

**“HARYANA STATE BOARD OF TECHNICAL EDUCATION AND
AICTE (HSBTE)” Office Building at Plot No. IP-11, Sector 3,
Panchkula**



ECBC Compliance Report

Submitted By:

**ECBC Cell, Haryana New and Renewable
Energy Development Agency (HAREDA)/
Haryana State Designated Agency (HSDA)
Akshay Urja Bhawan, Plot No-1, Sector 17,
Panchkula, Haryana 134109**

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Summary

Whole Building Performance Method has been used to show compliance of the project with ECBC.

Input Parameter	Baseline	Proposed	Units
Wall material	As per ECBC	200 mm Tric-Eco wall	
Wall U-value	0.0705	0.018	Btu/hrsqt F
Roof material	As per ECBC	20 mm Heat resistance Tiles + 40 mm Cement Screed + 100 mm Insulation (XPS) + 75 mm PCC In slope+ 150mm RCC Slab	
Roof U-value	0.0581	0.035	Btu/hrsqt F
Glazing U Value	0.528	0.283	Btu/hrsqt F
SHGC	0.27	0.25	
Window Shading	No	As per Architectural Drawings	
Cooling Sizing Ratio	1.15	1	
Heating Sizing Ratio	1.25	1	
HVAC System	VRF with DOAS sys	VRF with DOAS sys	
HVAC System Efficiency (EER)	3.02	3.50	
Lighting Power Density calculation (As per space function method- ECBC §6.3.2)			
Office	0.71	0.35	W/ ft ²
External	0.88	0.79	W/ ft ²
Zone Cooling set point	75	75	deg F
Zone Heating set point	70	70	deg F
Basement vent load	0.21	0.21	KW

Project achieves energy saving of 40.1% when compared with ECBC baseline case. Thereby, project is meeting the ECBC compliance by 'Whole Building Performance' approach.

Description	Energy Consumption/ Generation
Proposed case energy consumption (kWh)	390516
Base case energy consumption (kWh)	651805
Savings %	40.1%
Base case EPI (kWh/Sq.m./Annum)	111.4
Proposed case EPI (kWh/Sq.m./Annum)	66.7
EPI ratio	0.60
ECBC Level	SuperECBC

Introduction

HARYANA STATE BOARD OF TECHNICAL EDUCATION AND AICTE (HSBTE) OFFICE Building at Plot No. IP-11, Sector 3, Panchkula is under design stage falls in composite climate zone.

