GST BHAWAN GHAZIABAD

Site Area: 8959 sq.m

Latitude: 28 40' 36.63" N

Longitude: 77 27' 20.14"E

GST council is a governing body to regulate and direct each and every step for the implementation of goods and service tax in the nation.

Functions of GST Council:

CONTEXT

- Under definable threshold limit, services and goods will be exempted from GST building.
- Details of goods and services that are affiliated to GST, will be excluded from GST.



- From being the 'Gateway to UP' to having richest archeological history, Ghaziabad is amongst the most planned city of Uttar Pradesh.
- The city once ruled by Maratha kings, is now ruled by industries.
- Growth in industrial sector has set a benchmark in upgrading the economic graph of the city.

CLIMATE ANALYSIS

- Maximum temperature reaches 35 C which means summer months being around 32 C lowest temperature being 3 C with winter months having a mean of 8 C.
- Moderate amount of rainfall-generating a need to design proper water management on site to create a self sustained water consumption and storage system.
- Maximum Altitude Angle: 84.94 (Summer Solstice)
- Minimum Altitude Angle: 38.09 (Winter Solstice)
- · West followed by North is the prominent wind direction having high wind speed hence we receive a lot amount of natural wind.



PSYCHOMETRIC CHART





Above charts are for November-February which shows 20 percent human comfort, after adapting strategies (provide heating and high thermal mass in building human comfort increases to 100 percent.



Above charts are for March-June which shows 21 percent human comfort, after adapting strategies like radiant cooling and dehumidification, human comfort increases to 90 percent.

SWOT ANALYSIS

Strength

- Vacant , levelled land with existing boundary wall.
- Well road connectivity easy approach.
- Natural barrier is created from vehicular noise by existing trees on site. entry.

WEAKNESS

- Negligible vegetation on site.
- Unhealthy air quality.
- Presence of alluvial soil on site. (Weak soil type)
- No contextual shading on site. Fully exposed to sun.



• Site area is big enough to foster microclimate.



HREAT

• Fourth highest seismic zone making site vulnerable to earthquakes.





Nearest airport Safdarjung Airport (26.52 km SVV)



Nearest bus stand – Kamala Nehrunagar (2.6km)



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Nearest railway station (3.1km SE)



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FORM DEVELOPMENT



• Orienting the built mass along the north-south axis to increase the surface area and provide ample day–light.



• Connecting units are created to generate passive cooling through courtyards and promote cross ventilation.











• Concept of mutual shading and green terrace is developed by staggering the built units.



• Creating an array of punctures on West facade to reduce solar heat gain and implement self shading.











Second floor height: 3.5m Total height: 11.6m

> Registration code:



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ENERGY OPTIMIZATION

KINETIC PAVEMENTS

A special energy harvesting tiles, made from 95 percent recycled tyres. That flexes 5mm when stepped on converts 1 footstep to 3 joules of energy which would light up an LED Wayfinding sign of 30sec.

RADIANT COOLING



- . RAUTHERM S pipe 2. PRO-BALANCE manifold
- 3. Thermostat / humidity sensor
- 4. System controller
- 5. Surface sensor
- 6. Outdoor air sensor
- 7. Main control
- 8. Valve
- 9. Temperature sensor
- 10. Circulator pump 11. Mixing valve
- 12. Energy supply (e.g., geothermal heat
- pump)





Radiant cooling system consume considerably less energy when compared to conventional cooling system. Though climate is the main factor in energy saving but, radiant cooling system does manage to save 30 more than the conventional ones.

GREEN AREA





Building integrated Photovoltaic cells are used on the roof pergolas, control mechanism one axis control system using hydraulic system to achieve the disairable tile angle as regulated by sensors.

Also during night sensors control the tile angle for rain water harvesting.





WASTE WATER MANAGEMENET



- The use of low flow fixtures help in optimizing the building water demand.
- Low flow fixtures used
- W/C- Double flush (reduces water usage upto 66%)
- Faucet- Areated faucets (reduces water usage upto 38%)
- Screening created at the top of the building for accumulation and storage of rainwater for reuse on site rather than allowing it to runoff and convey them for filtration. Uses includes water for irrigation, gardens, office use with proper treatment, the harvested water can also be used for drinking If properly treated and for kitchen purposes. It can also be used for purposes such as groundwater recharge.
- The green roof helps to mitigate the urban heat island effect and helps to control Strom water runoff and retention improves and reduces energy consumption. Increases energy efficiency by 30%.

Drainage Ele rotection Lave Root Ba

fr.

MOISTURE NANO IRRIGATION



Substantial amount of moisture is released during sub surface irrigation system, which uses nano technology to reduce plant stress while constantly providing water and reducing its consumption by 75%.



ROOT ZONE TREATMENT SYSTEM

- It is an engineered method of purifying wastewater as it passes through artificially constructed wetland area.
- Root zone technology is a low cost method to treat wastewater.
- The Root zone treatment is a natural maintenance free system where the wastewater is purified by the roots of wetland plants.
- Roots of indeginious plants including canna, indica, helicornium and plantain act as filters in removing the organics in water while retaining salts.





