SUSTAINABLE LARGE DEVELOPMENT

INDIAN INSTITUTE OF TECHNOLOGY HYDERABAD

ARCOP ASSOCIATES PRIVATE LIMITED

2012 12 11

SUSTAINABILITY AND THE CITY – WHAT ARE WE TALKING ABOUT

KNOWN COMPONENTS OF AN URBAN FABRIC

THE BUILT (PRIVATE REALM – BUILDINGS)
THE UN-BUILT (PUBLIC REALM – STREETSCAPE, URBAN SPACES …)

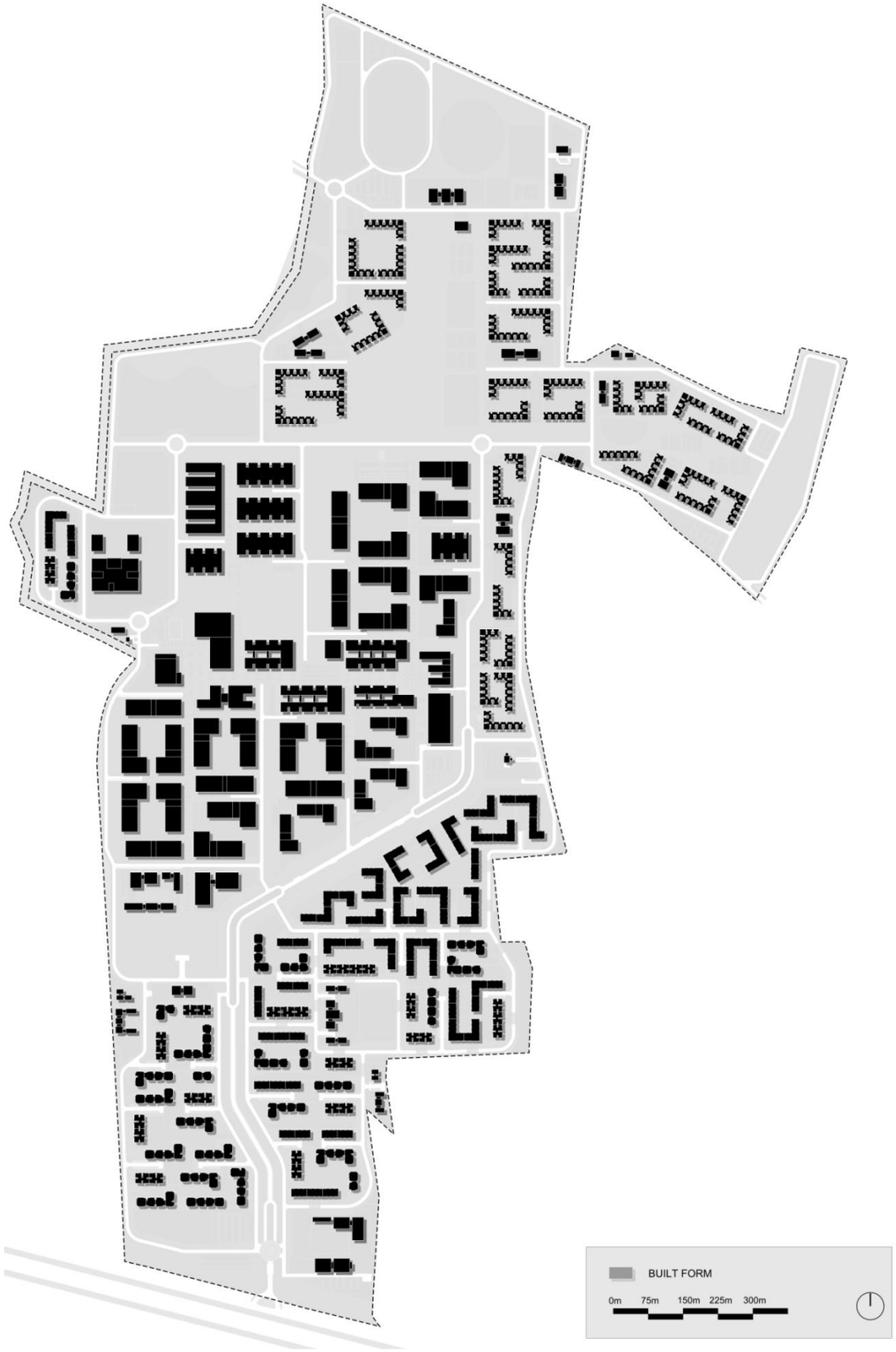
WHERE DOES THE ISSUE OF SUSTAINABILITY STAND

THE BUILT –
PART OF THE LARGER FRAMEWORK, BUT THE SOLE FOCUS

THE UN-BUILT – YET UNEXPLORED

THE PLATFORM \FRAMEWORK

A BASE ON WHICH BOTH OF THESE ARE PLACED – NEEDS TO BE ATTENDED TO



WHAT IS SUSTAINABLE ?

NOT JUST

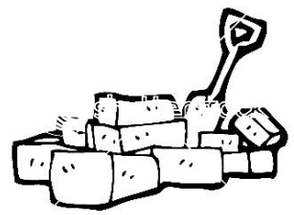
SUSTAINABLE RESOURCE MANAGEMENT
(ENERGY, TIME, WASTAGE, AIR, WATER)

BUT ALSO

SUSTAINABLE VALUE CREATION
(ECONOMIC, INTELLECTUAL)

SUSTAINABLE PLANNING
(CURRENT &FUTURE)

SUSTAINABLE QUALITY OF LIFE
(SOCIAL, TECHNOLOGY)



IIT HYDERABAD; INDIA

THE UNIQUE DESIGN CHALLENGE

A **600 Acre** Campus

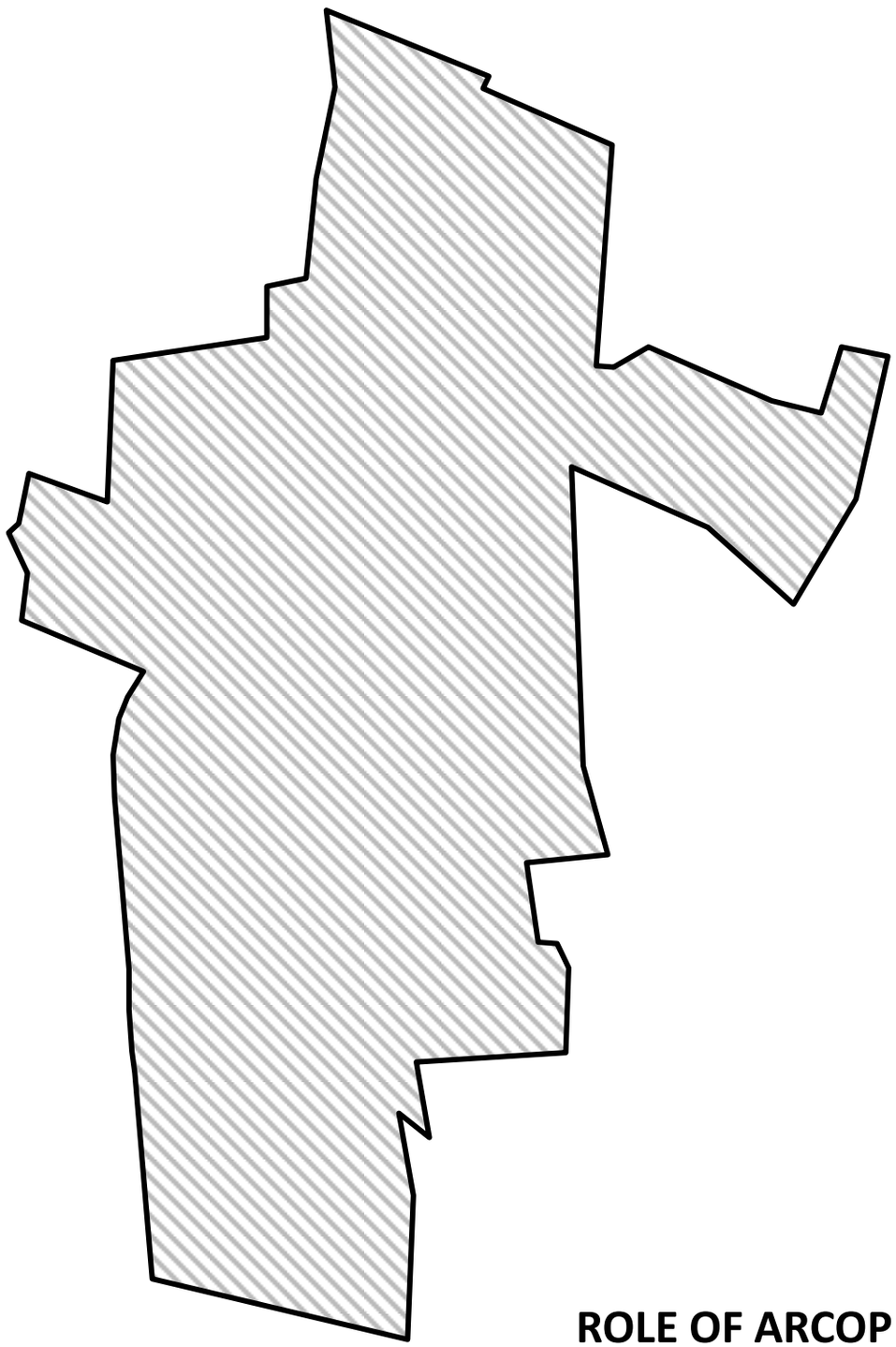
A Master Plan Designed For **100 Years**
To be built in phases

Total **Campus For 40,000 Residents**
Total **20,000 Students**

Campus planned & designed for

- Education And Research,
- Neighborhoods To Students,
- Neighborhoods To Families,
- Community Centers &Public Buildings,
- Recreation & Sports

……. Happy Sustainable Community Life.



