005
12°18'37.44" N 76°32'44.31" E elev 2591 ft
Eye alt 7775 ft

Site Boundries / Area

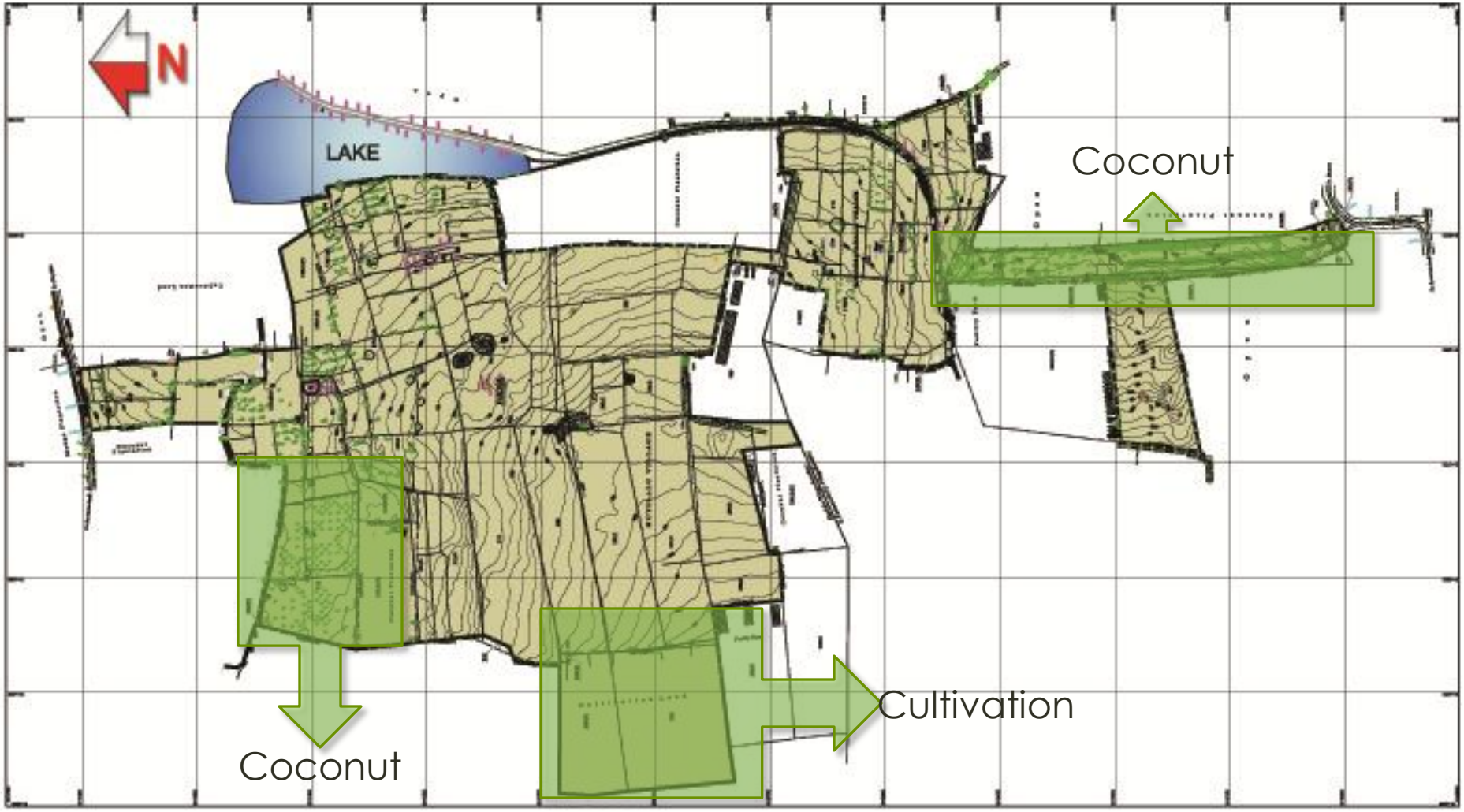
Total Site area :
127 Acres or 5,13,842 Sq.m. or 5,528,939 Sq.ft.



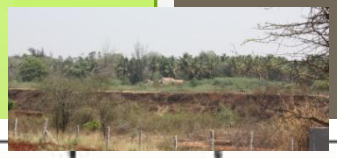
Terrain / Contour / Slope



Vegetation



Existing Site Features



Seasonal Lake

Coconut Plantation

LAKE

Temple

Poultry Farms

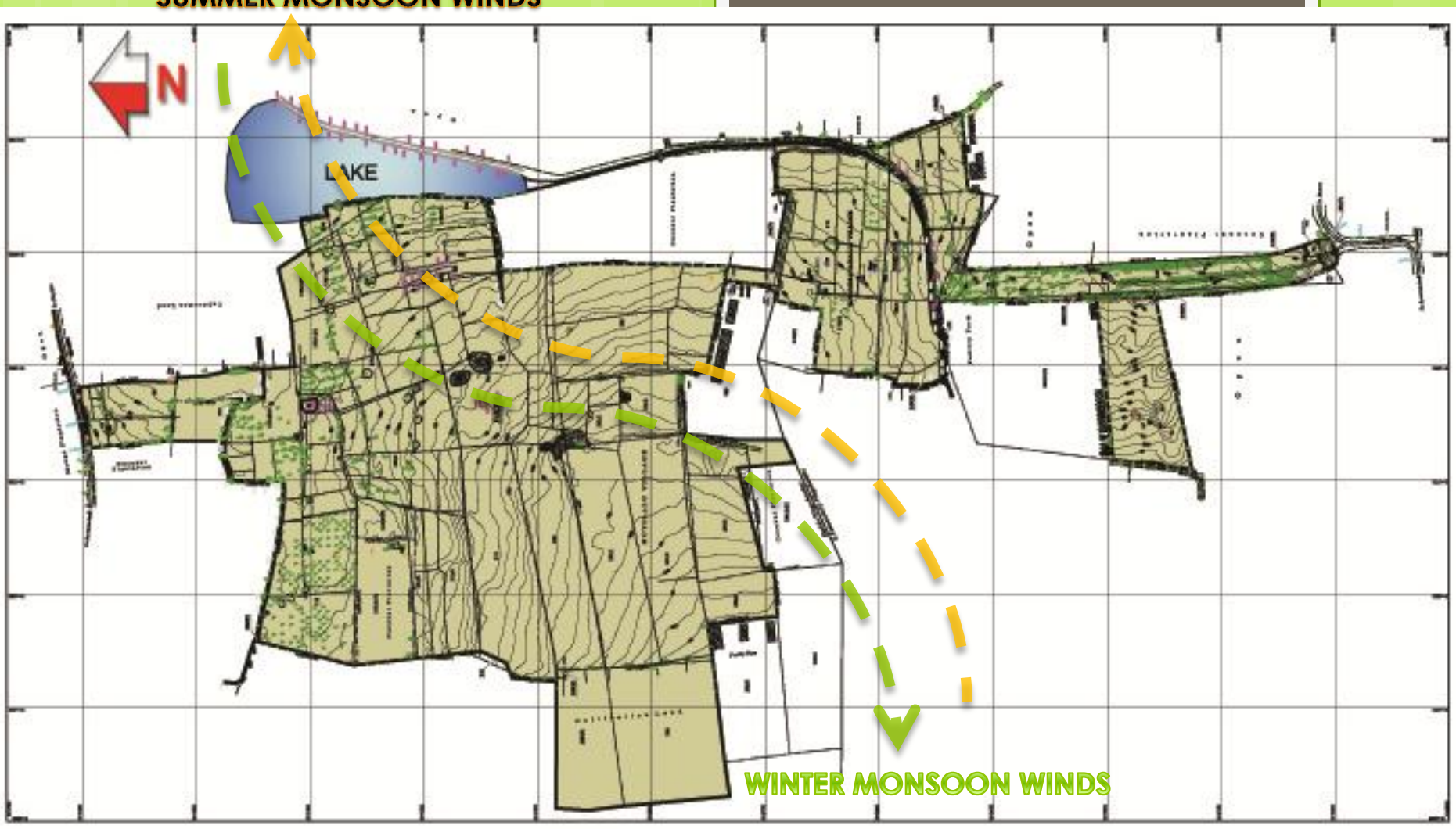
Coconut Plantation

FAVOURABLE

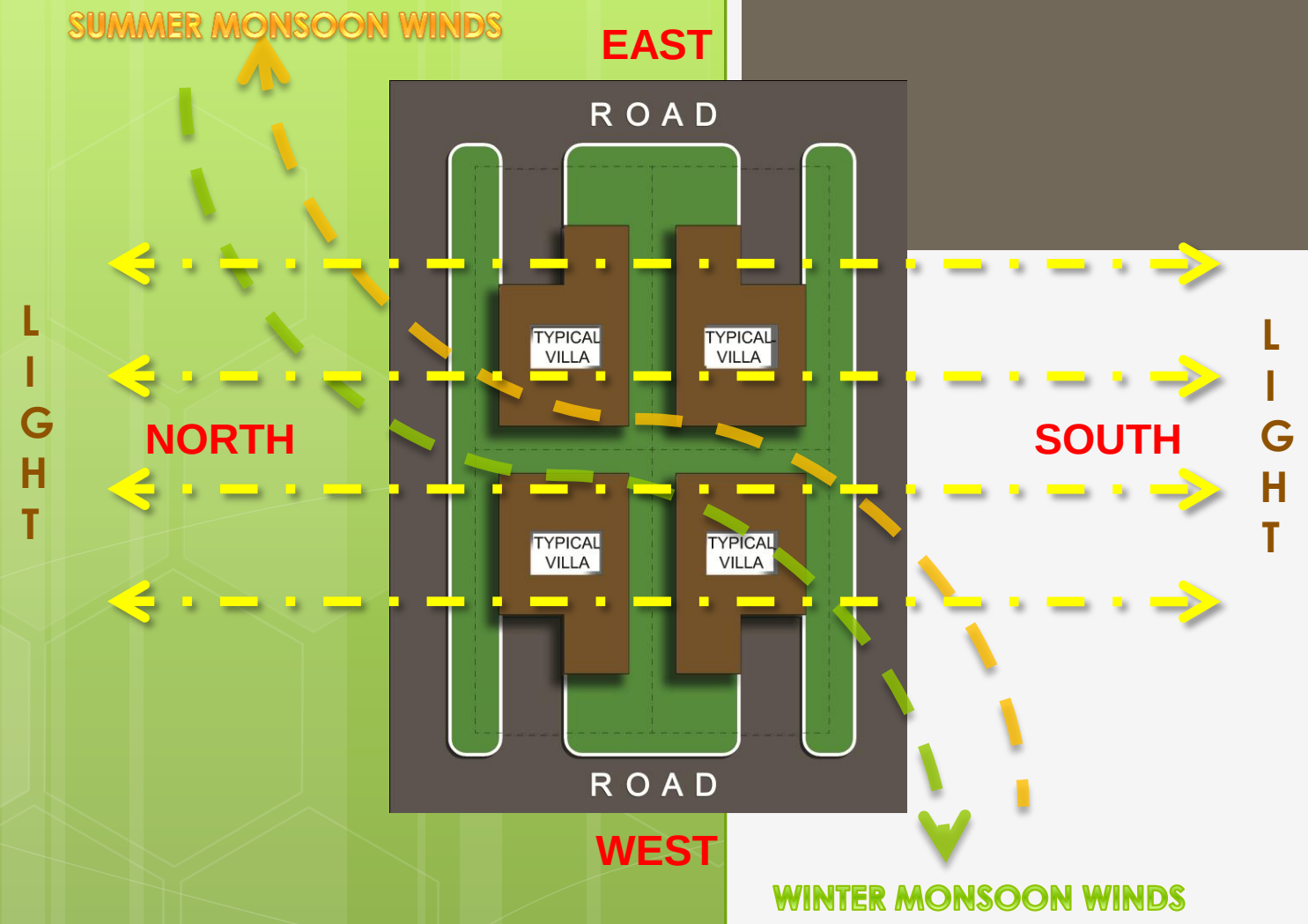
UNFAVOURABLE

2. CLIMATIC STUDY

Wind Directions



Inferences from climate analysis (Villa Orientation)

