VARDAMAN BHAVAN IS THE GST BUILDING IN GHAZIABAD DESIGNED FOR EXPERION DEVELOPERS WHICH REFLECTS THEIR PRINCIPALS OF TRANSPARENCY AND SUSTAINABILITY. THE DESIGN WAS ACHIEVED WITH THE HELP OF VARIOUS PASSIVE AND CLIMATE RESPONSIVE STRATEGIES. THE BUILDING WAS DESIGNED WITH THE PEOPLE WORKING THERE IN MIND. THE SPACE DESIGN CREATES AN ENVIRONMENT THAT MAKES IT A STRESS-FREE WORK ENVIRONMENT.

VARIOUS DESIGN ELEMENTS LIKE, LOUNGES, COURTYARDS, AND AN OPEN-AIR THEATER WERE CONSIDERED AS THE MAIN FOCUS TO HELP BUSINESSPEOPLE CONNECT TO NATURE AND KICK BACK TO WORK.

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SITE LOCATION

THE SITE IS LOCATED **IN KAMLA NEHRU NAGAR, GHAZIABAD , UTTAR PRADESH.**
SITE AREA - 8959.1 M2 . THE SITE IS ALONG THE NH9, EXPOSING THE SITE TO HEAVY TRAFFIC AND NOISE. THE SITE IS ALSO HAS OPEN FIELDS ON ITS NORTH, EAST AND SOUTH SIDES.

TOPOGRAPHY

LATTITUDE:
28°40'36.4"N
LONGITUDE:
77°27'19.3"E
ALTITUDE:
214M
SEISMIC ZONE:
IV

SWOT ANALYSIS

S — STRENGTHS
AMPLE AMOUNT OF SUNLIGHT ,OPEN FIELDS ON NORTH EASTERN SIDE AND ACCESS TO NH9.

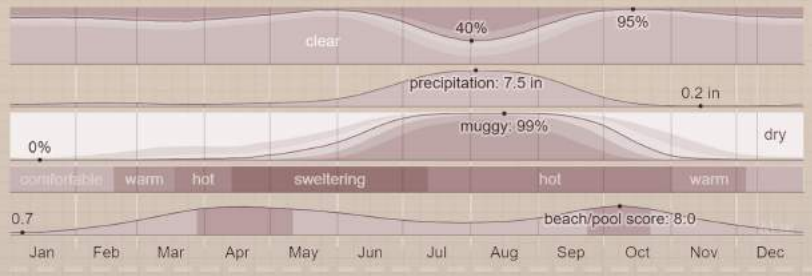
W — WEAKNESS
NOISE POLLUTION, UNORGANIZED CROWD, LACK OF BASIC AMENITIES.

O — OPPORTUNITIES
SHADING DEVELOPMENT AND WATER HARVESTING.

T — THREATS
ELECTRIC POLES ON THE WEST SIDE, OPEN DRAINAGES, ACCIDENT PRONE AREA

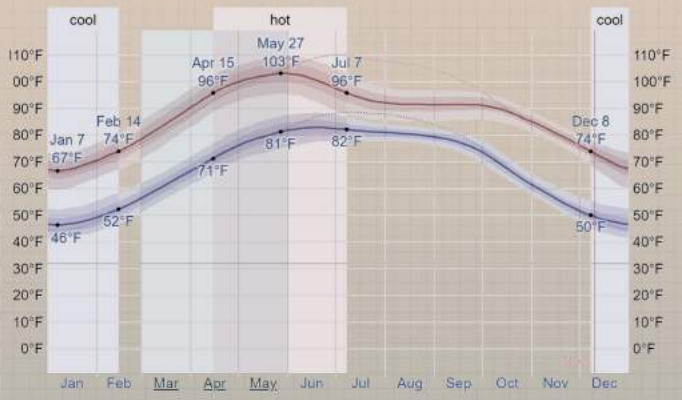
CLIMATE

GHAZIABAD'S CLIMATE IS **COMPOSITE TYPE**.THE WET SEASON IS HOT, OPPRESSIVE, AND PARTLY CLOUDY AND THE DRY SEASON IS WARM AND MOSTLY CLEAR.



AVERAGE TEMPERATURE

HOT SEASON: 2.8 MONTHS, FROM APRIL 15 TO JULY 7, WITH AN AVERAGE DAILY HIGH TEMPERATURE ABOVE 96°.
COOL SEASON: 2.2 MONTHS, FROM DECEMBER 8 TO FEBRUARY 14, WITH AN AVERAGE DAILY HIGH TEMPERATURE BELOW 74°F.



VEGETATION & CULTIVATION

IN THE FORMER DAYS A LARGE PART OF THE DISCTRICT WAS COVERED WITH FOREST OF SAL AND OTHER TREES, BUT SINCE THEN MOST OF IT HAS BEEN CLEARED AND BROUGHT UNDER THE PLOUGH. THOUGH THE DISTRICT IS NO LONGER RICH IN TIMBER, IT CAN STILL BE DESCRIBED AS WELL WOODED.

MANGO TREE

BAMBOO TREE

EUCALYPTUS TREE

SAL TREE

AGRICULTURE

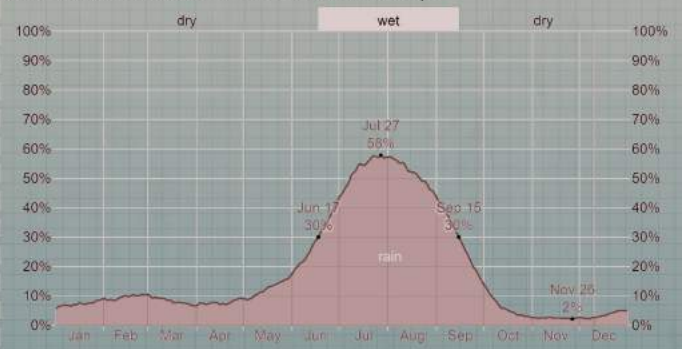
LOCAL CROPS

SUGAR CANE

PADDY

PRECIPITATION

WETTER SEASON: 2.9 MONTHS, FROM JUNE 17 TO SEPTEMBER 15(>30% CHANCE OF WET DAY WITH ATLEAST 0.04 INCHES OF PRECIPITATION).
DRIER SEASON:9.1 MONTHS, FROM SEPTEMBER 15 TO JUNE 17(WITH AN AVERAGE OF 0.8 DAYS WITH 0.04 INCHES OF PRECIPITATION).



RAINFALL

HIGHEST RAINFALL: AUGUST(AVERAGE OF 7.3 INCHES)
LOWEST RAINFALL: NOVEMBER (AVERAGE OF 0.2 INCHES)

SITE ANALYSIS

GRIHA TROHPY 2021-22

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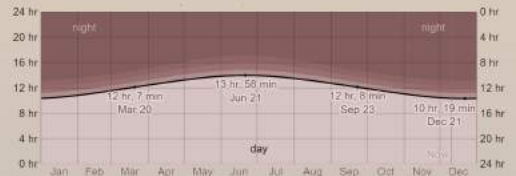
SUN

THE LENGTH OF THE DAY IN GHAZIABAD VARIES OVER THE COURSE OF THE YEAR. IN 2021, THE SHORTEST DAY IS DECEMBER 21, WITH 10 HOURS, 19 MINUTES OF DAYLIGHT; THE LONGEST DAY IS JUNE 21, WITH 13 HOURS, 58 MINUTES OF DAYLIGHT.

