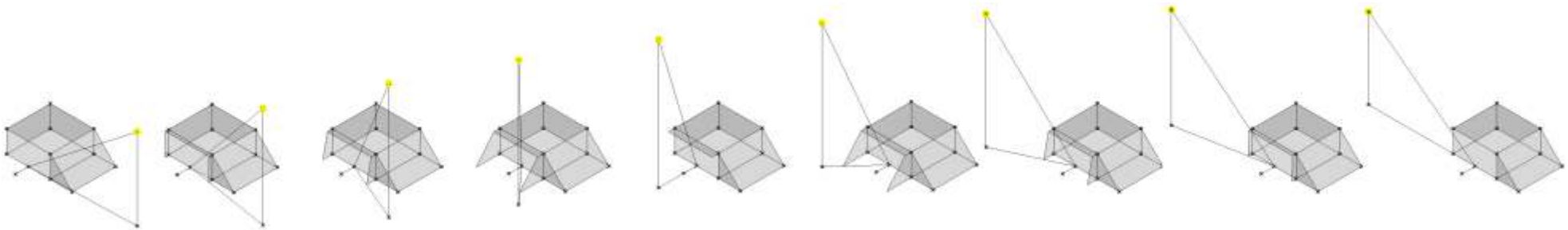

Devang Chauahan

IGBC AP | LEED GA (Ex)

[web] http://cargocollective.com/domain
[email] devang@outlook.in
[mob.] 9979389777

Master in Environmental Building Design (M.E.B.D.)
University of Pennsylvania, USA

Bachelor in Architecture (B.Arch.)
M.S. University of Baroda, India

Devang
Works from 2014 - Present I **INDIA**

1. Housing (Concept - Construction)

Public housing
Affordable housing

Public Housing

Role / **Project Coordinator**
Phase / **Design**

MSA / **2015-2016**
Location / **Diu**

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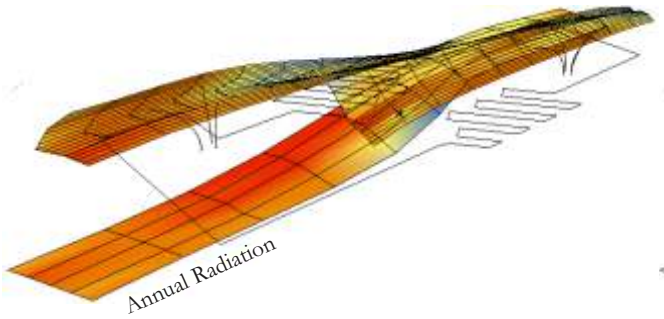
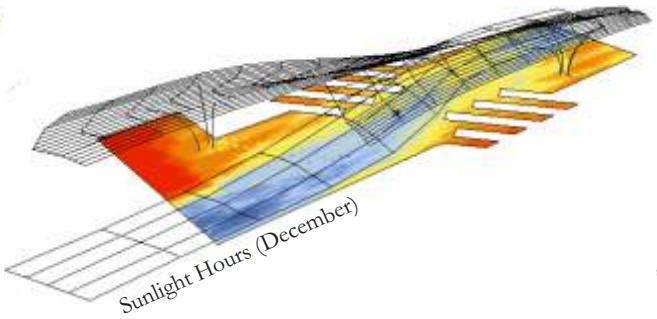
Affordable Housing

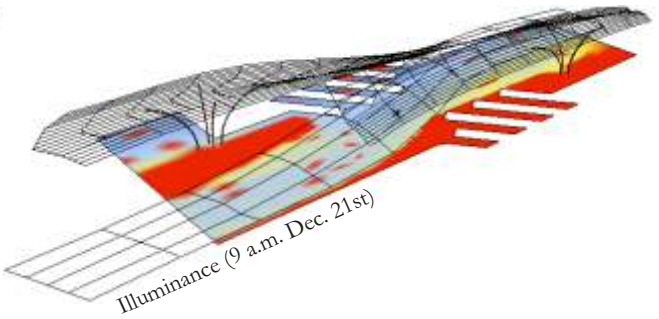
Role / **Project Coordinator**
Phase / **Under Construction**

MSA / **2014-2016**
Location / **Across Gujarat**

Site layout showing buildings, open spaces, parking areas, thick plantation, roads, service infrastructure, building cordinates, etc.