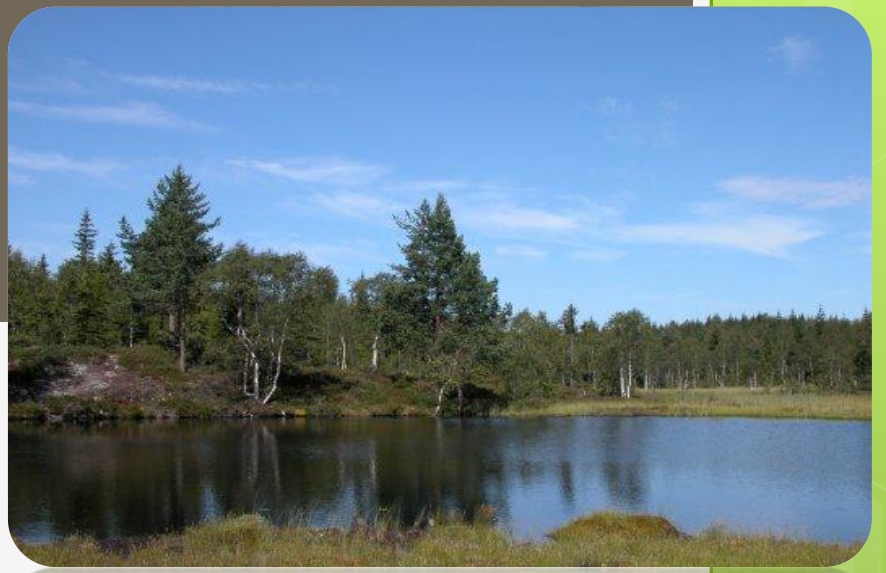


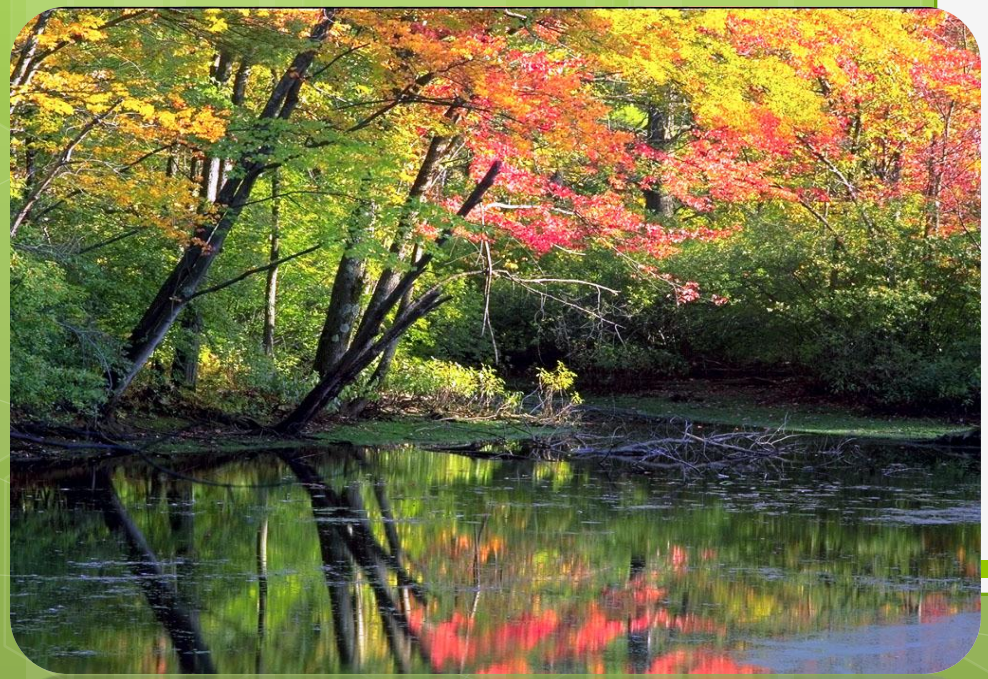
3
ENVIORNMENTAL INTEGRATION STRATEGIES FOR ECO VALLEY

Lake Rejuvenation

STRATEGIES :

- Directing all rain water runoffs to the proposed canal, which in turn, feeds the lake.
- Portion of the treated water of upto 2 Lakh ltr. from the proposed STP's would be fed to the lake.
- Aeration process would be carried out for the lake.
- Pitching around the lake.
- Rain water harvesting pits proposed around the





Use of solar energy

- **Solar farm - PV (photo-voltaic) panels in farm to produce 100kW power and fed to the electrical panel for supply to street & landscape lighting.**
- **Subsidy (30%) for PV from MNRE (Ministry of New and Renewable Energy)**
- **Roof mounted solar panels for individual villas for water heating.**

Plantation / Landscape strategy

- Avenue of shaded street trees.
- Plantation along the pathways, canal and jogging track to be year-round shading trees.
- Ayurvedic park proposed.
- Floral park proposed.
- Senior citizen park along with plantation.
- Local species of plants and trees are proposed with large spread for year-round shade.






Solid waste management

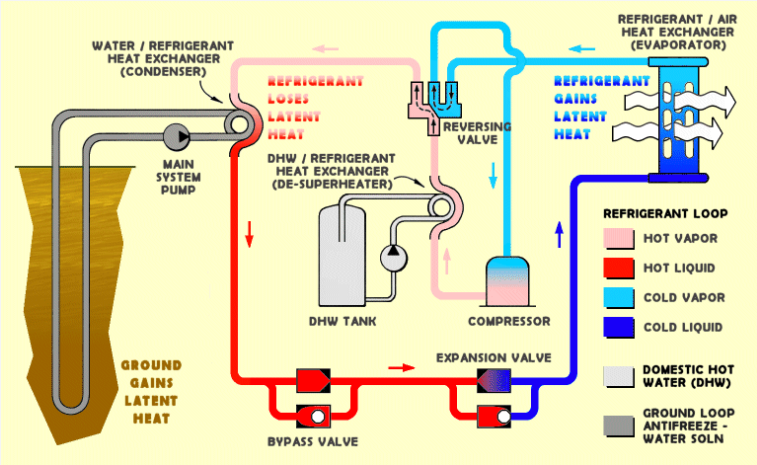
- Vermiculture proposed to produce in-house manure which can be used for landscape.
- Manure can also be a salable commodity.
- Segregation of wastes – Biodegradable & Non Biodegradable
- Colour coding for dust bins.
- Waste management plant of area 20,000 Sq.ft located at site.

Bio-degradable plastic roads

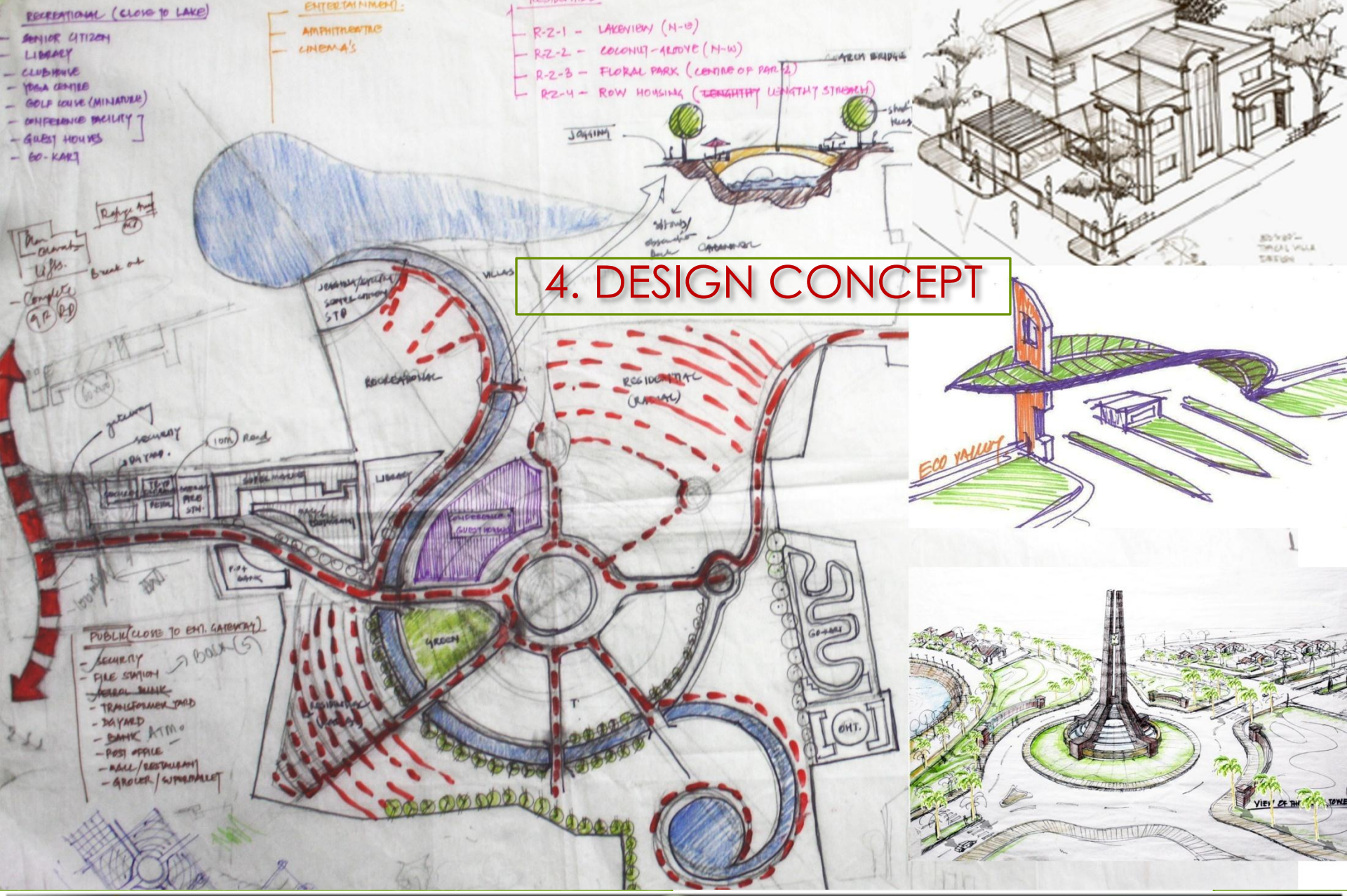
- Plastic increases the durability of the road by increasing the melting point of bitumen.
- Using plastic in the road makes the road less permeable to water hence increases life.
- Locally available non degradable plastic waste to be used.

