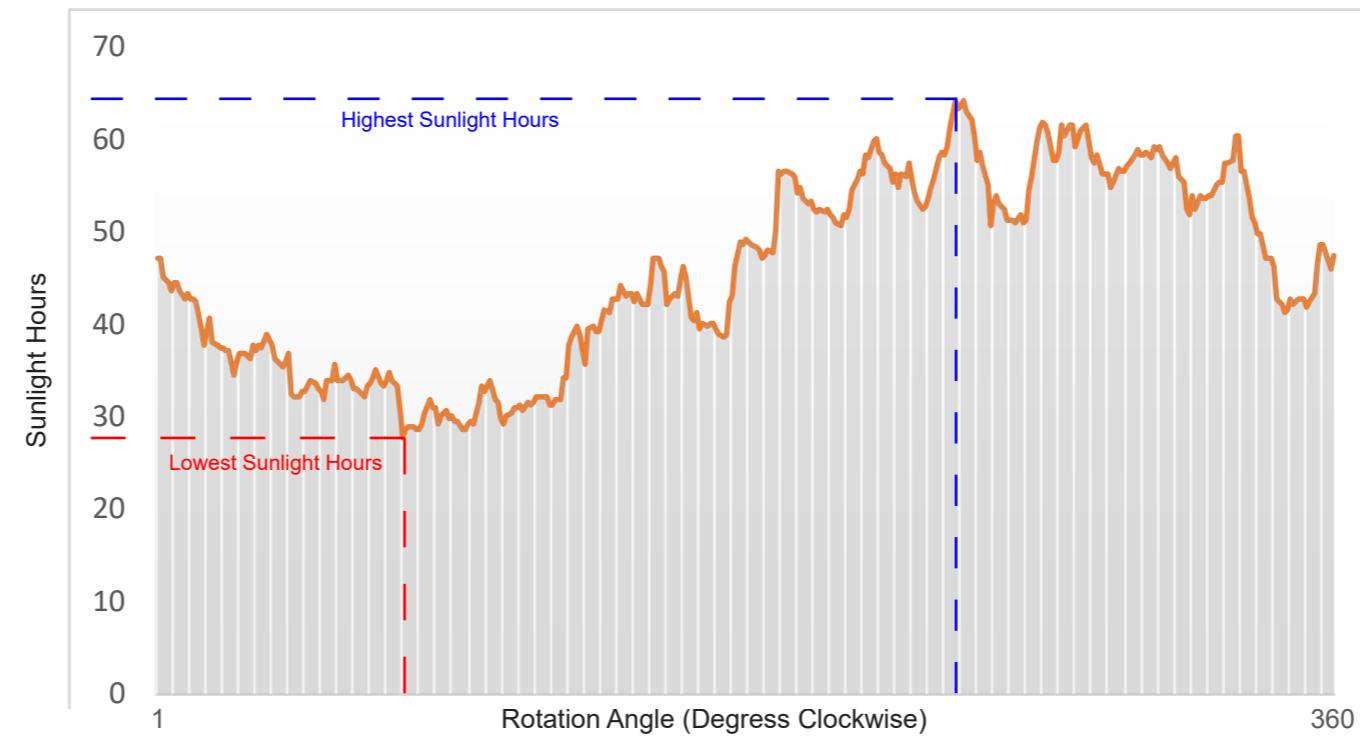




Preliminary Daylight Analysis for Preferred Option Facade Scheme 04

Analysis Strategy

The idea was to first find the **best** and the **worst** orientation for the villa from daylight point of view. In order to find that orientation the north is rotated 360 degrees and the result of sunlight hours received in the regularly occupied areas of the villa (Living, dining, and bedrooms) are recorded. The recorded observation is shown in the graph below. Based on the graph, it can be observed that the **113 degrees clockwise** rotation provided the maximum sunlight hours and **75 degrees anti-clockwise** provided the lowest sunlight hours in the regularly occupied areas of the villa. The sunlight hours are tracked for 10am, 12pm, 2pm on equinox and 10am, 12pm, 2pm on summer solstice.



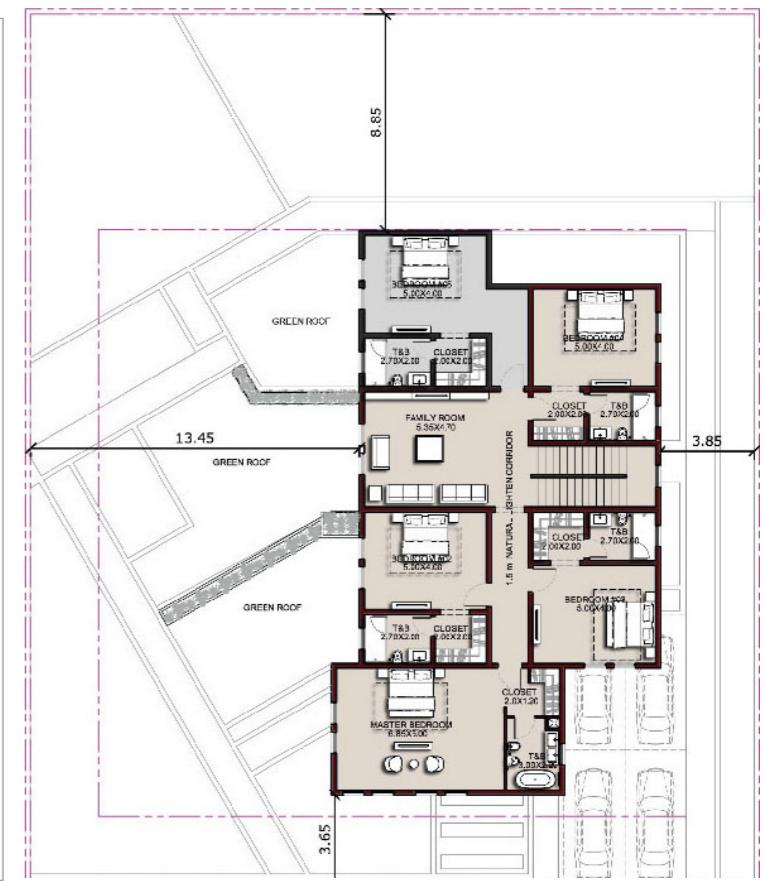
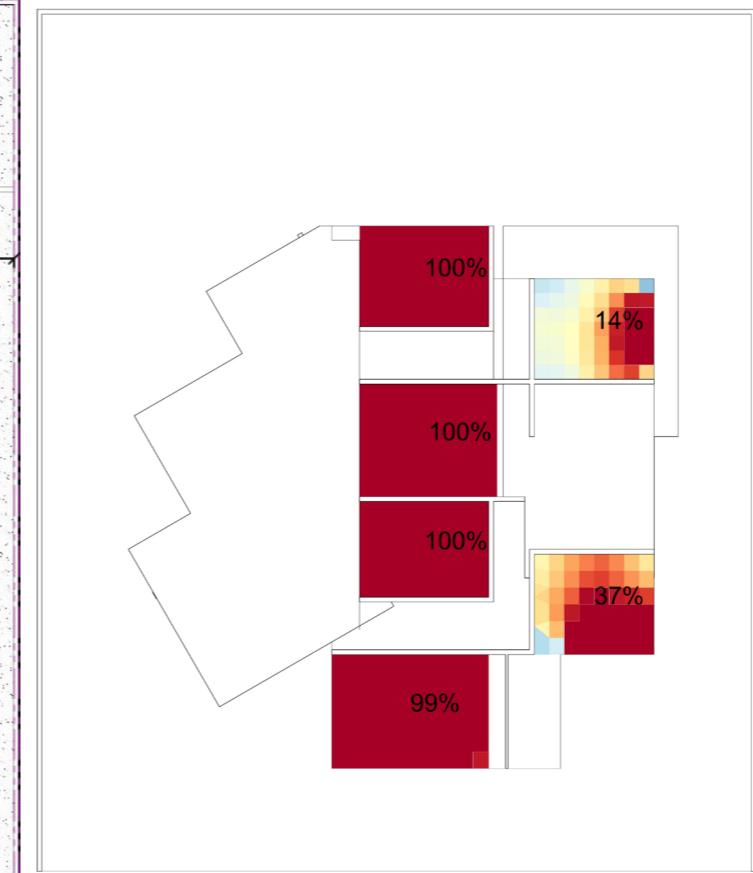
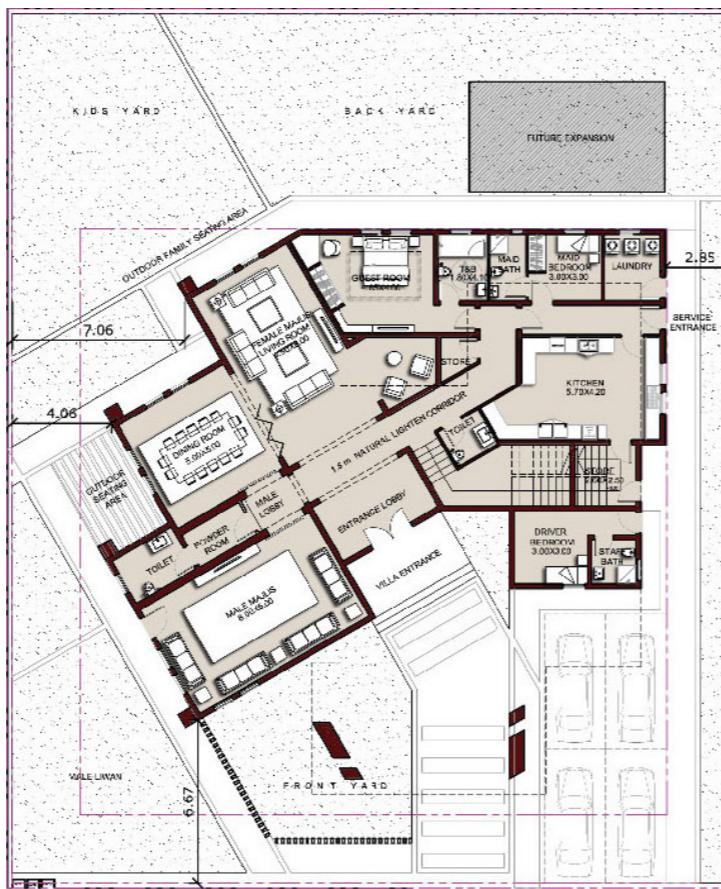
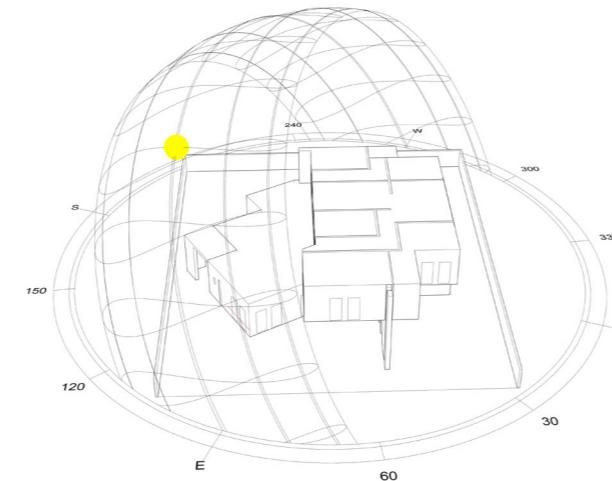
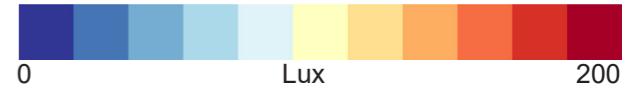
Simulation Parameters for Daylight Simulations