Building Floor Plan

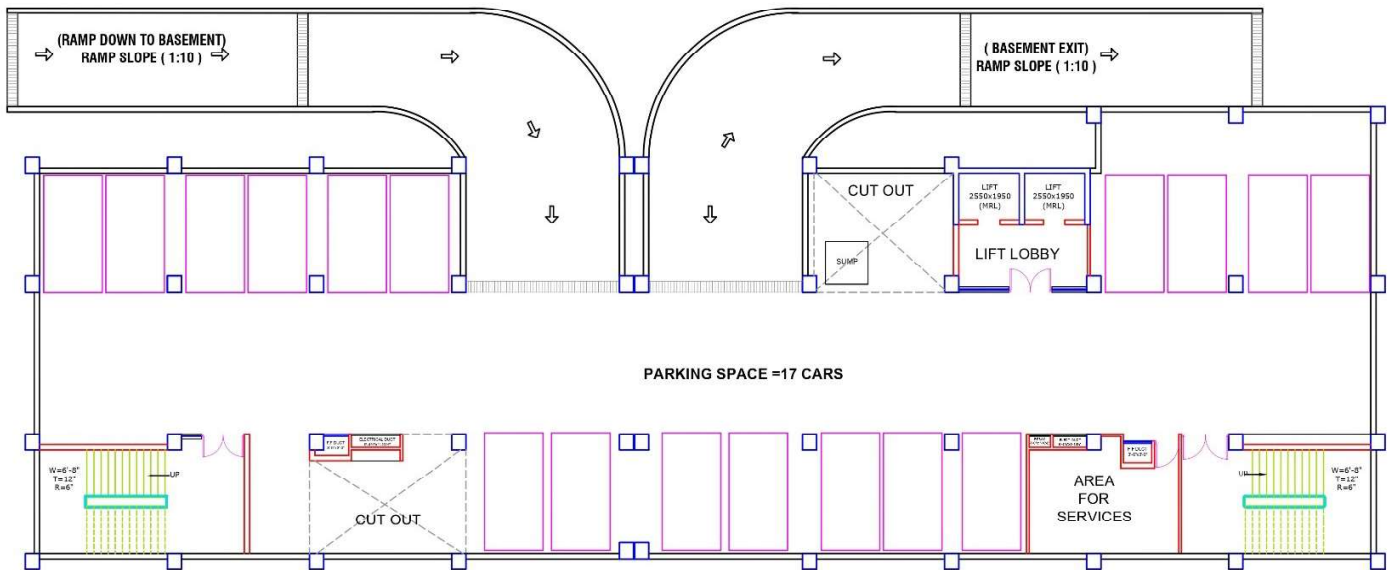


Figure 1: Basement plan

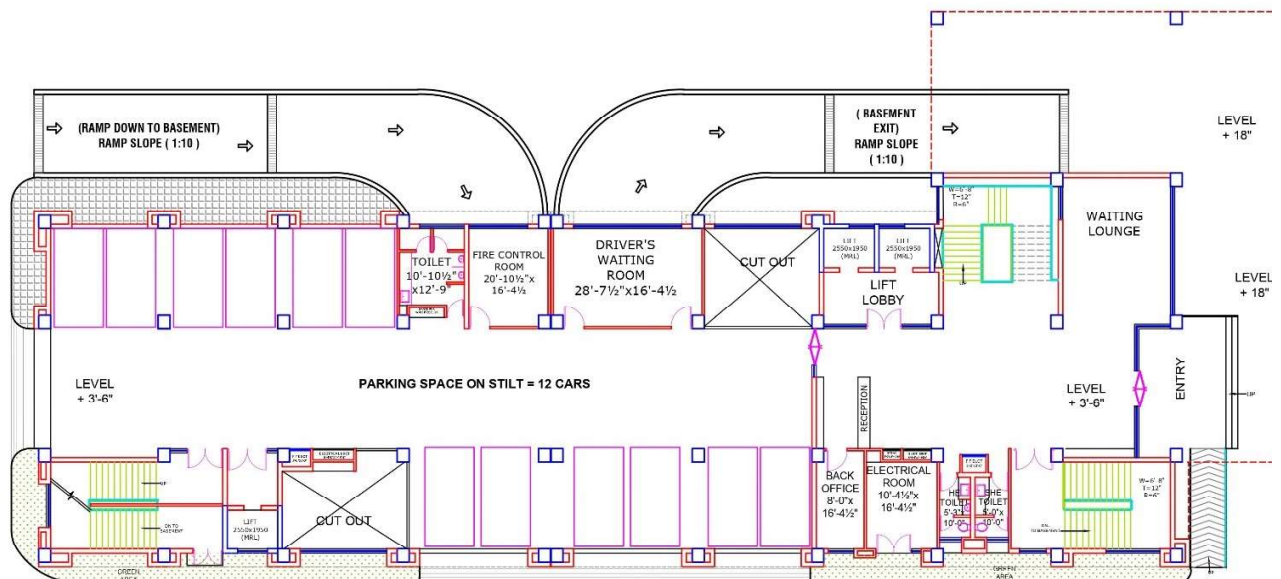


Figure 2: Ground/ Stilt Floor plan

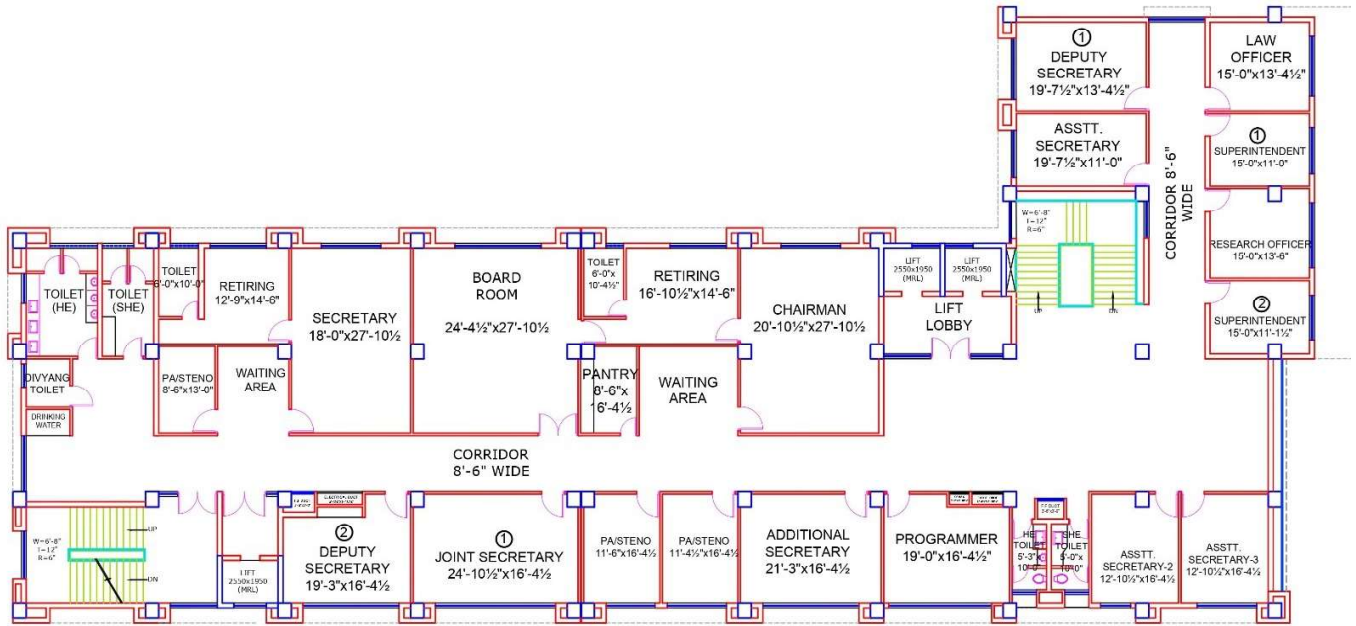


Figure 3: First floor plan

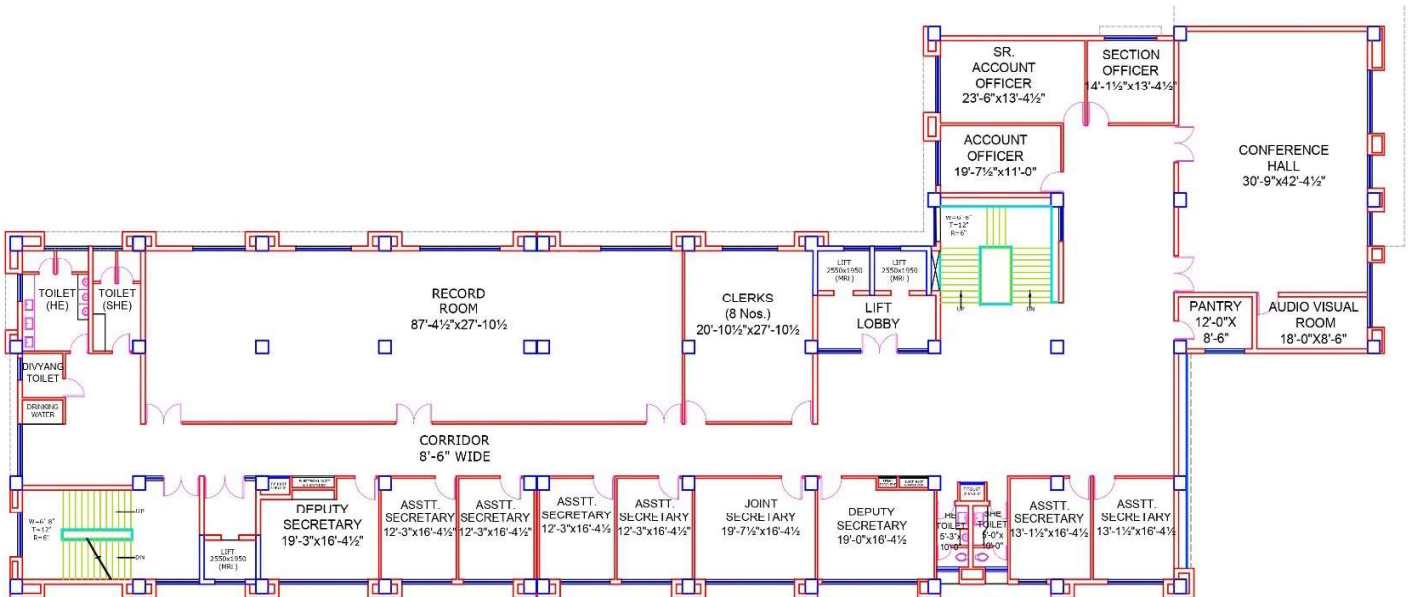


Figure 4: Second floor plan

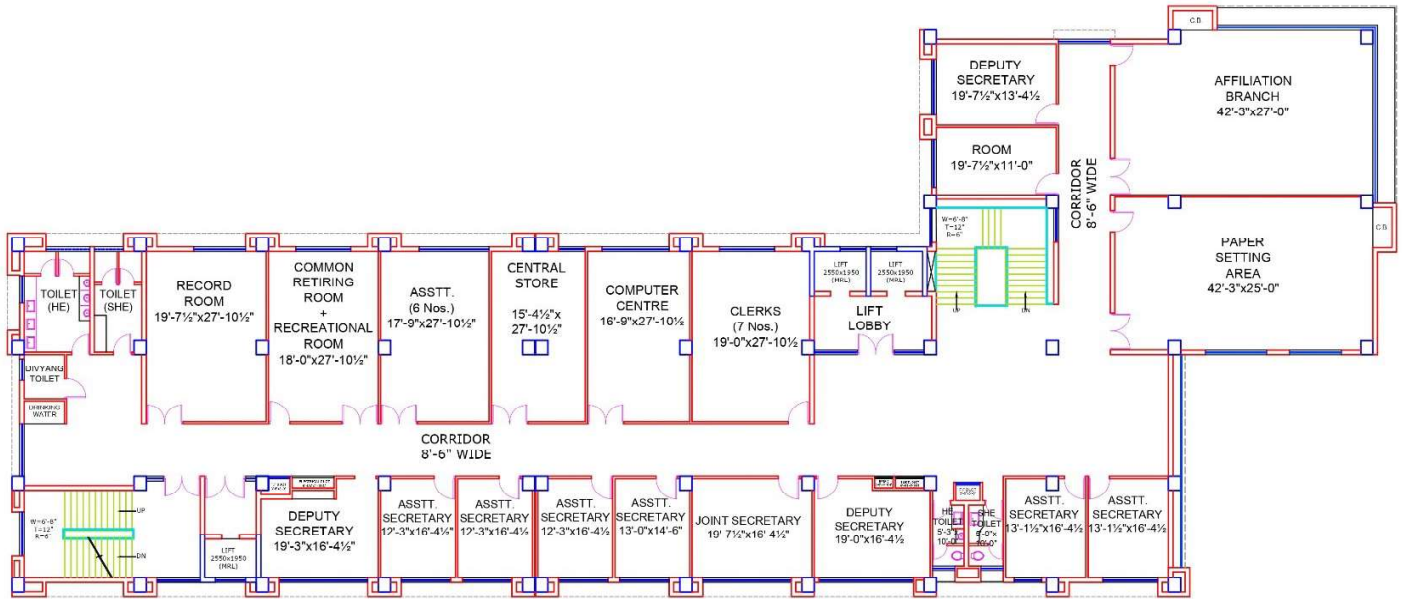


Figure 5: Third floor plan

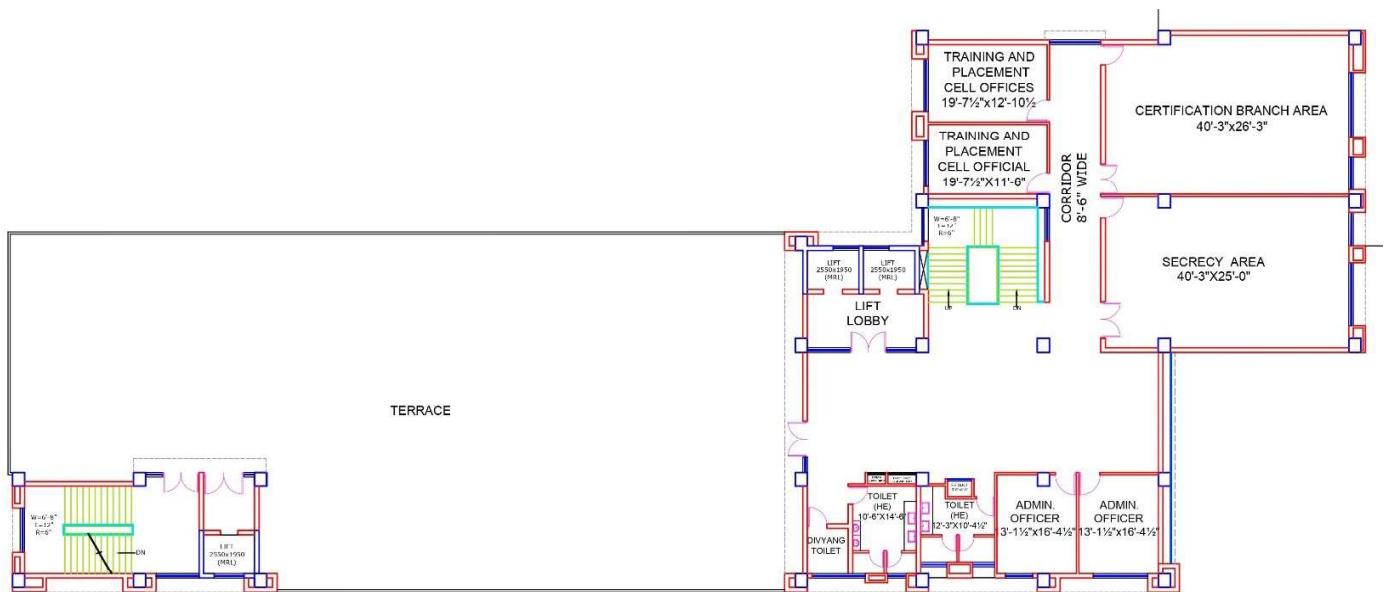


Figure 6: Fourth floor plan

Building Schedules

Annual Schedules | Week Schedules | Day Schedules |

Currently Active Day Schedule: Type: Fraction

Day Schedule Name: Type:

Hourly Values

Mdnt - 1:	<input type="text" value="0.0000"/> ratio	8-9 am:	<input type="text" value="0.2000"/> ratio	4-5 pm:	<input type="text" value="0.9500"/> ratio
1-2 am:	<input type="text" value="0.0000"/> ratio	9-10 am:	<input type="text" value="0.9500"/> ratio	5-6 pm:	<input type="text" value="0.3000"/> ratio
2-3 am:	<input type="text" value="0.0000"/> ratio	10-11 am:	<input type="text" value="0.9500"/> ratio	6-7 pm:	<input type="text" value="0.1000"/> ratio
3-4 am:	<input type="text" value="0.0000"/> ratio	11-noon:	<input type="text" value="0.9500"/> ratio	7-8 pm:	<input type="text" value="0.1000"/> ratio
4-5 am:	<input type="text" value="0.0000"/> ratio	noon-1:	<input type="text" value="0.9500"/> ratio	8-9 pm:	<input type="text" value="0.1000"/> ratio
5-6 am:	<input type="text" value="0.0000"/> ratio	1-2 pm:	<input type="text" value="0.5000"/> ratio	9-10 pm:	<input type="text" value="0.0000"/> ratio
6-7 am:	<input type="text" value="0.0000"/> ratio	2-3 pm:	<input type="text" value="0.9500"/> ratio	10-11 pm:	<input type="text" value="0.0000"/> ratio
7-8 am:	<input type="text" value="0.1000"/> ratio	3-4 pm:	<input type="text" value="0.9500"/> ratio	11-Mdnt:	<input type="text" value="0.0000"/> ratio

Figure 7: Office occupancy weekdays

Annual Schedules | Week Schedules | Day Schedules |

Currently Active Day Schedule: Type: Fraction

Day Schedule Name: Type:

Hourly Values

Mdnt - 1:	<input type="text" value="0.0000"/> ratio	8-9 am:	<input type="text" value="0.0000"/> ratio	4-5 pm:	<input type="text" value="0.0000"/> ratio
1-2 am:	<input type="text" value="0.0000"/> ratio	9-10 am:	<input type="text" value="0.0000"/> ratio	5-6 pm:	<input type="text" value="0.0000"/> ratio
2-3 am:	<input type="text" value="0.0000"/> ratio	10-11 am:	<input type="text" value="0.0000"/> ratio	6-7 pm:	<input type="text" value="0.0000"/> ratio
3-4 am:	<input type="text" value="0.0000"/> ratio	11-noon:	<input type="text" value="0.0000"/> ratio	7-8 pm:	<input type="text" value="0.0000"/> ratio
4-5 am:	<input type="text" value="0.0000"/> ratio	noon-1:	<input type="text" value="0.0000"/> ratio	8-9 pm:	<input type="text" value="0.0000"/> ratio
5-6 am:	<input type="text" value="0.0000"/> ratio	1-2 pm:	<input type="text" value="0.0000"/> ratio	9-10 pm:	<input type="text" value="0.0000"/> ratio
6-7 am:	<input type="text" value="0.0000"/> ratio	2-3 pm:	<input type="text" value="0.0000"/> ratio	10-11 pm:	<input type="text" value="0.0000"/> ratio
7-8 am:	<input type="text" value="0.0000"/> ratio	3-4 pm:	<input type="text" value="0.0000"/> ratio	11-Mdnt:	<input type="text" value="0.0000"/> ratio

