

Maximizing Thermal and Visual Comfort of an Unconditioned Space

Visual Comfort for Improved Case

Daylight

According to the point in time Daylight Analysis, the apartment gets lux levels between 100-500 on 21st March, 21st June and 21st December at 9am , 12 noon and 3pm.

The Daylight Autonomy is 90% for the whole apartment with a minimum threshold level of 150 lux.

Glare

The intolerable and disturbing glare conditions in the hall and bedroom have been solved by design of appropriate shading devices and the new glare analysis depicts imperceptible glare for 21st March, 21st June and 21st December at 9am , 12 noon and 3pm.

Thermal Comfort for Improved Case

The Base Case showed a adaptive comfort of 16.31% which has increased to 39.73% by implementing different passive design strategies like :

Reduction in Window Wall Ratio

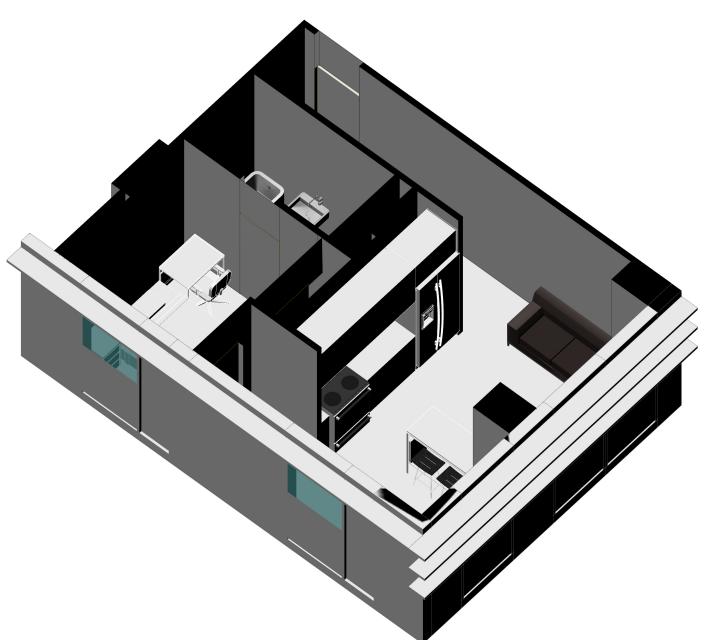
Increasing insulation value of materials used for construction of exterior walls and roof

Addition of shading devices on the exterior facades

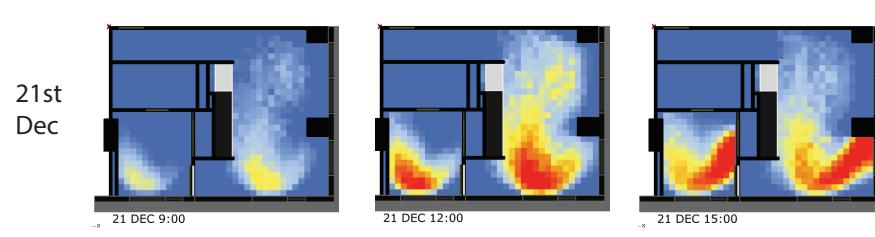
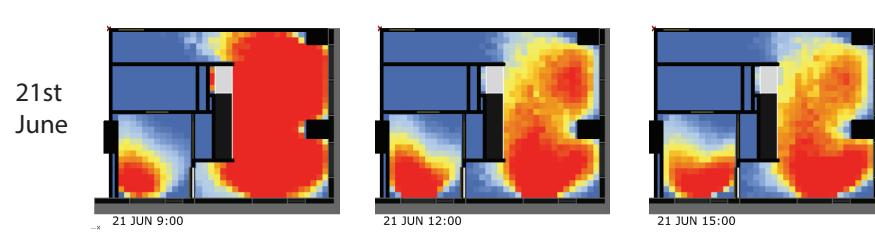
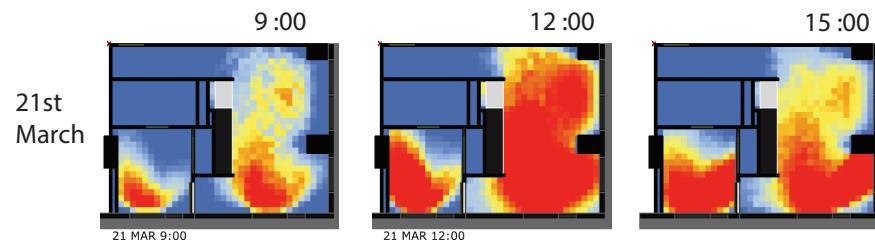
Addition to the thermal mass of the building by increasing thickness of floor slab