ROLE OF ARCOP

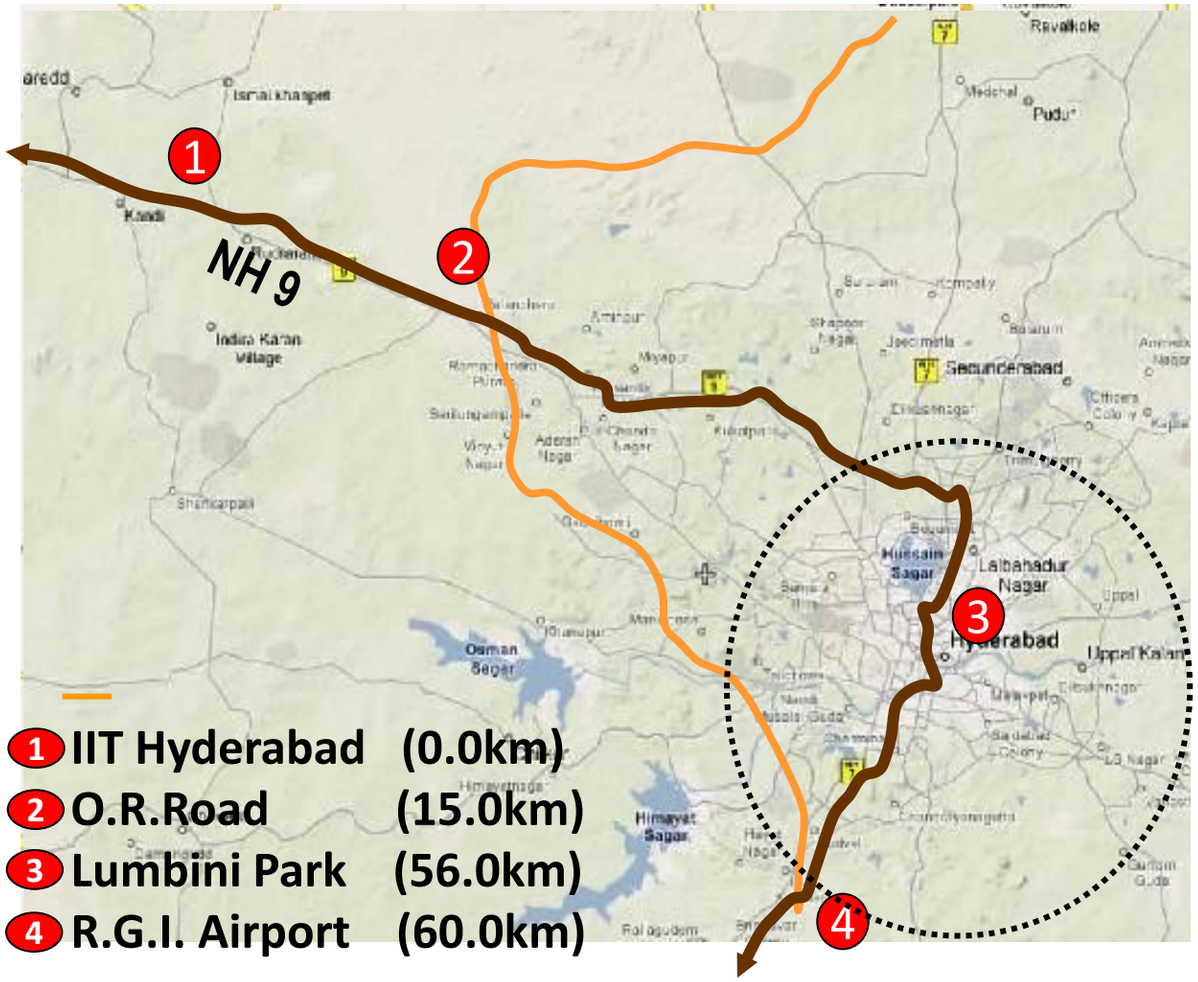
•MASTER PLANNER, URBAN DESIGNER
•LANDSCAPE DESIGNER AND ARCHITECTS FOR ACADEMIC BUILDINGS
•SUSTAINABLE DESIGN COORDINATION WITH OTHER ARCHITECTS

THE REGION – THE SITE

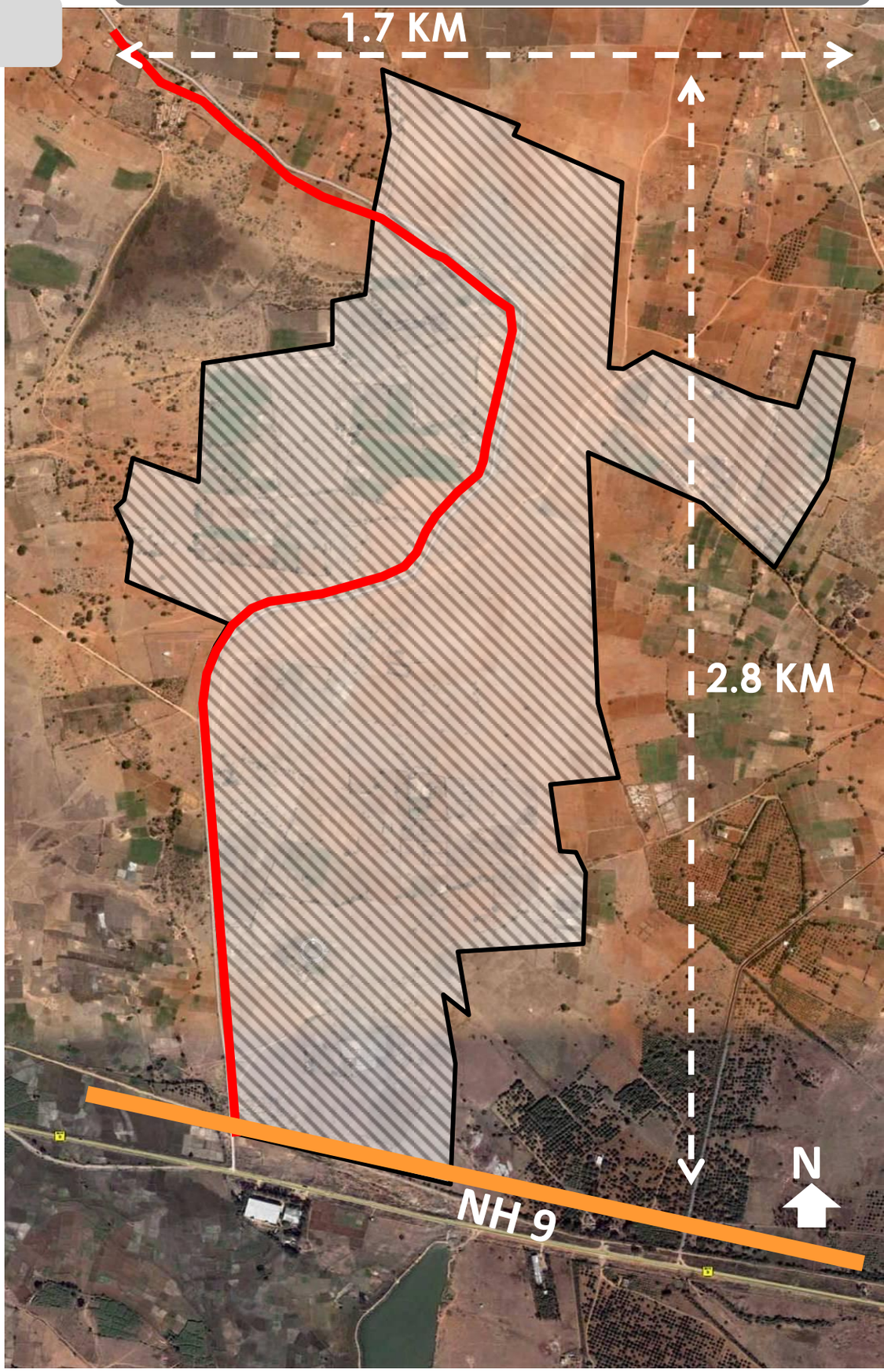
Locate near Kandi Village on National Highway 9

Being on N-H 9 towards Mumbai, Campus is easily accessible.

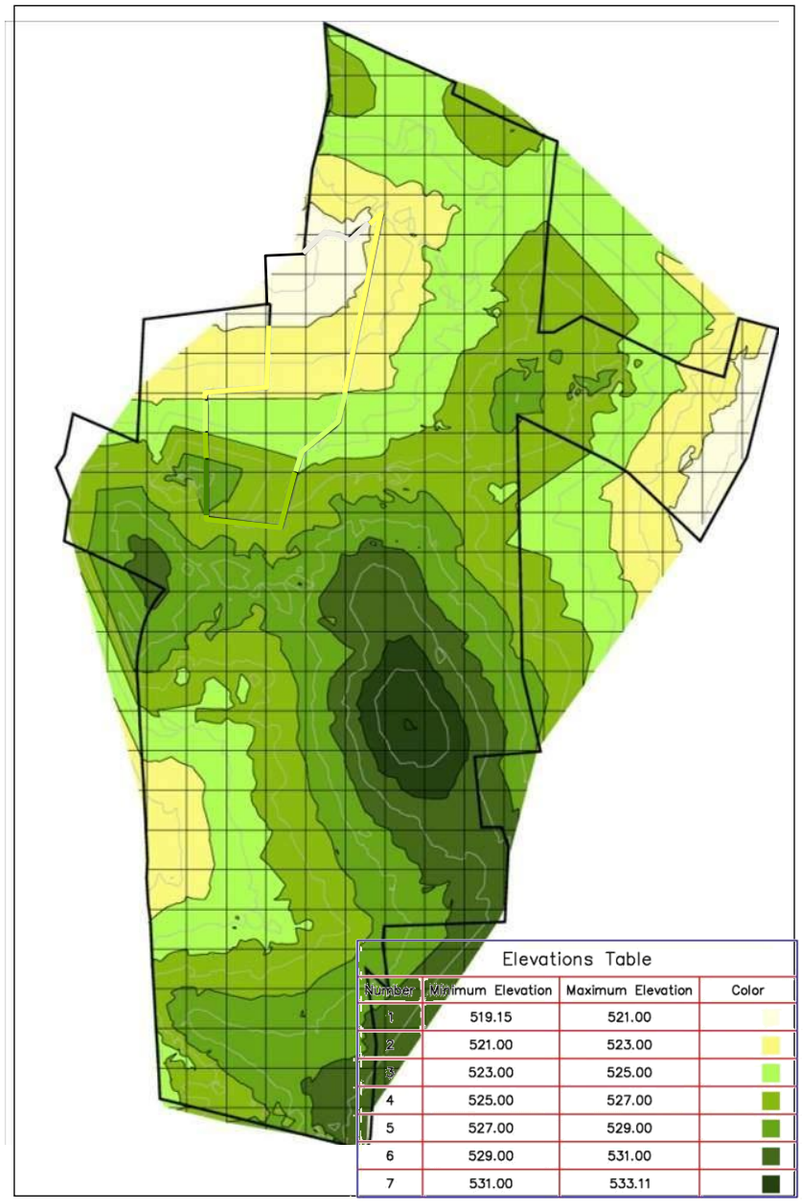
A micro study of the campus topography shows system of strong natural surface run off towards the regional level lakes within 3 Km of site.