Figure 8: Office occupancy weekend

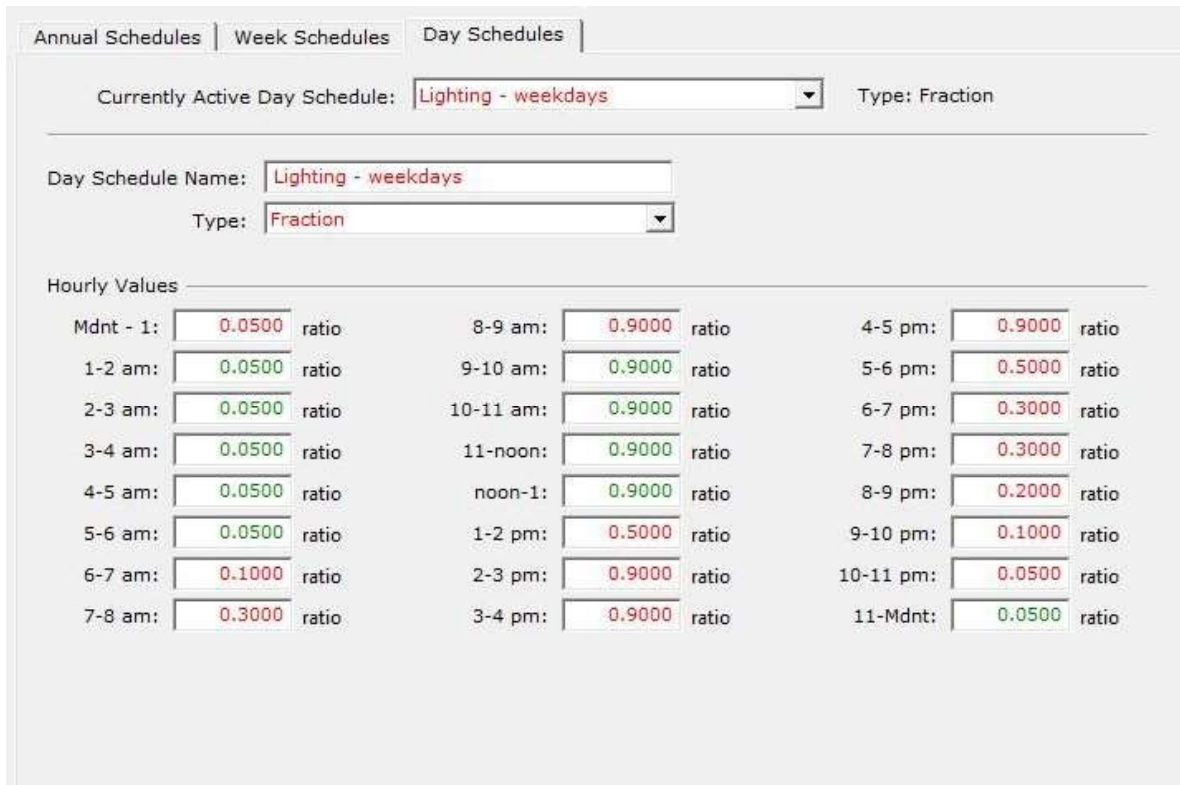


Figure 9: Office lighting weekdays

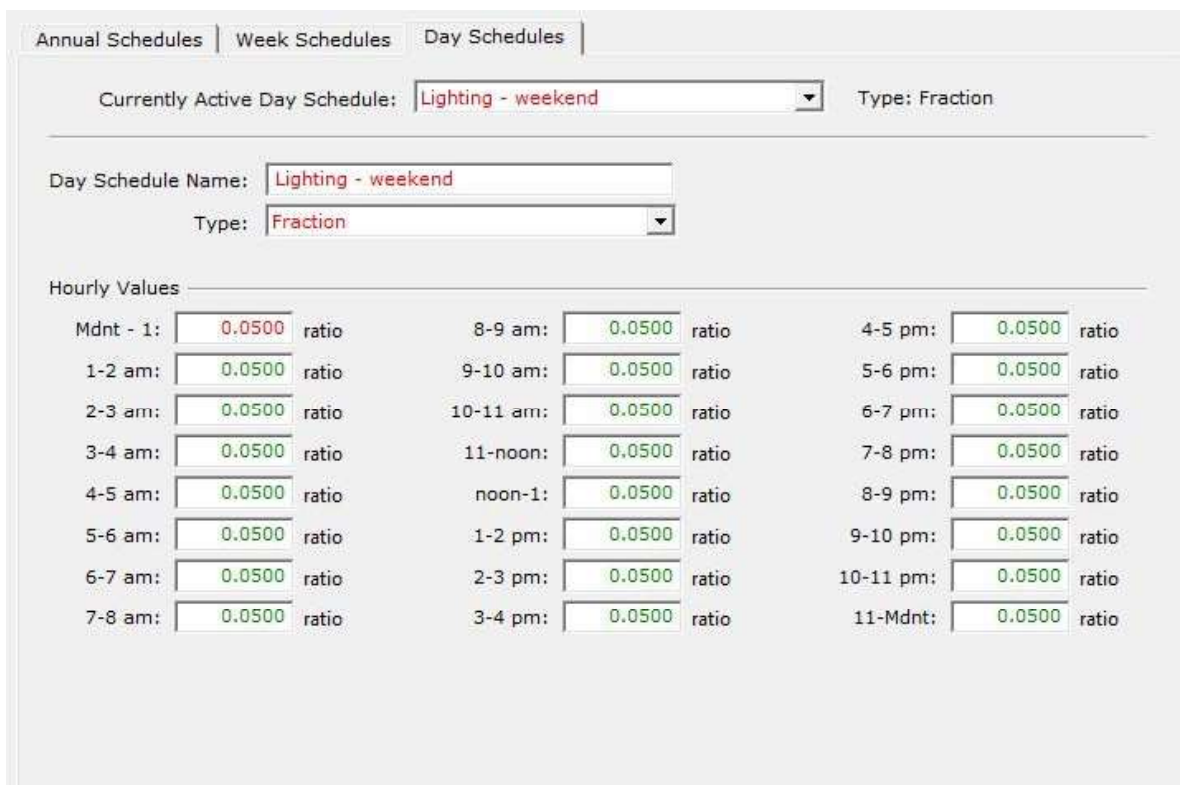


Figure 10: Office lighting weekend

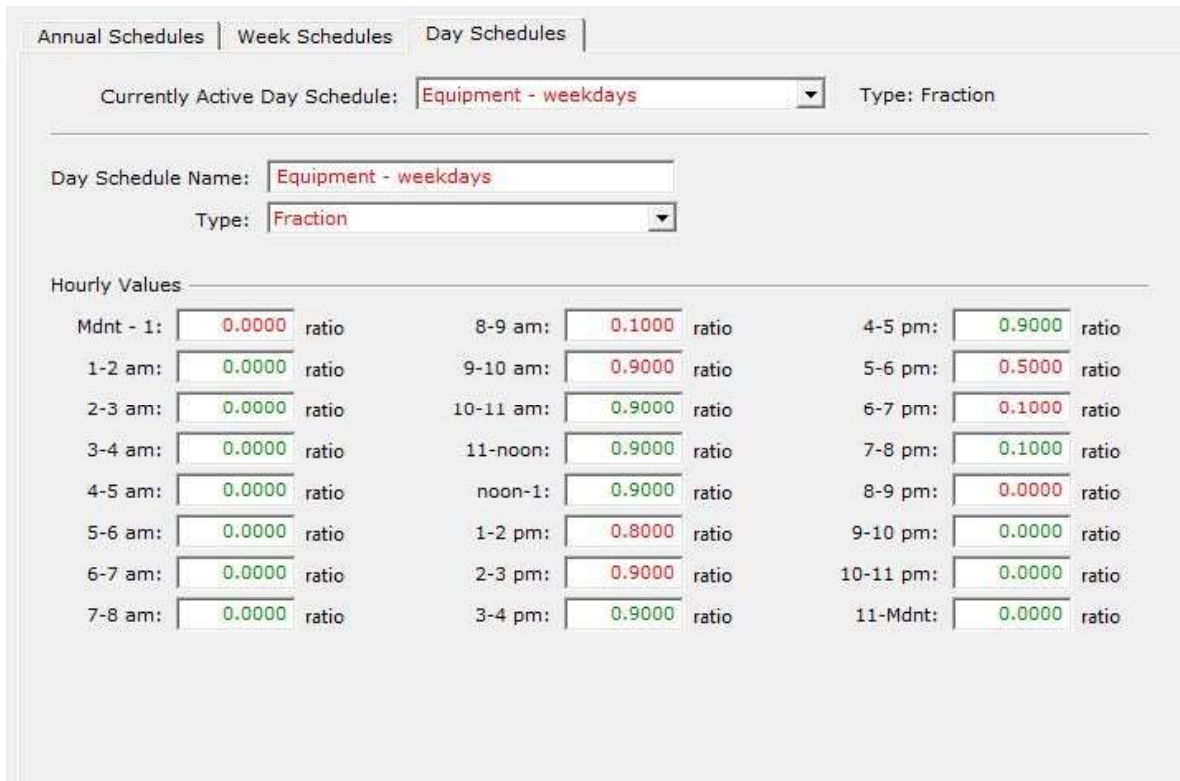


Figure 11: Office equipment weekdays

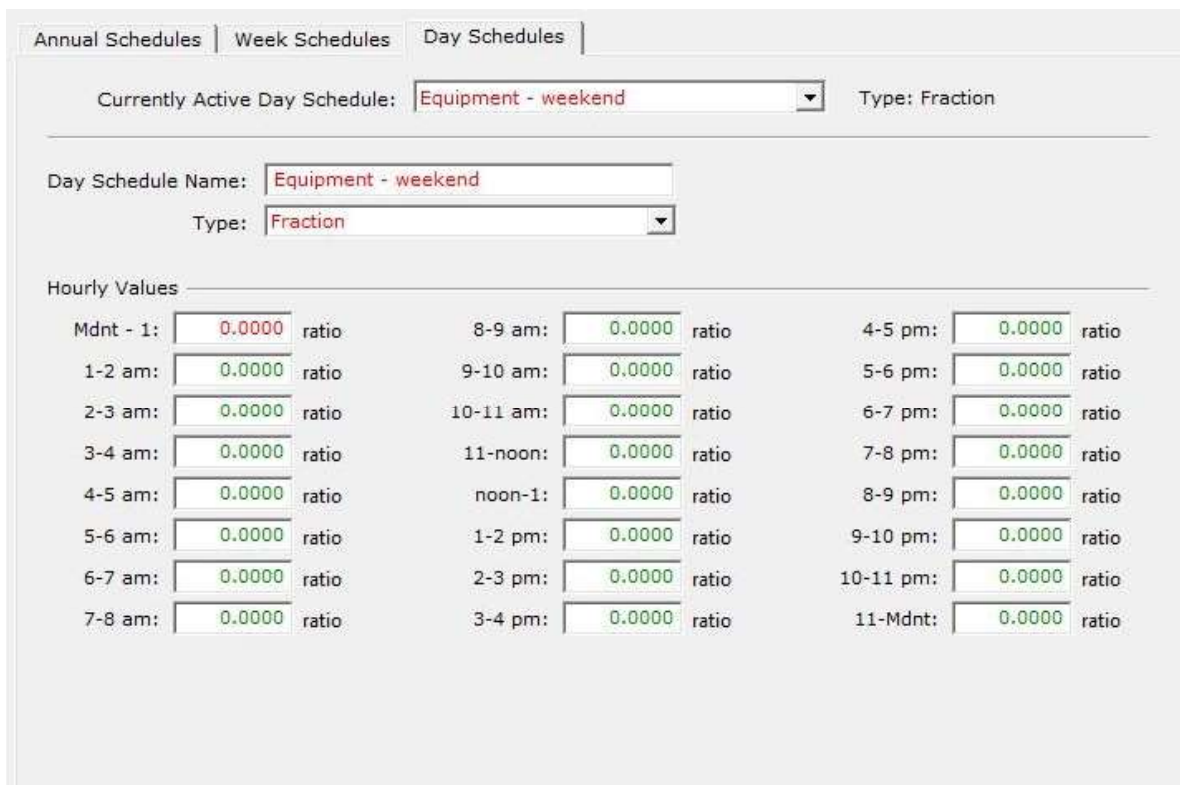


Figure 12: Office equipment weekend

Annual Schedules | Week Schedules | Day Schedules

Currently Active Day Schedule: **Fan - weekdays** Type: On/Off

Day Schedule Name: **Fan - weekdays**
 Type: **On/Off**

Hourly Values

Mdnt - 1:	<input type="text" value="0"/>	8-9 am:	<input type="text" value="1"/>	4-5 pm:	<input type="text" value="1"/>
1-2 am:	<input type="text" value="0"/>	9-10 am:	<input type="text" value="1"/>	5-6 pm:	<input type="text" value="1"/>
2-3 am:	<input type="text" value="0"/>	10-11 am:	<input type="text" value="1"/>	6-7 pm:	<input type="text" value="0"/>
3-4 am:	<input type="text" value="0"/>	11-noon:	<input type="text" value="1"/>	7-8 pm:	<input type="text" value="0"/>
4-5 am:	<input type="text" value="0"/>	noon-1:	<input type="text" value="1"/>	8-9 pm:	<input type="text" value="0"/>
5-6 am:	<input type="text" value="0"/>	1-2 pm:	<input type="text" value="1"/>	9-10 pm:	<input type="text" value="0"/>
6-7 am:	<input type="text" value="0"/>	2-3 pm:	<input type="text" value="1"/>	10-11 pm:	<input type="text" value="0"/>
7-8 am:	<input type="text" value="0"/>	3-4 pm:	<input type="text" value="1"/>	11-Mdnt:	<input type="text" value="0"/>

Figure 13: HVAC Fan weekdays

Annual Schedules | Week Schedules | Day Schedules

Currently Active Day Schedule: **Fan - weekend** Type: On/Off

Day Schedule Name: **Fan - weekend**
 Type: **On/Off**

Hourly Values

Mdnt - 1:	<input type="text" value="0"/>	8-9 am:	<input type="text" value="0"/>	4-5 pm:	<input type="text" value="0"/>
1-2 am:	<input type="text" value="0"/>	9-10 am:	<input type="text" value="0"/>	5-6 pm:	<input type="text" value="0"/>
2-3 am:	<input type="text" value="0"/>	10-11 am:	<input type="text" value="0"/>	6-7 pm:	<input type="text" value="0"/>
3-4 am:	<input type="text" value="0"/>	11-noon:	<input type="text" value="0"/>	7-8 pm:	<input type="text" value="0"/>
4-5 am:	<input type="text" value="0"/>	noon-1:	<input type="text" value="0"/>	8-9 pm:	<input type="text" value="0"/>
5-6 am:	<input type="text" value="0"/>	1-2 pm:	<input type="text" value="0"/>	9-10 pm:	<input type="text" value="0"/>
6-7 am:	<input type="text" value="0"/>	2-3 pm:	<input type="text" value="0"/>	10-11 pm:	<input type="text" value="0"/>
7-8 am:	<input type="text" value="0"/>	3-4 pm:	<input type="text" value="0"/>	11-Mdnt:	<input type="text" value="0"/>

Figure 14: HVAC Fan weekend

Annual Schedules | Week Schedules | Day Schedules

Currently Active Day Schedule: **Elevator - weekdays** Type: Fraction

Day Schedule Name: **Elevator - weekdays**
Type: **Fraction**

Hourly Values

Mdnt - 1:	0.0500 ratio	8-9 am:	0.8000 ratio	4-5 pm:	0.7500 ratio
1-2 am:	0.0500 ratio	9-10 am:	0.8000 ratio	5-6 pm:	0.9500 ratio
2-3 am:	0.0500 ratio	10-11 am:	0.5500 ratio	6-7 pm:	0.5000 ratio
3-4 am:	0.0500 ratio	11-noon:	0.3500 ratio	7-8 pm:	0.3000 ratio
4-5 am:	0.0500 ratio	noon-1:	0.2500 ratio	8-9 pm:	0.2000 ratio
5-6 am:	0.0500 ratio	1-2 pm:	0.9500 ratio	9-10 pm:	0.0500 ratio
6-7 am:	0.2000 ratio	2-3 pm:	0.9500 ratio	10-11 pm:	0.0500 ratio
7-8 am:	0.4000 ratio	3-4 pm:	0.3500 ratio	11-Mdnt:	0.0500 ratio

Figure 15: Elevator weekdays

Annual Schedules | Week Schedules | Day Schedules

Currently Active Day Schedule: **Elevator - weekend** Type: Fraction

Day Schedule Name: **Elevator - weekend**
Type: **Fraction**

Hourly Values

Mdnt - 1:	0.0500 ratio	8-9 am:	0.0500 ratio	4-5 pm:	0.0500 ratio
1-2 am:	0.0500 ratio	9-10 am:	0.0500 ratio	5-6 pm:	0.0500 ratio
2-3 am:	0.0500 ratio	10-11 am:	0.0500 ratio	6-7 pm:	0.0500 ratio
3-4 am:	0.0500 ratio	11-noon:	0.0500 ratio	7-8 pm:	0.0500 ratio
4-5 am:	0.0500 ratio	noon-1:	0.0500 ratio	8-9 pm:	0.0500 ratio
5-6 am:	0.0500 ratio	1-2 pm:	0.0500 ratio	9-10 pm:	0.0500 ratio
6-7 am:	0.0500 ratio	2-3 pm:	0.0500 ratio	10-11 pm:	0.0500 ratio
7-8 am:	0.0500 ratio	3-4 pm:	0.0500 ratio	11-Mdnt:	0.0500 ratio

Figure 16: Elevator weekend

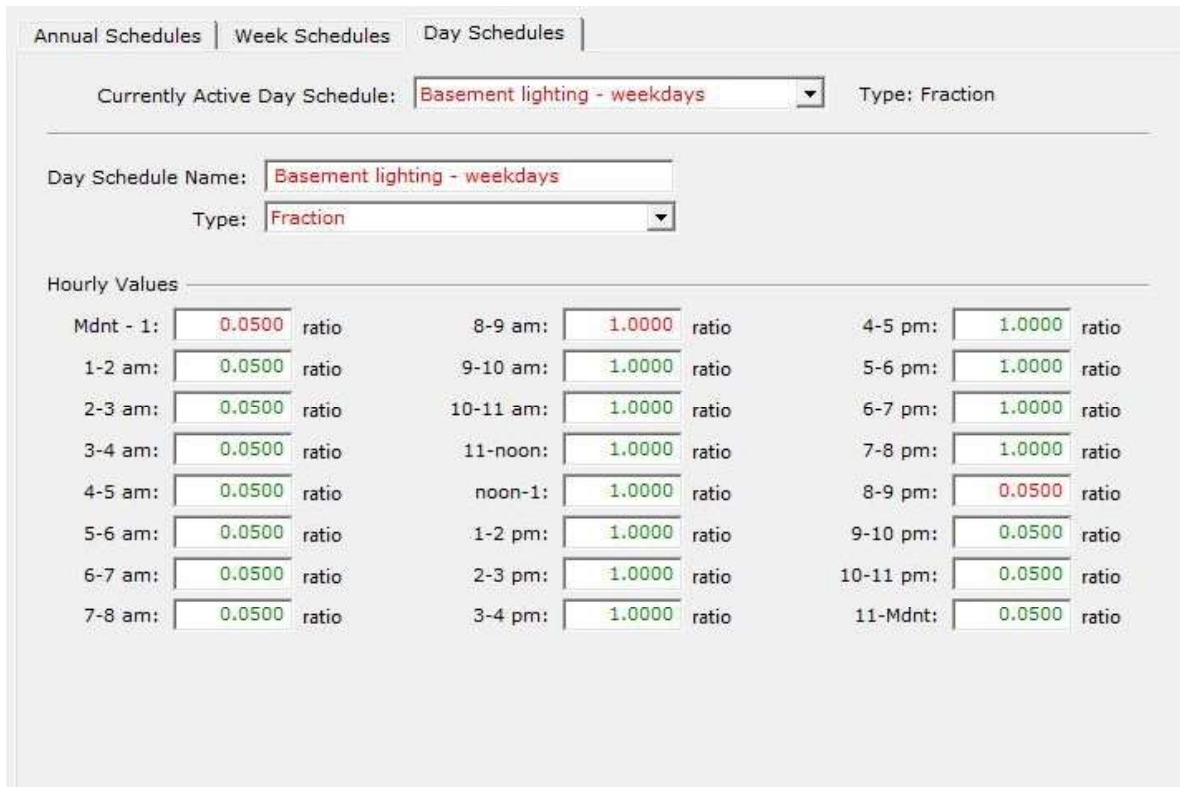


Figure 17: Basement lighting weekdays

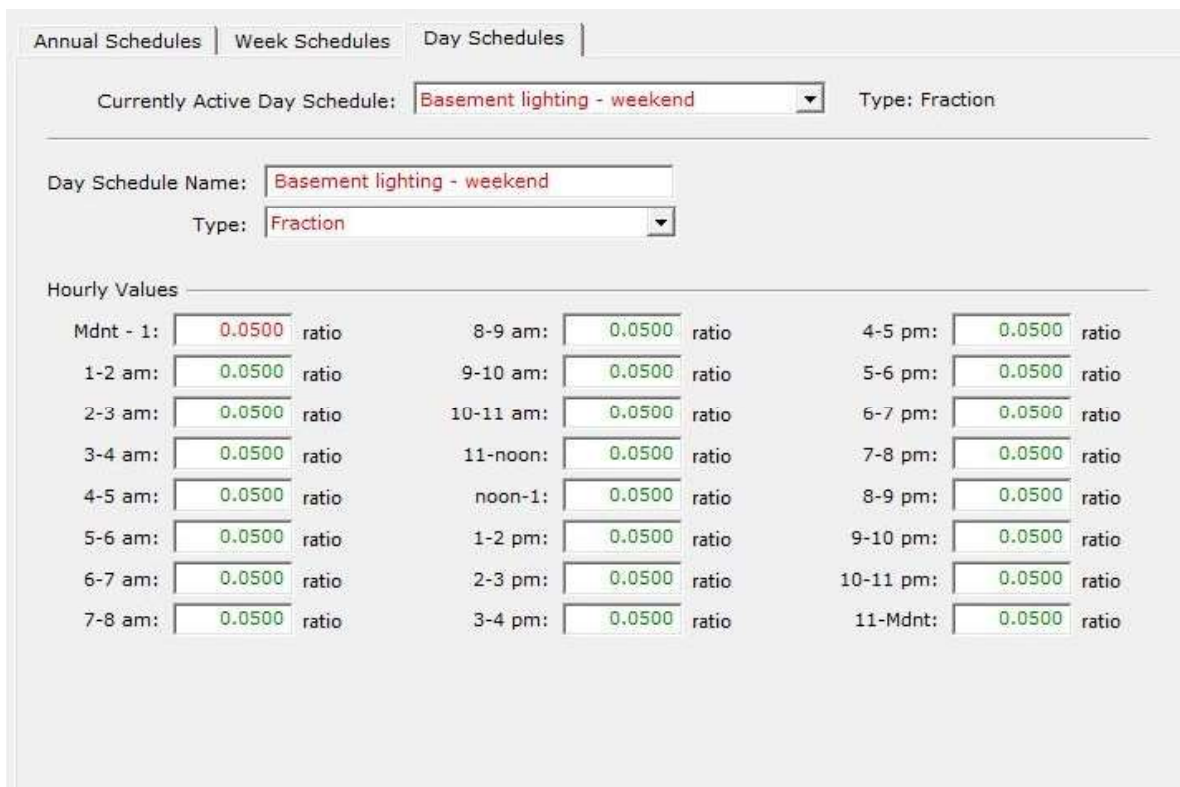


Figure 18: Basement lighting weekend

Annual Schedules | Week Schedules | Day Schedules

Currently Active Day Schedule: **Basement ventilation - weekdays** Type: Fraction