Making windows openable and therefore allowing ventilation

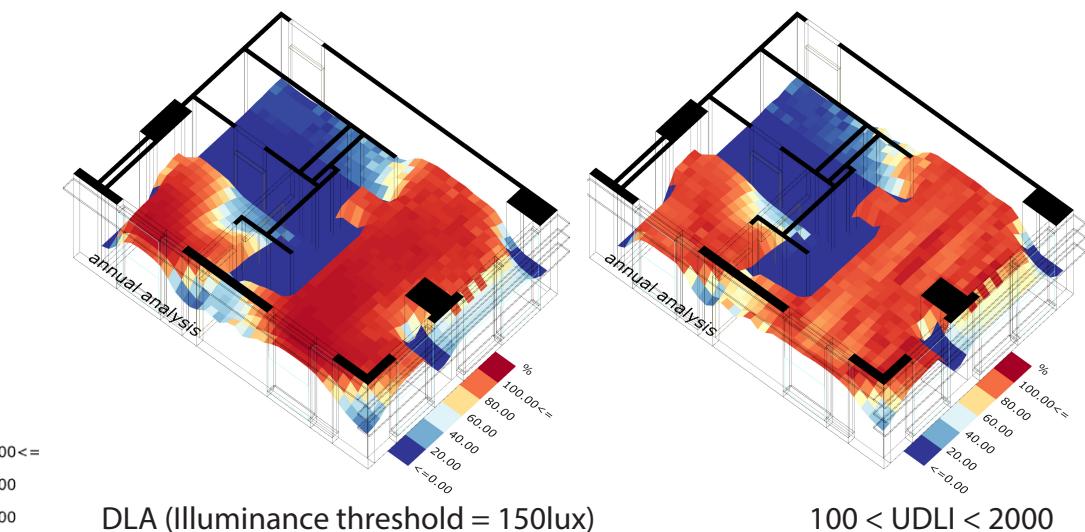
Improved Case



Point-in-time Grid Based Daylight Analysis

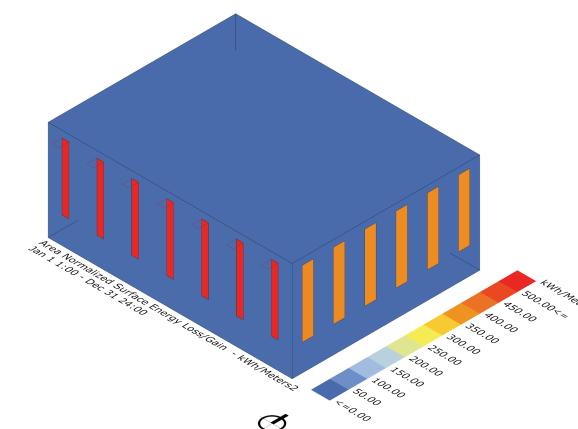
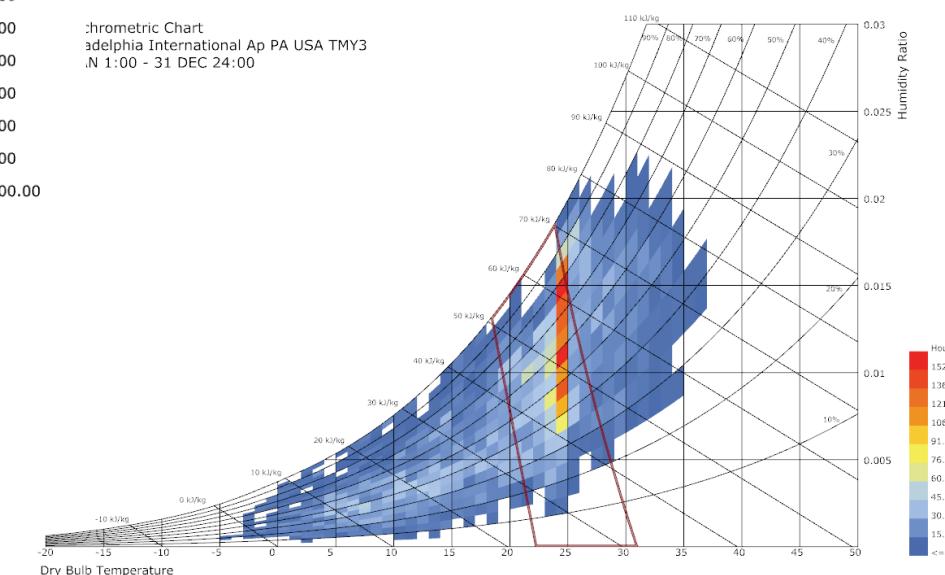