Geothermal Cooling

- To be used for club house, civic centre and other air-conditioned blocks.
- It is highly eco friendly and efficient.
- Low investment cost.
- Low operating cost.
- It can save 20 -50 % cooling costs over conventional cooling systems.



4. DESIGN CONCEPT



Concept

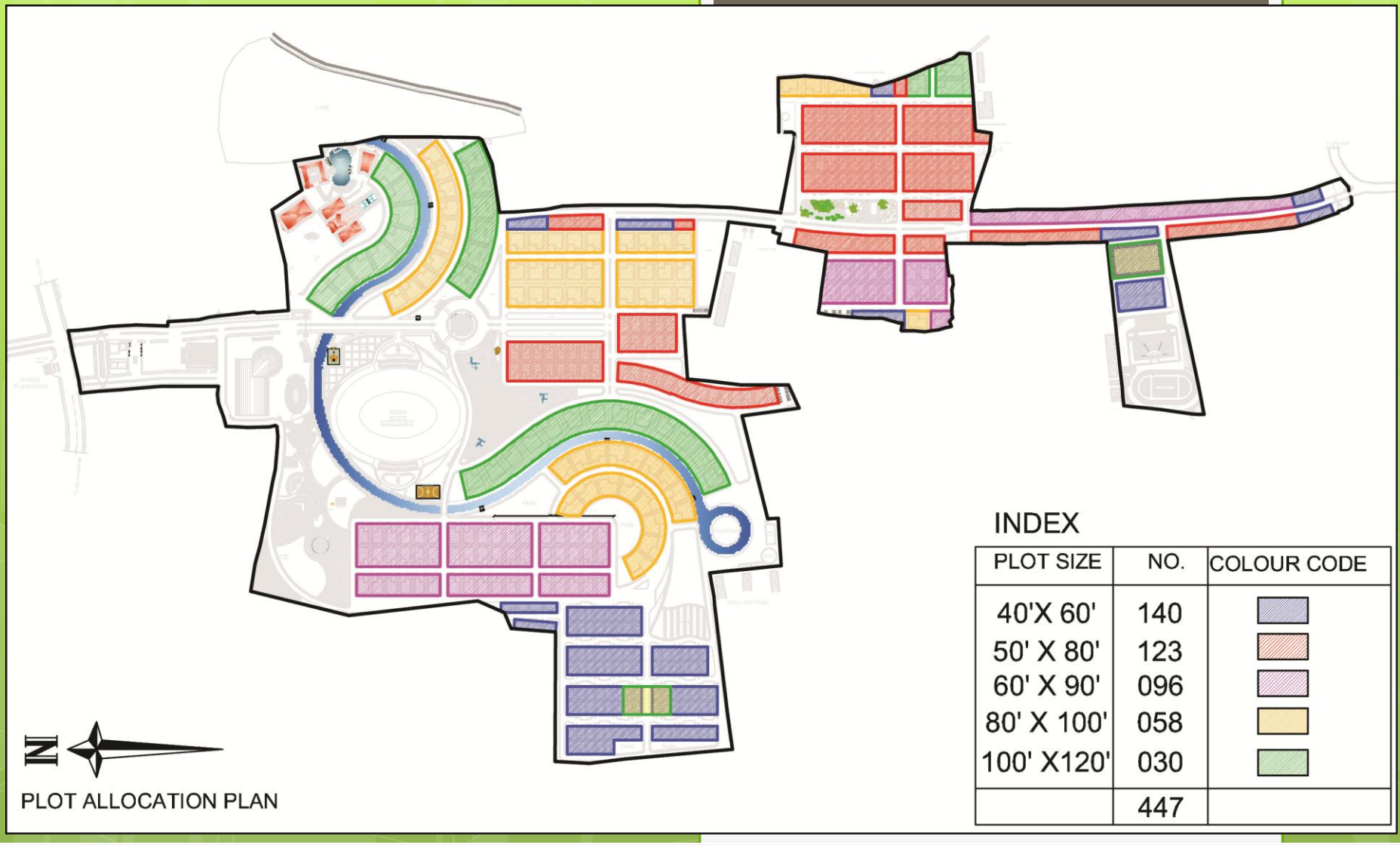




N
EXISTING LAKE
To Mysore
To Bommanhalli
To Mysore
To Bommanhalli
FLORAL PARK
CLOCK TOWER
CHILDREN PARK
PLAYGROUN D
AYURVEDIC PARK
THE CANAL - LOOP
THE OPEN AREAS
THE CIRCULATION AXIS
THE JUNCTIONS

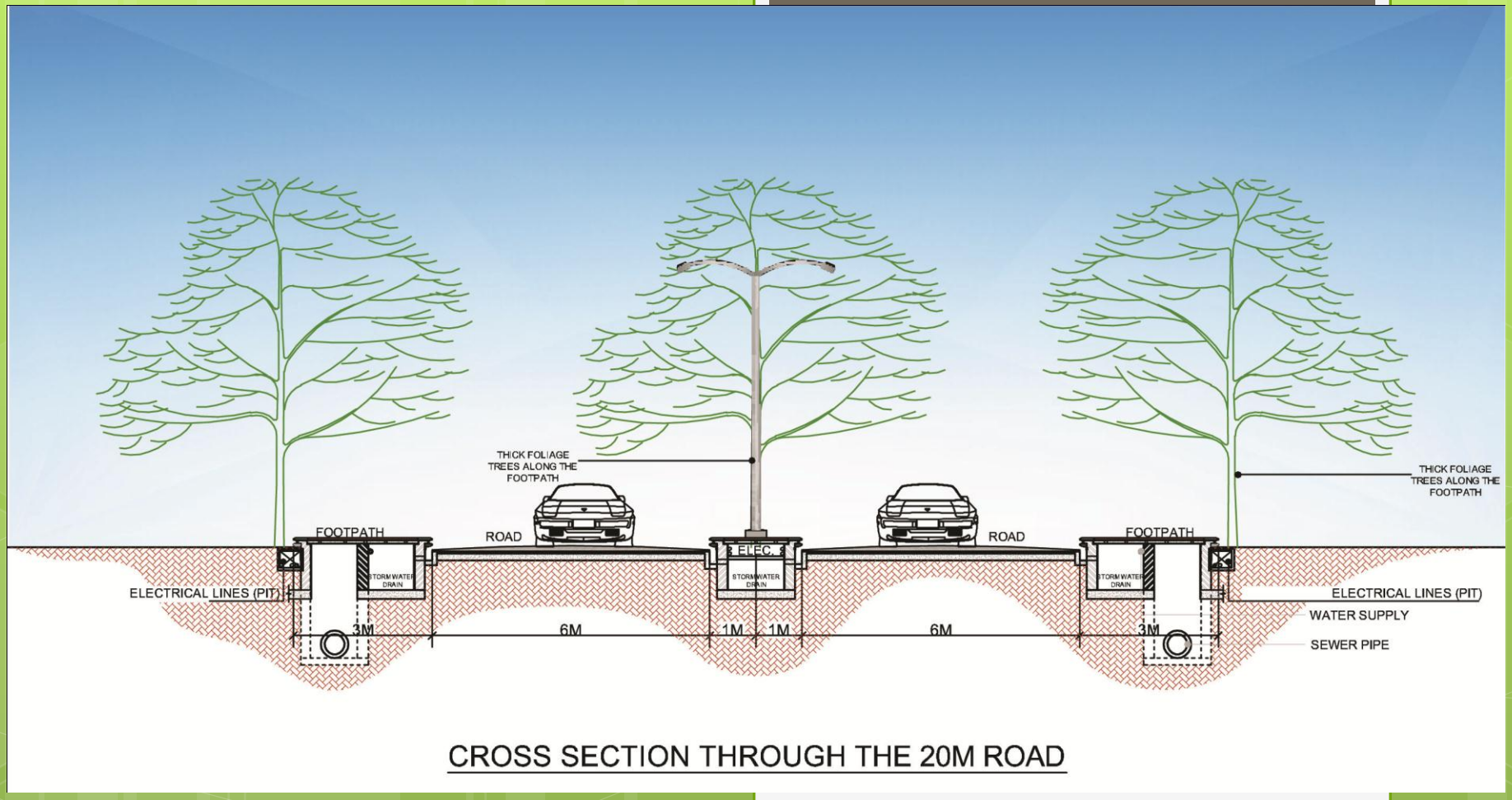
Parcelisation

Block Plan


INDEX
PLOT SIZE | NO. | COLOUR CODE
40'X 60' | 140
50' X 80' | 123
60' X 90' | 096
80' X 100' | 058
100' X120' | 030
447
N
PLOT ALLOCATION PLAN