Day Schedule Name: **Basement ventilation - weekdays**
Type: **Fraction**

Hourly Values

Mdnt - 1:	0.0000 ratio	8-9 am:	1.0000 ratio	4-5 pm:	1.0000 ratio
1-2 am:	0.0000 ratio	9-10 am:	1.0000 ratio	5-6 pm:	1.0000 ratio
2-3 am:	0.0000 ratio	10-11 am:	1.0000 ratio	6-7 pm:	0.0000 ratio
3-4 am:	0.0000 ratio	11-noon:	1.0000 ratio	7-8 pm:	0.0000 ratio
4-5 am:	0.0000 ratio	noon-1:	1.0000 ratio	8-9 pm:	0.0000 ratio
5-6 am:	0.0000 ratio	1-2 pm:	1.0000 ratio	9-10 pm:	0.0000 ratio
6-7 am:	0.0000 ratio	2-3 pm:	1.0000 ratio	10-11 pm:	0.0000 ratio
7-8 am:	0.0000 ratio	3-4 pm:	1.0000 ratio	11-Mdnt:	0.0000 ratio

Figure 19: Basement vent weekdays

Annual Schedules | Week Schedules | Day Schedules

Currently Active Day Schedule: **Basement ventilation - weekend** Type: Fraction

Day Schedule Name: **Basement ventilation - weekend**
Type: **Fraction**

Hourly Values

Mdnt - 1:	0.0000 ratio	8-9 am:	0.0000 ratio	4-5 pm:	0.0000 ratio
1-2 am:	0.0000 ratio	9-10 am:	0.0000 ratio	5-6 pm:	0.0000 ratio
2-3 am:	0.0000 ratio	10-11 am:	0.0000 ratio	6-7 pm:	0.0000 ratio
3-4 am:	0.0000 ratio	11-noon:	0.0000 ratio	7-8 pm:	0.0000 ratio
4-5 am:	0.0000 ratio	noon-1:	0.0000 ratio	8-9 pm:	0.0000 ratio
5-6 am:	0.0000 ratio	1-2 pm:	0.0000 ratio	9-10 pm:	0.0000 ratio
6-7 am:	0.0000 ratio	2-3 pm:	0.0000 ratio	10-11 pm:	0.0000 ratio
7-8 am:	0.0000 ratio	3-4 pm:	0.0000 ratio	11-Mdnt:	0.0000 ratio

Figure 20: Basement vent weekend

Envelope Detailed Specification

Table 1: Building envelope properties

Component	Category	Input Parameter	Base case	Proposed
Envelope	Wall	Material	As per ECBC	200 mm Tric-Eco Wall
		U-value (Btu/hrsqt F)	0.0705	0.018
	Roof	Material	As per ECBC	150 mm RCC
		U-value (Btu/hrsqt F)	0.0581	0.035
	Glass	U-value (Btu/hrsqt F)	0.528	0.283
		SHGC	0.27	0.25
		Shading Coefficient	0.31	0.29
		VLT	-	50%

Table 1 above lists the building envelope properties used for WBP method for Proposed Development

Table 2: U-Value calculation - Building envelope

Wall Composition –Tric Eco Wall				
Item	Thickness (mm)	Thickness (Inch)	R Value per inch (hr.sq.ft. °F/Btu)	R Value (hr.sq.ft. °F/Btu)
External Air				0.25
Tric-Eco Wall	200	7.87	6.87	54.07
Internal Air				0.68
Total R Value				55
U Value (Btu/hr.ft².°F)				0.018

ROOF ASSEMBLY				
Particulars	Thickness (mm)	Thickness (Inch)	R Value per inch (hr.sq.ft. °F/Btu)	R Value (hr.sq.ft. °F/Btu)
External Air				0.25
Heat resistance Tiles	20	0.787	0.2	0.16
Cement Screed	40	1.57	0.4	0.63
Insulation (XPS)	100	3.94	0.3	3.63
PCC In slope	75	2.95	2.4	7.1
RCC Slab	150	5.9	1.6	9.5
Internal Air				0.92
Total R Value				22.2
U Value (Btu/hr.ft².°F)				0.035

HVAC (Heating, Ventilation & Air-conditioning)

The ventilation system has been modeled in accordance with the requirement of §5.2.1 of the code. CFM and load calculation has been summary sheet has been attached in Annexure 1.

Table 3: Zone cooling & heating set point

Component	Category	Input Parameter	Base case	Proposed
HVAC	Specification	System	VRF with DOAS sys	VRF with DOAS sys
		Efficiency (EER)	3.02	3.50
	Operation	Schedule	As per ECBC 2017	
	Temperature	Cooling set point (°F)	75	
		Heating set point (°F)	70	

Lighting

Table 4: LPD level as per ECBC

Lighting Power Density calculation (As per space function method- ECBC §6.3.5)			
Space	Baseline case	Propose case	Unit
Office	0.78	0.35	W/ ft ²
External	0.88	0.79	W/ ft ²

Electrical Power

3.1.10. Transformer

The maximum total losses of the proposed transformer at 100% loading and 50% loading has been determined as per ECBC 2017 Table 7-2. Additional metering class current transformers (CTs) and potential transformers (PTs) shall be provided. Voltage drop for feeders shall not exceed 2% at design load. Voltage drop for branch circuit shall not exceed 3% at design load.

3.1.11. Motors (type, efficiency)

IE-4 High Efficiency Motors has been recommended as per ECBC 2017 Section 7.2.2 and shall be followed.

3.1.12. Diesel generator sets

BEE 5 Star Rated Diesel Generator sets have been recommended as per ECBC 2017 Section 7.2.3 and shall be followed.

3.1.13. Check metering and monitoring

Permanently installed electric meter to record demand (kW), energy (kWh), and total power factor (kVARH) has been recommended as per ECBC 2017 Section 7.2.4 and shall be followed. Additionally, sub-meters for HVAC system, Interior and Exterior Lighting and Plug loads shall also be provided.

3.1.14. Power factor correction

APFC panel shall be installed for Power Factor Correction of 0.99. Dry (MPPH type) automatic power factor improvement capacitor banks, 400/430 Volts shall conform to IS-2834-1964 (Amended to date). All the units shall be connected in parallel for each block by means of solid copper bars.

3.1.15. Power distribution system

Power cabling shall be sized so that the distribution losses do not exceed 1% of the total power usage as recommended in ECBC 2017 Section 7.2.6. All cables are XLPE as IS: 7098 for power current carrying capacity so the losses are minimum.

3.1.16. Uninterruptable Power Supply (UPS)

Energy Efficient UPS system with minimum efficiency of 93.8% at 100% loading is being installed for Emergency lighting, Fire alarm and security systems.

Energy Performance Analysis

The proposed building is considered operating throughout the day. The following table indicates the operating hours and diversity factors considered for the building.

Table 5: Operation schedule considered

Component	Category	Input Parameter	Base case	Proposed
Occupancy & Equipment	Equipment	All spaces (W/sqft)	1.0	
	Operation	Equipment Schedule	As per Section 9.6 of ECBC 2017	
		Occupancy Schedule	As per Section 9.6 of ECBC 2017	

Table 6: Summary of Unmet hours

Baseline case	Cool Unmet hour	9
	Heat Unmet hour	0
Proposed case	Cool Unmet hour	240
	Heat Unmet hour	0

Table 7: Summary of total tonnage and Sq. ft. per TR

	Total tonnage	Sq. ft. per TR
Proposed case	63	412
Baseline case	301	86

Summary of Renewable Energy generation of the project:

A dedicated REGZ equivalent to at least 25% of roof area or area required for generation of energy equivalent to 3% of total peak demand or connected load of the building to be SuperECBC, whichever is less, shall be provided in all buildings.

Total peak demand of the building = 164.3 kW

Therefore, 3% of peak demand = $(164.3 \times 0.03) = 4.93$ kW

But project has proposed to install **5 kW** PV system = $(5/164.3) \times 100\% = 3\%$ of total peak demand.

Solar PV generation calculation has been attached in Annexure 2.

Building View:

