

RESILIENCE RESIDENCE

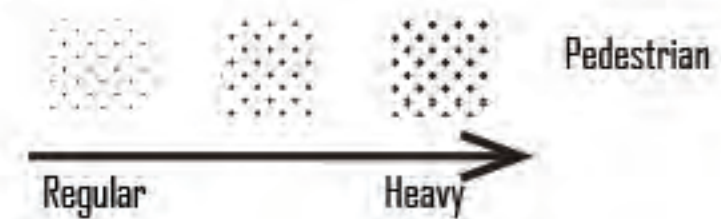


Ayshah AlBader
Thesis II
Prof. Patricia Andrasik

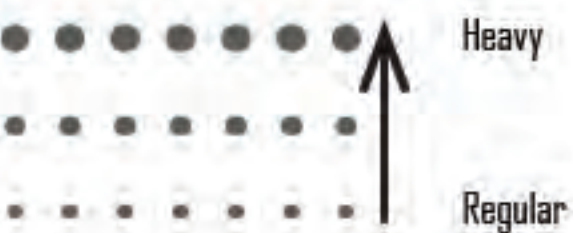


TRANSPORTATION

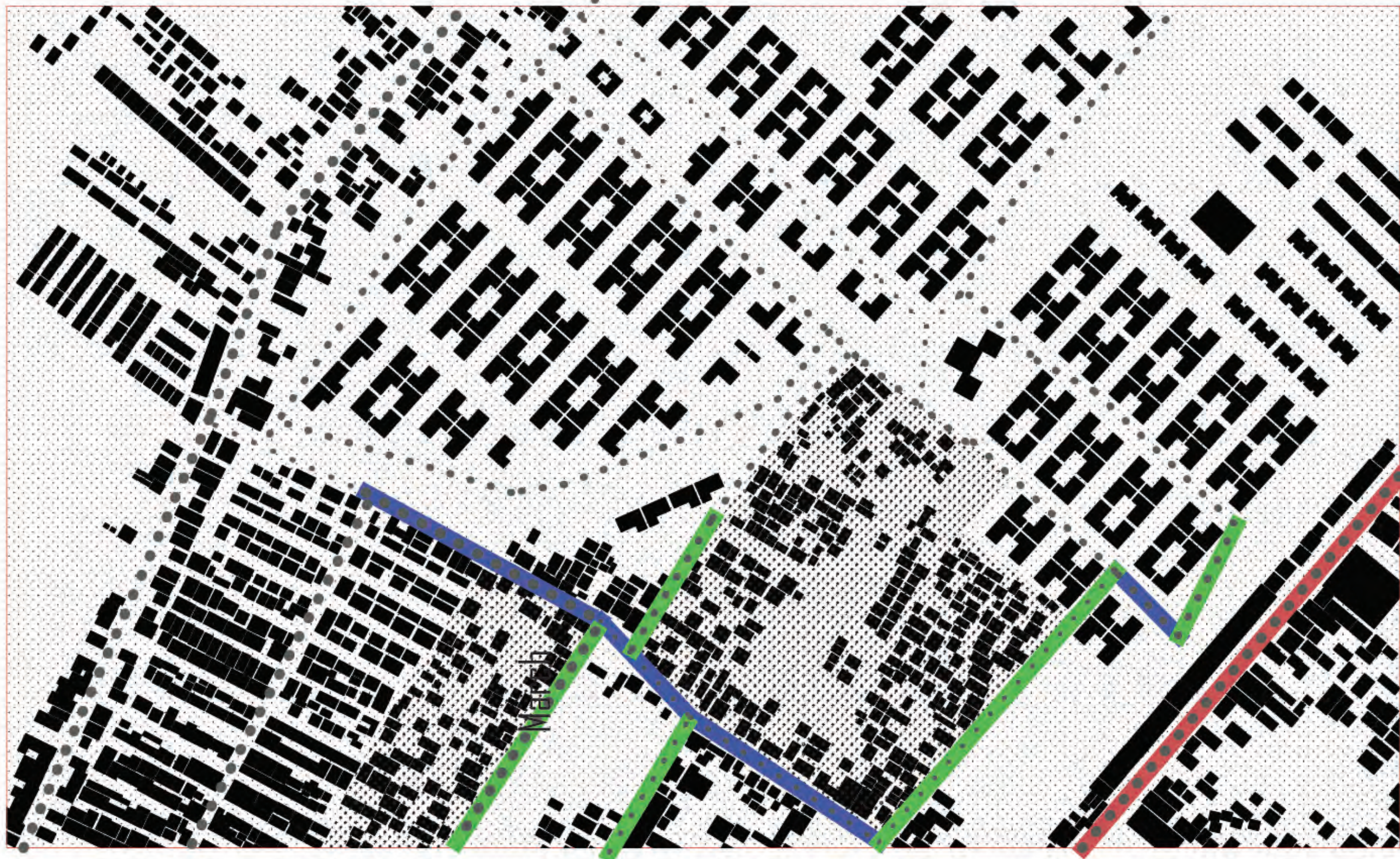
Traffic Breakdown



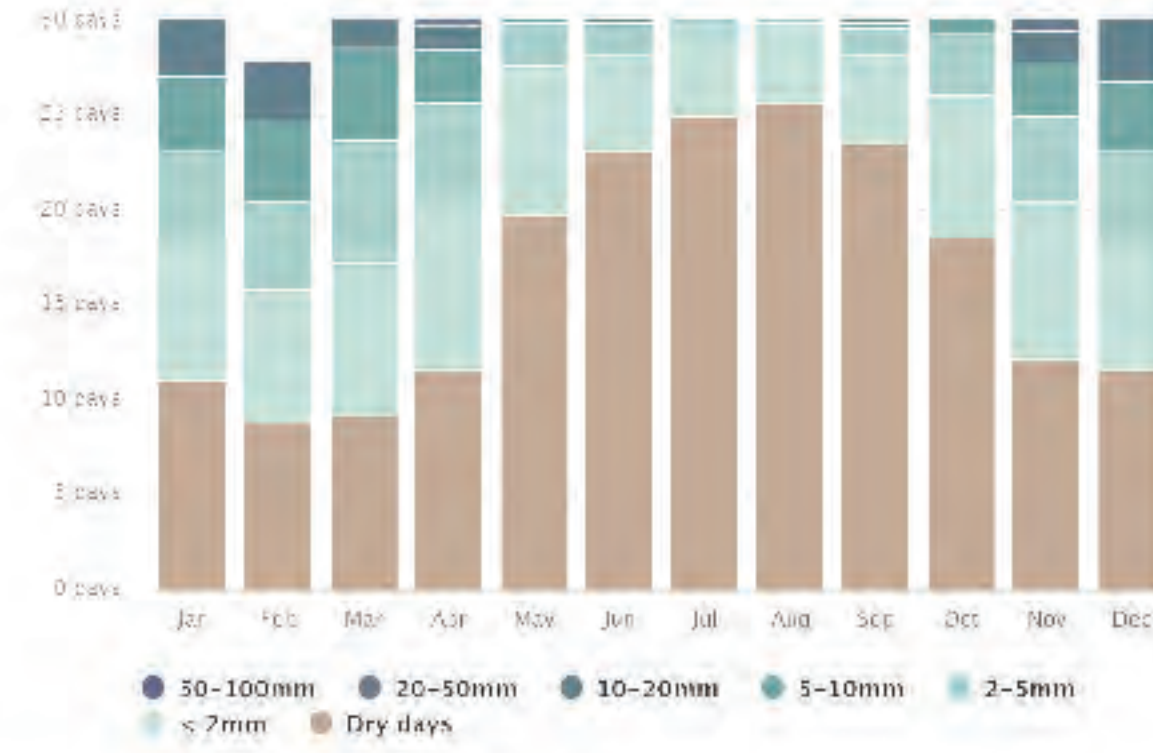
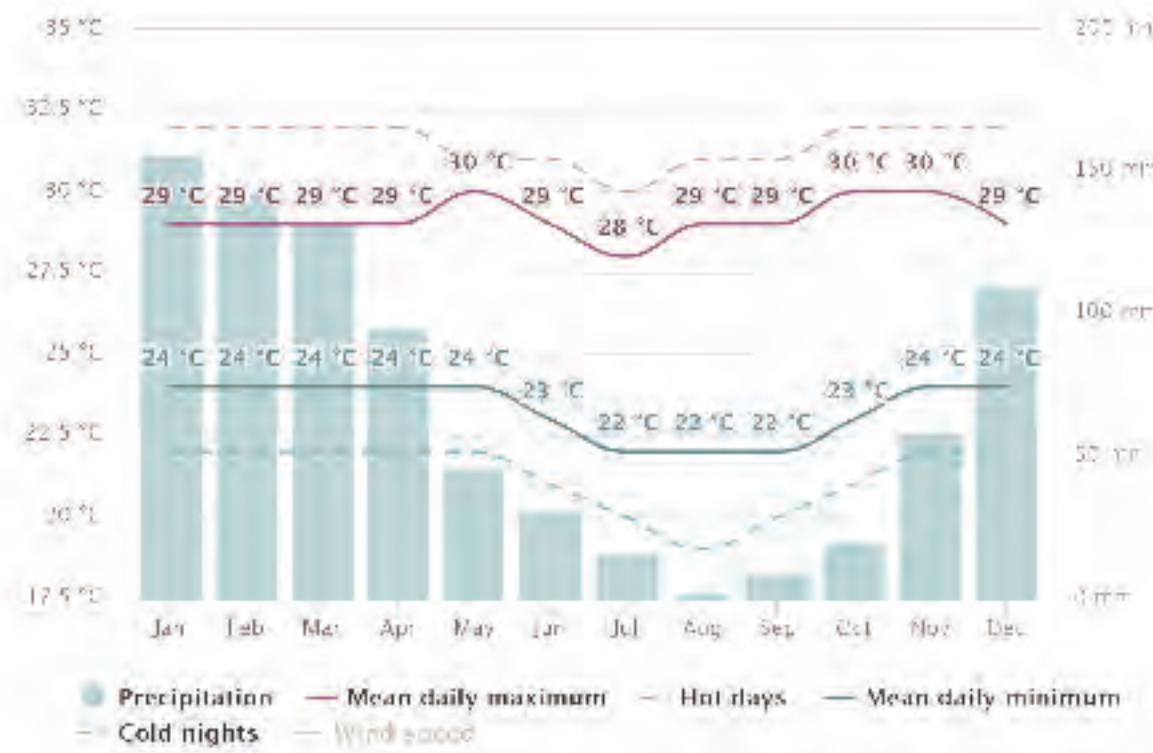
Vehicular



Types of Transportation

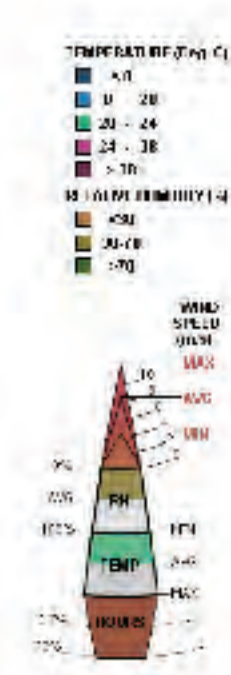
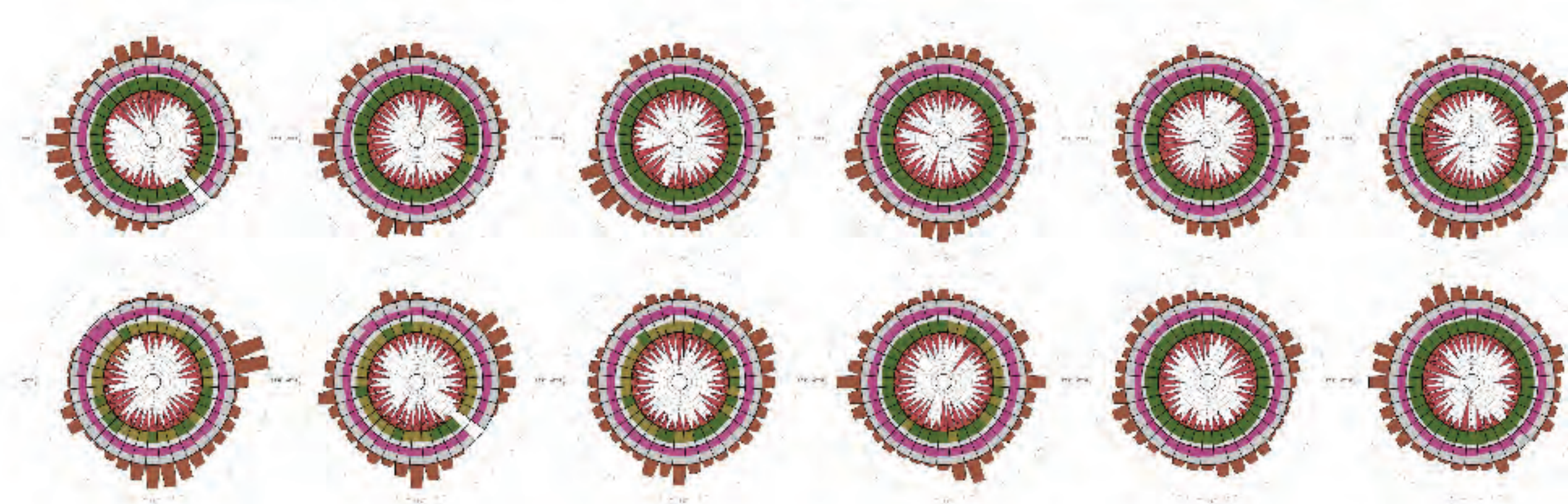
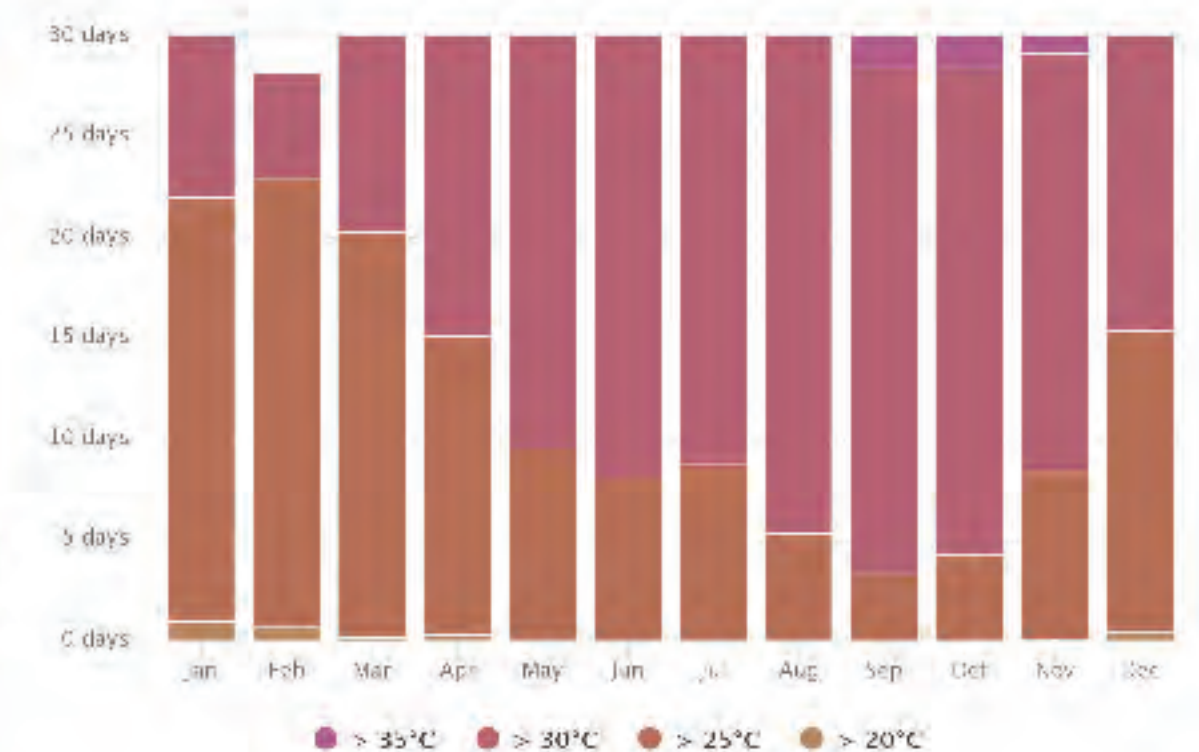
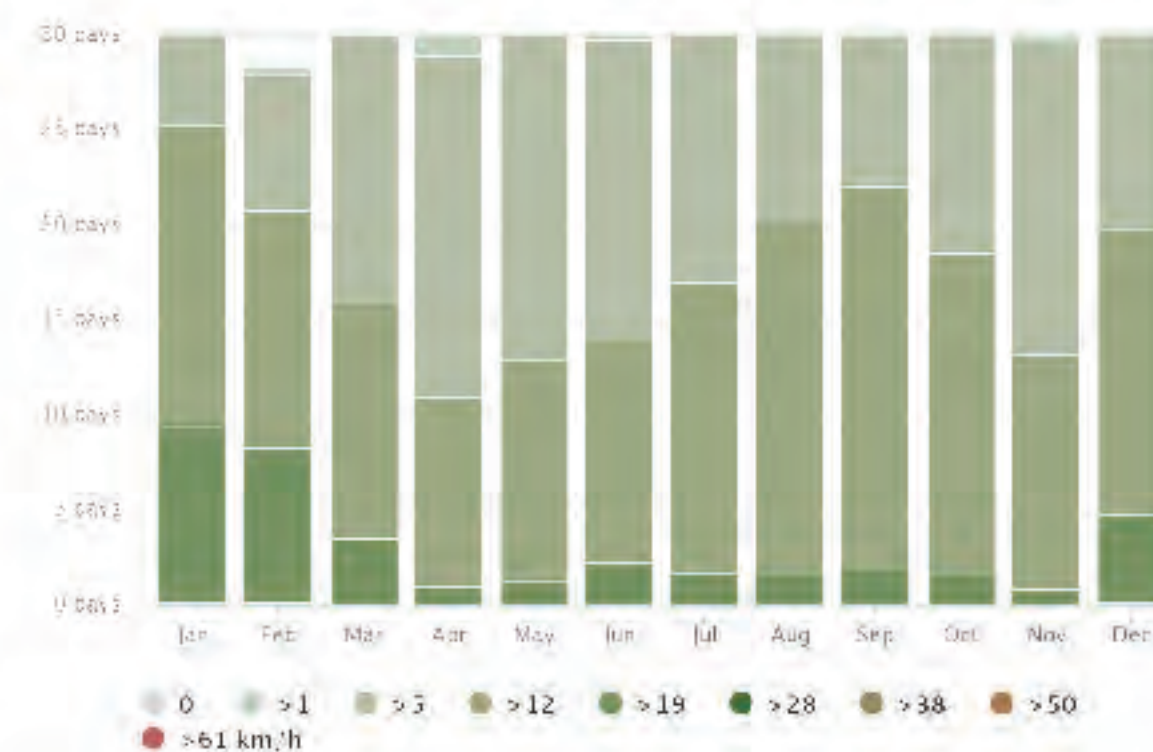
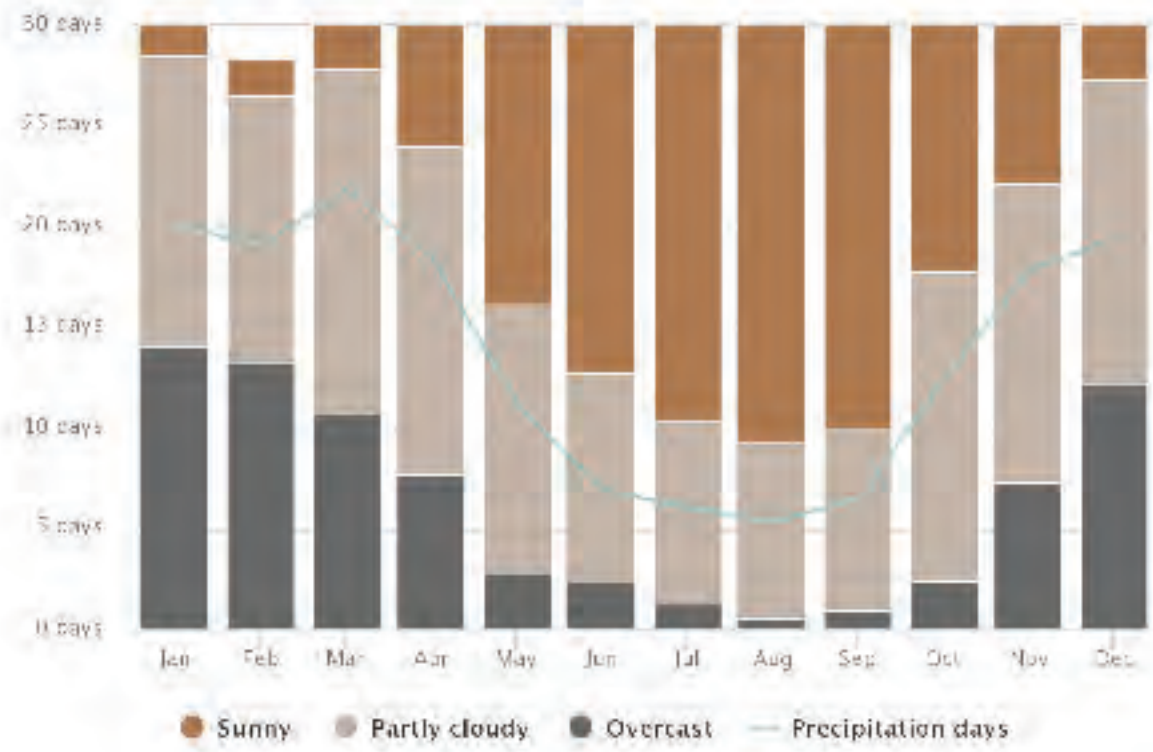


CLIMATE



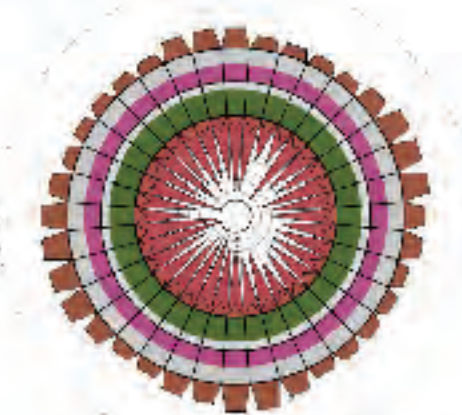
QUICK STATS

INDONESIAN CLIMATE OVERVIEW	RAIN SEASON (DEC-MAR)	DRY SEASON (SEP-NOV)
Average maximum temperature	31.0 °C	33.2 °C
Average minimum temperature	25.6 °C	25.6 °C
Temperature fluctuation in one year	4.1 °C	
Average air humidity	88%	70%
Average relative humidity	50% - 94%	50% - 90%
Average duration of solar radiation	7.3 hours	11.4 hours
Rainfall per month	280.6 mm	142.2 mm
Average wind velocity	1.0 - 3.5 m/sec	1.0 - 4.5 m/sec
Dominant wind direction	West	East
Periods without wind	35%	22%
Global radiant (kWh/m²)	216 kWh/m²	1366 kWh/m²

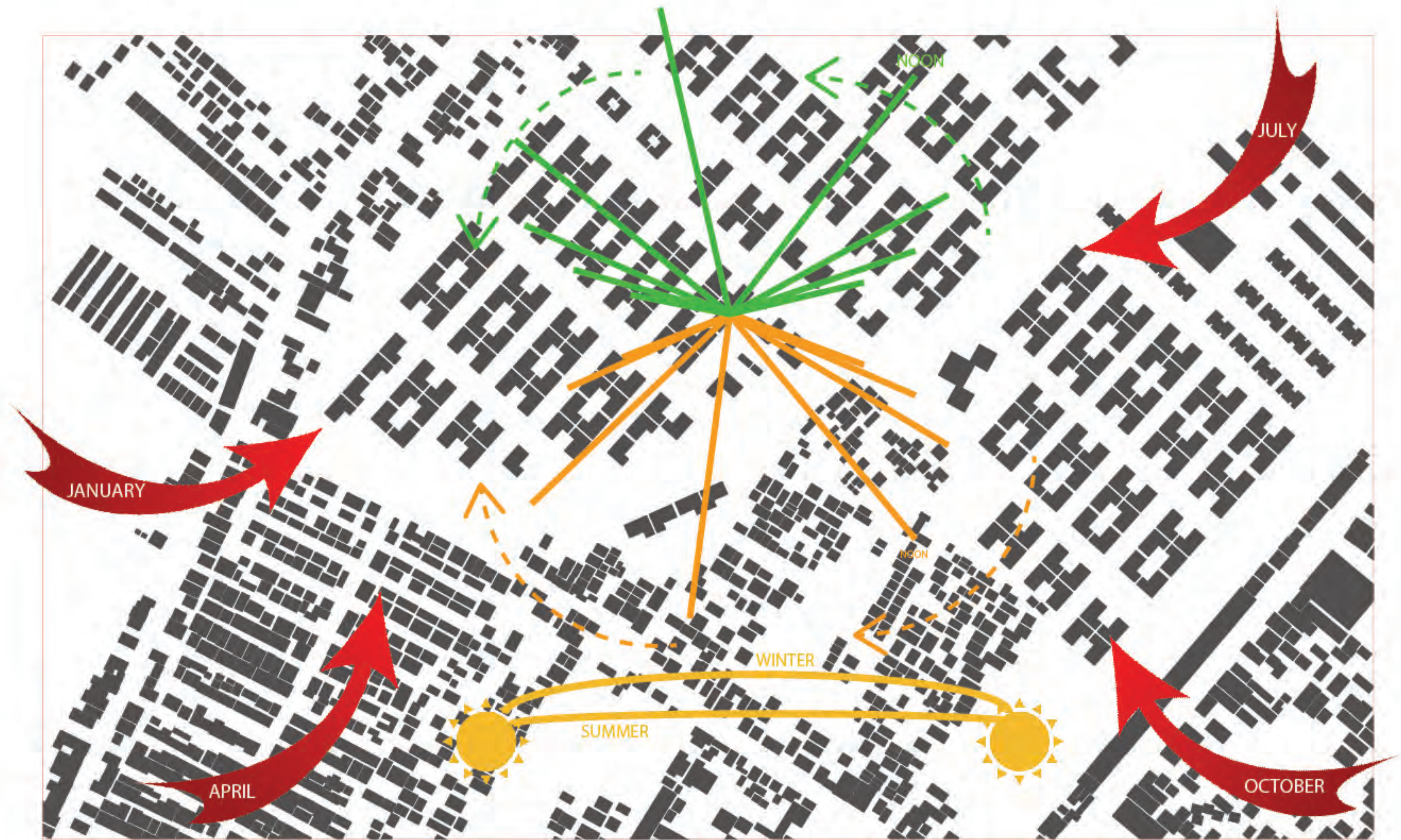


WIND ROSE DIAGRAMS

Wind rose for Jan for every month of the year on a scale above one hour.



- Wind Direction
- Summer Sun Rays
- Winter Sun Rays
- Sun Path



Indonesia	
Djakarta/Halimperda (Java)	1
Kupang Penfui (Sunda Island)	1
Makassar (Celebes)	1
Medan (Sumatra)	1
Palembang (Sumatra)	1
Surabaga Perak (Java)	1

Modify Section 5 as follows (I-P units):

TABLE 5.5-1 Building Envelope Requirements For Climate Zone 1 (A, B)*

Opaque Elements	Nonresidential		Residential		Semiheated	
	Assembly Maximum	Insulation Min. R-Value	Assembly Maximum	Insulation Min. R-Value	Assembly Maximum	Insulation Min. R-Value
Roofs						
Insulation Entirely above Deck	U-0.063	R-15.0 c.i.	U-0.048	R-20.0 c.i.	U-0.218	R-3.8 c.i.
Metal Building ^a	U-0.065	R-19.0	U-0.065	R-19.0	U-1.280	NR
Attic and Other	U-0.034	R-30.0	U-0.027	R-38.0	U-0.081	R-13.0
Walls, Above-Grade						
Mass	U-0.580	NR	U-0.151 nd	R-5.7 c.i. nd	U-0.580	NR
Metal Building	U-0.112	R-13.0	U-0.112	R-13.0	U-1.180	NR
	U-0.093	R-16.0	U-0.093	R-16.0	U-0.113	R-13.0
Steel-Framed	U-0.124	R-13.0	U-0.124	R-13.0	U-0.352	NR
Wood-Framed and Other	U-0.089	R-13.0	U-0.089	R-13.0	U-0.292	NR
Walls, Below-Grade						
Below-Grade Wall	C-1.140	NR	C-1.140	NR	C-1.140	NR
Floors						
Mass	U-0.322	NR	U-0.322	NR	U-0.322	NR
Steel-Joist	U-0.350	NR	U-0.350	NR	U-0.350	NR
Wood-Framed and Other	U-0.282	NR	U-0.282	NR	U-0.282	NR
Slab-On-Grade Floors						
Unheated	F-0.730	NR	F-0.730	NR	F-0.730	NR
Heated	F-1.020	R-7.5 for 12 in.	F-1.020	R-7.5 for 12 in.	F-1.020	R-7.5 for 12 in.
Opaque Doors						
Swinging	U-0.700		U-0.700		U-0.700	
Nonswinging	U-1.450		U-1.450		U-1.450	
 fenestration						
	Assembly Max. U	Assembly Max. SHGC	Assembly Max. U	Assembly Max. SHGC	Assembly Max. U	Assembly Max. SHGC
Vertical Glazing, 0%–40% of Wall						
Nonmetal framing (all) ^{bc}	U-1.20		U-1.20		U-1.20	
Metal framing (curtainwall/storefront) ^{cd}	U-1.20	SHGC 0.25 all	U-1.20	SHGC 0.25 all	U-1.20	SHGC NR all
Metal framing (entrance door) ^{ed}	U-1.70		U-1.70		U-1.70	
Metal framing (all other) ^{ed}	U-1.20		U-1.20		U-1.20	
Skylight with Curb, Glass, % of Roof						
0%–2.0%	U _{all} -1.98	SHGC _{all} -0.36	U _{all} -1.98	SHGC _{all} -0.19	U _{all} -1.98	SHGC _{all} -NE
> 2.1%–4.0%	U _{all} -1.98	SHGC _{all} -0.19	U _{all} -1.98	SHGC _{all} -0.16	U _{all} -1.98	SHGC _{all} -NE
Skylight with Curb, Plastic, % of Roof						
0%–2.0%	U _{all} -1.90	SHGC _{all} -0.34	U _{all} -1.90	SHGC _{all} -0.27	U _{all} -1.90	SHGC _{all} -NE
> 2.1%–4.0%	U _{all} -1.90	SHGC _{all} -0.27	U _{all} -1.90	SHGC _{all} -0.27	U _{all} -1.90	SHGC _{all} -NE
Skylight without Curb, All, % of Roof						
0%–2.0%	U _{all} -1.36	SHGC _{all} -0.36	U _{all} -1.36	SHGC _{all} -0.19	U _{all} -1.36	SHGC _{all} -NE
2.1%–5.0%	U _{all} -1.36	SHGC _{all} -0.19	U _{all} -1.36	SHGC _{all} -0.19	U _{all} -1.36	SHGC _{all} -NE

*The following definitions apply: c.i. = continuous insulation (see Section 3.2); NR = no (insulation) requirement.

^aWhen using R-value compliance method, a thermal spacer block is required; otherwise use the U-factor compliance method. See Table A2.3.

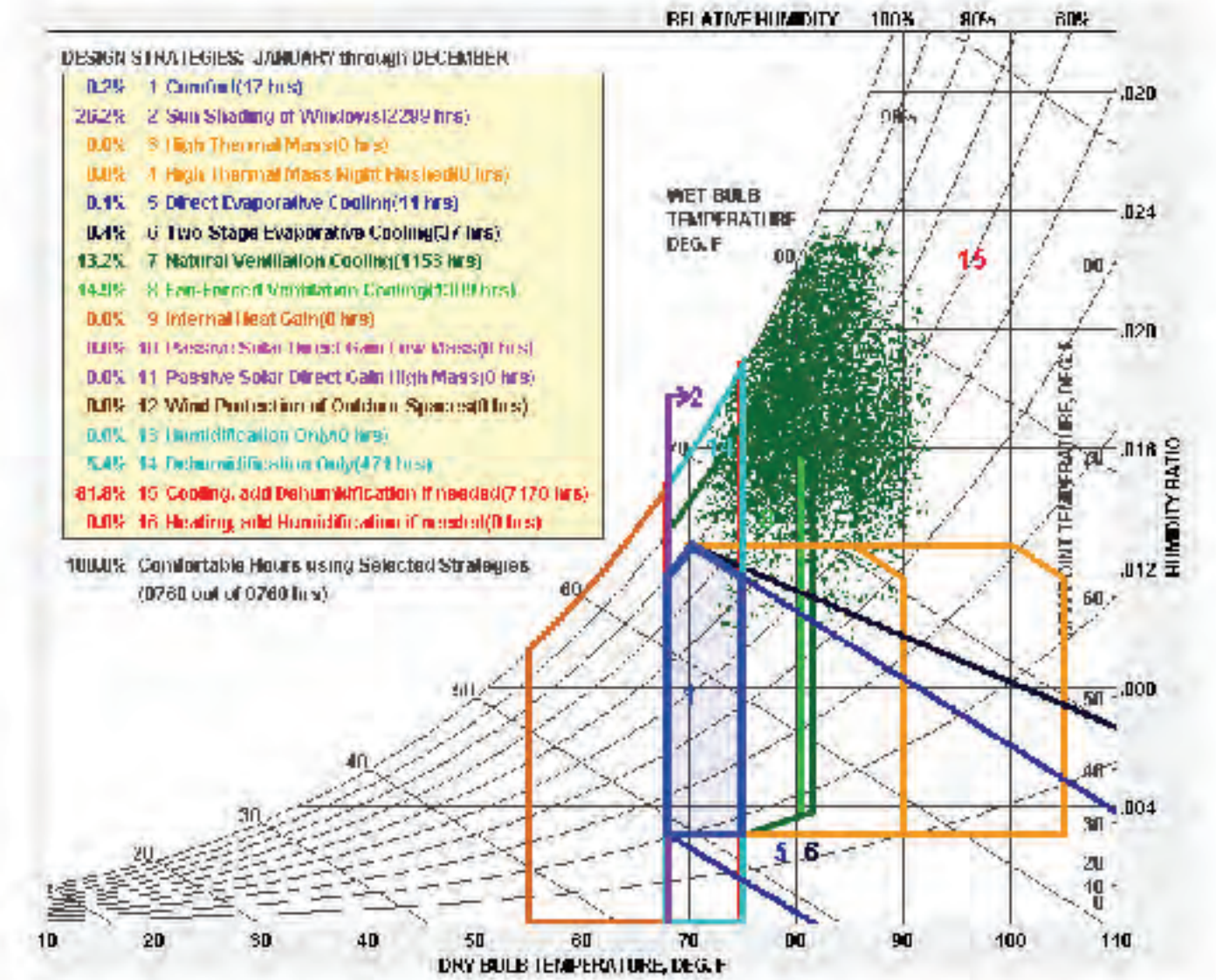
^bException to Section A3.1.3.1 applies.

^cNonmetal framing includes framing materials other than metal with or without metal reinforcing or cladding.

^dMetal framing includes metal framing with or without thermal break. The "all other" subcategory includes operable windows, fixed windows, and non-entrance doors.

International Climate Zone Definitions

Zone Number	Zone Name	Thermal Criteria (I-P Units)	Thermal Criteria (SI Units)
1A and 1B	Very Hot-Humid (1A) Dry (1B)	6000 < CDD50°F	6000 < CDD10°C
2A and 2B	Hot-Humid (2A) Dry (2B)	6000 < CDD50°F < 9000	3500 < CDD10°C < 6000
3A and 3B	Warm-Humid (3A) Dry (3B)	4000 < CDD50°F < 6000	2500 < CDD10°C < 3500
3C	Warm-Moist (3C)	CDD50°F < 4500 AND HDD50°F < 2000	CDD10°C < 2500 AND HDD10°C < 2000
4A and 4B	Mild-Humid (4A) Dry (4B)	CDD50°F < 4500 AND 3800 < HDD50°F < 5400	CDD10°C < 2500 AND HDD10°C < 3000
4C	Mild-Moist (4C)	2000 < CDD50°F < 5400	2000 < HDD10°C < 3000
5A, 5B, and 5C	Cool-Humid (5A) Dry (5B) Moist (5C)	5400 < CDD50°F < 7200	3000 < HDD10°C < 4000
6A and 6B	Cold-Humid (6A) Dry (6B)	7200 < CDD50°F < 9000	4000 < HDD10°C < 5000
7	Very Cold	9000 < CDD50°F < 12600	5000 < HDD10°C < 7000
8	Subarctic	12200 < CDD50°F	7000 < HDD10°C



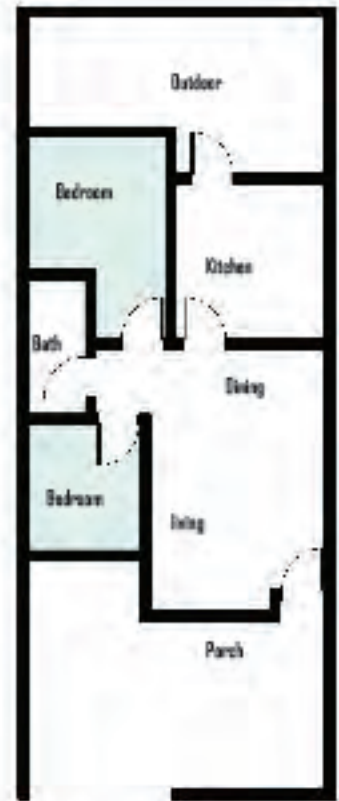
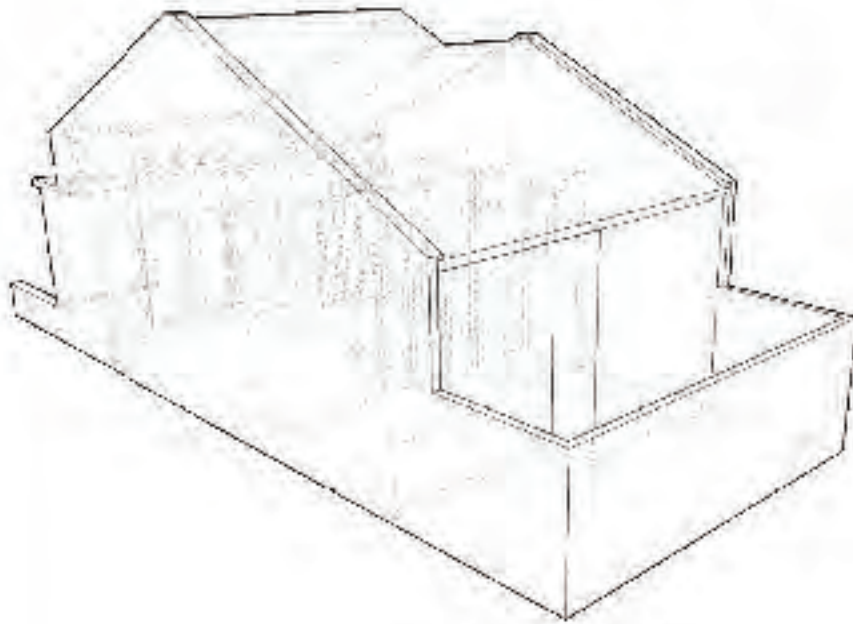
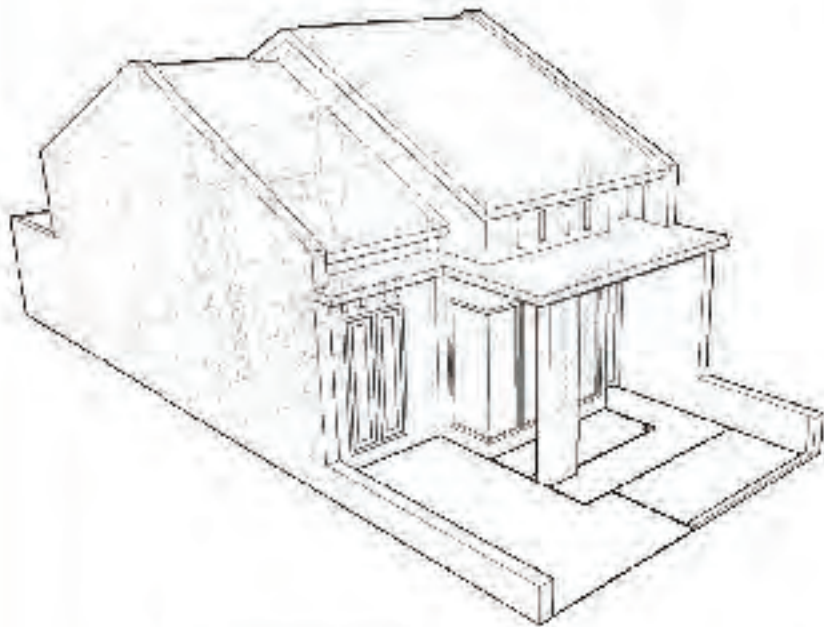
WEATHER DATA SUMMARY

LOCATION: Surakarta, IDN
Latitude/Longitude: 7.569° South, 110.817° East. Time Zone from Greenwich T
Data Source: WWS - 029 WMO Station Number, Elevation 541 ft.