BUILDING MATERIALS

GRASS-CRETE

- The surface water drainage system can be eliminated
- Infiltration of Strom water
- High load bearing capacity
- Increases green space
- Reduces heat land effect
- Uses recycled materials.



ASH-CRETE

- 40% of cement is replaced with flyash to produce ashcrete
- Recycled material
- Greater strength
- Reduces thermal cracking



FSC CERTIFIED TIMBER

The forest stewardship council (FSC) is an international non-profit multi stake holder organisation FSC certified wood come from sustainably managed forests its main aim, to lower the environmental impact maintenance of high conservation value forests - to maintain or enhance the attributes which defines such forest.



REFLECTIVE TILES

Reflective tiles are used on the top of roof to reflect heat radiation and to collect rainwater from roof top.

ACC BLOCKS

Acc Blocks reduces only surface wetting and no curing is needed before use, this reducing water consumption during construction.



Non VOC Paints

Low voc paints are water based solvent and not oil based paints with oil based solvent release volatile organic compounds (VOC's) which are harmful for our environment and carcinogenic. Therefore, Low VOC paints are environment friendly.

MATERIAL	EMBOIDING ENERGY (MJ/KG)	USAGE
Concrete (RCC)	0.298	WALL
AAC block	1759	WALL
Concrete Flooring	0.298	FLOOR
Terracota	18	FAÇADE
Double glazed window		,
with UPVC window	28.5	WALL
Grass crete	0.298	LANDSCAPE
Pond Tiles	18.9	POND
Steel Bars	56	COLUMN
Radiant system	19	ROOF
,		



The entrance is shaded by alternate poly-carbonate panels which gives diffused daylight in the area. These are also used to collect rainwater and is connected to PVC pipes.





CONSTRUCTION AND DEMOLITION MATERIALS

- Reuse of stones timber piping railings on site.
- Rubble, broken concrete pieces are used for building activities such as levelling and under coat of lanes.
- Fine materials such as sand and dust are used as covering materials.
- Larger unused are used for filling up low layering areas.
- Reused materials like plastic, glass and concrete are used for flooring.

DOUBLE GLAZED GLASS

Low E-coating on interior surface reflects room heat back to the interior U factor = 0.20

Solar heat gain constant = 0.26Visible light transmittance = 0.63

Often referred to as spectrally selective low-E glass due to their ability to reduce Solar heat gain while retaining high visible transmittance.

Low-solar-gain low-E glass is typically made with sputtered low-E coatings consisting of two layers of silver.

LIGHT SHELF



A light shelf is a passive architectural device used to reflect natural daylight into a building into a building. bouncing sunlight off a horizontal surface distribute it more evenly and deeply within a space, whereas direct sunlight can cause glare near an opening, whilst leaving dark areas further in.

PERFORATED SCREEN





Jalis are used to prevent glare and heat gain while ensuring adequate day lighting and views. It acts as a perforated screen which is used for bringing natural light and also ventilation.

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ENERGY USE

ELECTRICITY USE



END USE



Site and Source Energy

	Total Energy [GJ]	Energy Per Total Building Area [MJ/m2]	Energy Per Conditioned Building Area [MJ/m2]
Total Site Energy	5253.79	1709.14	1717.14
Net Site Energy	5253.79	1709.14	1717.14
Total Source Energy	8930.23	2905.15	2918.74
Net Source Energy	8930.23	2905.15	2918.74

Utility Use Per Conditioned Floor Area

	Electricity Intensity [MJ/m2]	Natural Gas Intensity [MJ/m2]	Additional Fuel Intensity [MJ/m2]	District Cooling Intensity [MJ/m2]	District Heating Intensity [MJ/m2]	Water Intensity [m3/m2]
Lighting	205.83	0.00	0.00	0.00	0.00	0.00
HVAC	0.00	0.00	0.00	1202.09	41.63	0.00
Other	267.58	0.00	0.00	0.00	0.00	0.00
Total	473.42	0.00	0.00	1202.09	41.63	0.00

Utility Use Per Total Floor Area

	Electricity Intensity [MJ/m2]	Natural Gas Intensity [MJ/m2]	Additional Fuel Intensity [MJ/m2]	District Cooling Intensity [MJ/m2]	District Heating Intensity [MJ/m2]	Water Intensity [m3/m2]
Lighting	204.88	0.00	0.00	0.00	0.00	0.00
HVAC	0.00	0.00	0.00	1196.50	41.43	0.00
Other	266.34	0.00	0.00	0.00	0.00	0.00
Total	471.22	0.00	0.00	1196.50	41.43	0.00

Window-Wall Ratio

	Total	North (315 to 45 deg)	East (45 to 135 deg)	South (135 to 225 deg)	West (225 to 315 deg)
Gross Wall Area [m2]	3748.42	1009.65	786.47	1129.37	822.94
Above Ground Wall Area [m2]	3748.42	1009.65	786.47	1129.37	822.94
Window Opening Area [m2]	629.86	163.96	133.32	217.99	114.59
Gross Window-Wall Ratio [%]	16.80	16.24	16.95	19.30	13.92
Above Ground Window-Wall Ratio [%]	16.80	16.24	16.95	19.30	13.92