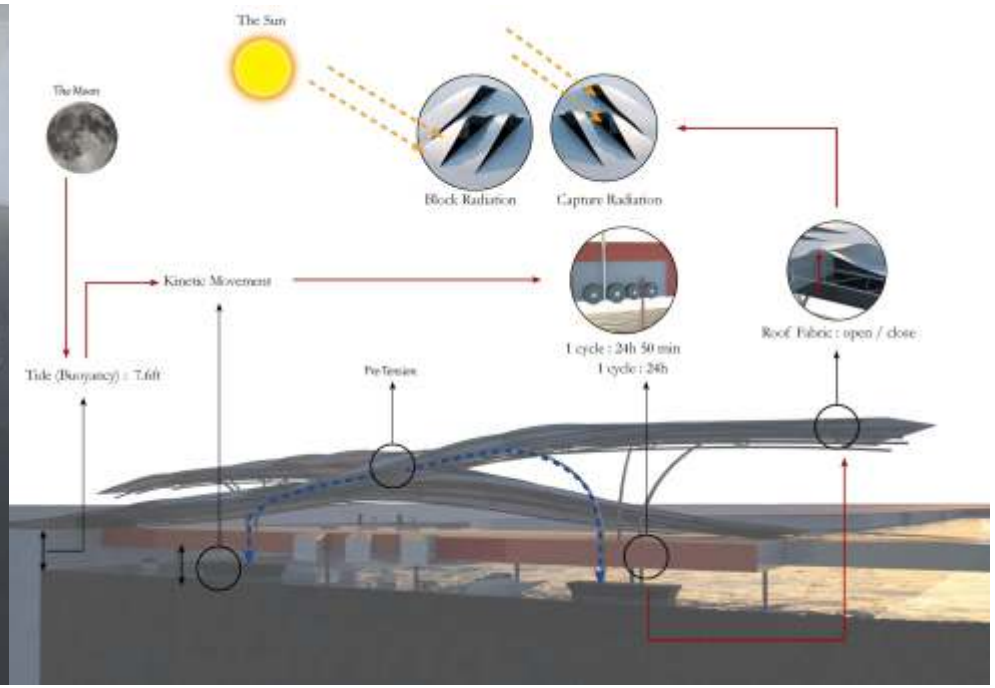

Annual Radiation

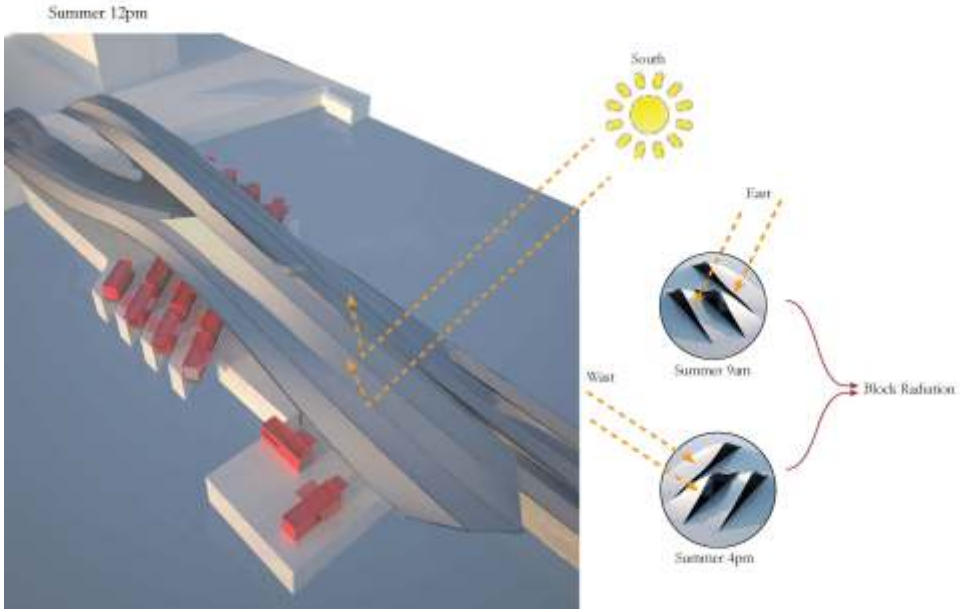

Sunlight Hours (December)