1. IIT Hyderabad (0.0km)
2. O.R.Road (15.0km)
3. Lumbini Park (56.0km)
4. R.G.I. Airport (60.0km)



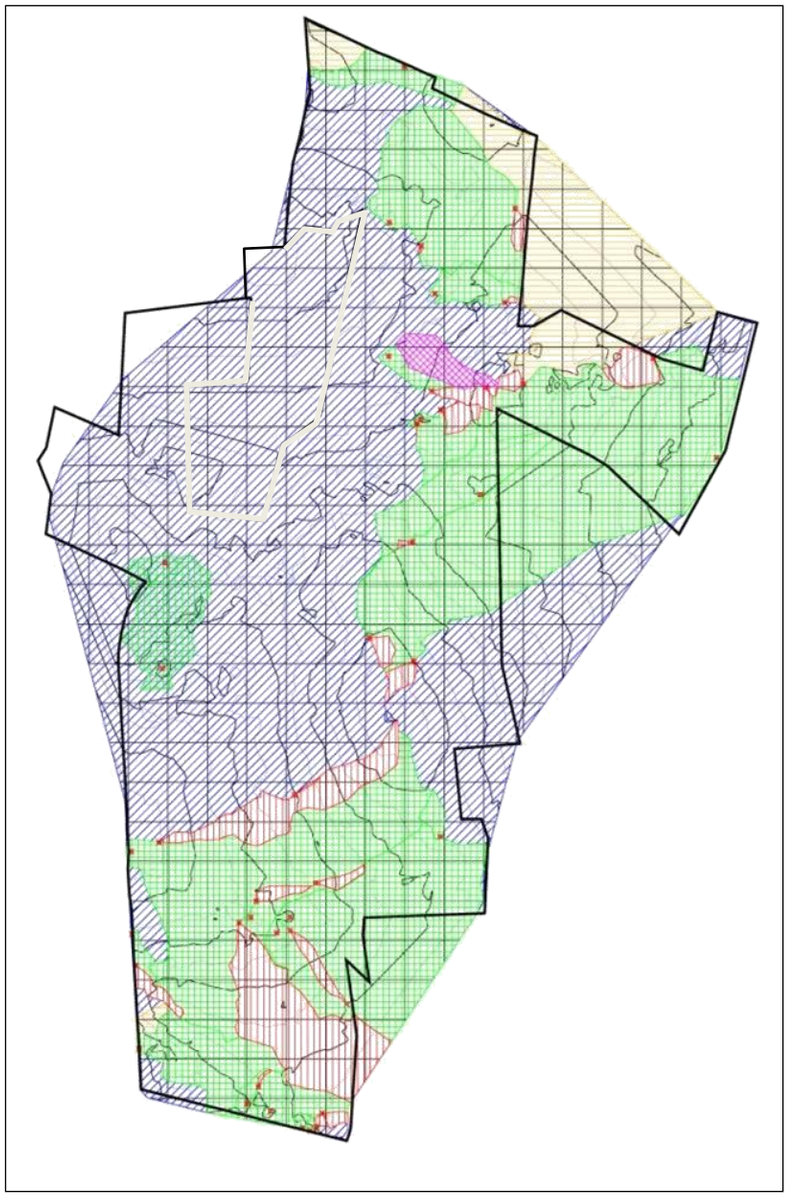
USING THE TOPOGRAPHY



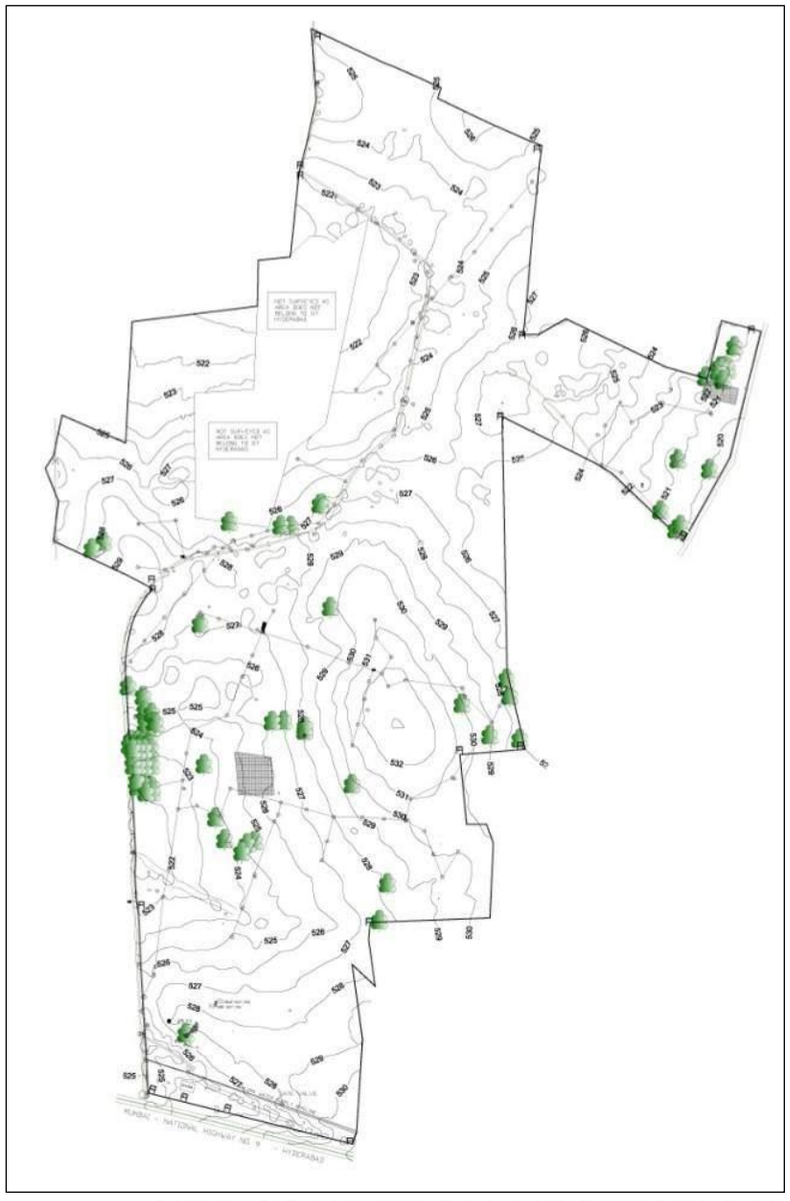
Elevations Table

Number	Minimum Elevation	Maximum Elevation	Color
1	519.15	521.00	
2	521.00	523.00	
3	523.00	525.00	
4	525.00	527.00	
5	527.00	529.00	
6	529.00	531.00	
7	531.00	533.11	