MONTHLY MEANS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Global Horiz Radiation (Avg Hourly)	91	98	111	123	126	133	138	131	126	120	96	Btu/sq.ft
Direct Normal Radiation (Avg Hourly)	49	45	62	91	100	112	121	115	80	61	42	Btu/sq.ft
Diffuse Radiation (Avg Hourly)	46	45	45	45	53	55	55	40	51	57	54	Btu/sq.ft
Global Horiz Radiation (Max Hourly)	218	244	246	301	305	286	287	316	315	346	340	Btu/sq.ft
Direct Normal Radiation (Max Hourly)	202	209	290	295	296	279	273	300	279	283	207	Btu/sq.ft
Diffuse Radiation (Max Hourly)	169	173	157	105	146	137	135	153	165	163	157	Btu/sq.ft
Global Horiz Radiation (Avg Daily Total)	1137	1203	1330	1536	1417	1465	1547	1629	1574	1492	1193	Btu/sq.ft
Direct Normal Radiation (Avg Daily Total)	612	540	639	1002	1103	1202	1240	1056	1010	786	478	Btu/sq.ft
Diffuse Radiation (Avg Daily Total)	703	607	709	732	574	636	640	714	662	677	623	Btu/sq.ft
Global Horiz Illumination (Avg Hourly)	30	32	38	42	40	41	43	44	43	44	32	footcandle
Direct Normal Illumination (Avg Hourly)	17	16	22	32	33	36	37	39	30	21	14	footcandle
Dry Bulb Temperature (Avg Monthly)	81	82	83	83	83	83	83	83	83	83	83	degrees F
Dew Point Temperature (Avg Monthly)	74	74	74	74	73	72	70	68	70	71	73	degrees F
Relative Humidity (Avg Monthly)	91	91	90	89	89	88	86	86	87	88	90	percent
Wind Direction (Monthly Mode)	260	270	250	180	100	60	90	180	160	160	250	degrees
Wind Speed (Avg Monthly)	4	3	4	4	5	5	6	6	5	4	4	mph
Ground Temperature (Avg Monthly of 1 Depth)	81	81	81	81	81	81	82	82	82	82	82	degrees F

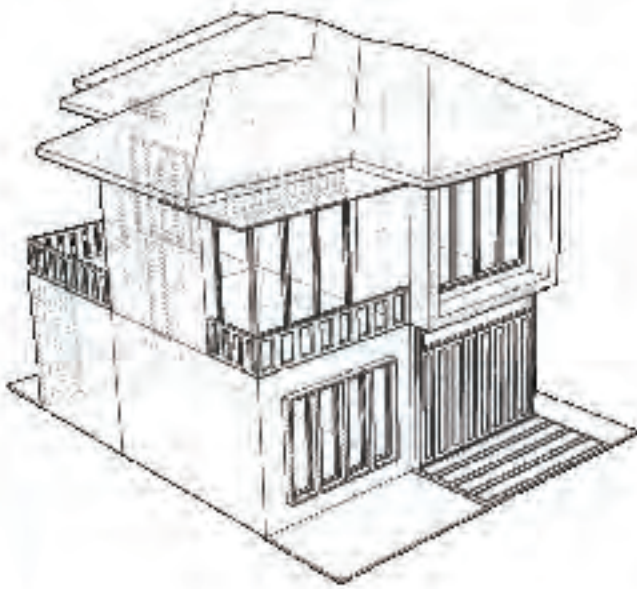


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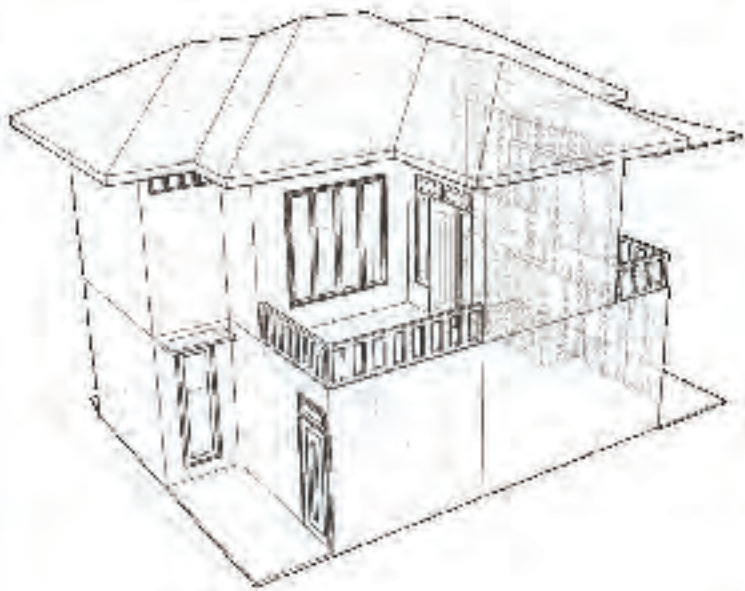


Ground Floor

TYPE 2

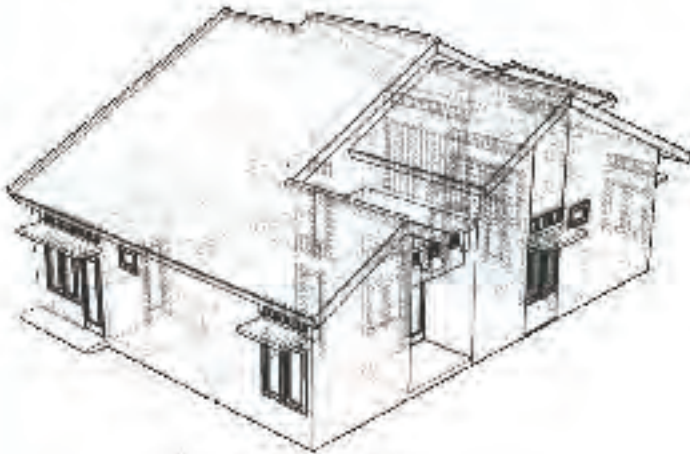
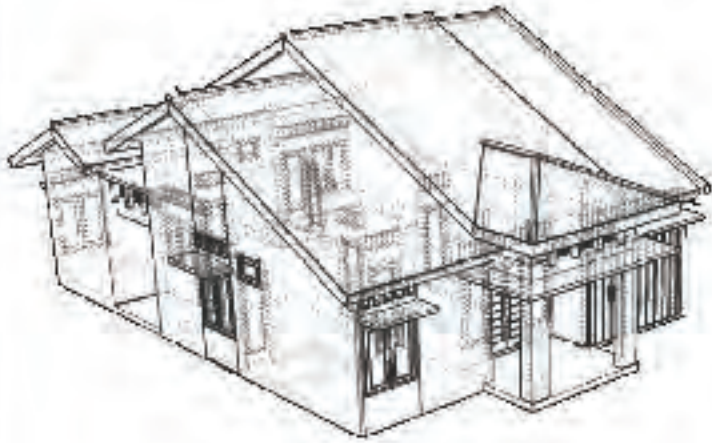


Second Floor



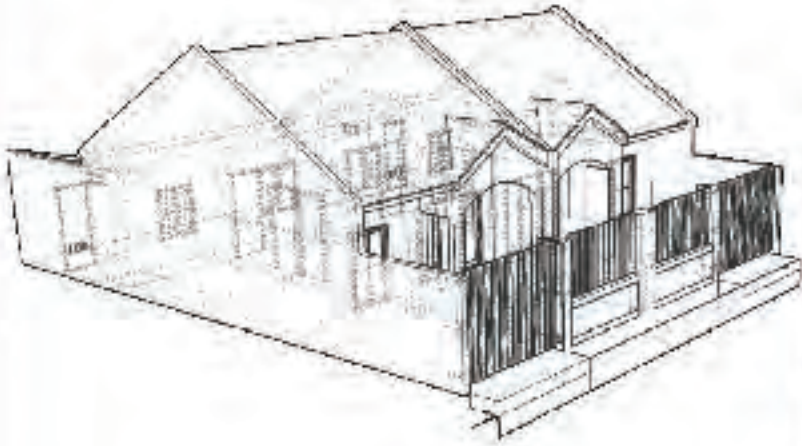
Ground Floor

TYPE 3

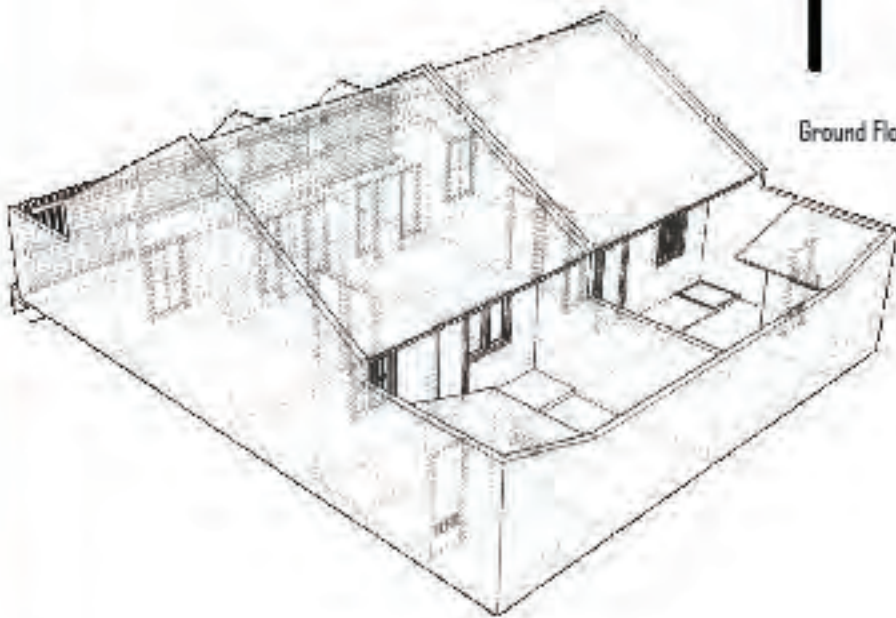


Ground Floor

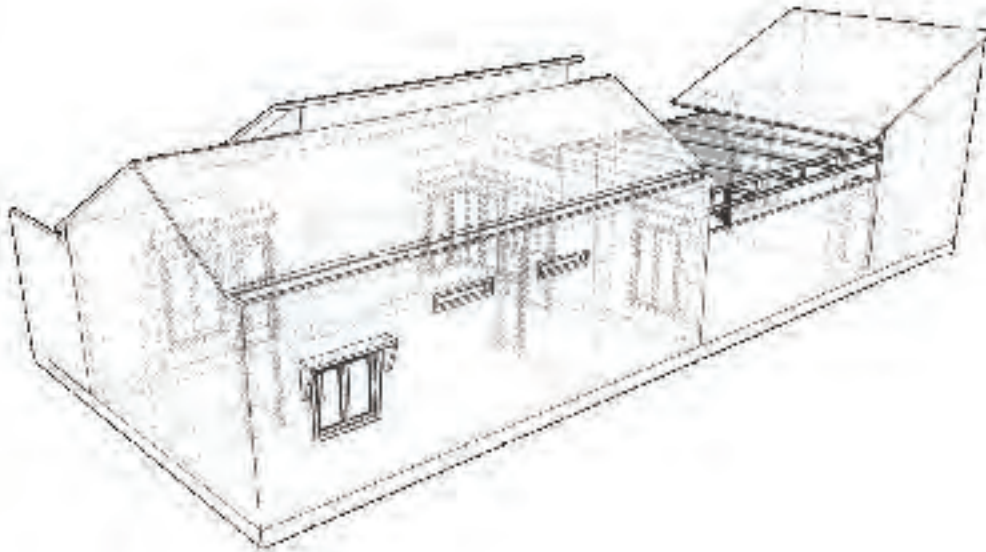
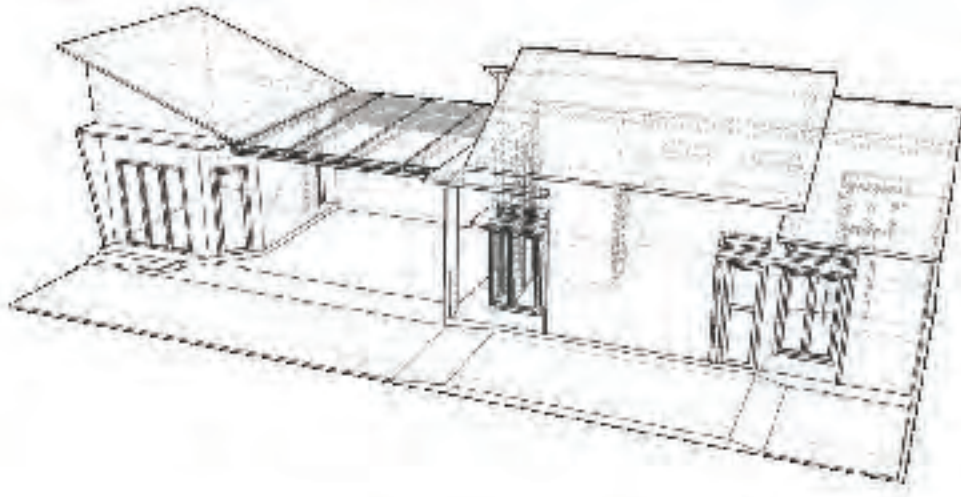
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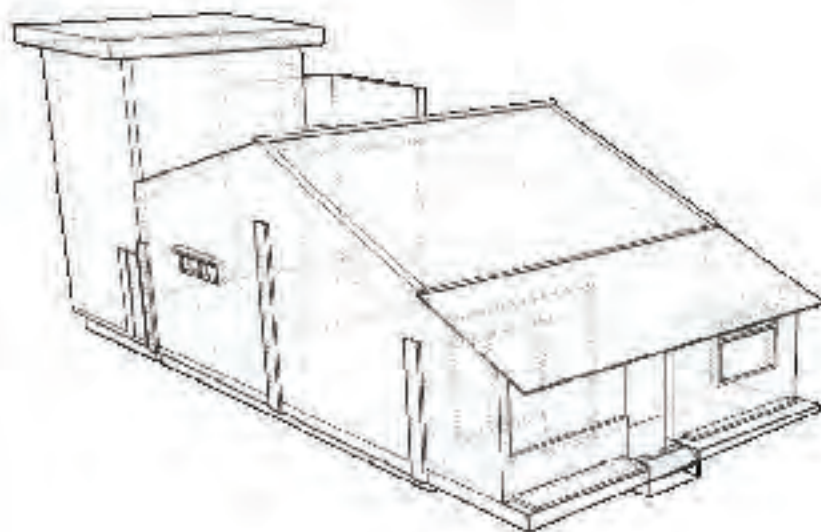
Ground Floor



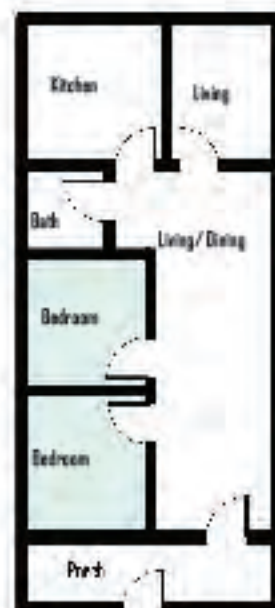
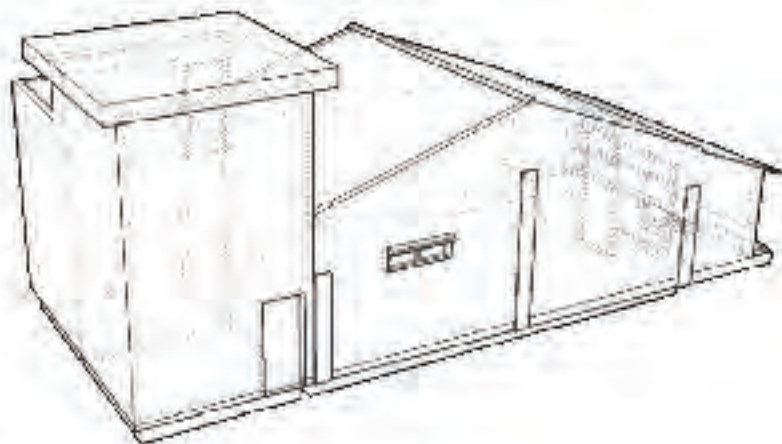
TYPE 5



TYPE 6

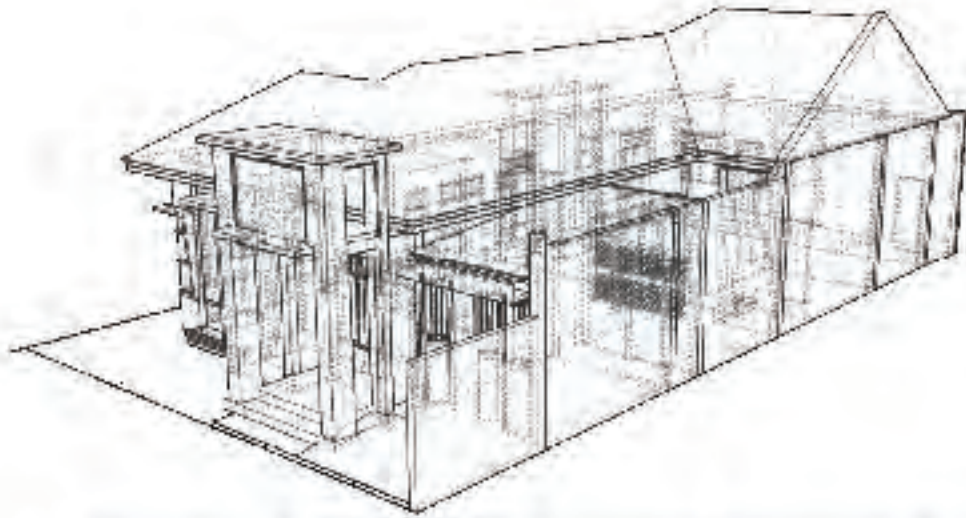
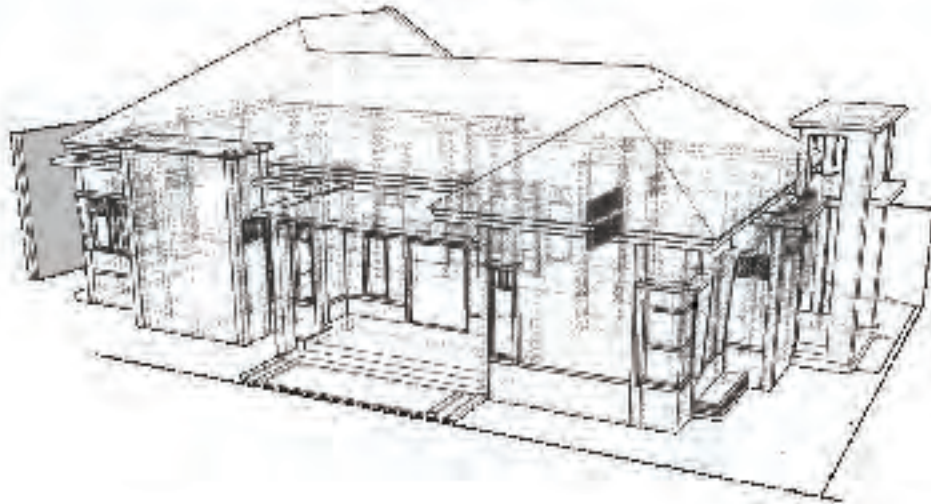


Second Floor



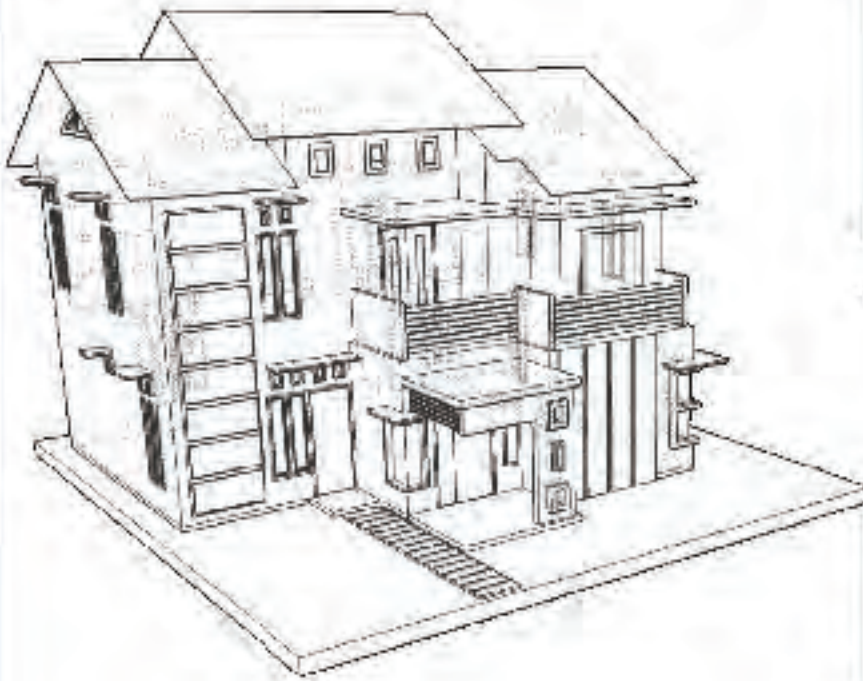
Ground Floor

TYPE 7



Ground Floor

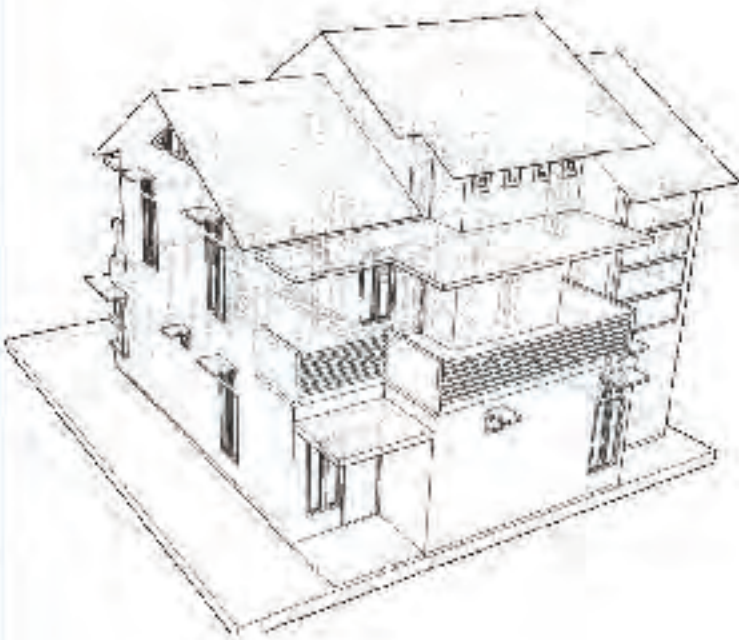
TYPE 8



Third Floor

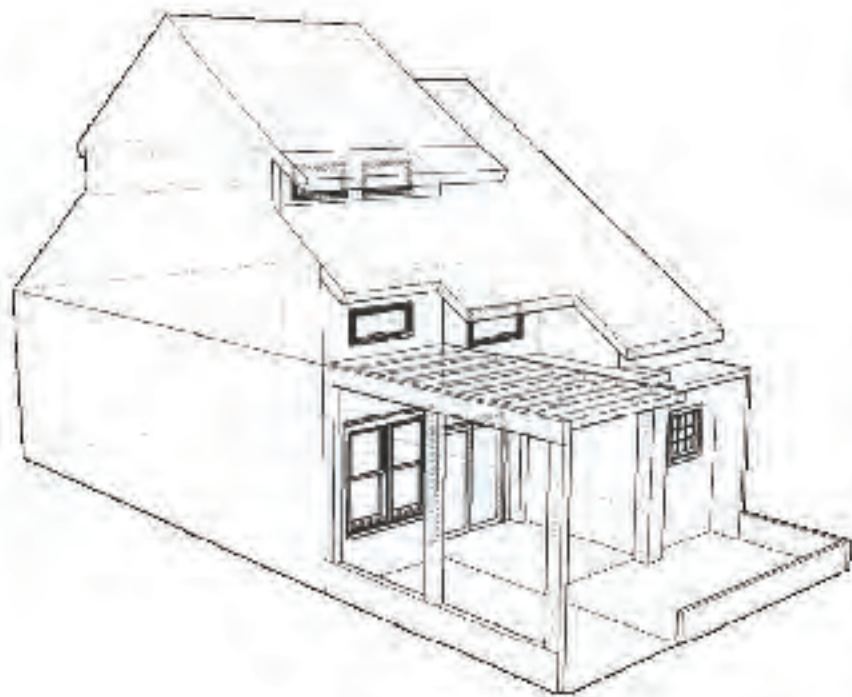


Second Floor



Ground Floor

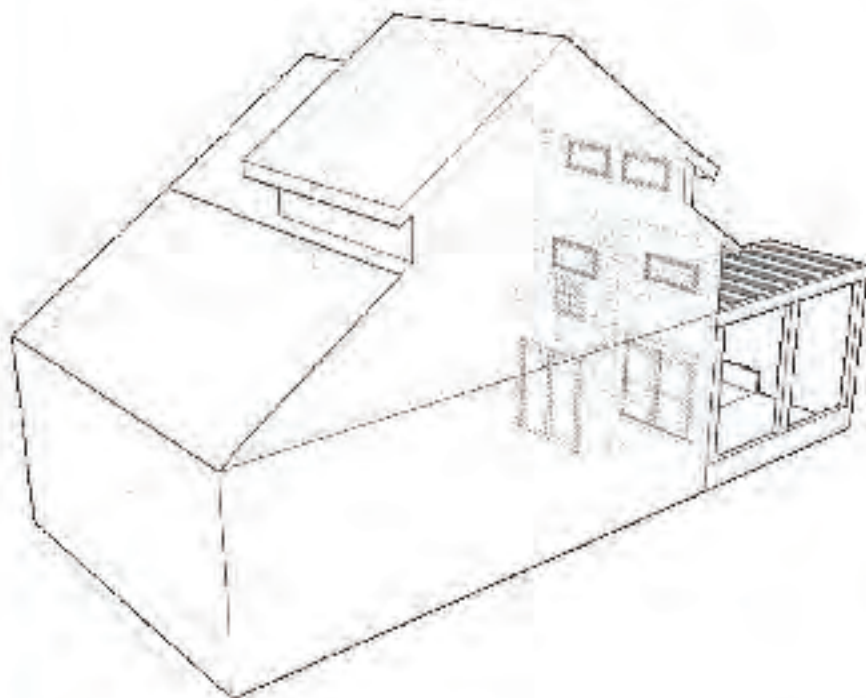
TYPE 9



Third Floor

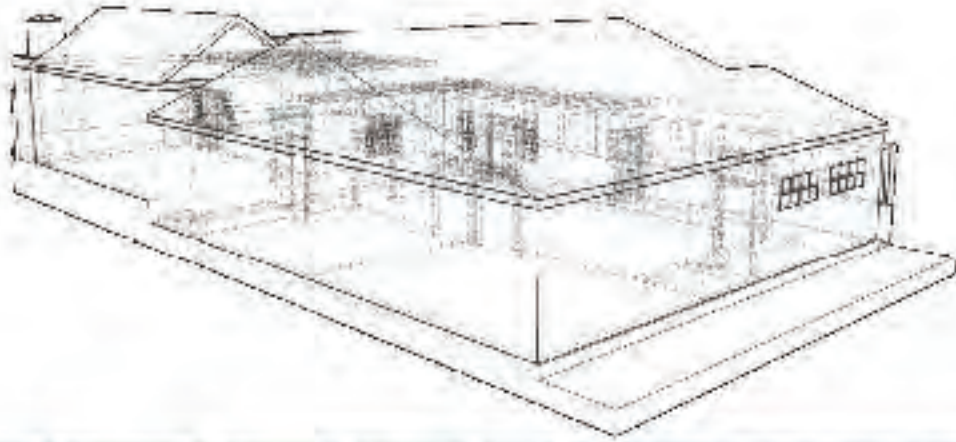
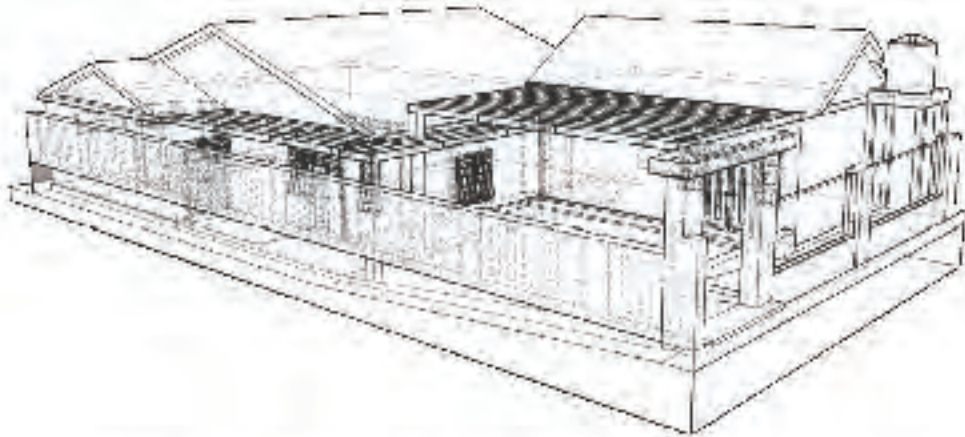


Second Floor



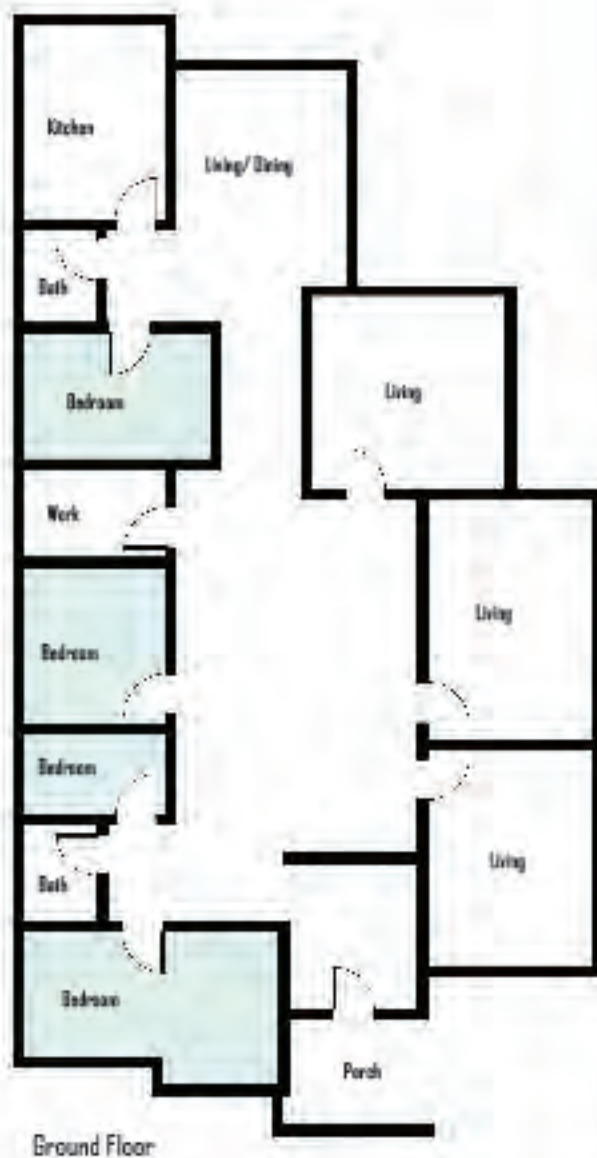
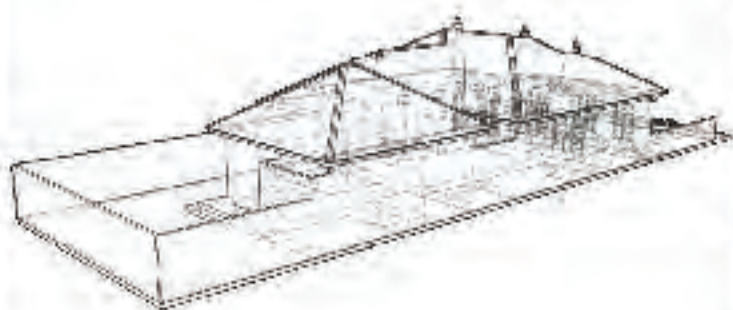
Ground Floor

TYPE 10

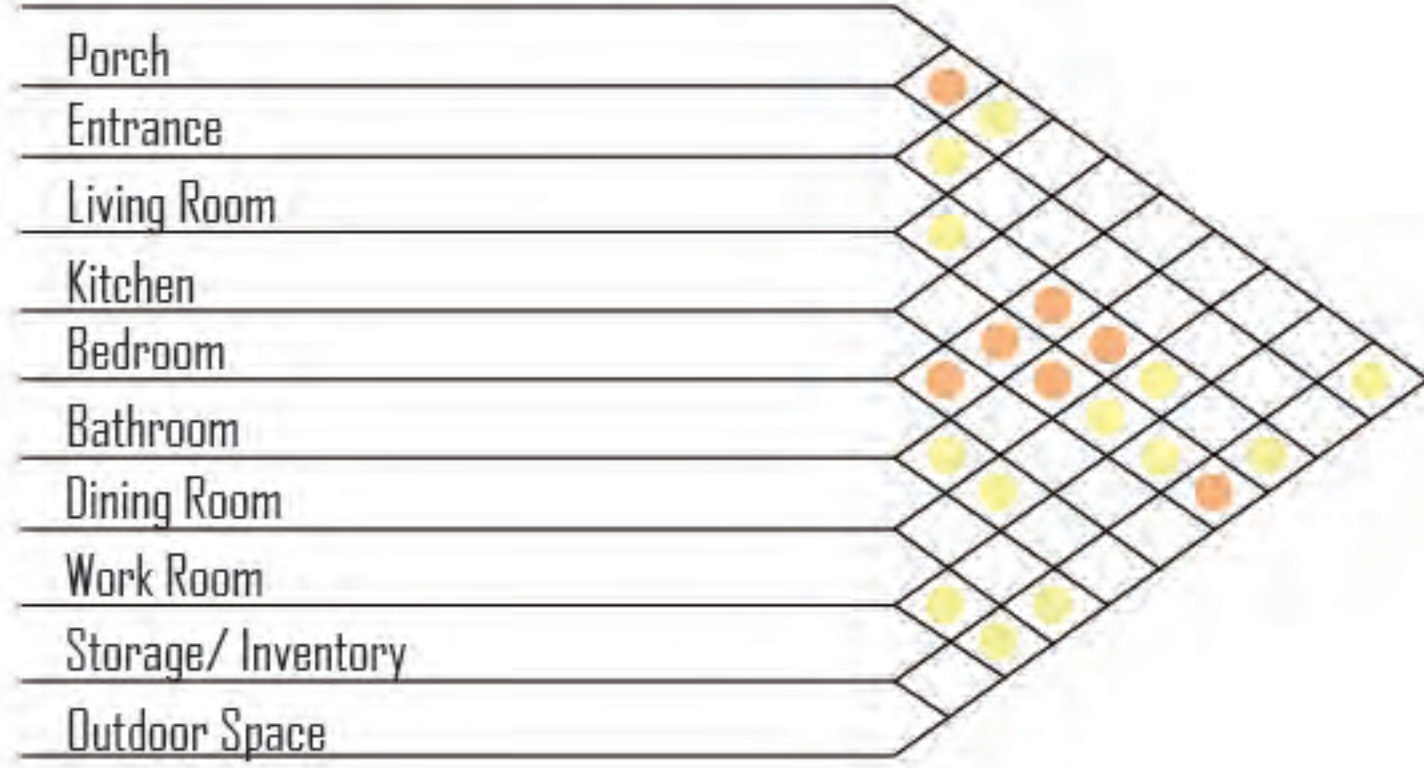


Ground Floor

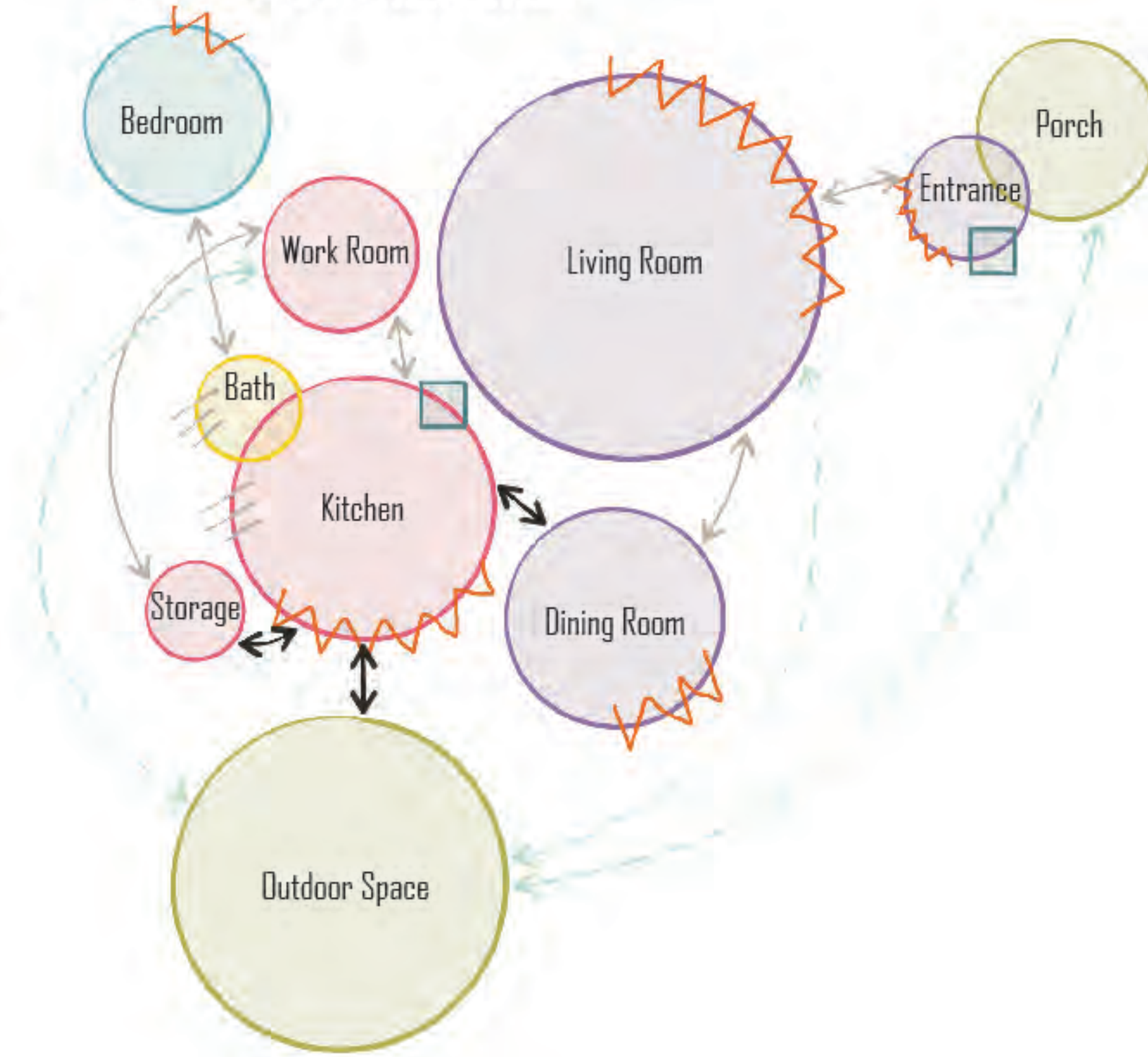
TYPE 11



ADJACENCY MATRIX



BUBBLE DIAGRAM

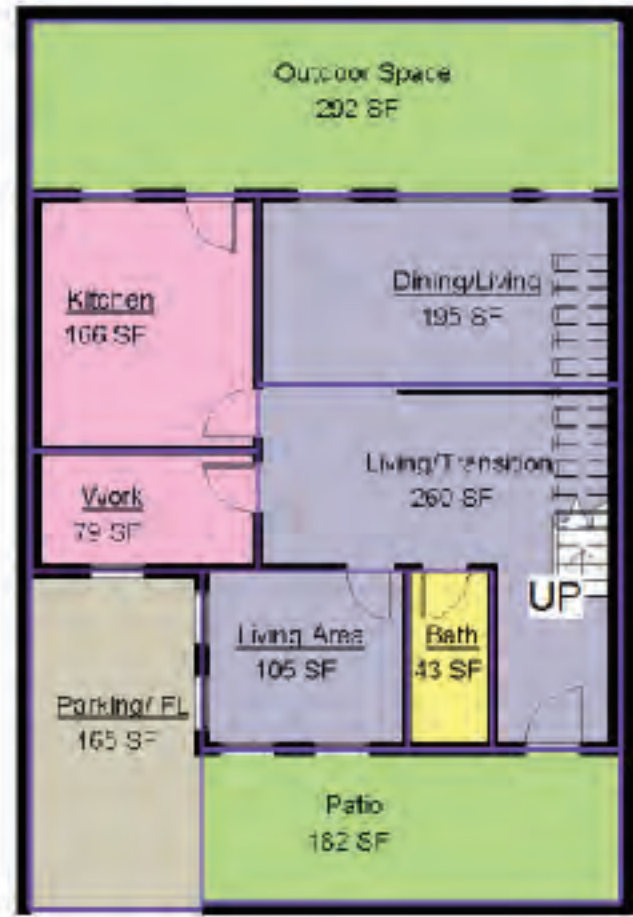


Legend

- Adjacent
- Nearby
- Not Related

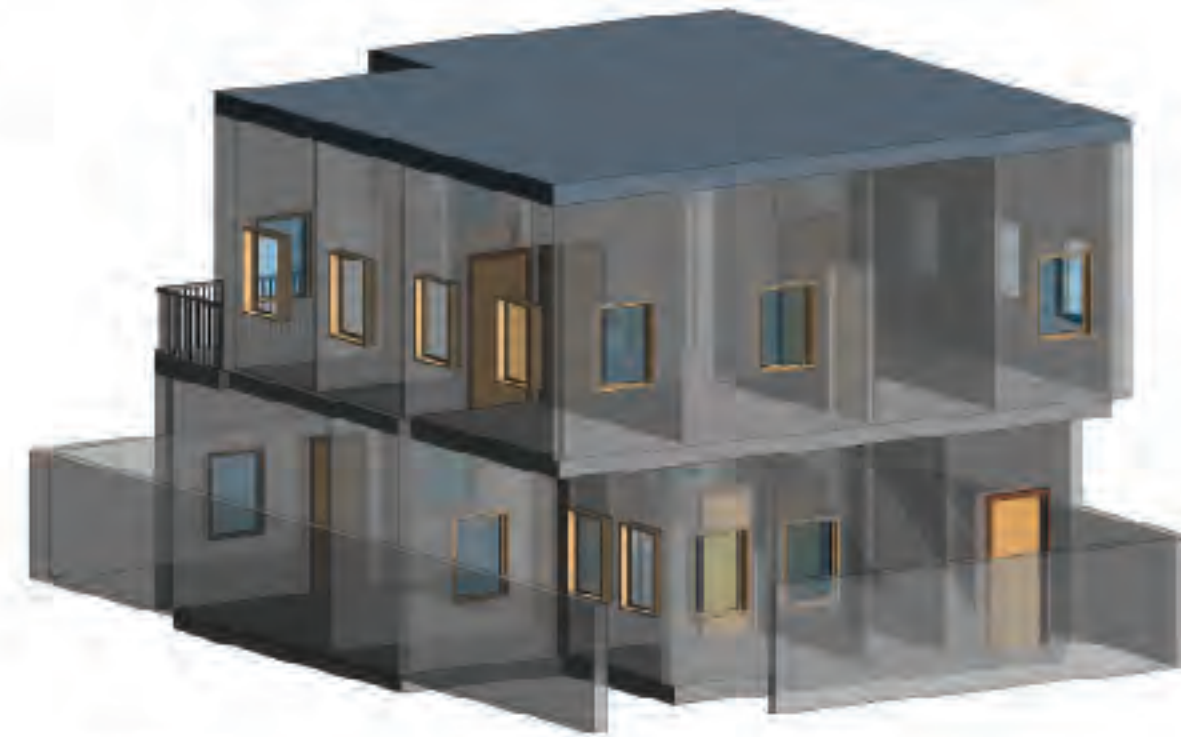
Legend

- Function Based Space
- Open Air Space
- Public Space
- Shared Private Space
- Private Space
- Entrance
- Direct Adjacency (Critical)
- Direct Path
- ↔ Nearby
- ↔ Close Proximity
- ⚡ Sunlight (Amount based on length)
- /// Ventilation



Area Legend

- Bath
- Dining/Living
- Kitchen
- Living Area
- Living/Transition
- Outdoor Space
- Parking/FL
- Patio
- Work



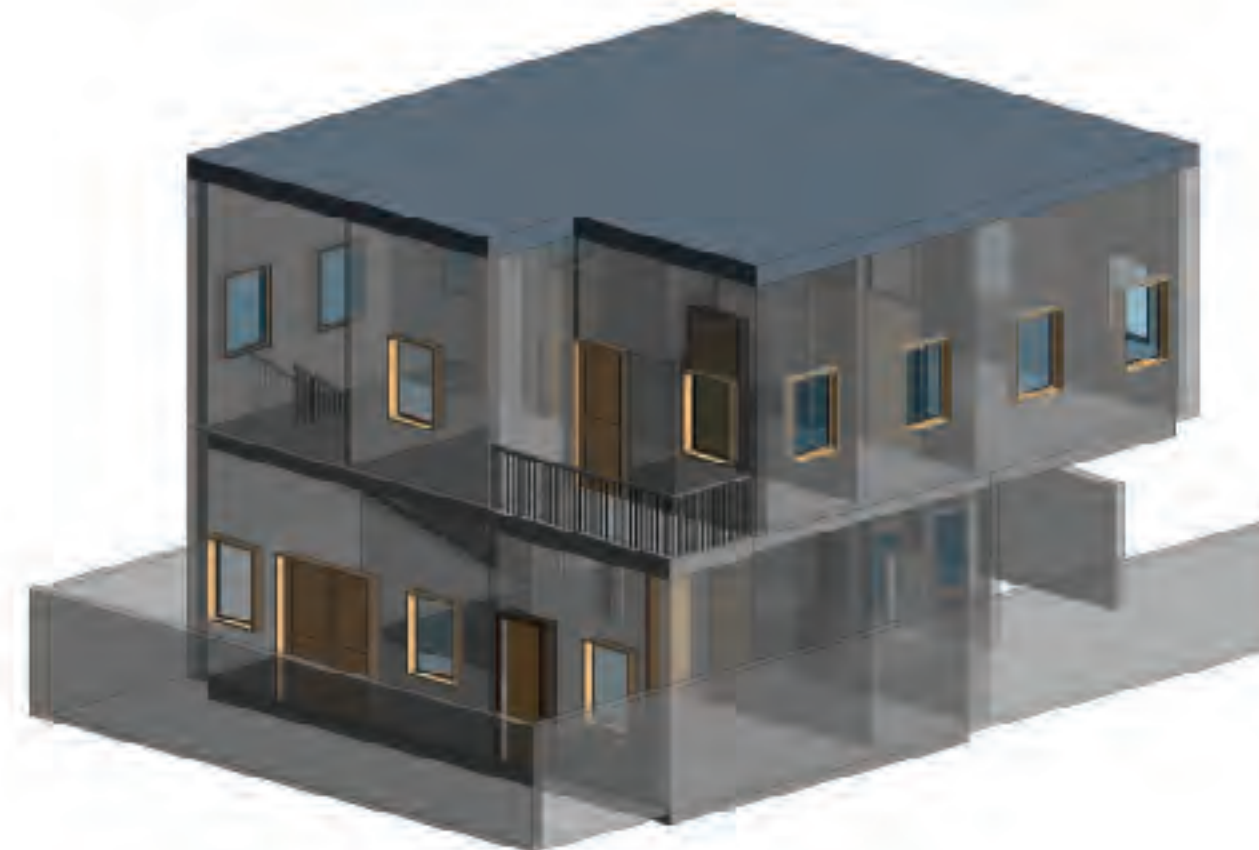
Front View

Level 1
1/16" = 1'-0"



Area Legend

- Balcony
- Bath
- Bed
- Circulation



Back View

Level 2
1/16" = 1'-0"

Building Performance Factors

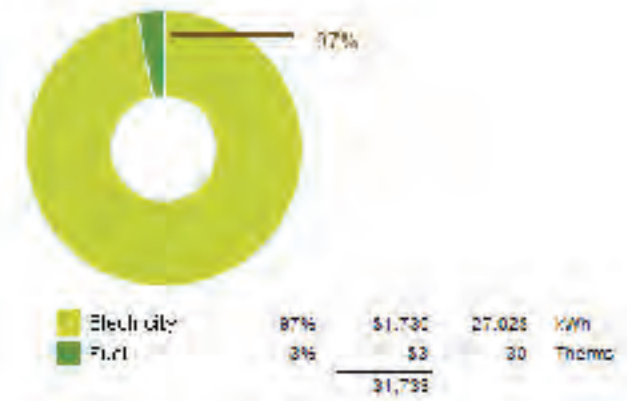
Location:	Dilagam Jawa Tengah
Weather Station:	1401122
Outdoor Temperature:	Max: 81°F Min: 61°F
Floor Area:	1,500 sf
Exterior Wall Area:	2,730 sf
Average Lighting Power:	0.01 W/ft²
People:	3 people
Exterior Window Ratio:	0.10
Heating Coeff:	60.00 / 1.00
Fuel Cost:	\$0.11 / Therm

Life Cycle Energy Use/Cost

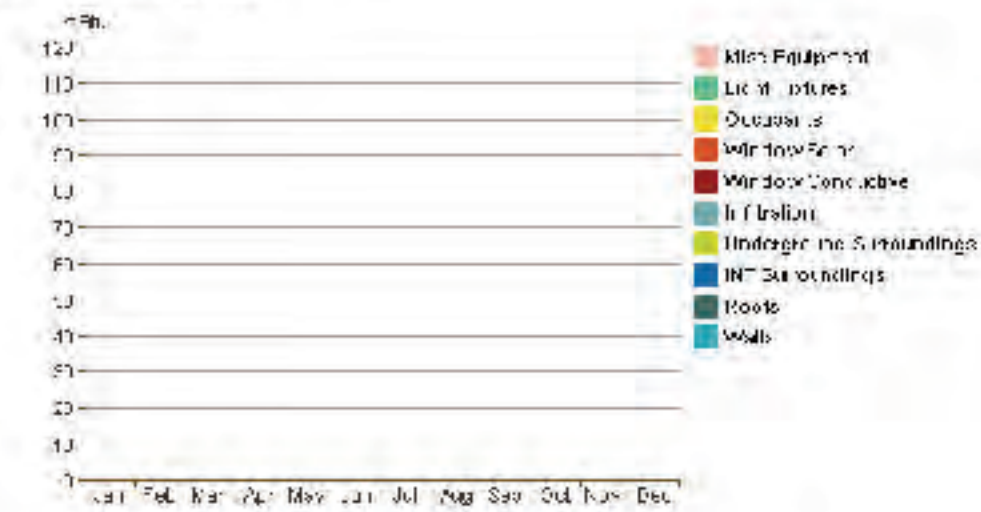
Life Cycle Electricity Use:	010,642 kWh
Life Cycle Fuel Use:	919 Therms
Life Cycle Energy Cost:	\$23,607