Reflectance	Percentage
Wall	50%
Floor	20%
Ceiling	80%
Shading	30%
Ground	10%

Transmittance	Percentage
Glazing	40%

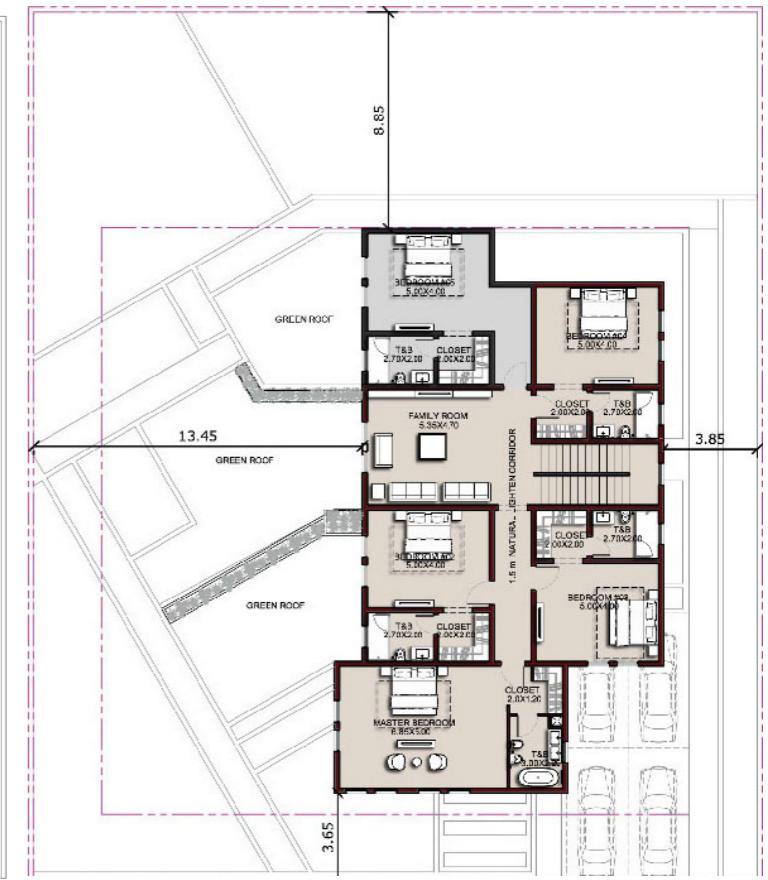
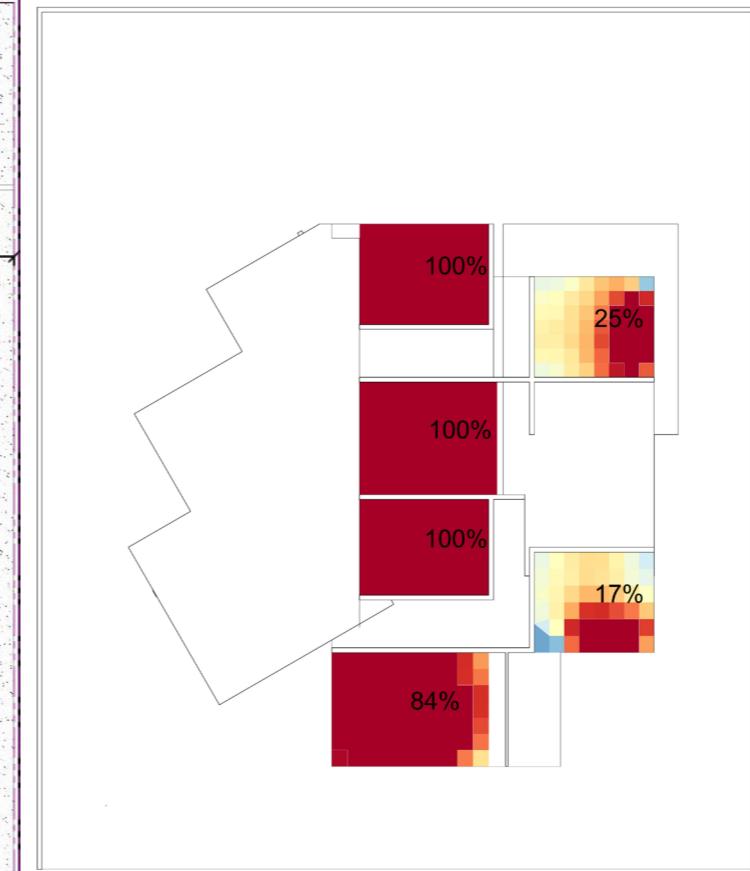
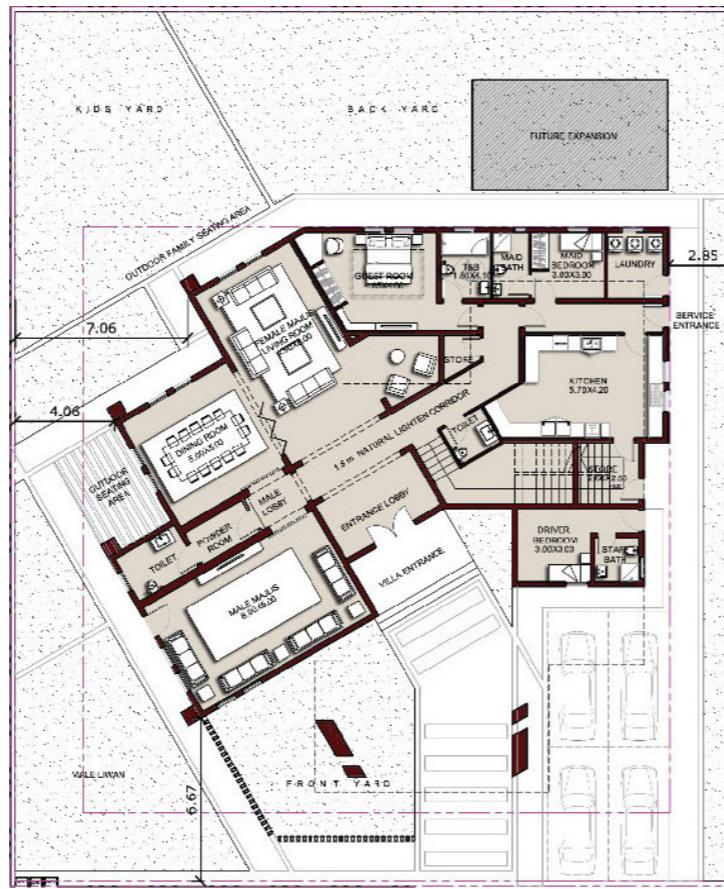
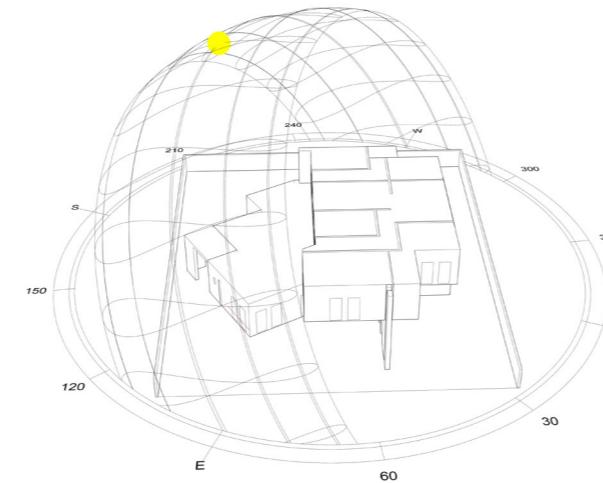
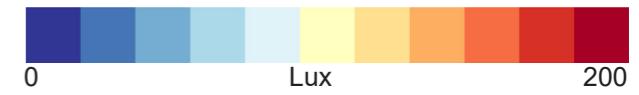
Illuminance @ 10 am on Equinox

Orientation 113 Degrees Clockwise from North



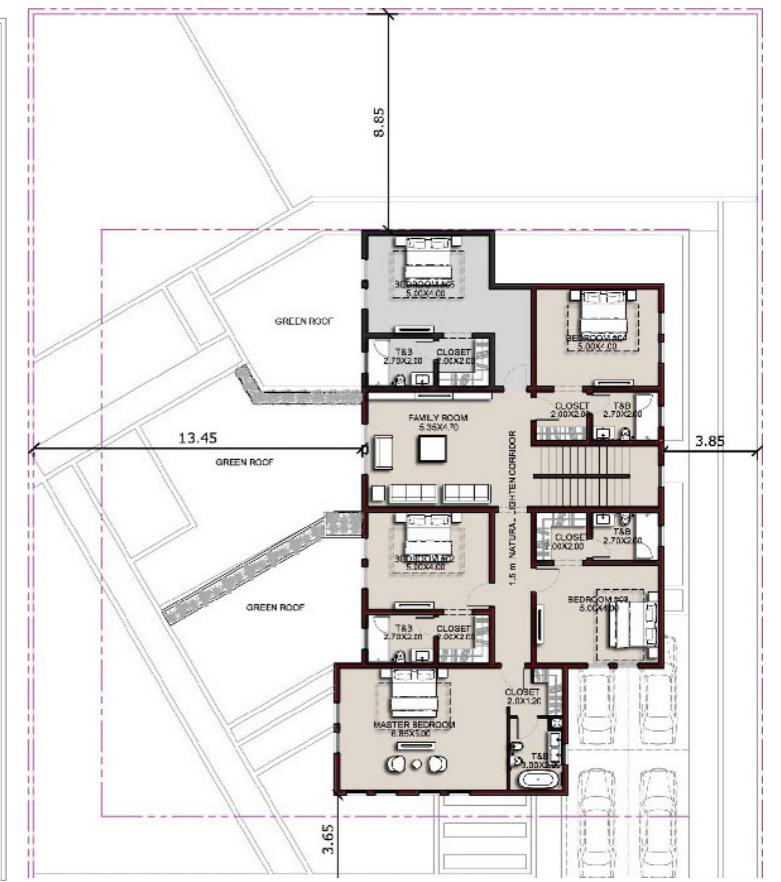
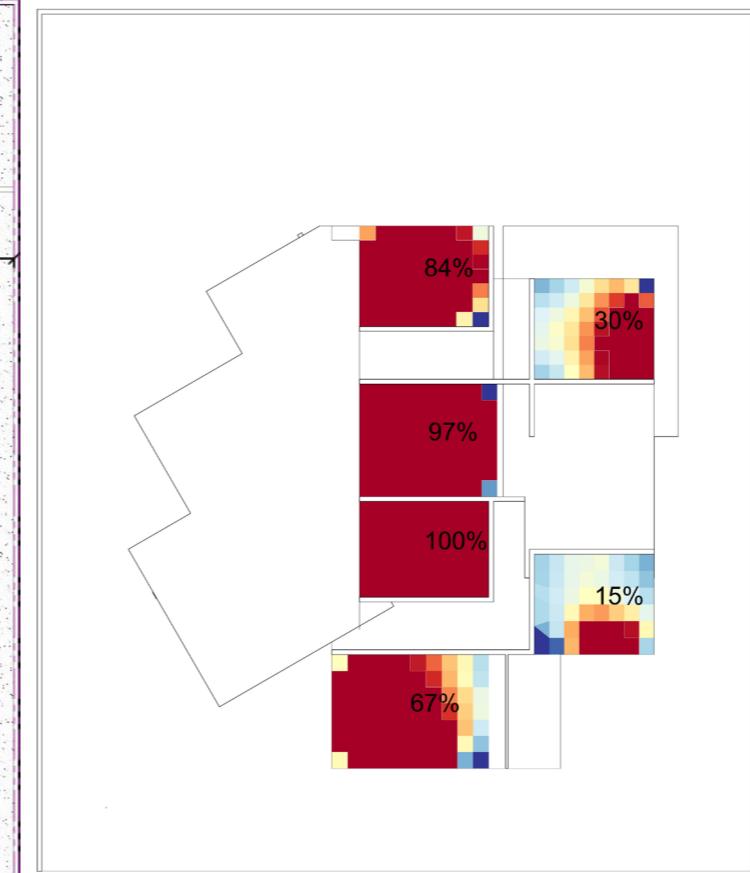
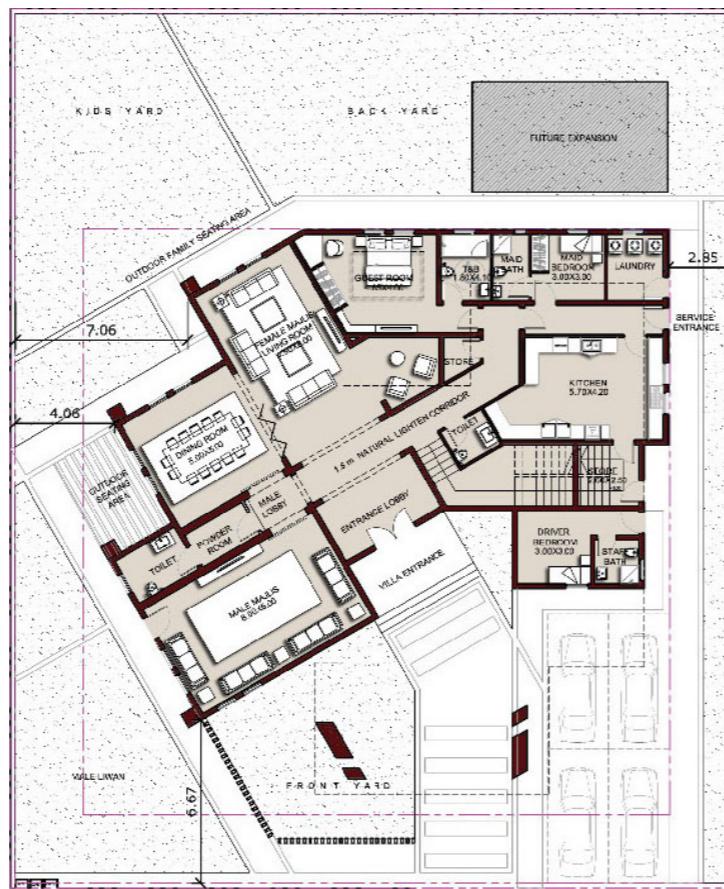
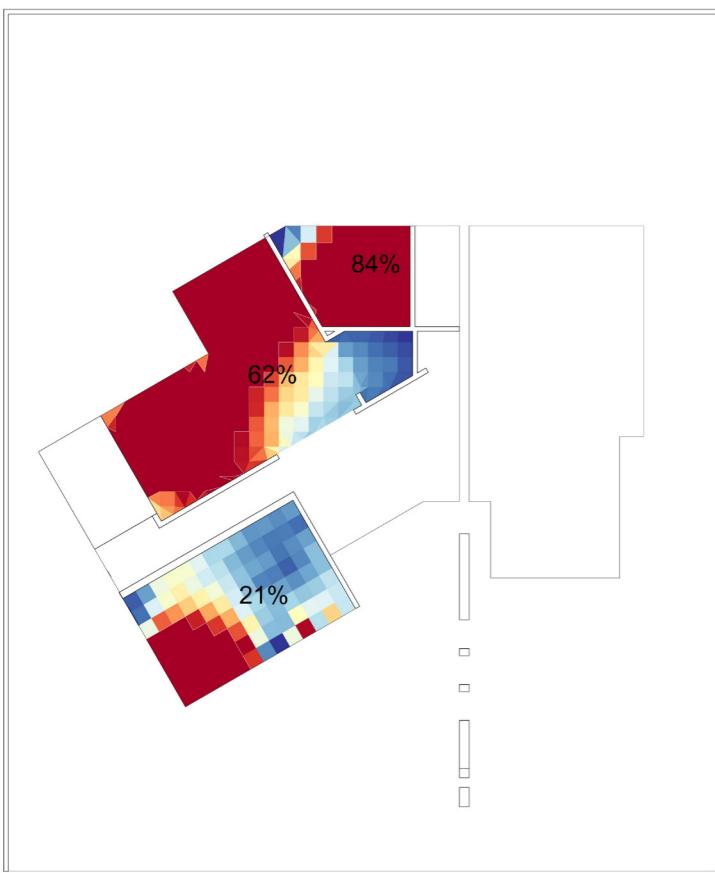
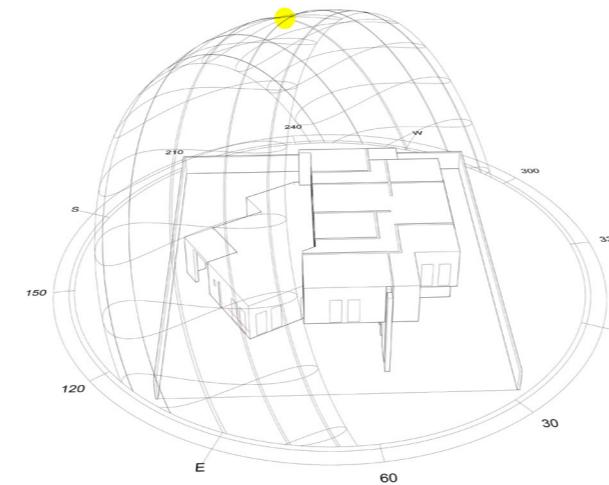
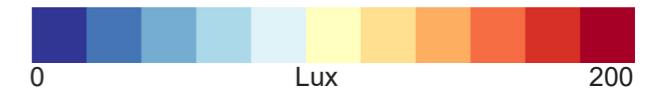
Illuminance @ 12 pm on Equinox