HOURS OF DAY LIGHT AND TWILIGHT

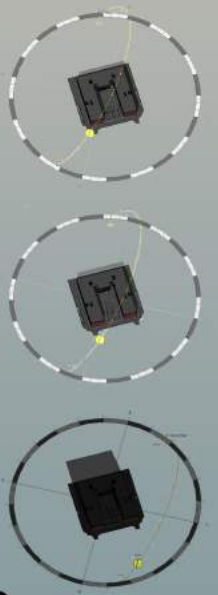


AVERAGE DAILY INCIDENT SHORTWAVE SOLAR ENERGY

SUN-PATH

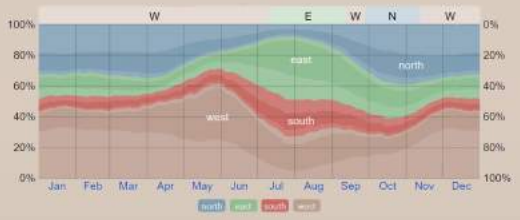
SHADOW ANALYSIS (MORNING)

SHADOW ANALYSIS (AFTERNOON)

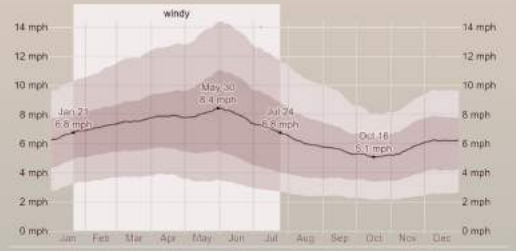


WIND DATA

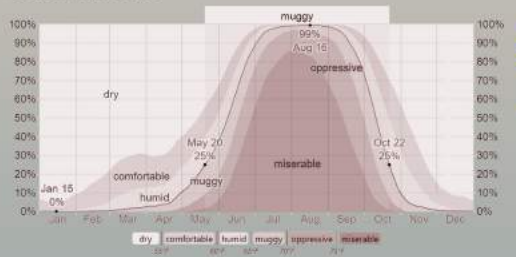
GHAZIABAD HAS NORTH EAST PROMINENT WINDS WITH SPEEDS OF UPTO 19KM/H.



AVERAGE WIND SPEED IN GHAZIABAD



HUMIDITY COMPFORT LEVELS IN GHAZIABAD



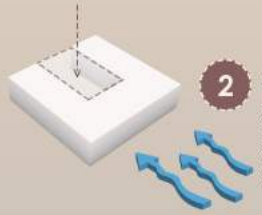
PROXIMITY

Roads
High way
Medical
Religion
education

FORM GENERATION

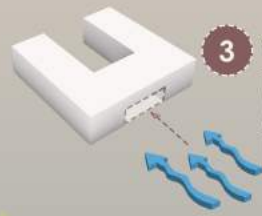
1 SITE MASSING

DERIVING THE MASS ON SITE BASED ON THE AREA STATEMENT.



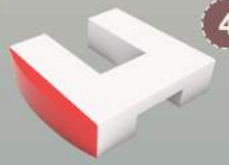
2 CIRCULATION

CREATING A DEPRESSION TO CREATE VOID FOR CIRCULATION.



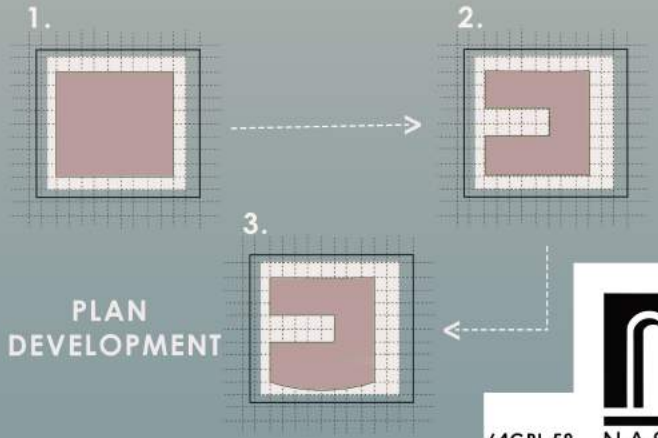
3 WIND RESPOSNE

THE INTAKE AIRFLOW IS INCREASED BY CREATING A PUNCTURE.



4 SOLAR RESPONSE

TO REDUCE THE HARSHNESS OF THE SUN, THE SOUTH FACADE IS DESIGNED WITH CURVED SKIN



PLAN DEVELOPMENT

SITE ANALYSIS

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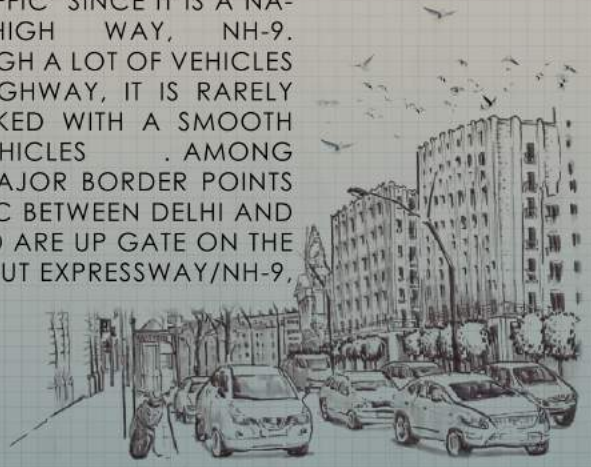
CITY CONTEXT

GHAZIABAD IS A CITY IN THE INDIAN STATE OF UTTAR PRADESH AND A PART OF THE NCR. IT IS THE ADMINISTRATIVE HEADQUARTERS OF GHAZIABAD DISTRICT AND IS THE LARGEST CITY IN WESTERN UTTAR PRADESH, WITH a POPULATION OF 1,729,000. GHAZIABAD MUNICIPAL CORPORATION IS DIVIDED INTO 5 ZONES - CITY ZONE, KAVI NAGAR ZONE, VIJAY NAGAR ZONE, MOHAN NAGAR ZONE AND VASUNDHARA ZONE WELL CONNECTED BY ROADS AND RAILWAYS, IT IS A MAJOR RAIL JUNCTION FOR NORTH INDIA.

TRAFFIC ANALYSIS

HEAVY TRAFFIC SINCE IT IS A NATIONAL HIGH WAY, NH-9. EVEN THOUGH A LOT OF VEHICLES USE THE HIGHWAY, IT IS RARELY FULLY PACKED WITH A SMOOTH FLOW IF VEHICLES . AMONG THE FIVE MAJOR BORDER POINTS FOR TRAFFIC BETWEEN DELHI AND GHAZIABAD ARE UP GATE ON THE DELHI-MEERUT EXPRESSWAY/NH-9.



USER GROUP

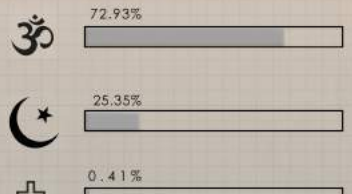
CULTURAL CHARACTERISTICS

HISTORY

GHAZI-UD-DIN

THE CITY OF GHAZIABAD WAS FOUNDED IN 1740 A.D. BY GHAZI-UD-DIN, AND NAMED AS "GHAZIUDDIN NAGAR" AFTER HIS OWN NAME. THE NAME "GHAZI-UDDIN NAGAR" WAS SHORTENED TO ITS PRESENT FORM, I.E., "GHAZIABAD" WITH THE OPENING OF THE RAILWAYS IN 1864.

RELIGION



FOOD

THE PLACE IS FAMOUS FOR ITS KEBABS, BIRYANI, KACHORI, HALWA, AND BANARASI CHAAT. MAJORITY ENJOYS NON-VEGETARIAN FOOD WITH A FAIR AMOUNT OF VEGETARIAN POPULATION.

THE **EMBROIDERY TECHNIQUE CALLED CHIKANKARI EMBROIDERY** IS POPULAR IN THESE AREAS. IT IS ALSO EXPORTED TO OTHER PARTS OF THE COUNTRY DUE TO ITS INCREASE IN DEMAND. CHIKAN WORK IS MOSTLY DONE ON COTTON, GEORGETTE, CREPE, ETC.

TRADITIONAL

TRADITIONAL HANDICRAFTS AND THE TRADITIONAL DANCE KATHAK ARE STILL APPRECIATED BY THE PEOPLE.