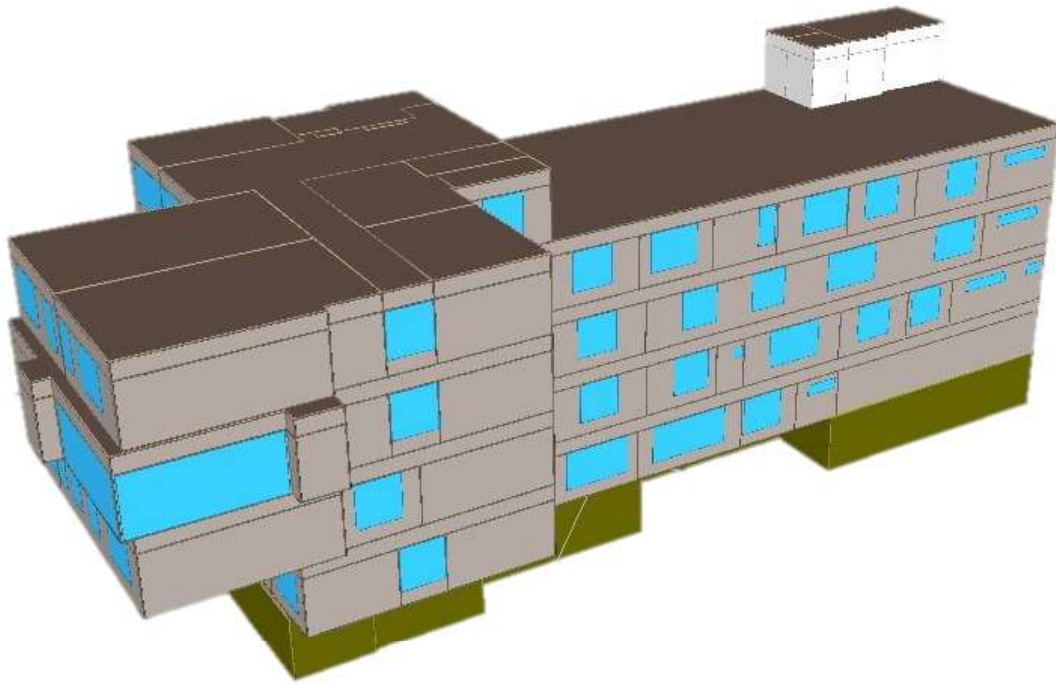


Figure 21 : 3D - front view of HSBTE building

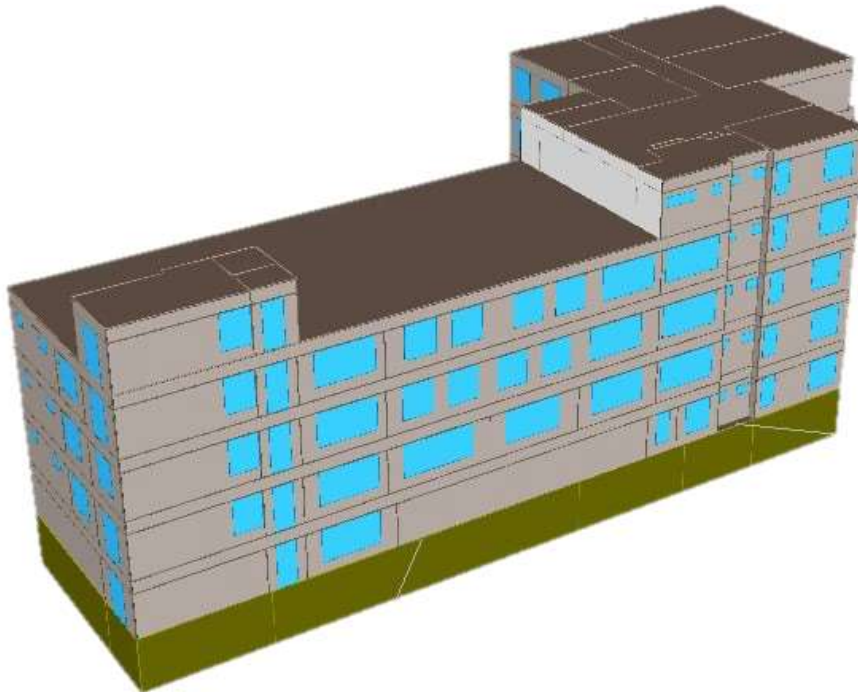


Figure 22: 3D - rear view of HSBTE building

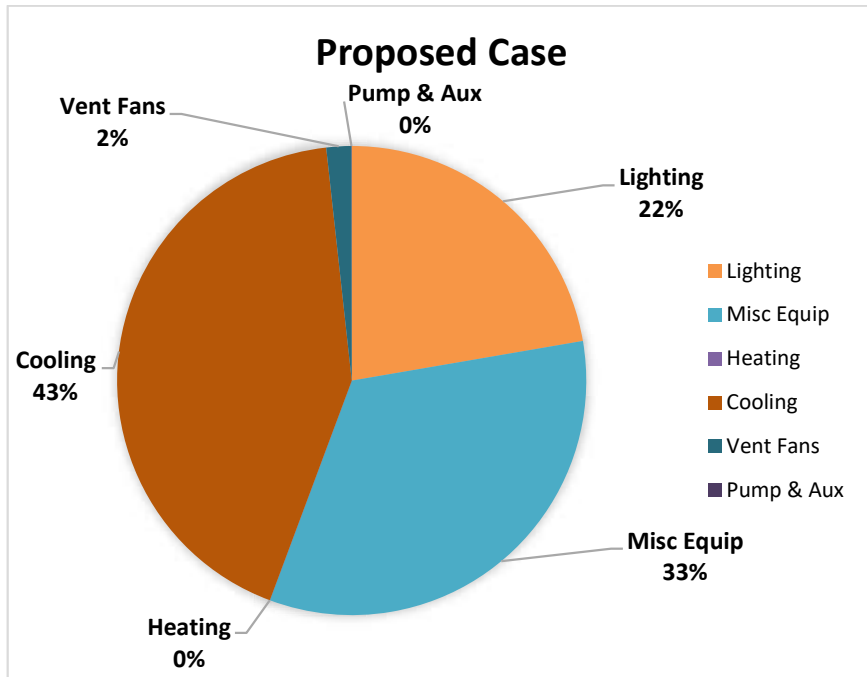


Figure 23: Proposed Energy End Use Characterization

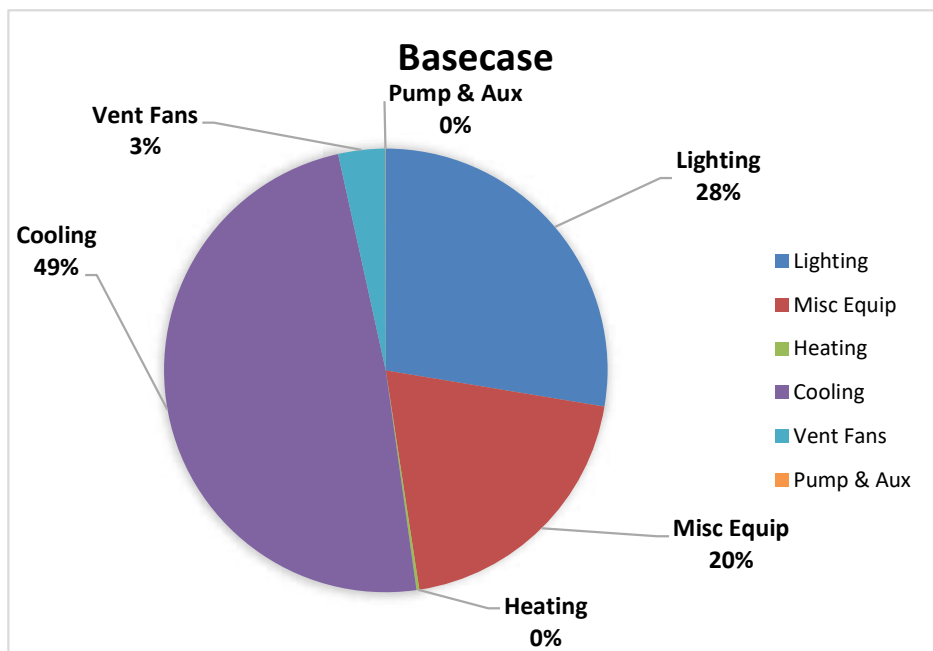


Figure 24: Base case Energy End Use Characterization

Overall Energy Consumption

Table 8: Overall Energy consumption in kWh (without basement and external lighting consumption)

DESCRIPTION	UNITS	LIGHTS	MISC EQUIP	Heating	Cooling	Pump & Aux	VENT FANS	TOTAL
PROPOSED	KWH	87077	130324	39	166277	101	6698	390516
BASE - 0 DEG	KWH	180172	130324	76	316502	103	22195	649372
BASE- 90 DEG	KWH	180172	130324	538	317769	106	22721	651630
BASE - 180 DEG	KWH	180172	130324	875	317595	105	22711	651782
BASE - 270 DEG	KWH	180172	130324	453	321182	107	22196	654434
BASE - AVG	KWH	180172	130324	485.5	318262	105.25	22455.75	651805
ENERGY / COST SAVINGS		51.7%	0%	92.0%	47.8	4.0	70.2%	40.1%

From the above table following parameters are analysed, proposed case energy consumption of the project is estimated to be **390516 kWh**, which is less than the base case energy consumption i.e., **651805 kWh**.

Therefore, the project achieves an energy saving of 40.1% when compared with the ECBC baseline case. Thereby, the project is meeting the SuperECBC compliance level by the 'Whole Building Performance' approach.

e-Quest Output Screenshots

Commercial Building

Baseline 0 degree

HSBTE - Panchkula DOE-2.2-50a 7/17/2022 11:14:40 BDL RUN 1

REPORT- BEPU Building Utility Performance WEATHER FILE- EPW New Delhi,Delhi,

	LIGHTS	TASK LIGHTS	MISC EQUIP	SPACE HEATING	SPACE COOLING	HEAT REJECT	PUMPS & AUX	VENT FANS	REFRIG DISPLAY	HT PUMP SUPPLEM	DOMEST HOT WTR	EXT USAGE	TOTAL
EM1 ELECTRICITY													
KWH	180172.	0.	130324.	76.	316502.	0.	103.	22195.	0.	0.	0.	16644.	666015.
EM2 ELECTRICITY													
KWH	0.	0.	0.	0.	0.	0.	0.	996.	0.	0.	0.	0.	996.
FM1 NATURAL-GAS													
THERM	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TOTAL ELECTRICITY 667012. KWH 11.804 KWH /SQFT-YR GROSS-AREA 11.804 KWH /SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 0.18
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.00
 HOURS ANY ZONE ABOVE COOLING THROTTLING RANGE = 9
 HOURS ANY ZONE BELOW HEATING THROTTLING RANGE = 0

NOTE: ENERGY IS APPORTIONED HOURLY TO ALL END-USE CATEGORIES.

Baseline 90 degree

HSBTE - Panchkula DOE-2.2-50a 7/17/2022 17:25:39 BDL RUN 1

REPORT- BEPU Building Utility Performance WEATHER FILE- EPW New Delhi,Delhi,

	LIGHTS	TASK LIGHTS	MISC EQUIP	SPACE HEATING	SPACE COOLING	HEAT REJECT	PUMPS & AUX	VENT FANS	REFRIG DISPLAY	HT PUMP SUPPLEM	DOMEST HOT WTR	EXT USAGE	TOTAL
EM1 ELECTRICITY													
KWH	180172.	0.	130324.	538.	317769.	0.	106.	22721.	0.	0.	0.	16644.	668272.
EM2 ELECTRICITY													
KWH	0.	0.	0.	0.	0.	0.	0.	996.	0.	0.	0.	0.	996.
FM1 NATURAL-GAS													
THERM	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TOTAL ELECTRICITY 669269. KWH 11.844 KWH /SQFT-YR GROSS-AREA 11.844 KWH /SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 1.57
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.00
 HOURS ANY ZONE ABOVE COOLING THROTTLING RANGE = 45
 HOURS ANY ZONE BELOW HEATING THROTTLING RANGE = 58

NOTE: ENERGY IS APPORTIONED HOURLY TO ALL END-USE CATEGORIES.

Baseline 180 degree

HSBTE - Panchkula DOE-2.2-50a 7/17/2022 17:41:25 BDL RUN 1

REPORT- BEPU Building Utility Performance WEATHER FILE- EPW New Delhi, Delhi,

	LIGHTS	TASK LIGHTS	MISC EQUIP	SPACE HEATING	SPACE COOLING	HEAT REJECT	PUMPS & AUX	VENT FANS	REFRIG DISPLAY	HT PUMP SUPPLEM	DOMEST HOT WTR	EXT USAGE	TOTAL
EM1 ELECTRICITY													
KWH	180172.	0.	130324.	875.	317595.	0.	105.	22711.	0.	0.	0.	16644.	668424.
EM2 ELECTRICITY													
KWH	0.	0.	0.	0.	0.	0.	0.	996.	0.	0.	0.	0.	996.
FM1 NATURAL-GAS													
THERM	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TOTAL ELECTRICITY 669421. KWH 11.846 KWH /SQFT-YR GROSS-AREA 11.846 KWH /SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 3.37
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.00
 HOURS ANY ZONE ABOVE COOLING THROTTLING RANGE = 30
 HOURS ANY ZONE BELOW HEATING THROTTLING RANGE = 170

NOTE: ENERGY IS APPORTIONED HOURLY TO ALL END-USE CATEGORIES.

Baseline 270 degree

HSBTE - Panchkula DOE-2.2-50a 7/17/2022 17:48:09 BDL RUN 1

REPORT- BEPU Building Utility Performance WEATHER FILE- EPW New Delhi, Delhi,

	LIGHTS	TASK LIGHTS	MISC EQUIP	SPACE HEATING	SPACE COOLING	HEAT REJECT	PUMPS & AUX	VENT FANS	REFRIG DISPLAY	HT PUMP SUPPLEM	DOMEST HOT WTR	EXT USAGE	TOTAL
EM1 ELECTRICITY													
KWH	180172.	0.	130324.	453.	321182.	0.	107.	22196.	0.	0.	0.	16644.	671078.
EM2 ELECTRICITY													
KWH	0.	0.	0.	0.	0.	0.	0.	996.	0.	0.	0.	0.	996.
FM1 NATURAL-GAS													
THERM	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TOTAL ELECTRICITY 672074. KWH 11.893 KWH /SQFT-YR GROSS-AREA 11.893 KWH /SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 4.56
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.00
 HOURS ANY ZONE ABOVE COOLING THROTTLING RANGE = 232
 HOURS ANY ZONE BELOW HEATING THROTTLING RANGE = 1

NOTE: ENERGY IS APPORTIONED HOURLY TO ALL END-USE CATEGORIES.

Proposed Case

HSBTE - Panchkula DOE-2.2-50a 7/17/2022 21:39:50 BDL RUN 1

REPORT- BEPU Building Utility Performance WEATHER FILE- EPW New Delhi,Delhi,

	LIGHTS	TASK LIGHTS	MISC EQUIP	SPACE HEATING	SPACE COOLING	HEAT REJECT	PUMPS & AUX	VENT FANS	REFRIG DISPLAY	HT PUMP SUPPLEM	DOMEST HOT WTR	EXT USAGE	TOTAL
EM1 ELECTRICITY													
KWH	87077.	0.	130324.	39.	166277.	0.	101.	6698.	0.	0.	0.	14892.	405408.
EM2 ELECTRICITY													
KWH	0.	0.	0.	0.	0.	0.	0.	996.	0.	0.	0.	0.	996.
FM1 NATURAL-GAS													
THERM	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TOTAL ELECTRICITY 406405. KWH 7.192 KWH /SQFT-YR GROSS-AREA 7.192 KWH /SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 4.70
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.00
 HOURS ANY ZONE ABOVE COOLING THROTTLING RANGE = 240
 HOURS ANY ZONE BELOW HEATING THROTTLING RANGE = 0

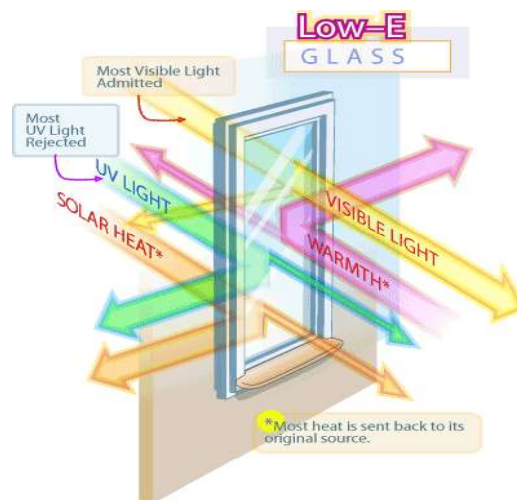
NOTE: ENERGY IS APPORTIONED HOURLY TO ALL END-USE CATEGORIES.

Daylight Analysis

Introduction

The commitment 4.2.3 of ECBC 2017 for ECBC Compliance Building is checked by computer simulation analysis. In the computer analysis method, the daylight analysis is done by creating a model in Design Builder and then simulating it further. A summary of daylight calculations is provided in Table 11. The simulation tool and UDI analysis image of each floor plate are attached below.

Daylight is a natural source of light, which meets all the requirements of good lighting while enhancing user efficiency and productivity. In India, daylight is available in plenty and can be used for satisfactory indoor illumination during the day. Daylighting plays a crucial role in developing comfortable indoor environmental quality. It reduces the need for electric lighting of building interiors, resulting in decreased energy use. Daylight penetration inside the living space depends entirely on the building design, i.e., the orientation, internal space arrangement, distribution of openings, size and shape of the openings, shading design and glazing properties, and soon.



For achieving utmost benefit of day lighting within a living space, the glass should be chosen in such a way that it allows maximum penetration of daylight to provide visual comfort to the inhabitants without producing glare. In addition to that, the glass should also restrict the heat of the sun from entering the space thereby reducing the cooling load of the space.

Objective

The prime intent of the criterion is to ensure connectivity between the interior and the exterior environment, by providing adequate day lighting within the living spaces. The analysis would help in:

- Optimizing the type of glass used
- Assessing the availability of daylight in living areas and finalizing the credit points as per the new buildings criteria.

Methodology-

In the computer analysis method, the daylight analysis is done by creating a model and then performing Analysis in Design Builder software. For day lighting analysis, the following design values have been considered during this process:

1. The model is designed considering that the sky is clear.
2. The day lighting simulation is done on a work plane of 800 mm height from finish floor level.

Executive Summary-

Project Name	HSBTE building, Panchkula
Project Type	Office Building
Location	Panchkula
Climate Type	Composite
Daylighted Area (%)	64.0 %
Simulation Tool Used	Design Builder

Daylight Analysis

The commitment 4.2.3 of ECBC 2017 for Compliance Building is checked by computer simulation Analysis. In the computer analysis method, the daylight analysis is done by creating a model and then performing Analysis in Design Builder software. A summary of daylight calculations is provided in the table below. The simulation tool and UDI Analysis image of each floor plate are attached below.