50-year life and 5.1% discount rate for costs

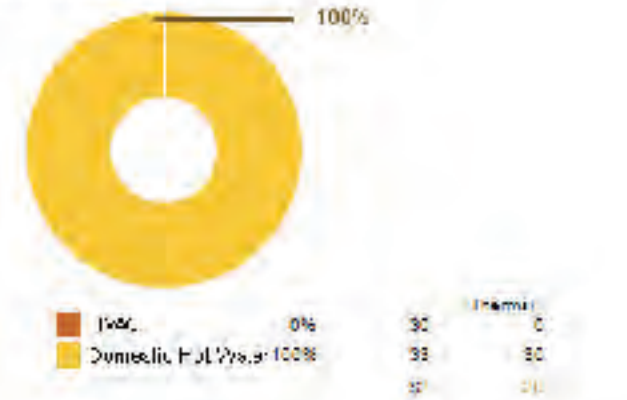
Annual Energy Use/Cost



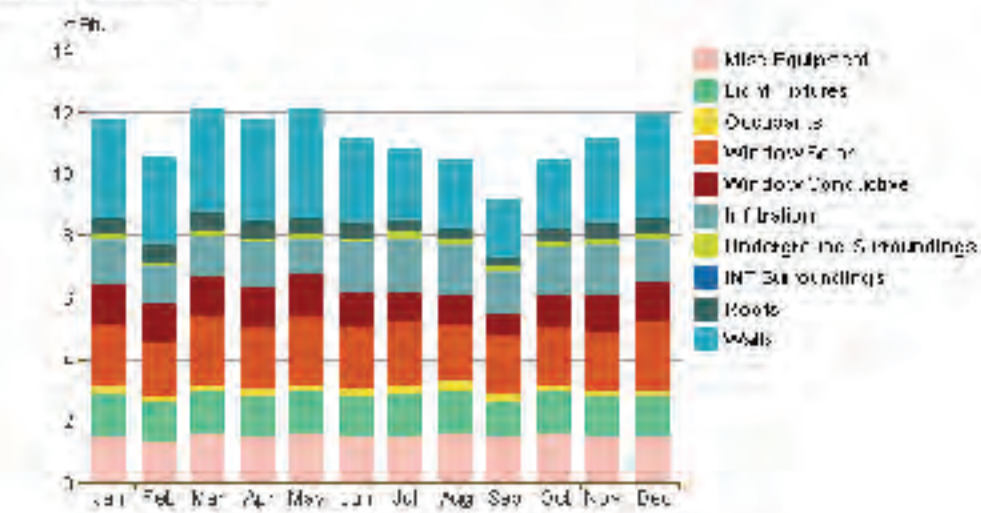
Monthly Heating Load



Energy Use: Fuel



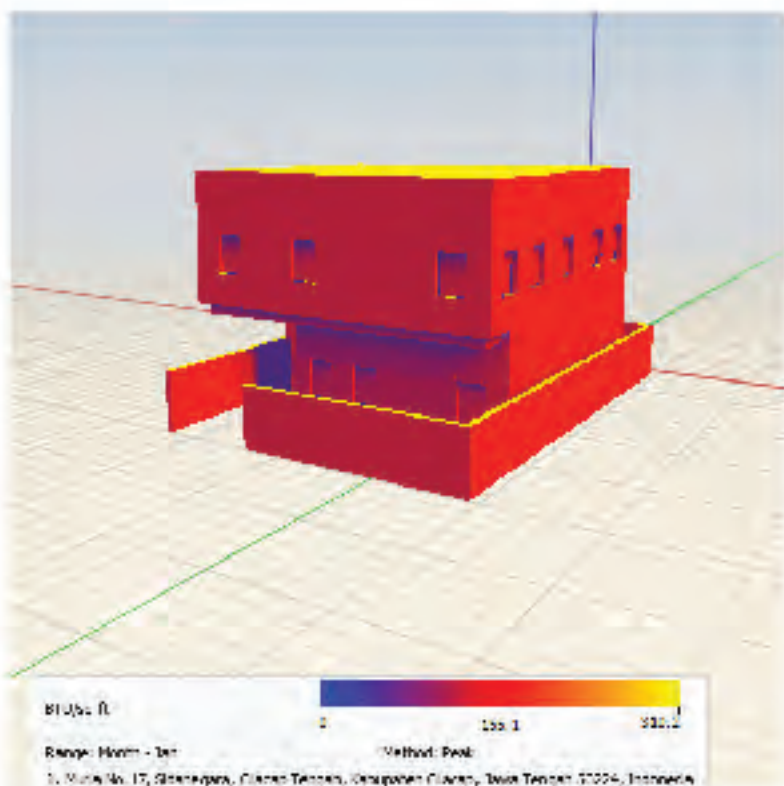
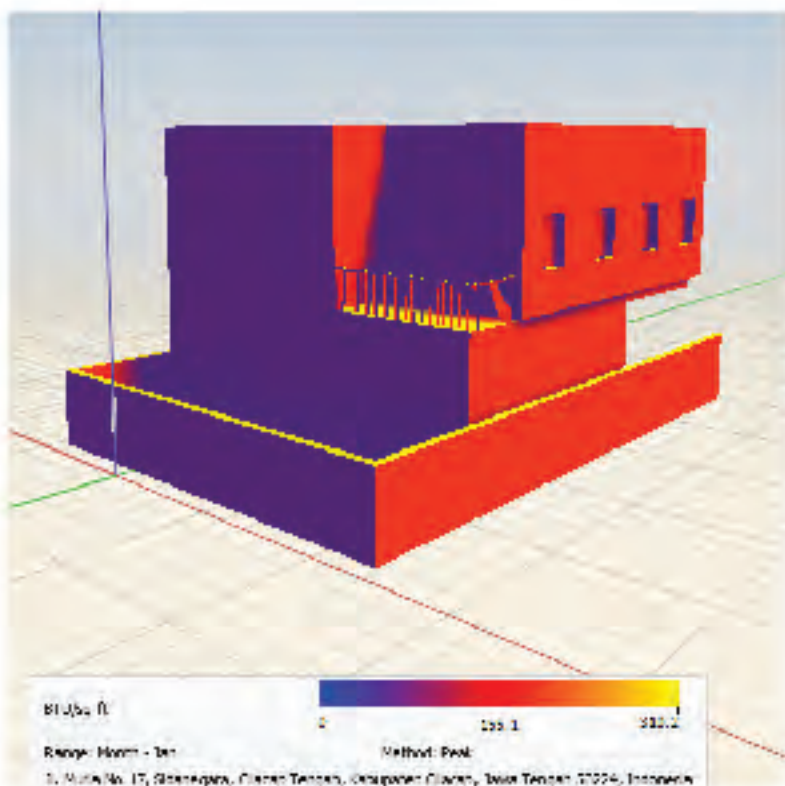
Monthly Cooling Load



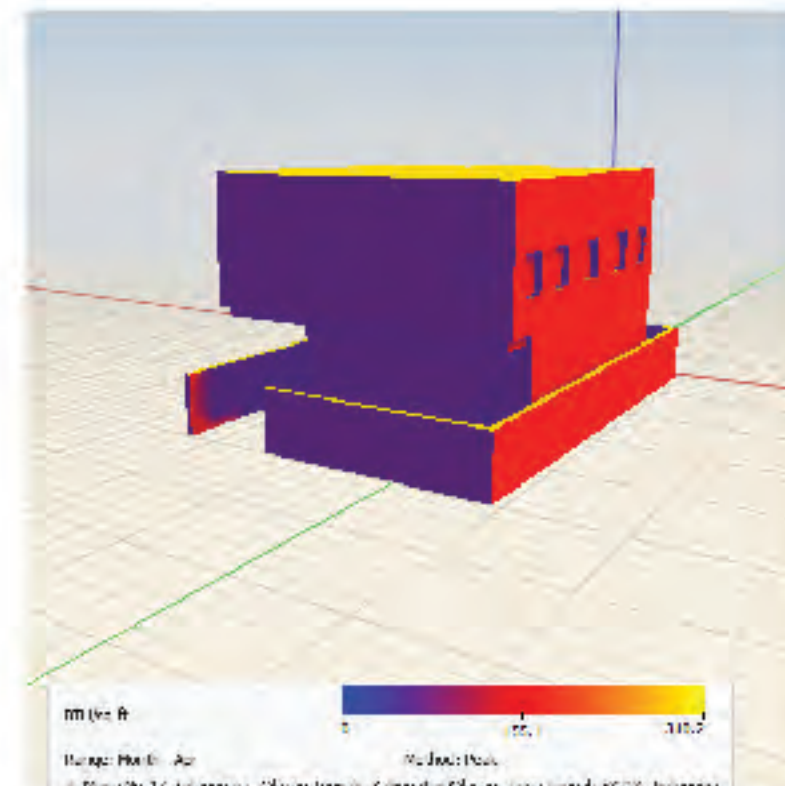
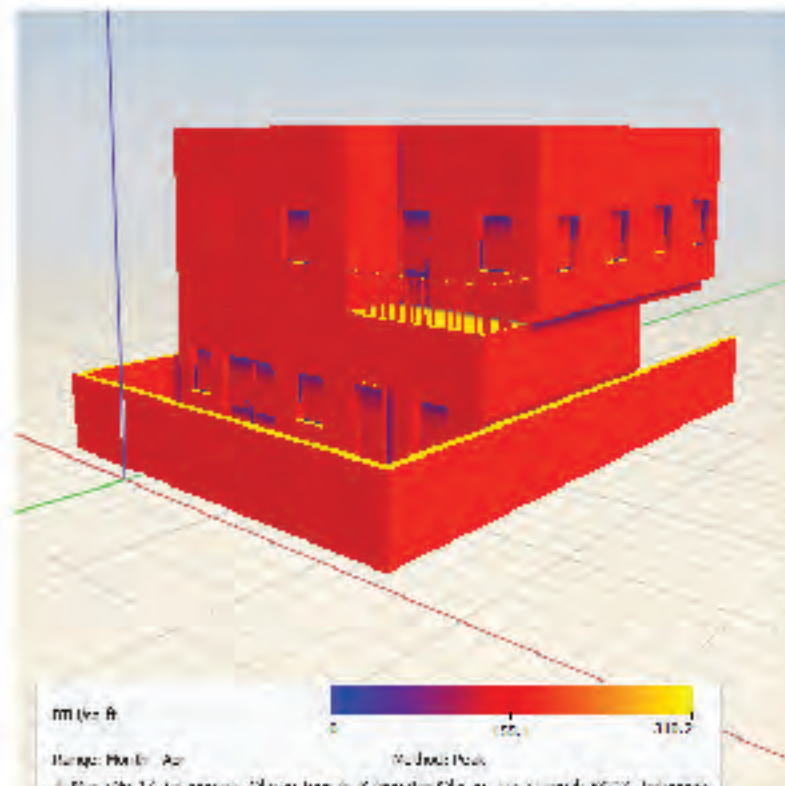
EUI= 95.2 KBTU/SF/YR

BASELINE MODEL

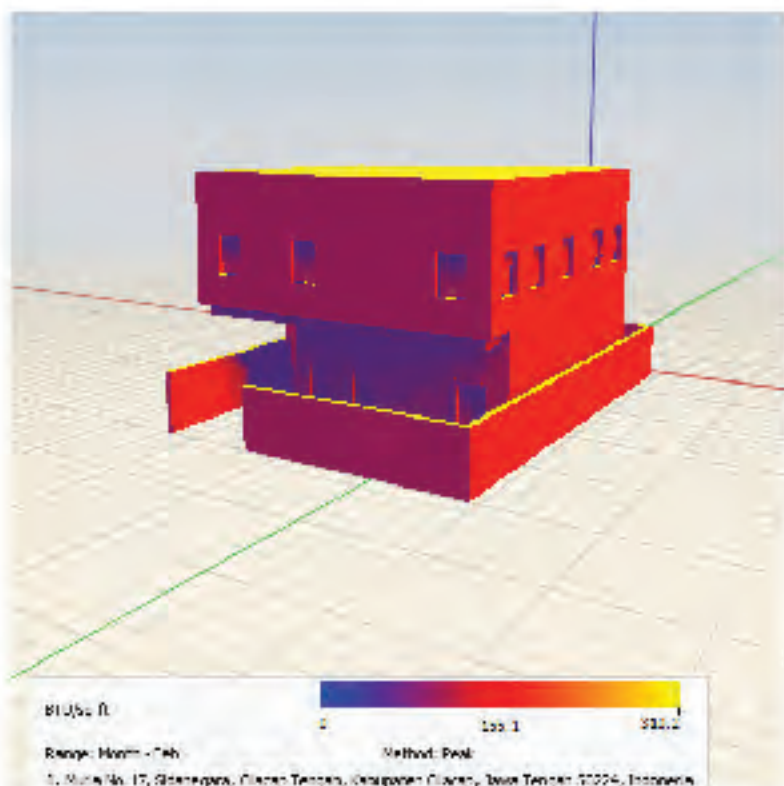
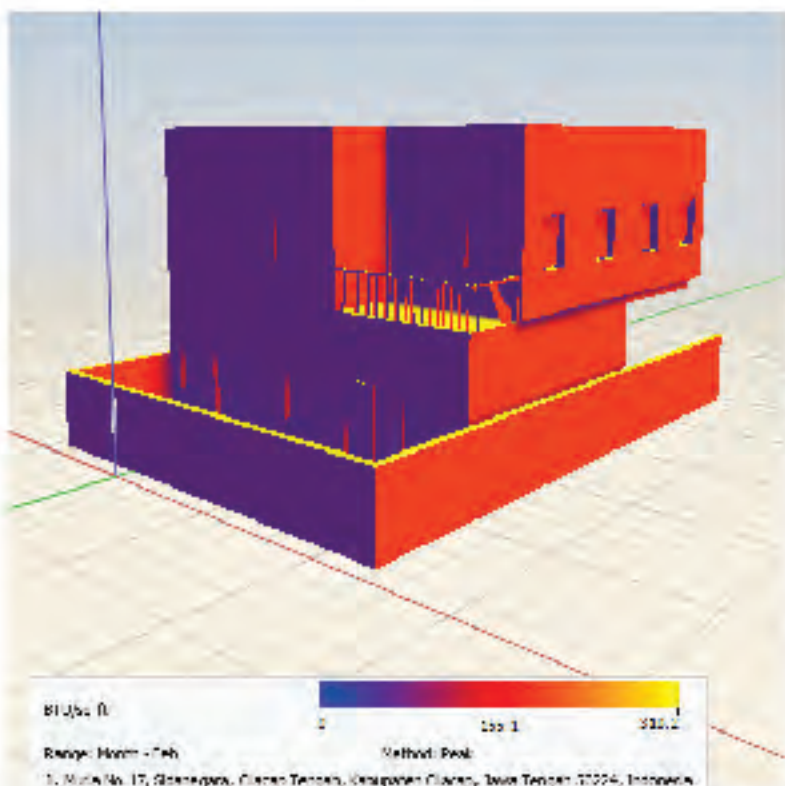
January



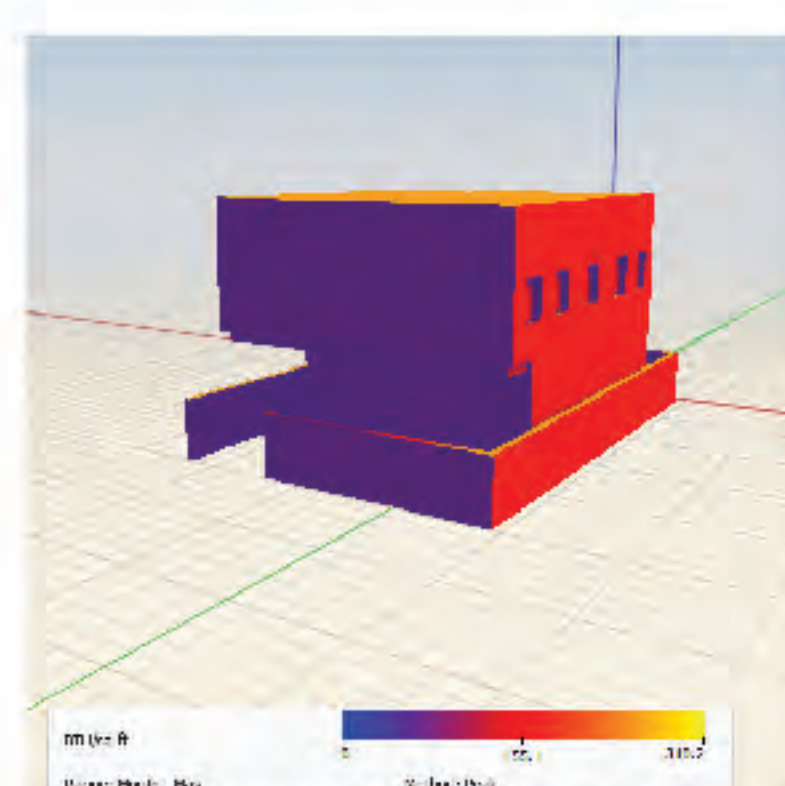
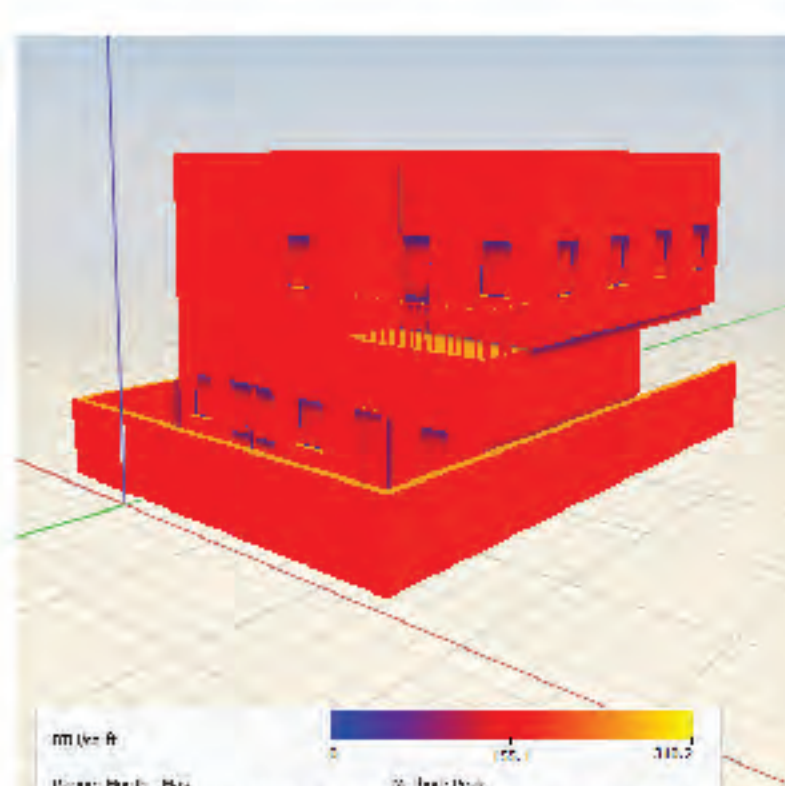
April



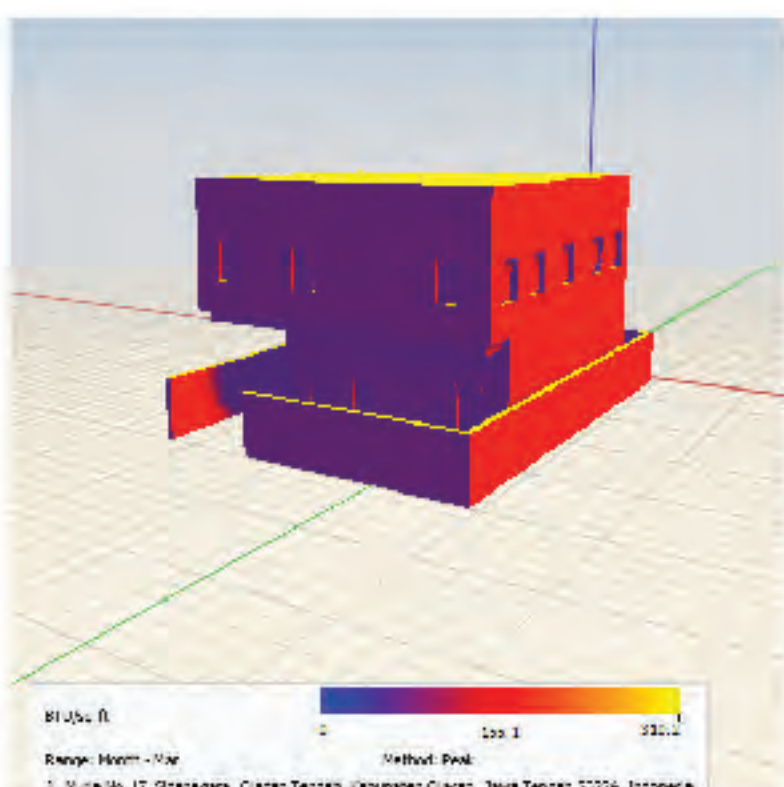
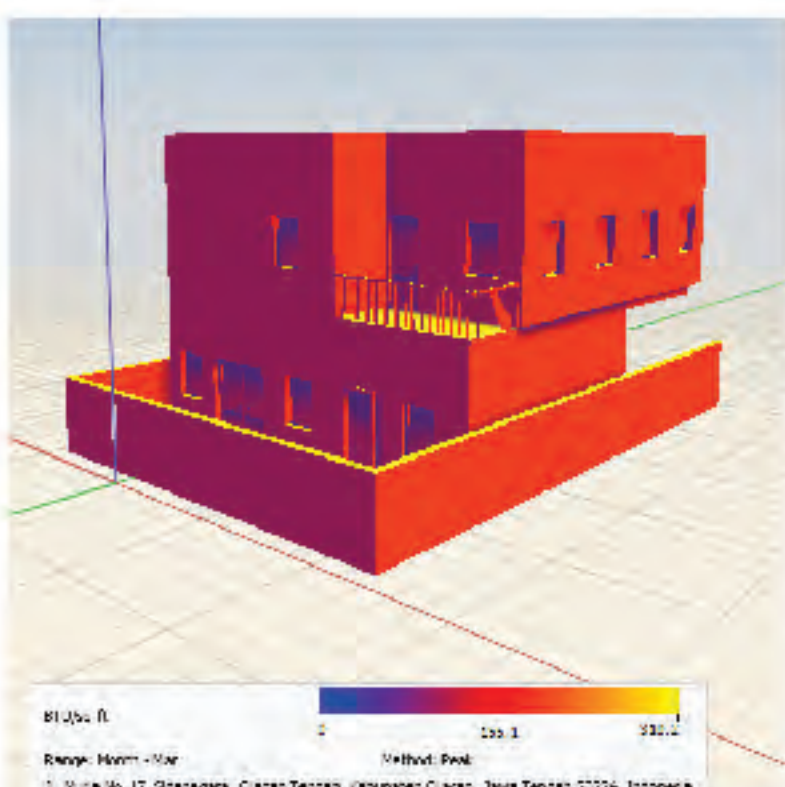
February



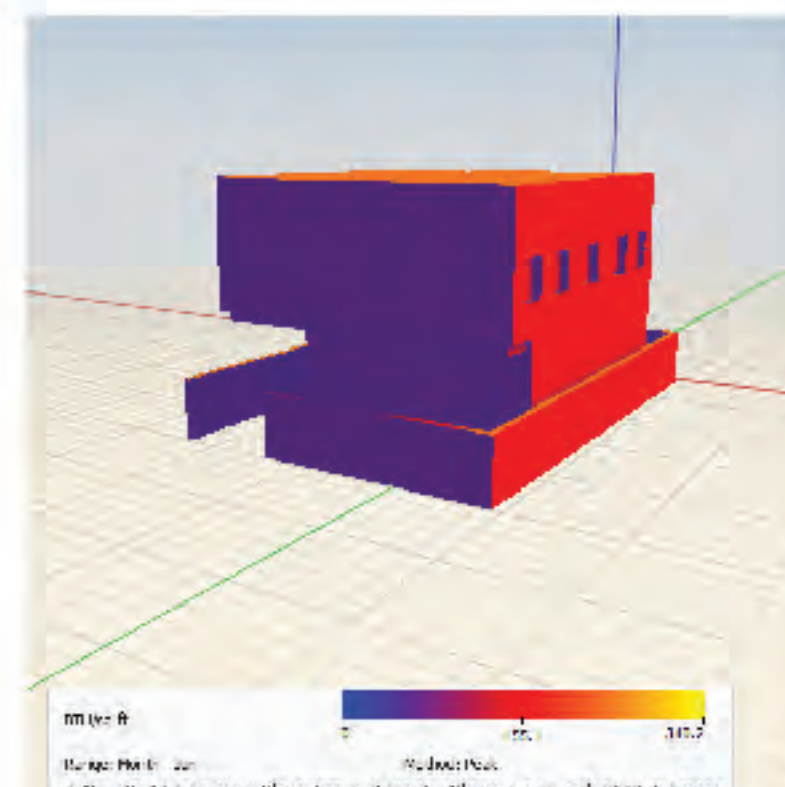
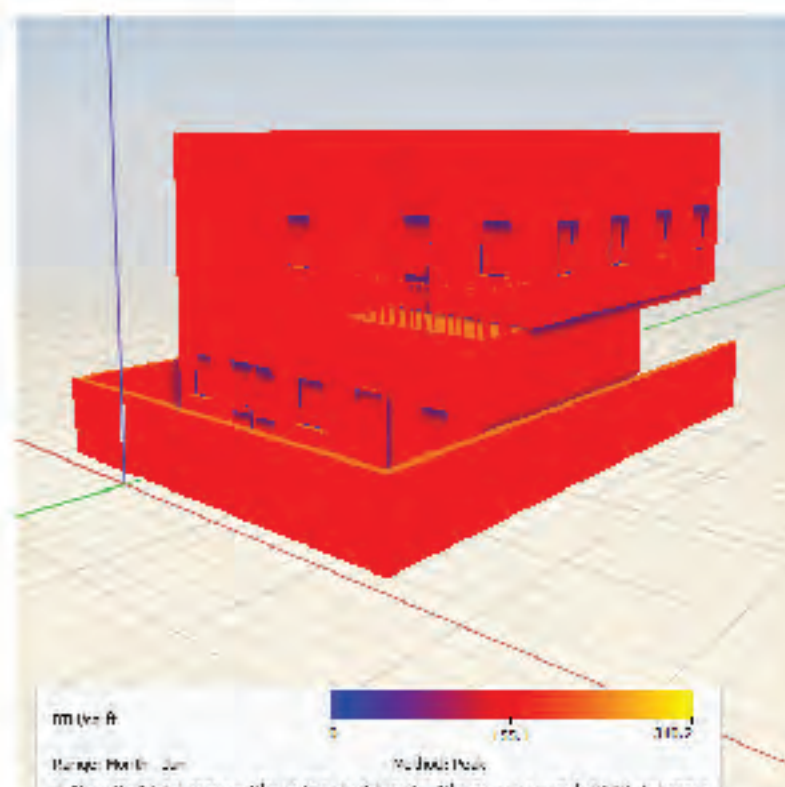
May



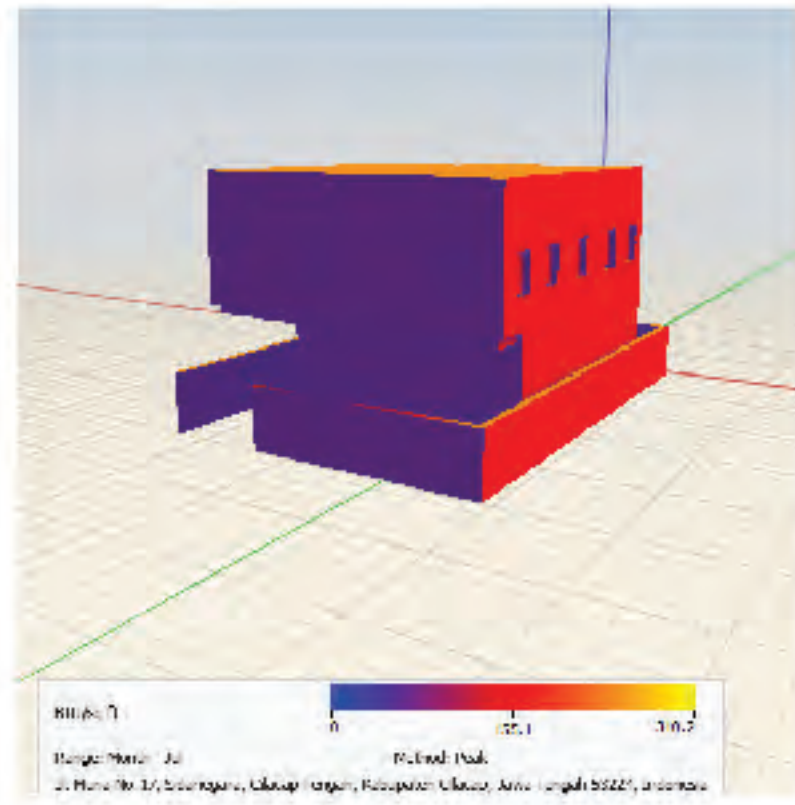
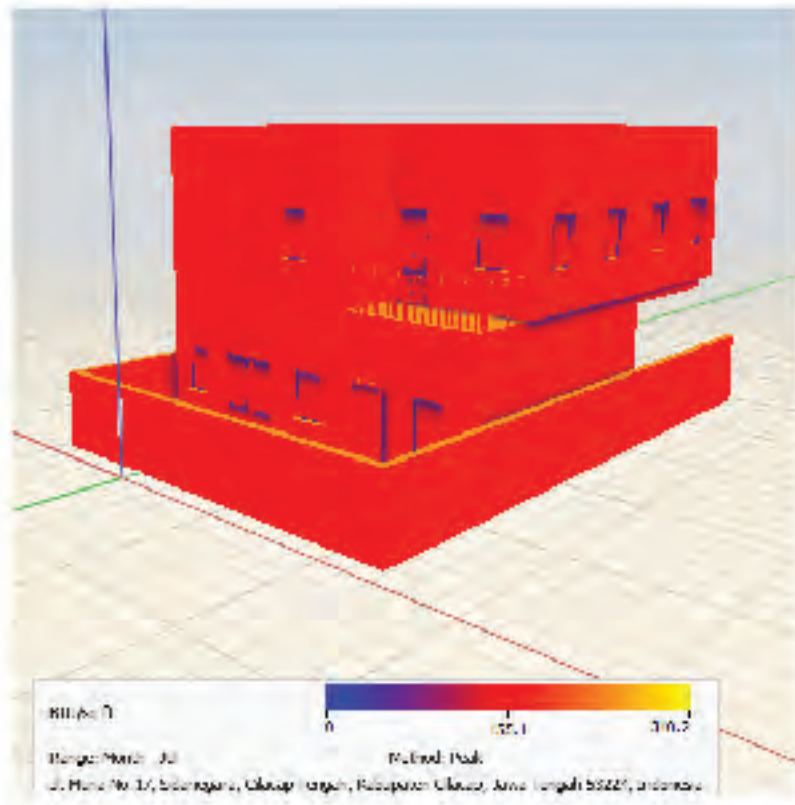
March



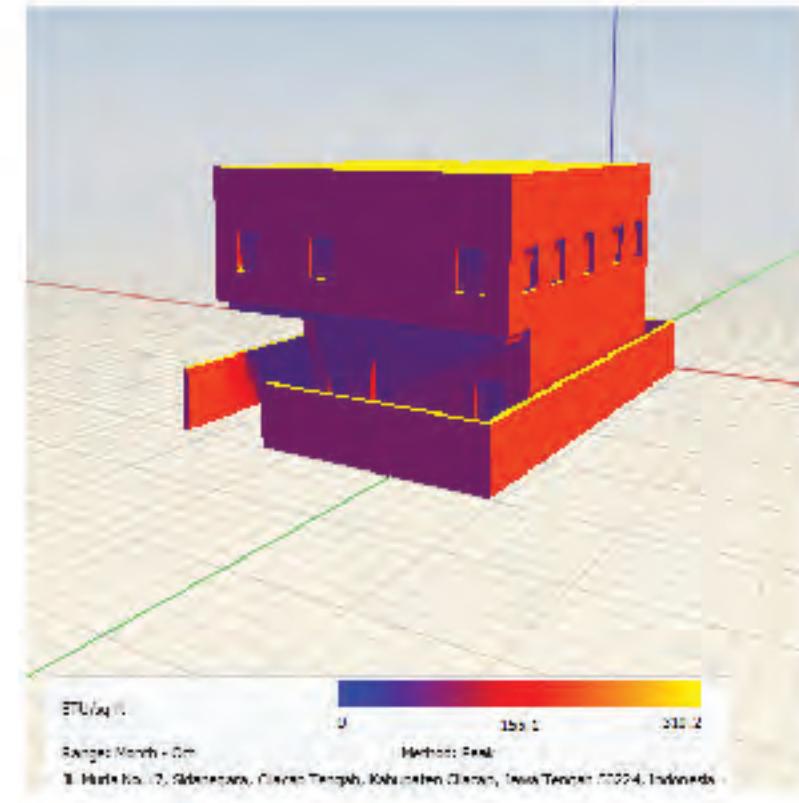
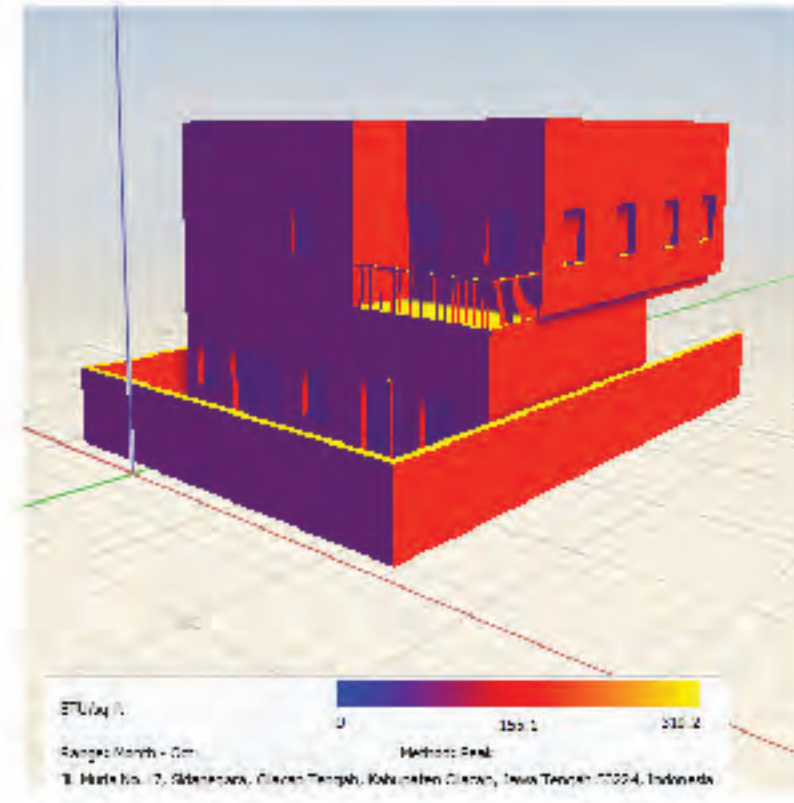
June



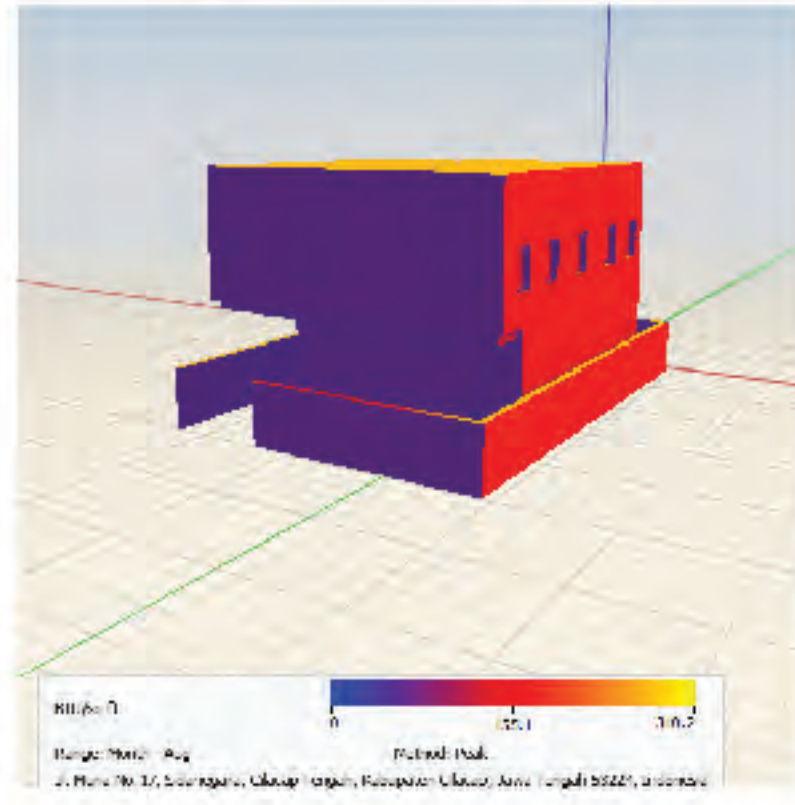
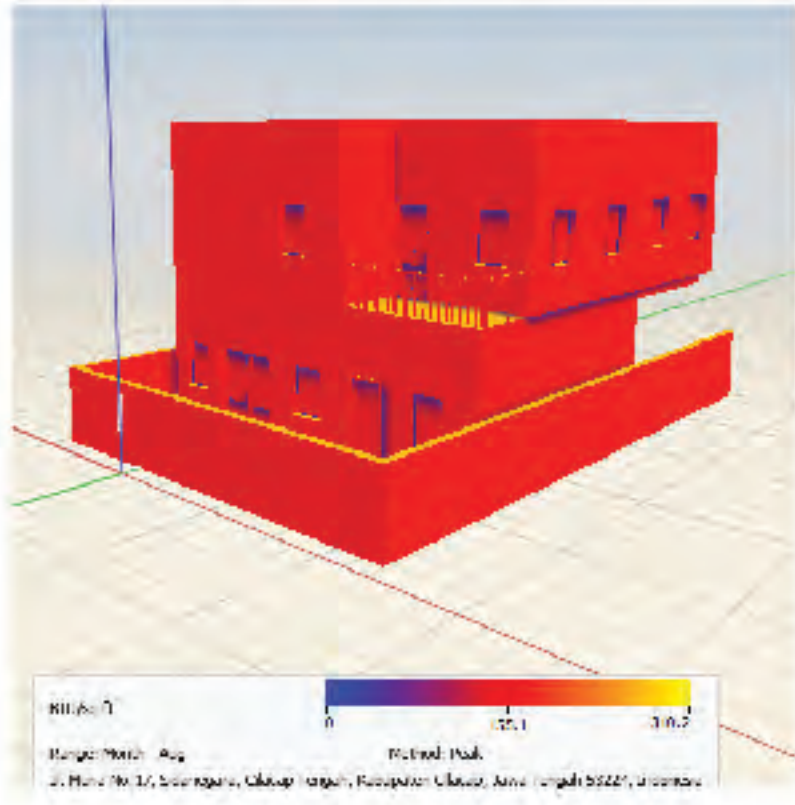
July



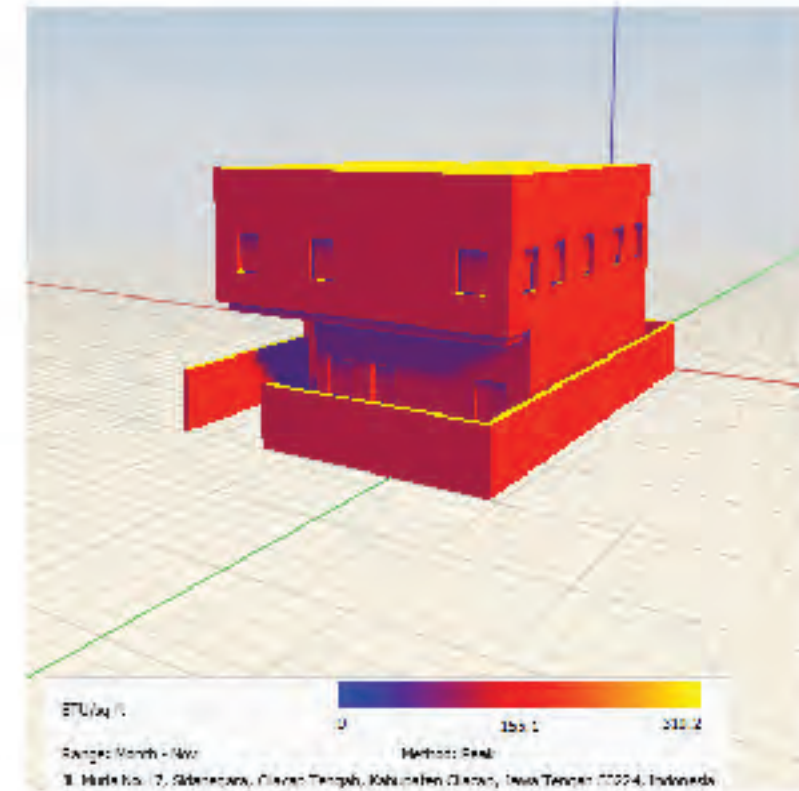
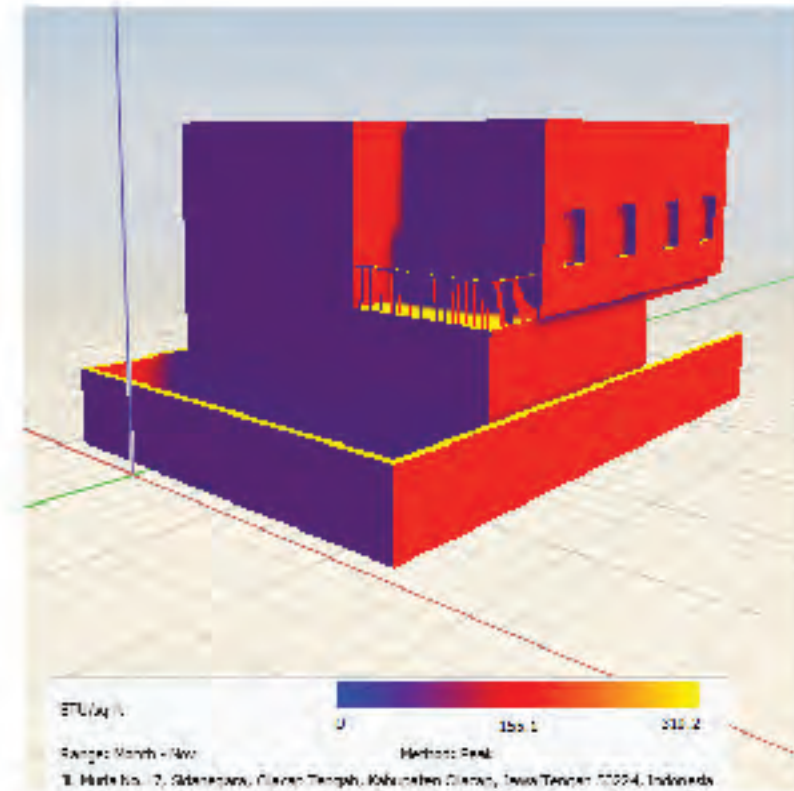
October