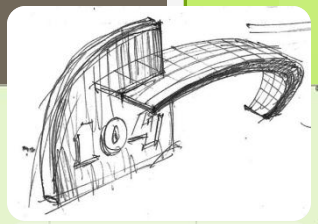
Traffic Plan

Typical Road Details



CROSS SECTION THROUGH THE 20M ROAD

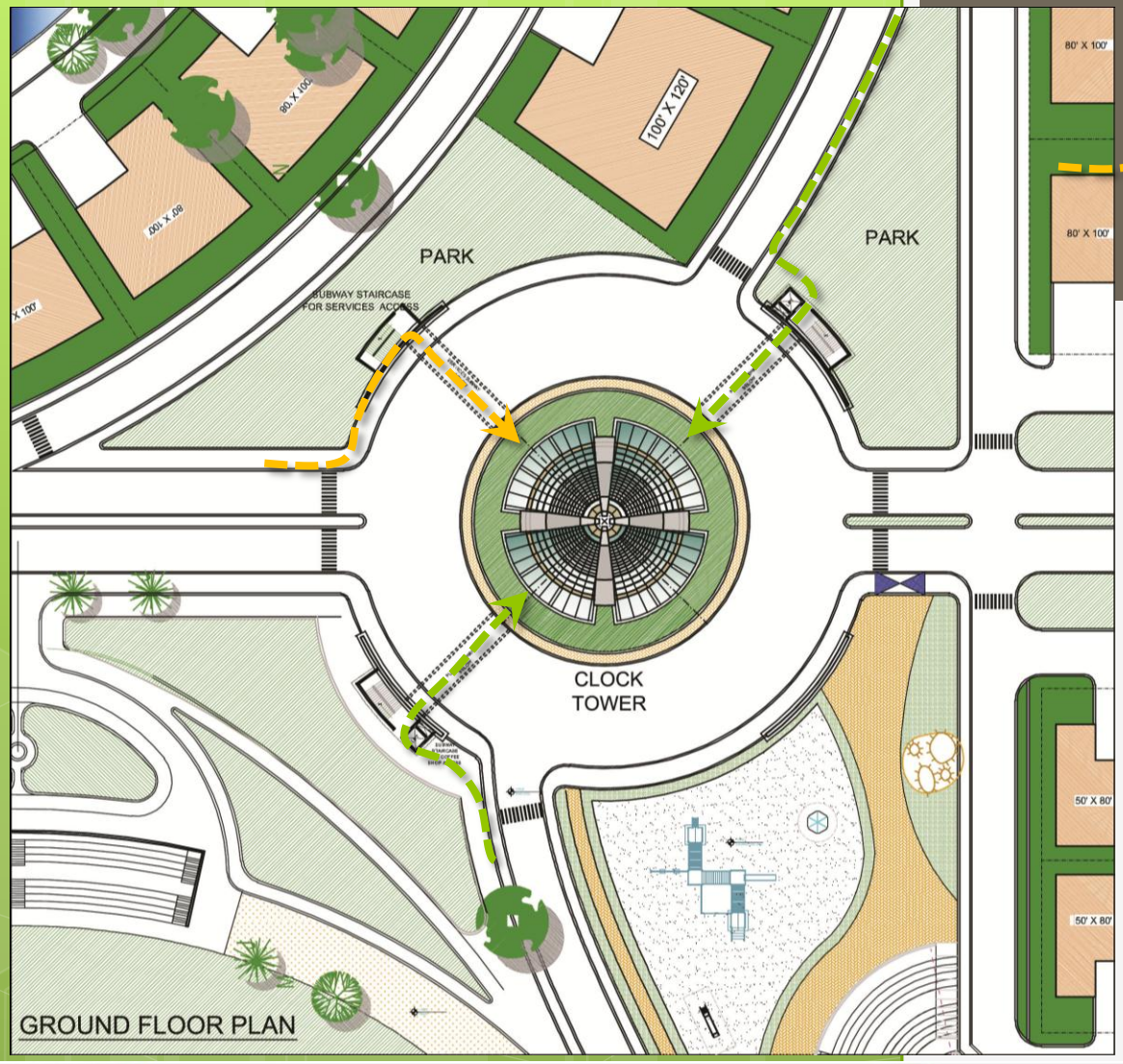
Residential Block Nomenclature

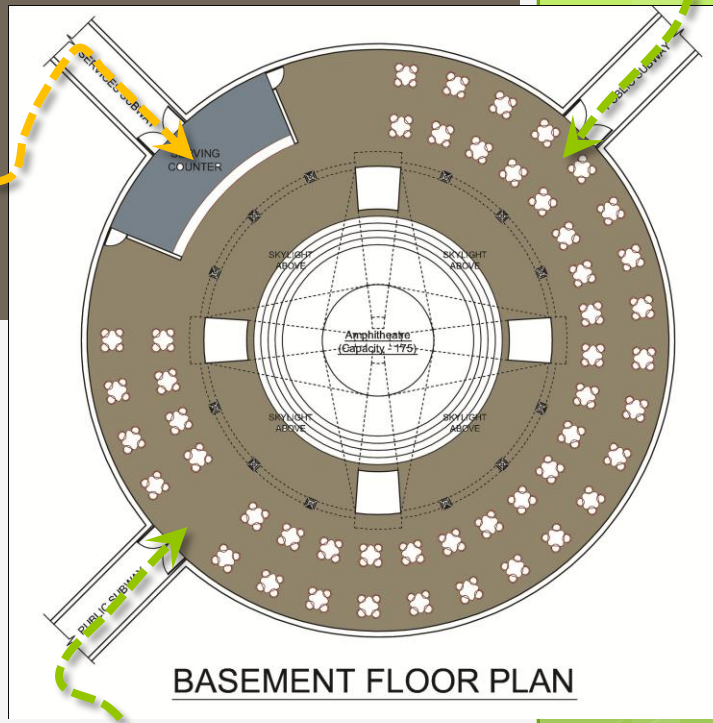


Clock Tower

View of the proposed clock tower and Underground Cafeteria