SITE CONDITION-ELEVATIONS



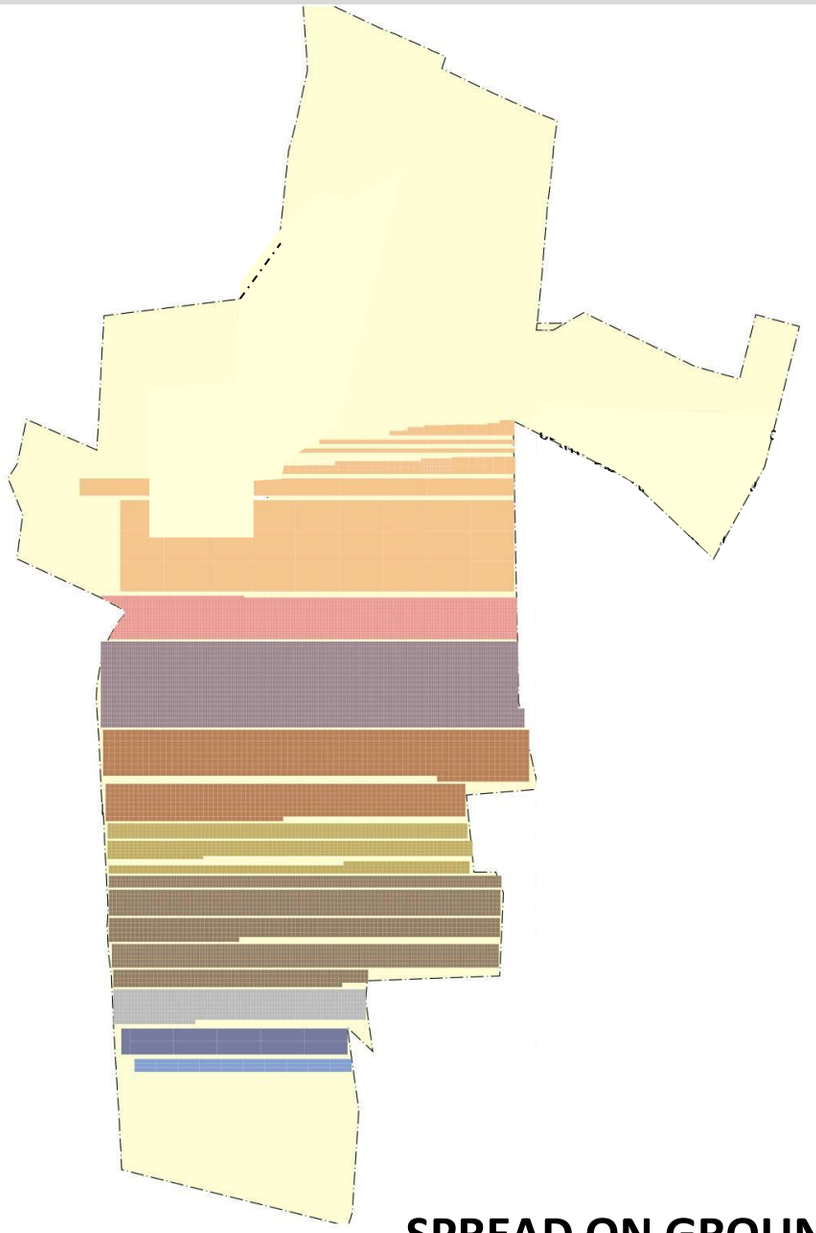
SITE CONDITION-WATERSHED



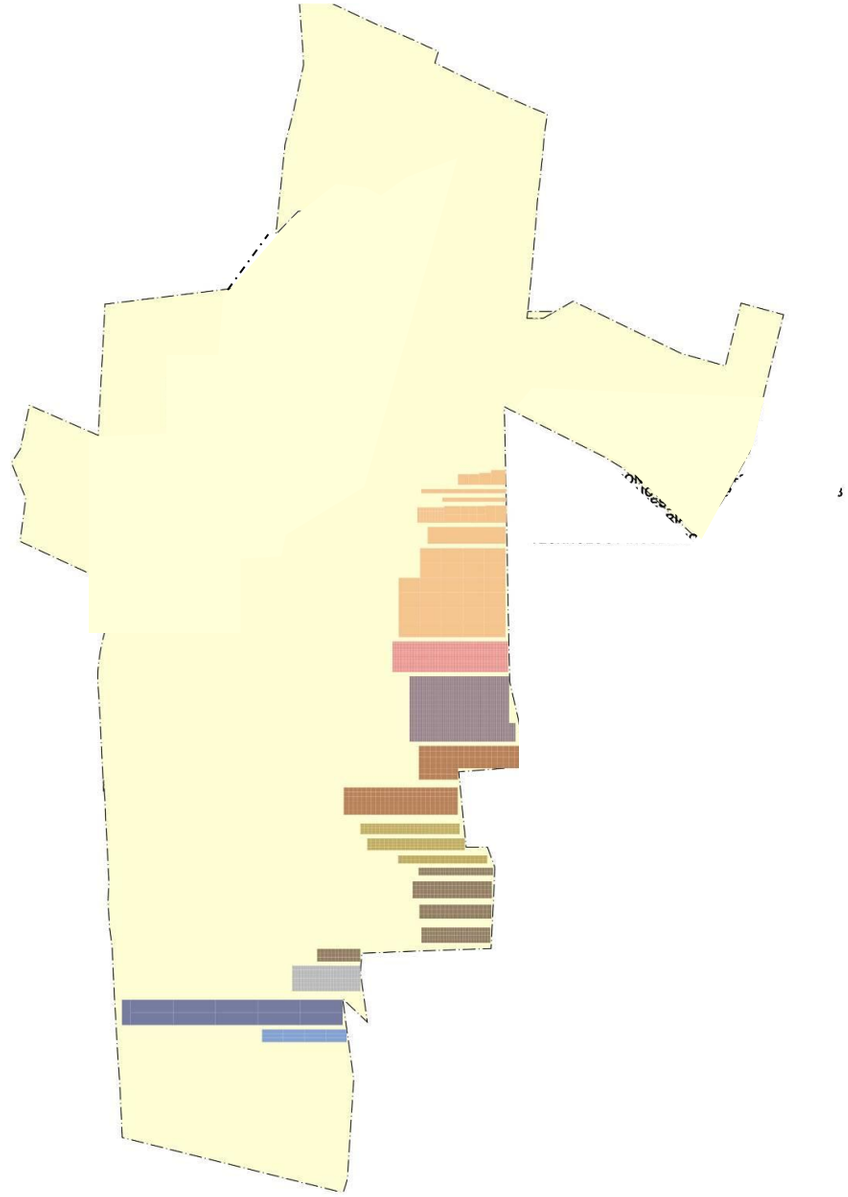
SITE CONDITION-VEGETATION

- MINIMAL SITE INTERVENTION
- CREATION OF LAKES IN THE DEPRESSION AREAS
- LOCATING A GREEN LUNG

EFFECTIVE LAND UTILIZATION



SPREAD ON GROUND

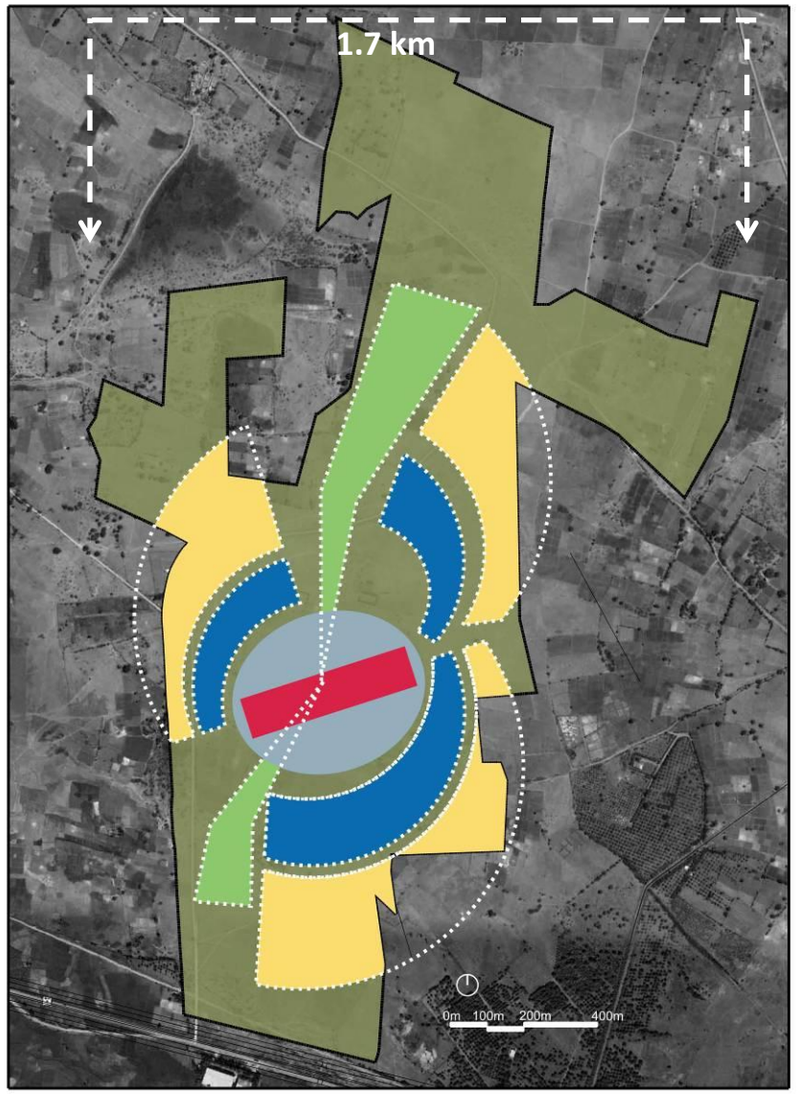


STACKING DIAGRAM

- PRINCIPLE OF MINIMUM FOOT PRINT (16% BUILDABLE FOOTPRINT)
- APPROPRIATE OPEN SPACE
- SENSIBLE DENSITY AND BUILT VOLUME

WHOLE TO A PART

ORGANIZATION STRUCTURE

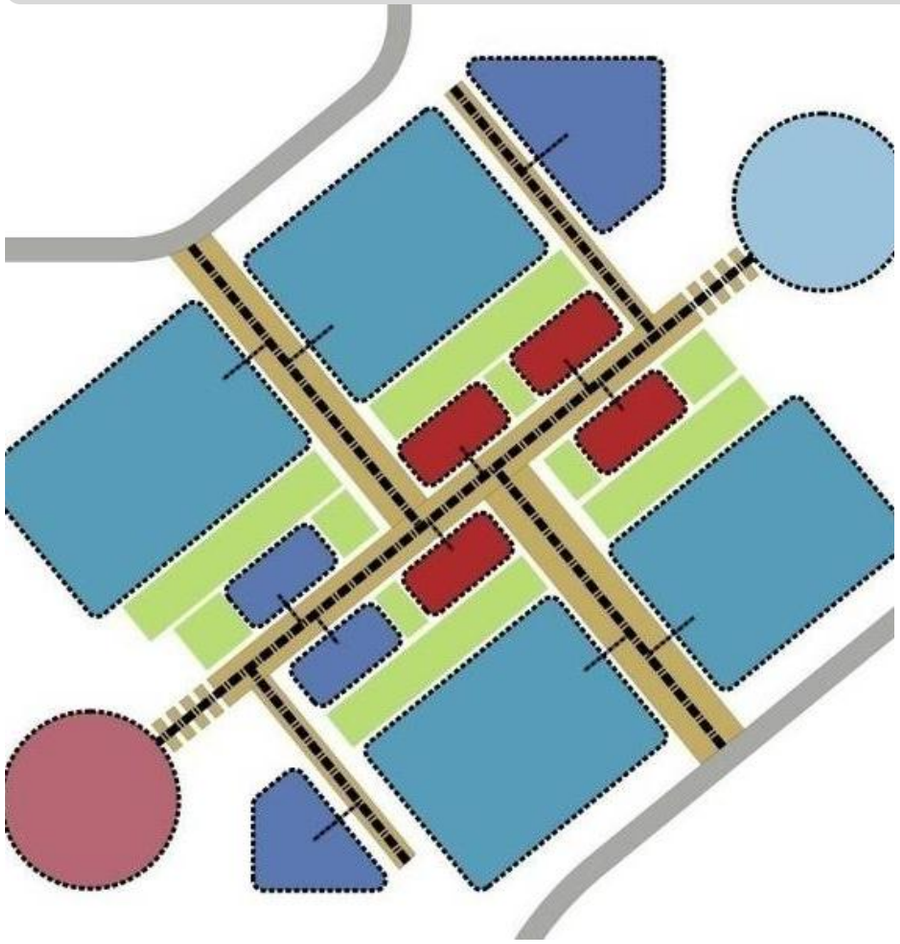


MIXED LAND USE STRUCTURE

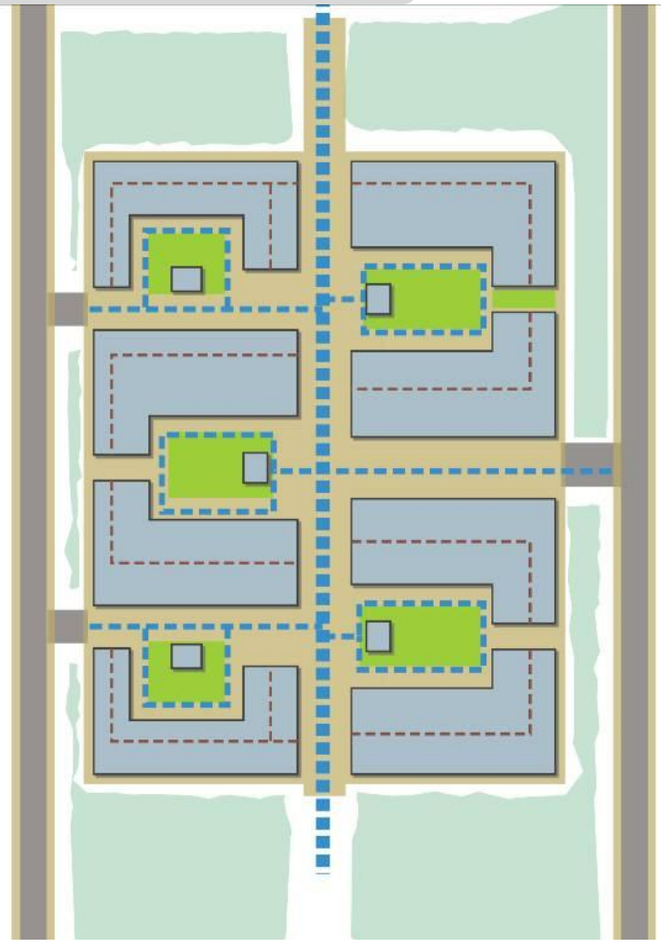