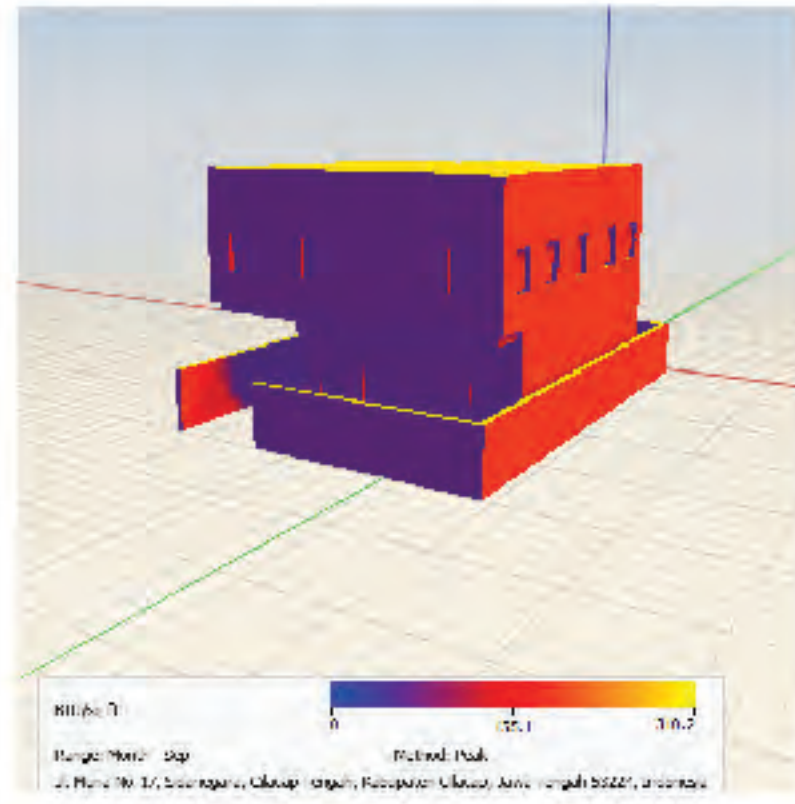
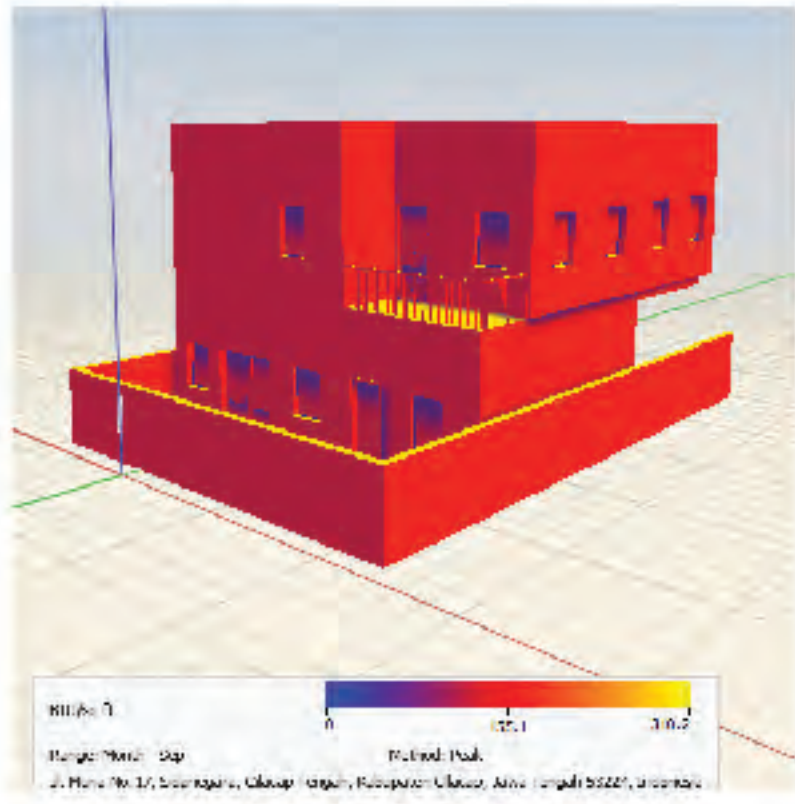
August



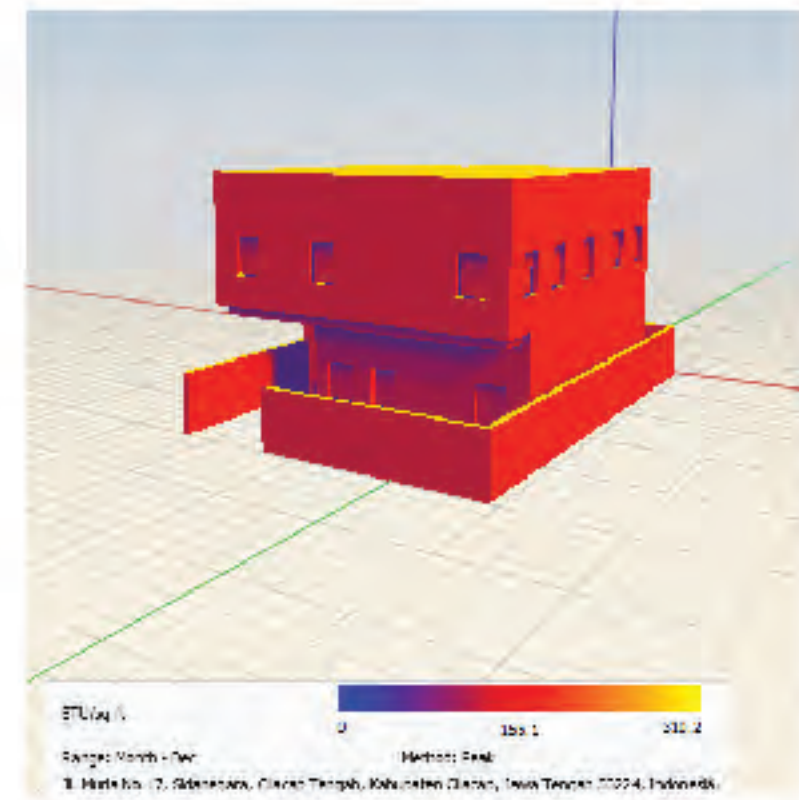
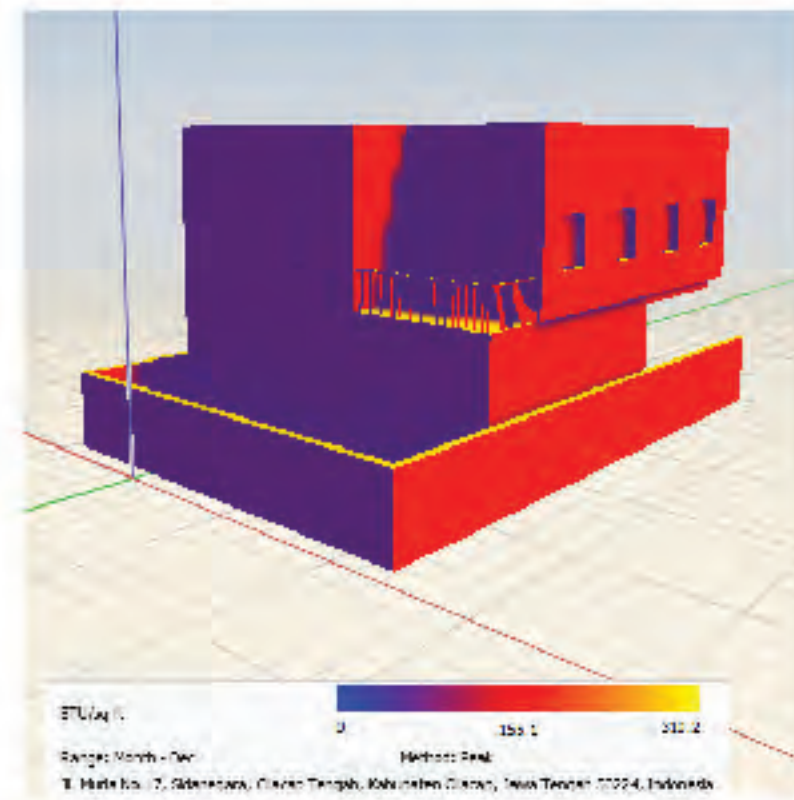
November



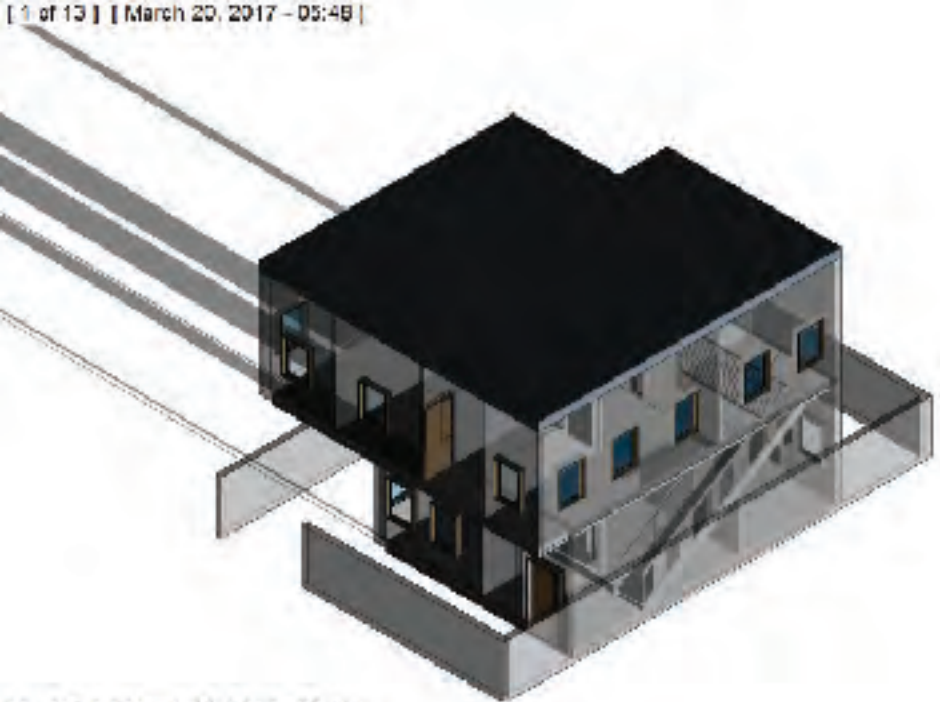
September



December

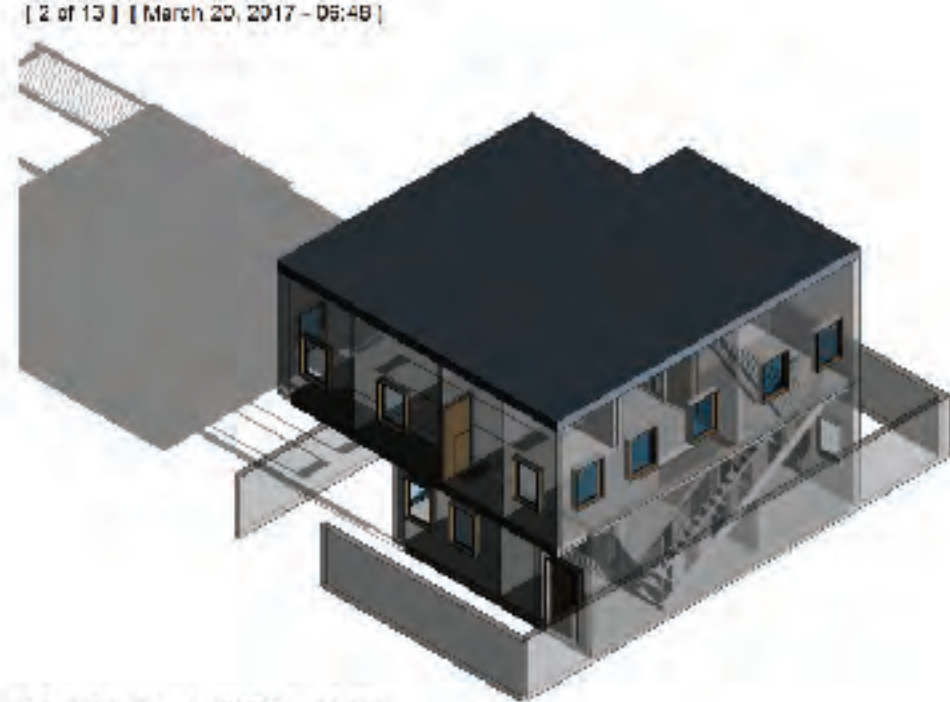


[1 of 13] [March 20, 2017 - 05:48]



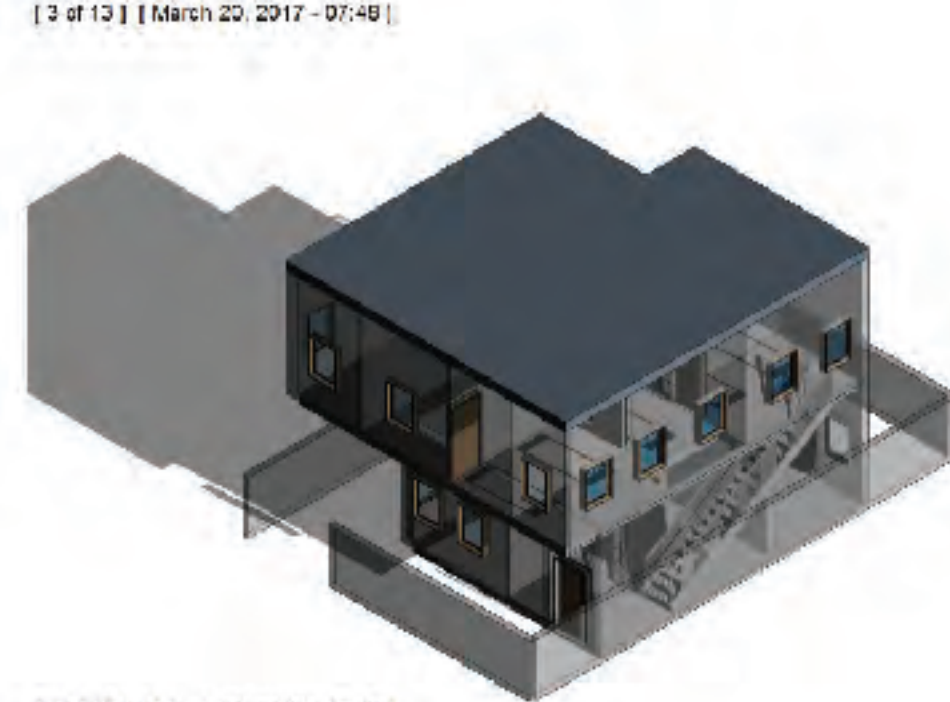
[5 of 13] [March 20, 2017 - 09:48]

[2 of 13] [March 20, 2017 - 06:48]



[6 of 13] [March 20, 2017 - 10:48]

[3 of 13] [March 20, 2017 - 07:48]

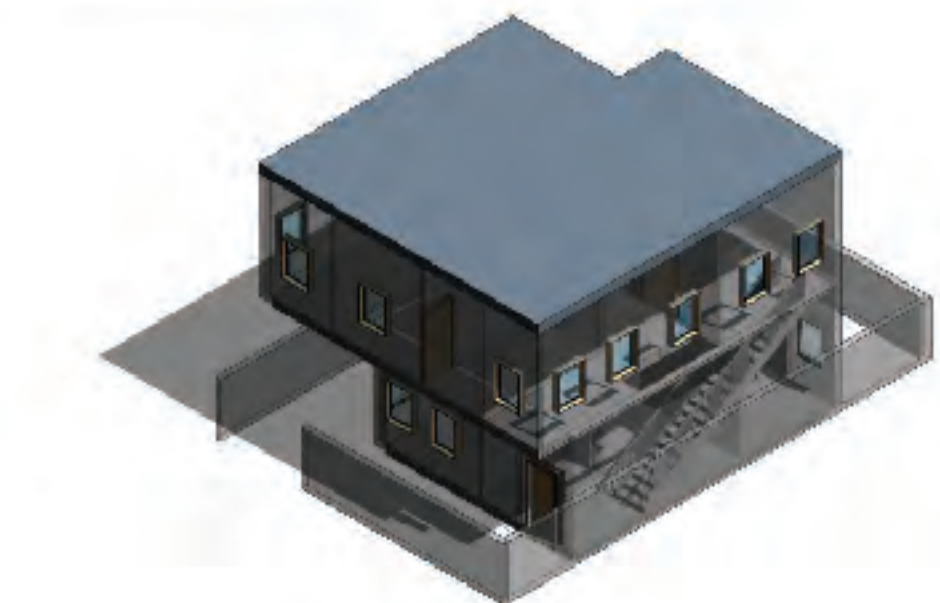


[7 of 13] [March 20, 2017 - 11:48]

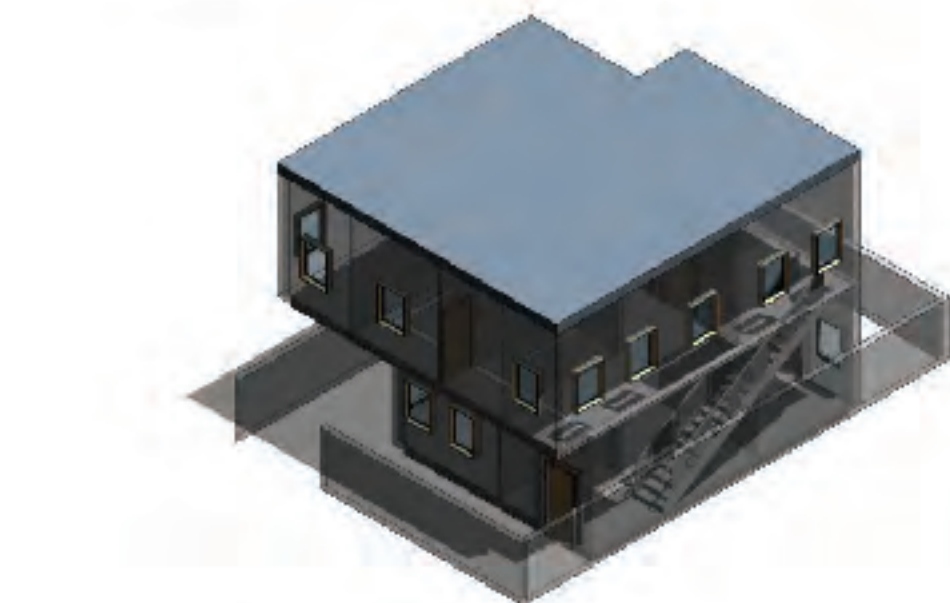
[4 of 13] [March 20, 2017 - 08:48]



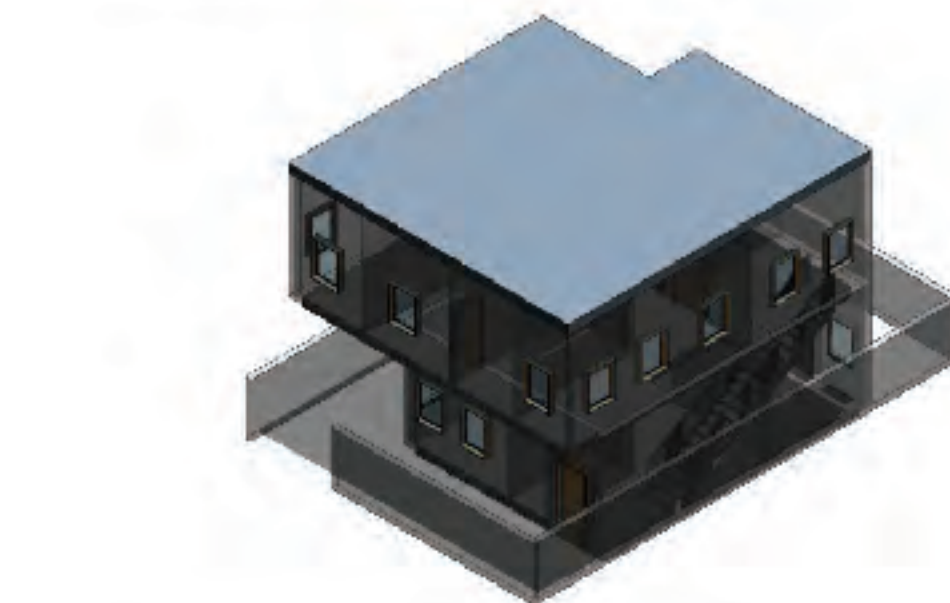
[8 of 13] [March 20, 2017 - 12:48]



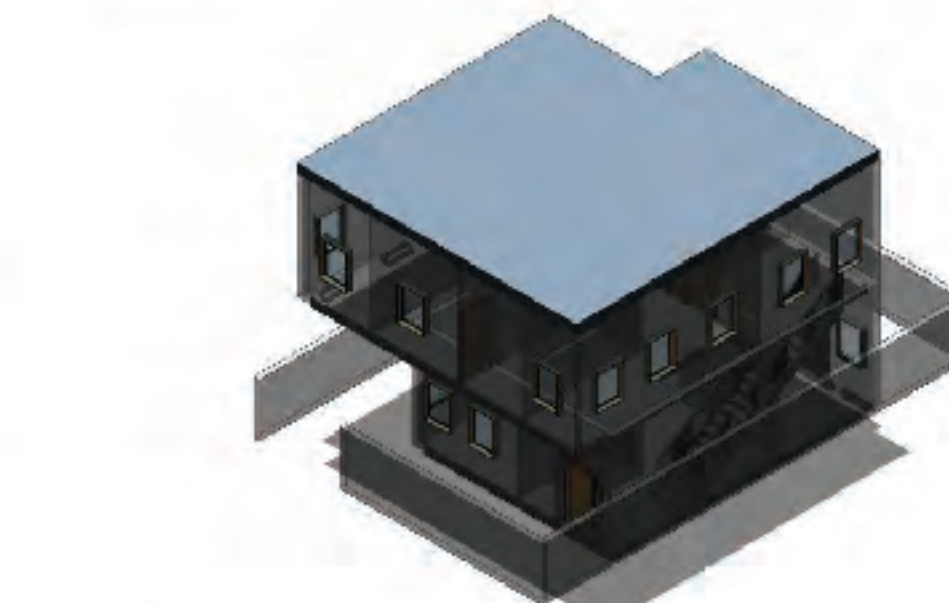
[9 of 13] [March 20, 2017 - 13:48]



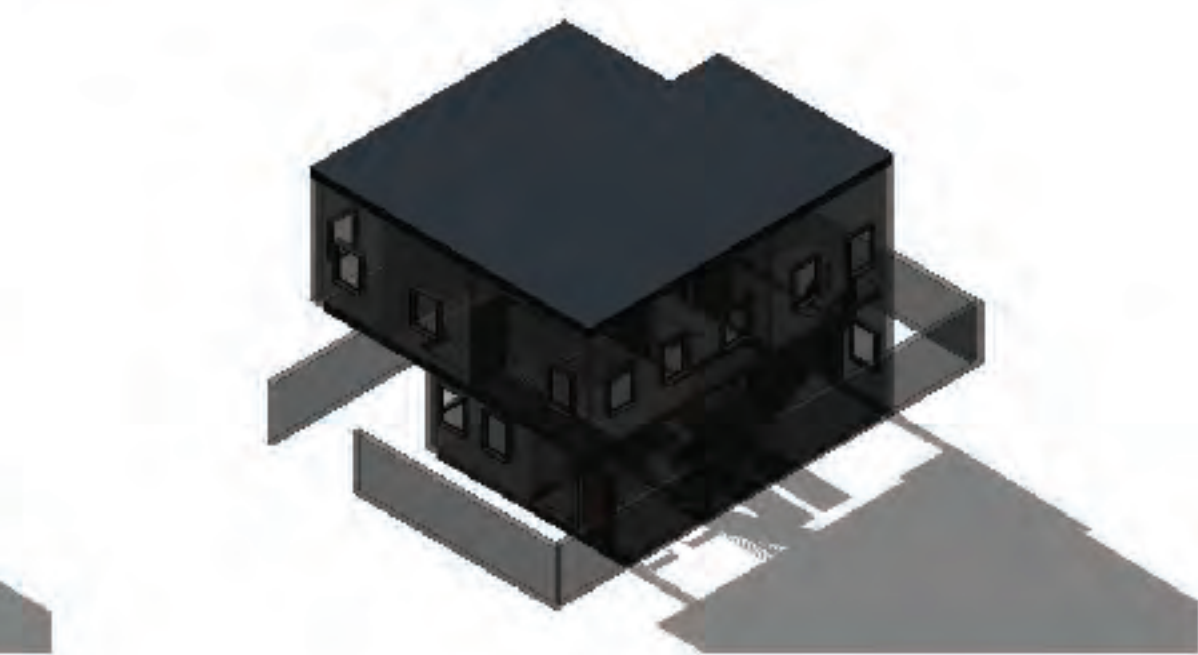
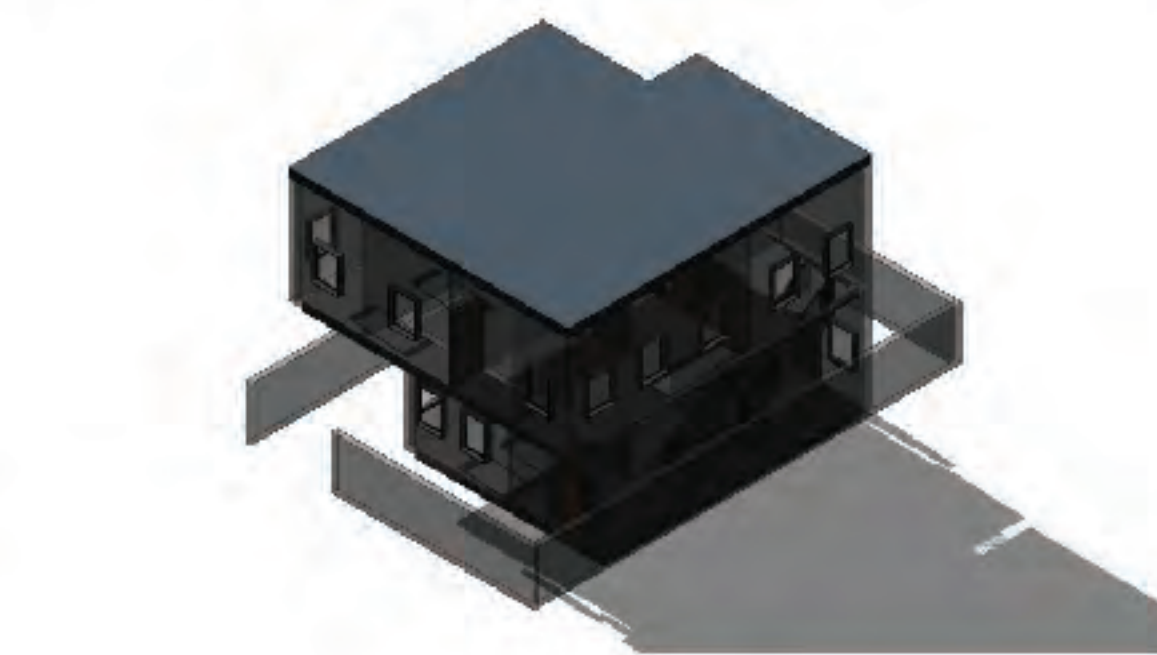
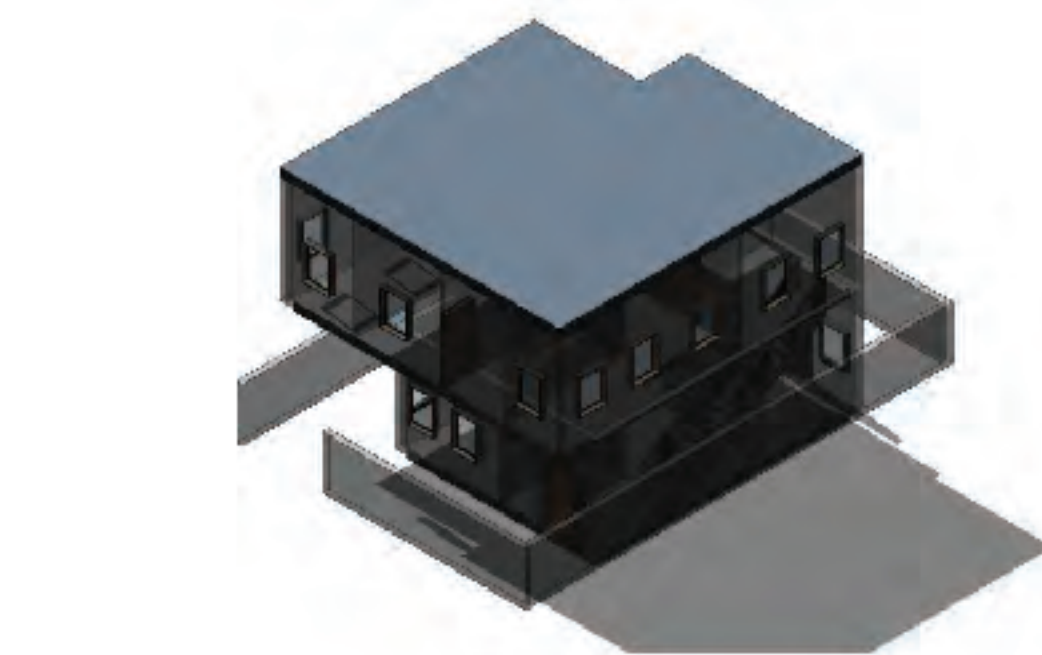
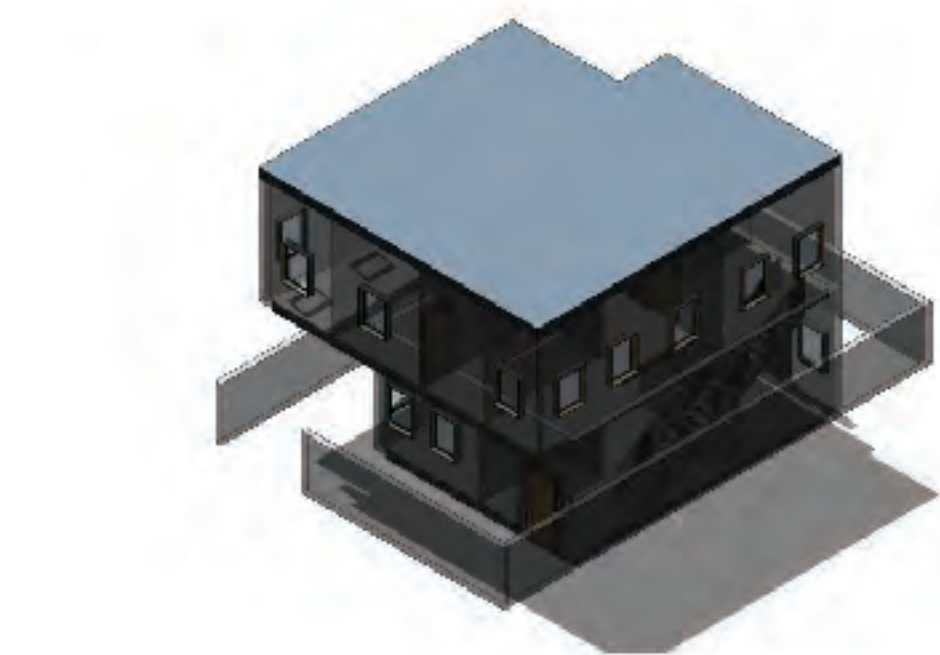
[10 of 13] [March 20, 2017 - 14:48]



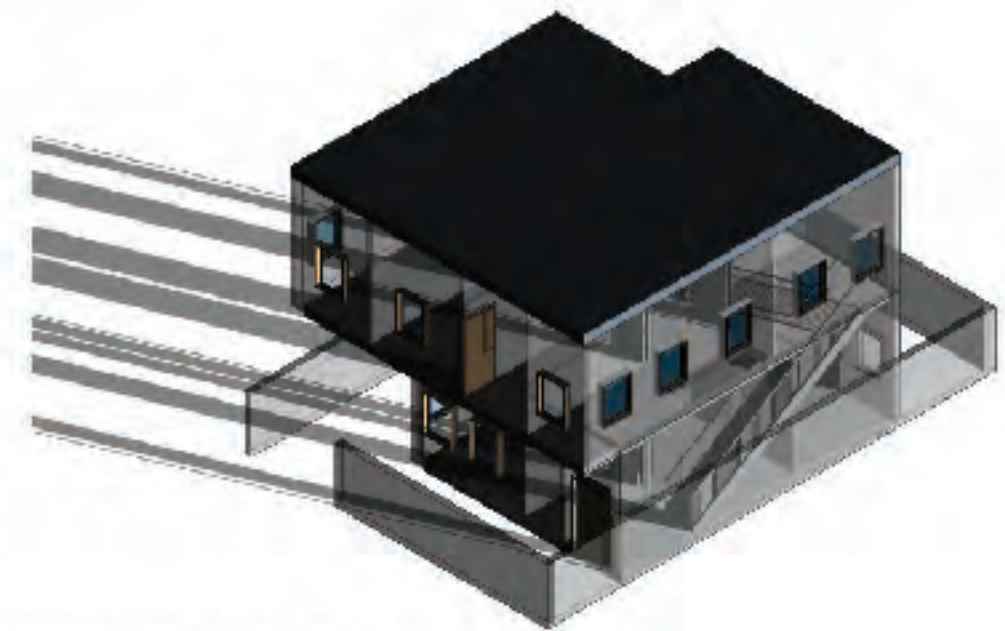
[11 of 13] [March 20, 2017 - 15:48]



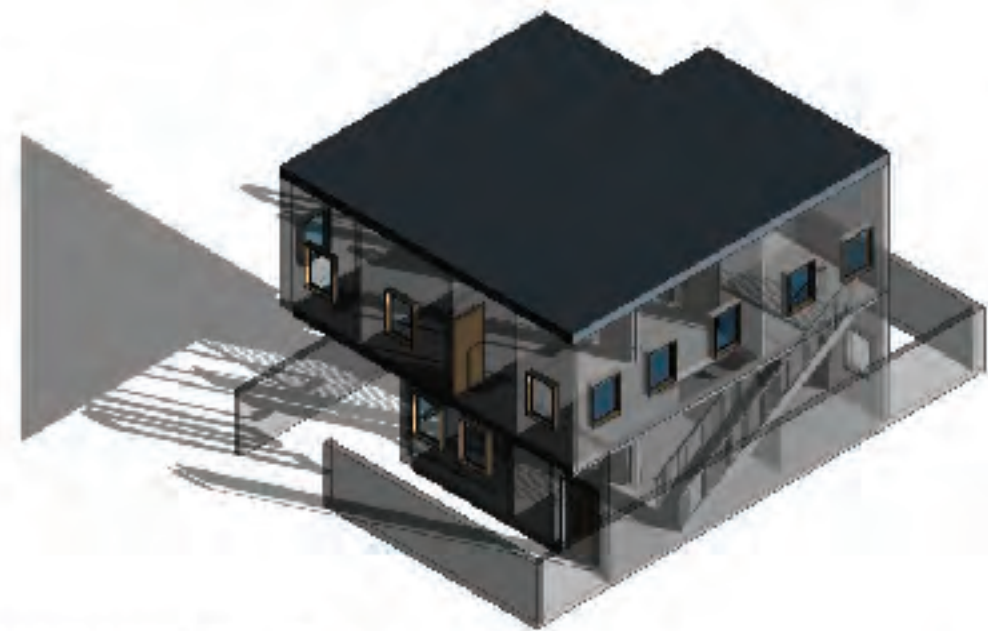
[12 of 13] [March 20, 2017 - 16:48]



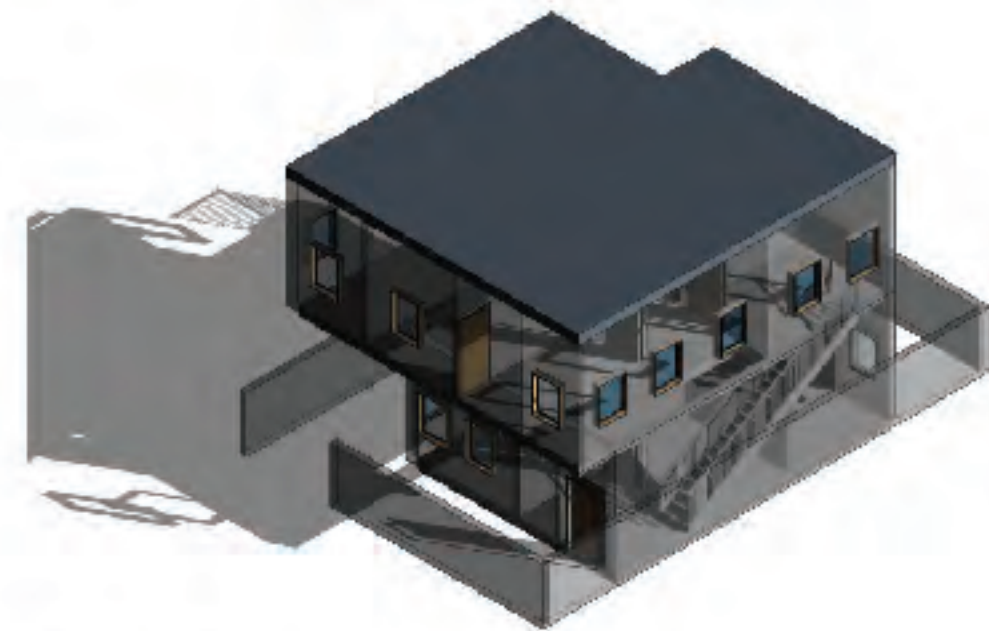
[1 of 12] [June 01, 2017 - 05:50]



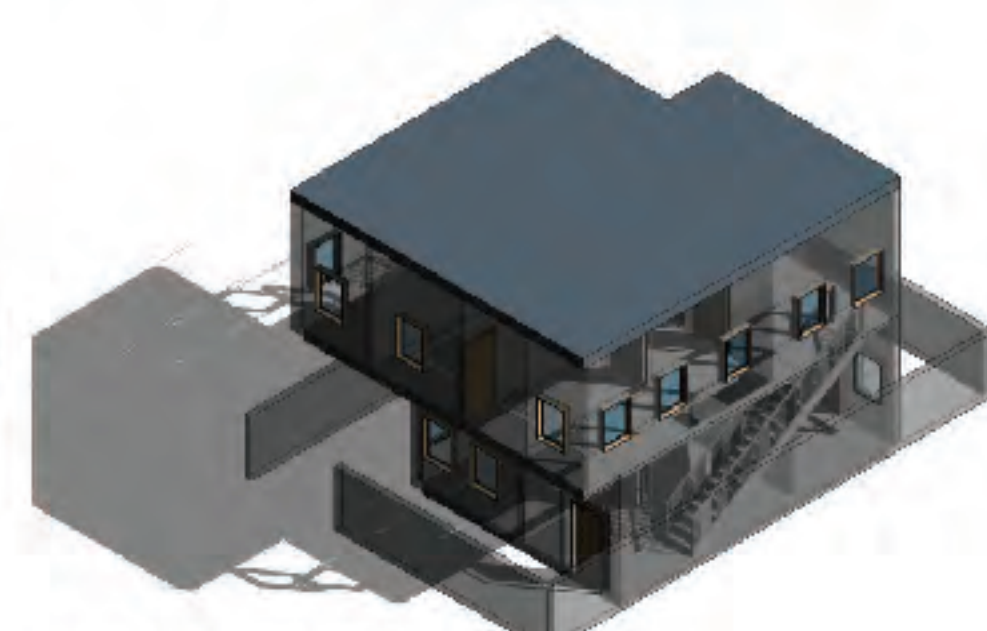
[2 of 12] [June 01, 2017 - 06:50]



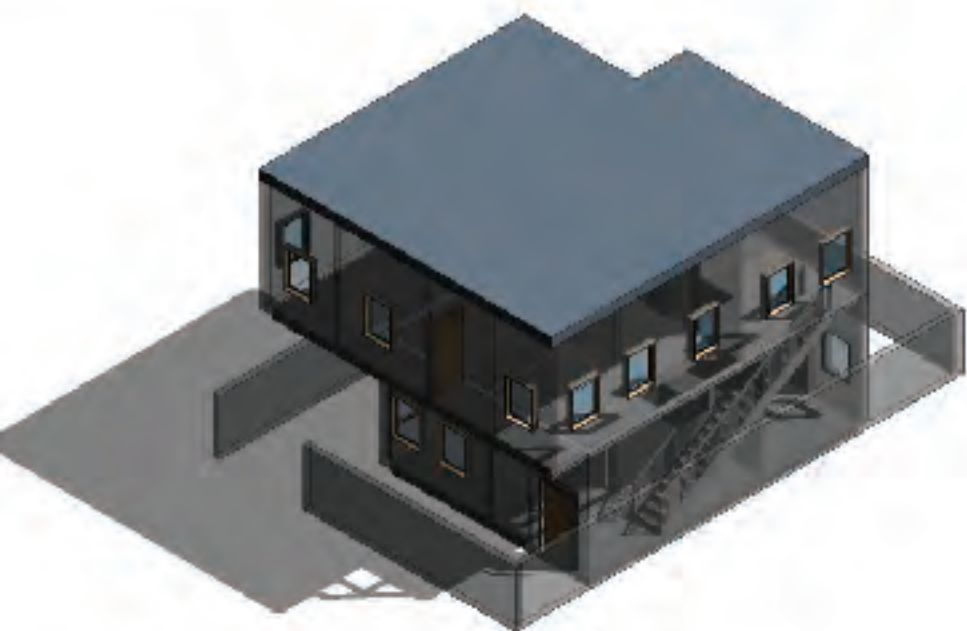
[3 of 12] [June 01, 2017 - 07:50]



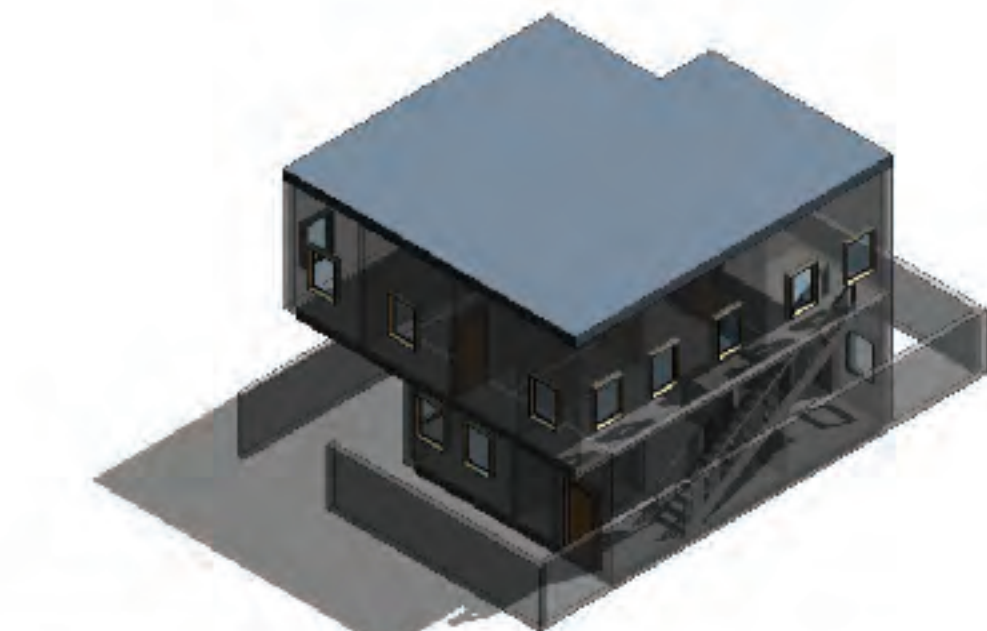
[4 of 12] [June 01, 2017 - 08:50]



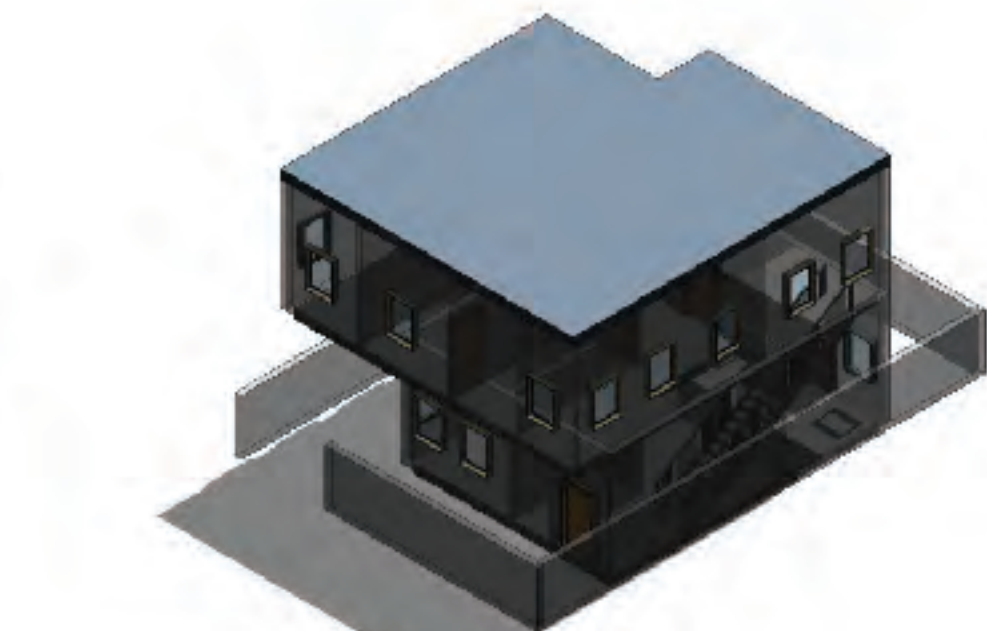
[5 of 12] [June 01, 2017 - 09:50]



[6 of 12] [June 01, 2017 - 10:50]



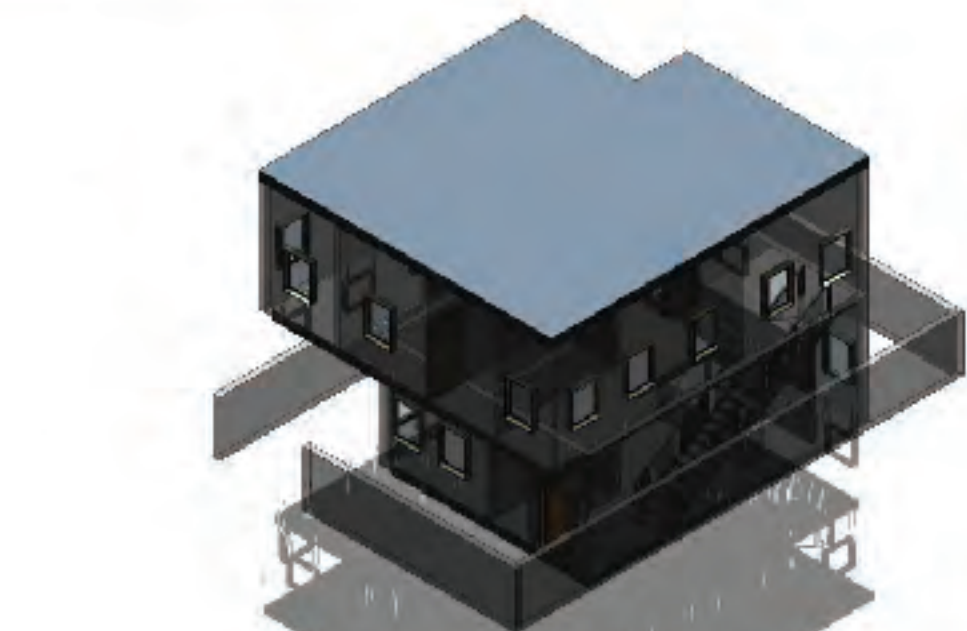
[7 of 12] [June 01, 2017 - 11:50]