Annual Daylight Analysis



Thermal Comfort Charts

Chrometric Chart
Philadelphia International Ap PA USA TMY3
N 1:00 - 31 DEC 24:00



Design Specifications for Improved Case

Window Wall Ratio

North	0
West	0
South	.125
East	.24

Construction

Exterior Wall	R34.4
Exterior Window	R0.1
Exterior Roof	SHGC 0.7

Rotation Angle

0°

Floor Slab

Existing Slab + 8 inches

Blinds

Yes East. South

Natural Ventilation

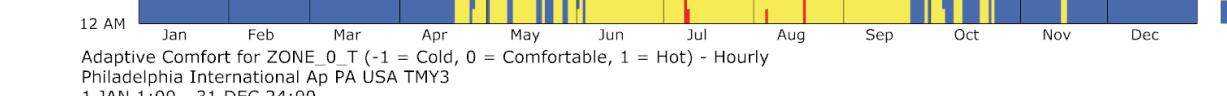
Min Indoor Temp. 25°C
Max Indoor Temp. -°C
Min Outdoor Temp. -°C
Max Outdoor Temp. -°C

0.3 0.3

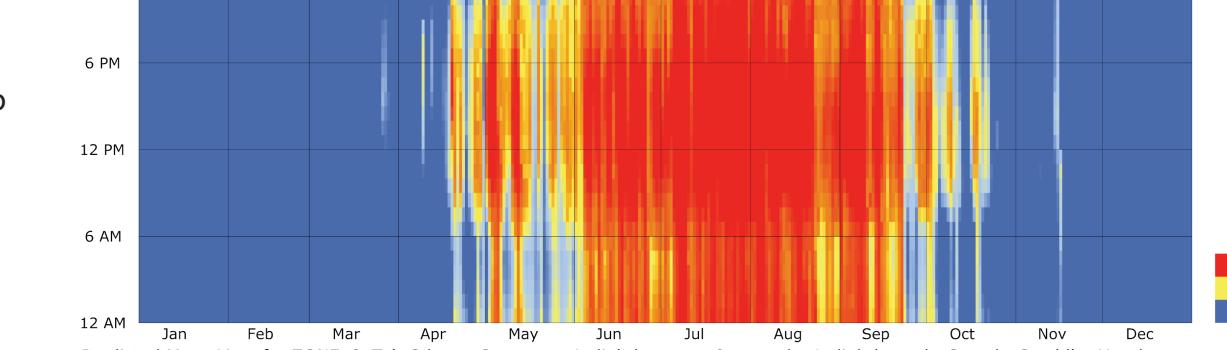
3 1

Air change hour

2



Adaptive Comfort for ZONE_0_T (-1 = Cold, 0 = Comfortable, 1 = Hot) - Hourly
Philadelphia International Ap PA USA TMY3
1 JAN 1:00 - 31 DEC 24:00



Predicted Mean Vote for ZONE_0_T (+3 hot, +2 warm, +1 slightly warm, 0 neutral, -1 slightly cool, -2 cool, -3 cold) - Hourly
Philadelphia International Ap PA USA TMY3
1 JAN 1:00 - 31 DEC 24:00