Orientation 113 Degrees Clockwise from North



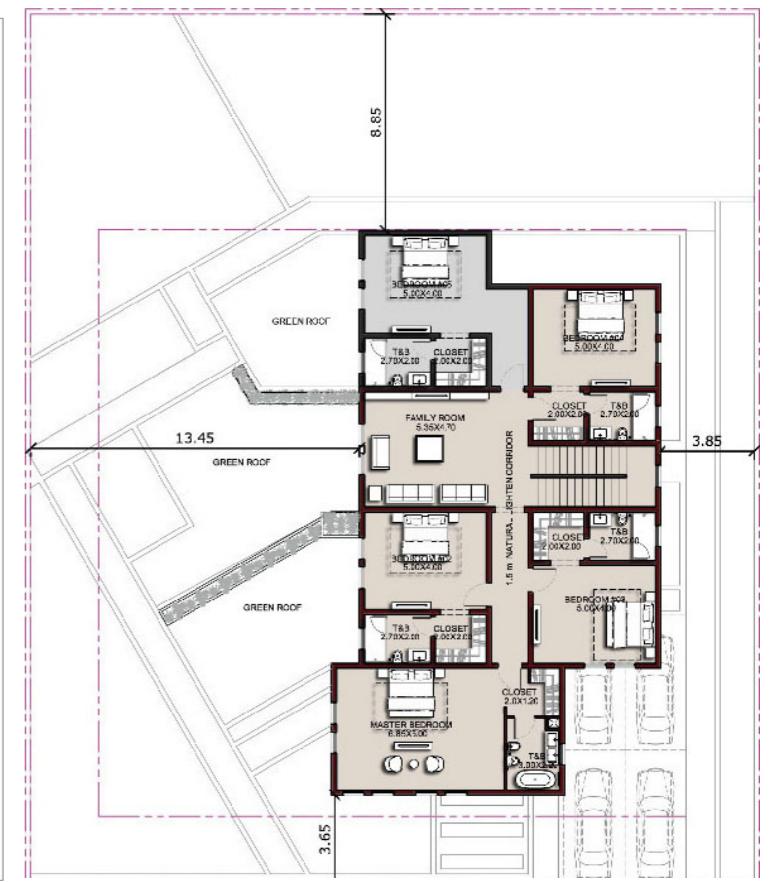
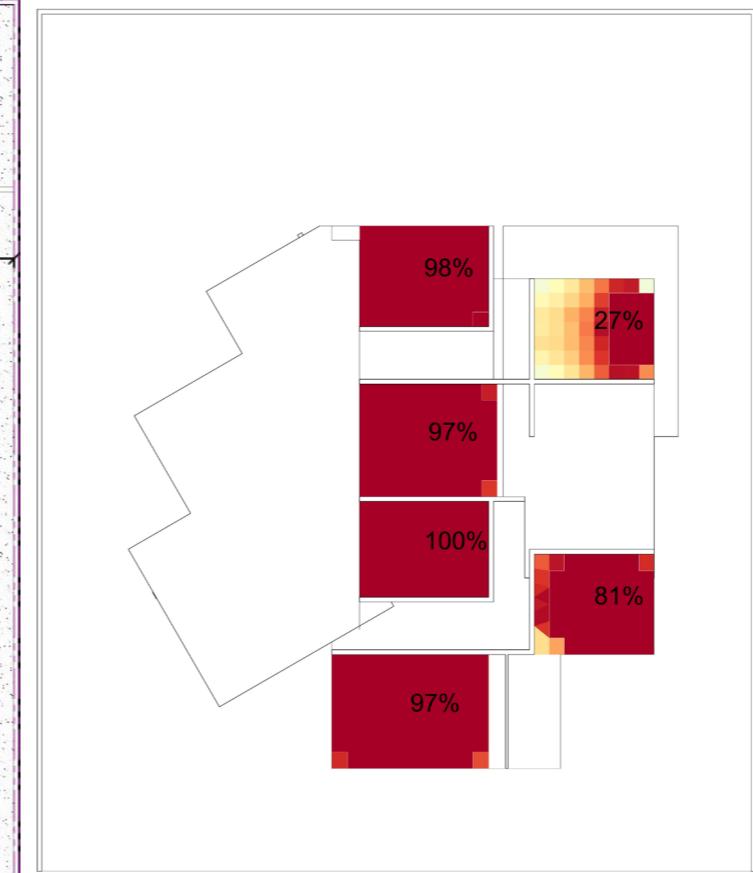
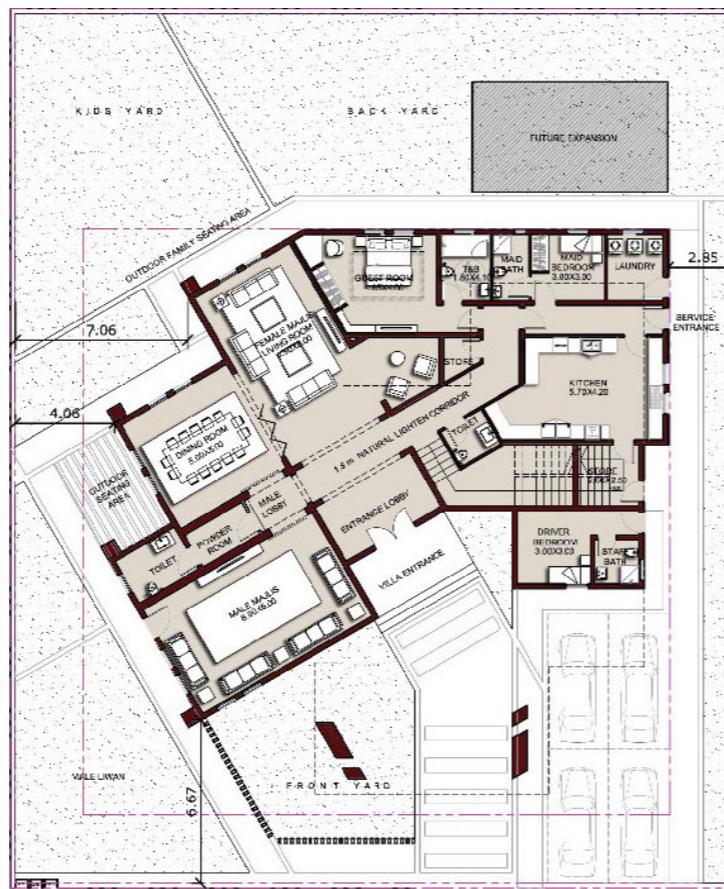
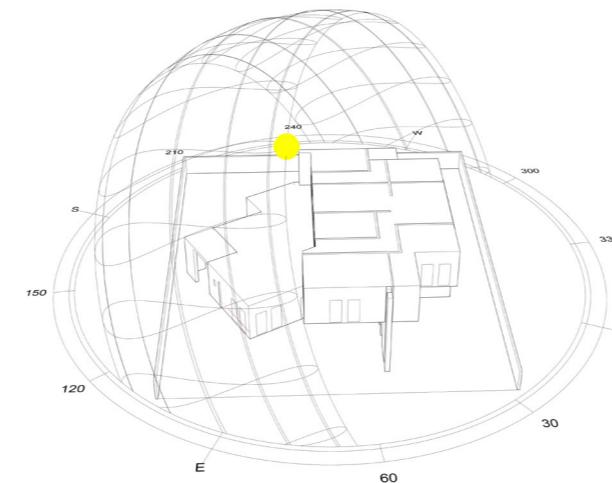
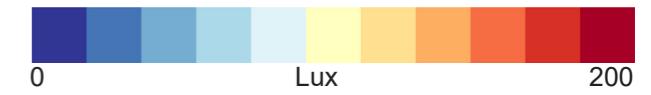
Illuminance @ 2 pm on Equinox