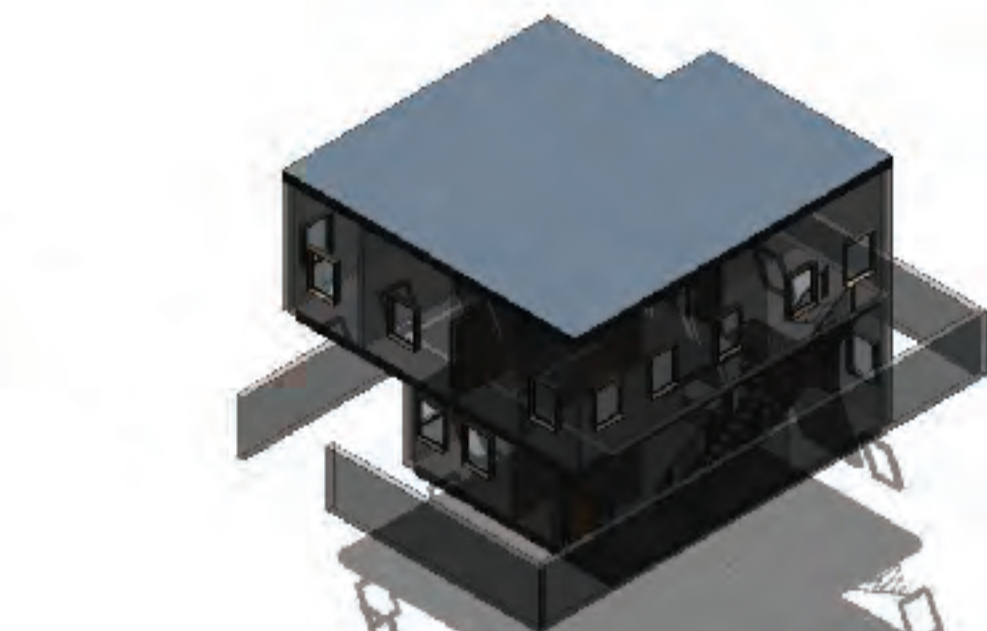
[8 of 12] [June 01, 2017 - 12:50]



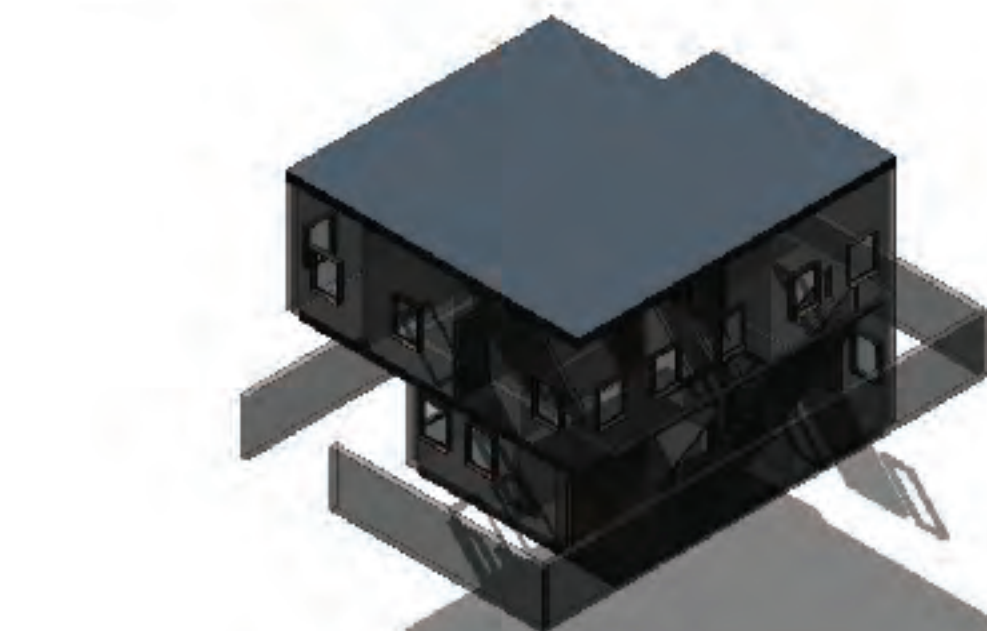
[9 of 12] [June 01, 2017 - 13:50]



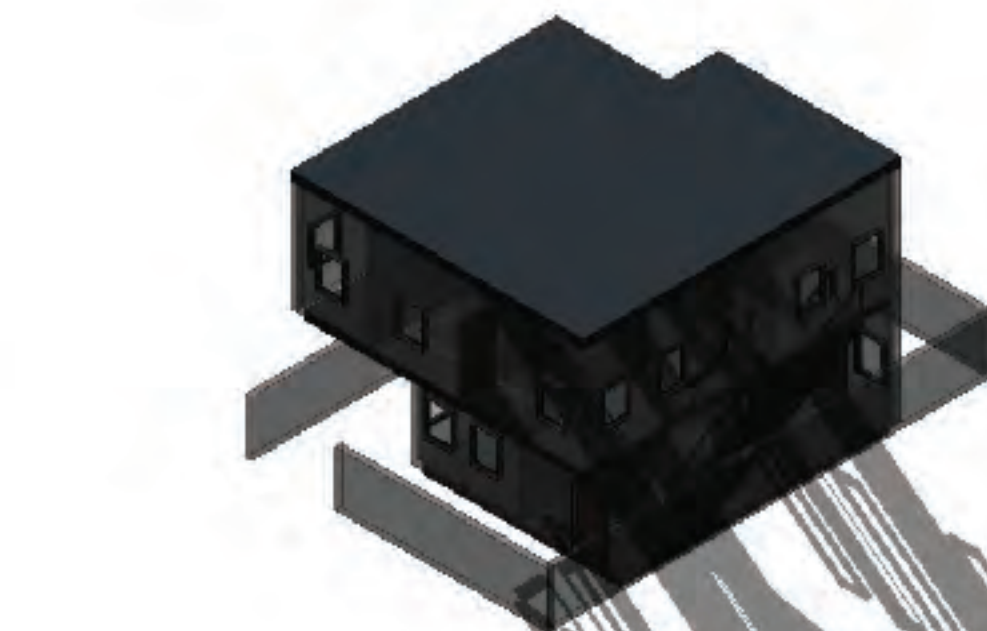
[10 of 12] [June 01, 2017 - 14:50]



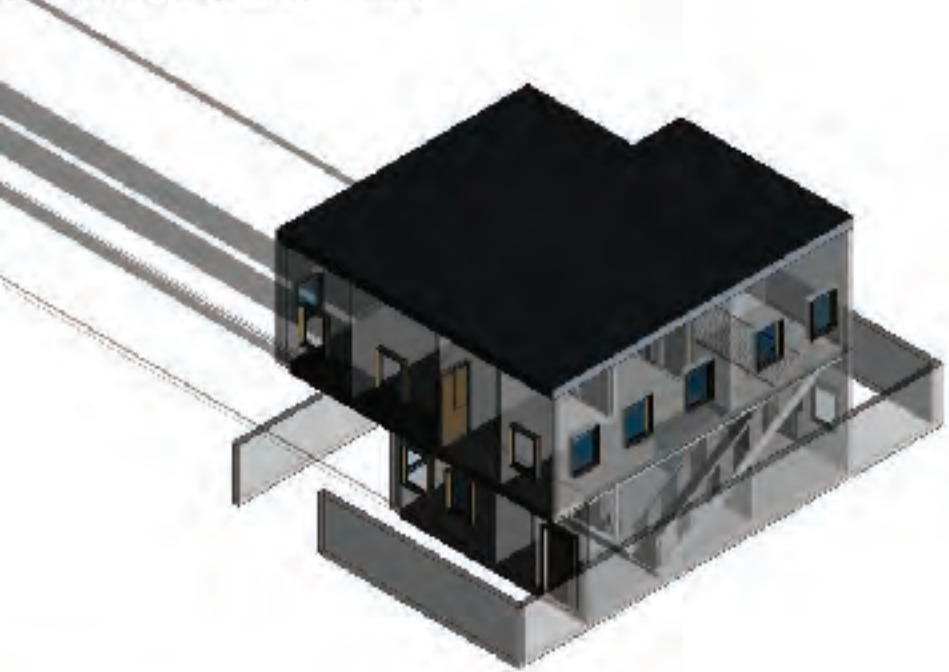
[11 of 12] [June 01, 2017 - 15:50]



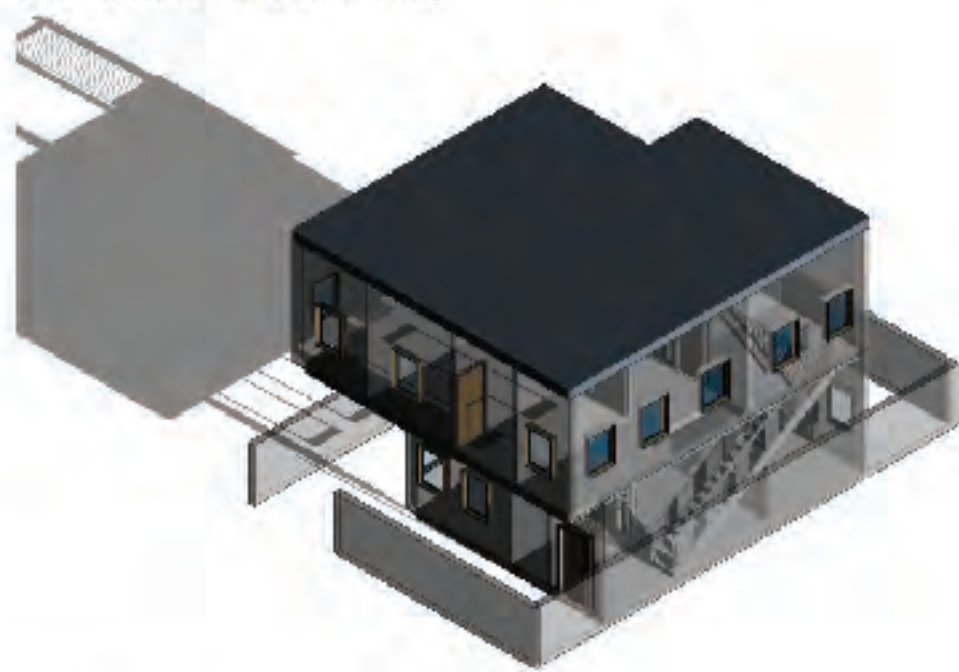
[12 of 12] [June 01, 2017 - 16:50]



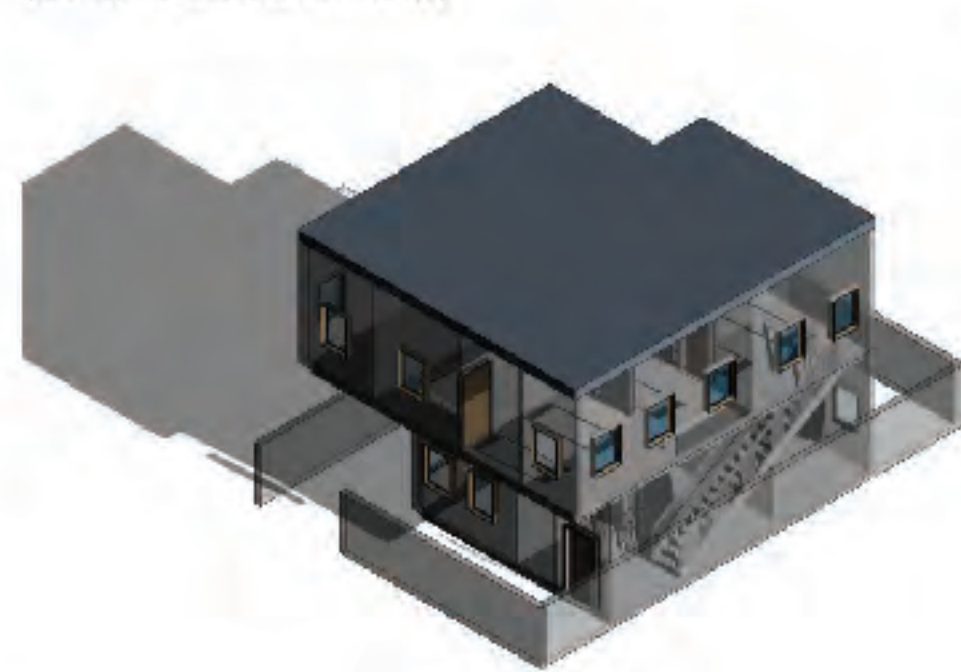
[1 of 13] | September 22, 2017 - 03:33 |



[2 of 13] | September 22, 2017 - 06:33 |



[3 of 13] | September 22, 2017 - 07:33 |



[4 of 13] | September 22, 2017 - 08:33 |



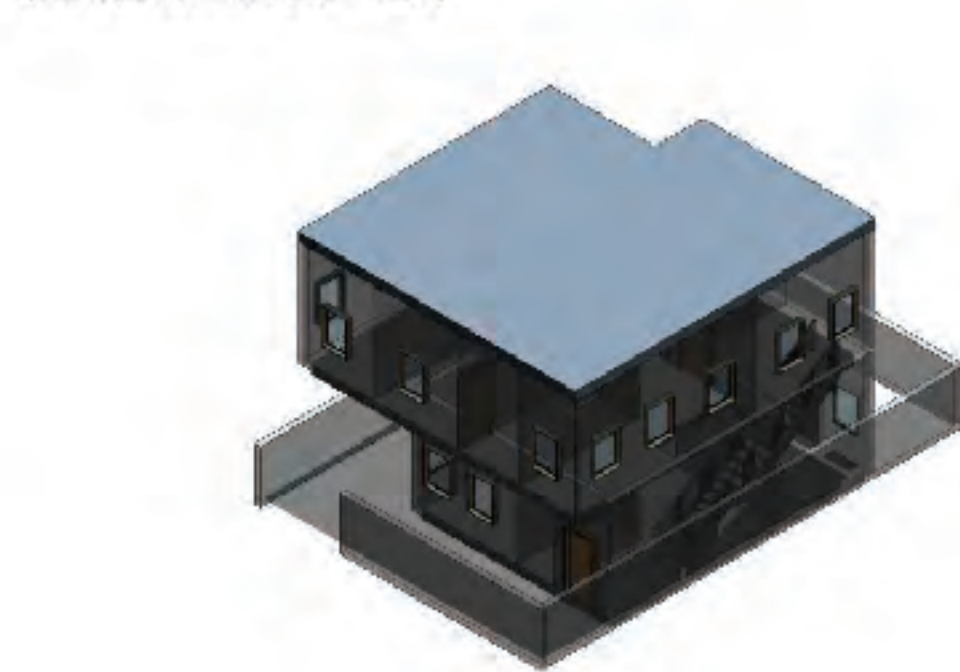
[5 of 13] | September 22, 2017 - 08:33 |



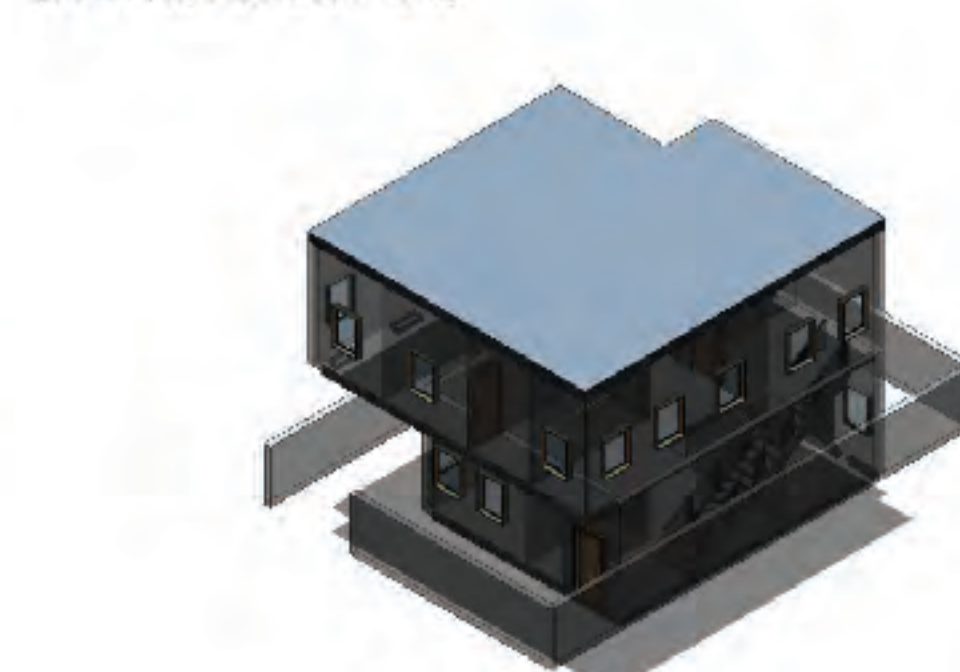
[6 of 13] | September 22, 2017 - 10:33 |



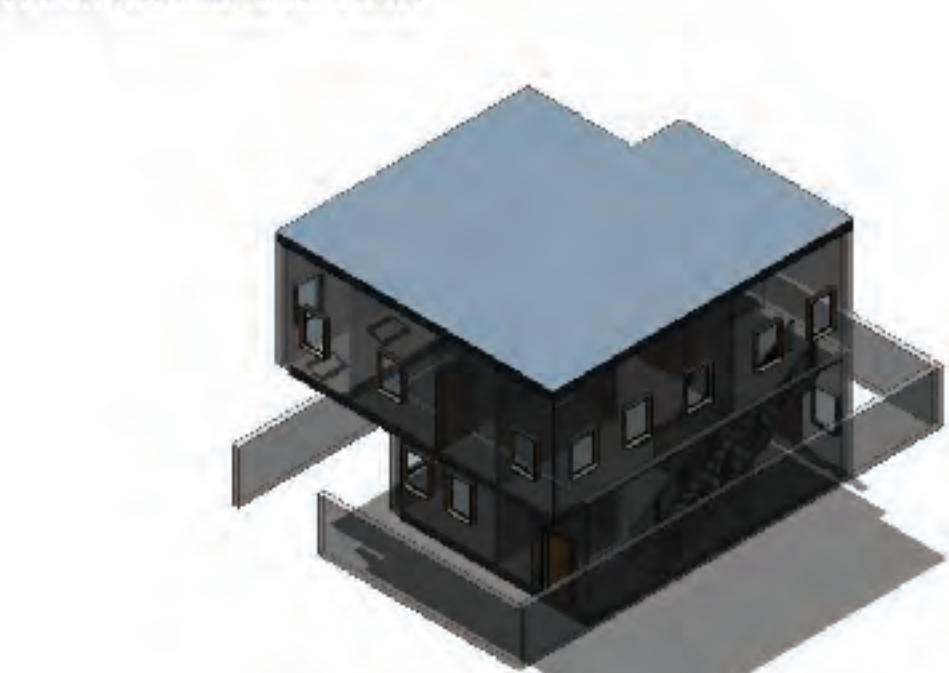
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[8 of 13] | September 22, 2017 - 12:33 |



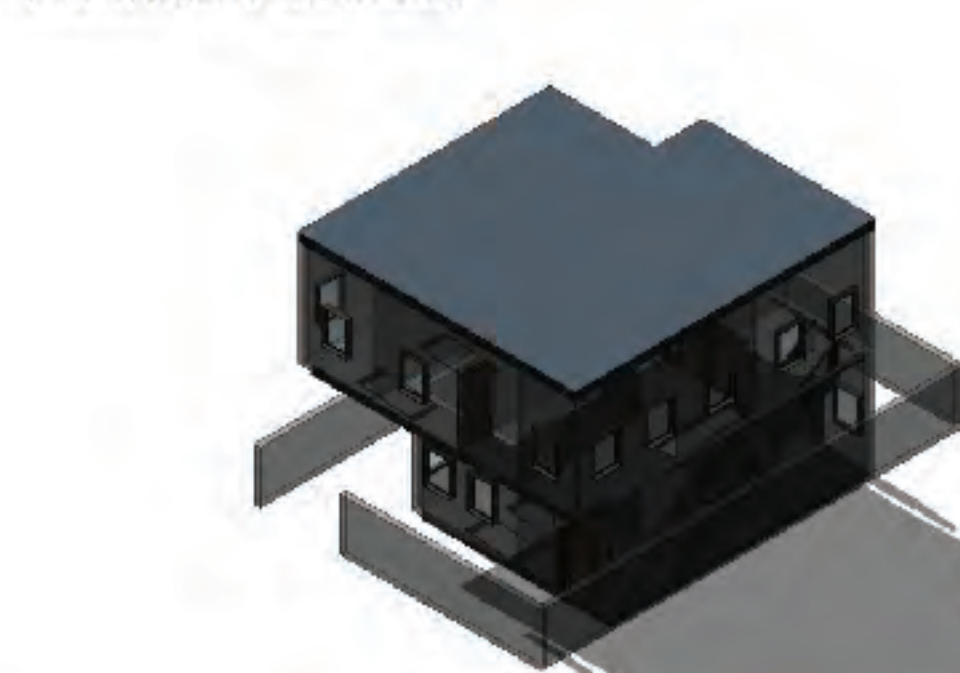
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[10 of 13] | September 22, 2017 - 14:33 |

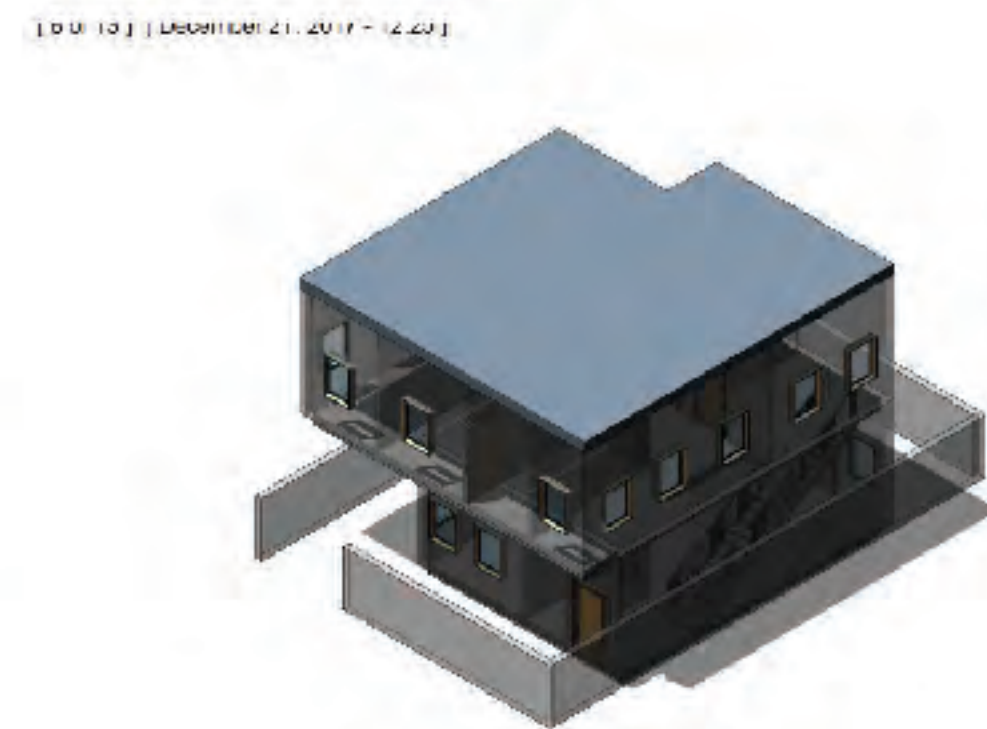
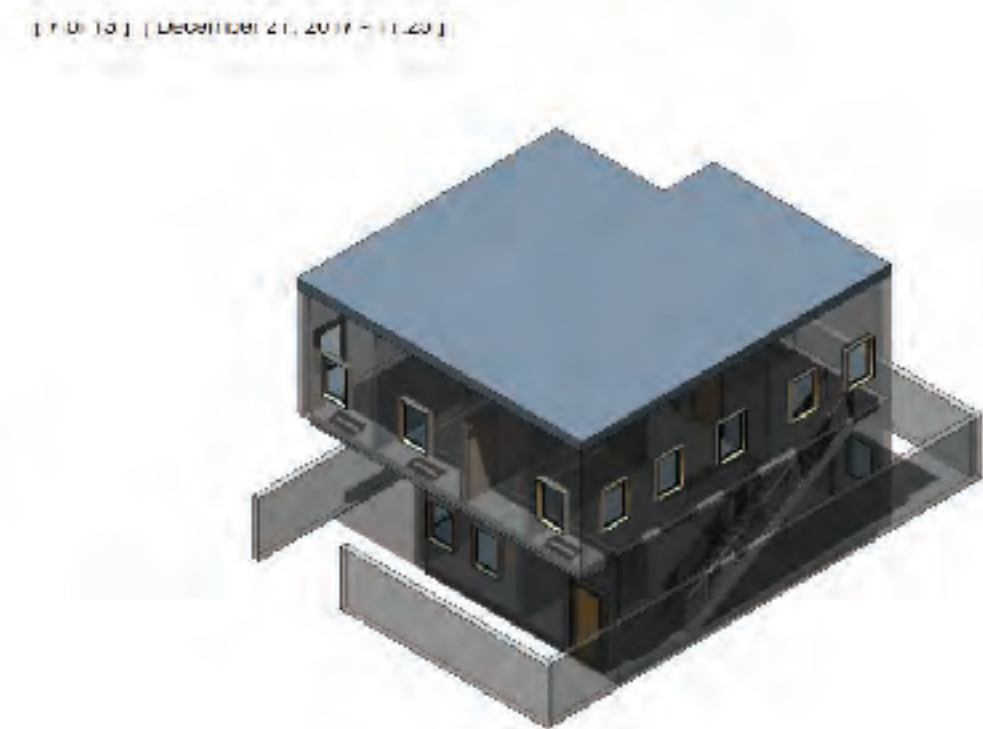
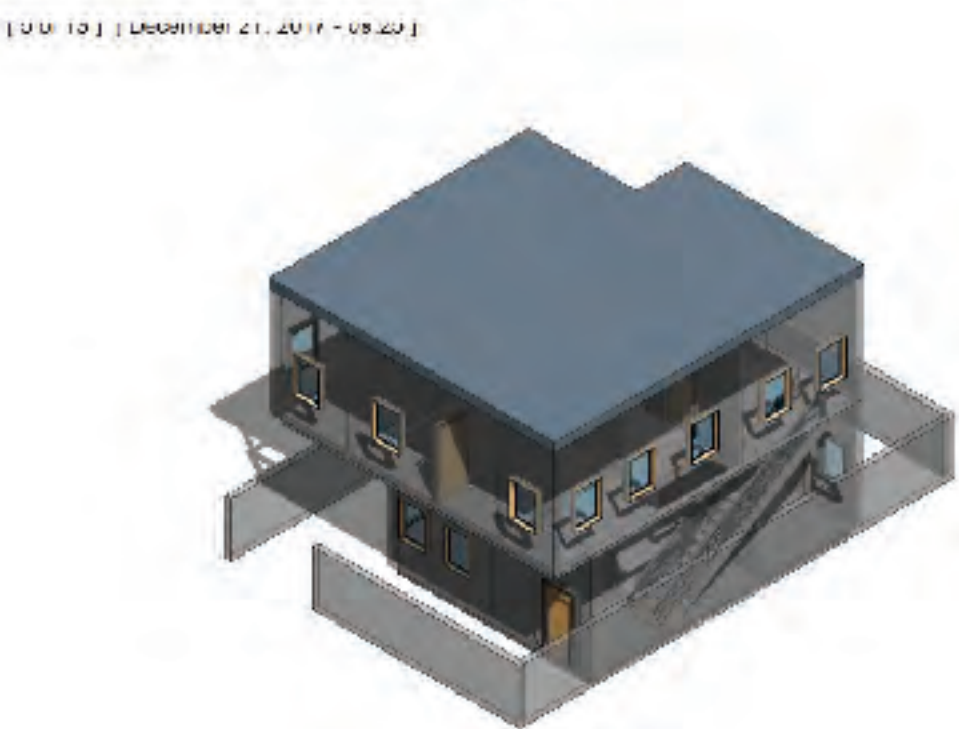
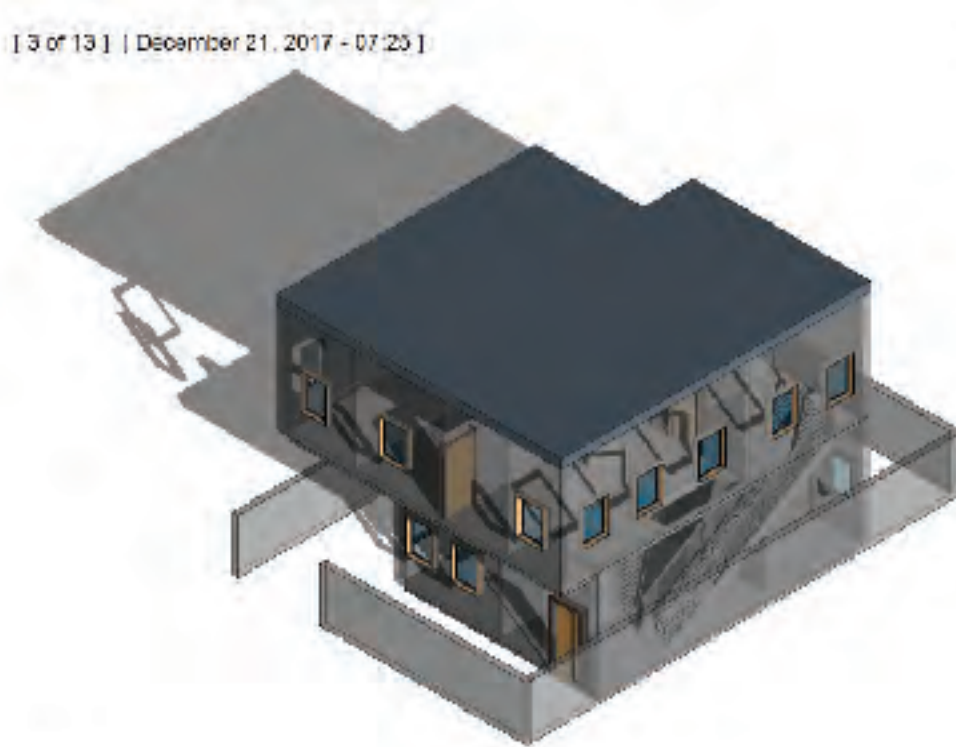
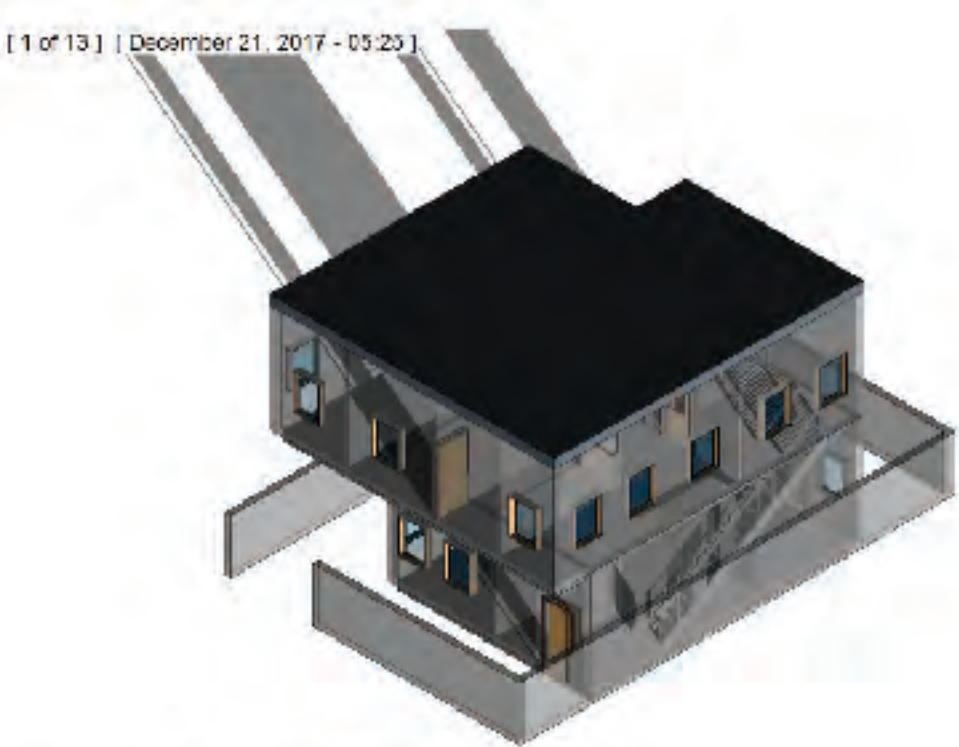


[11 of 13] | September 22, 2017 - 15:33 |

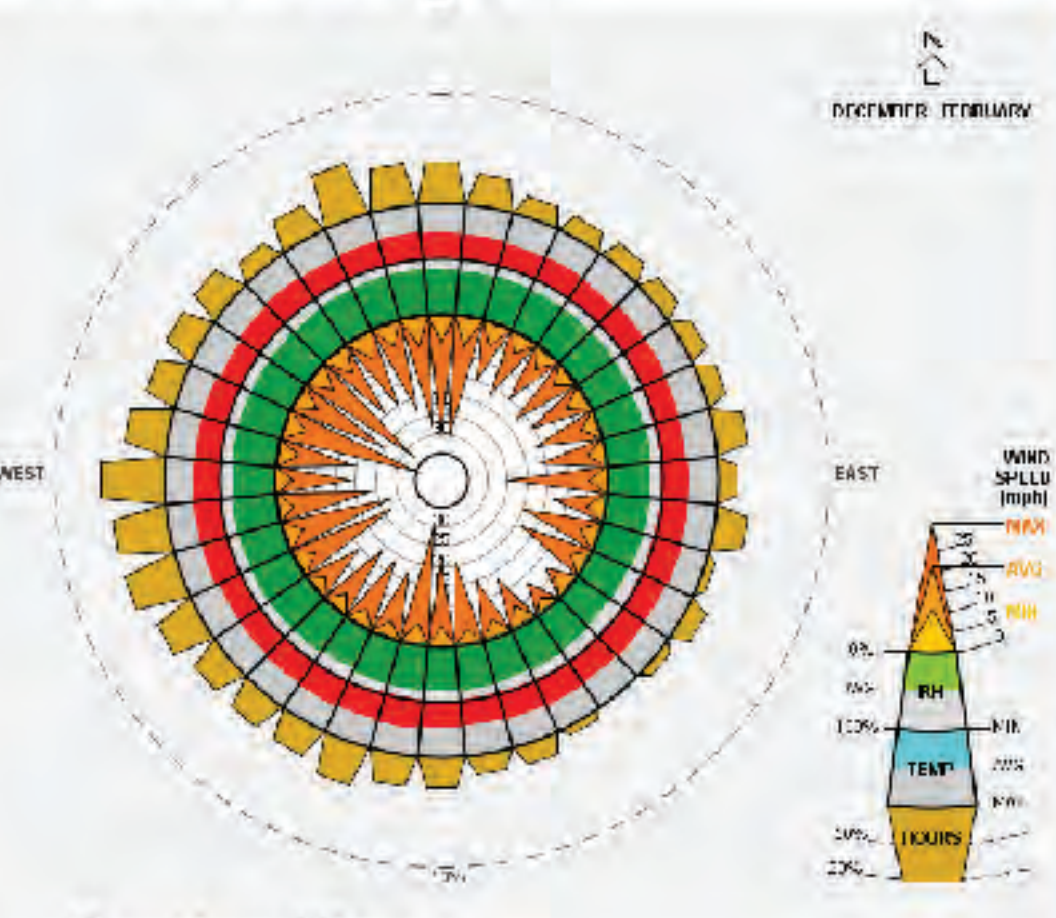


[12 of 13] | September 22, 2017 - 16:33 |

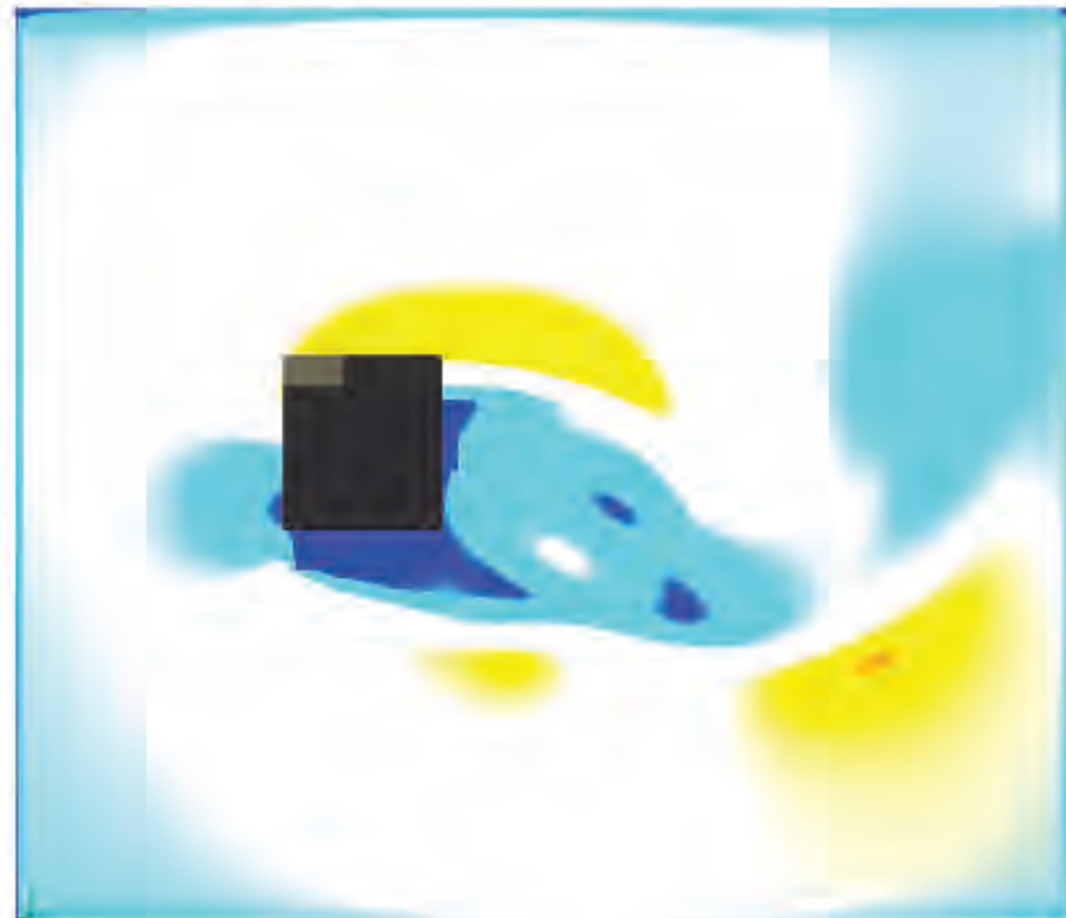




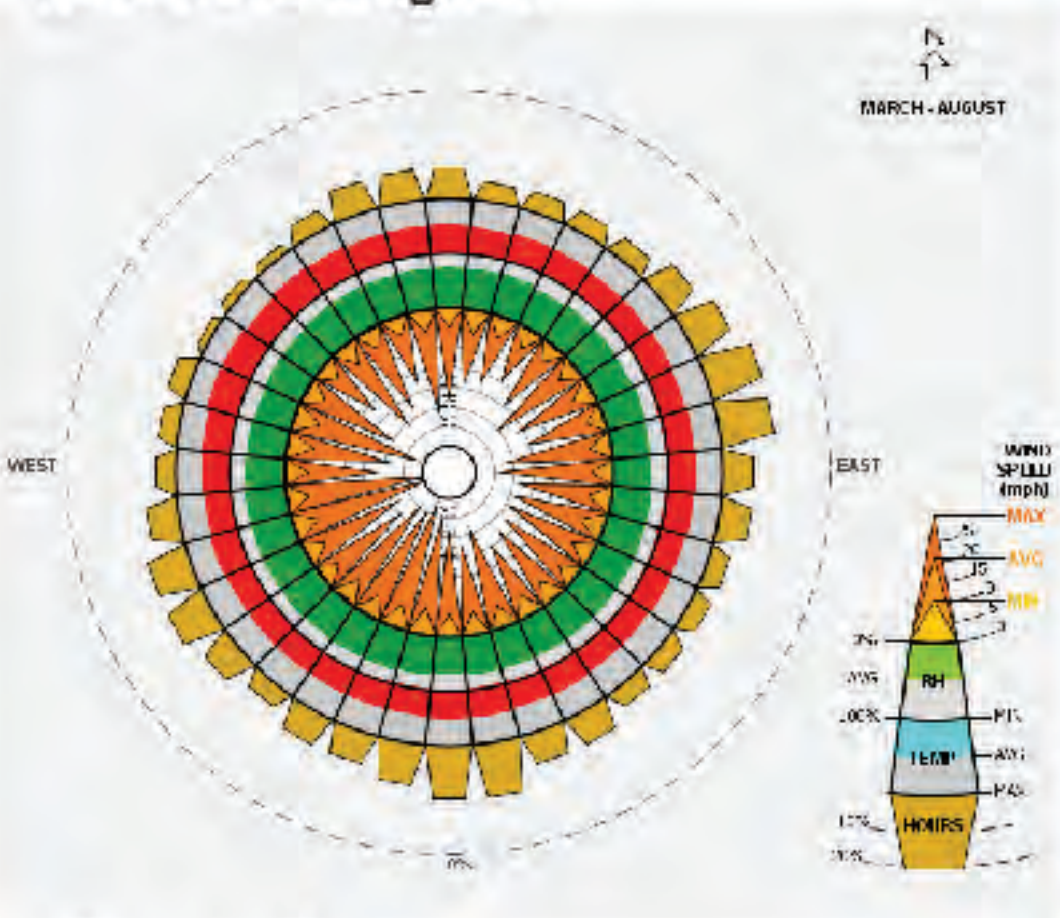
Wind Rose Diagram



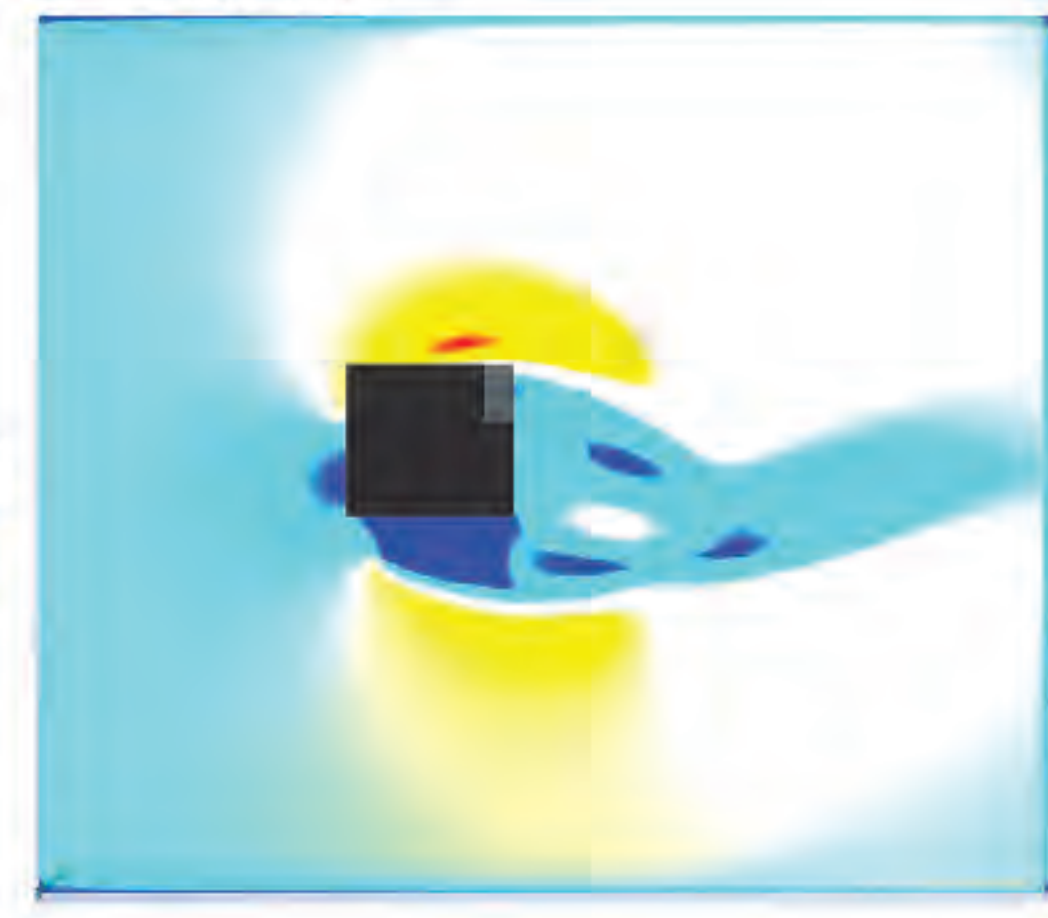
Plan View



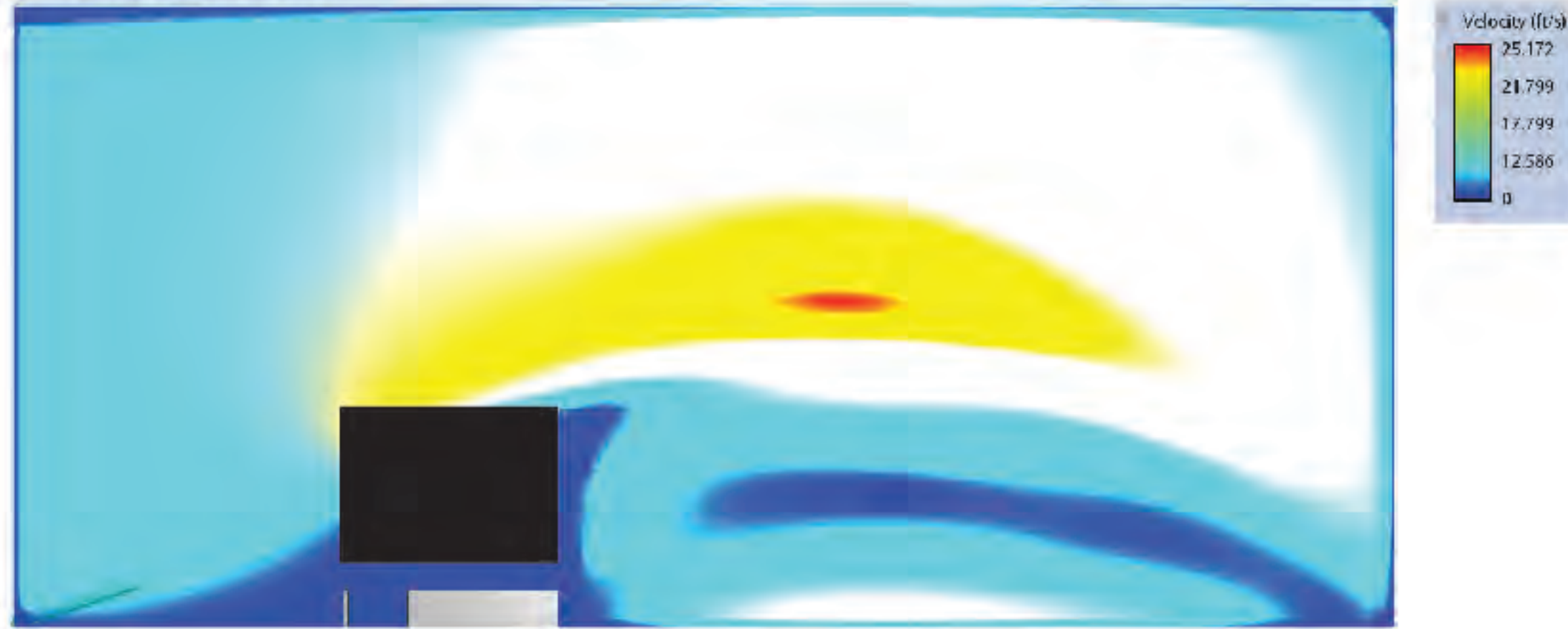
Wind Rose Diagram



Plan View



Section View



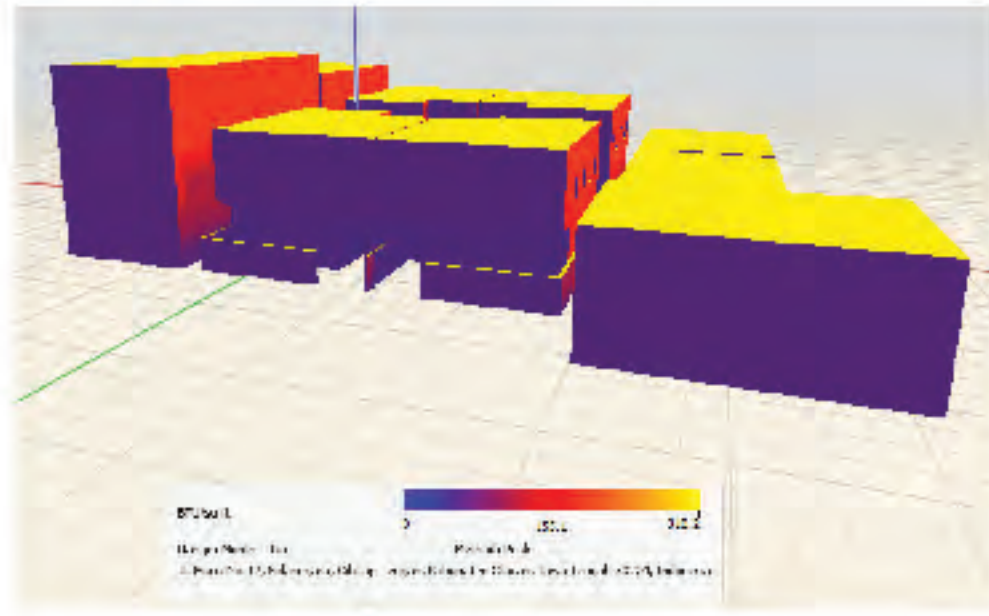
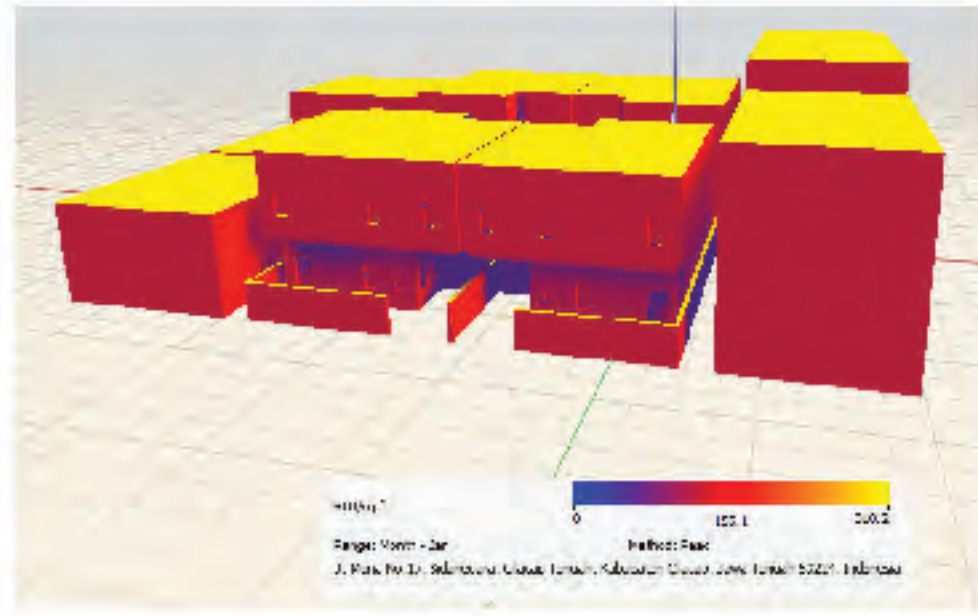
Winter Winds