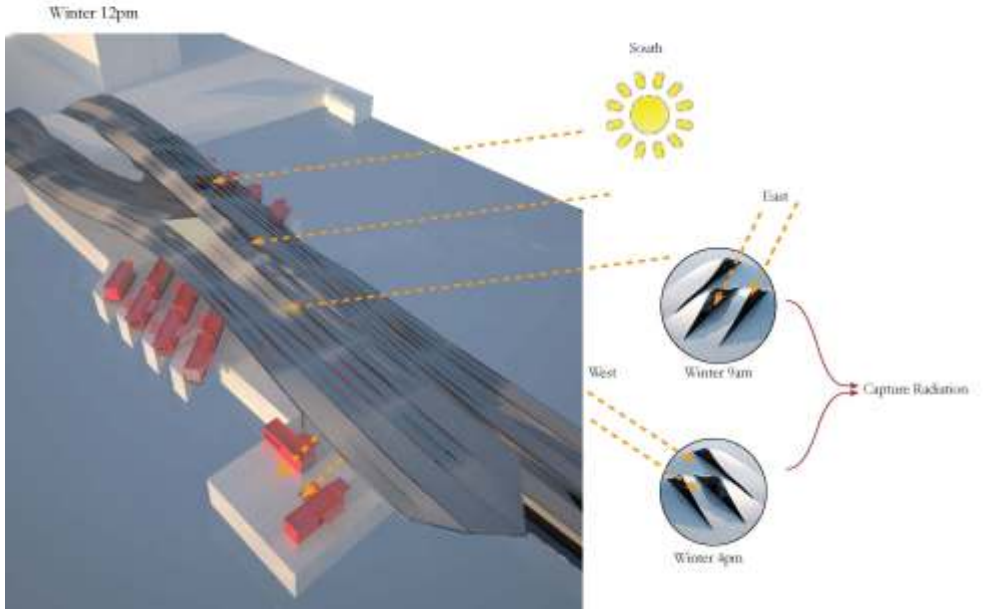

Illuminance (9 a.m. Dec. 21st)

4. Parametric Simulations + Optimization

Daylight Studies with Grasshopper+**DIVA+Ladybug**
Advanced CFD Studies


The Sun
The Moon
Block Radiation
Capture Radiation
Kinetic Movement
1 cycle : 24h 50 min
1 cycle : 24h
Roof Fabric : open / close
Tide (Buoyancy) : 7.6ft
Pre Tension

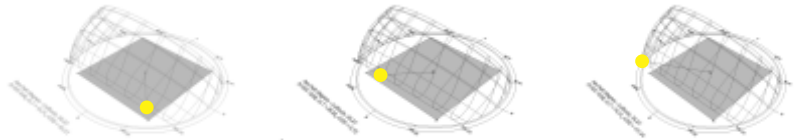

Summer 12pm
South
East
West
Summer 9am
Summer 4pm
Block Radiation


Winter 12pm
South
East
West
Winter 9am
Winter 4pm
Capture Radiation

Parametric Performance Simulation
Daylight Studies with Ladybug & DIVA

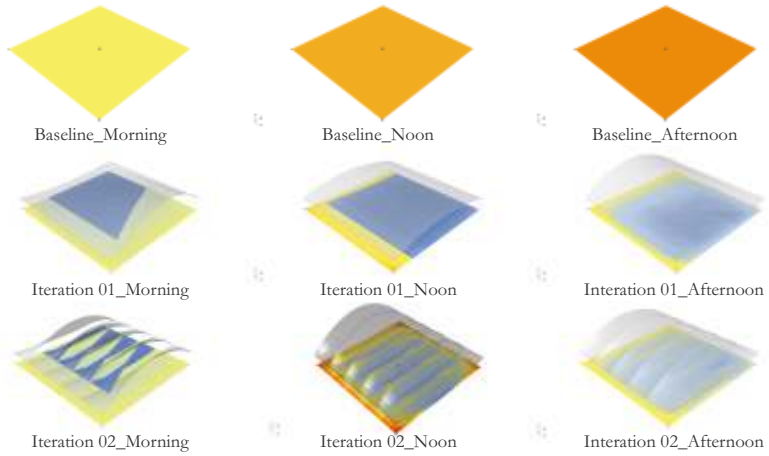
M.E.B.D. / **2013**
Advisor / **Brian Phillips**