Table 9: Daylight Calculation

Floor Description	UDI
Ground Floor	65.0 %
First Floor	62.4 %
Second Floor	63.1 %
Third Floor	61.1 %
Fourth Floor	71.6 %
Total UDI of the Project	64.0 %
SuperECBC recommendation for building category	60 %

Design Builder Daylight Simulation Screenshots

Simulated results:

Untitled, HSBTE - Panchkula

Annual daylighting

Block	Zone	Floor Area (m2)	sDA Area in Ra...	sDA Area in Ra...	ASE Area in Ra...	ASE Area in Ra...	UDI Area in Ra...	UDI Area in Ra...
Ground floor	Zone 1	1045.018	454.024	43.446	871.303	83.377	679.671	65.039
First floor	Zone 1	1188.997	474.834	39.936	1013.277	85.221	741.462	62.360
Second floor	Zone 1	1325.963	553.334	41.731	1109.124	83.647	837.053	63.128
Third floor	Zone 1	1344.631	535.439	39.820	1129.121	83.973	820.988	61.057
Fourth floor	Zone 1	802.671	489.249	60.953	583.368	72.678	575.096	71.648
Total		5707.280	2506.880	43.924	4706.193	82.459	3654.269	64.028

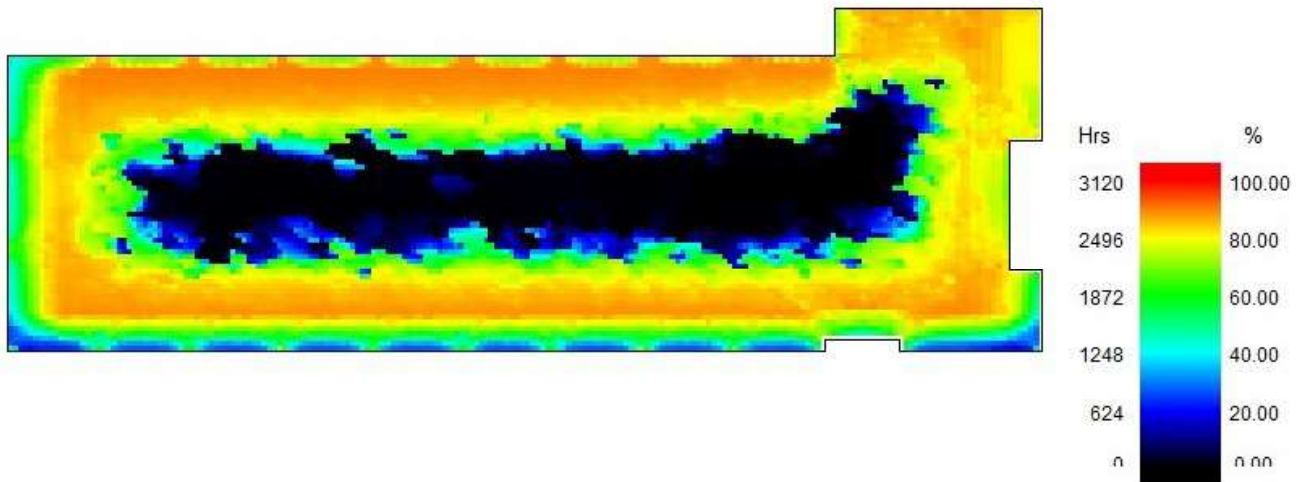
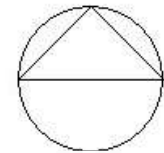


Figure 25: Ground Floor

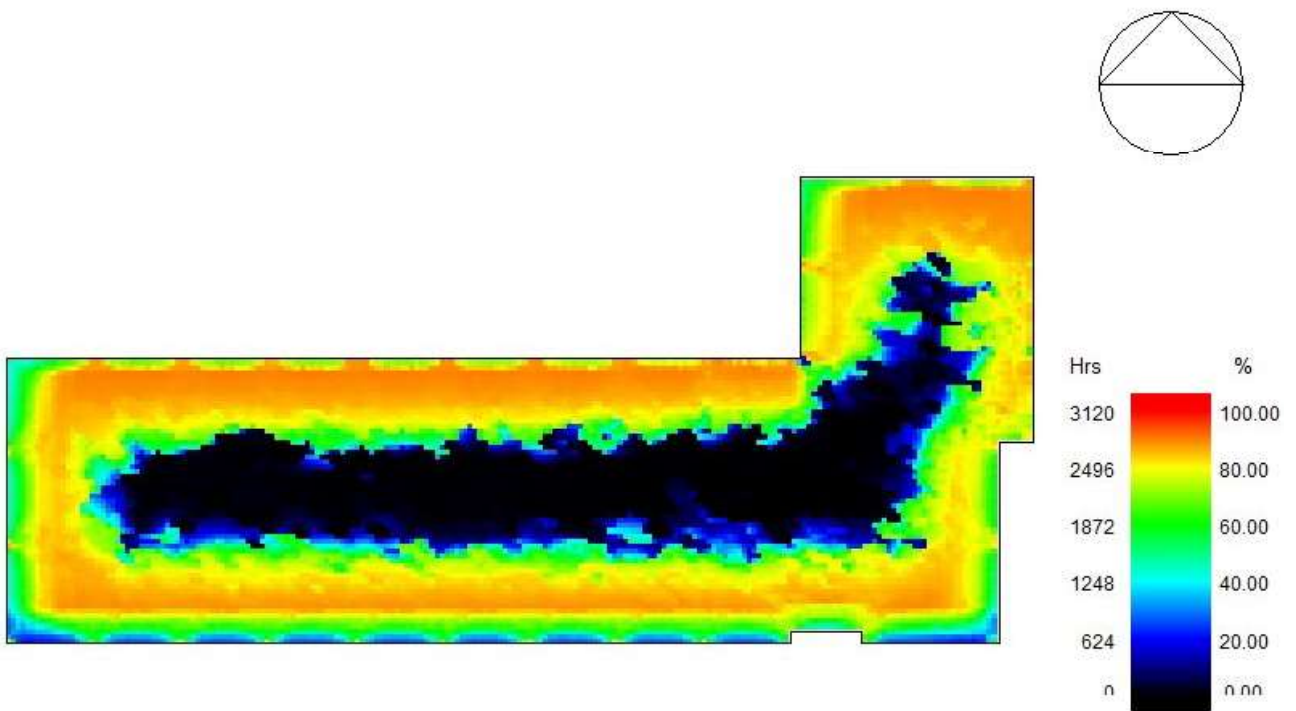


Figure 26: First Floor

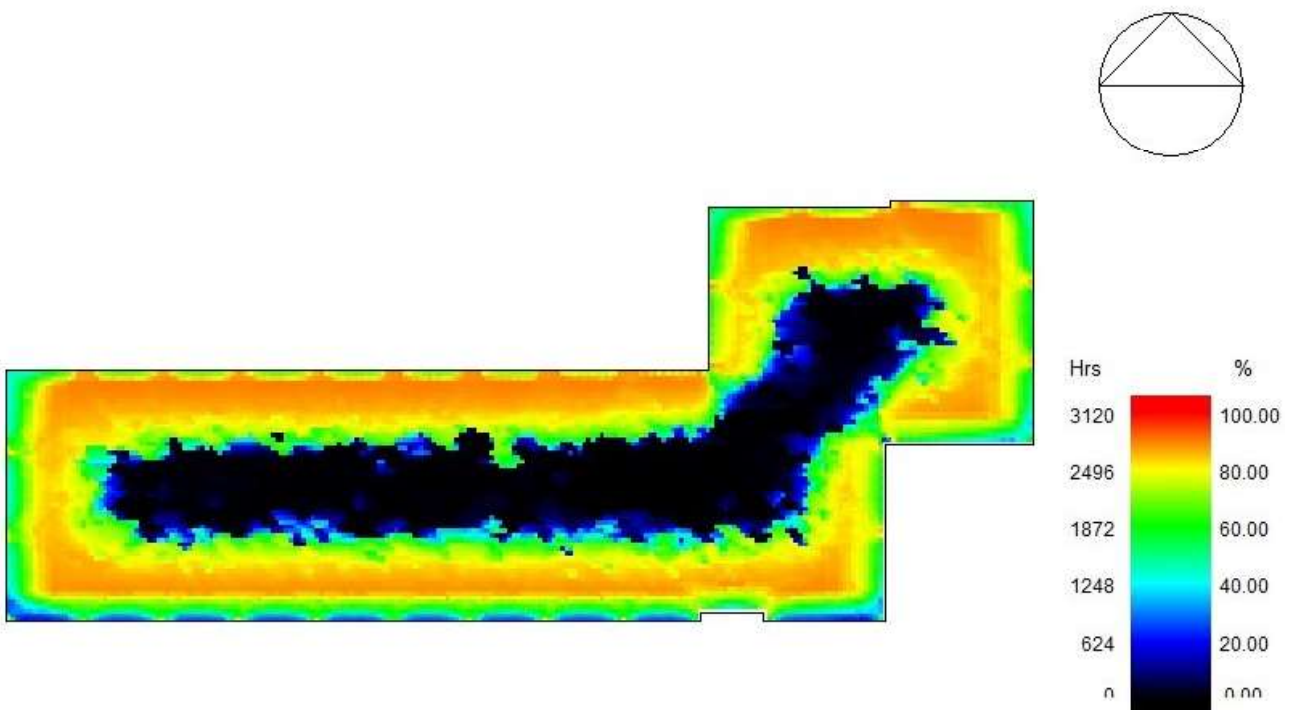


Figure 27: Second Floor

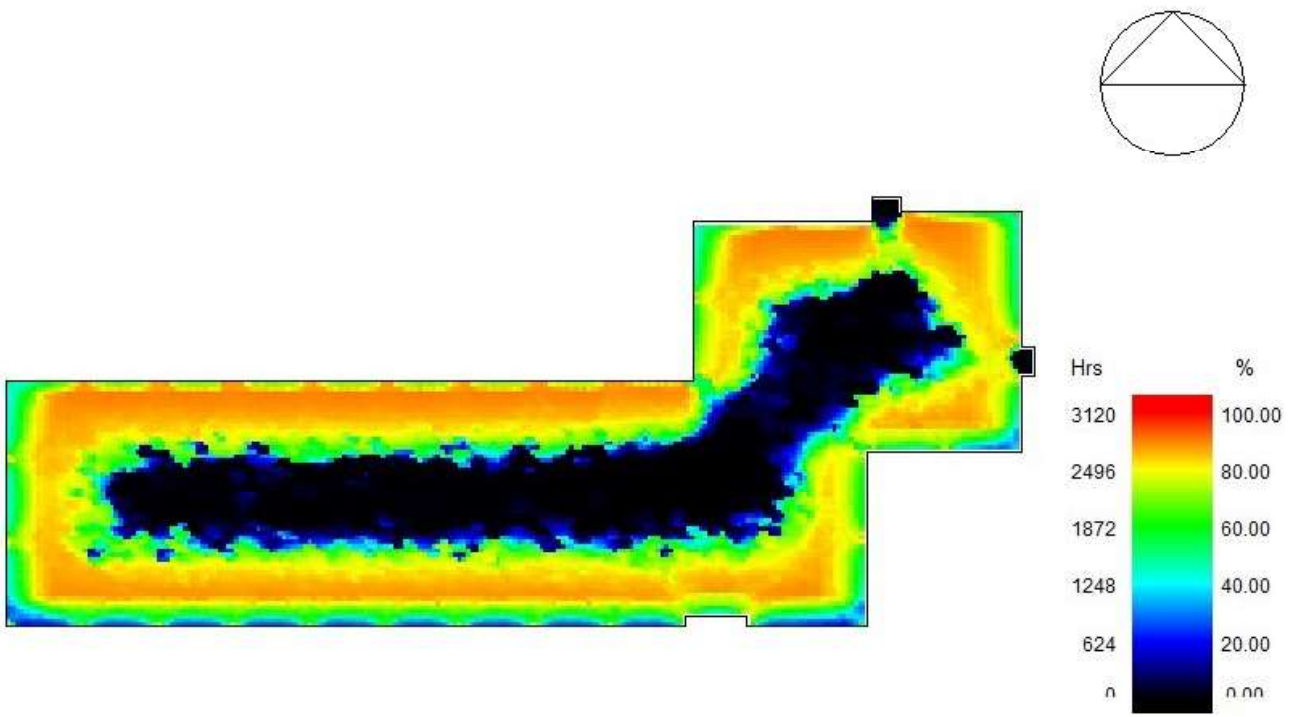


Figure 28: Third Floor

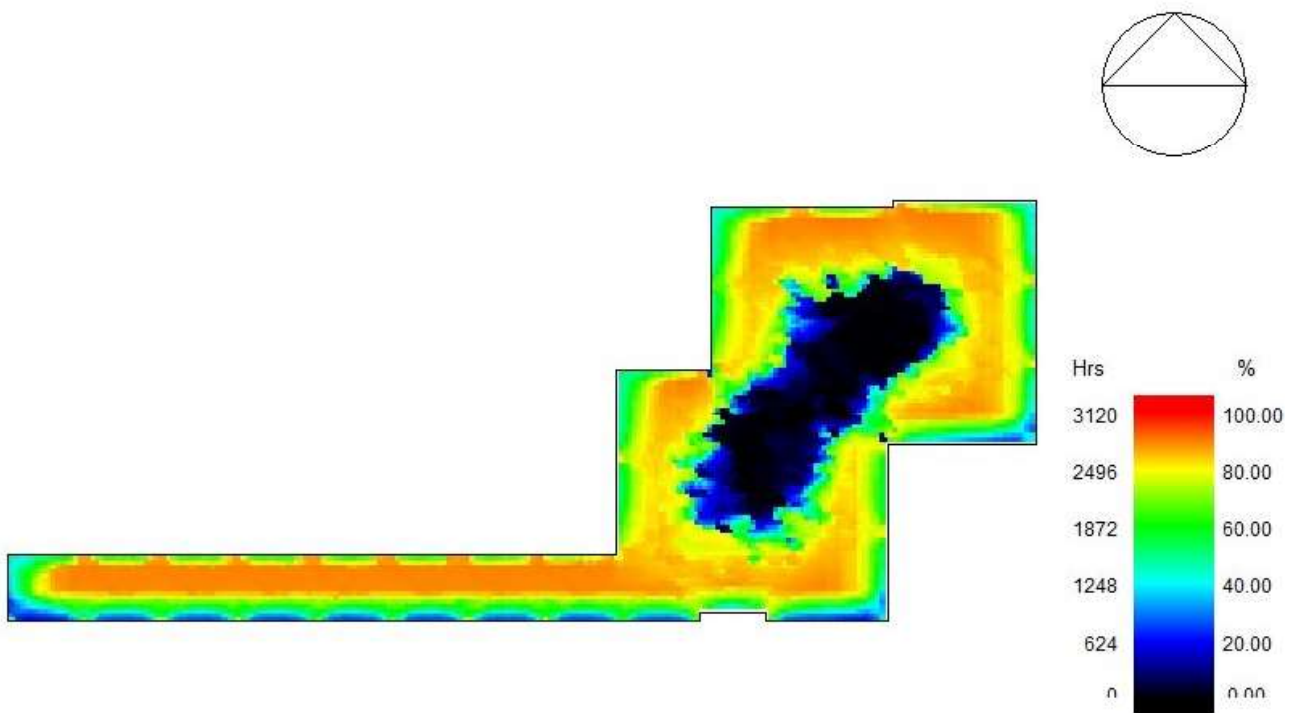


Figure 29: Fourth Floor

Cost Analysis:

For the increased energy performance of the building, energy efficient materials were used in the building which are not conventionally used. Cost comparison analysis was done for the building systems coming under the scope of ECBC for both the baseline and proposed buildings. The total investment in the conventional building is not available for the building systems coming under the scope of ECBC. As per incremental cost of investment payback period is around 8.5 years.