LOCAL BUILDING MATERIALS

ALL THE COMMON CONSTRUCTION MATERIALS ARE EASILY ACCESSIBLE TO THE PEOPLE IN GHAZIABAD. SOME OF THE MATERIALS ARE:


GRAVEL STONE


CERAMIC BRICKS


FLY ASH BLOCKS


CEMENT BRICKS


CLAY BRICKS


PRECAST CONCRETE BLOCKS

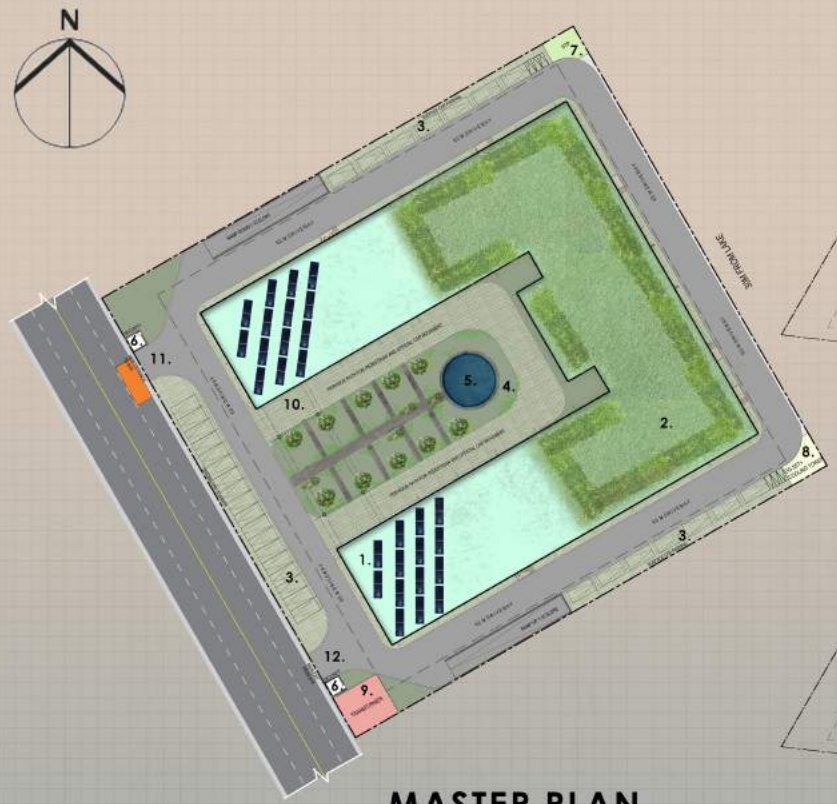

STONE GRIT

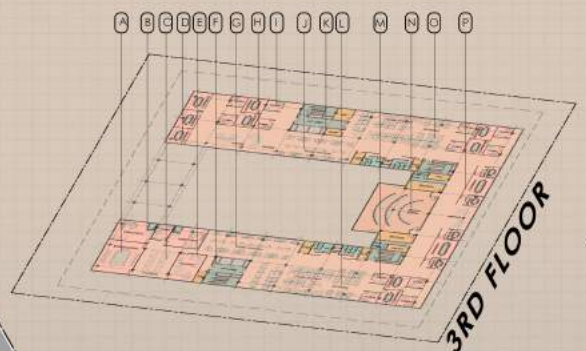
THE STRUCTURES HERE ARE MADE MOSTLY OUT OF MUD/STONE ALONE WITH CONSTRUCTION AS FIRST PREFERENCE. VERNACULAR HUTS ARE GENERALLY MADE OF MUD OR SUN-BAKED BRICKS WHICH ALSO TACKLE THE HARSH WEATHER CONDITIONS OF THE PLACE.

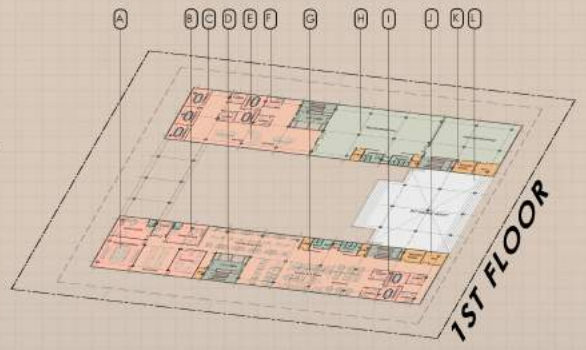
DEMOGRAPHICS

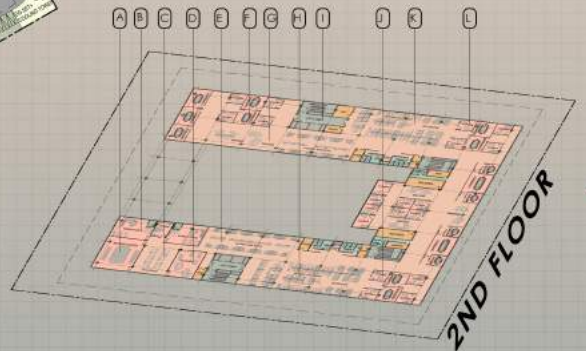
TOTAL POPULATION:
17.3 LAKHS(2011)

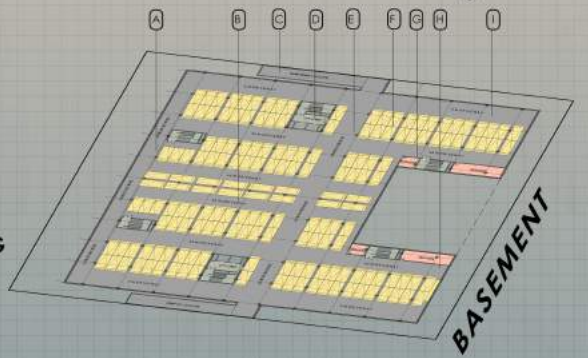
AVERAGE LITERACY:











MASTER PLAN

1.Solar panels
2.Roof gardening
3.Surface parking
4.Green space
5.Waterbody
6.Security cabin
7.Stp
8.Dg set + cooling towers
9.Transformers
10.Permeable pavers
11.site entry
12.site exit

THIRD FLOOR PLAN

A- BOARD ROOM
B- DIRECTOR'S
C- WAITING AREA
D- CONFERENCE
E- LOUNGE
F- LIFT LOBBY
G- WORK STATION
H- WAITING AREA
I- CABINS
J- WORK STATION
K- PANTRY
L- WORK STATION DIVISION
M- CABIN
N- BOARD ROOM
O- WORK STATION
P- CONFERENCE

SECOND FLOOR PLAN

A- BOARD ROOM
B- DIRECTOR ROOM
C- WAITING
D- LOUNGE
E- WORK STATION
F- CONFERENCE
G- WAITING AREA
H- WORK STATION
I- LIFT LOBBY
J- CABIN
K- WORK STATION
L - CABINS

FIRST FLOOR PLAN

A- BOARD ROOMS
B- DIRECTOR ROOM
C- CONFERENCE
D- LIFT LOBBY
E- WAITING AREA
F- CABIN
G- WORK STATION
H- MULTIPURPOSE HALL
I- CONFERENCE
J- AHU
K- RECORD ROOM
L- OAT DOUBLE HEIGHT

GROUND FLOOR PLAN

A- TRANSFORMER
B- EMERGENCY PARKING
C- SECURITY
D- VISITING OFFICERS
E- SERVER ROOM
F- MALKHANA
G- RECORD ROOM
H- SALES SHOP FOR CONFISCATED GOODS
I- RECEPTION
J- GST PAYER SERVER CENTER
K- RECEPTION
L- GYMNASIUM
M- LOUNGE
N- DORM
O- WORKERS PLACE
P- OAT DOUBLE HEIGHT

BASEMENT

A- 3.6M DRIVEWAY
B- 4.5M DRIVEWAY
C- RAMP OF 1:10 SLOPE
D- LIFT LOBBY
E- 5.6M DRIVEWAY
F- CAR PARKING
G- SERVICES
H- 4.5M DRIVEWAY
I- 6M DRIVEWAY

DRAWINGS

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KEY PLAN

MATERIALS

MATERIALS SELECTION AT THE BUILDING DESIGN PROCESS HAS A GREAT INFLUENCE ON THE BUILDING'S SUSTAINABILITY. BUILDING CONSTRUCTION IS ONE OF THE BIGGEST ENVIRONMENTAL IMPACTS ON THE BUILT ENVIRONMENT.THE MATERIALS CHOSEN WILL HELP IN ELEVATING SUSTAINABLILITY.

FLY ASH USE IN CONCRETE IMPROVES THE WORKABILITY OF PLASTIC CONCRETE, AND THE STRENGTH AND DURABILITY OF HARDENED CONCRETE. PROVEN COSTEFFECTIVE

CEMENT MIXED WITH FINE AGGREGATE PRODUCES MORTAR FOR MASONRY, OR WITH SAND AND GRAVEL, PRODUCES CONCRETE.