PHASING STRUCTURE

- GREEN SPINE AS THE ORGANIZATION STRUCTURE
- INTERACTIONS & PROXIMITIES
- SELF SUFFICIENT PHASES
- WALKABLE, CYCLABLE, LIVABLE CAMPUS

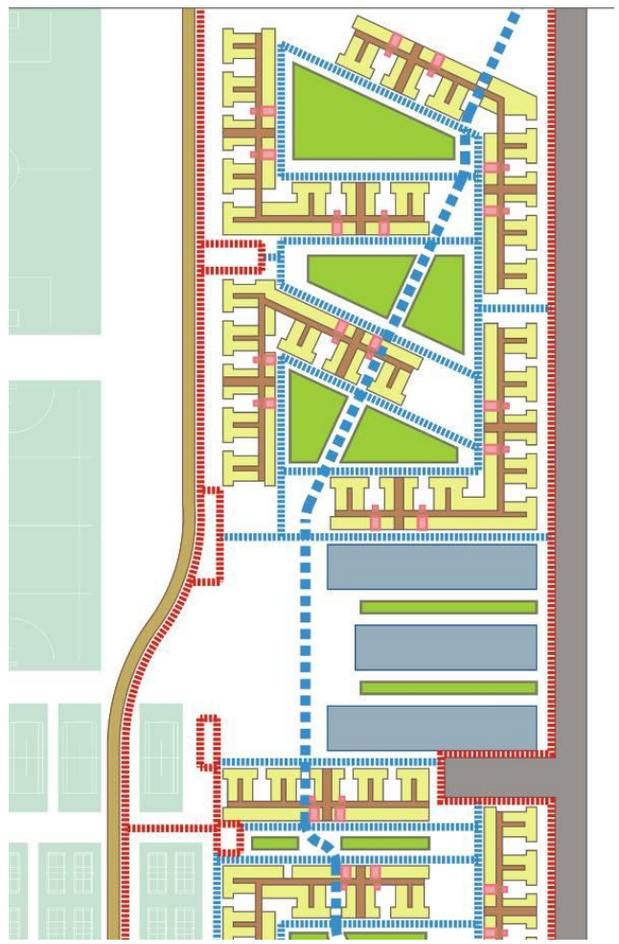
PART TO A WHOLE



TOWN CENTER & STUDENT COMMONS



ACADEMIC QUAD



HOSTEL QUAD

- QUAD, A QUADRANGLE: A SYSTEM OF INDIVIDUAL BLOCKS SPATIALLY DISPOSED IN FLEXIBLE COMBINATION AROUND A COURTYARD

- VARIOUS QUADS WOVEN ALONG A STRONG PEDESTRIAN SPINE

- DIFFERENT PEDESTRIAN SPINES CULMINATING INTO A TOWN CENTER

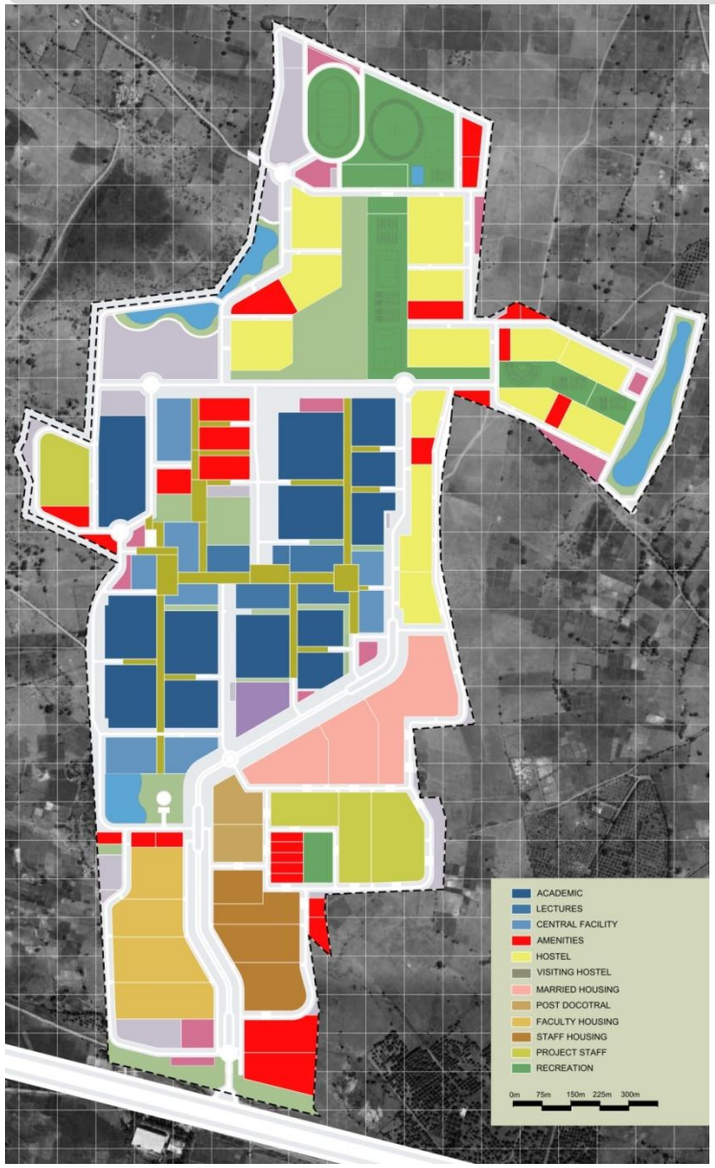
WALKABLE CAMPUS

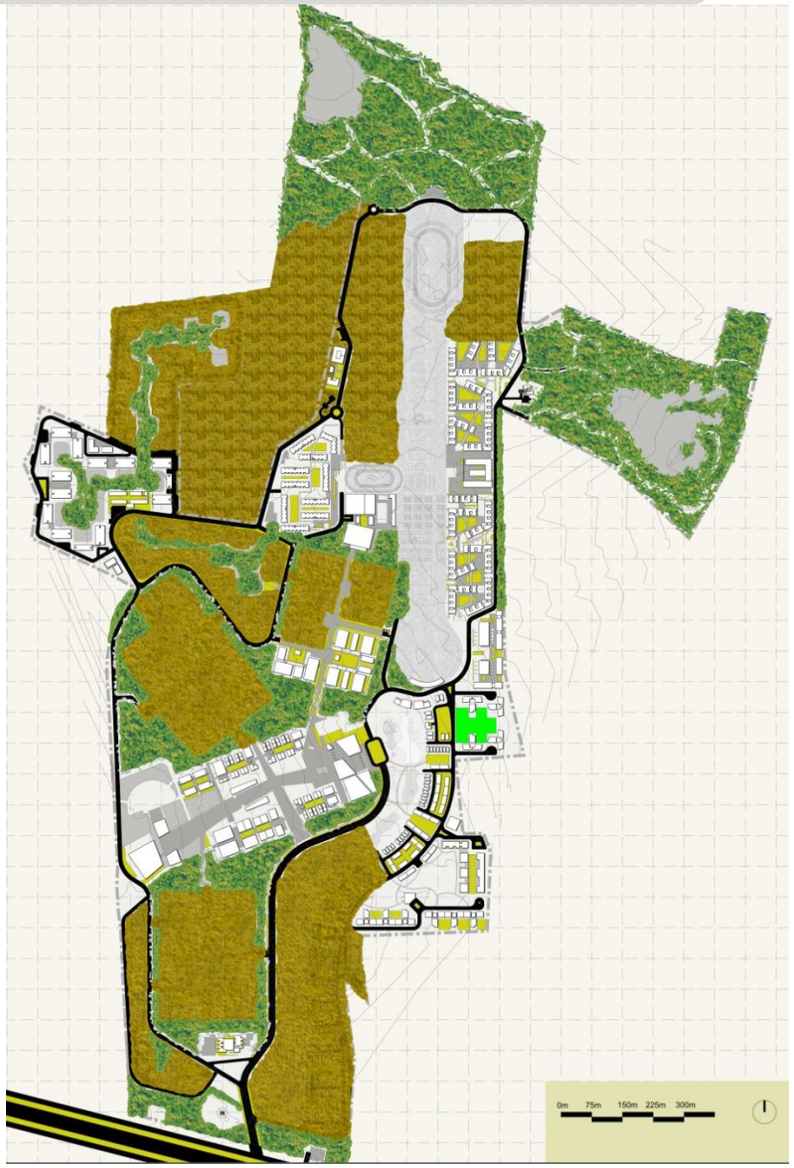
- **TIME DISTANCE ANALYSIS – A 10 MIN WALK APPROACH**