Clock Tower Plan

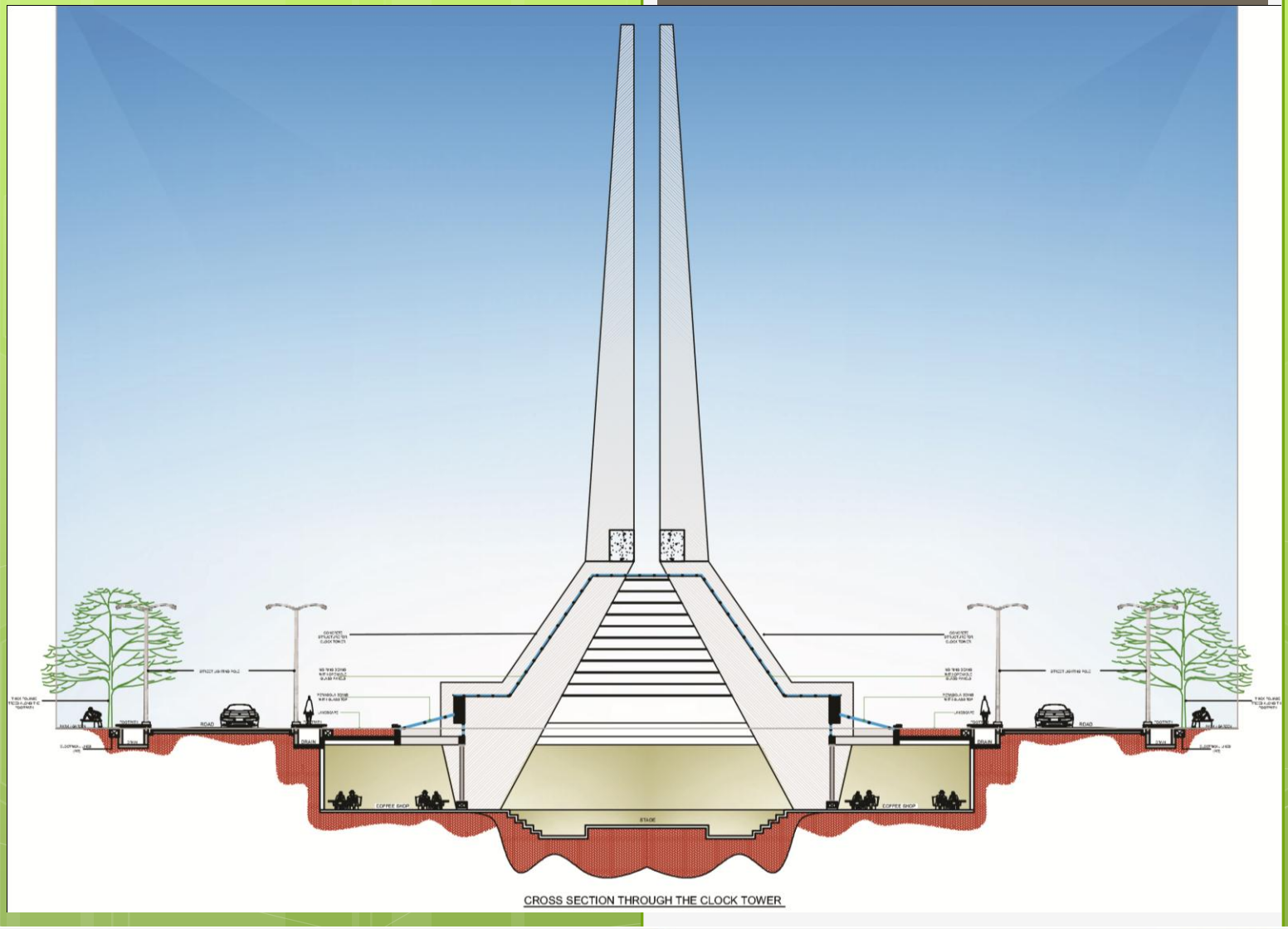




PUBLIC IN

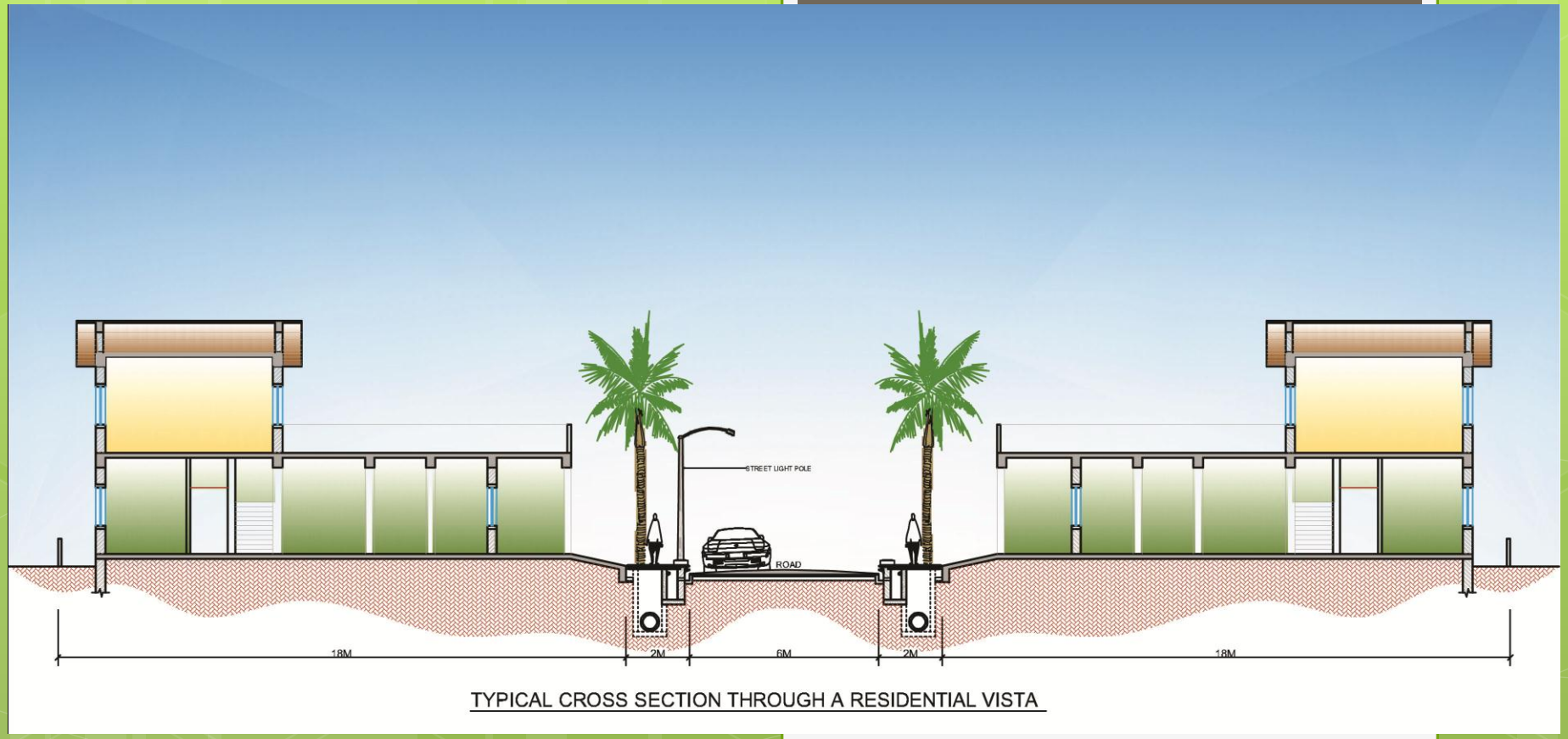
SERVICES IN

Clock Tower Section



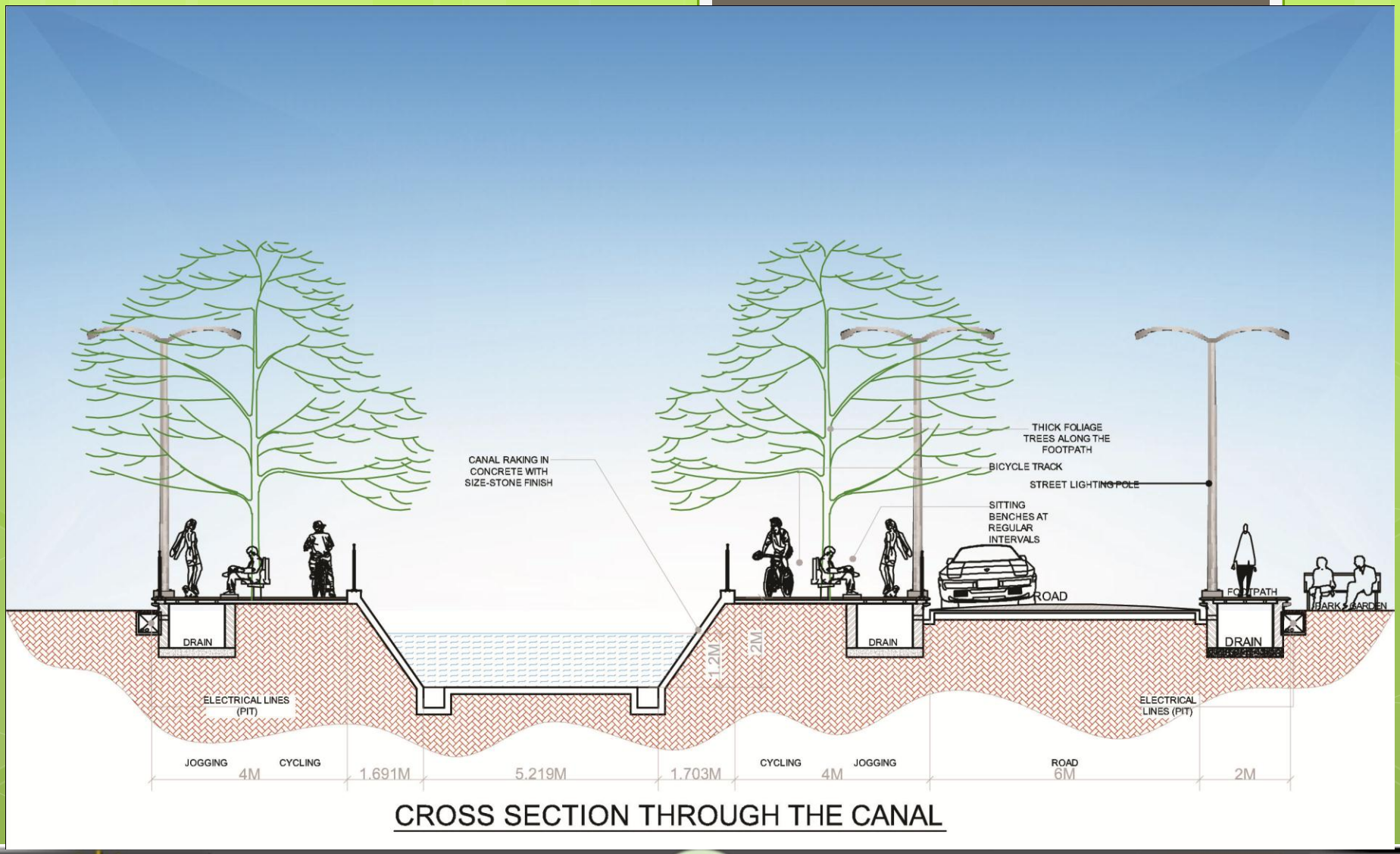
CROSS SECTION THROUGH THE CLOCK TOWER

Typical Street Section



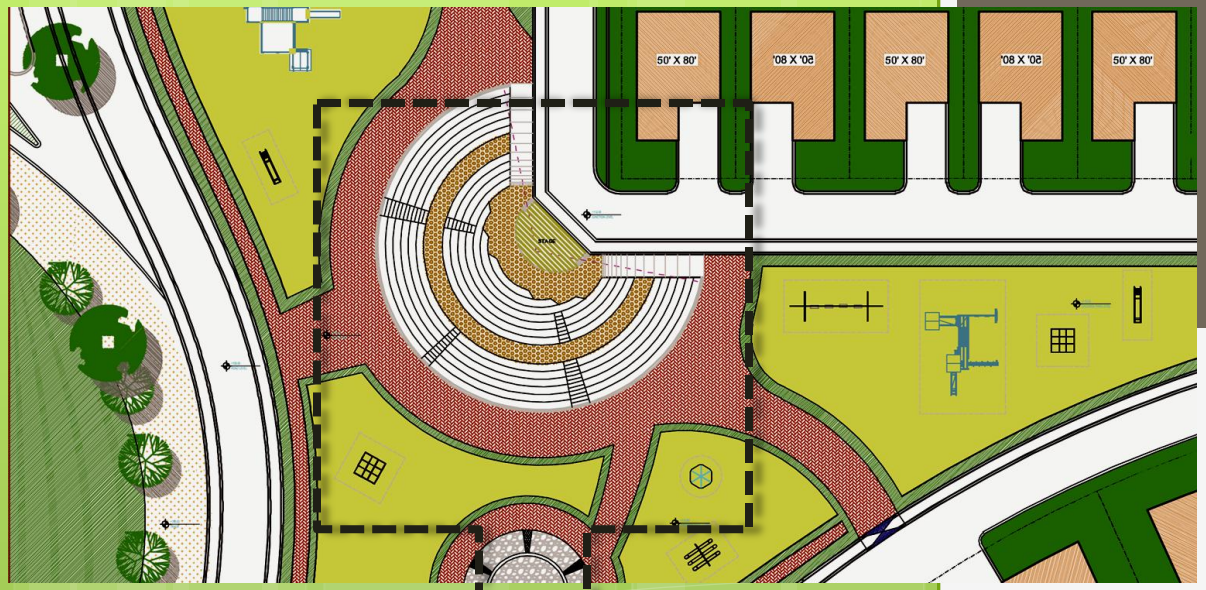