Section View

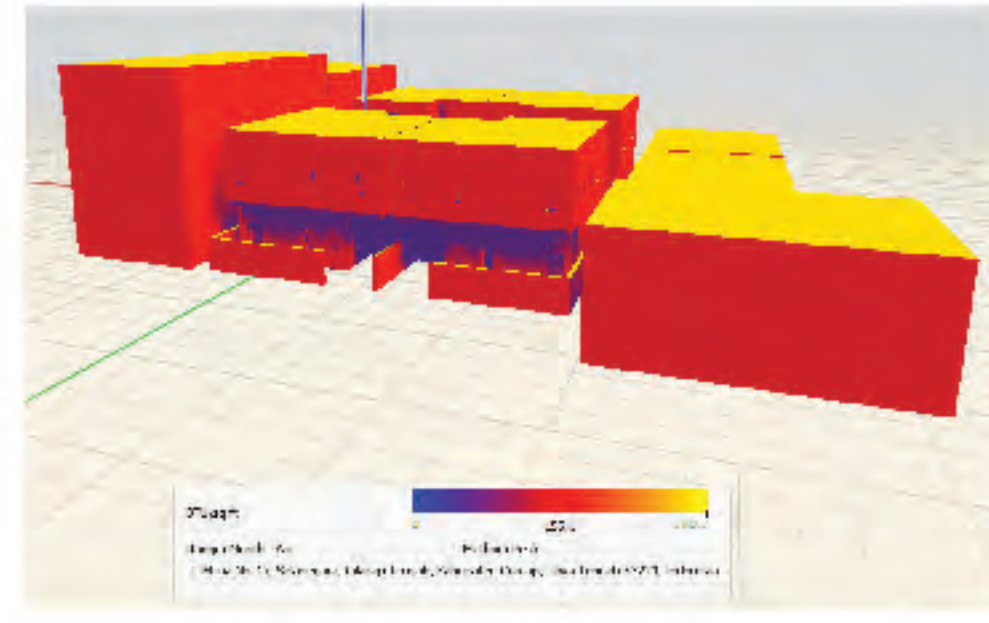
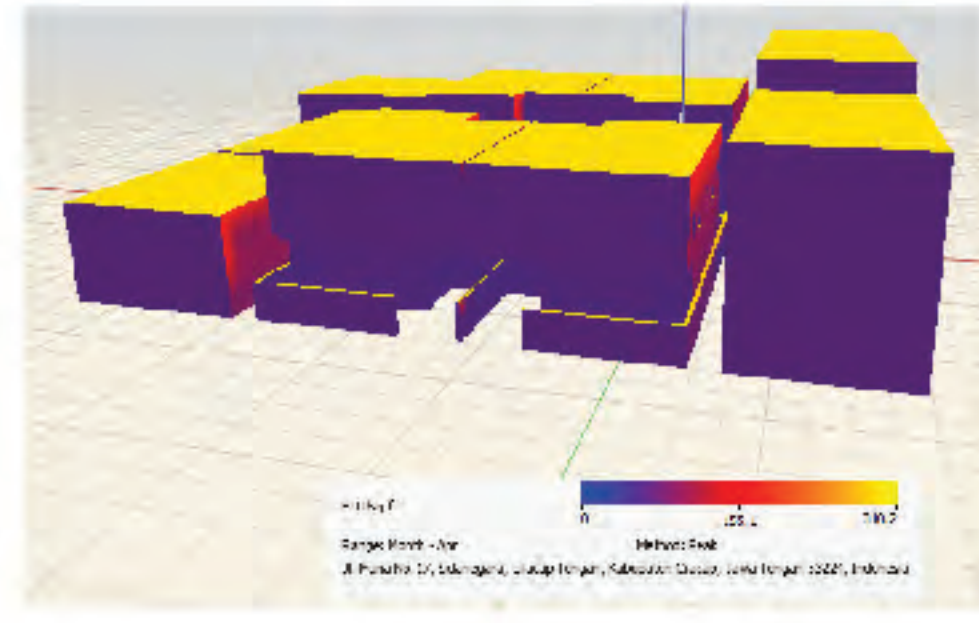


Summer Winds

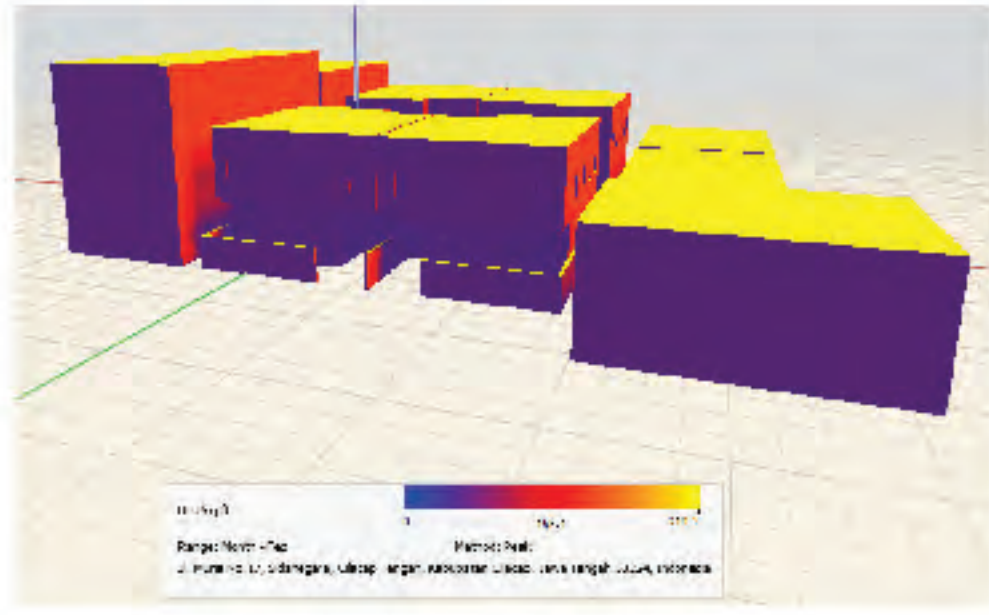
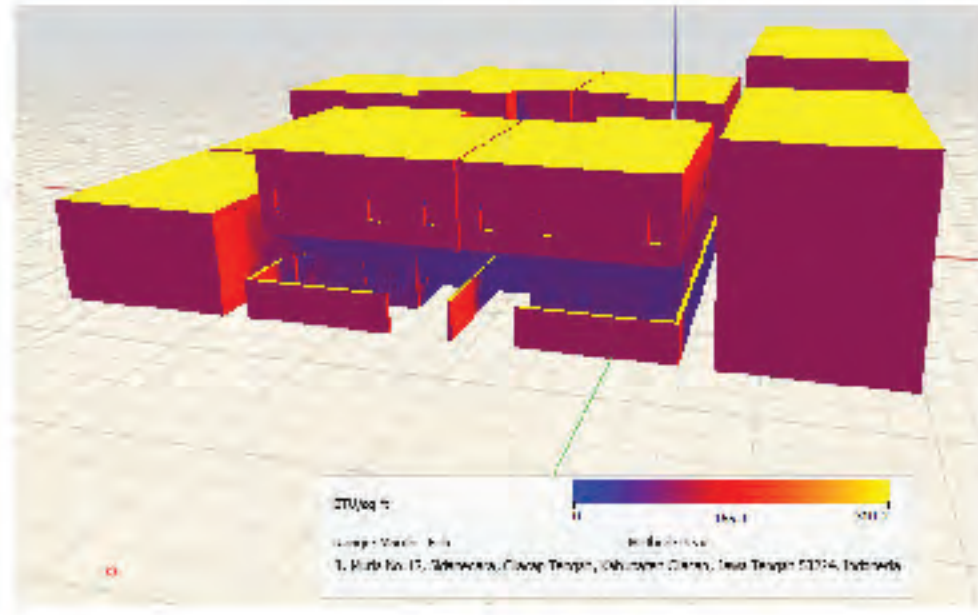
January



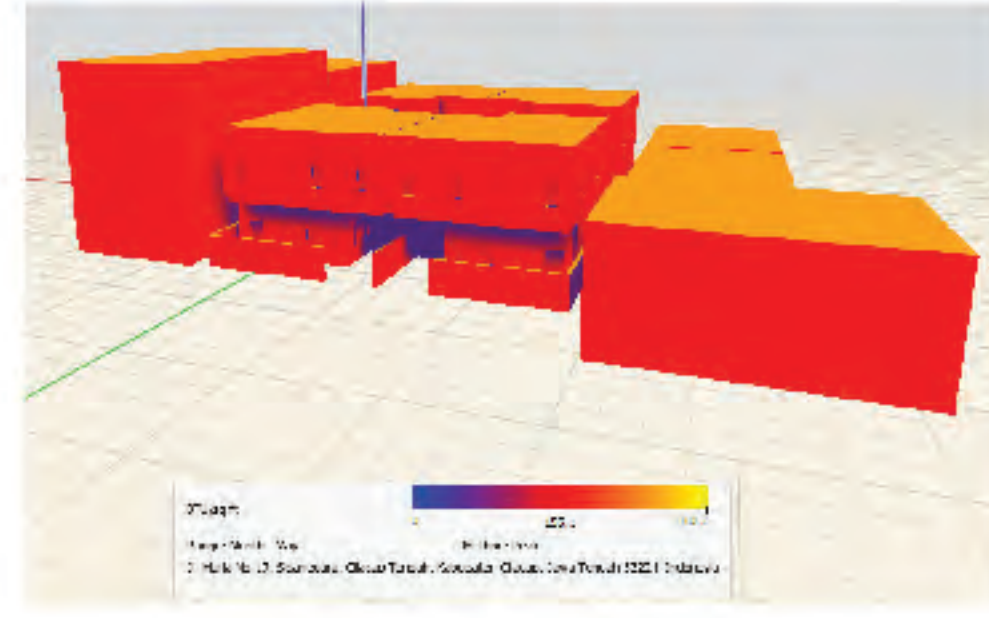
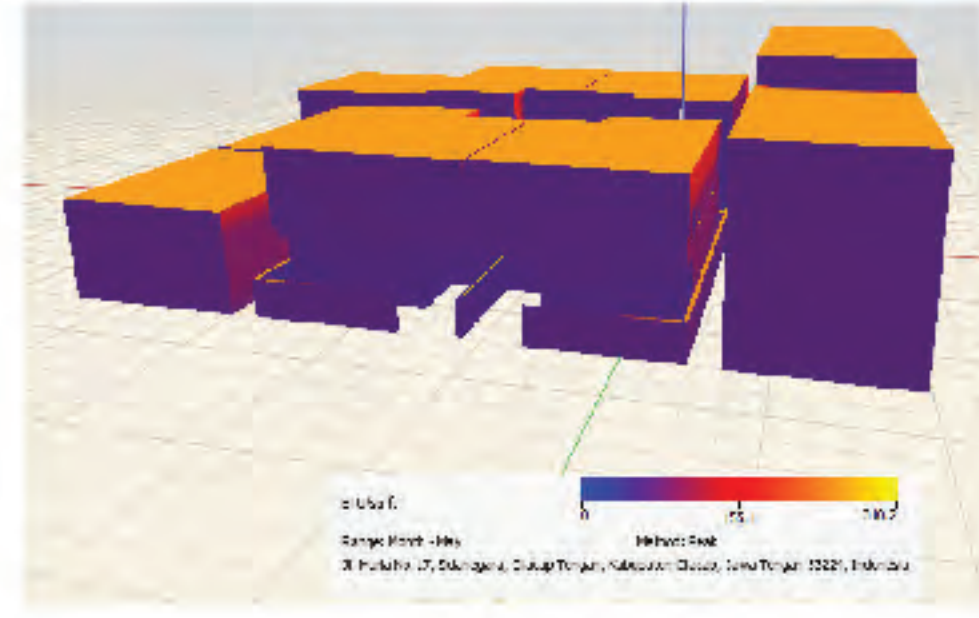
April



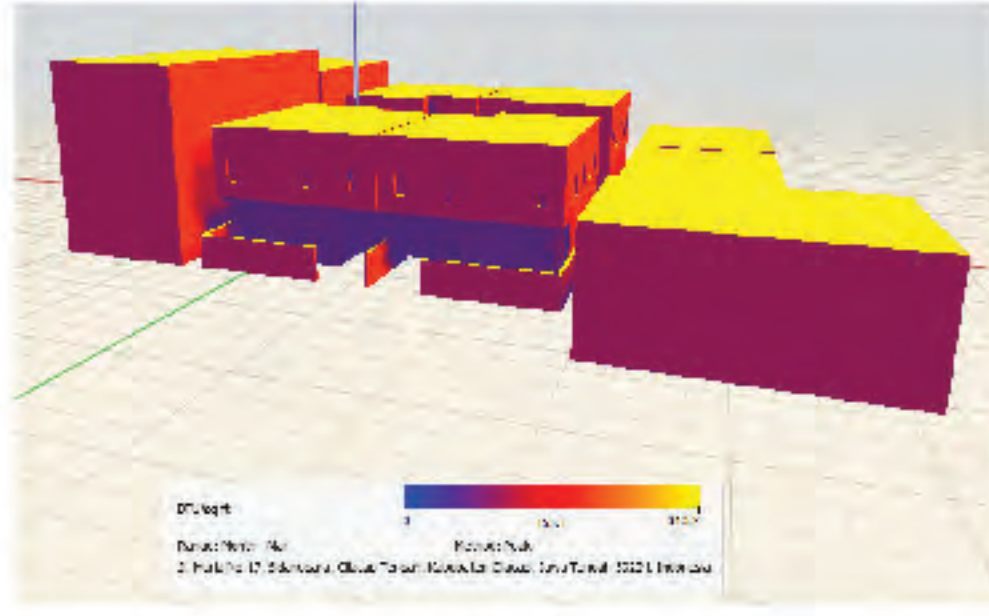
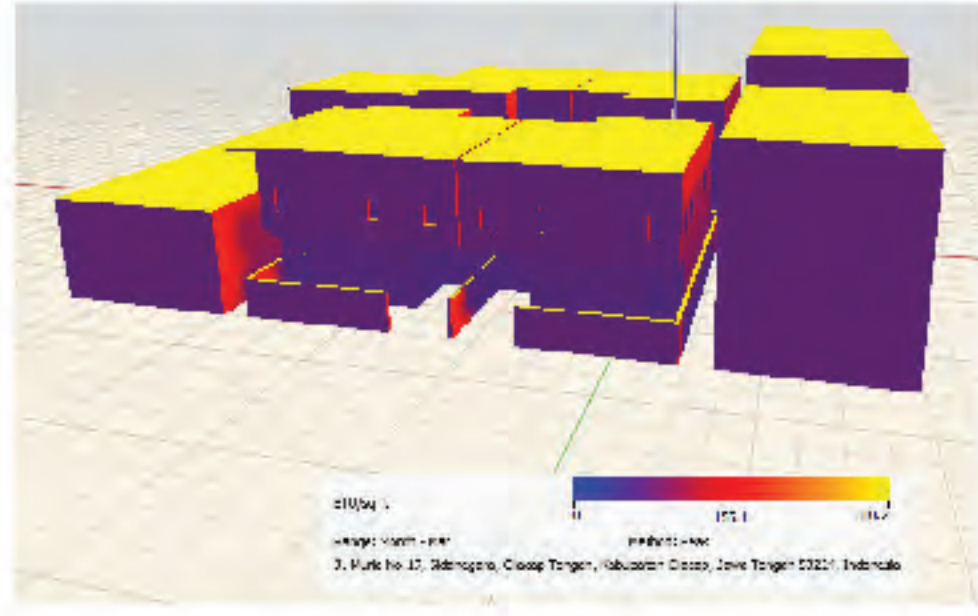
February



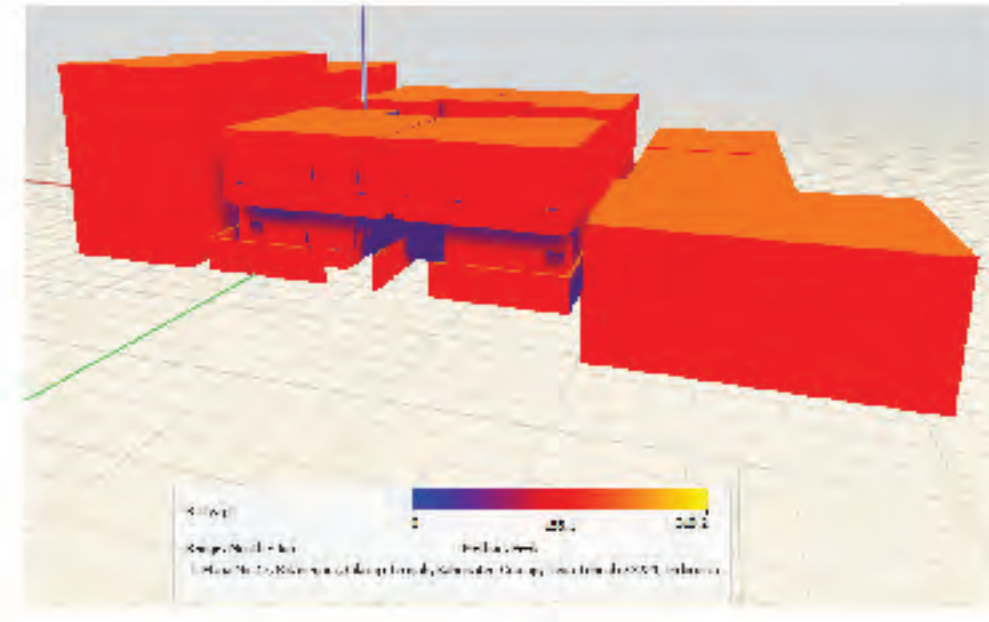
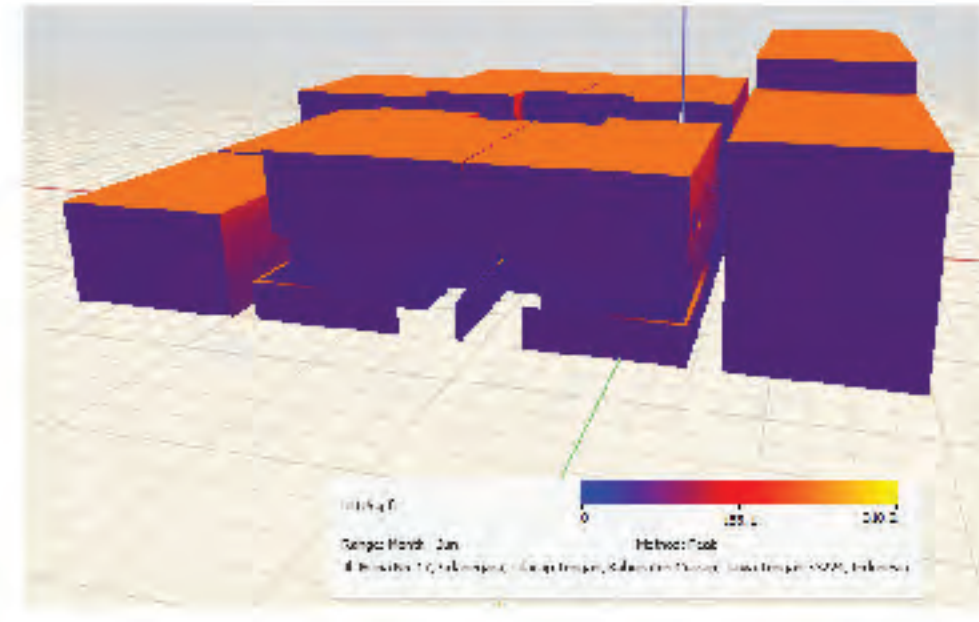
May



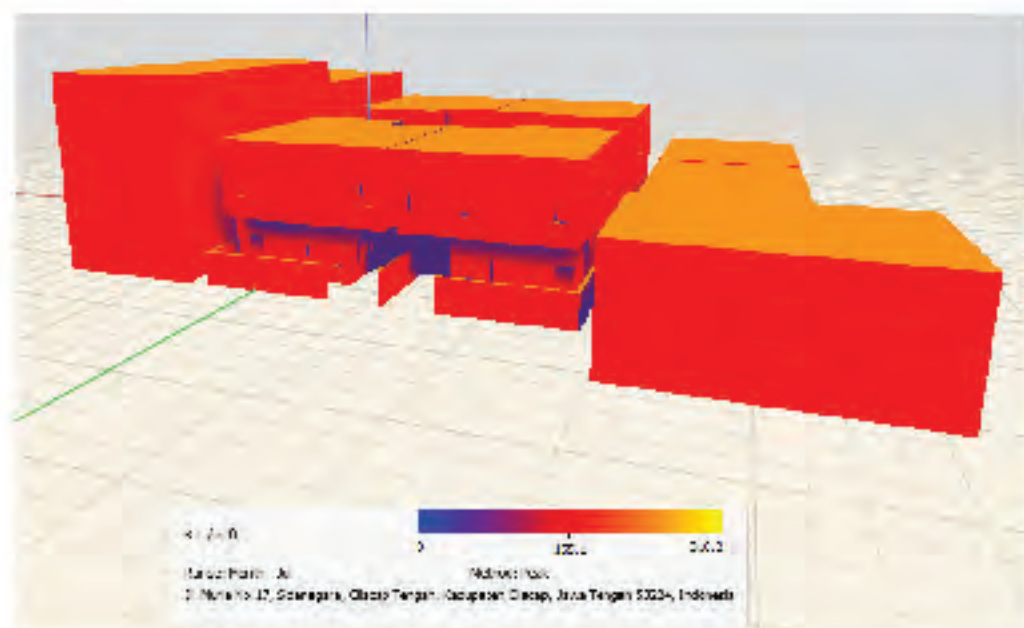
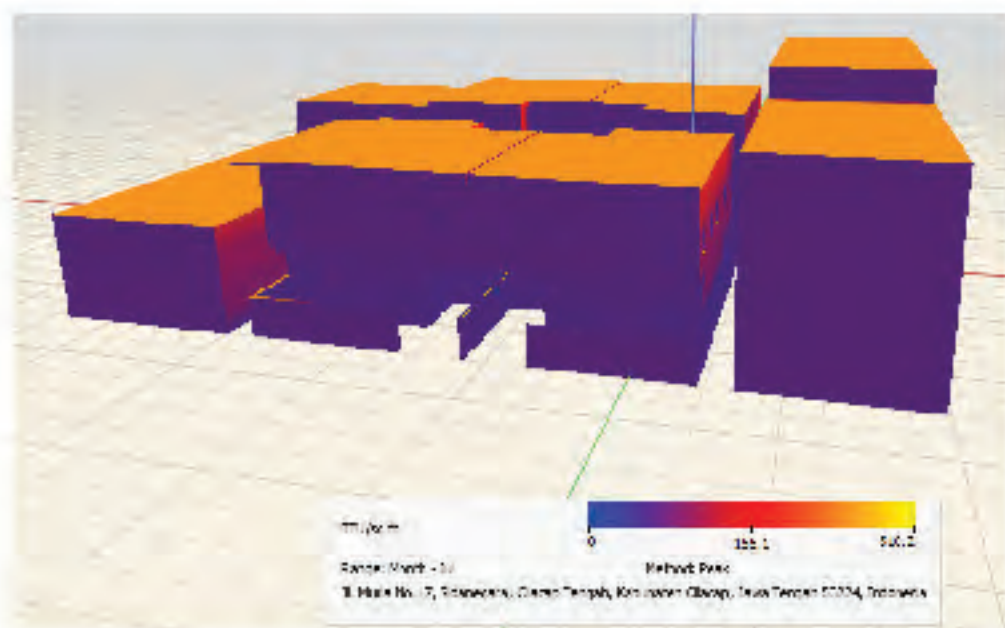
March



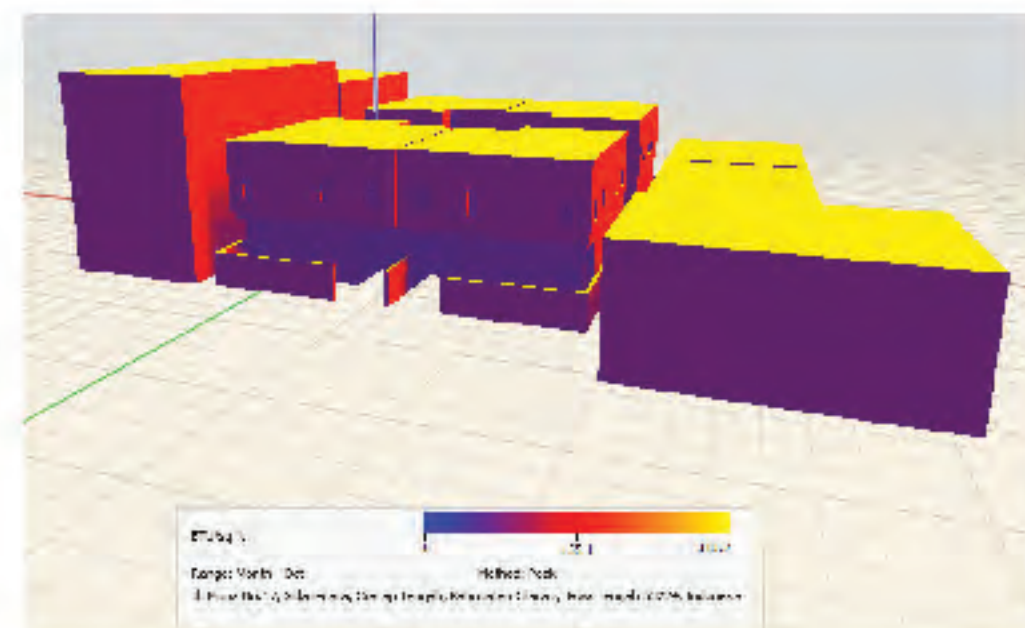
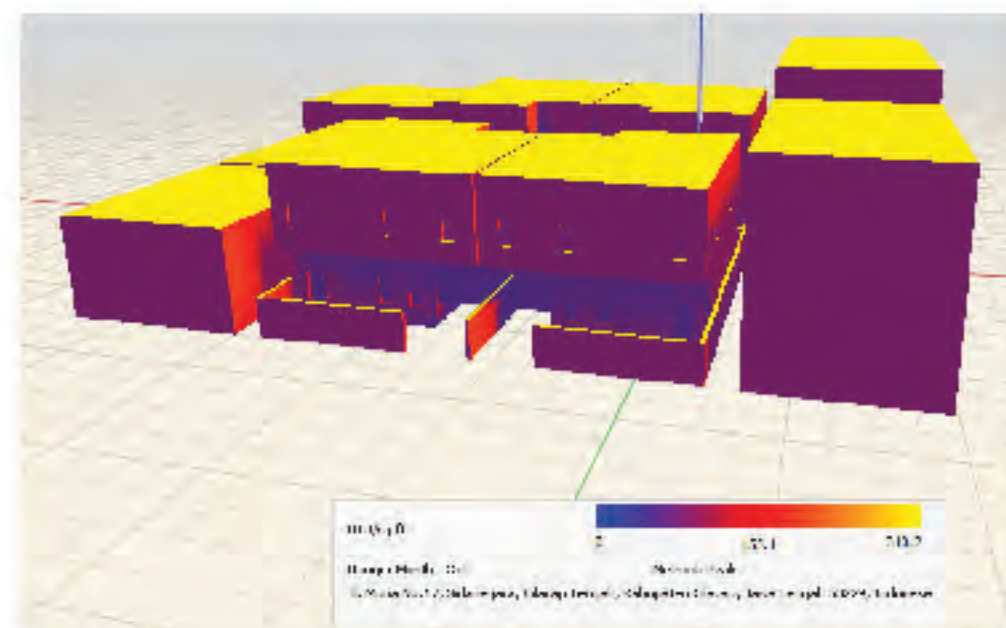
June



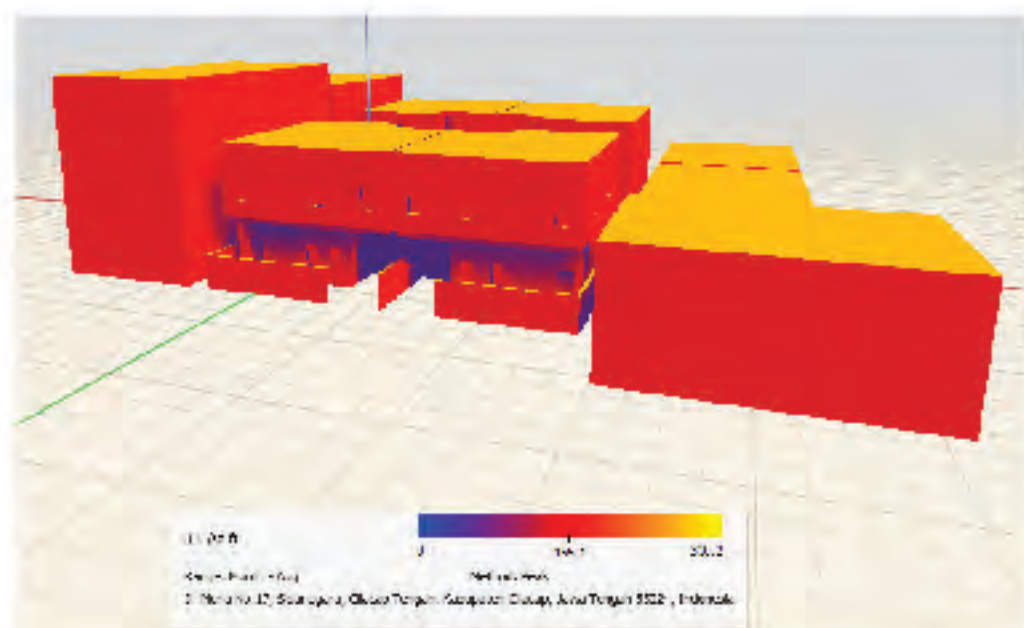
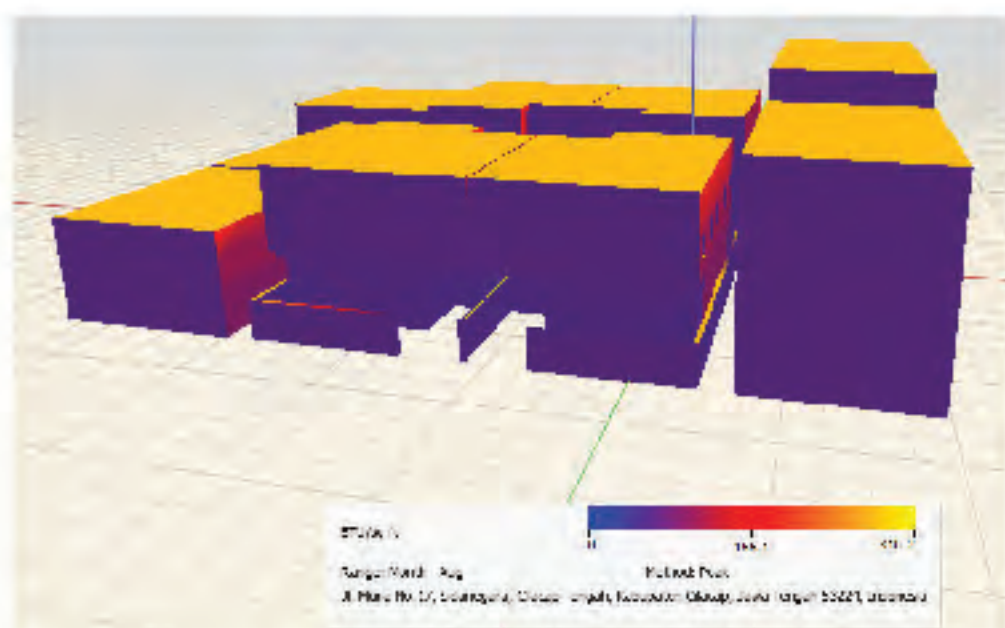
July



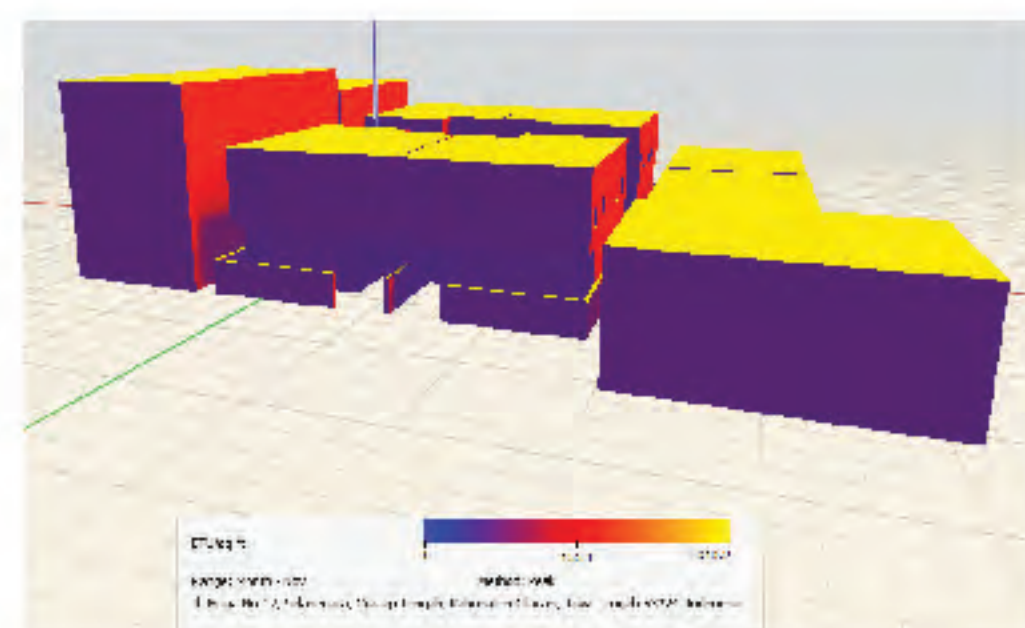
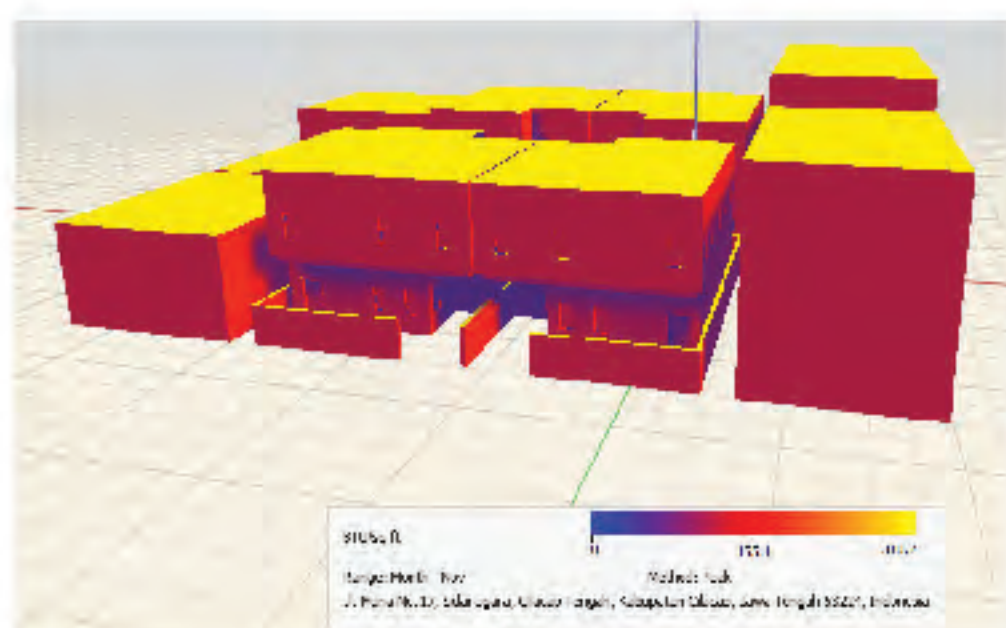
October



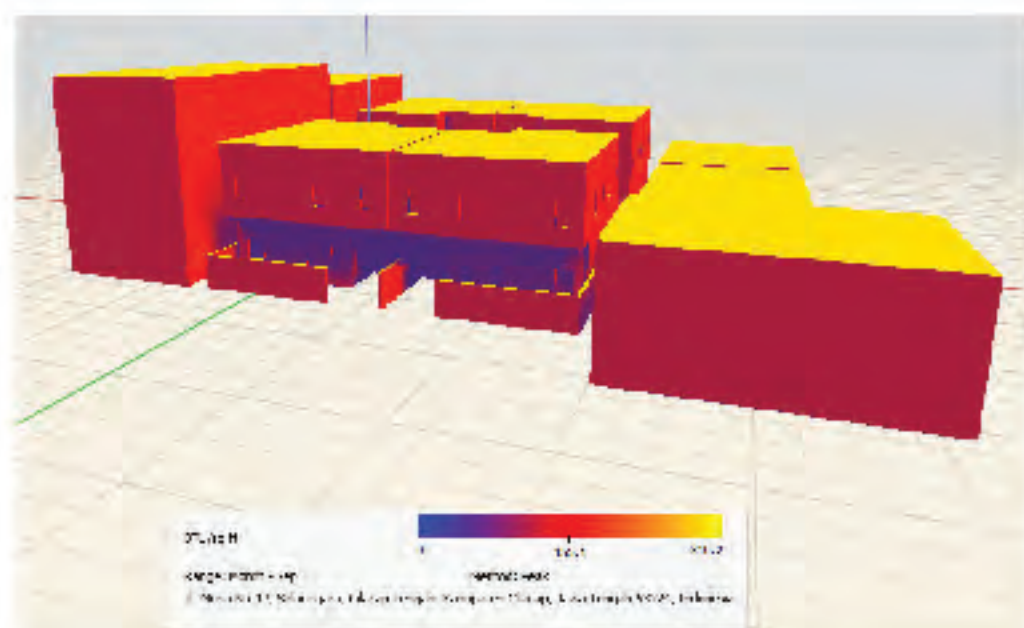
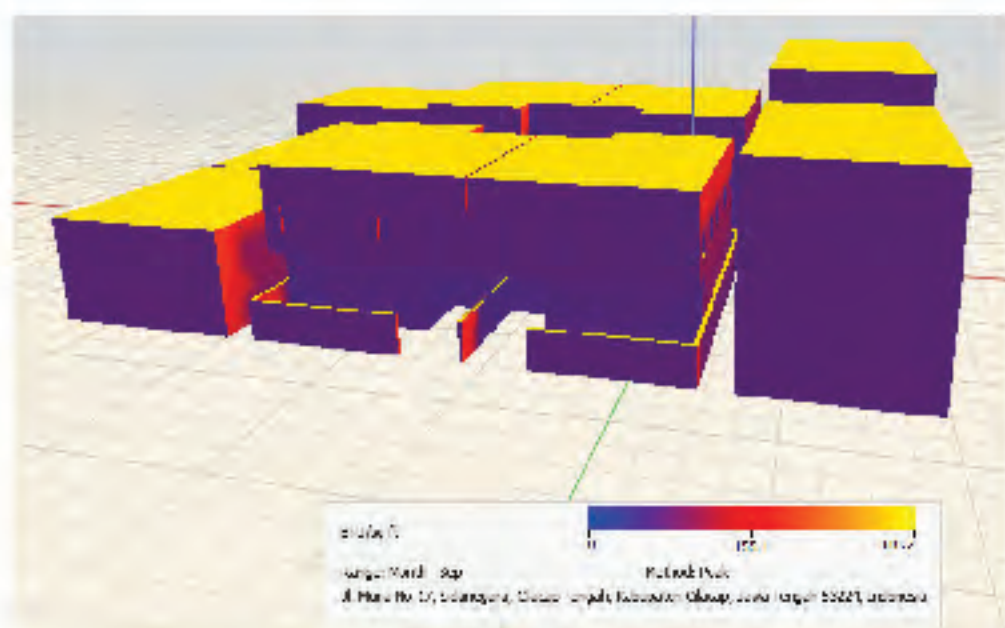
August