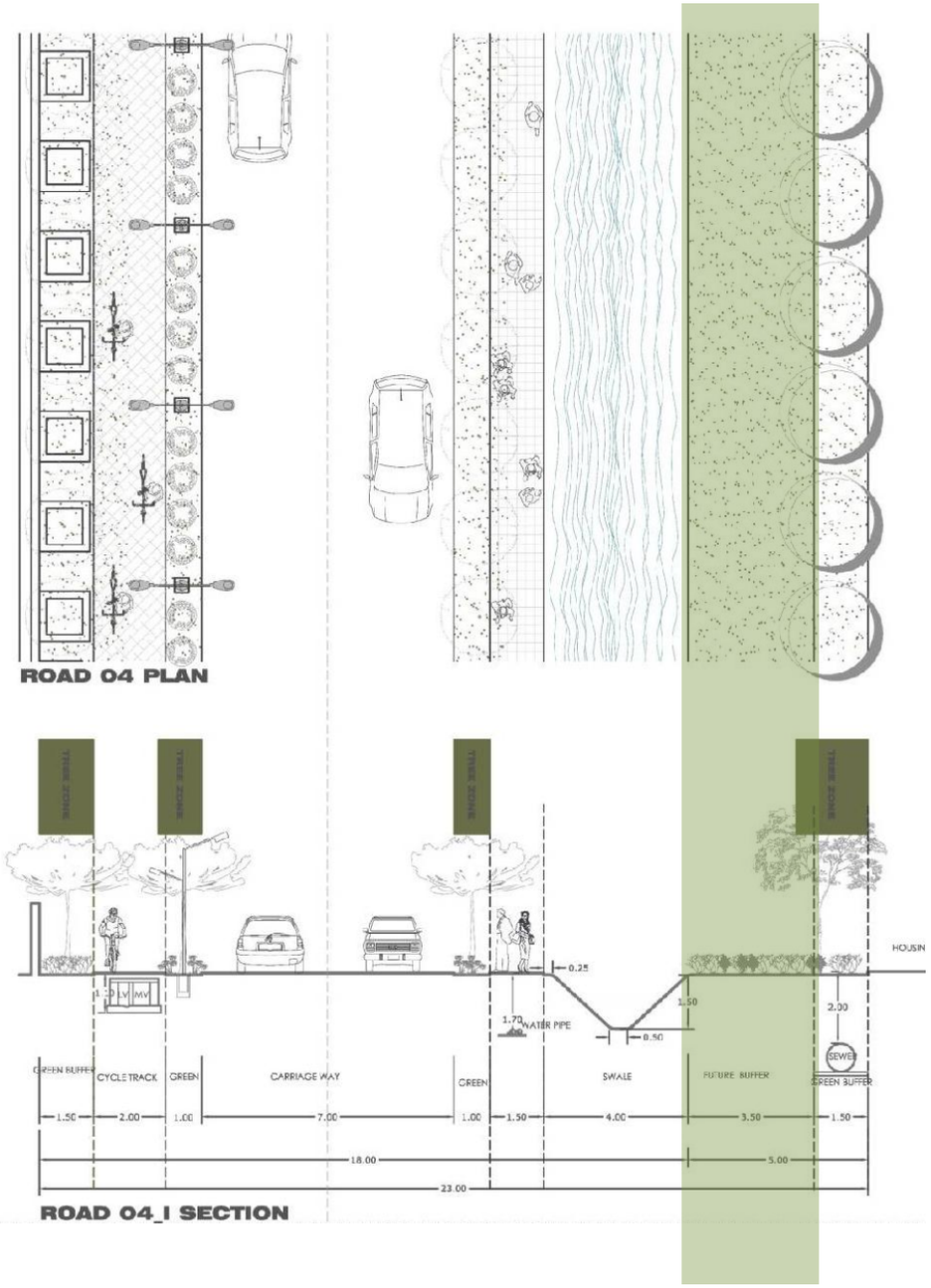
- **WORKING TOWARDS A STRONG PUBLIC TRANSPORT**

- **FOR INTRA CAMPUS MOVEMENT –PRIORITY TO PEDESTRIAN MOVEMENTS, CYCLE PATHS, BATTERY BUSES**

FUTURE FLEXIBILITY

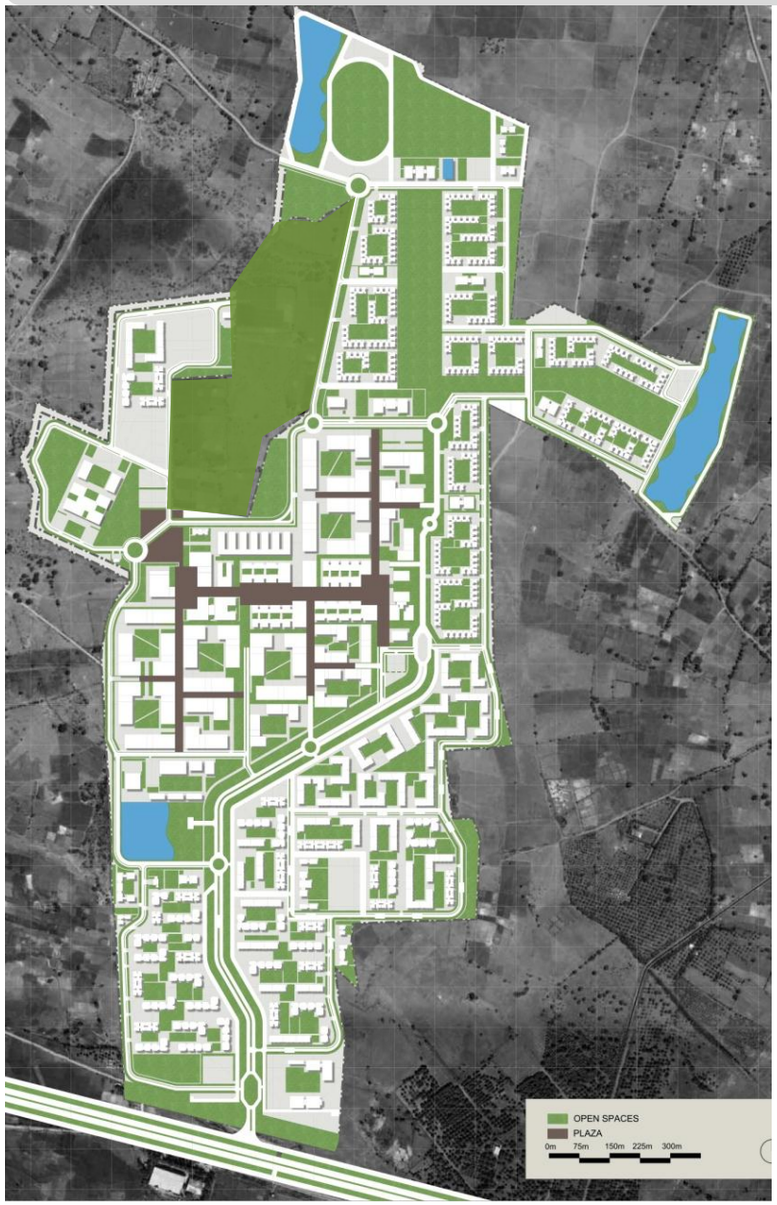






- MODULAR SYSTEM OF PLANNED GROWTH
- PROVIDING SHORT TERM PLANTATION FOR FUTURE PHASES
- PHASING OF INFRASTRUCTURE TO SUPPORT GROWTH & CHANGE

LANDSCAPE



POSITIVE CONTRIBUTION

Crafting an Edible Skin

Fig. 16, 17. Underutilized terrace transformed into a productive and attractive place

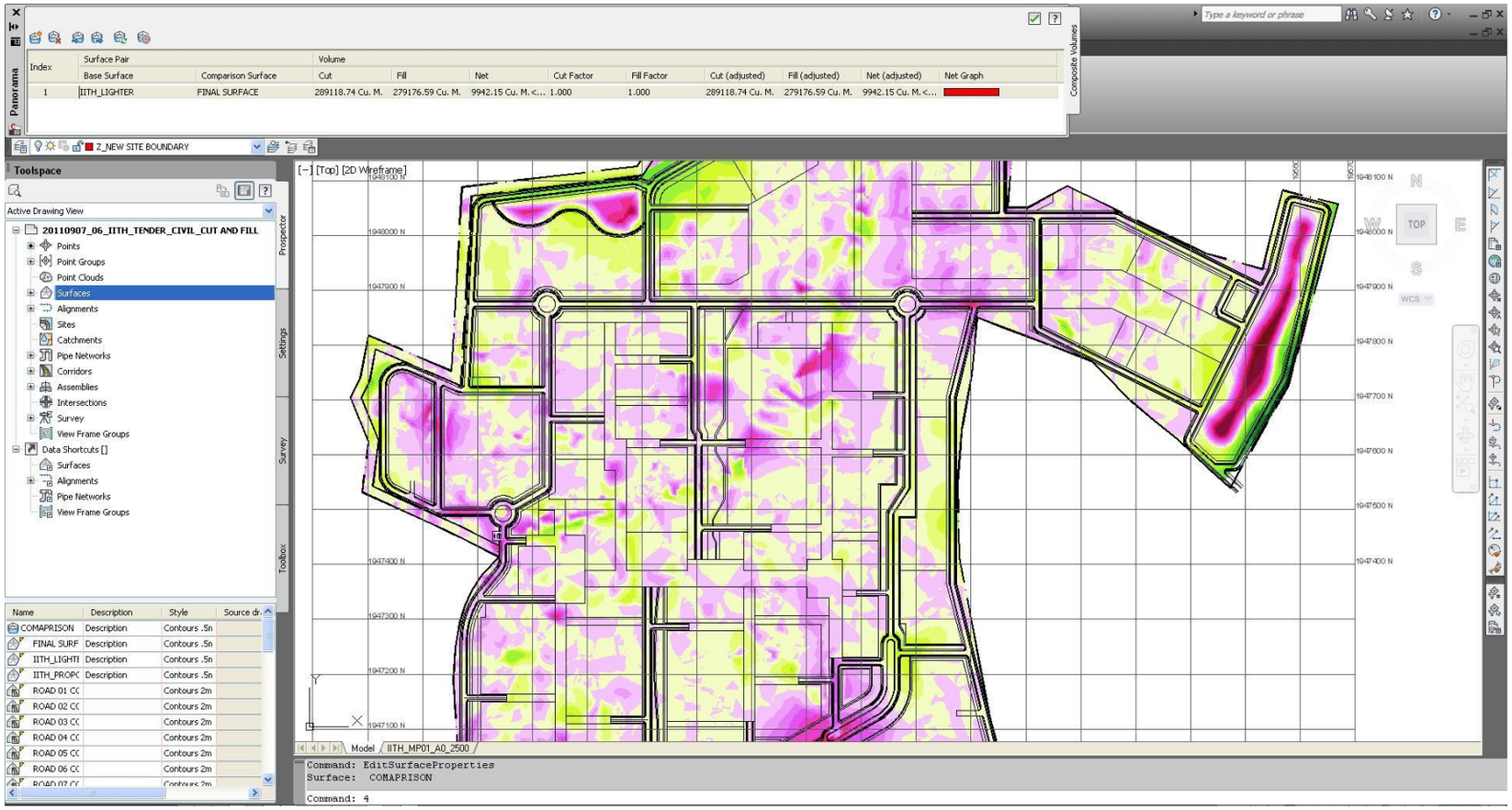
Fig. 18, 19. Bare, paved over concrete plaza being transformed through the use of design fragment