Orientation 113 Degrees Clockwise from North



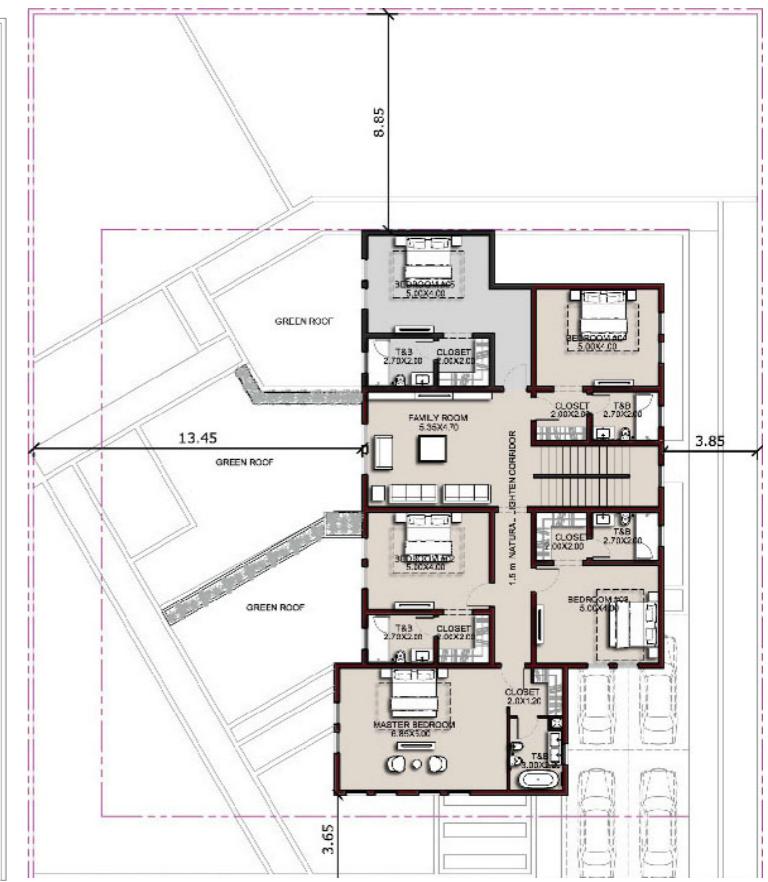
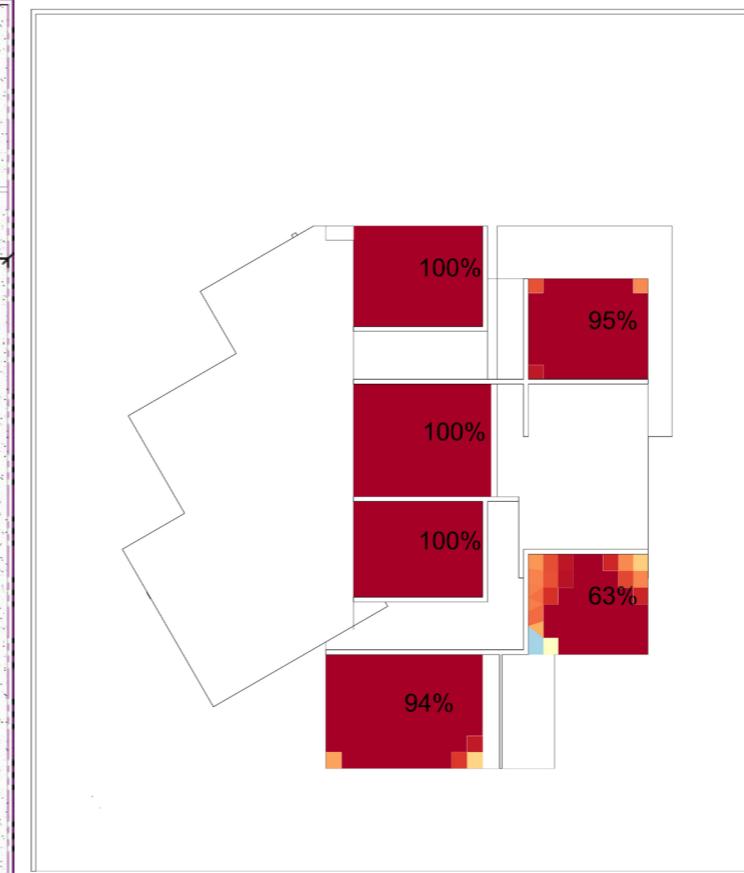
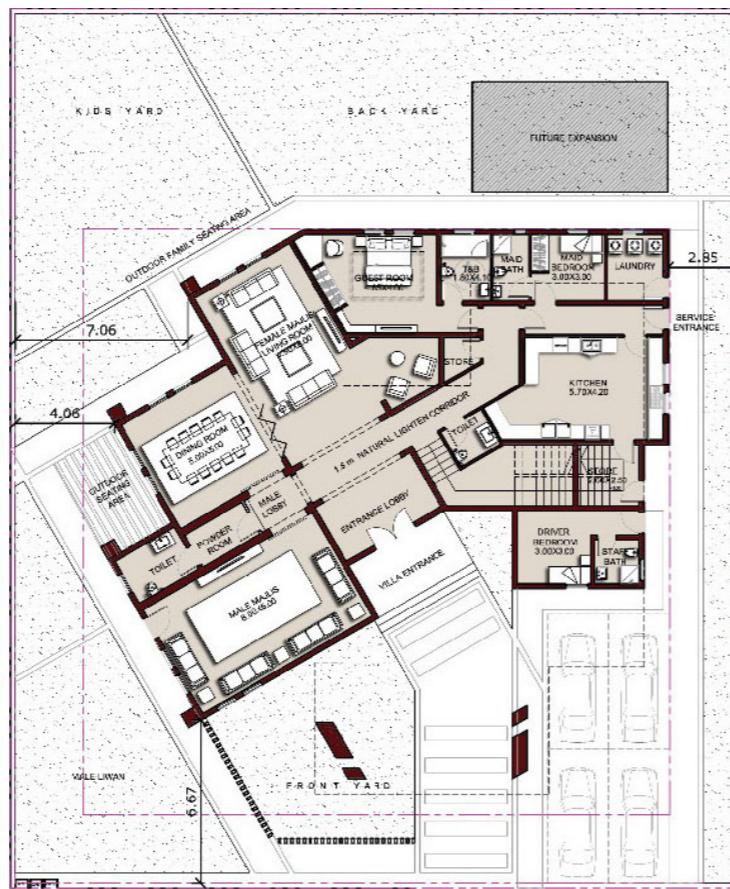
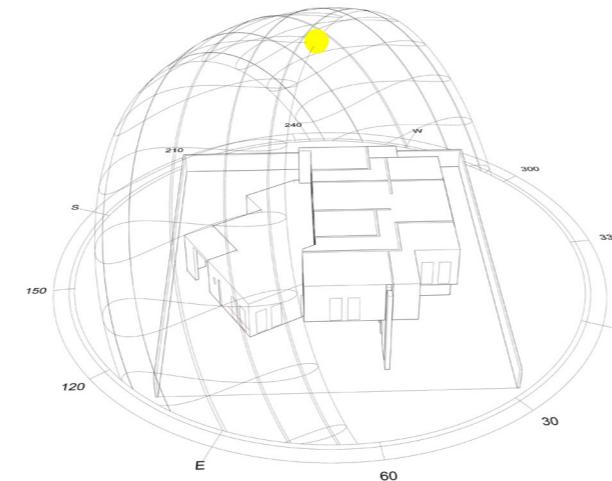
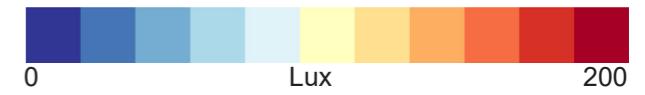
Illuminance @ 10 am on Summer Solstice

Orientation 113 Degrees Clockwise from North



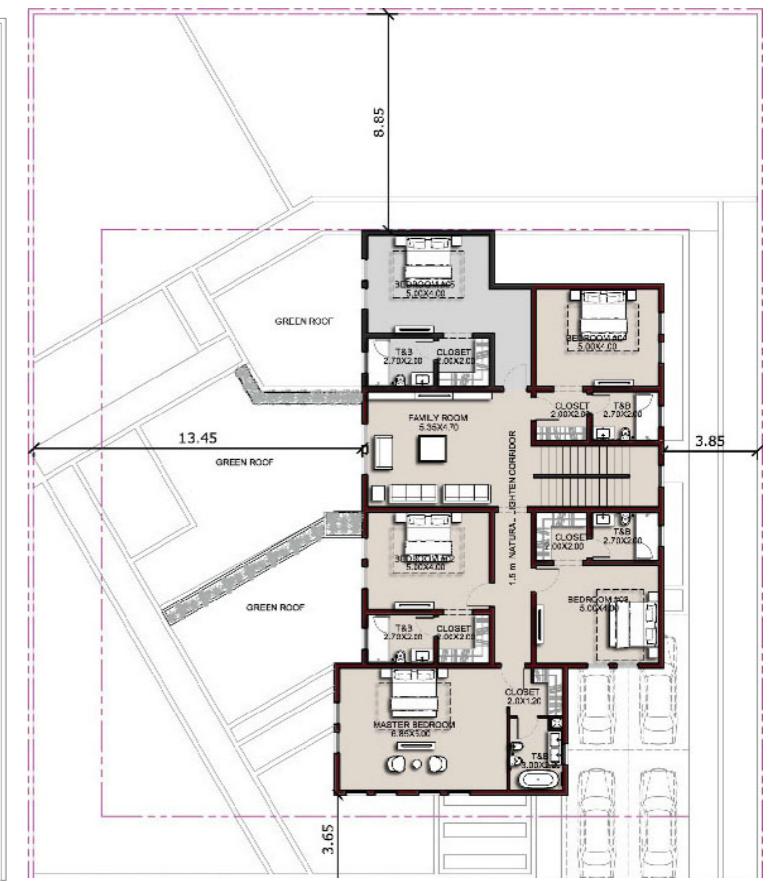
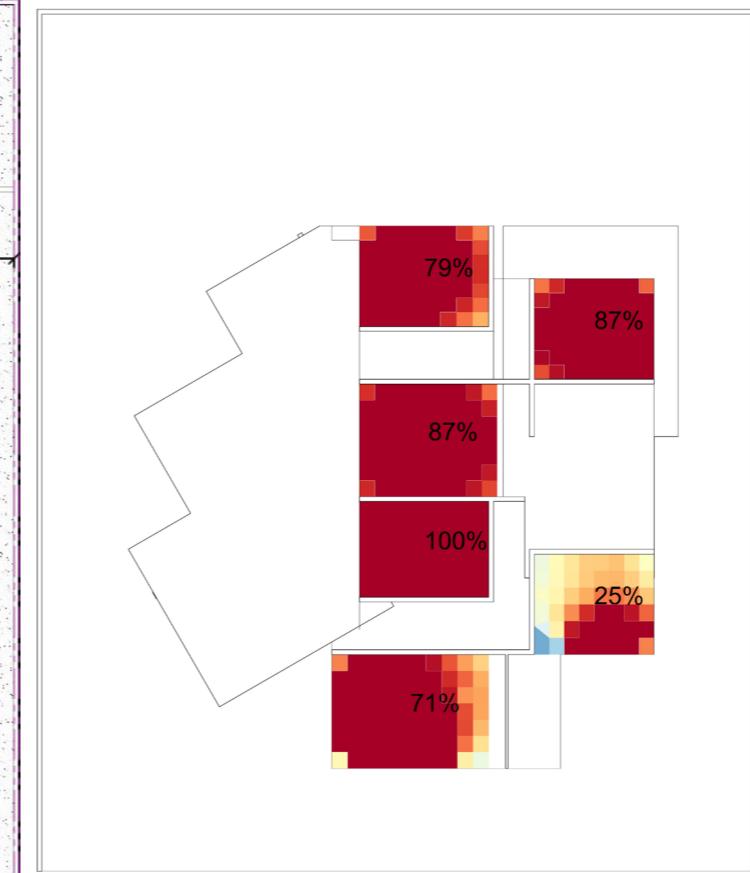
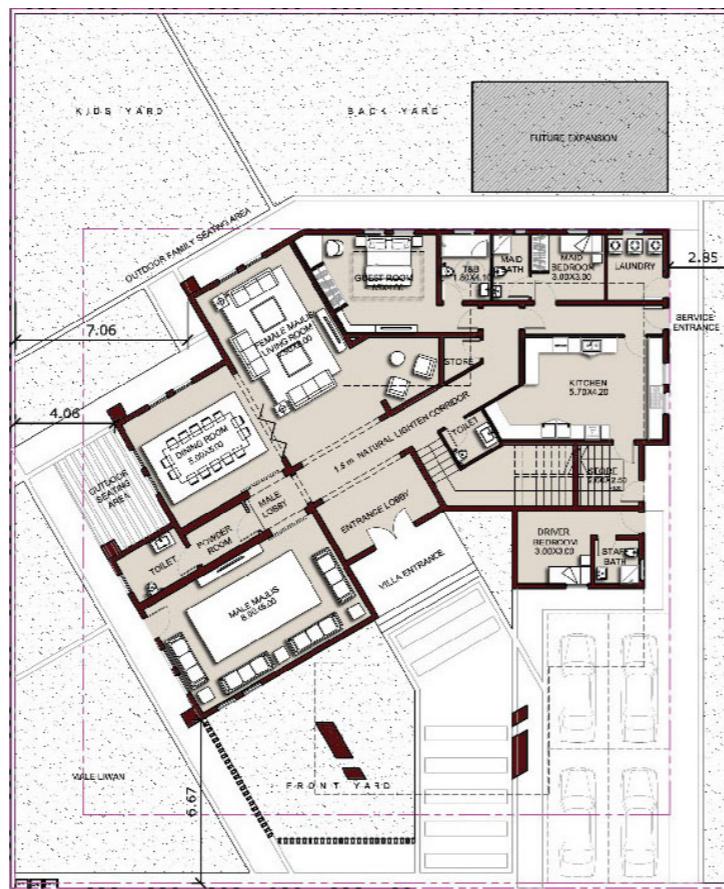
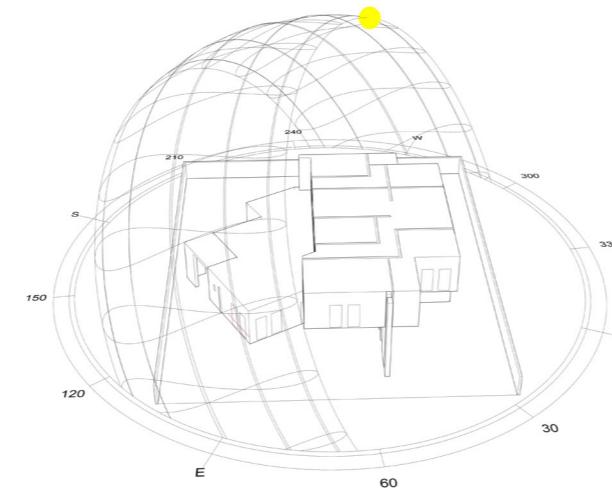
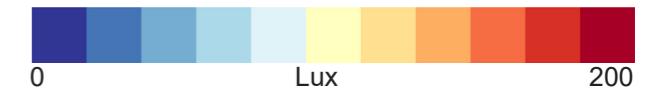
Illuminance @ 12 pm on Summer Solstice