TYPICAL CROSS SECTION THROUGH A RESIDENTIAL VISTA

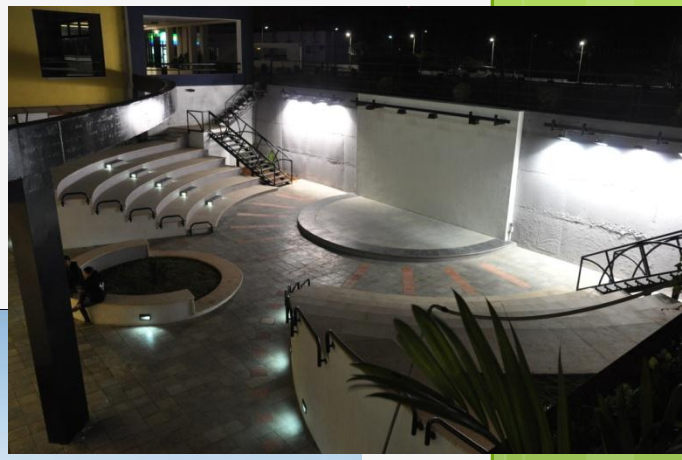
Typical Canal Section



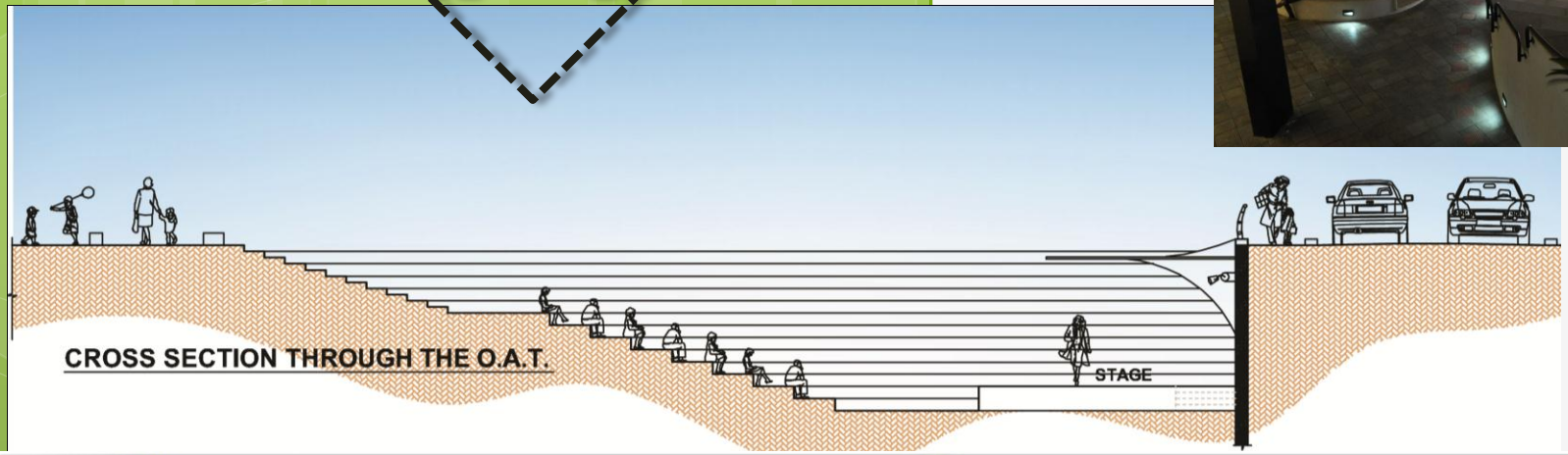
CROSS SECTION THROUGH THE CANAL

Open Air Theatre

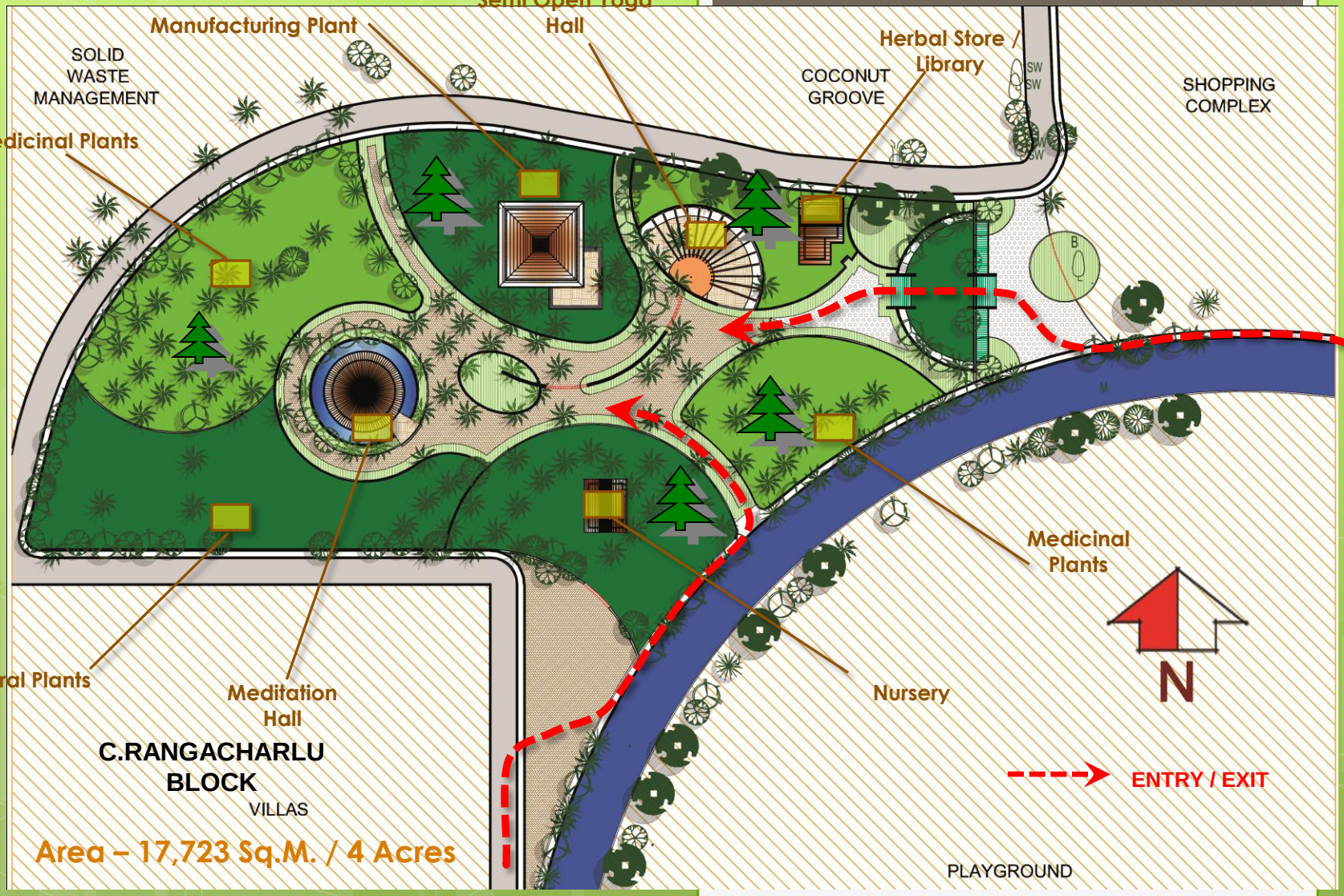




Capacity – 950 Pers. Area – 1,060 Sq.M.