Table 10: Cost Analysis:

Cost Feasibility Analysis – Haryana State Board of Technical Education (HSBTE), Panchkula						
S. No.	Particulars	Quantity	Unit	Rate	Total Amount (Rs)	Difference (lacs)
1	Red Brick wall assembly					
	1. Outside plaster 15 mm	1356.14	Cu.ft			
	2. External Red Brick wall 230 mm	20794.19	Cu.ft			
	3. Inside Cement Plaster 15 mm	1356.14	Cu.ft			
	4. Roof	24380.38	Sq.ft			
	Note: For Both case Red Brick has been taken so no extra cost will be incremented					
	Wall area from Ground to Top Floor					
	Total Wall Area	27563.88	Sq.ft			
	Total Window area	10671.52	Sq.ft			
	Red Brick Wall	588.48	cum	2300	1353493.90	
	Cost of 230 mm Eco Tric wall	2561.70	sqm	3212.8	8230226.18	
	Extra cost for wall				6876732.28	
	No Insulation provided	588.48	sqm	0	0.00	
	Total increment cost of Wall Assembly		INR		6876732.28	6876732.28
2	RCC Roof Work					
	Basecase: RCC roof Slab 150 mm	339.88	cum	3950	1342506.98	
	Proposed Case: RCC roof Slab 150 mm+XPS 100mm	339.88	cum	5476	1861156.52	
	Total increment cost of roof Assembly		INR		518649.53	518649.5336
3	Glass Work in windows					
	Basecase: Single glazed vision panels in UPVC frame	991.78	sqm	1004	995744.06	
	Proposed Case: DGU panels in UPVC frame	991.78	sqm	2391	2371338.69	
	Total increment cost Window Glazing Assembly		INR		1375594.63	1375594.632
4	HVAC					
	Base case- VRF-EER 3.05	301.00	ton	53000	15953000	
	Propose case- VRF-EER 3.68	384.00	ton	59000	22656000	
	Cost Saving in HVAC System		INR		6703000	6703000
5	Lighting					
	Basecase: Lighting Load	515	Nos	250	128750	
	Proposedcase: Lighting Load	415	Nos	200	83000	
	Cost Saving in Lighting System		INR		-45750	-45750
6	Roof Top Solar PV Panel 25% of roof area or 3% of Peak Demand or Connected Load					
		5	kW	48042	240210	240210
7	Occupancy control in all toilets and rooms except common areas (Approx) as per drawing					
		20	Nos.	3090	61800	61800
	Total cost		INR			15730236.45
	Add 10% for miscellaneous items					1573023.645
	Total					17303260.09
	Add GST @ 12%					2076391.211
	Total additional cost for ECBC compliance		INR			19379651.3

S. No.	Case	kWh/Year				
1	Base Case	651805				
2	Proposed Case	390516				
3	Renewable Energy Generation Zone	7325				
	Total Annual Energy Savings	268614				
	Total Saving in Cost (INR) @ 8.5	2283219				
	Payback Period (Years)	8.5				

ECBC Compliance Forms

ECBC Compliance Forms are placed at Annexure -4.

Appendix:

- Annexure 1 : Ventilation CFM and load calculation
- Annexure 2 : Solar PV generation calculation sheet from snapshot.
- Annexure 3 : Cut sheets
- Annexure 4 : Compliance Forms

Abbreviations

AAC	Autoclaved Aerated Concrete	mps	Meters Per Second
ACTI	Cooling Tower Institute	ODP	Ozone Depletion Potential
ANSI	American National Standards Institute	PCC	Pozzolana Cement Concrete
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers	PCM	Phase Change Material
DEVap	Desiccant Enhanced Evaporative Air-Conditioning	PMV	Pulse Modulating Valve
ECBC	Energy Conservation Building Code	PUF	Polyurethane Foam
EEV	Electronic Expansion Valve	RCC	Reinforced Cement Concrete
GPM	Gallons Per Minute	TRIC	Thermally Resistant Insulated Concrete
GWP	Global Warming Potential	TXV	Thermostatic Expansion Valve
HR	Heat Recovery	VAV	Variable Air Volume
HVAC	Heating, Ventilation and Air Conditioning	VRF	Variable Refrigerant Flow
LCCA	Life Cycle Cost Analysis	VRV	Variable Refrigerant Volume
LDAC	Liquid-Desiccant Air Conditioner	WG	Water Gauge

System & Zone Name	System Type Principal Zone Activity	Type*	Ret Zn	Area sqft	Design Flow		Design Ventilation				Design Capacity				Hrs Outside Thri-Range				
					Supply cfm	Supply cfm/sf	Min Flow	OSA cfm	OSA %	OSA cfm/sf	OSA cfm/per	Cool tons	Cool sf/ton	Cool cfm/ton	Cool Btuh/sf	Heat Btuh/sf	Cool Hrs	Heat Hrs	
EL6 Sys5 (PVVT) (B)	Pkgd Var Vol Var Temp	U		183	532	2.91	4%	19	4%	0.104	0.4	1	100	484	72.1	177.3	0	0	
... EL6 SSE Perim Zn (B.SSE1)	Office (Open Plan) (40%)	U		503	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
... EL6 West Perim Zn (B.W2)	Office (Open Plan) (40%)	U		48,29	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
... EL6 ESE Perim Zn (B.ESE3)	Office (Open Plan) (40%)	U		455	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
... EL6 SE Perim Zn (B.SE4)	Office (Open Plan) (40%)	U		334	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
... EL6 Core Zn (B.C5)	Office (Open Plan) (40%)	U		19	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
... EL6 Core Zn (B.C6)	Office (Open Plan) (40%)	U		13	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
... EL6 North Perim Zn (B.N7)	Office (Open Plan) (40%)	U		35,41	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
... EL6 Core Zn (B.C8)	Office (Open Plan) (40%)	C		183	532	2.91	4%	19	4%	0.104	20.0	1	166	484	72.1	177.3	0	0	
... EL6 NW Perim Zn (B.NW9)	Office (Open Plan) (40%)	U		140	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
Sum of Zones	532	1	0%	0%
Sum of Zones / System Total	100%	100%

System & Zone Name	System Type Principal Zone Activity	Type*	Ret Zn	Area sqft	Design Flow		Design Ventilation				Design Capacity				Throttling Range		
					Supply cfm	Supply cfm/sf	Min Flow	OSA cfm	OSA %	OSA cfm/sf	OSA cfm/per	Cool tons	Cool sf/ton	Cool cfm/ton	Cool Btuh/sf	Heat Btuh/sf	Hrs Outside Thri-Range
Sum of SYSTEMs	2,59,92	14,73,14	5.67	91%	30,93	2%	0.119	9.0	301	80	490	138.9	341.1	0%
Sum of ZONEs	14,68,67	5.65	..	..	..	..	..	301	..	..	..	..	..
Sum of Zones / System Total	100%	..	..	..	..	..	..	100%	..	..	..	..	..

* Return Types: .. 'P' = Plenum Return .. 'D' = Ducted Return .. 'd' = Direct return .. (Plenum Zones are not shown on this report)
 * Zone Types: .. 'C' = Conditioned Zone .. 'U' = Unconditioned Zone .. 'S' = Slave Zone .. (conditioned but no t-stat)

Annexure 2 : Solar PV generation calculation sheet from snapshot

PVWatts® Calculator


My Location
panchkula, haryana
» Change Location

English
Español
HELP
FEEDBACK

RESOURCE DATA
SYSTEM INFO
RESULTS



RESULTS

Print Results

7,325 kWh/Year*



Month	Solar Radiation <small>(kWh / m² / day)</small>	AC Energy <small>(kWh)</small>
January	4.06	484
February	5.11	535
March	6.16	682
April	6.94	721
May	6.86	727
June	5.99	621
July	5.09	567
August	5.47	613
September	5.86	629
October	5.99	667
November	5.15	568
December	4.37	510
Annual	5.59	7,324



Go to
system info

Annexure 3 : Cut Sheets

6.1 Brick work with common burnt clay F.P.S. (non modular) bricks of class designation 7.5 in foundation and plinth in:

6.1.1 Cement mortar 1:4 (1 cement : 4 coarse sand)

Code	Description	Unit	Quantity	Rate ₹	Amount ₹
	Details of cost for 1 cum MATERIAL				
2602	Common burnt clay F.P.S. (non modular) bricks class designation 7.5	1000 Nos	0.494	4500.00	2223.00
2201	Carriage of Bricks	1000 Nos	0.494	276.72	136.70
	Cement mortar 1 : 4 (1 cement : 4 coarse sand)				
3.9	Rate as per item No 3.9 of SH: Mortar	cum	0.25	4010.35	1002.59
9999	Sundries	L.S.	2.73	2.00	5.46
	LABOUR				
0123	Mason (brick layer) 1st class	day	0.36	738.00	265.68
0124	Mason (brick layer) 2nd class	day	0.36	679.00	244.44
0115	Coolie	day	1.37	558.00	764.46
0101	Bhisti	day	0.20	617.00	123.40
	TOTAL				4765.73 W
	Add 1 % Water charges on "W"				47.66
	TOTAL				4813.38 X
	Add GST on "X" (multiplying factor 0.1405)				676.28
	TOTAL				5489.66 Y
	Add 15% CPOH on "Y"				823.45
	TOTAL				6313.11 Z
	Add Cess @ 1% on "Z"				63.13
	Cost of 1 Cum.				6376.25
	Say				6376.25

6.1.2 Cement mortar 1:6 (1 cement : 6 coarse sand)

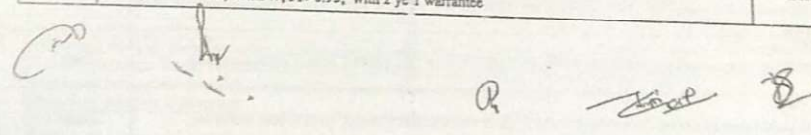
Code	Description	Unit	Quantity	Rate ₹	Amount ₹
	Details of cost for 1 cum MATERIAL				
2602	Common burnt clay F.P.S. (non modular) bricks class designation 7.5	1000 Nos	0.494	4500.00	2223.00
2201	Carriage of Bricks	1000 Nos	0.494	276.72	136.70
	Cement mortar 1 : 6 (1 cement : 6 coarse sand) (Rate as per item No 3.11)				
3.11	Rate as per Item No.3.11 of SH: Mortar	cum	0.25	3356.15	839.04
9999	Sundries	L.S.	2.73	2.00	5.46
	LABOUR				
0123	Mason (brick layer) 1st class	day	0.36	738.00	265.68
0124	Mason (brick layer) 2nd class	day	0.36	679.00	244.44
0115	Coolie	day	1.37	558.00	764.46

- 6.47 Providing and laying autoclaved aerated cement blocks masonry with 150mm/230mm/300 mm thick AAC blocks in super structure above plinth level up to floor V level with RCC band at sill level and lintel level with approved block laying polymer modified adhesive mortar all complete as per direction of Engineer-in-Charge. (The payment of RCC band and reinforcement shall be made for seperately).**

Code	Description	Unit	Quantity	Rate ₹	Amount ₹
	Details of cost for 1 cum. MATERIAL				
8655	Autoclaved areated cement (AAC) blocks	cum	1.00	2600.00	2600.00
0357	Polymer modified adhesive mortar	Kg	30.00	15.00	450.00
9999	Sundries	L.S.	2.73	2.00	5.46
	LABOUR				
0123	Mason (brick layer) 1 st class	day	0.36	738.00	265.68
0124	Mason (brick layer) 2nd class	day	0.36	679.00	244.44
0115	Coolie	day	1.37	558.00	764.46
	Extra labour element required for lifting of materials (above floor two level upto floor five level) (0.75x 1.50 = 1.13)				
0115	Coolie	day	1.13	558.00	630.54
	TOTAL				4960.58 W
	Add 1 % Water charges on "W"				49.61
	TOTAL				5010.19 X
	Add GST on "X" (multiplying factor 0.1405)				703.93
	TOTAL				5714.12 Y
	Add 15% CPOH on "Y"				857.12
	TOTAL				6571.23 Z
	Add Cess @ 1% on "Z"				65.71
	Cost of 1 cum				6636.95
	Say				6636.95

Code No.	Description	Unit	Rate ₹
8308	PPR Union 32 mm	each	137.20
8309	PPR Union 40 mm	each	184.80
8310	PPR Union 50 mm	each	352.80
8311	PPR Union 63 mm	each	483.60
8312	PPR Union 75 mm	each	933.00
8500	Water for jetting / blowback	1000 litre	1500.00
8501	Polymer modified cementation coating	kg	140.00
8502	Fibre glass cloth	sqm	25.00
8504	Multi surface paint	litre	255.00
8505	Acrylic exterior paint	litre	170.00
8506	Premium Acrylic exterior paint	litre	180.00
8507	Textured exterior paint	litre	240.00
8508	Primer for cement paint	litre	79.00
8509	Special Primer (C.W.)	litre	140.00
8510	Metal Primer (U.G.)	litre	90.00
8511	Fibre reinforced elastomeric liquid water proofing membrane	litre	198.69
8512	Cementitious water proofing coating with elastic polymers	kg	189.13
8513	Acrylic modified resin based texture	kg	36.00
8514	40 mm long S.S screws with plastic rawl plugs	100	40.00
8515	Galavanised MS 8 mm outer diameter M-6 dash fastener 50mm long	each	31.00
8516	ZMB 60/equivalent	kg	105.00
8517	ZMB thinner	litre	205.00
8518	Zycoprime / equivalent	litre	210.00
8519	Zycosil / equivalent	litre	1800.00
8520	Elastobar / equivalent	kg	300.00
8552	Mineral fibre beveled tegular edged ceiling tiles 595 x595mm,16 mm thick	sqm	830.00
8553	Mineral fibre beveled tegular edged ceiling tiles 595 x595mm,16 mm thick with bio-block conforming to ISO 5 (class 100) specifications.	sqm	920.00
8554	Mineral fiber beveled tegular edged ceiling tiles 595 x595mm,20 mm thick.	sqm	1040.00
8555	G.I main runner 15 x32 mm of 3000 mm length, 0.33 mm thick	each	185.00
8556	G.I cross-T 15 x32 mm of 1200 mm length, 0.33 mm thick	each	78.00
8557	G.I cross-T 15 x32 mm of 600 mm length, 0.33 mm thick	each	35.00
8558	G.I hanger rod 6mm dia fully threaded upto 1000 mm length	each	26.00
8559	Stainless steel U Channel of size (50x25x2mm)	metre	160.00
8560	Non staining water resistant clear silicon	metre	65.00
8561	Extruded polystyrene rigid insulation board 50 mm thick	sqm	525.00
8562	Expanded Polystyrene insulation board 120 mm thick confirming to IS 4671-1984, Fire retardant property self-extinguishing type as per EN 13501-1	sqm	800.00
8563	15 mm thick, light weight, integral densified micro look edged,false ceiling tiles of size 595x595 mm.	sqm	720.00
8564	15 mm thick, light weight,fully perforated square/butt edge integral densified,false ceiling tiles of size 595x595 mm.	sqm	900.00
8565	Galavanised MS hanger rod 6 mm dia MS fully threaded up to 1000mm length	each	26.00
8566	Powder coated steel section main-T ceiling sections 15x42x0.40 mm (3000 mm long)	each	235.00
8567	Galvanized mild steel perimeter wall angle 22x19x0.40 mm (3000mm long)	each	115.00