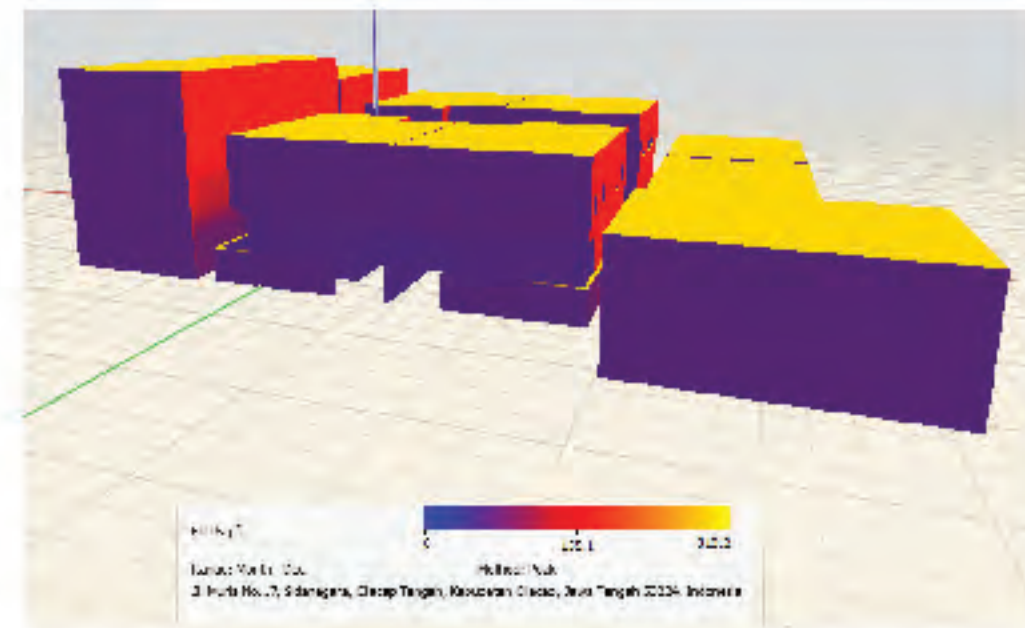
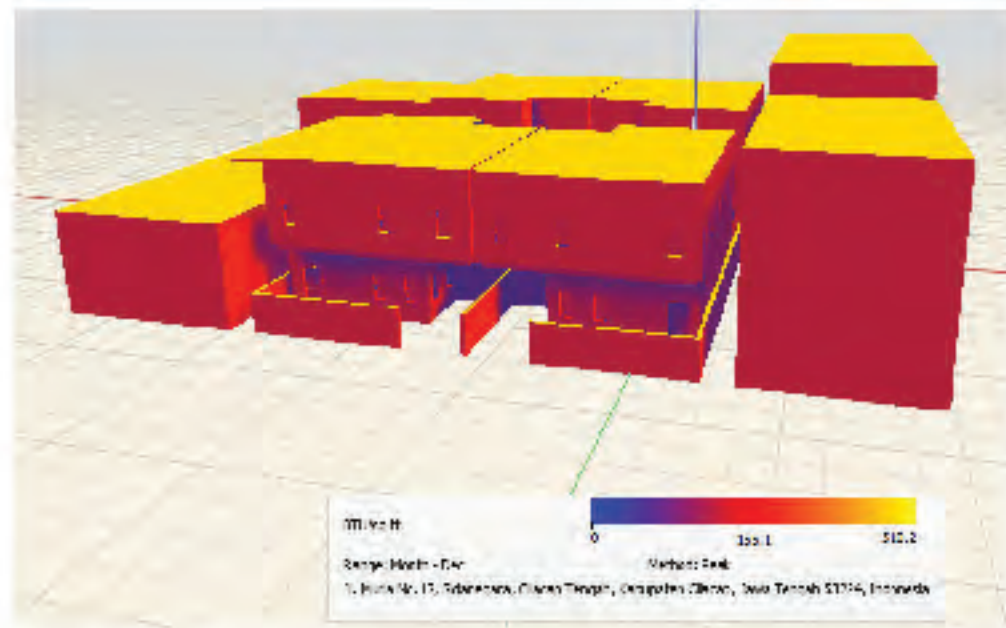
November



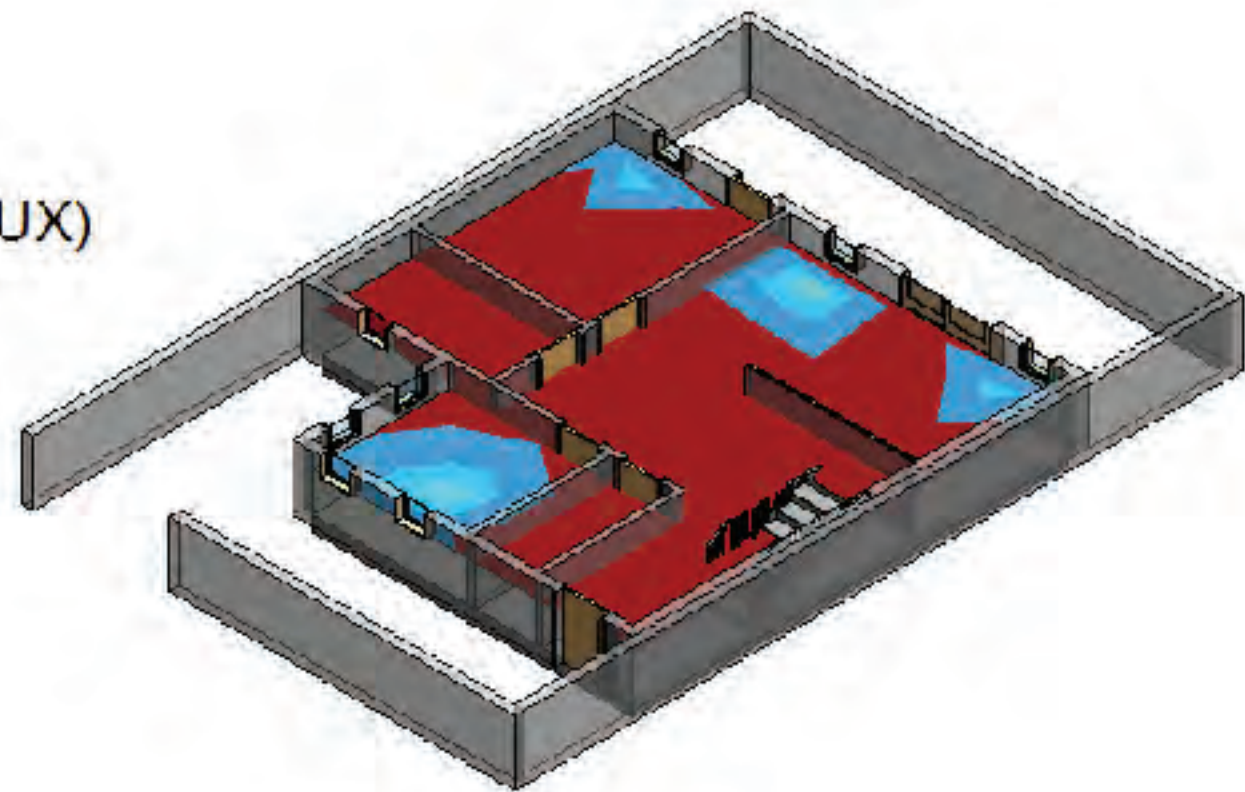
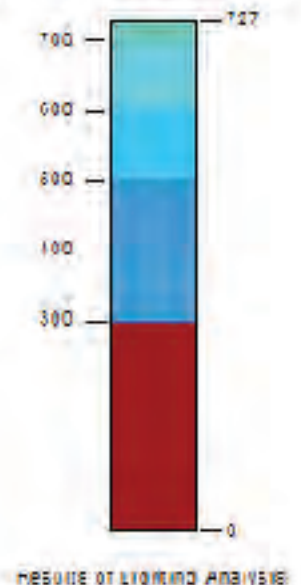
September



December

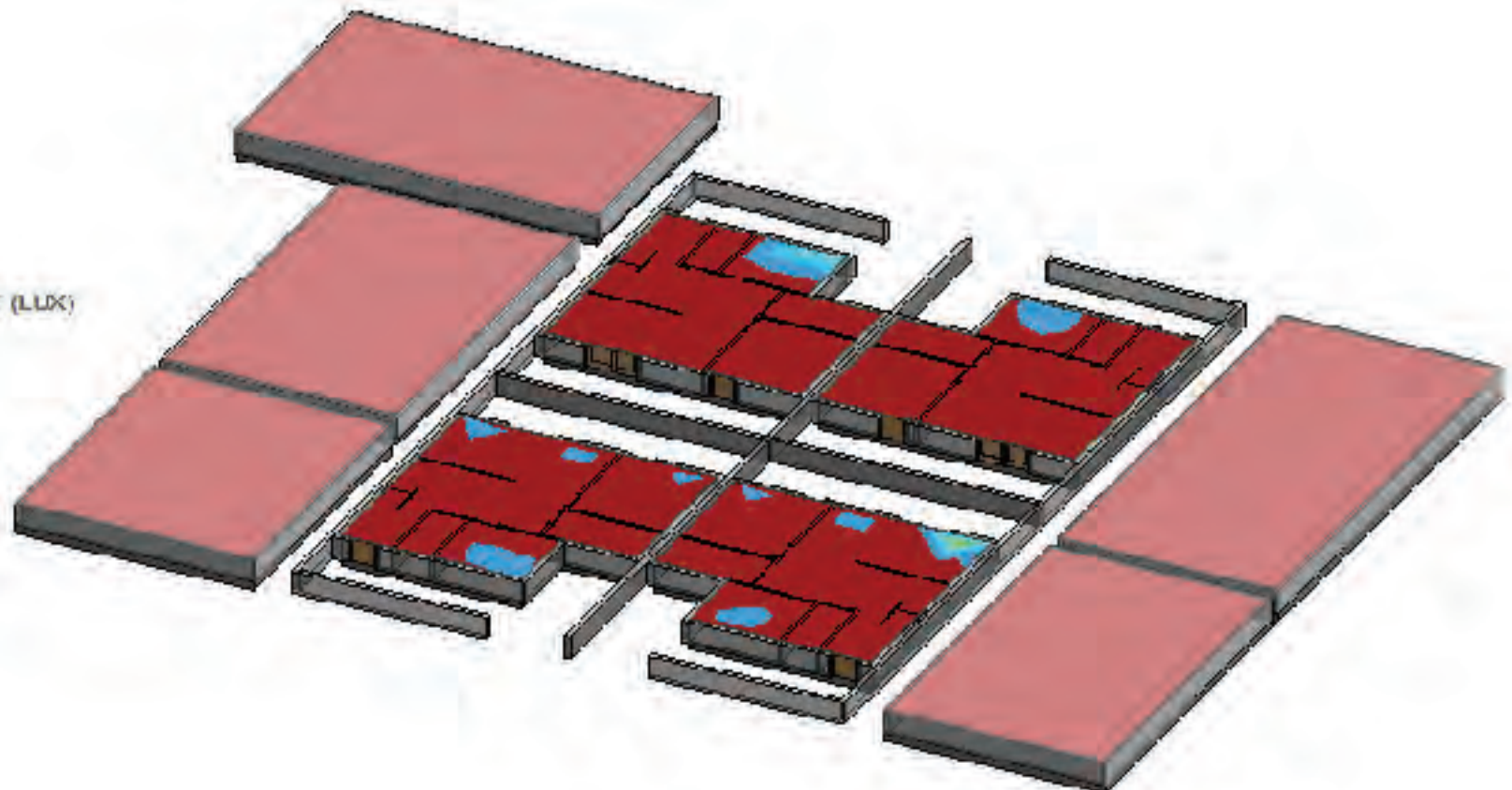
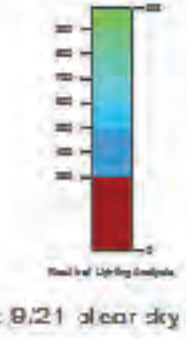


Lighting Analysis Results-Level 1 (LUX)

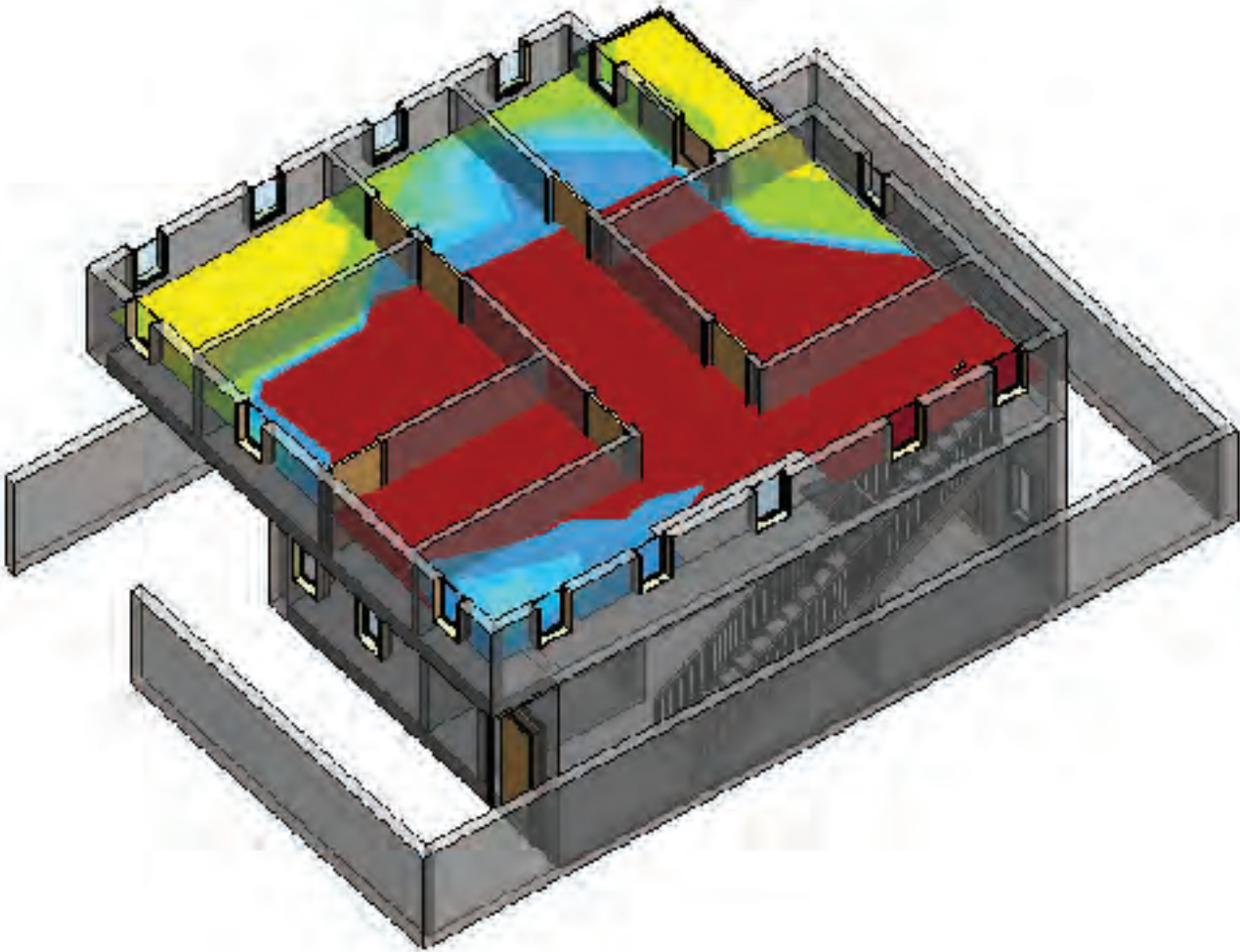
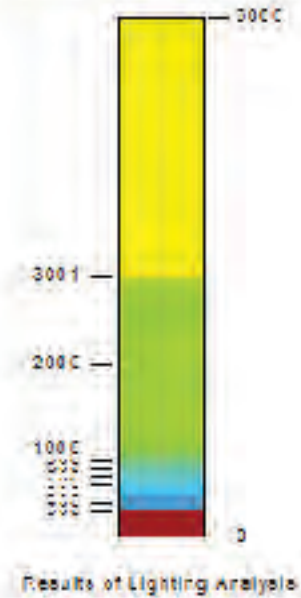


lx: 9/21 clear sky 3pm

Lighting Analysis Results-Level 1 (LUX)

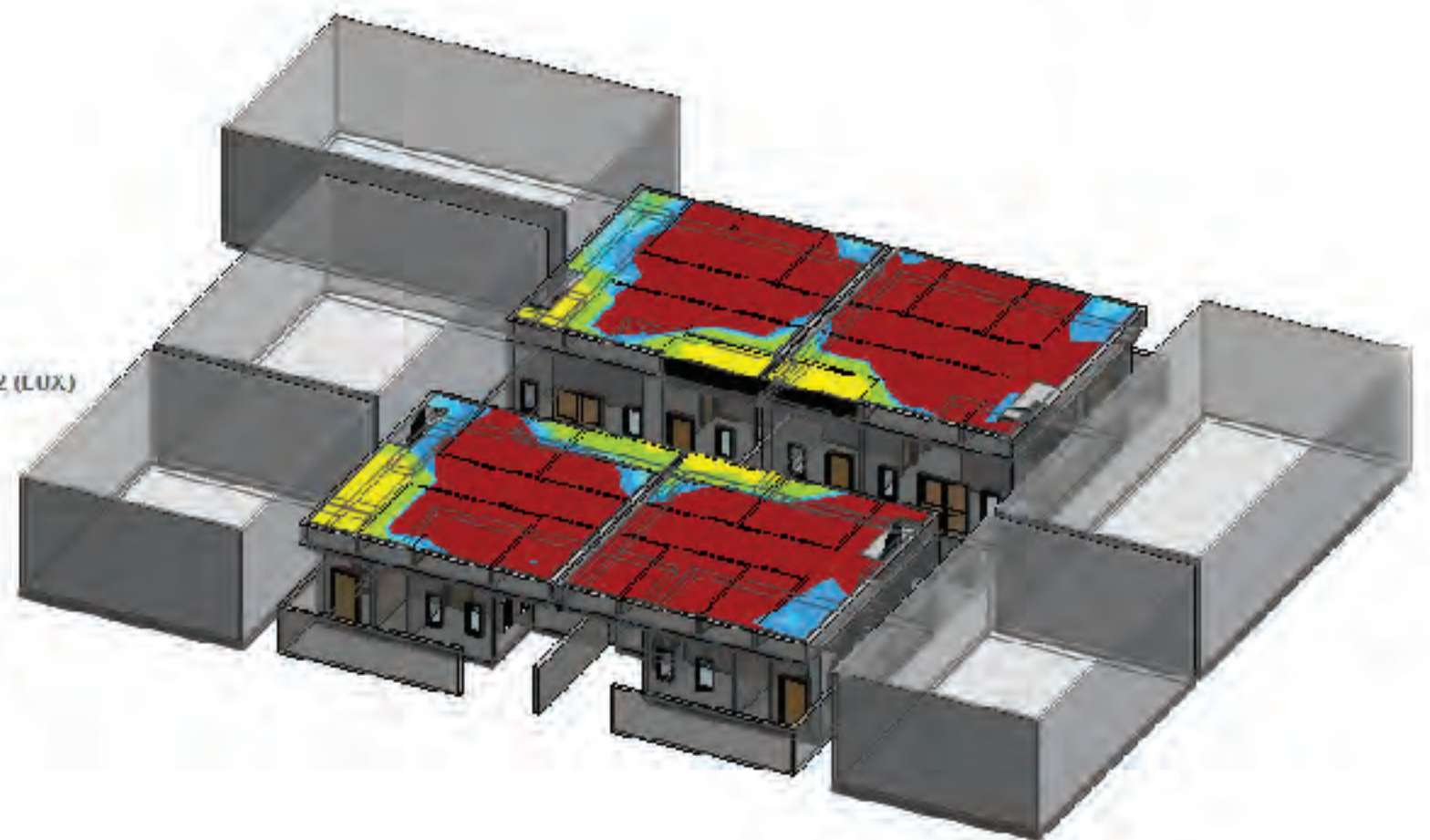
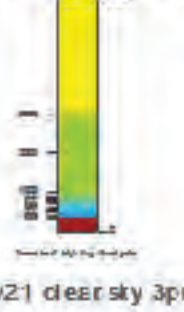


Lighting Analysis Results-Level 2 (LUX)



lx: 9/21 clear sky 3pm

Lighting Analysis Results-Level 2 (LUX)



Daylighting Single Residence

Daylighting Multiple Houses & Context

Baseline

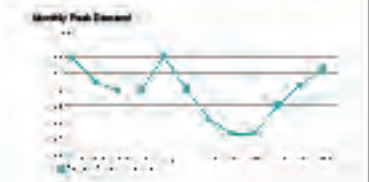
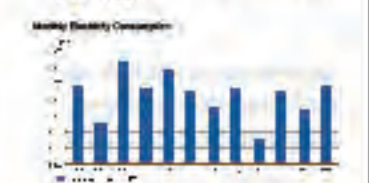
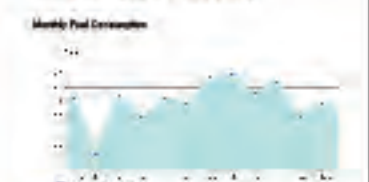
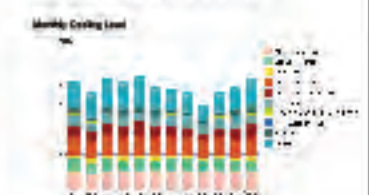


Building Performance Metrics

Energy Use Intensity	100.0
Life Cycle Energy Intensity	100.0
Renewable Energy Potential	100.0

Annual Carbon Emissions

CO2	100.0
CH4	100.0
N2O	100.0
HFC	100.0
PFC	100.0
SF6	100.0



Smaller Windows

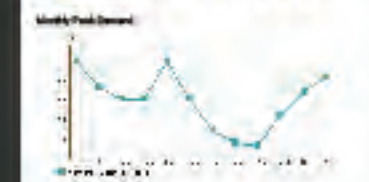
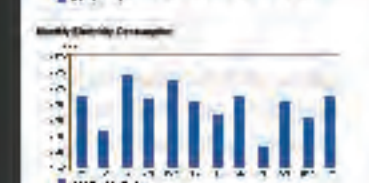
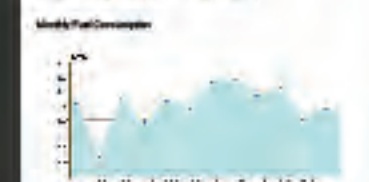
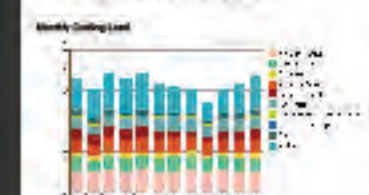


Building Performance Metrics

Energy Use Intensity	95.0
Life Cycle Energy Intensity	95.0
Renewable Energy Potential	100.0

Annual Carbon Emissions

CO2	95.0
CH4	95.0
N2O	95.0
HFC	95.0
PFC	95.0
SF6	95.0



Small Windows + No West Openings

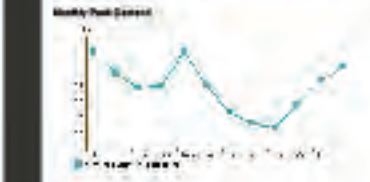
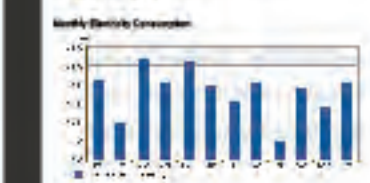


Building Performance Metrics

Energy Use Intensity	90.0
Life Cycle Energy Intensity	90.0
Renewable Energy Potential	100.0

Annual Carbon Emissions

CO2	90.0
CH4	90.0
N2O	90.0
HFC	90.0
PFC	90.0
SF6	90.0



Large Windows + No West Openings

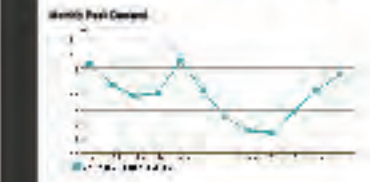
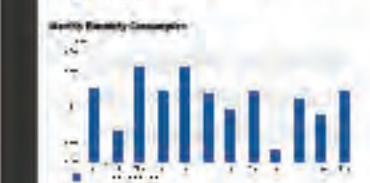
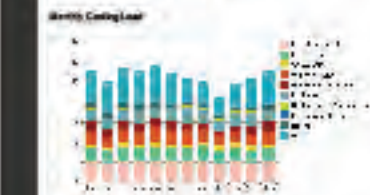


Building Performance Metrics

Energy Use Intensity	85.0
Life Cycle Energy Intensity	85.0
Renewable Energy Potential	100.0

Annual Carbon Emissions

CO2	85.0
CH4	85.0
N2O	85.0
HFC	85.0
PFC	85.0
SF6	85.0



Small Windows + No West or East Openings

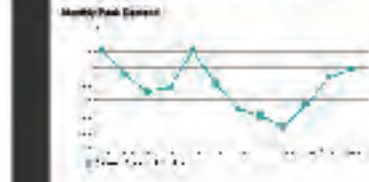
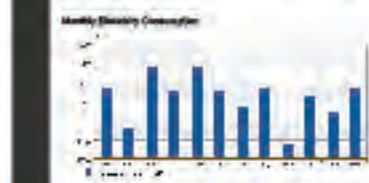
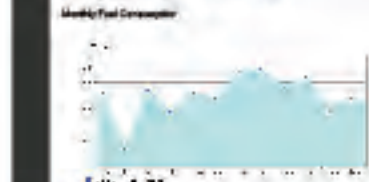
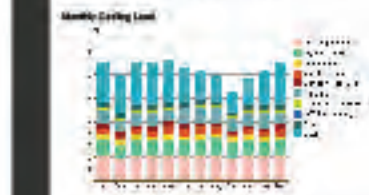


Building Performance Metrics

Energy Use Intensity	80.0
Life Cycle Energy Intensity	80.0
Renewable Energy Potential	100.0

Annual Carbon Emissions

CO2	80.0
CH4	80.0
N2O	80.0
HFC	80.0
PFC	80.0
SF6	80.0



Horizontal Design

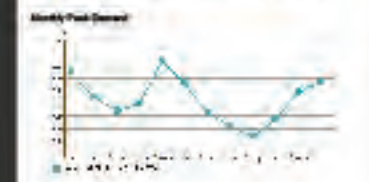
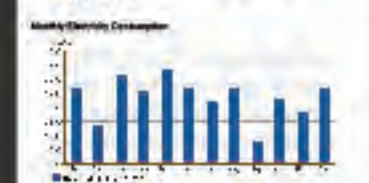
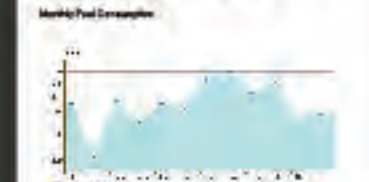
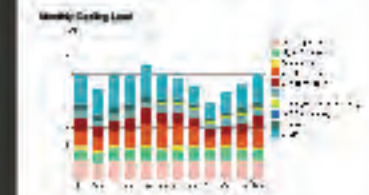
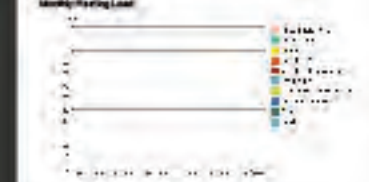


Building Performance Metrics

Energy Use Intensity	75.0
Life Cycle Energy Intensity	75.0
Renewable Energy Potential	100.0

Annual Carbon Emissions

CO2	75.0
CH4	75.0
N2O	75.0
HFC	75.0
PFC	75.0
SF6	75.0



Vertical Design

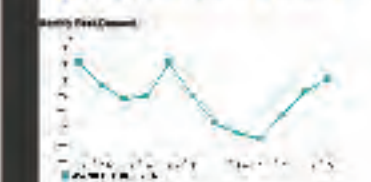
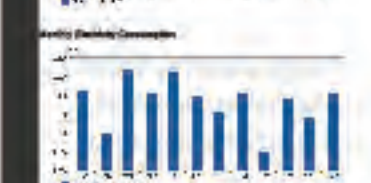
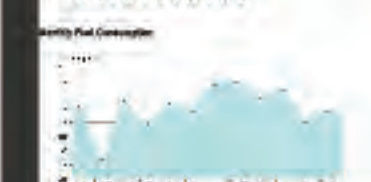
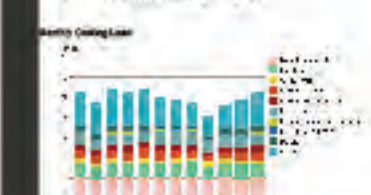


Building Performance Metrics

Energy Use Intensity	70.0
Life Cycle Energy Intensity	70.0
Renewable Energy Potential	100.0

Annual Carbon Emissions

CO2	70.0
CH4	70.0
N2O	70.0
HFC	70.0
PFC	70.0
SF6	70.0



Mass Modification

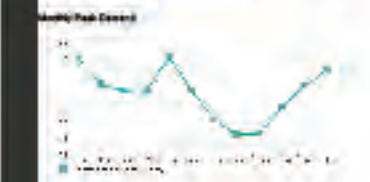
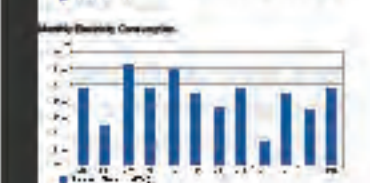
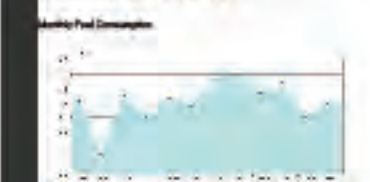


Building Performance Metrics

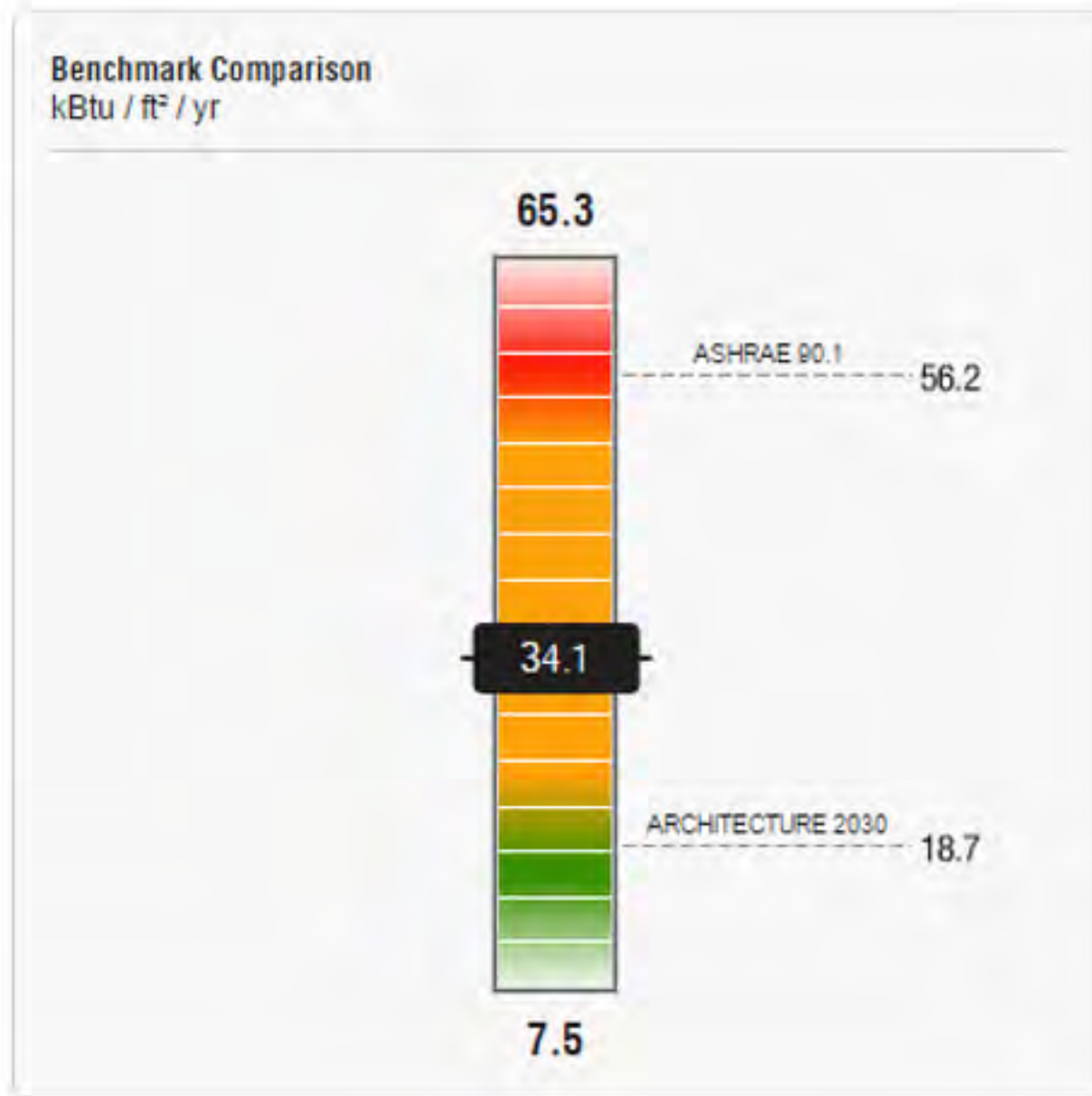
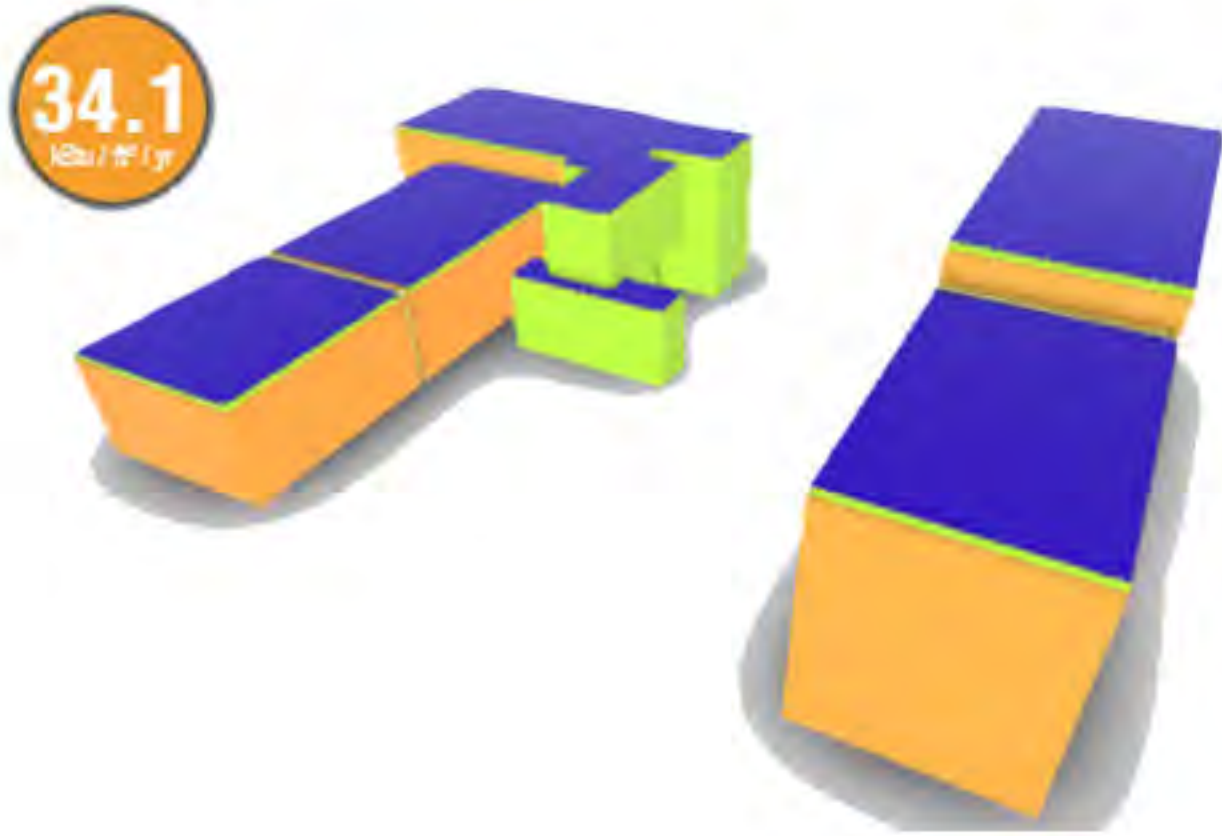
Energy Use Intensity	65.0
Life Cycle Energy Intensity	65.0
Renewable Energy Potential	100.0

Annual Carbon Emissions

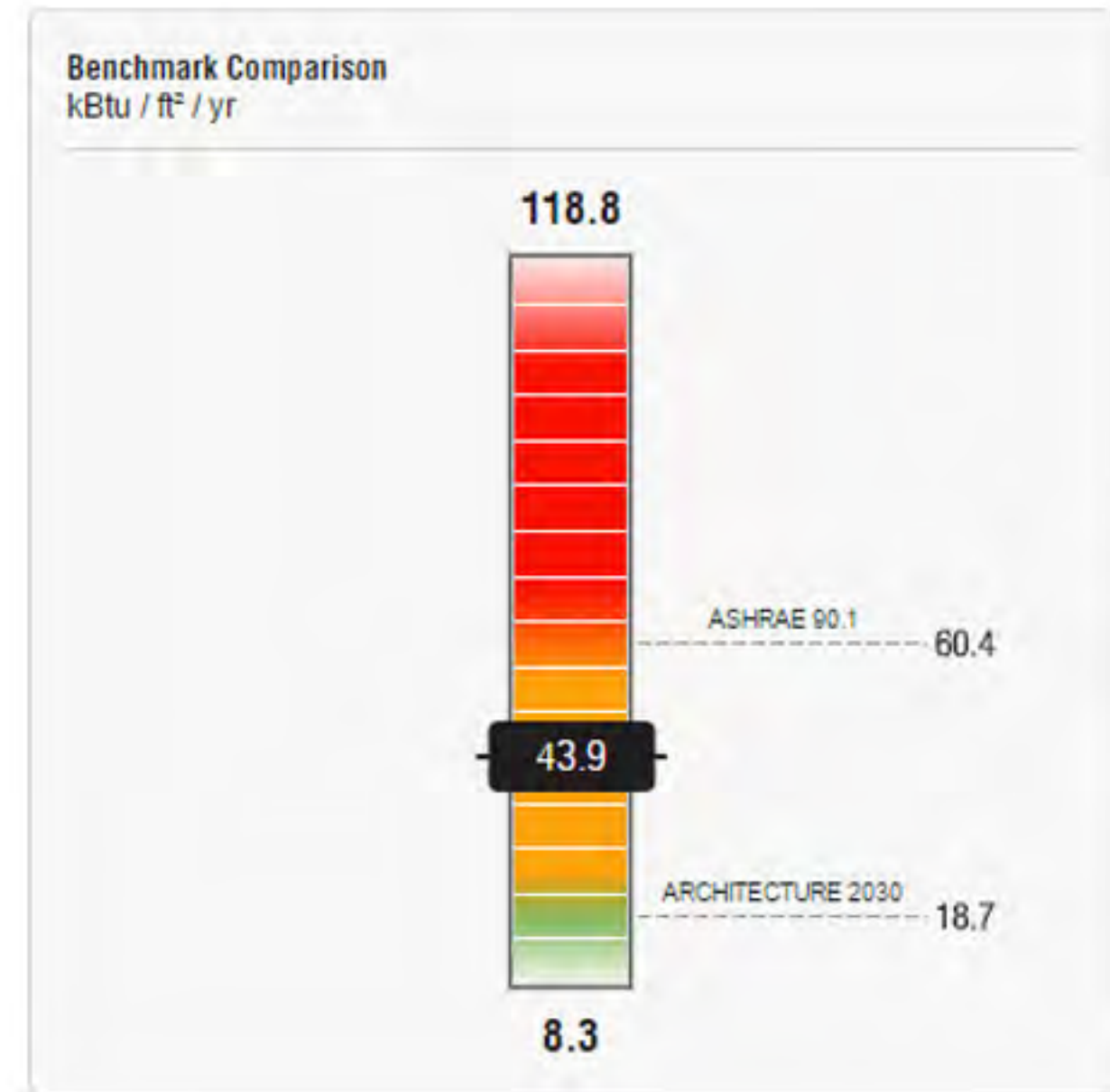
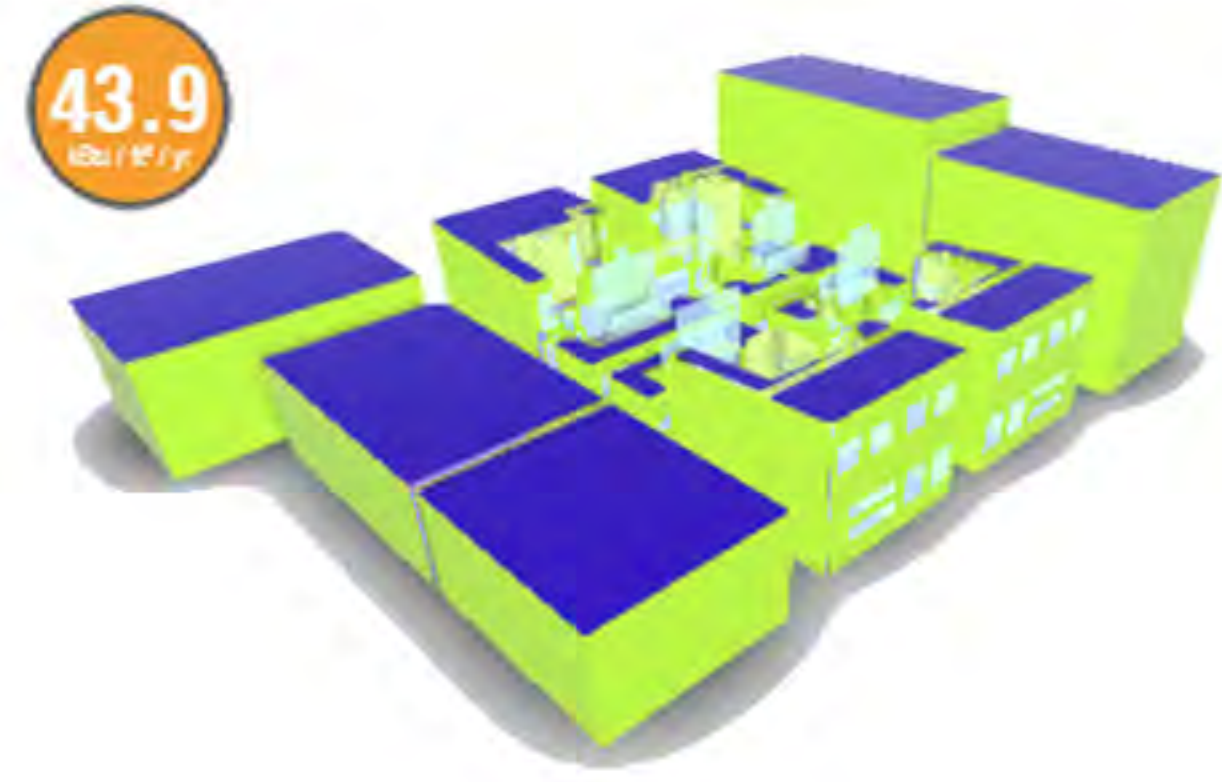
CO2	65.0
CH4	65.0
N2O	65.0
HFC	65.0
PFC	65.0
SF6	65.0



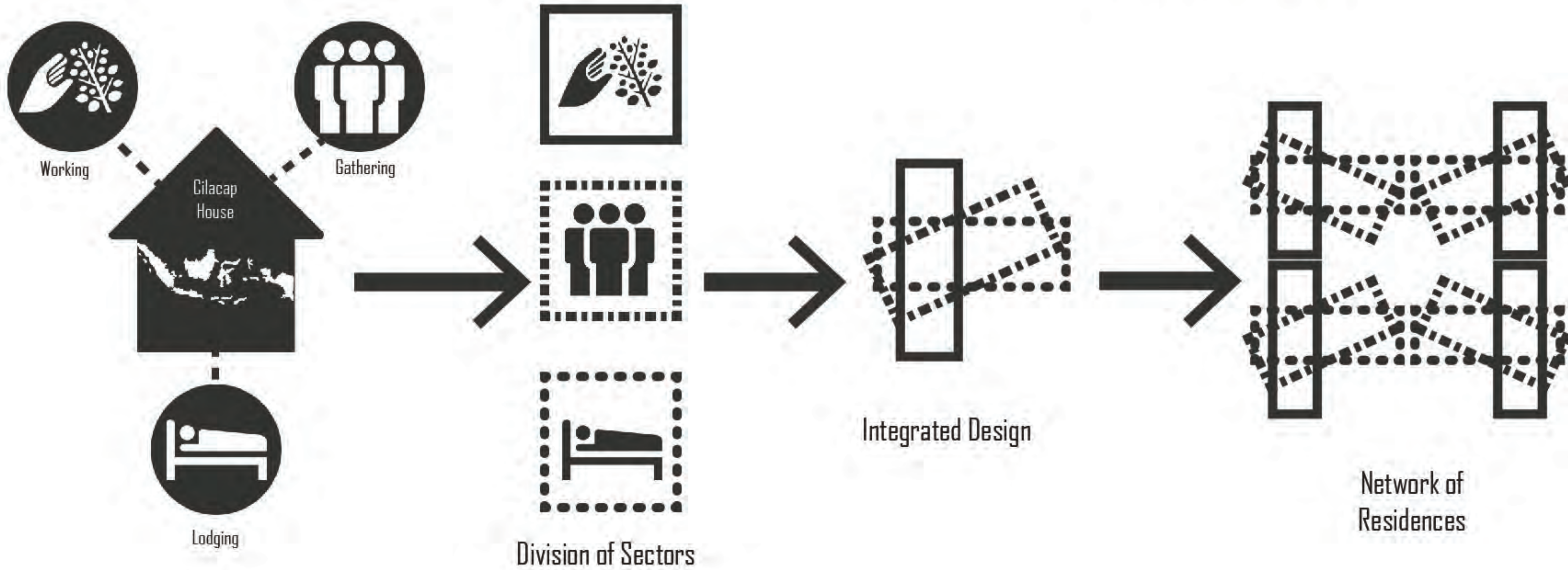
Single Model (Massing)