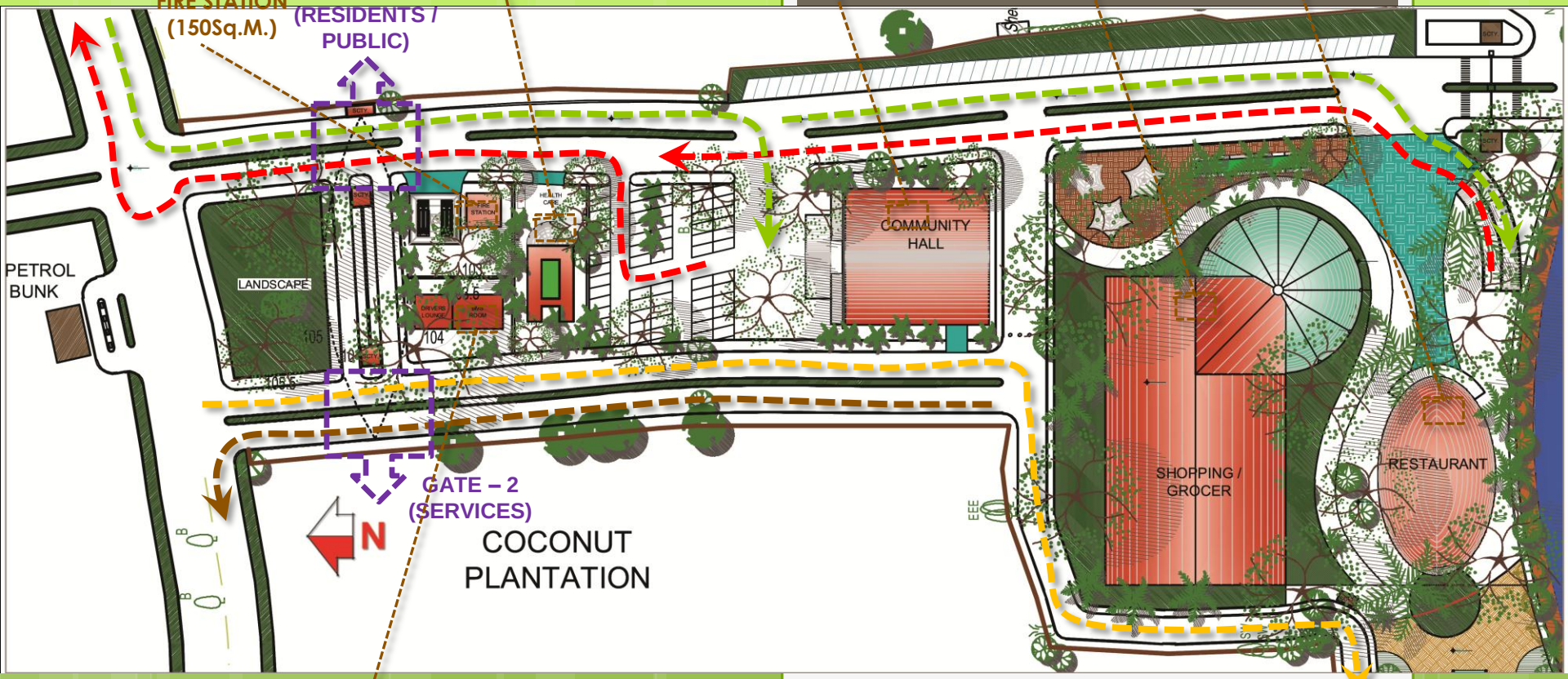
Ayurvedic Park



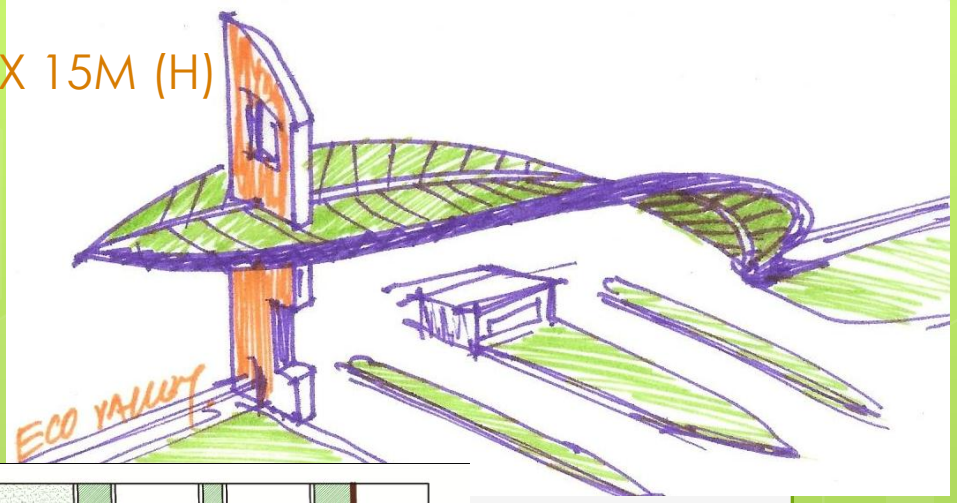
Club House

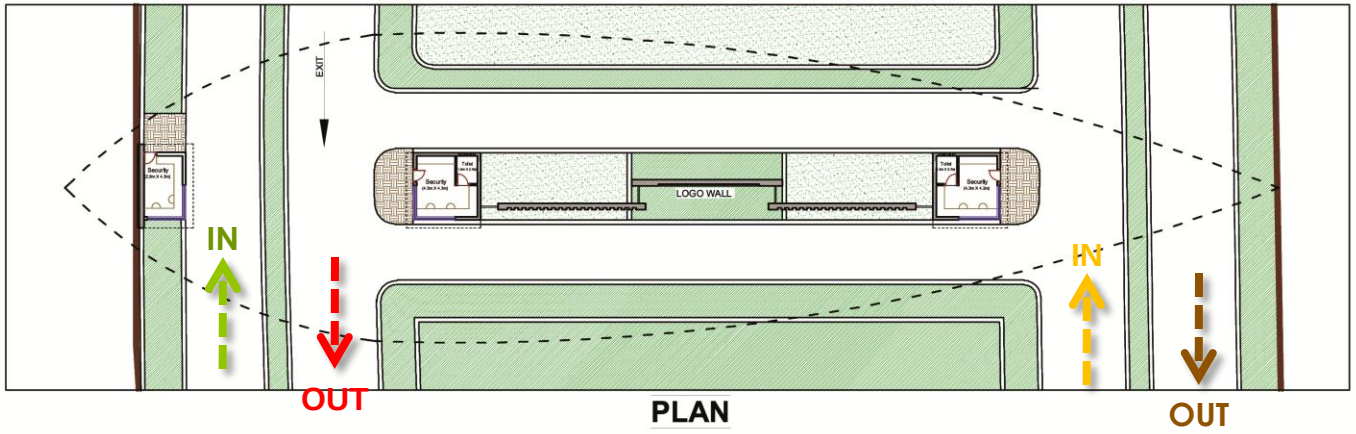
Area – 4.3 Acres

Civic-Centre

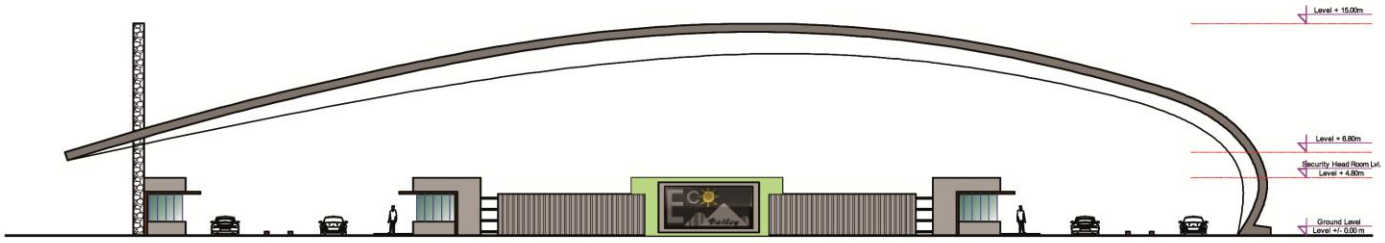


Entrance Gateway 80M (L) X 22M (B) X 15M (H)





PLAN



ELEVATION

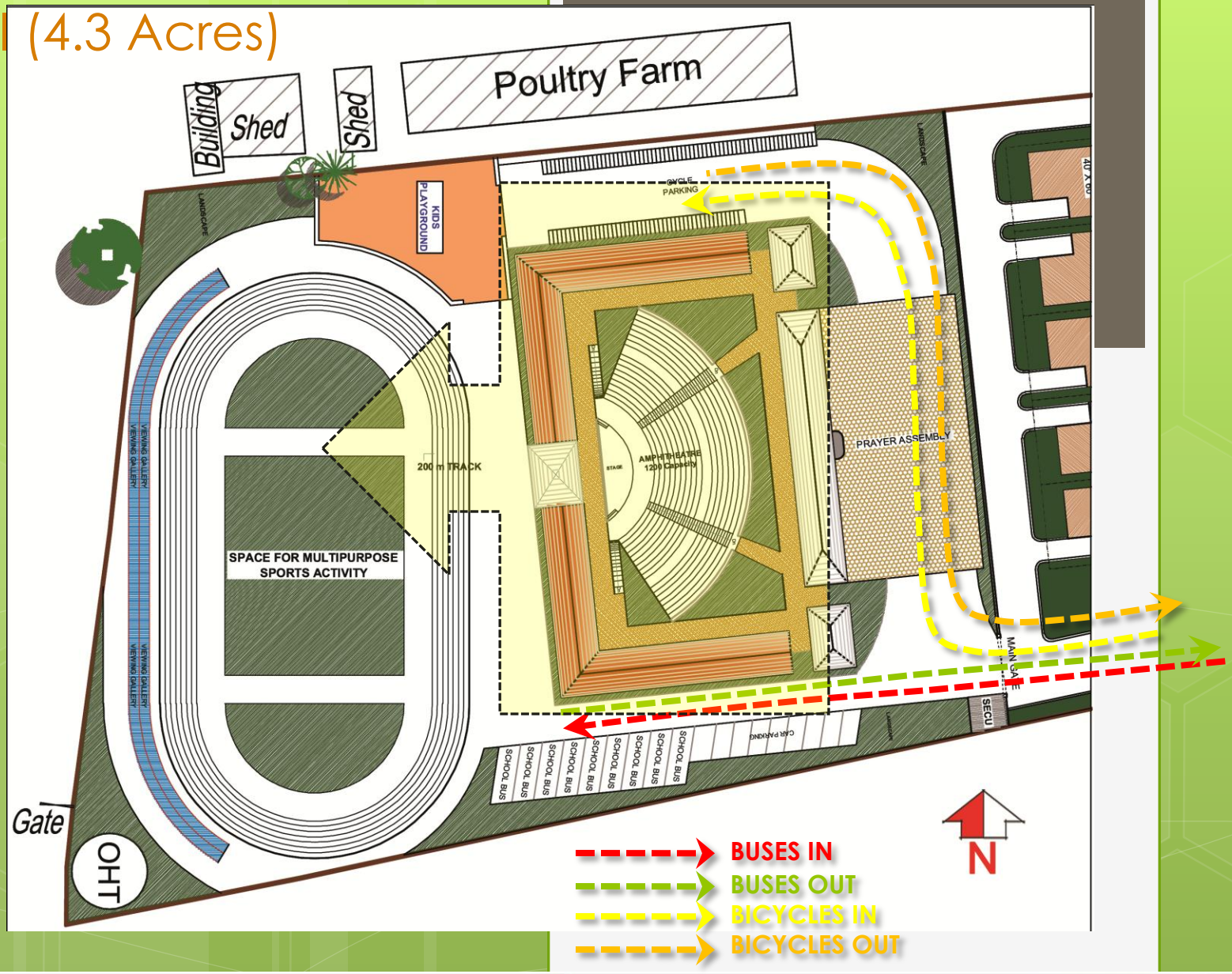
PUBLIC / RESI.

PUBLIC / RES1.

SERVICES

SERVICES OUT

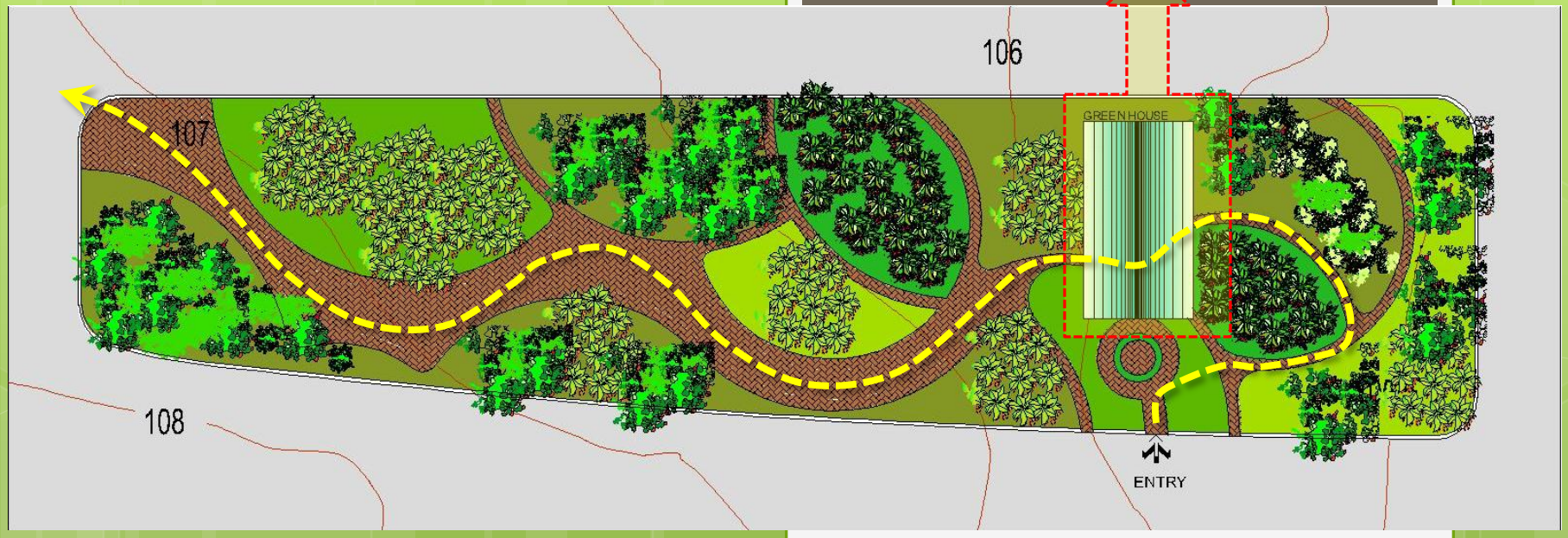
School (4.3 Acres)



School – Area Statement

S.No	Description	No	Built-up Area (Sq.Ft.)	Total (Sq.Ft.)
1	ADMINISTRATION:			
a	Conference Room	1	500	500
b	Principal off.	1	200	200
c	V.Principal off.	1	125	125
d	Administrative Office	1	1000	1000
e	Toilet	1	150	150
2	CLASSROOMS:			
a	Kindargarden	8	400	3200
b	Toilet	1	400	400
c	Staff Room	1	400	400
d	Class Rooms	36	550	19800
e	Toilet	6	300	1800
3	LABS:			
a	Computer Lab	3	600	1800
b	Staff Computer Lab	1	600	600
c	Physics Lab	1	600	600
d	Chemistry Lab	1	600	600
e	Biology Lab	1	750	750
f	Junior Science Lab	1	500	500
g	Maths Lab	1	600	600
4	OTHERS:			
a	Library	1	3500	3500
b	Staff Room	1	1200	1200
c	Toilets	1	400	400
d	General Store	1	200	200
e	Sports Room	1	150	150
f	NCC Room	1	150	150
g	Medical Room	1	175	175
h	Maintainence Room	1	150	150
i	Electrical Room	2	75	150
j	AV Room	1	2800	2800
k	Activity Room	1	1200	1200
l	Resource Room	3	400	1200
	TOTAL			44300
	15% for Circulation			6645
	TOTAL BUILT UP AREA			50945