Simulation
05



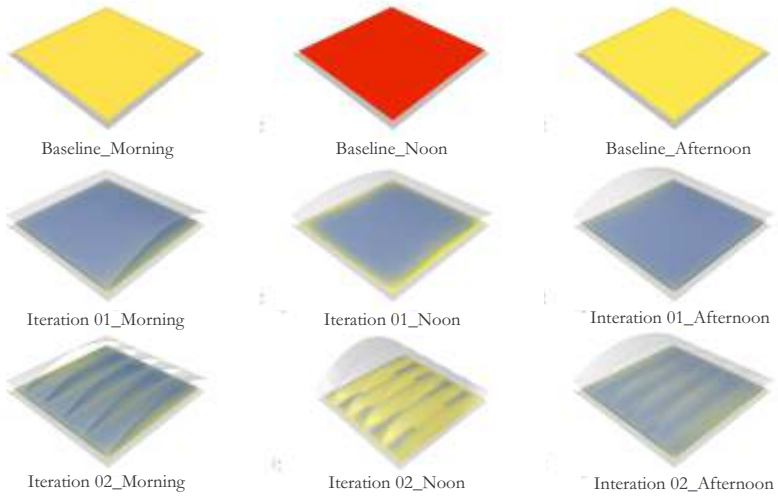
Winter Situation
Incident Radiation

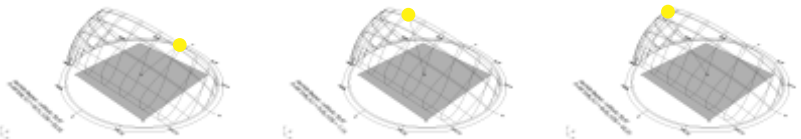
Dec 21st _Overcast Sky
(Kwh/m2)



Winter Situation
Illuminance

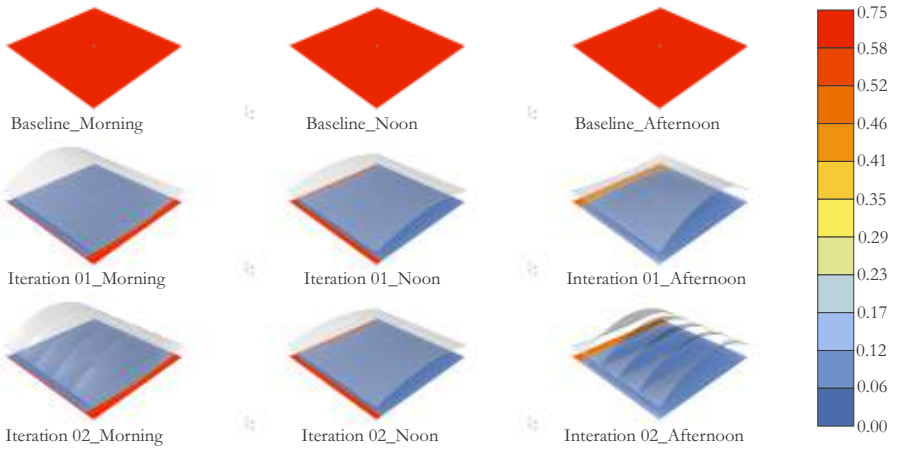
Dec 21st _Overcast Sky
(Lux)