Fig. 20. Bush hammered concrete wall

Fig. 21. Vertical growing: bush beans over concrete wall

- **URBAN FOREST , STRIP PLANTATION – A GREEN LUNG – 14%**
- **VEGETATIVE COVER AND NATIVE TREES**
- **PRODUCTIVE LANDSCAPE ON PAVED SURFACES – 7%**

TECHNOLOGY UTILIZATION



- TECHNOLOGY TO ARRIVE UPON OPTIMUM DESIGN THOUGH MICRO STUDIES
- BIM – LEAN APPROACH TO DESIGN & CONSTRUCTION PROCESS
- C & D WASTE MANAGEMENT

MANAGEMENT AND MONITORING

- CAMPUS MONITORING HUB
- SERVICE TUNNELS FOR EASY ACCESS FOR MAINTENANCE

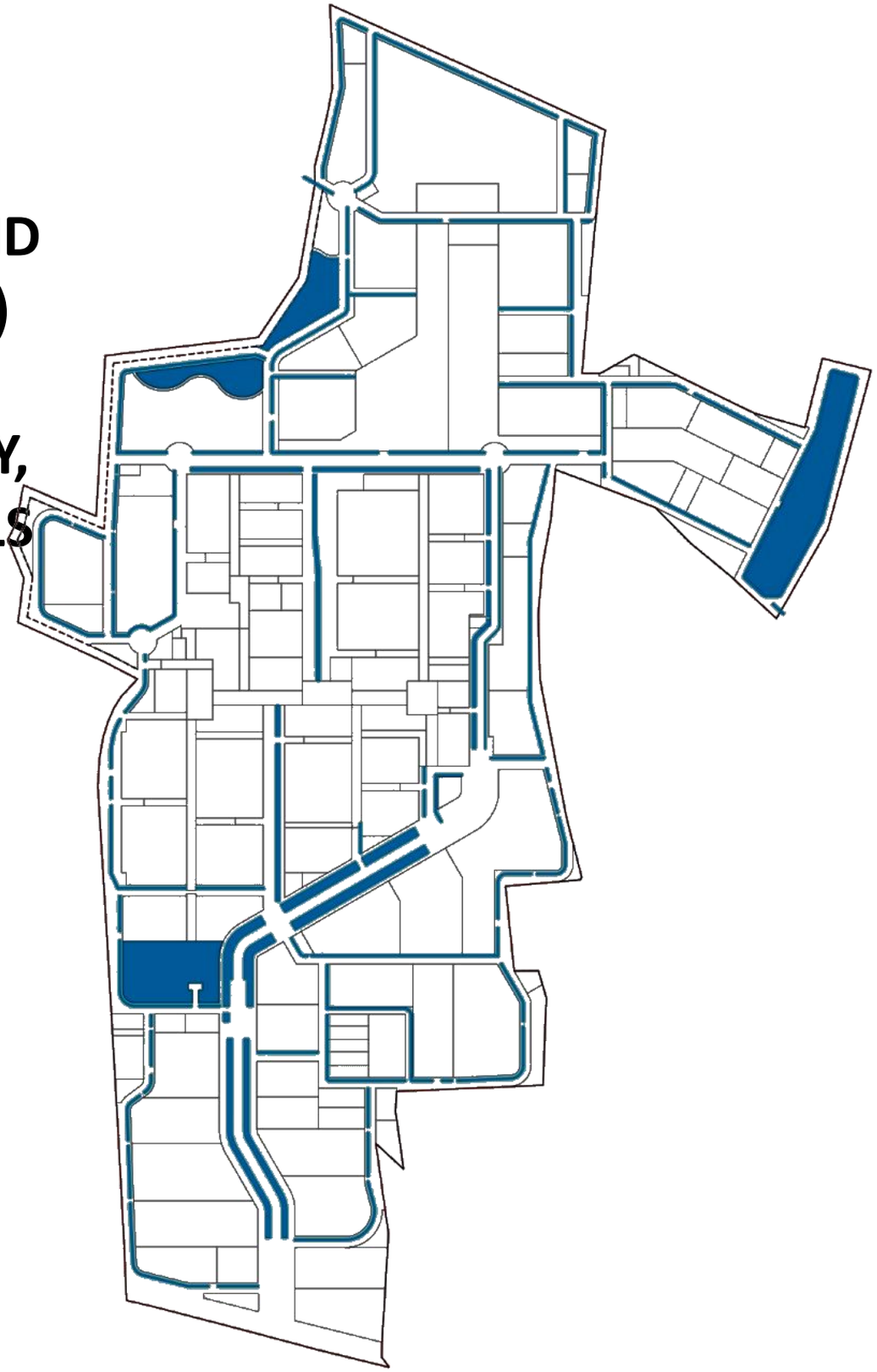
FRUGAL ENGINEERING – AIR, WATER, ENERGY

WATER SYSTEM – UTILIZE, STORAGE AND RECHARGE - SWALES (4%) AND LAKES (2.3%)

BATTERY LESS SOLAR FARM FOR 40% ENERGY, COMPLIMENTED BY ROOF TOPS SOLAR PANELS (4%)

DISTRICT COOLING – EFFICIENT BECAUSE OF DIVERSITY

ORGANIC WASTE TO BE RECYCLED TO GENERATE ENERGY - 3000 KG / DAY



ENERGY CENTERS

ELECTRICAL ENERGY

VENTILATION AND AIR-CONDITIONING

CENTRAL COMMAND AND CONTROL STATION

STRATEGIES

CENTRALIZED DG SETS

CENTRALIZED CHILLING PLANT (DISTRICT COOLING)

RADIANT COOLING

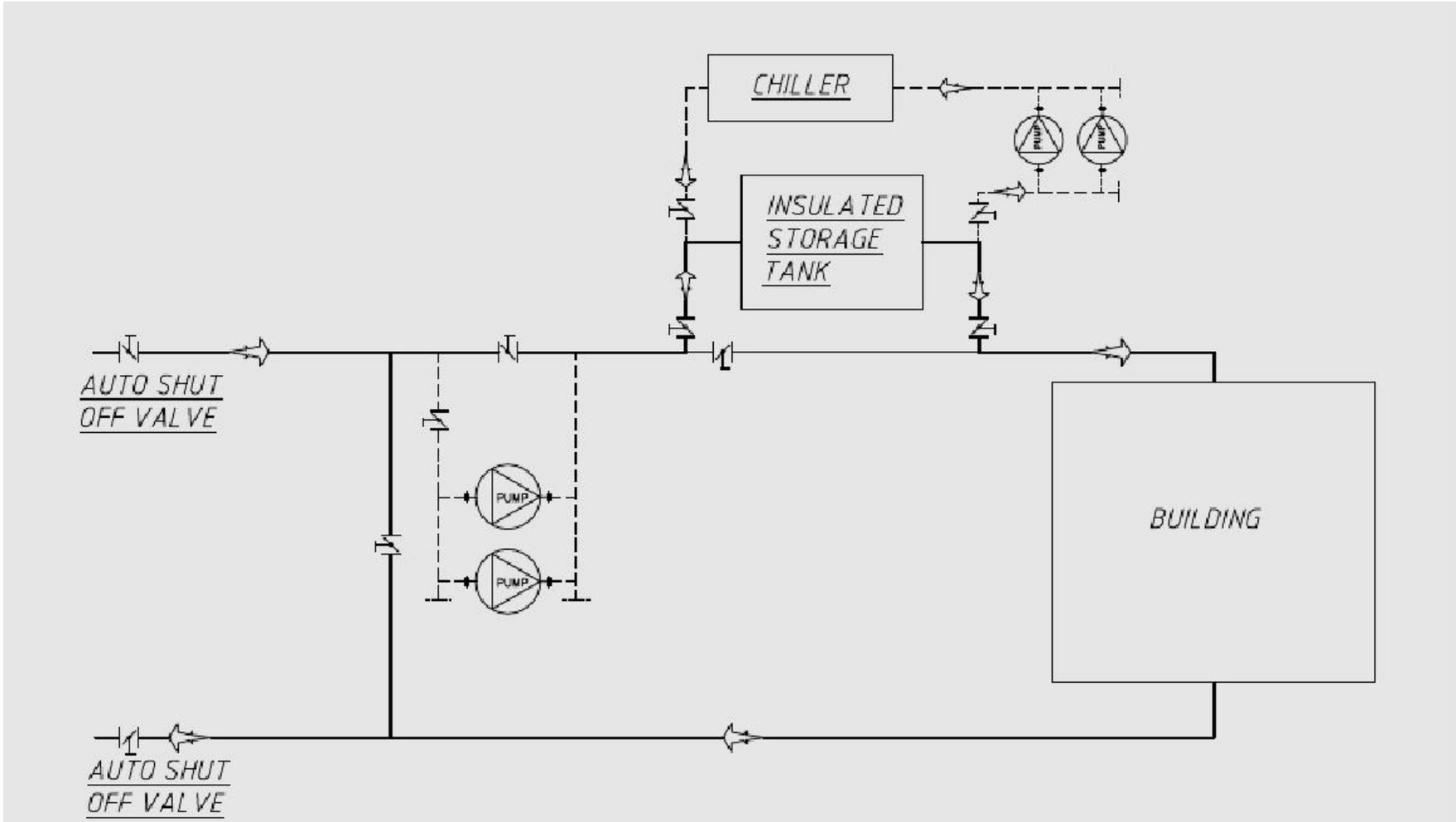
ZONING DISTRIBUTION

STRATEGIES *continued……*

THERMAL STORAGE (OFF PEAK LOADS)