SANDSTONE IS IDEAL FOR EXTERIOR APPLICATIONS FOR PAVING, WATER-BODY DECK, EXTERIOR WALL CLADDING, LANDSCAPE PATIO, AND PATH DESIGNS.

PARTICLE BOARD, ALSO KNOWN AS CHIPBOARD, IS AN ENGINEERED WOOD PRODUCT MANUFACTURED FROM WOOD CHIPS OR JUTESTICK CHIPS AND A SYNTHETIC RESIN.

INTERIOR VIEWS

IT IS IMPORTANT THAT PANEL HEIGHTS BE SET SO THAT EMPLOYEES CAN COMMUNICATE WITH EACH OTHER WHEN SEATED AND SEE EACH OTHER WHEN STAND-

EMPLOYEES SHOULD TAKE BREAKS BETWEEN WORK ESPECIALLY IF IT IS THE KIND OF WORK THAT REQUIRES THEIR FULL ATTENTION.

STUDIES HAVE PROVEN THAT EMPLOYEES WHO WORK IN OFFICES WITH LOUNGE AREAS ARE MORE PRODUCTIVE THAN THOSE WHO WORK IN OFFICES WITHOUT THEM.

VOCS PAINTS ARE CHEMICALS FOUND IN SOLVENT-BASED AND IN SMALL QUANTITIES IN MANY WATER-BASED PAINTS AND COATINGS. THEIR MAIN PURPOSE IN SOLVENT-BASED PAINTS IS TO ACT AS THE MEDIUM TO TRANSFER THE PAINT FROM THE CAN TO THE SURFACE AND AID THE PAINT'S FLOW.

FURNITURE

DESPITE FREQUENT VISITS FROM PARTNERS AND CUSTOMERS, THESE OFFICES SHOULD PROJECT AN ELEGANT IMPRESSION AND DEMONSTRATE THE COMPANY'S PROFITABILITY.

A SPACE'S PRODUCTIVITY CAN BE MAXIMIZED BY MAKING FURNITURE AND OFFICE EQUIPMENT SUCH ACCESSIBLE TOGETHER.

THE ROOM IS QUIET AND DISTRACT-FREE, ALLOWING EVERYONE IN THE ROOM TO FOCUS AND LISTEN TO EACH OTHER. IT ALLOWS YOU TO GET DOWN TO BUSINESS EASILY.

INIDVISUAL EXECUTIVE OFFICE SPACE.

INTERIOR AND MATERIALS

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7. ENERGY OPTIMIZATION

THE INTENT OF THIS CRITERION IS TO ENSURE THAT THE PROJECTS ARE MADE ENERGY-EFFICIENT BY ENHANCING THE ENVELOPE PERFORMANCE WHILE ALSO REDUCING ENERGY CONSUMPTION THROUGH INSTALLATION OF EFFICIENT EQUIPMENTAND LIGHTING FIXTURES.

7.1.1 ENSURE THAT THE PROJECT DEMONSTRATES COMPLIANCE WITH THE MANDATORY REQUIREMENTS OF ECBC

4.0 BUILDING ENVELOPE	
4.1 GENERAL THE BUILDING ENVELOPE SHALL COMPLY WITH THE MANDATORY PROVISIONS OF §**4.2**, AND THE PRESCRIPTIVE CRITERIA OF §**4.3**. **4.2** MANDATORYREQUIREMENTS	✓
4.2.1 FENESTRATION	✓
4.2.1.1 U-FACTOR U-FACTORS SHALL BE DETERMINED FOR THE OVERALL FENESTRATION PRODUCT (INCLUDING THE SASH AND FRAME) IN ACCORDANCE WITH ISO-15099 BY AN ACCREDITED INDEPENDENT LABORATORY, AND LABELED OR CERTIFIED BY THE MANUFACTURER. U-FACTORS FOR SLOPED GLAZING AND SKYLIGHTS SHALL BE DETERMINED AT A SLOPE OF 20 DEGREES ABOVE THE HORIZONTAL. FOR UNRATED PRODUCTS, USE THE DEFAULT TABLE IN APPENDIX A.	✓
4.2.1.2 SOLAR HEAT GAIN COEFFICIENT SHGC SHALL BE DETERMINED FOR THE OVERALL SINGLE OR MULTI GLAZED FENESTRATION PRODUCT (INCLUDING THE SASH AND FRAME) IN ACCORDANCE WITH ISO-15099 BY AN ACCREDITED INDEPENDENT LABORATORY, AND LABELED OR CERTIFIED BY THE MANUFACTURER.	✓
EXCEPTIONS TO §**4.2.1.2**: (A) SHADING COEFFICIENT (SC) OF THE CENTER OF GLASS ALONE MULTIPLIED BY 0.86 IS AN ACCEPTABLE ALTERNATE FOR COMPLIANCE WITH THE SHGC REQUIREMENTS FOR THE OVERALL FENESTRATION AREA. (B) SOLAR HEAT GAIN COEFFICIENT (SHGC) OF THE GLASS ALONE IS AN ACCEPTABLE ALTERNATE FOR COMPLIANCE WITH THE SHGC REQUIREMENTS FOR THE OVERALL FENESTRATION PRODUCT.	✓
4.2.1.3 VISUAL LIGHT TRANSMITTANCE VISUAL LIGHT TRANSMITTANCE (VLT) SHALL BE DETERMINED FOR THE FENESTRATION PRODUCT IN ACCORDANCE WITH ISO-15099 BY AN ACCREDITED INDEPENDENT LABORATORY, AND LABELED OR CERTIFIED BY THE MANUFACTURER. FOR UNRATED PRODUCTS, USE THE DEFAULT TABLE IN APPENDIX A.	✓
4.2.2 OPAQUE CONSTRUCTION U-FACTORS SHALL BE CALCULATED FOR THE OPAQUE CONSTRUCTION IN ACCORDANCE WITH ISO-6946. TESTING SHALL BE DONE IN ACCORDANCE WITH APPROVED ISO STANDARD FOR RESPECTIVE INSULATION ENVELOPE ENERGY CONSERVATION BUILDING CODE 2017 17 TYPE BY AN ACCREDITED INDEPENDENT LABORATORY, AND LABELED OR CERTIFIED BY THE MANUFACTURER. FOR UNRATED PRODUCTS, USE THE DEFAULT TABLES IN APPENDIX A.	✓

9. LOW ODP AND GWP MATERIALS

9.1.1 ENSURE THAT ALL THE INSULATION USED IN THE BUILDING ENVELOPE AND FOR HVAC SYSTEMS ARE CFC AND HCFC FREE.

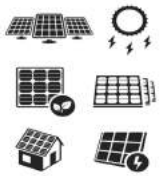
7.1.3 DEMONSTRATE THAT 100% OF EXTERIOR LIGHTING FIXTURES4 (LAMP + BALLAST) MEET THE LUMINOUS EFFICACY OF 80 LM/W.

ACHIEVED ✓

7.1.4 ENSURE THAT THE PROJECT MEETS THE GRIHA BENCHMARK FOR EPI5 AS PER TABLE 3.3

EPI

TOTAL BUILT UP	13000	SQM
TOTAL POWER CONSUMPTION	450	KW
No. Hrs	8	
No. of working Days	230	
	828000	KWH
EPI	***63.7***	



7.1.5 ENSURE THAT THE PROJECT DEMONSTRATES ADDITIONAL REDUCTION FROM THE GRIHA BENCHMARK FOR EPI AS PER TABLE 3.4.

BENCH MARK AS PER GRIHA <90

7.1.6 ENSURE THAT THE EQUIPMENT INSTALLED WITHIN THE PROJECT (WHICHEVER APPLICABLE AS PER TABLE 3.5) IS EITHER BEE-STAR LABELLED OR OF EQUIVALENT PERFORMANCE.