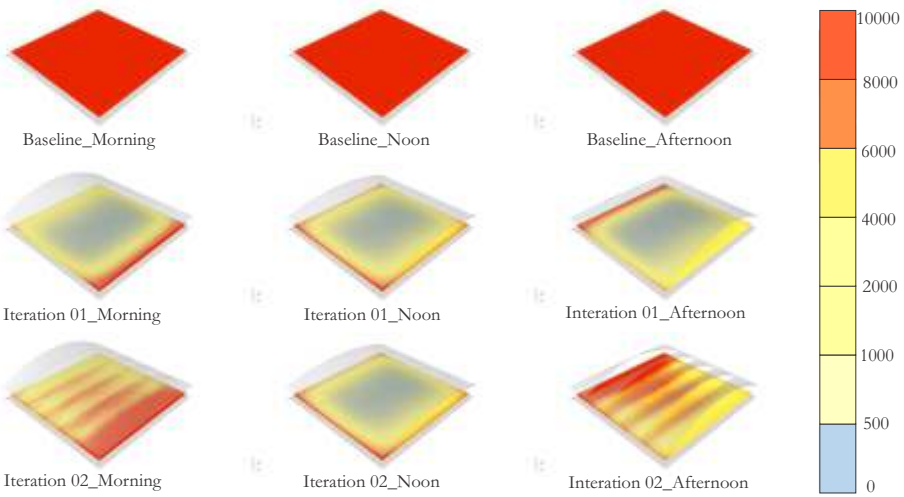
Summer Situation
Incident Radiation

June 21st _Sunny Sky
(Kwh/m2)



Summer Situation
Illuminance

June 21st _Sunny Sky
(Lux)



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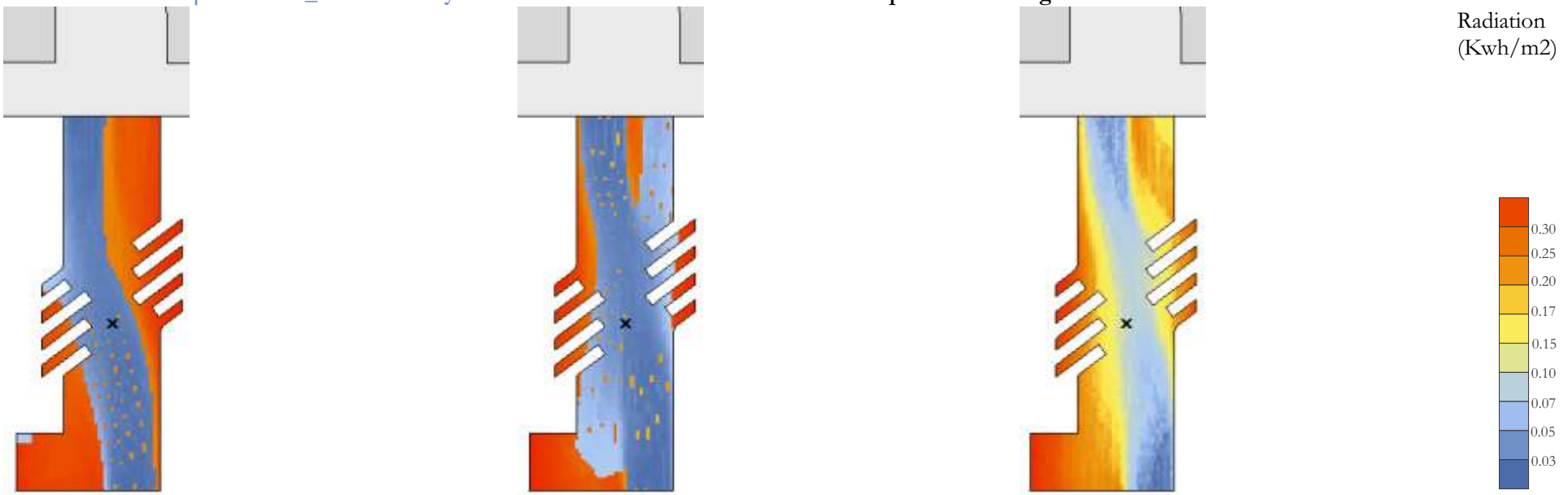
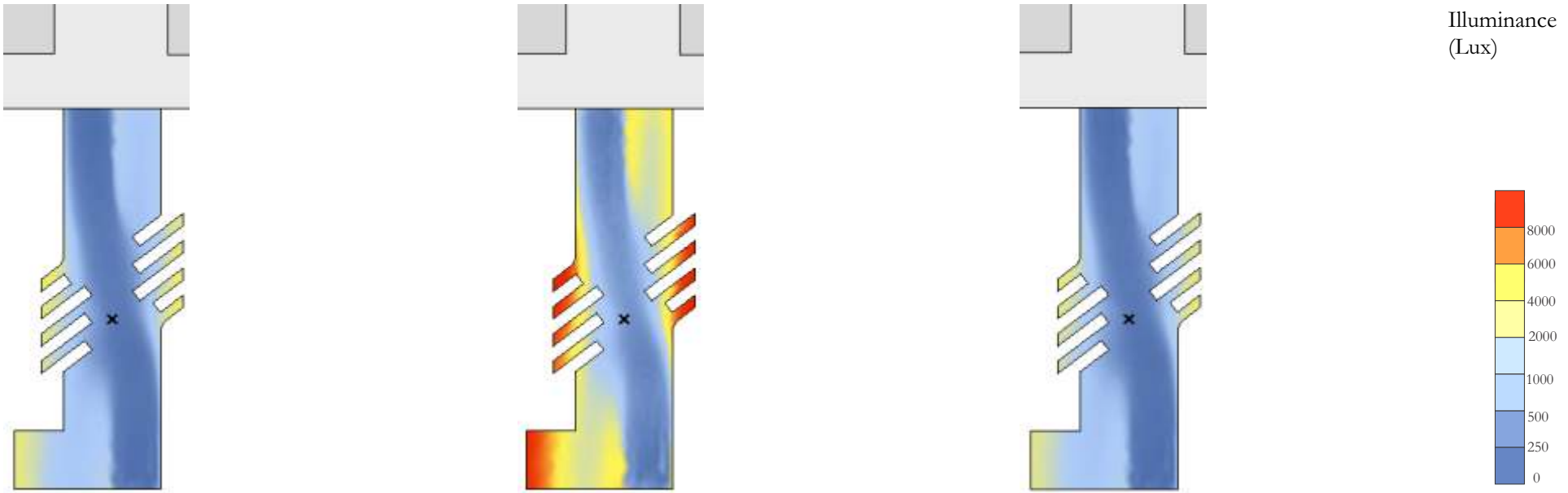
Winter Situation | Dec 21st _Overcast Sky