OFC BACKBONE CONTROLS

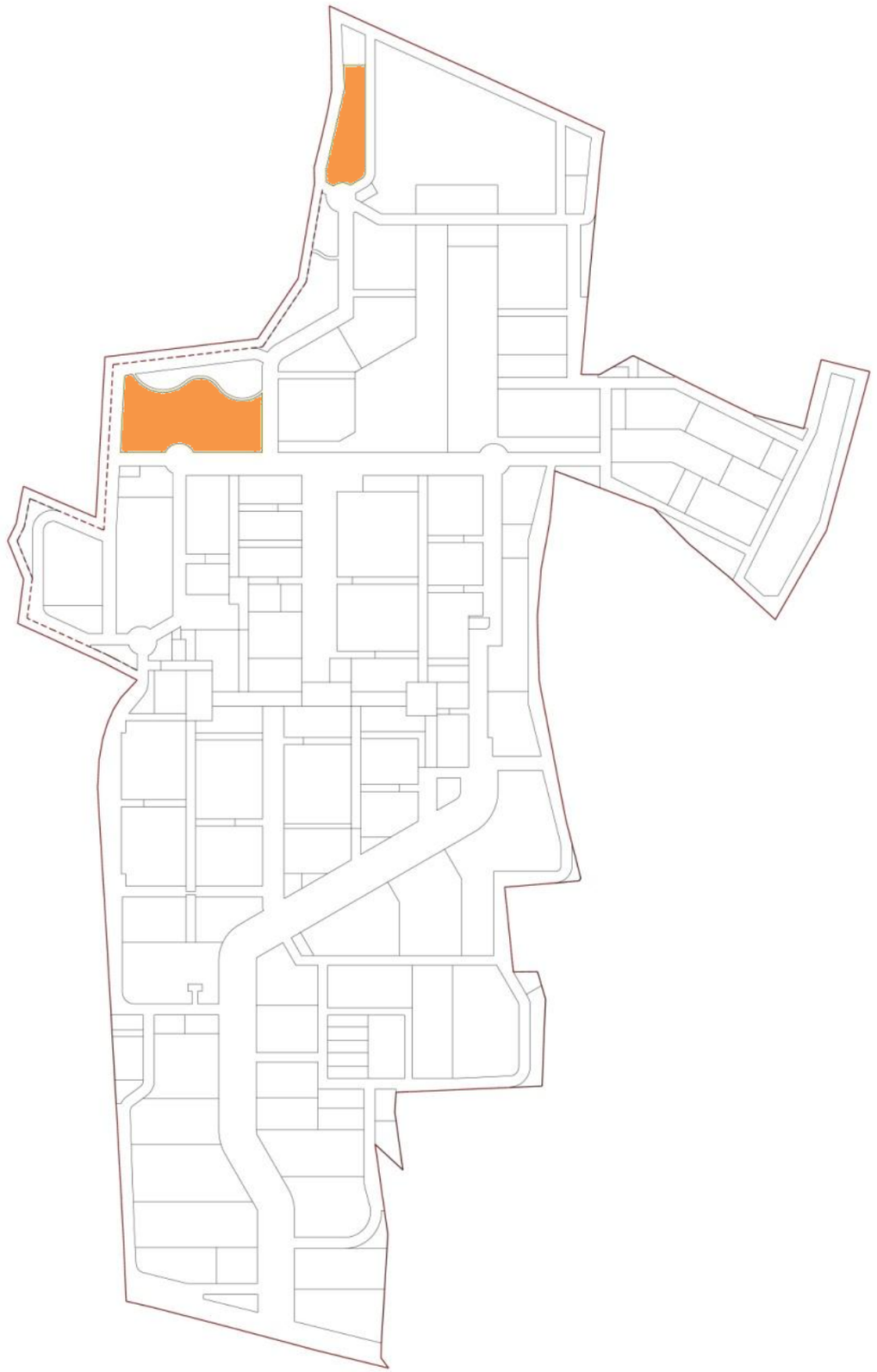
ENERGY RECOVERY



RENEWABLE ENERGY

GRID INTERACTIVE SOLAR FARM (40%)

SOLAR THERMAL



ENERGY PERFORMANCE

BASE CASE ELECTRICAL DEMAND	**35 MW**
DESIGNED ELECTRICAL DEMAND	**22 MW**

BASE CASE AIR CONDITIONING DEMAND	**18000 TR**
DESIGNED CASE AIR CONDITIONING DEMAND	**9200 TR**

ENERGY PERFORMANCE

BASE CASE EPI

ACADEMIC	170 kwh / sqm / yr
HOUSING	1 kwh / sqm / yr
HOSTELS	1 kwh / sqm / yr

TARGET EPI

ACADEMIC	100 kwh / sqm / yr
HOUSING	1 kwh / sqm / yr
HOSTELS	1 kwh / sqm / yr

WATER CONSERVATION

BASELINE

LPCD FIGURES		
	Academics	Residential
Domestic Water Demand	45	200
Total Demand	3038850	12857200
TOTAL (LPD)	**158,96,050**	

ADOPTED

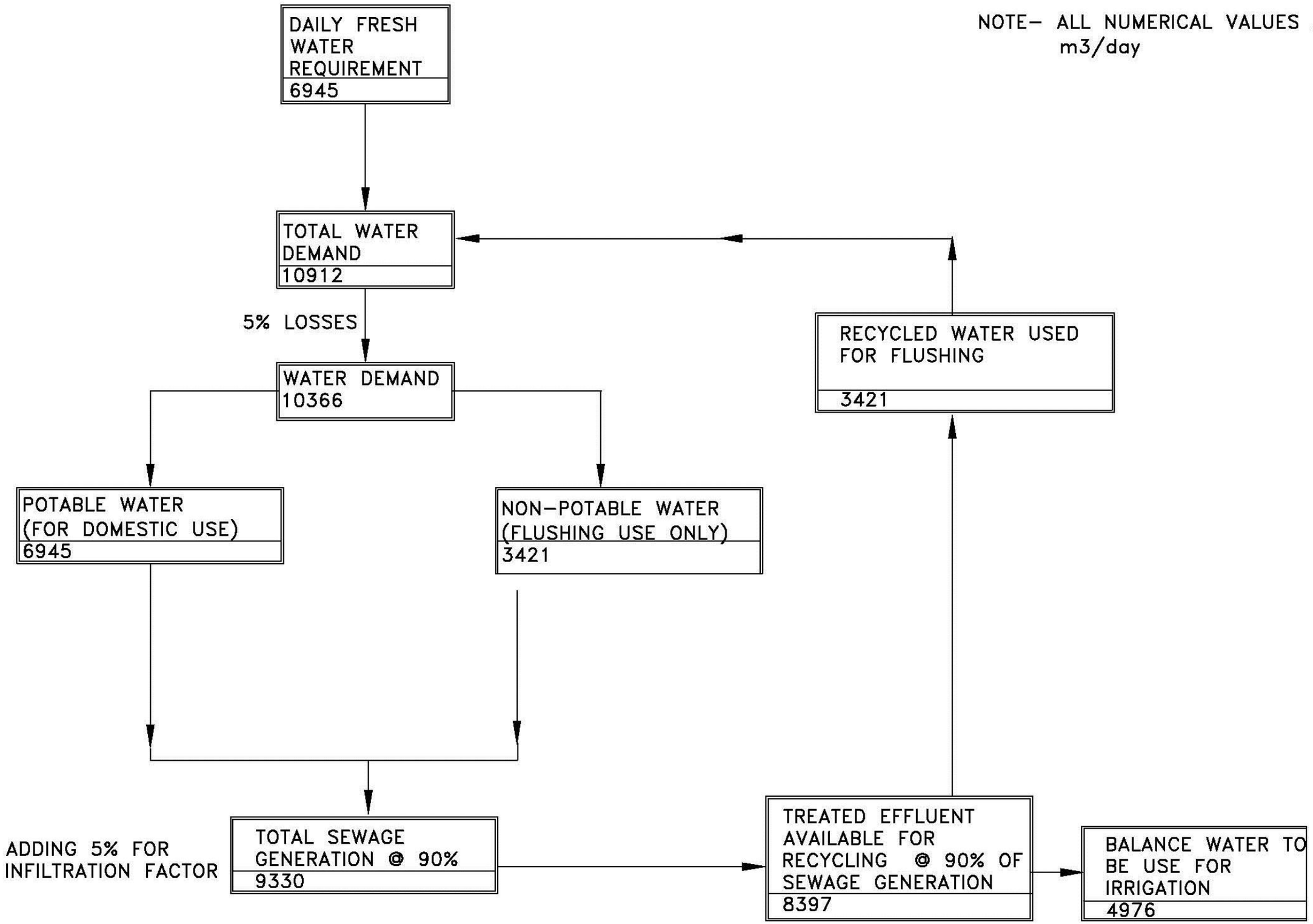
LPCD FIGURES		
	Academics	Residential
Domestic Water Demand	25	135
Total Demand	1688250	8678610
TOTAL (LPD)	**103,66,860**	

Total Savings = 55,29,190 LPD

ESTIMATED SAVINGS ARE BEING ACHIEVED BY THE FOLLOWING MEASURES:

- **Reduction on water consumption by using latest approved water conservative Low Flow Sanitary Fixtures & Fittings as per MOEF, TERI GRIHA, and Green Building guidelines.**
- **Water Metering shall be done to monitor and control the water use leading to reduced UFL Unaccounted For Losses.**

WATER BALANCING



WATER BALANCING

	Total (in LPD)
Total Domestic Water Demand	103,66,860
Total Sewerage Generated (Total Domestic Demand x 0.9)	9330174
Total Treated Effluent Water Available from STP for Recycling (90%)	8397157
Total Amount Re-used for Flushing Water Purposes	3421064
Balance Water Available for Discharge to external site irrigation	4976093
Net Daily Fresh Water Required per Day	69,45,796

•HIGHLIGHTS OF WATER MANAGEMENT PLAN :

•100% Recycling of Waste water for re-use in the campus leading to 30% Reduced Freshwater Demand

•Treated wastewater after tertiary treatment shall be directly re-used for flushing and horticulture/ landscaping within the Project Area

•Tube wells/Municipal Supplies required only for net daily domestic fresh water requirements.