★★★

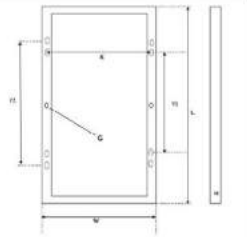
8. RENEWABLE ENERGY

SOLAR PANEL CALCULATION

300 WATT - MODULE DATA SHEET		
ELECTRICAL PARAMETERS		
Model Name	ECO 300	
Cell Configurations (Nos.)	12 x 6 (72) Series	
Parameters	Value	Tolerance
Pmax (W)	300	(0 to + 3.0%)
Voc (V)	44.2	(± 3.0%)
Isc (A)	8.8	(± 5.0%)
Vmax (V)	36.15	
Imax (A)	8.3	
Fill Factor (%)	77.13%	
Module Efficiency (%)	15.48%	
Maximum System Voltage (VDC)	1000	
Temp. Coefficient of Pmax (%/°C)	-0.39	
Temp. Coefficient of Voc (%/°C)	-0.31	
Temp. Coefficient of Isc (%/°C)	0.06	
Electrical values measured at STC: 25°C, 1.5AM, 1000 W/m²		
MECHANICAL PARAMETERS		
Parameters	Measurement	Tolerance
L - Length of Module (mm)	1960	± 1.0 mm.
W - Width of Module (mm)	989	± 1.0 mm.
H - Height of Module (mm)	40	± 0.5 mm.
X - Pitch Distance (mm)	950	± 1.0 mm.
Y- Pitch Distance (mm)	1200, 1600	± 1.0 mm.
Mounting Hole (mm)	8 oblong of size 6.5 mm x 10 mm	
Grounding Hole (mm)	2 Nos. of Dia .4mm on Length Side	
Cell	Polycrystalline Solar Cells, 156.75mm(X)156.75mm	
Junction Box	TUV approved, IP 65 / IP 67 rated 4 terminal junction box with 3 bypass diodes	
Cables	1000mm Long, 4mm² cables with MC4 Compatible Connectors	
Weight	22 Kg.	

Module Design (Front)

Module Design (Back)



8.1.1 ENSURE INSTALLATION OF ON-SITE AND OFF-SITE RENEWABLE ENERGY SYSTEM TO OFFSET A PART OF THE ANNUAL ENERGY CONSUMPTION OF INTERNAL ARTIFICIAL LIGHTING, HVAC, AND DOMESTIC HOT WATER SYSTEMS AS MENTIONED IN TABLE 3.6.

Sheet Name : LPD calculation of common area lighting : interior and exterior

Sr No	Description	Area (SQ.M)	Nos	Total area	Req Lux as per NBC	Light Fixture Type	Wattage of Light	Lumen Efficiency (Lumen /watt)	Lumen Per Fixture	Overall Lux required for the given Area	Maintainace Fator (MF)	Utilization Fcator (UF)	Total Fixture Required	Total wattage	LPD (Watt / sq.m)	LPD as per ECBC	% Reduction
Exterior Lights																	
1	Landscape	764	1	764	50	LED	20	110	2200	38220	0.7	0.7	35	709	0.93	2.5	63%
2	Basement Parking	5872	1	5872	75	LED	38	105	4000	440400	0.7	0.7	225	8538	1.45	2.5	42%
3	Ground Floor Parking	1093	1	1093	50	LED	20	110	2200	54650	0.7	0.7	51	1014	0.93	2.5	63%
4	Road Ways & Pathways	2034	1	2034	50	LED	45	80	3600	101700	0.7	0.7	58	2594	1.28	2.5	49%
5	Common Passage 1	836	1	836	200	LED	20	100	2000	167200	0.85	0.85	116	2314	2.77	4	31%
6	Common Passage 2	836	1	836	200	LED	20	100	2000	167200	0.85	0.85	116	2314	2.77	4	31%
7	Common Passage 3	836	1	836	200	LED	20	100	2000	167200	0.85	0.85	116	2314	2.77	4	31%
8	Pre Funtional Space	258.72	1	259	500	LED	12	108	1300	129360	0.85	0.85	138	1653	6.39	4	-60%
9	Multipurpose hall	123	1	123	300	LED	12	108	1300	36900	0.85	0.85	39	471	3.83	4	4%
10	cabin	13.69	8	110	500	LED	12	108	1300	54760	0.85	0.85	58	700	6.39	4	-60%
11	12 PAX Conference	20.25	4	81	300	LED	22	59	1300	24300	0.85	0.85	26	569	7.03	4	-76%
12	Conference	28.14	2	56	300	LED	12	183	2200	16884	0.85	0.85	11	127	2.26	4	43%
13	Cabin	13.69	32	438	500	LED	22	100	2200	219040	0.85	0.85	138	3032	6.92	4	-73%
14	12 PAX Conference	23.4	24	562	300	LED	22	59	1300	168480	0.85	0.85	179	3946	7.03	4	-76%
15	Office space 1	240	5	1200	500	LED	38	87	3300	600000	0.85	0.85	252	9563	7.97	4	-99%
16	Conferance 1	28.14	10	281	500	LED	22	100	2200	140700	0.85	0.85	89	1947	6.92	4	-73%
17	Conferance 2	54	3	162	500	LED	22	59	1300	81000	0.85	0.85	86	1897	11.71	4	-193%
18	Office space	238.14	1	238	500	LED	22	100	2200	119070	0.85	0.85	75	1648	6.92	4	-73%
19	Conference hall	238.14	1	238	300	LED	22	100	2200	71442	0.85	0.85	45	989	4.15	4	-4%
20	Office space 2	128	2	256	500	LED	12	108	1300	128000	0.85	0.85	136	1635	6.39	4	-60%
21	Office space 3	167.09	3	501	500	LED	22	100	2200	250635	0.85	0.85	158	3469	6.92	4	-73%
22	Office space 4	54	3	162	500	LED	12	108	1300	81000	0.85	0.85	86	1035	6.39	4	-60%
23	Lounge 1	90.52	4	362	150	LED	12	108	1300	54312	0.85	0.85	58	694	1.92	4	52%
24	Lounge 2	54	3	162	150	LED	12	108	1300	24300	0.85	0.85	26	310	1.92	4	52%
CONNECTED LOAD	53	KW												53485			
1 SOLAR PANEL WP	0.33													53			
NO. PANELS	165																
AREA REQUIRE	658	SW/ W DIRECTION															

CALCULATIONS 1

13. WATER DEMAND REDUCTION

THE INTENT OF THIS CRITERION IS TO REDUCE THE OVERALL WATER DEMAND OF THE PROJECT. ONE CAN REDUCE BUILDING WATER DEMANDS FOR VARIOUS USAGES, THAT IS, FLUSHING, WASHING, BATHING, ETC., BY USE OF LOW-FLOW FIXTURES AND EFFICIENT WASHING (CLOTHES AND DISHES) EQUIPMENT. LANDSCAPE WATER DEMAND CAN BE REDUCED BY USE OF VARIOUS DESIGN ELEMENTS SUCH AS NATIVE SPECIES, XERISCAPING, GROUPING OF SIMILAR SPECIES, ETC., ALONG WITH EFFICIENT USE OF IRRIGATION SYSTEMS.

13.1.1 DEMONSTRATE REDUCTION IN BUILDING WATER DEMAND FROM THE GRIHA BASE CASE (DEFINED IN APPENDIX 5A, TABLE 1) AS PER TABLE 5.2.