Without Operable Shading



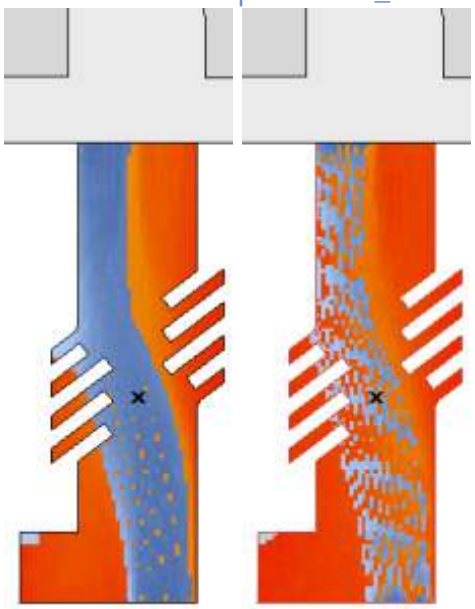
9 a.m. to 10 a.m. | 12 p.m. to 1 p.m. | 3 p.m. to 4 p.m.



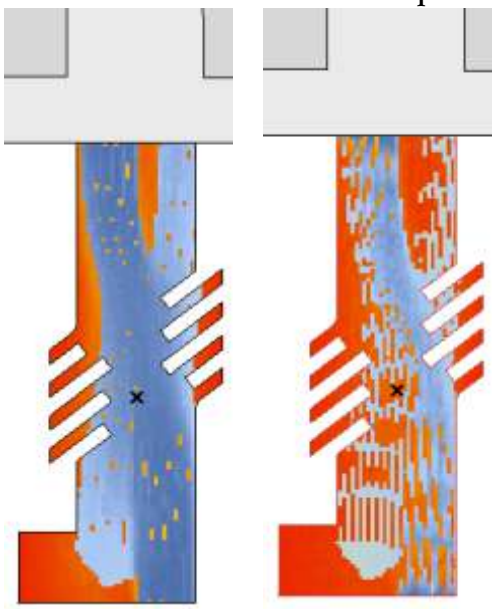
9 a.m. | 12 p.m. | 3 p.m.