Floral Park (0.85 Acres)



Floral Park (Flowers)

Cosmos Pink

Cockscomb Plumed

Spiny Baleria

Crossandra

Net Veined Bladderwort

Roses

Mysore Mallige

Aerial View of Eco Valley

VILLA DESIGNS

5. SERVICES

Electrical Load Estimate (MESCOM Requirement)

Sl. No	Description	Connected Load (kW)	Demand Factor	Demand Load (kW)
1	Load for Ville of type 40 x 60, 145 Nos. @ 5kW - Three phase/villa	725	1.00	725
2	Load for Ville of type 50 x 80 132 Nos. @ 7kW - Three phase/villa	924	1.00	924
3	Load for Ville of type 60 x 90 83 Nos.@ 9kW - Three phase/villa	747	1.00	747
4	Load for Ville of type 80 x 100 59 Nos.@ 10kW - Three phase/villa	590	1.00	590
5	Load for Ville of type 100 x 120 @ 12kW - Three phase/villa	372	1.00	372
6	Civic amenities area -PHC, Groceries	50	0.6	30.0
7	Pump + bore well + STP load	300	0.6	180.0
8	Club house	250	0.6	150.0
9	External / Landscape lighting	150	1.0	150.0
10	School	200	0.7	140.0
11	Community Centre	200	0.7	140.0
12	Miscellaneous	100	0.6	60.0
	Total	**4608.00**		**4208.00**

Assuming power available from the 3000 sq m solar farm approximately 200kW,
Maximum demand load =4008kW = 4715kVA @ 0.85 p.f

Recommended 9nos. 11kV/0.433kV, 500kVA Outdoor Oil filled Transformers at three(3) Centralised locations with 87% loading, LT metering
Other common area loads with respective transformers of 200kVA, 250kVA,500kVA on HT metering

Electrical Load Estimate (CESCOM Requirement)

(D.G.SET SIZING CONSIDERING 100% BACK UP for all amenties and 50% back up for residential)

Sl. No	Description	Connected Load (kW)	Demand Factor	Demand Load (kW)
1	Load for Ville of type 40 x 60 145 Nos.@ 2.5kW - Three phase/villa	363	1.00	363
2	Load for Ville of type 50 x 80 132 Nos.@ 3.5kW - Three phase/villa	462	1.00	462
3	Load for Ville of type 60 x 90 83 Nos. @ 4.5kW - Three phase/villa	374	1.00	374
4	Load for Ville of type 80 x 100 59 Nos.@ 5kW - Three phase/villa	295	1.00	295
5	Load for Ville of type 100 x 120 31 Nos. @ 6kW - Three phase/villa	186	1.00	186
6	Civic amenities area -PHC, Groceries	50	0.6	30.0
7	Pump + bore well + STP load	300	0.6	180.0
8	Club house	250	0.6	150.0
9	External / Landscape lighting	150	1.0	150.0
10	School	200	0.7	140.0
11	Community Centre	200	0.7	140.0
12	Miscellaneous	100	0.6	60.0
	Total	**2929.00**		**2529.00**

Assuming power available from the 3000 sq m solar farm approximately 100kW, and landscape , street lighting shall be powered by this,
Assuming an overall diversity factor of 70%, Maximum demand load =1630kW = 2038kVA @ 0.80 p.f

Recommended 5nos. 500kVA 415V diesel generator sets with acoustic enclosure at three(3) Centralised locations with 81% loading

Water Calculations

	Description of Module	No of Villas	No of Persons/ Villa	Total No of Persons	Water required/ Person in lpcd	DomesticWater demand	Misc. Domestic Water demand(5%)	Total Domestic Water Demand in Cum/day	Total waste water generated (80% of Domestic water demand)
1	Villas	450	5	2250	200	450000	22500	473	378
2	Community Centre			750	15	11250	563	12	9
3	Children School			1500	45	67500	3375	71	57
4	Total No'of cars considered	450	1	450	15	6750	338	7	6
	Total			**4950**		**535500**	**26775**	**562**	**450**
	UNDERGROUND SUMP FOR RESIDENTIAL BLOCK								
1	Domestic water sump(1day storage)				**562**	CUM			
2	Filter water sump(1 Day requirement)				**562**	CUM/DAY			
	Total U.G Sump capacity				**1125**	**CUM**			
	CENTRALISED OHT (25% OF 1 Day				141				
				Say	150				
1	OHT 01				**100**	cum			
2	OHT 02				**50**	**cum**			
2	STP Capacity				**450**	**KLD**			
	Water to be used for landscape				**150**	**KLD**			
	Water to be used for Flushing				**150**	**KLD**			
	Water to be used for Ground water Recharge				**150**	**KLD**			

6. COSTING

OPTION -01

SUMMARY

COSTING (OPTION-I)

I	Land Area		127 Acre
II	Assumed Land Cost		INR. 44.45 Crores
III	Infrastructure Cost		INR. 107 Crores
IV	Total Saleable Area		21,70,400 Sft
V	% of Ground Coverage		
	Total Area in Sqm. -		514138

Sl.No	Description	Area in Sq.m	% of Coverage
(a)	Villas (Residential)	201710	40.00%
(b)	Commercial		
	Healthcare	197	0.04%
	Community hall	1297	0.25%
	Shopping Mall and Restaurant	4890	0.95%
	Club House	5780	1.12%
	Security, Pumphouse, BMS	762	0.15%
	Open Air Theatre	1096	0.21%
	School	6030	1.17%
			4.00%
(c)	Roads	128534	25.00%
(d)	Landscape & Parks		
	Landscape & Parks	49085	9.55%
	Ayurvedic Park	19465	3.79%
	Children's Park	8703	1.69%
	Floral Park	3437	0.67%
	Senior Citizen's Park	2774	0.54%
			16.23%
(e)	Pathways	37200	7.24%
(f)	Cricket Ground	21350	4.15%
(g)	Canal	13045	2.54%
(h)	Clock Tower	1305	0.25%
(i)	Temple	105	0.02%
(j)	Solar Farm	756	0.15%
(k)	Basket Ball	508	0.10%
(l)	Solid Waste Management	2150	0.42%
			100.00%

VI	Sale Cost of Land		INR 910 per Sft
VII	Cost of Individual Villa's		
	40' x 60' - Gadriatic		INR 33 Lakhs
	40' x 60' - Villa		INR 58 Lakhs
	50' x 80' - Villa		INR 73 Lakhs
	60' x 90' - Villa		INR 88 Lakhs
	80' x 100' - Villa		INR 93 Lakhs
	100' x 120' - Villa		INR 1.14 Crores

VIII Cost of Land and Constructed Villas For Buyers

Sl.No	Description	Land Cost (in INR)	Construction Cost (in INR.)	Total Cost (in INR.)
(a)	40' x 60' - Gadriatic	22 Lakhs	33Lakhs	55 Lakhs
(b)	40' x 60' - Villa	22Lakhs	58Lakhs	80 Lakhs
(c)	50' x 80' - Villa	37 Lakhs	73Lakhs	1.10 Crores
(d)	60' x 90' - Villa	50 Lakhs	88Lakhs	1.38 Crores
(e)	80' x 100' - Villa	73 Lakhs	93Lakhs	1.66 Crores
(f)	100' x 120' - Villa	1.11 Crores	1.14Crores	2.25 Crores

IX	Total Project Cost		
	Land Cost		INR. 44.45 Crores
	Infrastructure Cost		INR. 107 Crores
	Total Cost of Villa Construction		INR. 338 Crores
	Total Project Cost		INR. 490 Crores
	[Rupees Four Hundred And Ninety Crores Only]		

OPTION -02

SUMMARY

COSTING (OPTION-II)

I	Land Area		127 Acre
II	Assumed Land Cost		INR 44.45 Crores
III	Infrastructure Cost		INR 93 Crores
IV	Total Saleable Area		27,86,200 Sft
V	% of Ground Coverage		
	Total Area in Sqm. -		514138

Sl.No	Description	Area in Sq.m	% of Coverage
(a)	Villas(Residential)	258941	51.00%
(b)	Commercial		
	Healthcare	147	0.03%
	Community hall	1185	0.23%
	Super market	492	0.10%
	Clubhouse	5780	1.12%
	Security, Pumphouse, BMS	762	0.15%
	Open Air Theatre	673	0.13%
	School	6030	1.17%
			3.00%
(c)	Roads	111733	21.73%
(d)	Landscape & Park		
	Landscape	60301	11.73%
	Senior Citizen's Park	1735	0.34%
	Ayurvedic Park	10852	2.11%
	Children's Park	3246	0.63%
	Floral Park	2340	0.46%
			16.00%
(e)	Pathways	21706	4.22%
(f)	Cricket Ground	8096	1.57%
(g)	Canal	12045	2.34%
(h)	Clock Tower	1305	0.25%
(i)	Temple	105	0.02%
(j)	Solar Farm	972	0.19%
(k)	Basket Ball	508	0.10%
(l)	Solid Waste Management	1916	0.37%
			100.00%

VI	Sale Cost of Land		INR 640 per Sft
VII	Cost of Individual Villa's		
	40' x 60' - Gadriatic		INR 33 Lakhs
	40' x 60' - Villa		INR 58 Lakhs
	50' x 80' - Villa		INR 73 Lakhs
	60' x 90' - Villa		INR 88 Lakhs
	80' x 100' - Villa		INR 93 Lakhs
	100' x 120' - Villa		INR 1.14 Crores
VIII	Cost of Land and Constructed Villas For Buyers		

Sl.No	Description	Land Cost (in INR)	Construction Cost (in INR)	Total Cost (in INR)
(a)	40' x 60' - Gadriatic	16 Lakhs	33Lakhs	49 Lakhs
(b)	40' x 60' - Villa	16 Lakhs	58Lakhs	74 Lakhs
(c)	50' x 80' - Villa	26 Lakhs	73Lakhs	99 Lakhs
(d)	60' x 90' - Villa	35 Lakhs	88Lakhs	1.23 Crores
(e)	80' x 100' - Villa	52 Lakhs	93Lakhs	1.45 Crores
(f)	100' x 120' - Villa	77 Crores	1.14Crores	1.91 Crores

IX	Total Project Cost		
			INR 44.45 Crores
	Infrastructure Cost		INR 93 Crores
	Total Cost of Villa Construction		INR 485 Crores
	Total Project Cost		INR 623 Crores
	[Rupees Six Hundred And Twenty Three Crores Only]		

THANK YOU