13.1.3 DEMONSTRATE REDUCTION IN LANDSCAPE WATER DEMAND FROM THE GRIHA BASE CASE (DEFINED IN APPENDIX

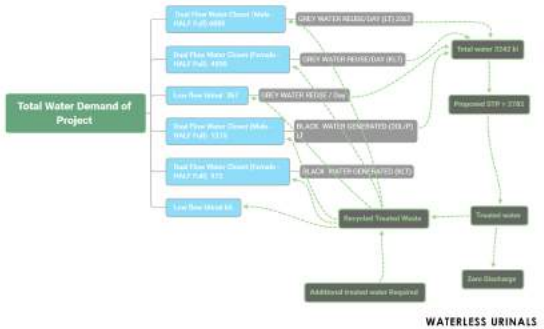
WATER REDUCTION

TOTAL POPOULATION		1200							
EMPLOYEES	1020								
VISITORS	180								
Flush Fixture	Daily uses	Flowrate LPF	Occupants	Water	Flush Fixture	Daily uses	Flowrate LPF	Occupants	Water
Conventional Water Closet - HALF FLUSH(Male)	5	5	612	9180	Dual Flow Water Closet (Male - HALF Full)	4.5	2.5	612	6885
Conventional Water Closet - HALF FLUSH (Female)	5	3	408	6120	Dual Flow Water Closet (Female - HALF Full)	4.5	2.5	408	4590
Conventional urinals	2	4	612	4896	Low flow Urinal	0.4	1.5	612	367
VisITORS					VisITORS				
Conventional Water Closet - HALF FLUSH(Male)	5	5	108	1620	Dual Flow Water Closet (Male - HALF Full)	4.5	2.5	108	1215
Conventional Water Closet - HALF FLUSH (Female)	5	3	72	1080	Dual Flow Water Closet (Female - HALF Full)	4.5	3	72	972
Conventional urinals	2	4	108	864	Low flow Urinal	0.4	1.5	108	65
Total Use (LT)				23760	Total Use / DAY (LT)				14094
Total Use (KLT)				23.76	Total Use /DAY(KLT)				14
Annual Work Day				230	Annual Work Day				230
Total Annual Usage (LT)				5464800	Total Annual Usage (LT)				3241620
Total Annual Usage (KLT)				5464.8	Total Annual Usage (KLT)				3242
GREY WATER REUSE/DAY (LT) 25LT				30000	GREY WATER REUSE/DAY (LT) 25LT				7752
GREY WATER REUSE/DAY (KLT)				30.00	GREY WATER REUSE/DAY (KLT)				7.75
GREY WATER REUSE ANNUAL (LT)				6900000	GREY WATER REUSE ANNUAL (LT)				1782891
GREY WATER REUSE ANNUAL (KLT) **(A)**				6900	GREY WATER REUSE ANNUAL (KLT) **(A)**				1783
BLACK WATER GENERATED (2DL/P) LT				24000	BLACK WATER GENERATED (2DL/P) LT				6342
BLACK WATER GENERATED (KLT)				240	BLACK WATER GENERATED (KLT)				63
BLACK WATER GENERATED ANNUAL LT				5640000	BLACK WATER GENERATED ANNUAL LT				1490441
BLACK WATER GENERATED ANNUAL KLT **(B)**				5640	BLACK WATER GENERATED ANNUAL KLT **(B)**				1490
A-B ANNUAL (KLT)				1260	**A-B ANNUAL (KLT)**				292
					A+B				3273
					Landscape Requirement LT/day				2526.3
					Landscape Requirement Annual KLD **(C)**				922

Flow rate options available: 6.0, 8.0 & 12 LPM

70% Water + 30% Air = 100% Rejuvenation

Rainwater KLD (C)	58
C + D (Total treated water)	2840
NET USAGE ANNUAL (KLT)	2505
STP CAPACITY KLD	180
STP water (85% efficiency) **(D)**	2782
Water Reused	2413
Remaining water	370
Misc 25%	92
To muncipal (KLD)	277
WATER USAGE REDUCTION %	77%



Flow rate options available: 1.4, 2.5, 4.0, 6.0, 8.0, 10 LPM

WATERLESS URINALS

Pressmatic Taps
750ml per operation

Air Showers
Save 30% of water.

Sensor Taps
0.11Ltr. per second.

3/6 Ltrs. flushing systems
Save approx 50% of water

2/4 Ltrs. flushing systems
Save approx 65% of water

Sensor urinals
1.5 Litre per Flush

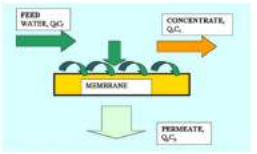
14. WASTE-WATER TREATMENT

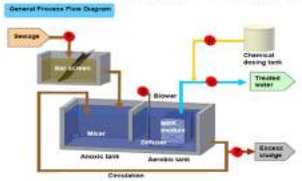
THE INTENT OF THIS CRITERION IS TO PROMOTE GREYWATER AND BLACKWATER SEGREGATION AND FURTHER TREAT THEM ONSITE TO REDUCE THE PROJECT'S DEPENDENCY ON FRESH WATER. 5B, FIGURE 1) AS PER TABLE 5.3

14.1.1 ENSURE THAT 100% OF WASTEWATER GENERATED ON-SITE IS TREATED THROUGH EITHER A CHEMICAL-BASED OR NATURAL WASTEWATER TREATMENT SYSTEM.

14.1.2 ENSURE THAT 100% OF WASTEWATER IS SEGREGATED (INTO GREYWATER AND BLACKWATER) AND TREATED INDEPENDENTLY ON-SITE.

14.2.1 SUBMIT NARRATIVE DESCRIBING THE PROCESS FLOW OF THE WASTEWATER TREATMENT SYSTEM INSTALLED ON-SITE TO DEMONSTRATE COMPLIANCE WITH APPRAISALS.



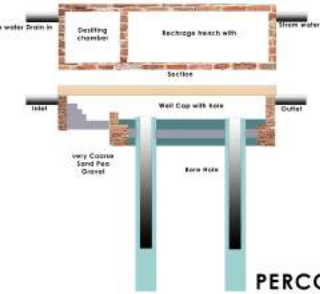


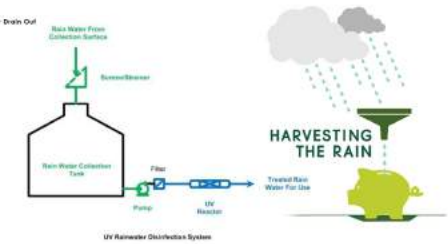
15. RAIN-WATER MANAGEMENT

THE INTENT OF THIS CRITERION IS TO MANAGE RAINWATER EFFICIENTLY SUCH THAT POST-CONSTRUCTION STORM WATER RUN-OFF DOES NOT EXCEED THE PRE-CONSTRUCTION RUN-OFF.

15.1.1 DEMONSTRATE THAT THE POST-CONSTRUCTION STORM WATER RUN-OFF GENERATED FROM THE SITE IS BEING MANAGED WITHIN THE GRIHA PROJECT BOUNDARY AS PER TABLE 5.4 BASED ON THE PEAK HOURLY RAINFALL (MM/H).

RAIN WATER HARVESTING STRUCTURE				
PARTICULARS	**OTHER OPEN AREAS**	**ROAD/PAVEMENT/PARKING AREAS**	**OPEN & GREEN AREA**	**ROOF TOP AREA**
Area (Sq.m.)	1161	1654	2028	3492
Runoff coefficient	0.3	0.8	0.15	0.9
Peak Hour Rainfall (m)	0.045	0.045	0.045	0.045
Volume of one hour Rainfall	15.6735	59.544	13.689	141.426
15 Minutes Volume	3.918375	14.886	3.42225	35.3565
TOTAL VOLUME	**57.583125**			
Volume of 1 recharge Pit				30
No. of recharge pits required				1.9194375
Proposed no. of recharge pits				2





PERCOLATION PIT

10. VISUAL COMFORT

THE INTENT OF THIS CRITERION IS TO ENSURE THAT VISUAL COMFORT (DAYLIGHTING AND ARTIFICIAL LIGHTING) IS PROVIDED TO THE BUILDING OCCUPANTS THROUGH AN INTEGRATION OF ACTIVE AND PASSIVE DESIGN MEASURES.