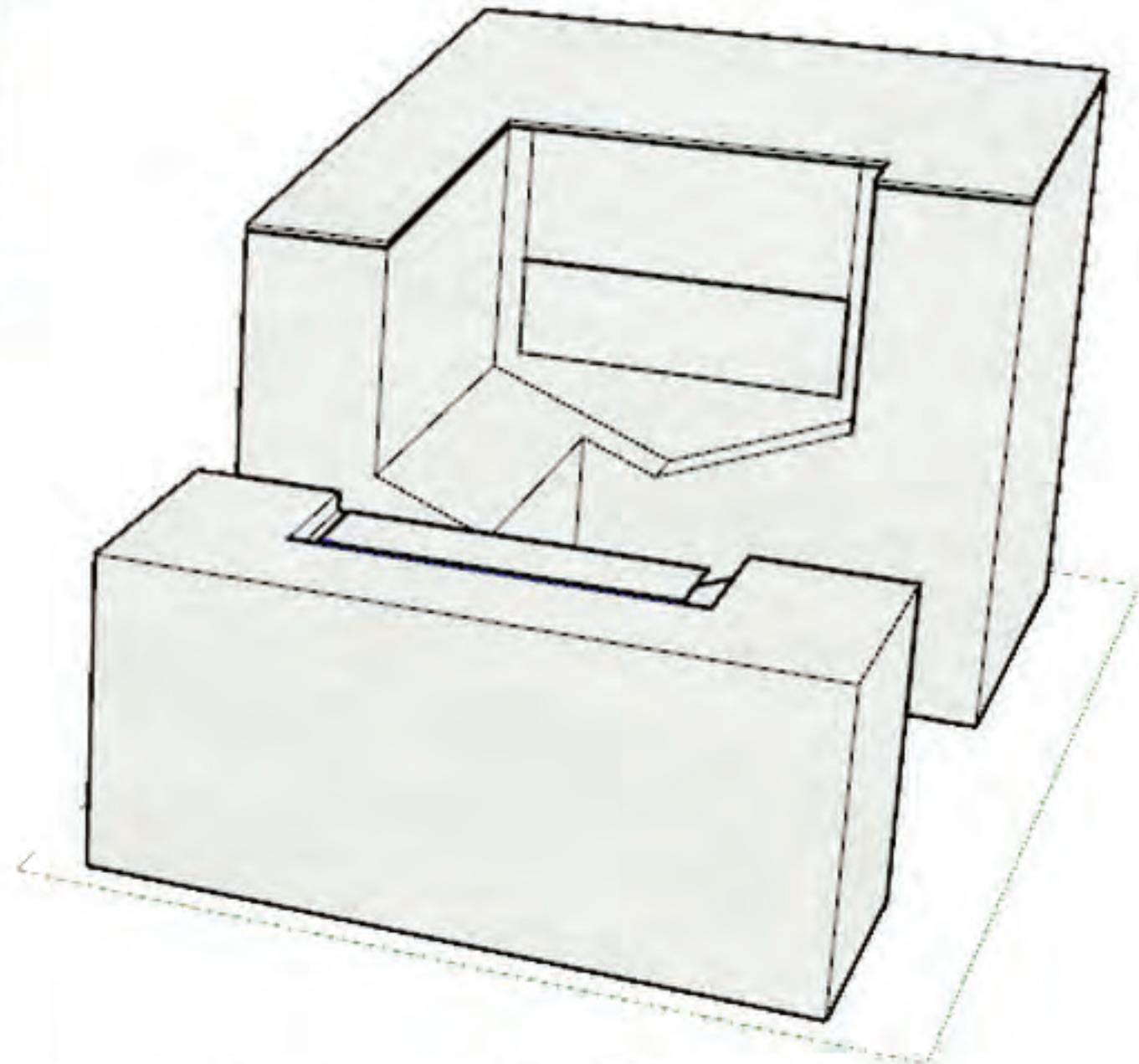
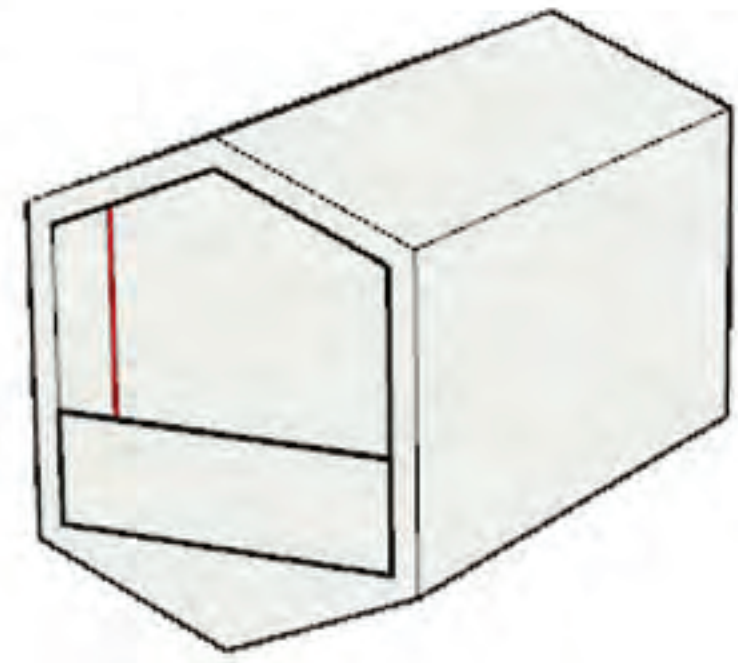
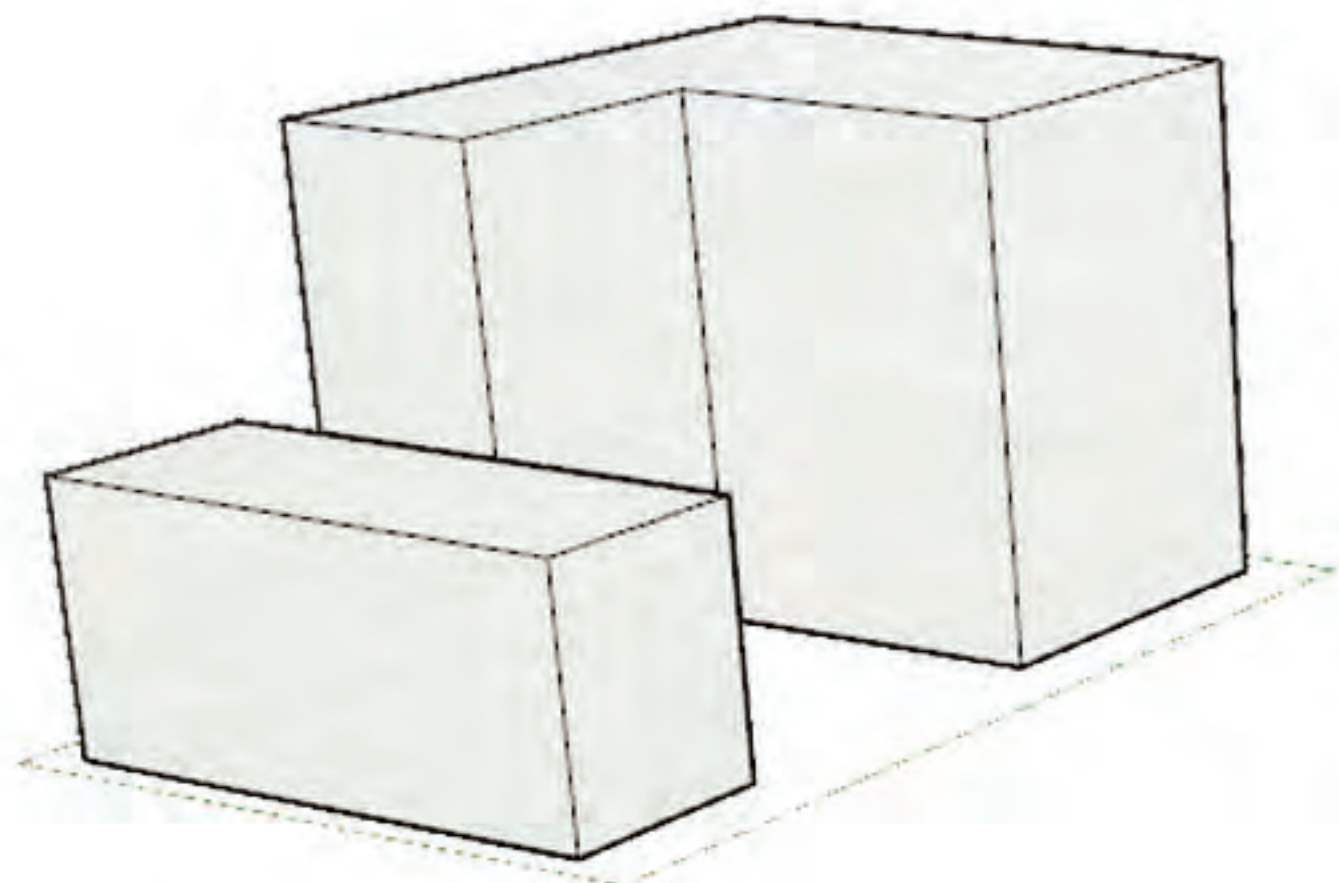
Complete Lot (Actual Form)



PART I



SOLUTION?



Optimized form
+
Zones



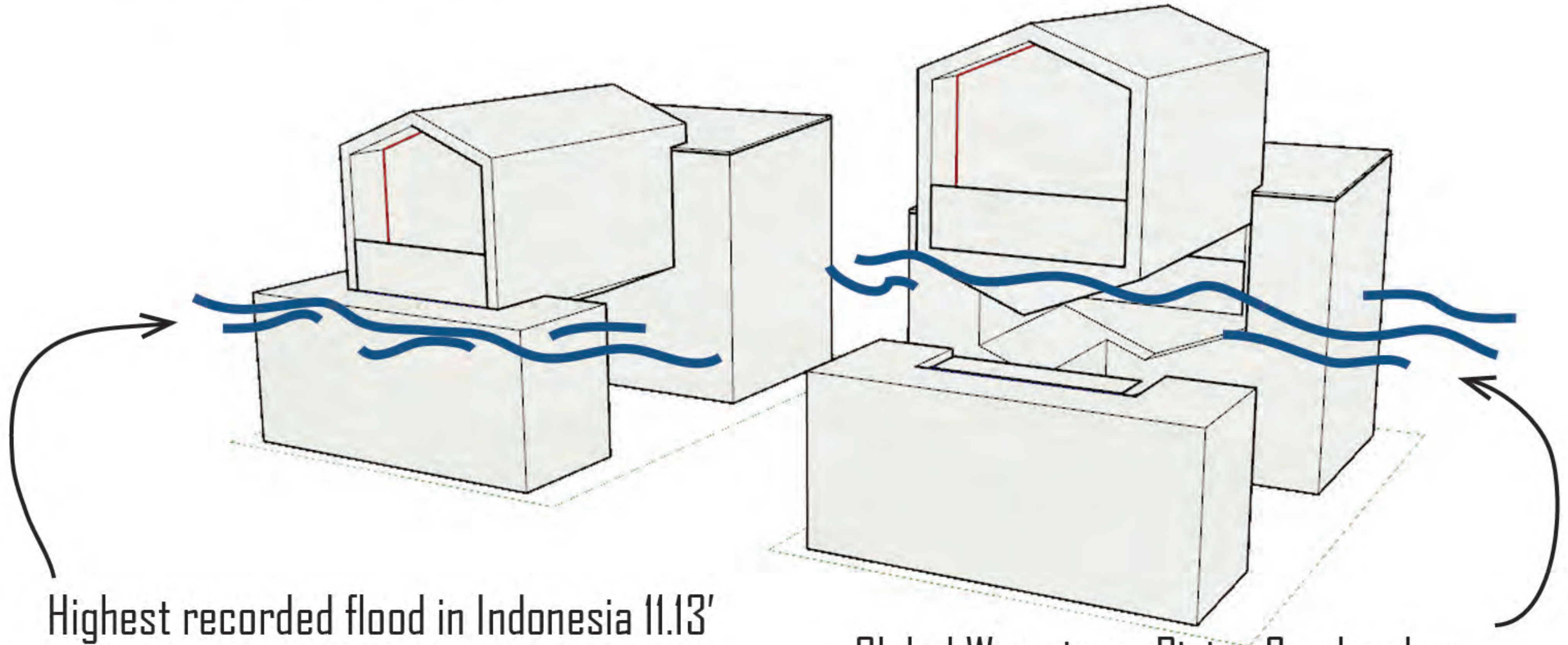
Emergency Pod



Configure form to hold pod

Pod at idle position
(Safe for current floods)

Pod at 'Emergency' position
(Safe for future floods)



Highest recorded flood in Indonesia 11.13'

Global Warming = Rising Sea levels +
Harsher Weather Conditions







East Elevation



South Elevation



West Elevation



North Elevation



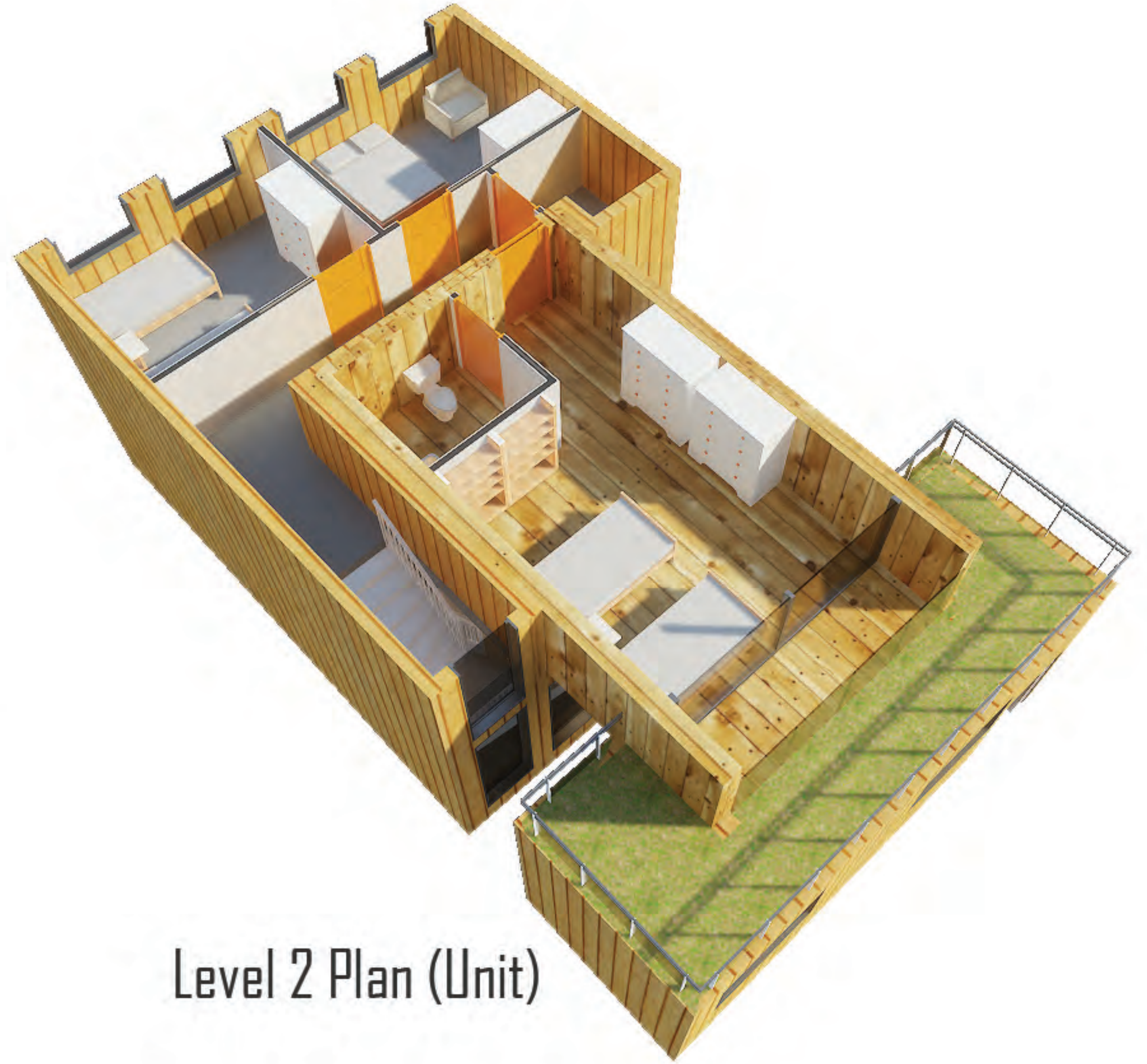
Level 1 Plan (Site)



Level 1 Plan (Unit)

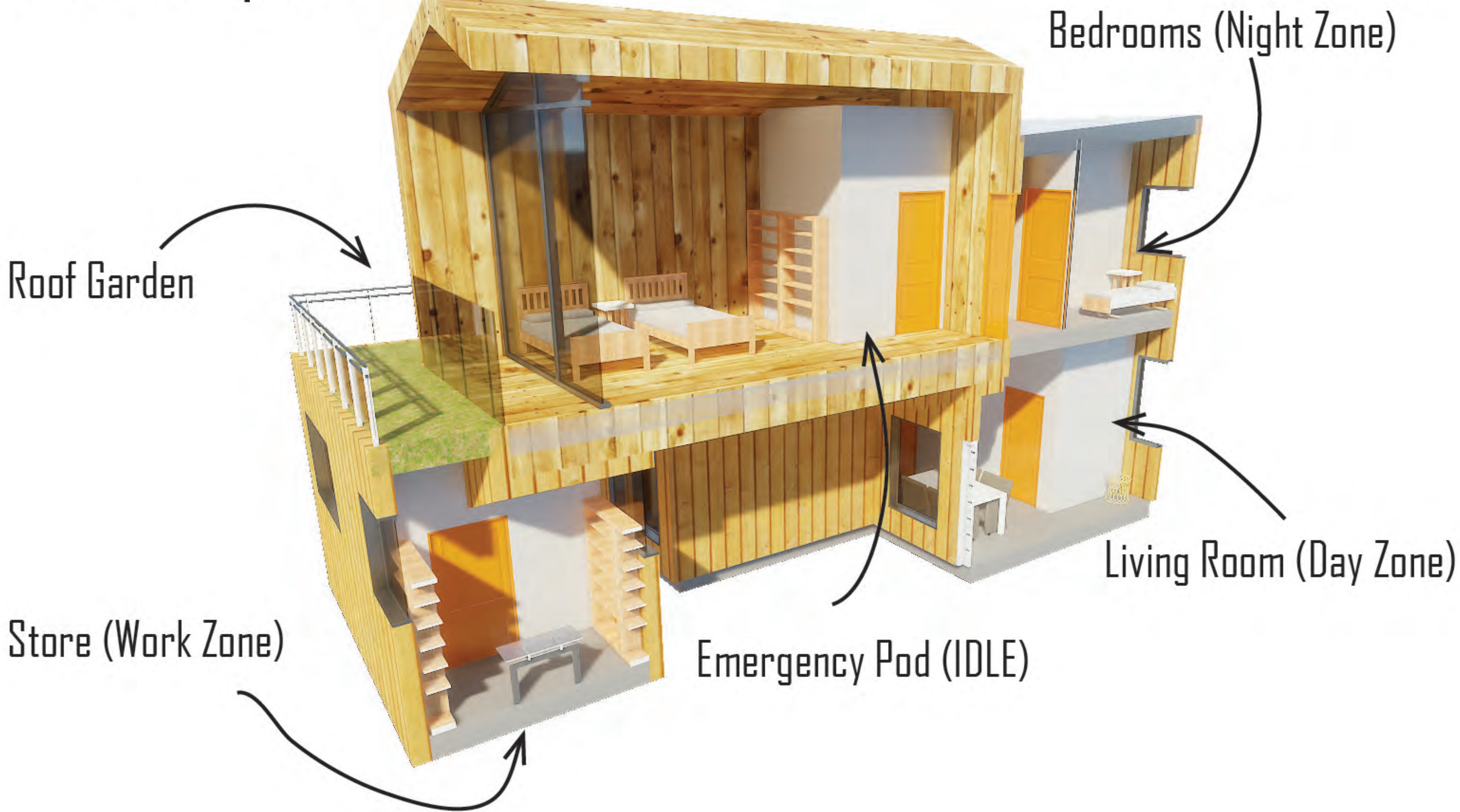


Level 2 Plan (Site)



Level 2 Plan (Unit)

Section Perspective



Roof Garden

Bedrooms (Night Zone)

Living Room (Day Zone)

Store (Work Zone)

Emergency Pod (IDLE)

Section Perspective

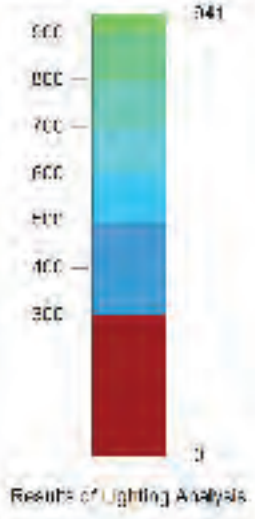


Horizontal
Circulation

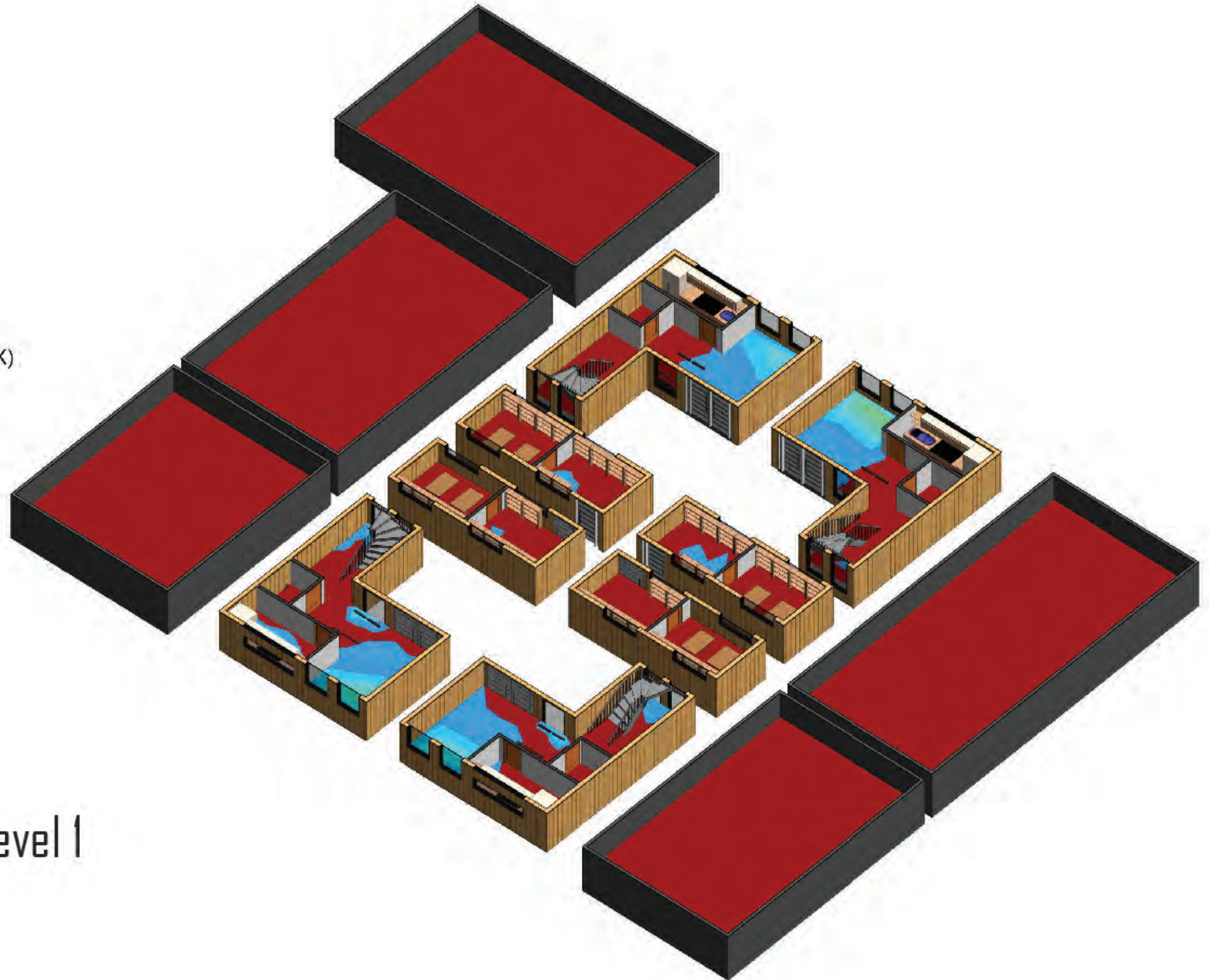
Verticle
Circulation

Work Room

Lighting Analysis Results-Level 1 (LUX)

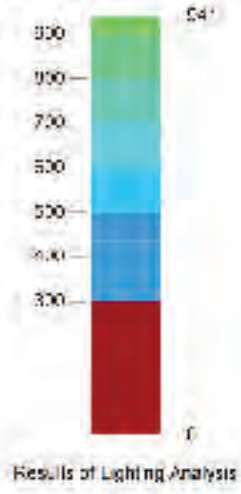


Ix: 9/21 clear sky 3pm

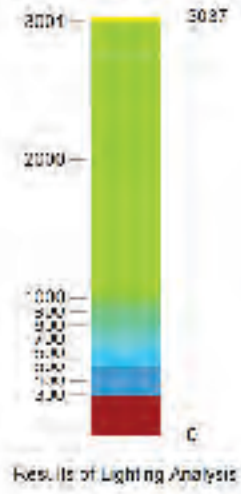


Daylighting Analysis : Level 1

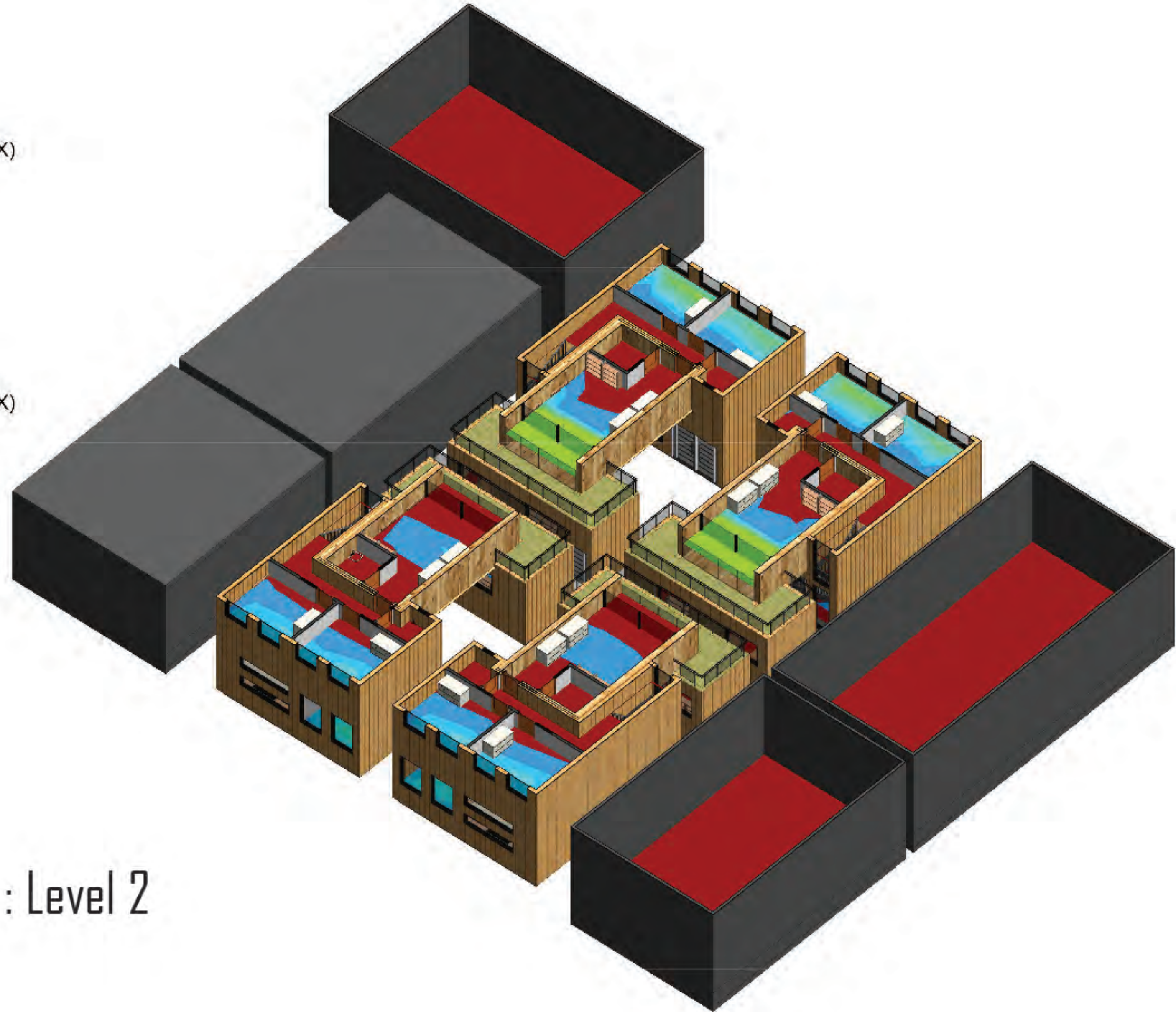
Lighting Analysis Results-Level 1 (LUX)



Lighting Analysis Results-Level 2 (LUX)

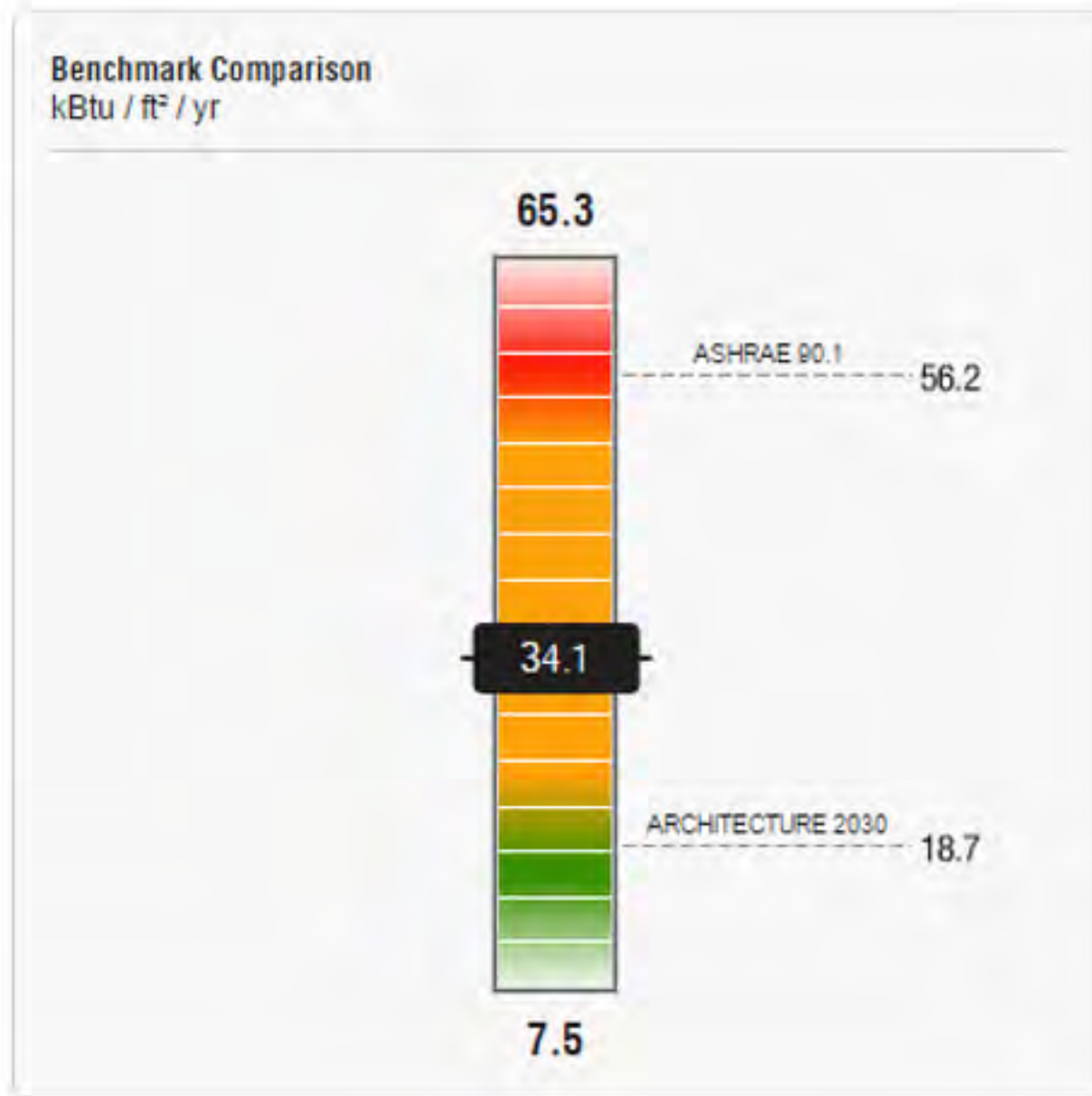
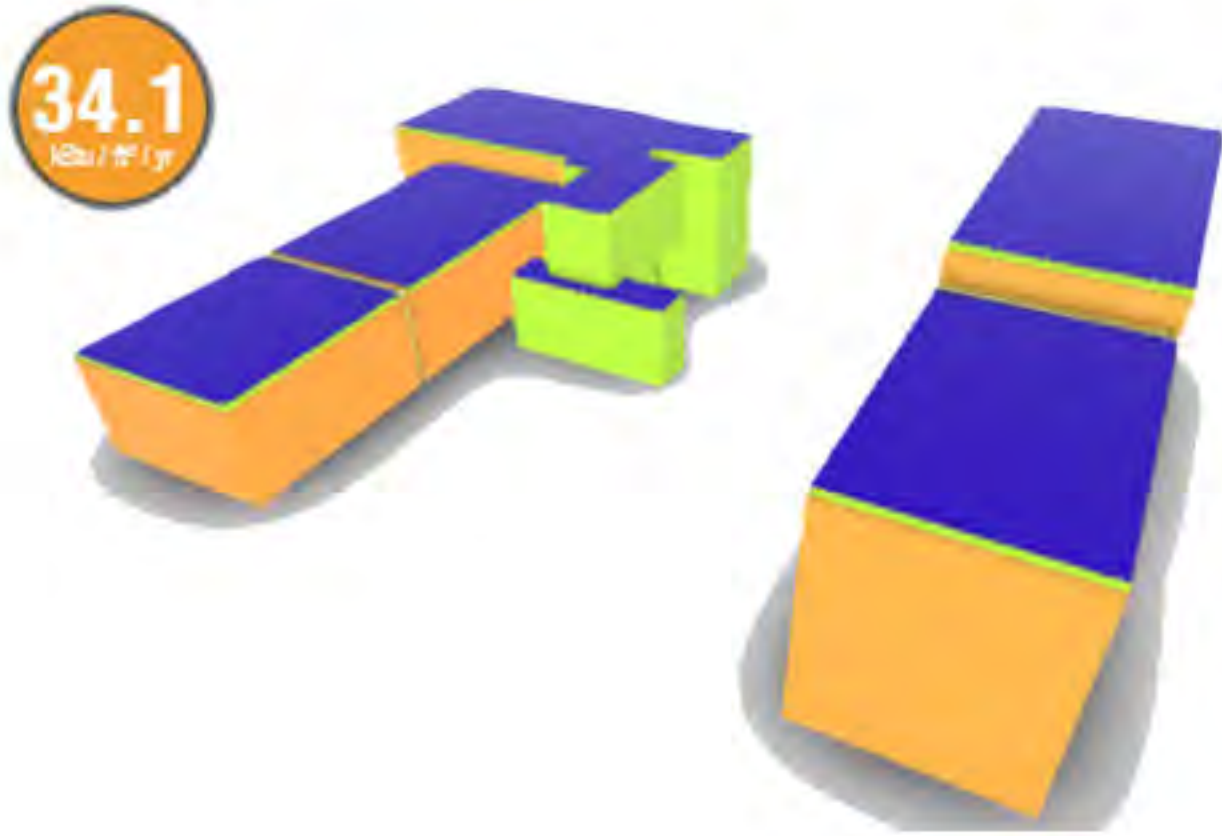


Ix: 9/21 clear sky 3pm

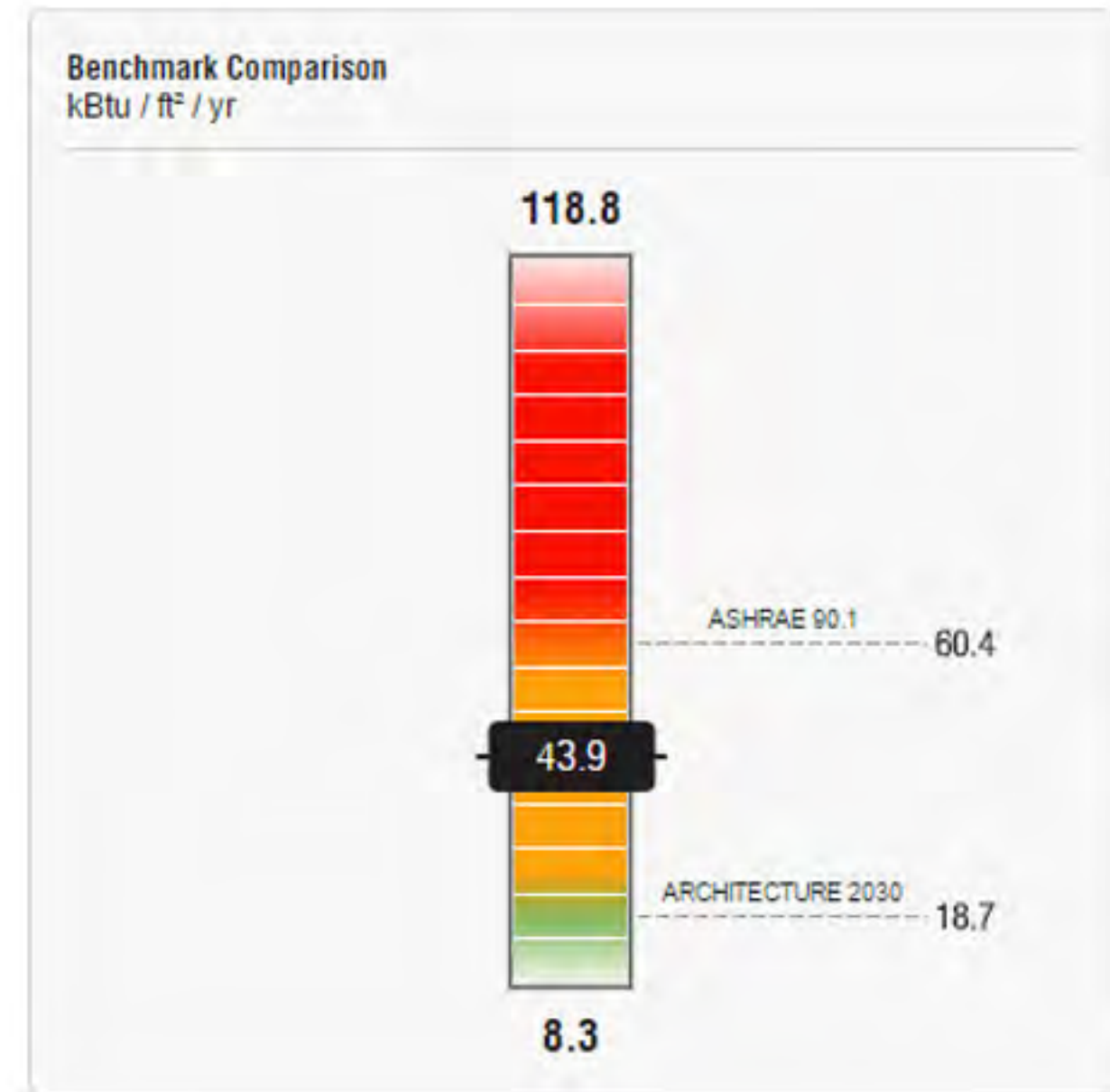
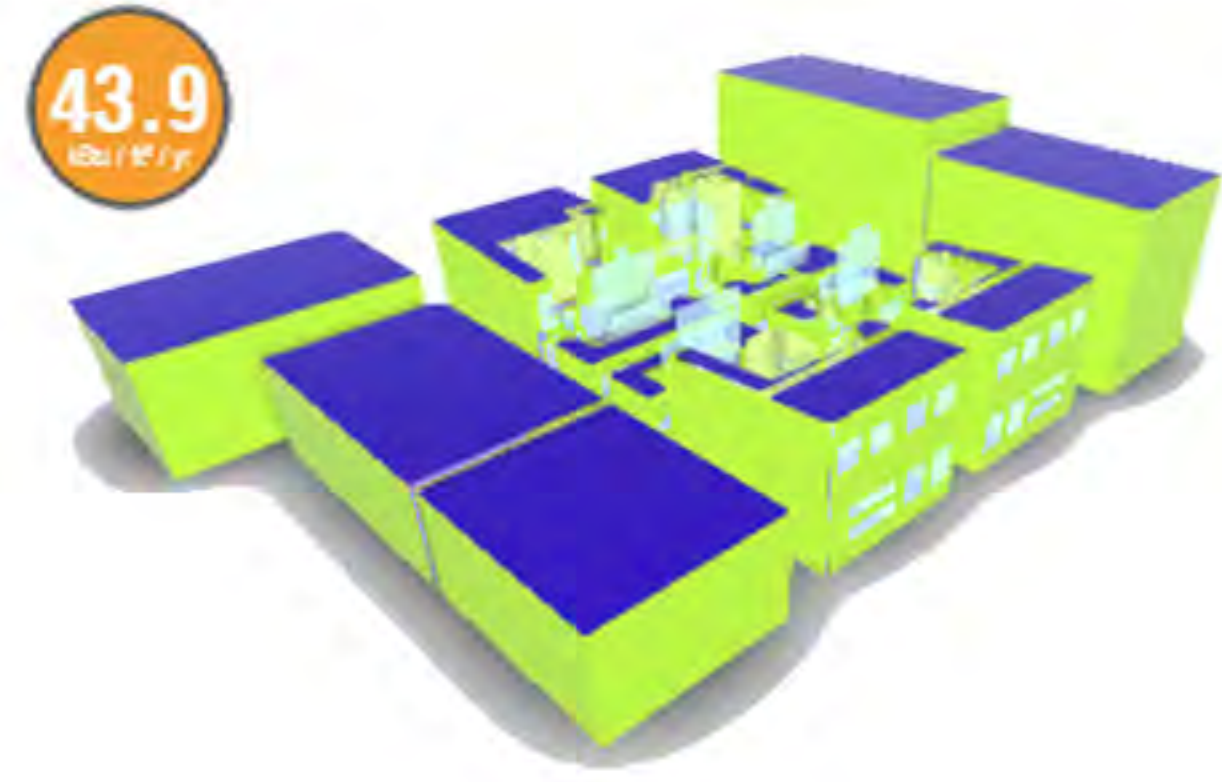


Daylighting Analysis : Level 2

Single Model (Massing)



Complete Lot (Actual Form)



PROCESS

Locate

PROCESS

Locate



Analyze

Climate
Culture
Context

PROCESS



PROCESS

Locate



Analyze

Climate
Culture
Context



Program

PROCESS



Optimize

Solar
Wind
Daylighting
Energy

Locate



Analyze

Climate
Culture
Context



Program

PROCESS



Massing

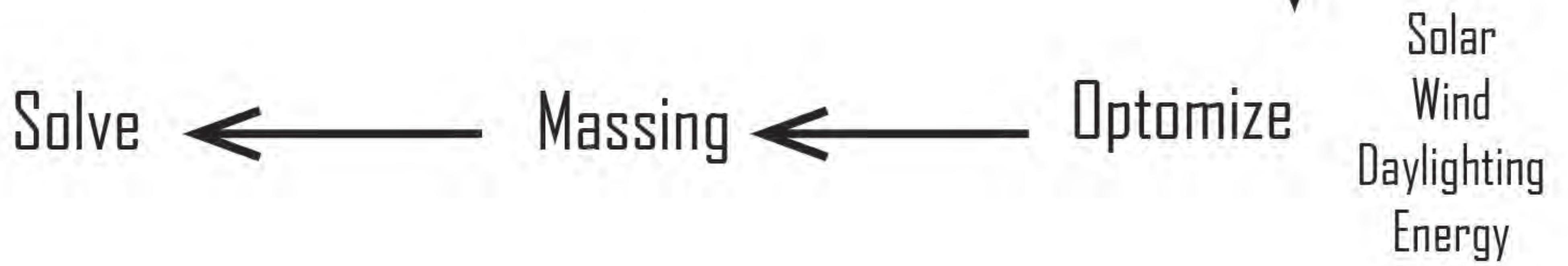


Optimize

Solar
Wind
Daylighting
Energy



PROCESS



Locate → Analyze Climate
Culture
Context → Program

PROCESS

Solar
Wind
Daylighting
Energy

Solve ← Massing ← Optimize

↓

Product