Orientation 113 Degrees Clockwise from North



Illuminance @ 2 pm on Summer Solstice

Orientation 113 Degrees Clockwise from North



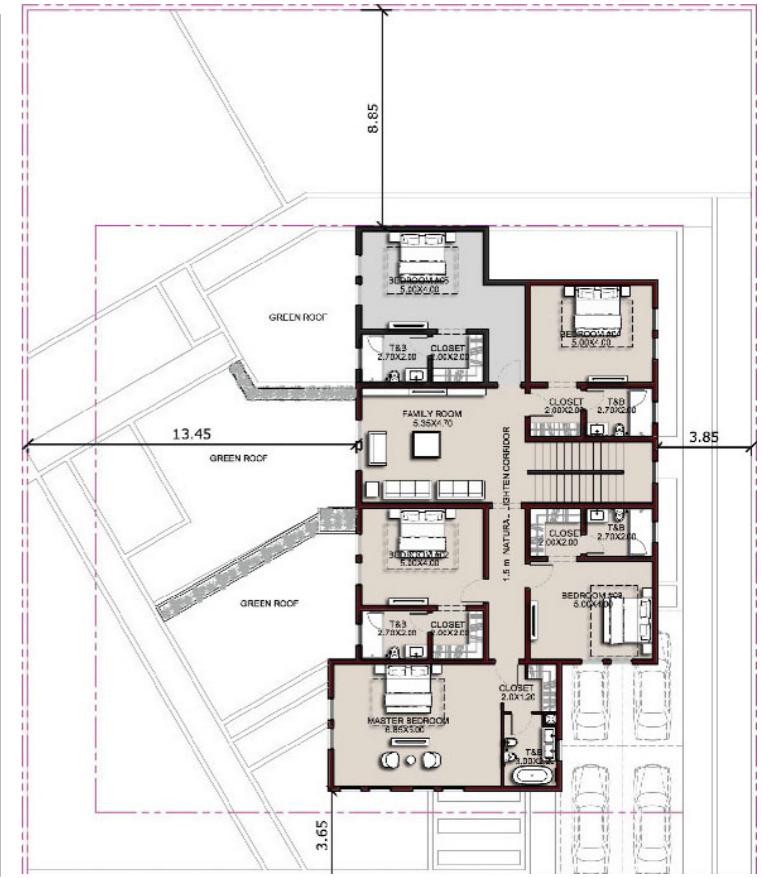
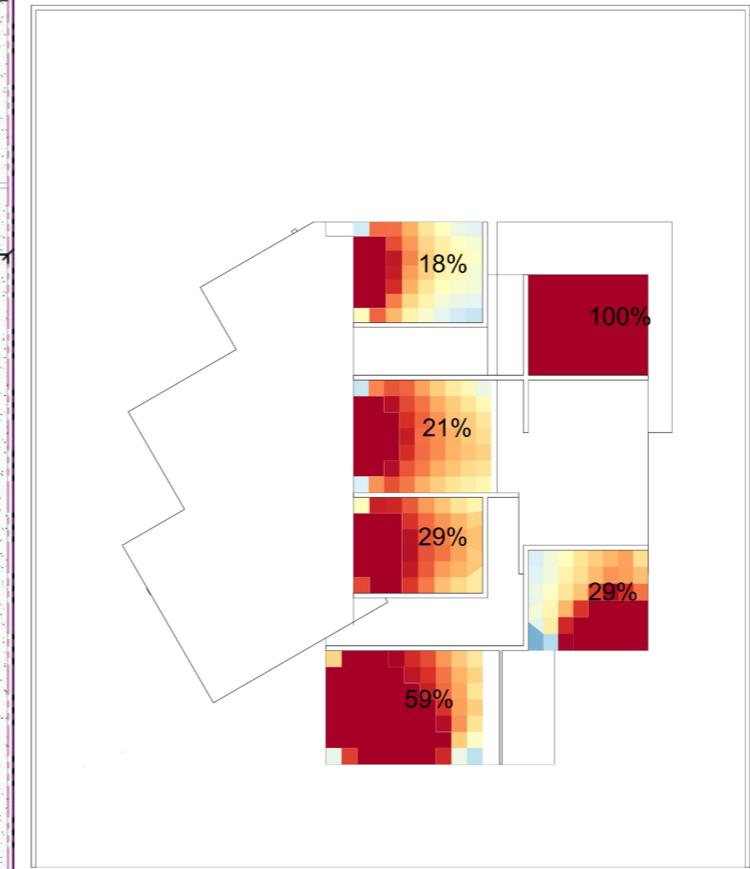
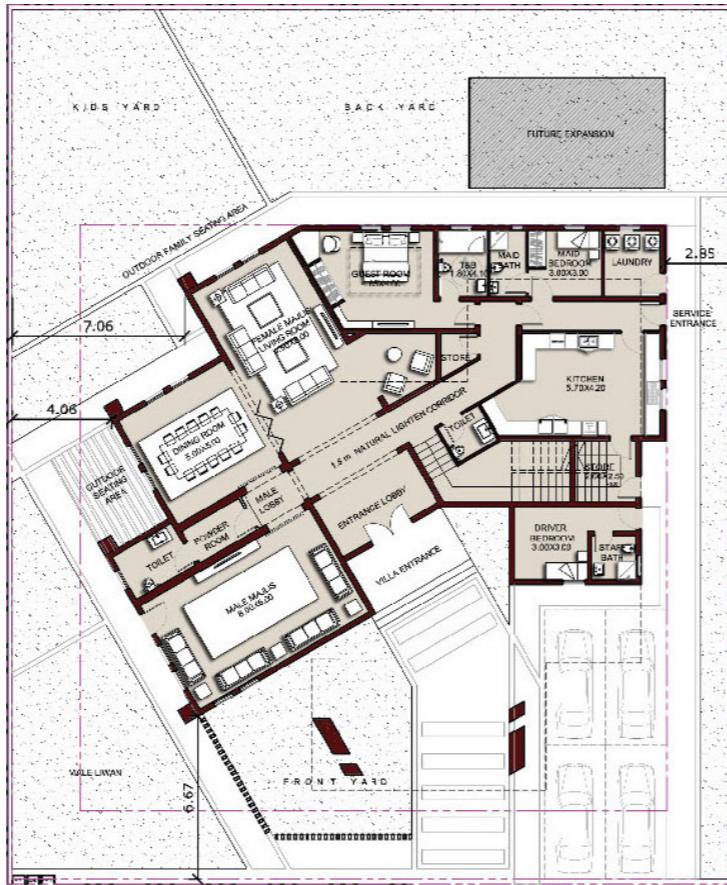
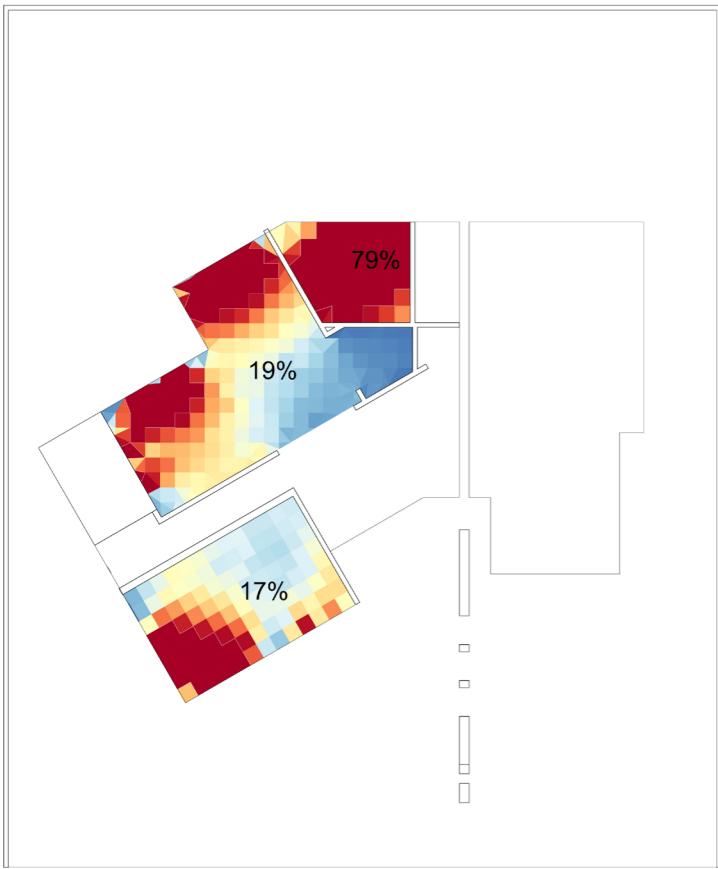
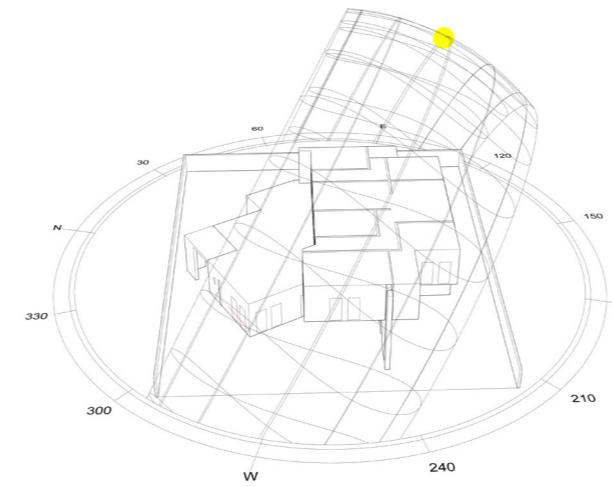
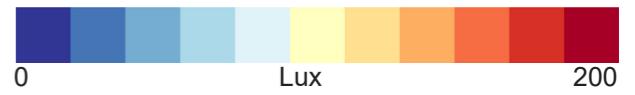
Result for the best Orientation 113 Degree Clockwise from North

Overall, **60%** of the regularly occupied area achieves minimum 200 lux on equinox and summer solstice days.

Floor	Space	Area (m2)	Compliance at Equinox 10 a.m.		Compliance at Equinox 12 p.m.		Compliance at Equinox 2 p.m.		Compliance at Summer Solstice 10 a.m.		Compliance at Summer Solstice 12 p.m.		Compliance at Summer Solstice 2 p.m.		
			%	Area (m2)	%	Area (m2)	%	Area (m2)	%	Area (m2)	%	Area (m2)	%	Area (m2)	
Ground	Male Majlis	43.01	79%	33.9779	37%	15.9137	21%	9.0321	83%	35.6983	63%	27.0963	23%	9.8923	
	Dining + Female Majlis	70.17	27%	18.9459	36%	25.2612	62%	43.5054	19%	13.3323	39%	27.3663	26%	18.2442	
	Guest Room	20.38	20.00%	4.076	31.00%	6.3178	84.00%	17.1192	20.00%	4.076	49.00%	9.9862	49.00%	9.9862	
First	Master Bedroom	31.11	99.00%	30.7989	84.00%	26.1324	67.00%	20.8437	97.00%	30.1767	94.00%	29.2434	71.00%	22.0881	
	Bedroom 3	21	3.00%	0.63	17.00%	3.57	15.00%	3.15	81.00%	17.01	63.00%	13.23	25.00%	5.25	
	Bedroom 2	21.6	100.00%	21.6	100.00%	21.6	100.00%	21.6	100.00%	21.6	100.00%	21.6	100.00%	21.6	
	Family Room	27.02	100.00%	27.02	100.00%	27.02	97.00%	26.2094	97.00%	26.2094	100.00%	27.02	87.00%	23.5074	
	Bedroom 4	21	14.00%	2.94	25.00%	5.25	30.00%	6.3	27.00%	5.67	95.00%	19.95	87.00%	18.27	
	Bedroom 5	22.68	100.00%	22.68	100.00%	22.68	84.00%	19.0512	97.00%	21.9996	100.00%	22.68	79.00%	17.9172	
	Total Floor	277.97		162.6687		153.7451		166.811		175.7723		198.1722		146.7554	
Average Compliant Area (m2)		167.32078													
Percetange of Compliant Area (%)		60.19													