ONLY HORIZONTAL PROJECTION

Window type ADD THE TYPE OF SPACE	Orientation	SHGC of installed glazing (as per manufacturer's cut-sheet)	"H" Projection of Horizontal Shade (in mm)	"V" Height of Window (in mm)	Projection Factor (PF) = H/V	"M" Multiplication factor	Adjusted SHGC =Max.SHGC/M	"SC" (shading co-efficient) =Adj. SHGC/ 0.86
CABIN AND ME	N	0.7	810	2000	0.41	0.88	0.8	0.92
DIRECTORS AN	S	0.27	1300	2000	0.65	0.64	0.4	0.49

ONLY VERTICAL PROJECTION

Window type ADD THE TYPE OF SPACE	Orientation	SHGC of installed glazing (as per manufacturer's cut-sheet)	"H" Projection of Vertical Shade (in mm)	"V" width of Window (in mm)	Projection Factor (PF) = H/V	"M" Multiplication factor	Adjusted SHGC =Max.SHGC/M	"SC" (shading co-efficient) =Adj. SHGC/ 0.86
WORK STATION	E	0.57	900	2100	0.43	0.8	0.7	0.83
CONFERENCE,	W	0.57	900	2100	0.43	0.8	0.7	0.83

HORIZONTAL & VERTICAL PROJECTION

Window type	Orientation	Max. SHGC =0.20	"H1" Projection of Horizontal Shade (in mm)	"V1" Height of Window (in mm)	Projection Factor (PF1) =H1/V1	"H2" Projection of Vertical Shade (in mm)	"V2" Width of Window (in mm)	Projection Factor (PF2) =H2/V2	Final PF= PF1+PF2 / 2	"M" Multiplication factor	Adjusted SHGC =Max.SHGC/M	"SC"(shading co-efficient) =Adj. SHGC/ 0.86
LOUNGE, WORI	SE	0.35	1200	2100	0.57	450	2000	0.23	0.40	0.6	0.6	0.68
WAITING ROON	S	0.35	810	2100	0.39	900	2000	0.45	0.42	0.53	0.7	0.77

At least 80% of the exterior openings (fenestration) have a Projection Factor of 0.5 or more(as given in ECBC 2006; Table 4.3.3-2; Pg No. 8)

25. DEDICATED FACILITIES FOR SERVICE STAFF

CARETAKER'S FACILITIES (CRITERIA 25)

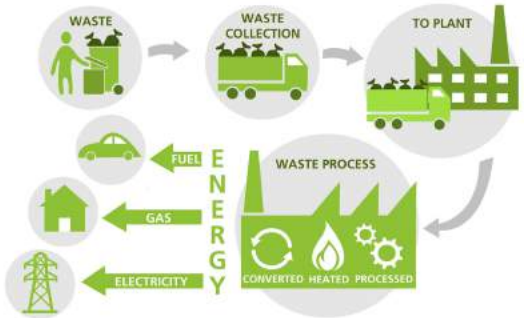
- ADEQUATE HOUSING TO MEET OR EXCEED LOCAL / LABOUR BYELAW REQUIREMENT.
- SANITARY FACILITIES: PROVIDING 3 TOILET SEATS & 3 URINALS FOR THE FIRST 100 WORKERS AND ONE ADDITIONAL TOILE SEAT & URINAL FOR EVERY 100 WORKERS THEREAFTER
- FIRST-AID AND EMERGENCY FACILITIES.
- ADEQUATE DRINKING WATER FACILITIES.
- PERSONAL PROTECTIVE EQUIPMENT
- DUST SUPPRESSION MEASURES.
- ADEQUATE ILLUMINATION LEVELS IN CONSTRUCTION WORK AREAS.
- SITE EMERGENCY ALARM.
- THE SANITARY MEASURES ARE PROVIDED SEPARATELY FOR MEN AND WOMEN.

WASTE MANAGEMENT - POST OCCUPANCY

THE INTENT OF THIS CRITERION IS TO PROVIDE THE NECESSARY INFRASTRUCTURE TO FUTURE OCCUPANTS OF THE PROJECT SOTHAT THEY CAN SUSTAINABLY MANAGE ON-SITE SOLID WASTE DURING THE OPERATION PHASE AND COMPLY WITH THE STATUTORY NORMS FOR DISPOSAL IN A WAY THAT AUGMENTS RESOURCE RECOVERY.

Water Requirement / person/day	**45**
Total Occupants	**1200**
Total Water Requirement (LD) per day	54000
Total Water Requirement (KL) per day	**54**
Domestic litres per head/ day	25
Fresh water requirement (KLD)	**30**
Flushing Litres per head/ day	20
Treated Water Requirement (KLD)	**24**
Waste water Generation	**46**
Proposed Capacity of STP	**30**
Green AREA	
Required Green Area (25% of open area)	1210
Proposed Green Area (22% of plot area)	1934
WASTE	
Total Solid Waste Generation TPD	0.25
Organic waste	0.12
Quantity of Hazardous waste Generation	0.65
Quantity of Sludge Generated from STP	4.3
ENERGY	
refrigeration & equipment	100
lighting	290
cooling equipment	120
ventilation	80

Solid Waste	
Total Population	**1200**
Waste generated /person	**0.2 (kg/day)**
Total W.G	**0.24 TPD**
Biodegradeable Organic waste	**0.11TPD**
Non Biodegradeable Waste	**0.13TPD**



PLANT FACTOR

Grass	Empty	Above basemnt TREE	Above basemnt LAWN	Above basemnt Shrub	Road	Roof
206	1093	218.4	291	254.8	2034	1200
0.45		1.15	1	1.3		1.3
93		251	291	331		1560

PROPOSED TRESS

Tree name	Scientific name
Palm tree	Arecaceae
Ashoka tree	Saraca asoca
Shisham tree	Dalbergia sissoo
Jamun tree	Syzygium cumini
Anjeer tree	Ficus carica
Palasha	Butea monosperma
Bel	Aegle marmelos
Babbol	Vachellia nilotica

PROPOSED SHRUBS
Scientific name
Round Ficus
West Indian Lantana
Verbenas
Furcaria plant
Bottle Brush Tapori Plant for Garden

PROPOSED VERTICAL FACADE PLANTS
Scientific name
Pansy Swiss
Rangoon creepers
wisteria
morning glories

THESE TREES AND BUSHES ARE BEST GROWN IN THE SOIL OF GAZIYABAD AND HAVE WATER RETENTION CAPACITY. WHICH INCREASE IN GROUND WATER LEVEL. GRASS ALSO USED HAVE SOME AMOUNT OF WATER RETENTION CAPACITY AND WANT LESS WATERING AND VERTICAL GARDEN PLANTS OR CREEPERS ARE SUCH THAT THEY NEED LESS WATER AND ARE MORE EFFECTIVE.

1.GREEN INFRASTRUCTURE

2.LOW-IMPACT DESIGN STRATEGIES

3.DESIGN TO MITIGATE UHIE

4: AIR AND SOIL POLLUTION CONTROL

5: TOPSOIL PRESERVATION

6: CONSTRUCTION MANAGEMENT PRACTICES

7: ENERGY OPTIMIZATION

8: RENEWABLE ENERGY UTILIZATION

9: LOW ODP AND GWP MATERIAL

10: VISUAL COMFORT

13: WATER DEMAND REDUCTION

14: WASTEWATER TREATMENT

15: RAINWATER MANAGEMENT T

16: WATER QUALITY AND SELF-SUFFICIENCY

18: ORGANIC WASTE TREATMENT ON-SITE

INTERFACE AND NAMES OF DEVICES CAN BE ALTERED USING

EASY TO UNDERTAND FAMILIAR ANDROID INTERFACE

USERS GET DAILY REMINDER TO BE CONSICOUS ABOUT ENERGY CONSERVATION

CRITERIAS

INNOVATIVE SOULTIONS

DENIM INSULATION

ALSO KNOWN AS COTTON INSULATION, DENIM INSULATION IS A POPULAR FORM OF COMPACT INSULATION. THE MAJORITY OF DENIM INSULATION IS COMPOSED OF RECYCLED SCRAPS OF DENIM LEFT OVER FROM THE CLOTHING MANUFACTURING PROCESS. THE OTHER PORTION OF DENIM INSULATION IS PLASTIC THAT HAS BEEN TREATED WITH BORIC ACID, WHICH MAKES THE INSULATION FLAME RETARDANT. IN ADDITION TO BEING ECO-FRIENDLY, THIS TREATMENT ALSO MAKES DENIM INSULATION RESISTANT TO PESTS, INSECTS, AND MILDEW.

Charging Station

IMPROVING EFFICIENCY AND CUTTING COSTS, **ELECTRIC CHARGING POINTS** AT WORK MAY MAKE LIFE EASIER FOR EMPLOYEES, REDUCING TIME SPENT SEEKING OUT WHERE TO CHARGE, FOR EXAMPLE. BUSINESSES WITH FLEETS OF VEHICLES HAVE THE OPPORTUNITY TO SAVE MONEY ON FUEL, MAINTENANCE COSTS, AND PROMOTE ZERO-EMISSION VEHICLES.