Schedule Item No	Common Specification	Unit	Complete Rate	Labour Rate
1416	Supply and fixing of Recess/pendent mounting having 1' X 4' Size 36 to 46 Watt seamlessly integrated LED luminaire with acrylic sheet diffuser and integral electronic driver, .Complete in all respect.			
	CAT-AAA 3960-5060 system lumens, 110lm/W, PF>0.95, THD <10% at full, CR>80, with 5 years warrantee	Each	6200	122
	CAT-AA 3600-4600 system lumens, 100lm/W, PF>0.95, THD <10% at full, CR>80, with 3 year warrantee.	Each	4290	122
	CAT-A 3220-4140 system lumens, 90lm/W, PF>0.95, THD <20% at full, CR>80, with 2 year warrantee	Each	2200	122
1417	Supply & fixing of water tight oblong 10 watt LED Bulkhead luminaire having die cast housing with driver set confirming to IP65 and above protection, .Complete in all respect.			
	CAT-AAA 1100 system lumens, 110lm/W, PF>0.95, with 5 years warrantee	Each	1400	122
	CAT-AA 1000 system lumens, 100lm/W, PF>0.95, with 3 year warrantee.	Each	1250	122
	CAT-A 900 system lumens, 90lm/W, PF>0.95, with 2 year warrantee	Each	-	-
1417(A)	Supply and fixing of Single LED light wall bracket 3 to 6 Watt on matching M.D.F.E.G Board base etc. complete in all respect.			
	CAT-AAA 330-660 system lumens, 110lm/W, PF>0.95, with 5 years warrantee	Each	2600	82
	CAT-AA 300-600 system lumens, 100lm/W, PF>0.95, with 3 year warrantee.	Each	-	-
	CAT-A 270-540 system lumens, 90lm/W, PF>0.95, with 2 year warrantee	Each	-	-
1418	Supply and fixing of Surface/Pendent mounting 20 Watt LED Surface Mounting weather proof Luminaire with PC Housing and opal finish cover confirming to IP65 Complete in all respect.			
	CAT-AAA 2200 system lumens, 110lm/W, PF>0.95, with 5 years warrantee	Each	2030	122
	CAT-AA 2000 system lumens, 100lm/W, PF>0.95, with 3 year warrantee.	Each	-	-
	CAT-A 1800 system lumens, 90lm/W, PF>0.95, with 2 year warrantee	Each	-	-
1418(A)	Supply and fixing of Surface/Pendent mounting 40 Watt LED Surface Mounting weather proof Luminaire with PC Housing and opal finish cover confirming to IP65 .Complete in all respect.			
	CAT-AAA 4400 system lumens, 110lm/W, PF>0.95, with 5 years warrantee	Each	2290	122
	CAT-AA 4000 system lumens, 100lm/W, PF>0.95, with 3 year warrantee.	Each	-	-
	CAT-A 3600 system lumens, 90lm/W, PF>0.95, with 2 year warrantee	Each	-	-



 (अभय शंकर श्रीवास्तव)

 मुख्या अधिकारी (वि०/या०)

 लो०/वि०/या०

 28/11/24

 (सफा रोग)

 अधीक्षण अधिकारी

 लो०/वि०/या०

 लो०/वि०/या०

3/

 (अभय शंकर श्रीवास्तव)

 मुख्या अधिकारी (वि०/या०)


 लो०/वि०/या०

 28/11/24

BILL OF QUANTITIES - NON HARYANA PWD SCHEDULES ITEMS						
S. No	Non HSR / CPWD DSR 2014 item	Description of item	Unit	Quantity	Rate	Amount
1		2	3	4	5	6.00
37	MP SOR 12.18	Providing and Fixing of sky lights consisting of 16mm thick Multi cell/tight cell Polycarbonate Panel System of approved colour, 16 mm thick (minimum) having uniform in color with an integral Tight-Cell core constructed not to exceed 4mmx4mm in a cross section. Vertical Standing Seam manufactured at both sides of the panel. Snap-on connector to interlock the panels shall have a grip-lock double tooth locking mechanism to ensure maximum uplift capability and shall be of same color as that of panel. Panel shall be factory sealed/end welded panels with additional End-cap/Aluminium U-Profile (mill finish) for ends. Panel shall be co-extruded with special anti glare compound and UV protected. The full system shall be fitted on MS purlins perpendicular to direction of sheeting with purlin spacing as specified by Manufacturer. The rate includes cost of all the operations, labour and all materials and tests (as applicable) involved such as bolts nuts and screws etc. and labour for cutting bending to required profile, necessary scaffolding, hoisting in position etc. for proper completion of the work etc. complete as per specification drawings and direction of Engineer in charge. Finished surface area of roofing fixed over steel tubular structure shall be measured for payment. MS tubular frame work shall be measured separately for payment.	sqm	88.00	3,546.00	312,048.00
37.00	16 RR	Providing and laying matt finished vitrified tiles of size 100x100x16mm having water absorption less than 0.5% and conforming to IS: 15622 of approved make in all colours and shades in out door floors such as footpath, court yard multi models etc., laid on 20mm thick base of cement mortar 1:4 (1cement : 4 coarse sand) in all shapes & patterns including grouting the joints with white cement mixed with matching pigments etc. complete as direction of Engineer-in-Charge.	sqm	731.07	1,474.20	1,077,743.39
38.00	21.1.1.1	Providing and supplying aluminium extruded tubular and other aluminium sections for louvers as per the architectural drawings and approved shop drawings, the aluminium quality as per grade 6063 T5 or T6 as per BS 1474, including anodising coating AC 15 microns conforming to AAMA 2604 of required colour and shade as approved by the Engineer-in-Charge. (The item includes cost of material such as cleats, sleeves, screws etc. necessary for fabrication of extruded aluminium frame work. Nothing extra shall be paid on this account).	kg	10,746.00	348.50	3,744,981.00
SUB TOTAL CPWD SOR 2014 ITEMS						48,218,601.96
NON SOR ITEMS -CIVIL						
39	NS-AR01	Providing & fixing in position, 200 mm thick 3D wall panels(factory made and machine made of 2.5 mm dia G.I. wire mesh with 50 mm pitch on both faces of the wall. Both the meshes are to be kept at 120, 135 mm gap and connected by the zig zag G.I. wire of 3mm dia at alternate row by welding (between an angle of 50-70 degree and the connecting wire must be welded at an average distance of 100 mm).The gap between the mesh to be filled with 100 mm thick EPS of density not less than 16 kg/cum and faces are finished by applying the layer of 50 mm thick cement mortar 1:3 (1 cement :3 coarse sand(coarse and may contain some stone chips (not more than 40%) of size less than 6mm)) with the help of shotcreting equipment etc at a pressure of not less than 1 bar complete as per the direction of the Engineer in charge and both surfaces finished with trowel in place of brick wall. (Ar)	sqm	1,484.00	3,212.80	4,767,795.20
40	NS-AR02	Extra for cutting hole for light fixtures i/c framing.	sqm	326.00	86.30	28,133.80
41	NS-AR03	Providing and fixing beveled edge mirror of superior glass (of approved quality) complete with 12 mm thick BWR plywood ground fixed to wooden cleats with C.P. brass screws and washers complete.(ref -AOR)	sqm	119.97	2,524.00	302,804.28
42	NS-AR05	Providing and fixing Dorma make floor spring BIS 75V EN 1-4 in doors with top pivot, bottom pivot and stainless steel cover plate i/c cutting of glass for patch fittings, cutting and repairing of floor. (AR)	each	10.00	19,414.70	194,147.00

BILL OF QUANTITIES - NON HARYANA PWD SCHEDULES ITEMS						
S. No	Non HSR / CPWD DSR 2014 Item	Description of item	Unit	Quantity	Rate	Amount
1						6.00
43	NS-AR06	Providing and laying one layer of Extruded polystyrene insulation board 100mm thickness of 32 to 35 kg cubic meter density (Foamular) , with shiplap joint at all levels, as shown in drawing. (A)	sqm	1,864.40	1,634.15	3,046,709.26
44	NS-AR07	Providing and fixing antistatic carpet roll 22 OZ weight per sqm as per approved sample laid with adhesive and protected with polythene till handover. (price Rs. 100 per sqft plus tax)	sqm	292.69	1,451.00	424,693.19
45	NS-AR08	Providing and fixing one layer of Extruded polystyrene insulation board 75mm thickness of 32 to 35 kg cubic meter density (Foamular) , with shiplap joint in partitions at all levels, fixed to existing framing as shown in drawing. (AR)	sqm	850.00	1,253.00	1,065,050.00
46	NS-AR09	Extra (DGU having) for 6mm thick solar glass on external side with properties having SHGC 0.32, and VLT having 59% and U value of 1.5 w/m2degK in place of HSR item 17.104 with 6mm glass shall have U value < 1.8, solar factor <0.35 light transmission> 49%	sqm	1,487.00	2,237.00	3,326,419.00
47	NS-AR10	Providing and fixing 50mm thick Glass Reinforced Concrete (G.R.C) Screens in approved size, pattern, design, thickness and color of M/S Unistone make or equivalent. The Screens should be made from '53 grade' White Portland Cement manufactured by 'JK Cement' or equivalent, Quartz, Fine Silica Sand, Alkali Resistant Glass Fiber manufactured by 'Saint Gobain' or equivalent, Super Plasticizers manufactured by 'BASF' or equivalent, Polymers manufactured by 'BASF' or equivalent and U.V resistant Synthetic inorganic pigments should be used for pigmentation manufactured by 'BAYFERROX (Germany)' or equivalent. The material casting should take place in Synthetic Rubber / FRP Mould manufactured by 'Reckli' or equivalent. The fixing of Screens should be 'Dry fixing' i.e. to be done with Stainless Steel (SS - 304) 'L' shaped Clamps, dash fasteners and pins	sqm	70.26	8,056.70	566,063.74
48	NS-AR11R	Supplying and applying 1.14 mm EPDM rubbergard membrane in horizontal surface waterproofing of roof consisting of 1st layer of with 200 gsm geotextile membrane on bottom, laying EPDM membrane as second layer jointed with quick seam tape, quick seam primer for jointing, form flash, adhesive, top layer 200 GSM geotextile i/c overlap, complete as per manufacturer's specifications, testing of waterproofing for 48 hrs.	sqm	3,386.93	1,123.70	3,805,893.24
		Technical parameters FIRESTONE RubberGard: MATERIAL: 1.14 mm thick non reinforced vulcanized EPDM RUBBERGARD meeting ASTM D 4637 requirement. The sheet should be as large as possible but not less than 6m unspliced width. Weight - 1.4 kg per sqm, Tensile strength - > 9 N/ mm², Elongation - > 300 %, Tear resistance - > 35kN/m, Brittleness point - < -45 ° C, Water absorption - < 2 % Provide EPDM membrane, splice tape, primer and bonding adhesive that are FM approved . Identify materials with FM Approvals markings. All the materials used should be from the same manufacturer.				

4/29/2020 Gmail - Quotation for the systems

 ECBC Cell Uttar Pradesh <ecbc.uttarpradesh@gmail.com>

Quotation for the systems

Ambience Solutions <callupambience@yahoo.com> Wed, Apr 29, 2020 at 5:49 PM
 Reply-To: Ambience Solutions <callupambience@yahoo.com>
 To: ECBC Cell Uttar Pradesh <ecbc.uttarpradesh@gmail.com>


Dear Raj,
 Please find attached.

regards

Sameer Srivastava
B.E.(Hons.),Chartered Engineer
GRIHA-Certified Professional
For Green Habitats
ISHRAE- Certified Professional
For Clean Room Design
President-ISHRAE (Lucknow SubChapter)
 Ambience Solutions
 MM-310, Sector-D
 Aliganj, Lucknow-226024
 # 9838501380
 Solutions for HVAC , Green Buildings &
 Indoor Environmental Quality

"Adopt the Pace of Nature, Her Secret is Patience"

[Quoted text hidden]

 **Costs per Tr.xls**
 23K

	A	B	C	D	E
0					
1	S.no	Equipment	Minimum EER at Full Load (Cooling Mode)	Minimum COP at Full Load (Cooling Mode)	Rate per Tr. (W.O. Tax)
2	1	VRF System	3.02		53000.00
3	2	VRF System	3.65		59000.00
4					
5	3	Water Cooled Chiller-Centrifugal Type (< 150 Tr.)		5.4	56000.00
6	4	Water Cooled Chiller-Centrifugal Type (150 Tr. To 300 Tr.)		6.1	60000.00
7	5	Water Cooled Chiller-Centrifugal Type (> 300 Tr.)		6.3	70000.00
8					

Annexure 4: Compliance Forms

Whole Building Performance Method Compliance Form

Haryana Energy Conservation Building Code WBP Compliance Form

Project Info	Project Address: "Haryana State Board of Technical Education (HSBTE)" Office Building at Plot No. IP-11, Sector 3, Panchkula	Date
		For Building Department Use
	Project Built-up Area [m ²]: 6763.9	
	Project Above-grade Area [m ²]: 5851.6	
	Project Conditioned Area [m ²]: 2415.6	
	Applicant Name and Address:	
	Project Climatic Zone: Composite	

Building Classification	<input type="checkbox"/> Hospitality	<input checked="" type="checkbox"/> Business
	<input type="checkbox"/> HealthCare	<input type="checkbox"/> Educational
	<input type="checkbox"/> Assembly	<input type="checkbox"/> Shopping Complex

Project Description	<input checked="" type="checkbox"/> New Building	<input type="checkbox"/> Addition	<input type="checkbox"/> Alteration
	<input type="checkbox"/> Self-occupied	<input type="checkbox"/> Core and Shell	<input type="checkbox"/> Mixed-Use
Compliance is sought for Energy efficiency level	<input type="radio"/> ECBC Compliant	<input type="radio"/> ECBC+ Compliant	<input checked="" type="radio"/> SuperECBC Compliant
EPI Ratio			0.60

The following information is necessary to check a building permit application for compliance with the Whole Building Performance Method requirements in the Haryana Energy Conservation Building Code.							
Applicability			Code Section	Component	Information Required	Location on Plans	Building Department Notes
Yes	No	N/A					
Whole Building Performance Method							
✓			9.1	General			
✓			9.1.2	Compliance	As per specified in the code		
✓			9.1.3	Annual Energy Use	As per specified in the code		
✓			9.1.4	Trade off Limited to Building Permit	As per specified in the code		
✓			9.1.5	Documentation Requirements	As per specified in the code		
✓			9.2	Mandatory Provisions			
✓			4	Building Envelope			
✓			4.2	Mandatory Requirement	As per specified in the code		

✓			5	Comfort System and Controls		
✓			5.2	Mandatory Requirement	As per specified in the code	
✓			6	Lighting and Controls		
✓			6.2	Mandatory Requirement	As per specified in the code	
✓			7	Electrical & Renewable Energy System		
✓			7.2	Mandatory Requirement	As per specified in the code	
✓			9.3	Simulation Requirements	As per specified in the code, Bureau of Energy Efficiency Approved Software for Demonstrating Compliance with ECBC in Table 14-1	
✓			9.4	WBP Compliance Report	As per HECBC Section 9.0	