Conditioned Window-Wall Ratio

	Total	North (315 to 45 deg)	East (45 to 135 deg)	South (135 to 225 deg)	West (225 to 315 deg)
Gross Wall Area [m2]	3748.42	1009.65	786.47	1129.37	822.94
Above Ground Wall Area [m2]	3748.42	1009.65	786.47	1129.37	822.94
Window Opening Area [m2]	629.86	163. <mark>9</mark> 6	133.32	217.99	114. <mark>5</mark> 9
Gross Window-Wall Ratio [%]	16.80	16.24	16.95	19.30	13.92
Above Ground Window-Wall Ratio [%]	16.80	16.24	16.95	19.30	13.92

Skylight-Roof Ratio

Total	
1442.47	Gross Roof Area [m2]
0.00	Skylight Area [m2]
0.00	Skylight-Roof Ratio [%]

DAYLIGHT ANALYSIS

Second Floor First Floor Ground Floor (LUX) 1076 — 972 — 864 — 756 — 648 — 540 — 432 — 324 — 108 —

SOLAR GAIN ANALYSIS



CALCULATION AND QUANTITIES

ENVIRONMENT BUDGET (Operation Stage)		MATERIAL	COST	PIECE	TOTAL COST	RETURN	
COMPONENT	CAPITAL COST	RECURRING COST					
	RS	PER ANNUM	FOUNDATION	12000	58.32	699840	
			Concrete(RCC)	3000	2900	8700000	5%
SEWAGE TREATMENT PLANT	2000000	720000	AAC BLOCK	110	24650	2711500	2%
			CONCRETE FLOORING	24	6045	145080	10%
RAIN WATER HARVESTING SYSTEM	25000	2500		7			
SOLID WASTE STORAGE BINS & COMPOSTER	250000	84000	TERRACOTTA	2200	390.2	858440	1%
	1500000	2800000	DOUBLE GLAZED WINDOW	750	152	114000	
HORTICOLTORE DEVELOPMENT	1500000	380000	WITH UPVC FRAME	750	152	114000	50%
SPV PLANT	3024000	240000	STONE PLINTH	600	1080	648000	50%
			CONCRETE PLINTH	2500	360	900000	50%
ENVIRONMENT MONITORING & 6 MONTHLY		150000	GRASS CRETE	600	<u>1730</u>	1038000	5%
CLEARANCE CONDITION		130000	ROOF REFLECTIVE TILE	55	2015	110825	10%
			PINEWOOD	800	6428	5142400	10%
			RAILING	350	42.6	14910	50%
TOTAL	6799000	4996500	PAINT	30	40078	1202340	60%
			POND TILES	65	484	31460	-
ENVIRONMENT BUDGET	(Construction Sta	age)	STONE SILL	50	152	7600	10%
COMPONENT			LIGHT FIXTURE	1500	442	663000	25%
COMPONENT	(RS in Lacs)	RECURKING COST	WC	12000	55	660000	15%
	(10 11 2005)		BASIN	1800	35	63000	15%
			HAND SHOWER	900	55	49500	15%
BARRICADING OF CONSTRUCTION SITE	10	1.5	STEEL FRAMING	4500		540000	15%
ANTI SMOKE GUN (COMPLETE SYSTEM)	5	2	STEEL BARS	40000		2600000	60%
			RADIANT SYSTEM			1500000	60%
DISPLAY OF DUST MITIGATION MEASURES	1	0.2	FLY ASH	450	1	450	5%
SITE SANITATION (mobile toilets , etc)	3	1	ELEVATOR	650000	2	1300000	1%
			URINALS	2500	35	87500	20%
MOBILE STP	3	1.5	WATER TANK	45000	4	180000	15%
DISINFECTION/PEST CONTROL	2	1	ASHCRETE		2500	4000	30%
	_	_	CHAIR	6000	217	1302000	15%
LABOR WELFARE	3	2	TABLE	14000	132	1848000	35%
	2	1	BED	40000	4	160000	50%
WHEEL WASHING	5	1	SOFA	50000	12	600000	40%
WASTE STORAGE BINS	0.5	0.25	TEA TABLE	8000	12	96000	25%
	1.5	0.15	SOLAR PANEL	7560	400	3024000	35%
TRAFFIC MANAGEMENT SIGNAGES	1.5	0.15	WIND TURBINE	150000	10	1500000	80%
SAFETY TRAINING TO WORKERS		2	RAINWATER HARVESTING			25000	50%
			TREES	5000	300	1500000	10%
ENVIRONMENT MONITORING		2	PLANTS	1000	70	70000	
LABOUR HEALTH CHECK UP & FIRST AID			SEPTIC TANK			0	
FACILITY	2	1.8	IRRIGATION SYSTEM			60000	
						40156845	
TOTAL	34	16.4					

Employees fresh: 33kld Employees flushing: 21kld Visitors fresh: 0.5kld Visitors flushing: 1.5kld Guest room fresh: 0.8kld Guest room flushing: 0.45kld Gardening: 3kld Radient cooling system: 25kld \leftarrow



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NASA

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