19: UTILIZATION OF ALTERNATIVE MATERIALS IN BUILDING

21: ALTERNATIVE MATERIALS FOR EXTERNAL SITE DEVELOPMENT

23: SAFETY AND SANITATION FOR CONSTRUCTION WORKERS

24: UNIVERSAL ACCESSIBILITY

25: DEDICATED FACILITIES FOR SERVICE STAFF

26: POSITIVE SOCIAL IMPACT

27: PERFORMANCE METERING AND MONITORING

28: COMMISSIONING FOR FINAL RATING

29: OPERATION AND MAINTENANCE PROTOCO

30: INNOVATION

ENERGY USAGE DIGITAL SIGNAGE

PROVIDING ENERGY USAGE DATA WILL HELP USERS
TO PREVENT POLL OF ENERGY WHICH IS

PRIVACY
EG: ~~FAN 02~~ COOLING DEVICE

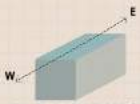
INSTALLED IN THE MOST VISIBLE LOCATION IN THE BUIDLING

CREATING A RESPONSIBLE ENVIORNMENT FOR ENERGY OPTAMIZATION.

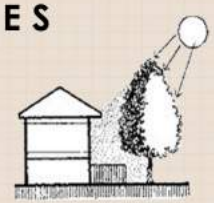
PASSIVE STRATEGIES

GREEN ROOF

WINDOW DESIGN



E-W BUILDING ORIENTATION



VEGETATIVE COVER

THE BUILDING DESIGN CATERS TO DIFFERENTLY ABLED AND SENIOR CITIZEN

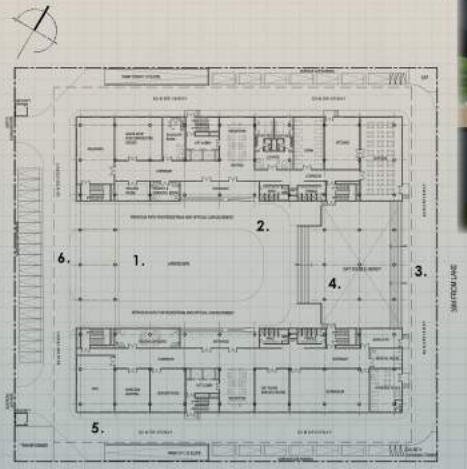
1.

2.

3.

4.

5.



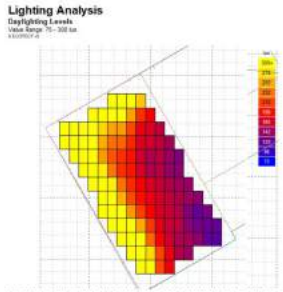
6.

GRIHA TROHPY 2021-22

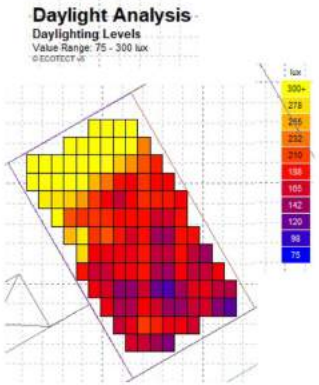
64GRI-59

NASA

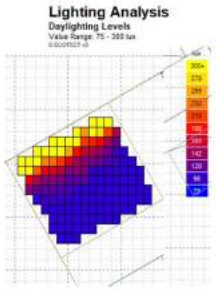
DAYLIGHT ANALYSIS



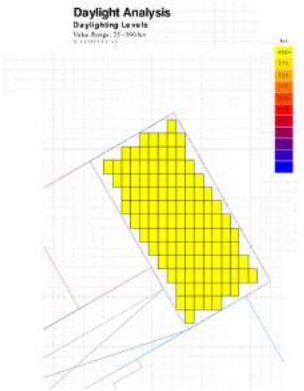
GROUND FLOOR MALKHA DAY LIGHT LEVELS 75-300 LUX



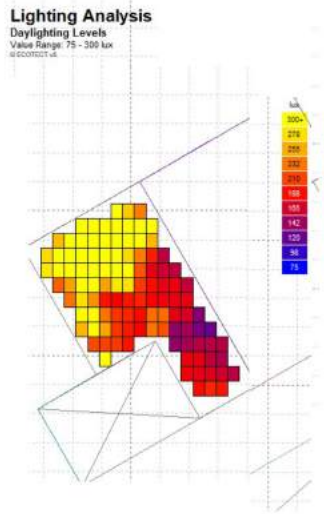
DORMITORY DAY LIGHT LEVELS 75-300 LUX



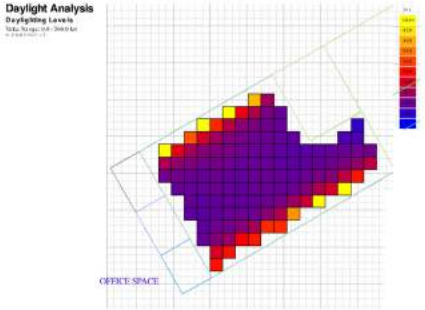
SALES SHOP DAY LIGHT LEVELS 75-300 LUX



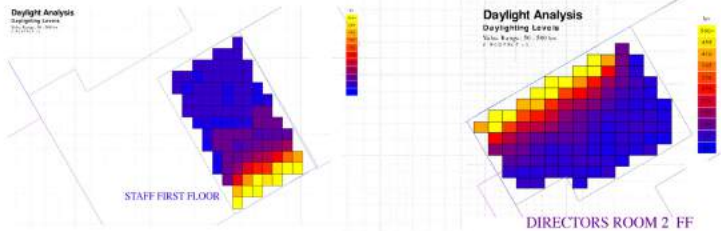
CANTEEN DAY LIGHT LEVELS 75-300 LUX



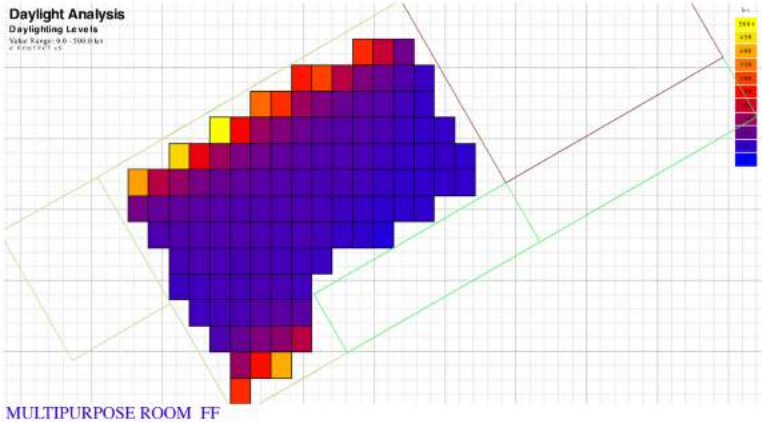
FF OFFICE SPACES



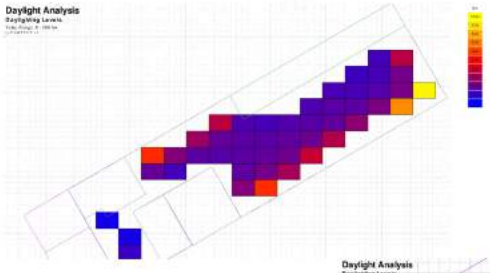
STAFF RES GF LIGHT LEVELS 75-300 LUX

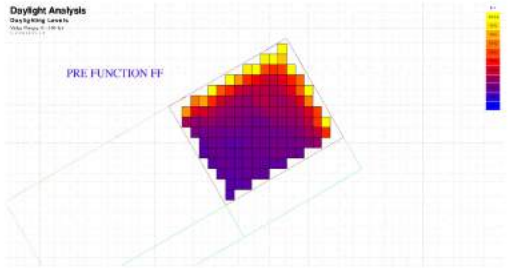


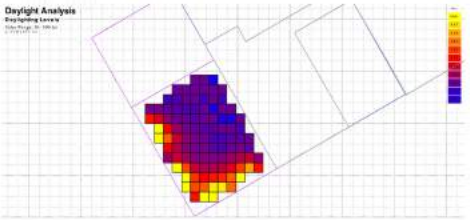
DIRECTORS ROOM 2 FF



MULTIPURPOSE ROOM FF







FF BOARD ROOM

SIMULATIONS

GRIHA TROHPY 2021-22 64GRI-59 NASA