Winter Situation | Dec 21st _Overcast Sky

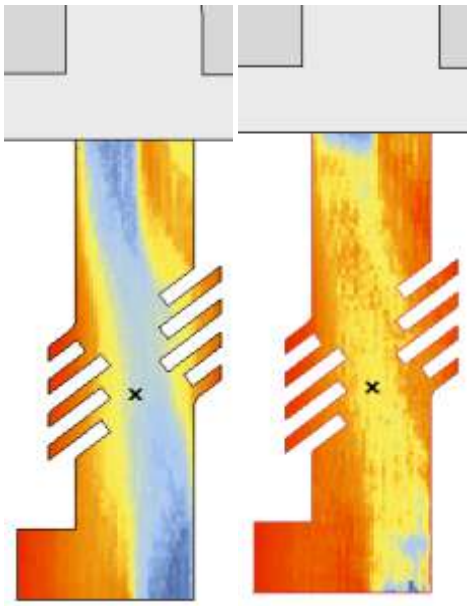
With Operable Shading



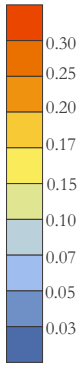
9 a.m. to 10 a.m.

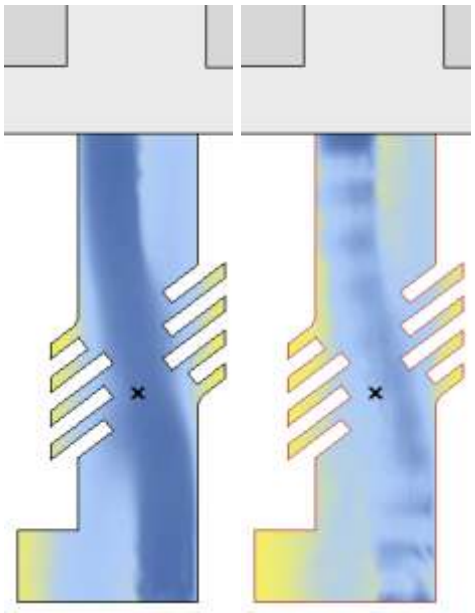


12 p.m. to 1 p.m.



3 p.m. to 4 p.m.





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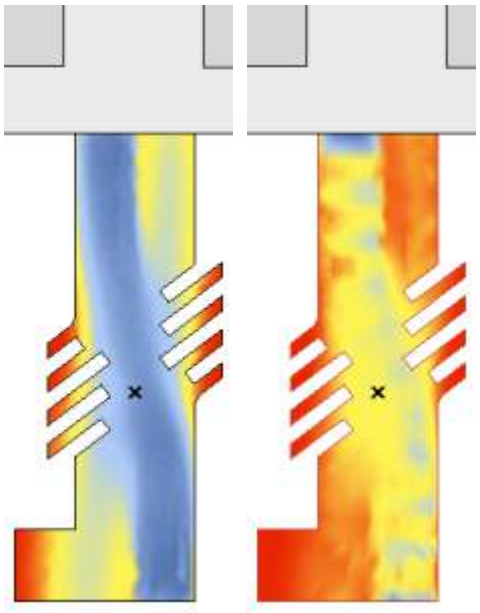

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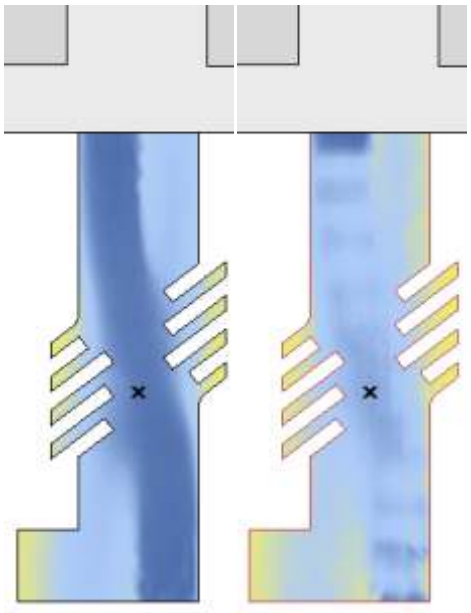
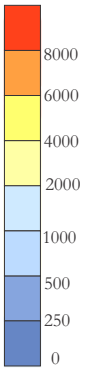


3 p.m.