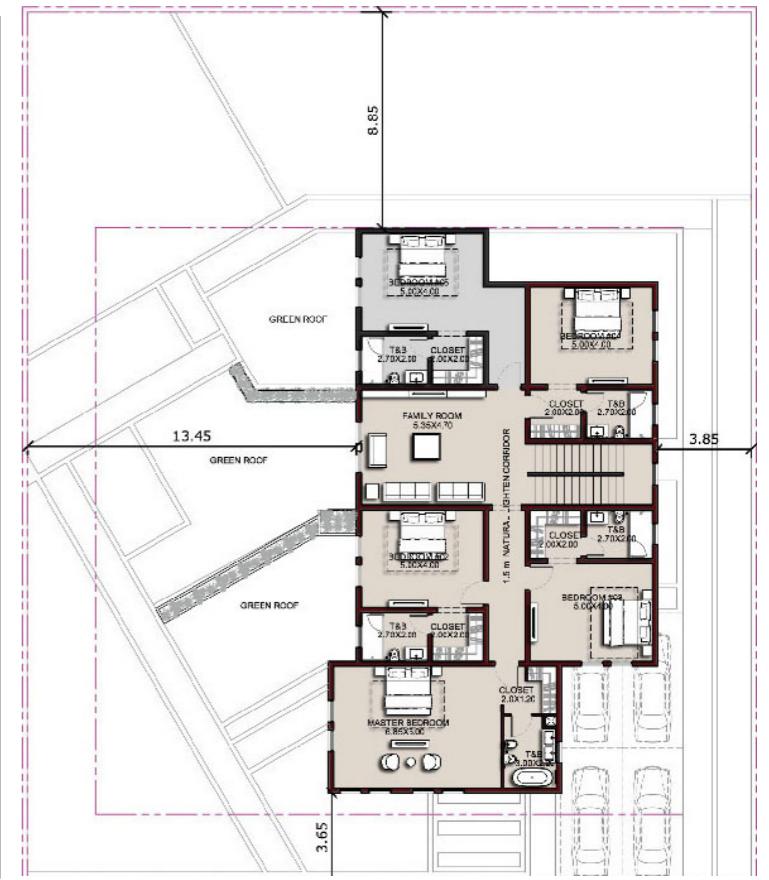
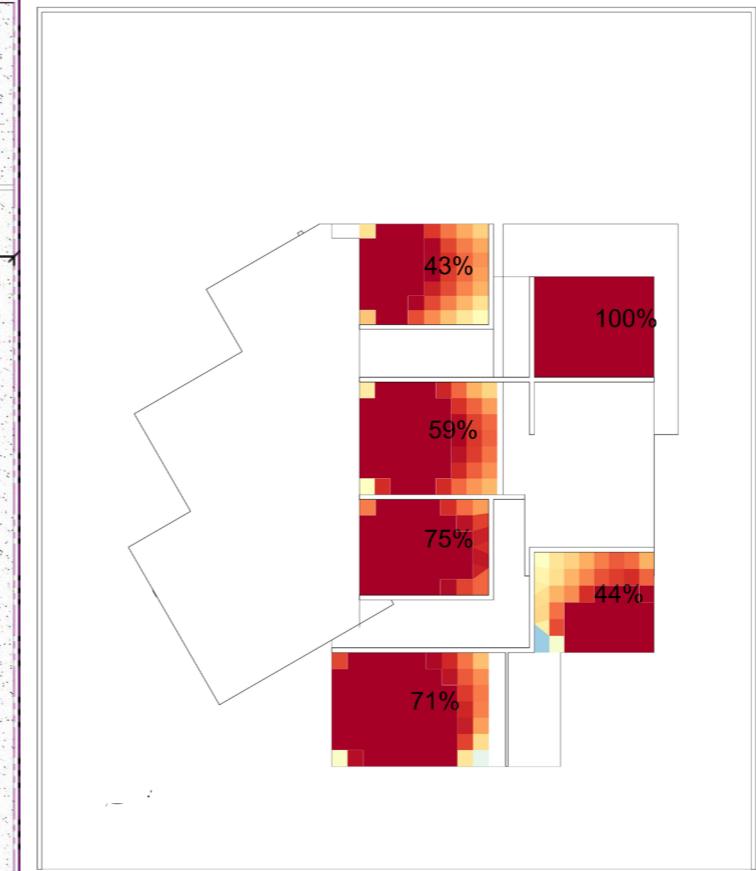
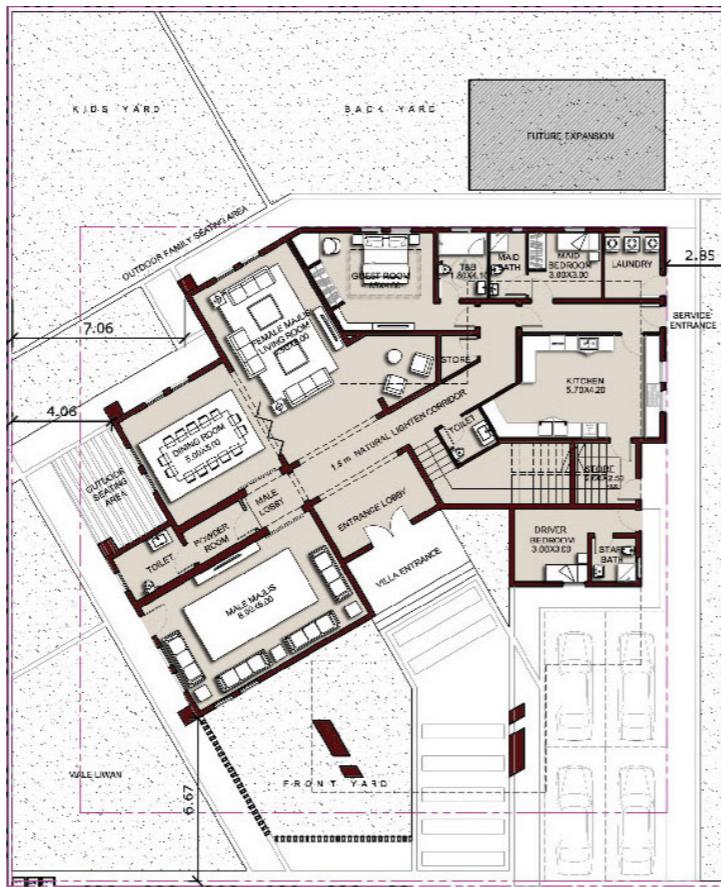
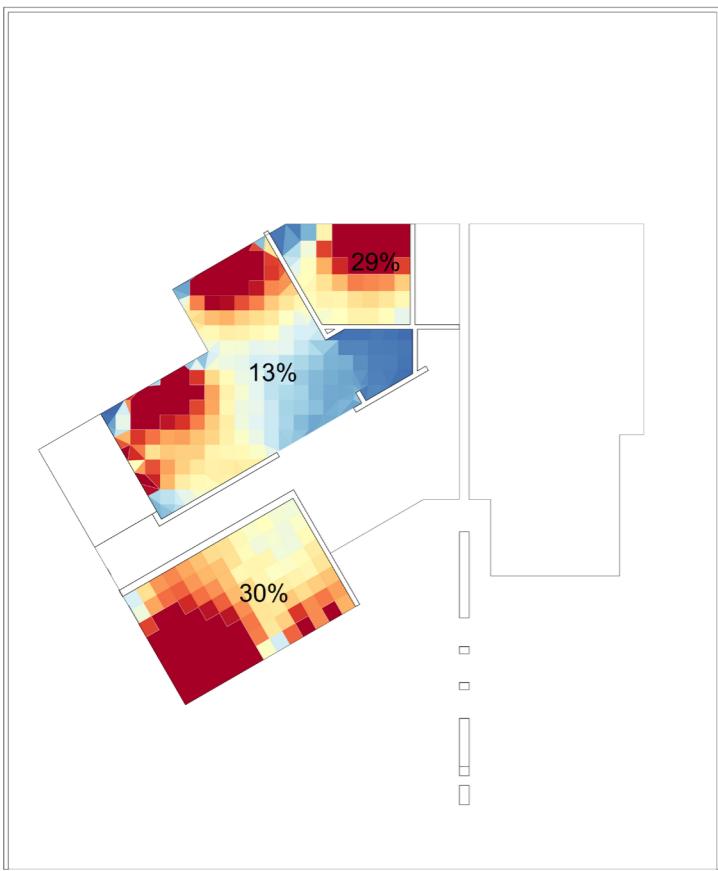
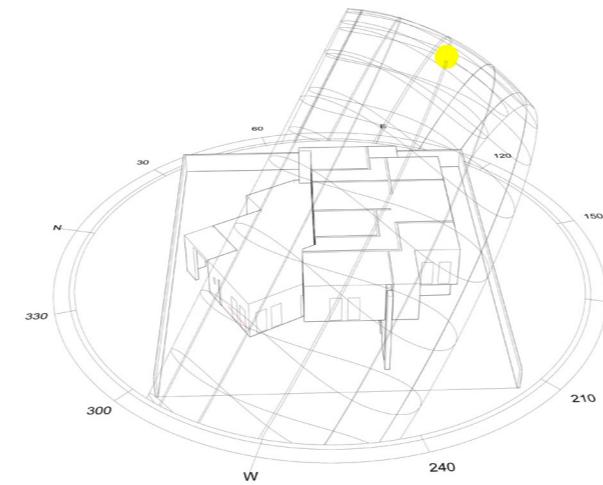
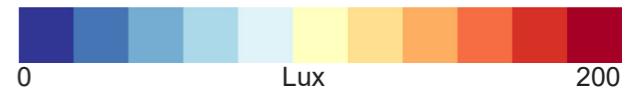
Illuminance @ 10 am on Equinox

Orientation 75 Degrees Anti-Clockwise from North



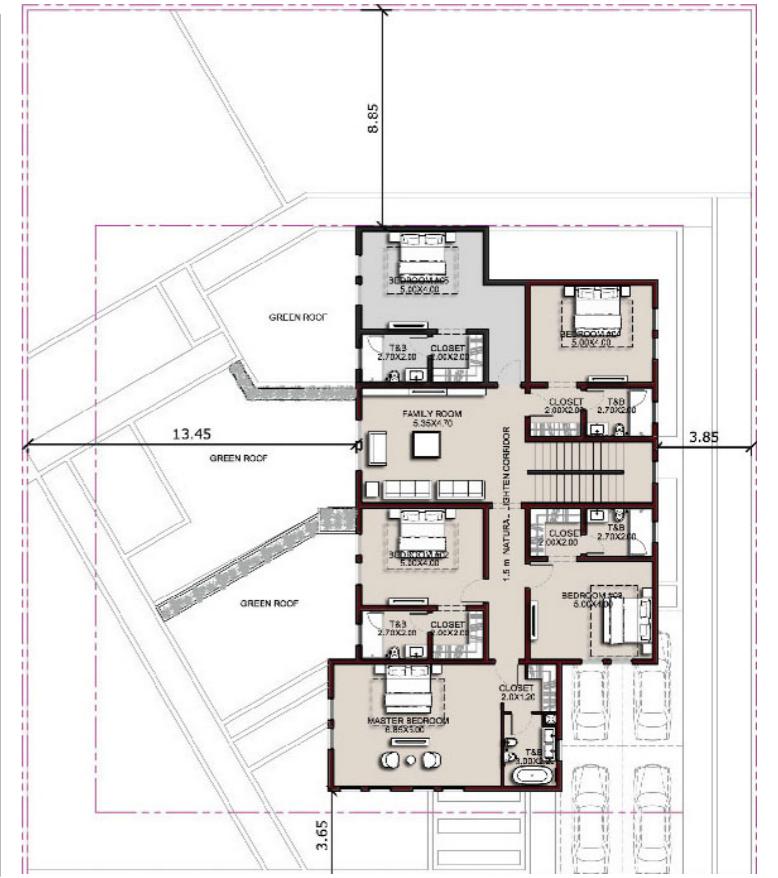
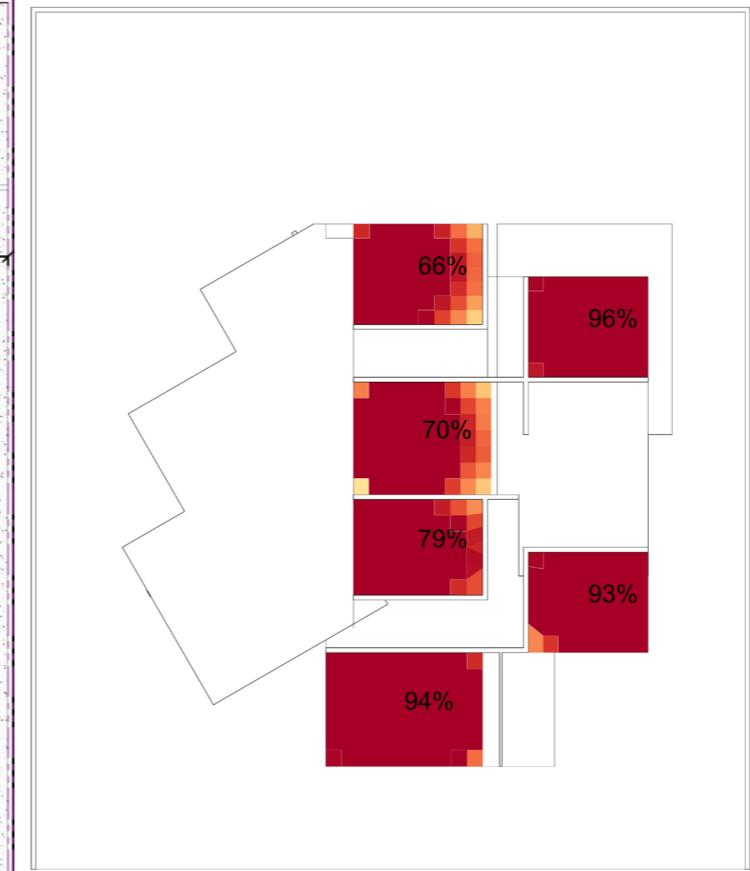
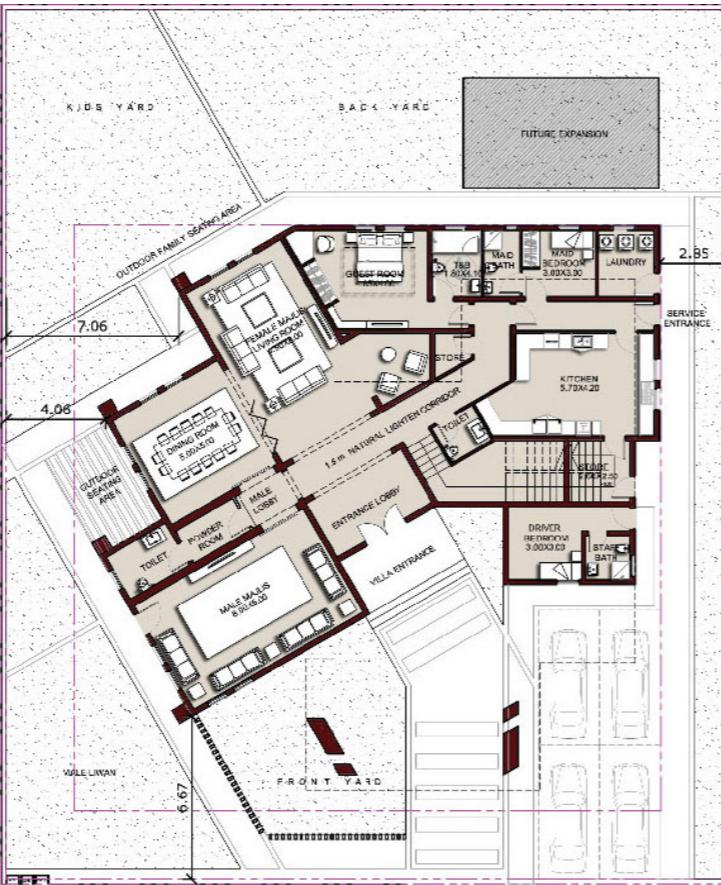
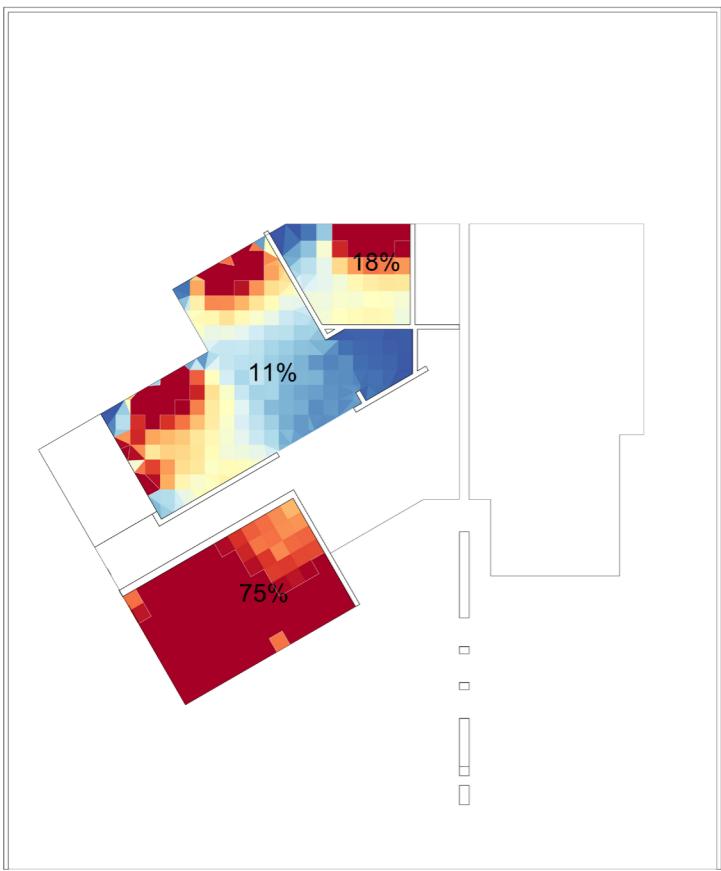
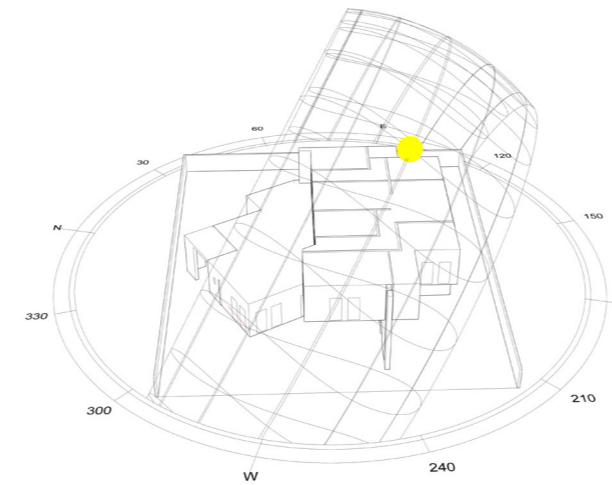
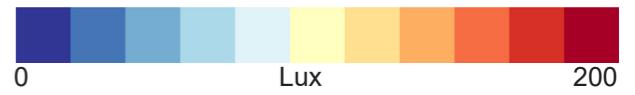
Illuminance @ 12 pm on Equinox

Orientation 75 Degrees Anti-Clockwise from North



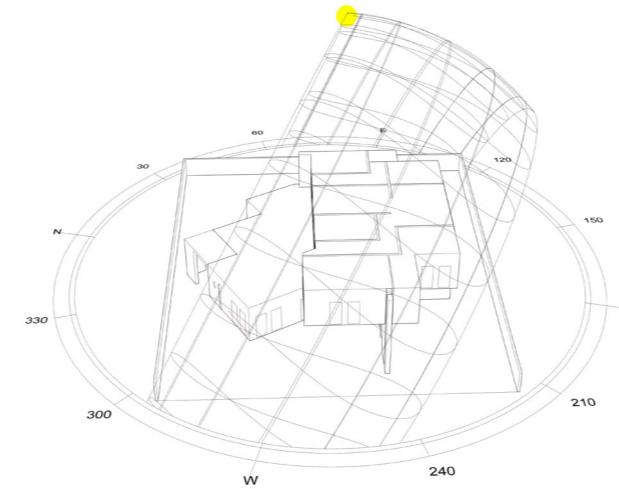
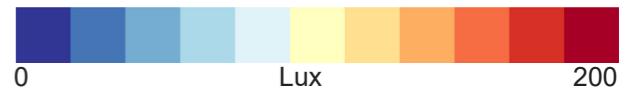
Illuminance @ 2 pm on Equinox

Orientation 75 Degrees Anti-Clockwise from North



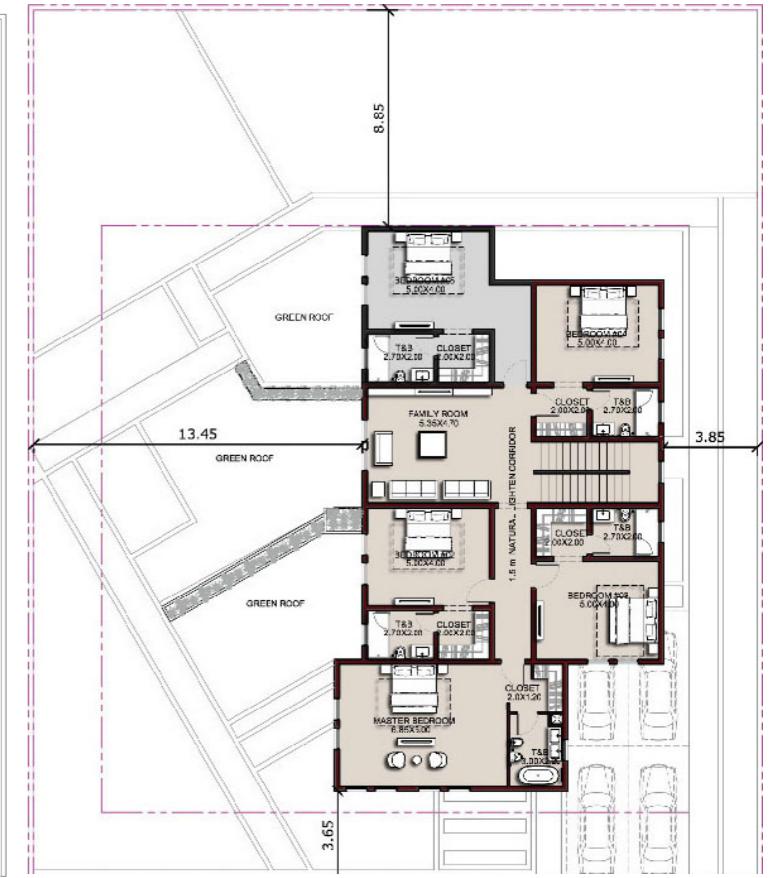
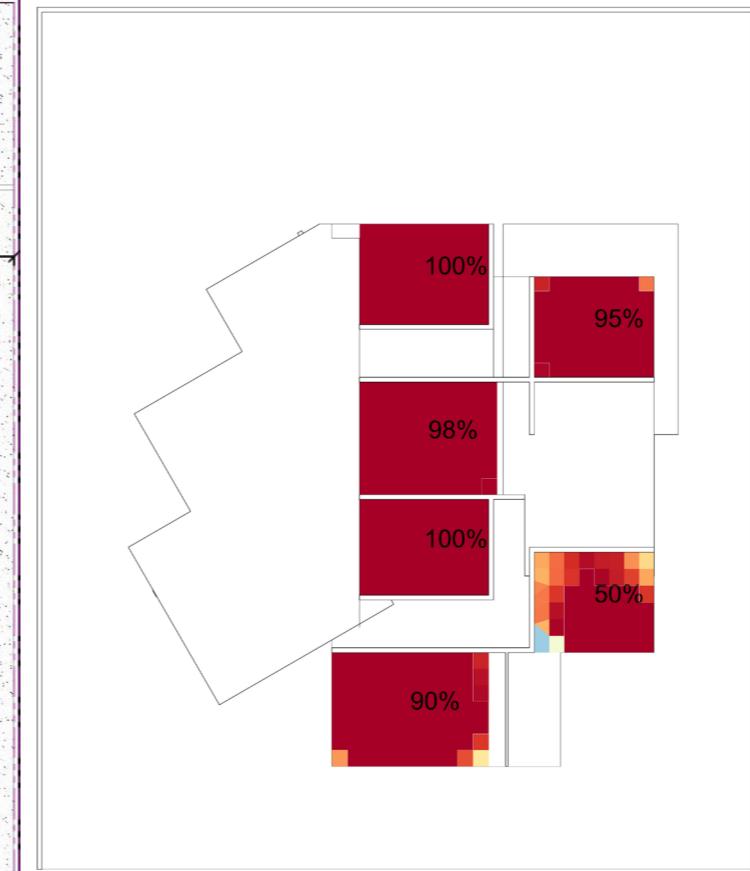
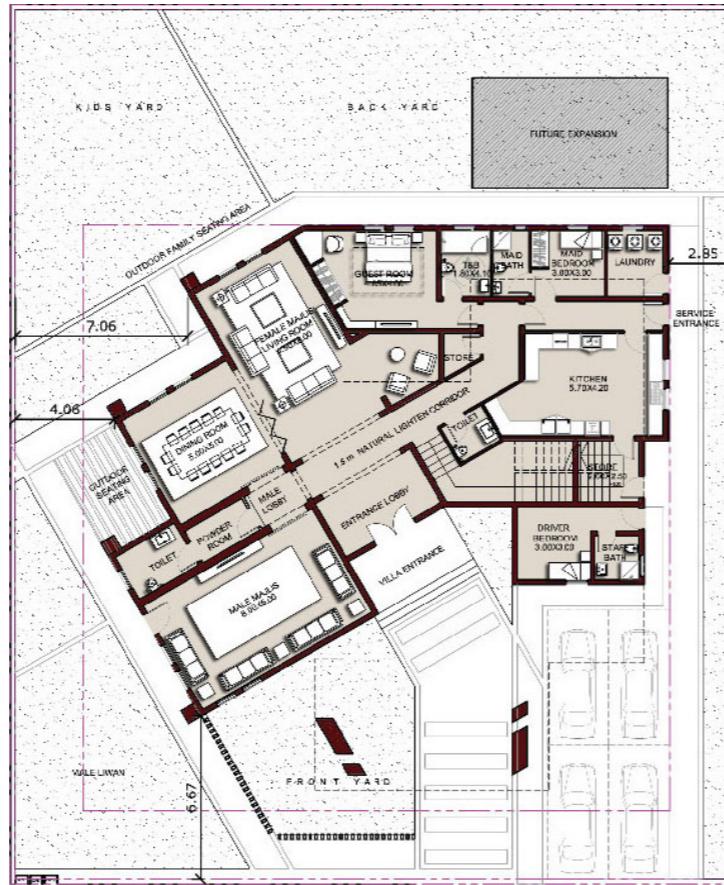
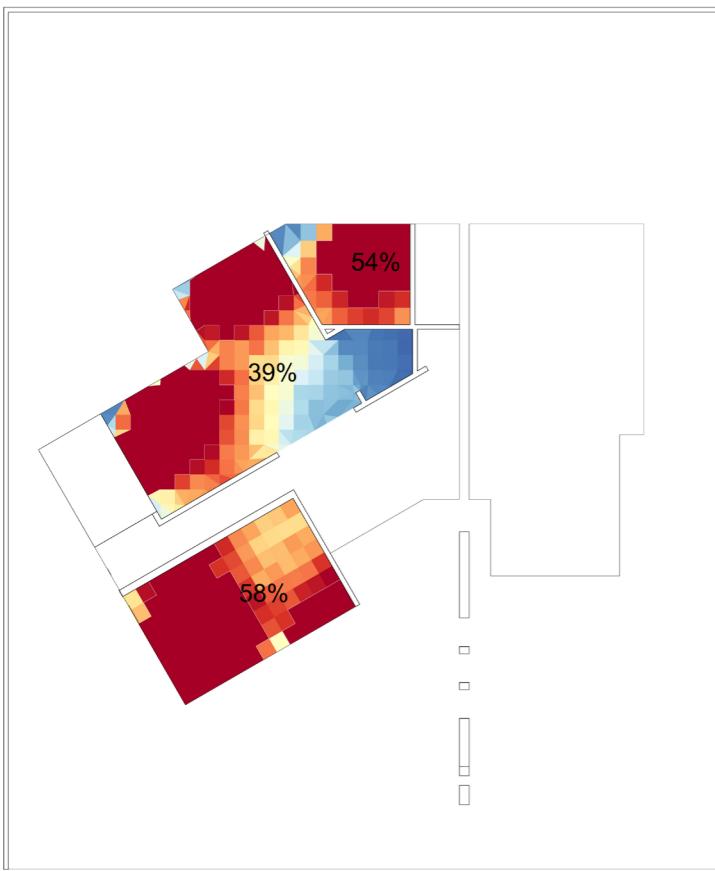
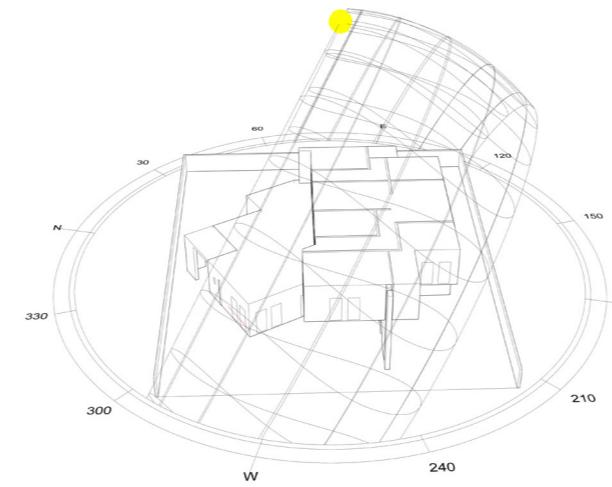
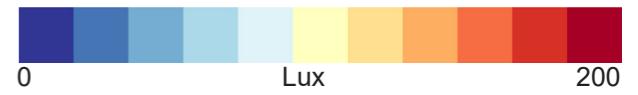
Illuminance @ 10 am on Summer Solstice

Orientation 75 Degrees Anti-Clockwise from North



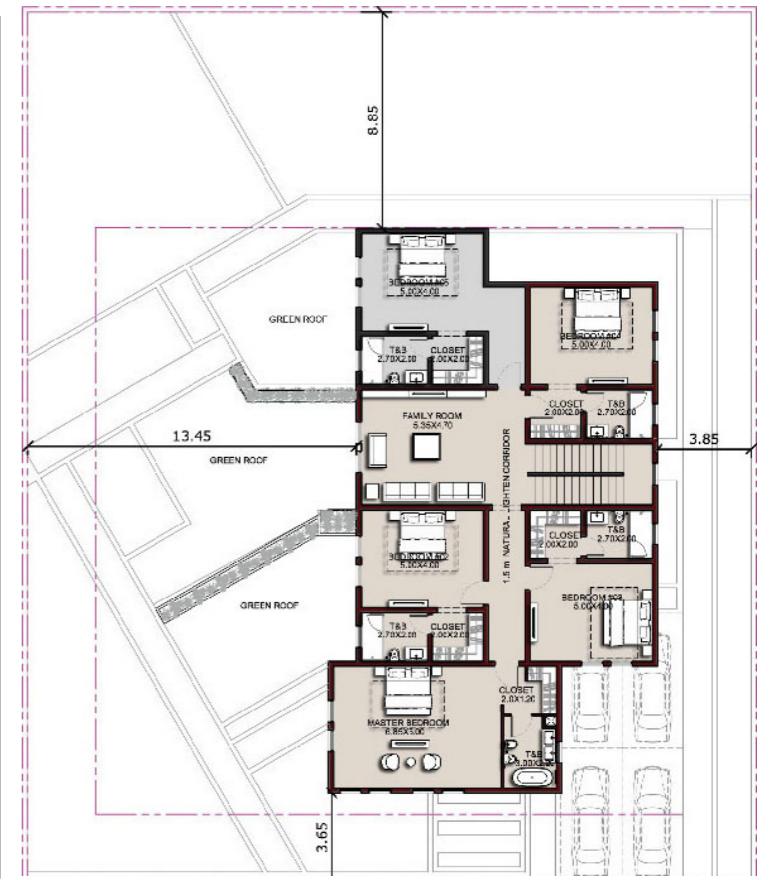
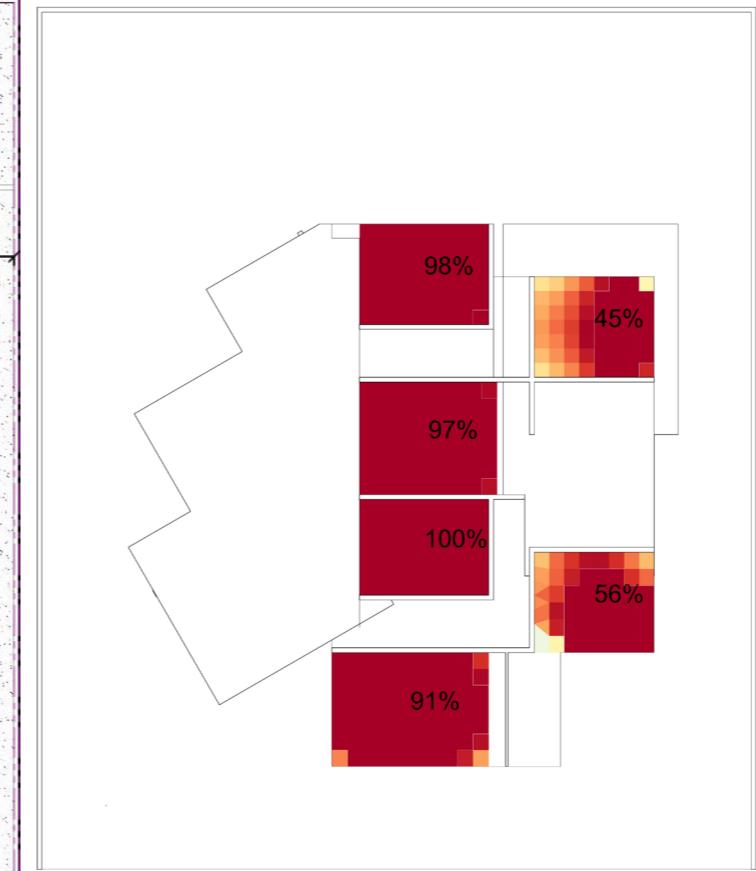
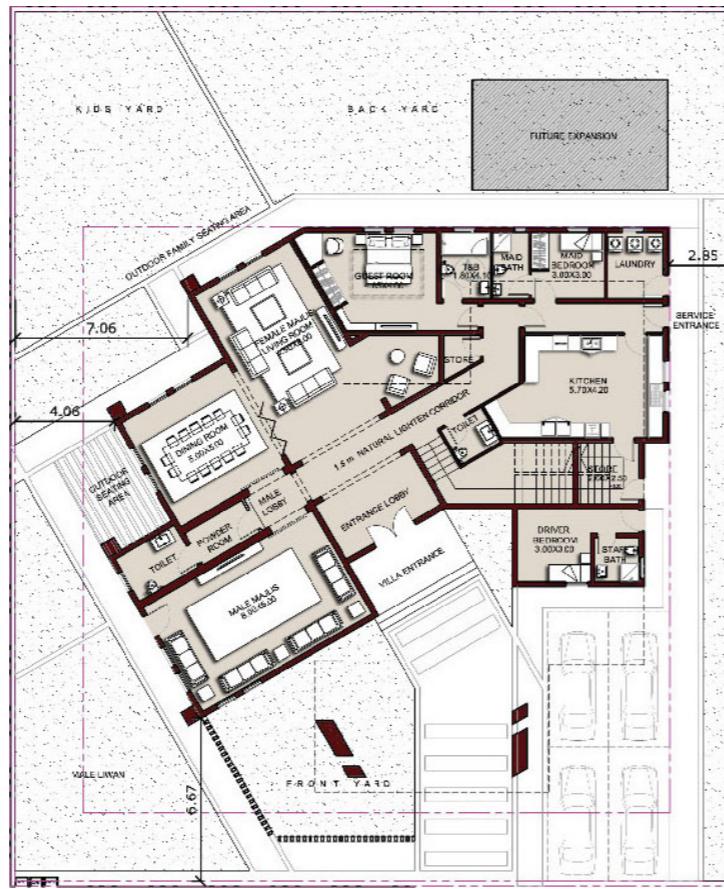
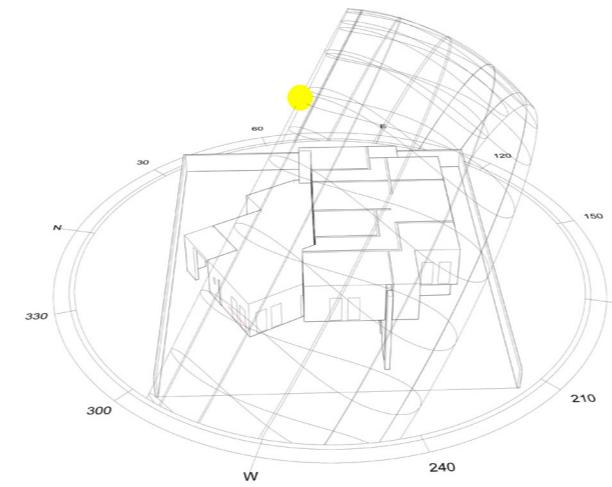
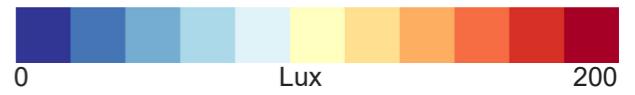
Illuminance @ 12 pm on Summer Solstice

Orientation 75 Degrees Anti-Clockwise from North



Illuminance @ 2 pm on Summer Solstice

Orientation 75 Degrees Anti-Clockwise from North



Result for the Worst Orientation 75 Degree Anti-Clockwise from North

Overall, **53.45%** of the regularly occupied area achieves minimum 200 lux on equinox and summer solstice days. Therefore any orientation other than this orientation is expected to perform better in compliance with the estidama daylight criteria.

Floor	Space	Area (m2)	Compliance at Equinox 10 a.m.		Compliance at Equinox 12 p.m.		Compliance at Equinox 2 p.m.		Compliance at Summer Solstice 10 a.m.		Compliance at Summer Solstice 12 p.m.		Compliance at Summer Solstice 2 p.m.		
			%	Area (m2)	%	Area (m2)	%	Area (m2)	%	Area (m2)	%	Area (m2)	%	Area (m2)	
Ground	Male Majlis	43.01	17%	7.3117	30%	12.903	75%	32.2575	21%	9.0321	58%	24.9458	60%	25.806	
	Dining + Female Majlis	70.17	19%	13.3323	13%	9.1221	11%	7.7187	43%	30.1731	39%	27.3663	19%	13.3323	
	Guest Room	20.38	79.00%	16.1002	29.00%	5.9102	18.00%	3.6684	84.00%	17.1192	54.00%	11.0052	20.00%	4.076	
First	Master Bedroom	31.11	59.00%	18.3549	71.00%	22.0881	94.00%	29.2434	63.00%	19.5993	90.00%	27.999	91.00%	28.3101	
	Bedroom 3	21	29.00%	6.09	44.00%	9.24	93.00%	19.53	17.00%	3.57	50.00%	10.5	56.00%	11.76	
	Bedroom 2	21.6	29.00%	6.264	75.00%	16.2	79.00%	17.064	98.00%	21.168	100.00%	21.6	100.00%	21.6	
	Family Room	27.02	21.00%	5.6742	59.00%	15.9418	70.00%	18.914	86.00%	23.2372	98.00%	26.4796	97.00%	26.2094	
	Bedroom 4	21	100.00%	21	100.00%	21	96.00%	20.16	64.00%	13.44	95.00%	19.95	45.00%	9.45	
	Bedroom 5	22.68	18.00%	4.0824	43.00%	9.7524	66.00%	14.9688	66.00%	14.9688	100.00%	22.68	98.00%	22.2264	
	Total Floor	277.97		98.2097		122.1576		163.5248		152.3077		192.5259		162.7702	
Average Compliant Area (m2)		148.58265													
Percetange of Compliant Area (%)		53.45													