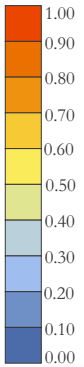
Summer Situation | June 21st _Sunny Sky

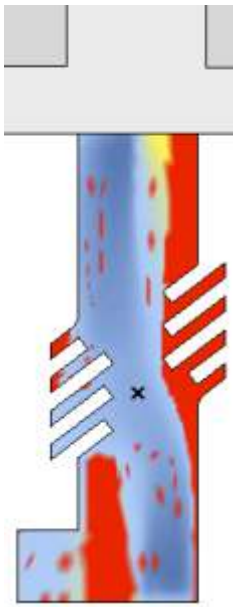
Without Operable Shading

9 a.m. to 10 a.m.

12 p.m. to 1 p.m.

3 p.m. to 4 p.m.





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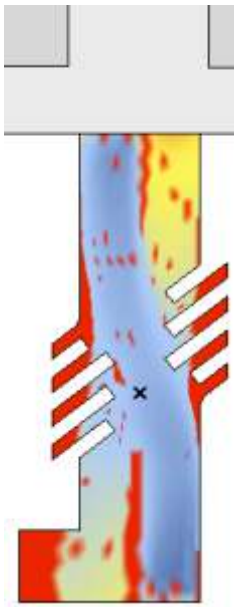
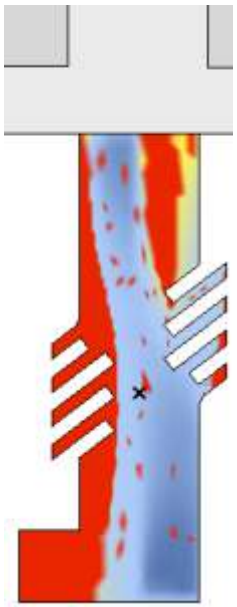
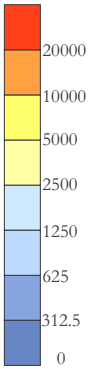


12 p.m.

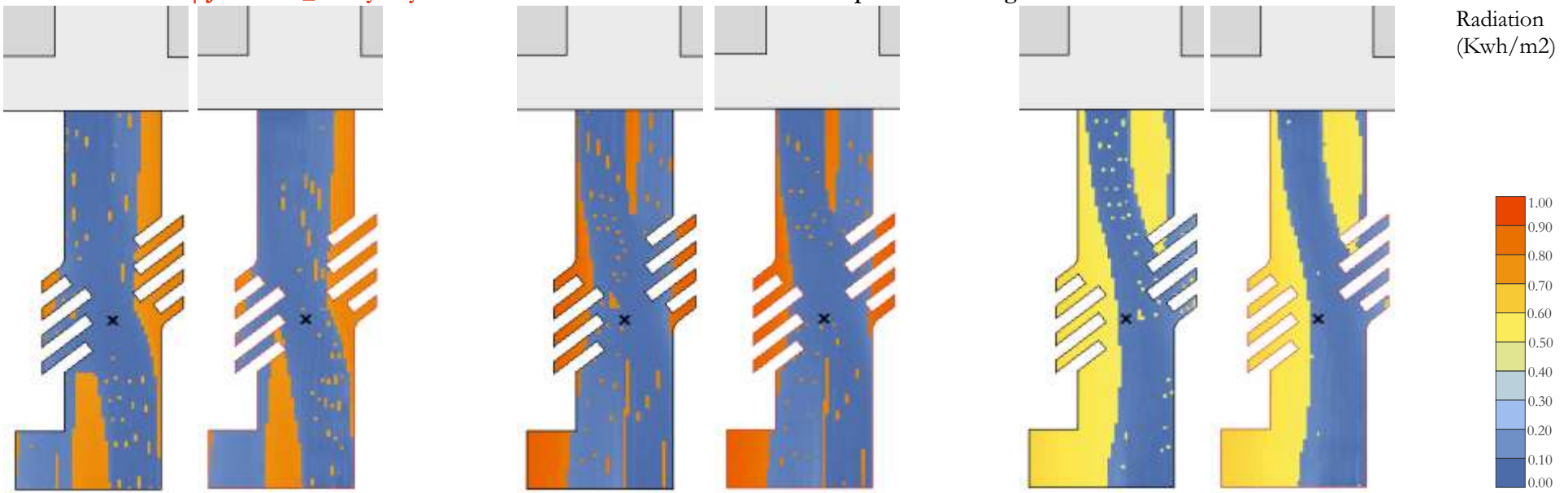


3 p.m.

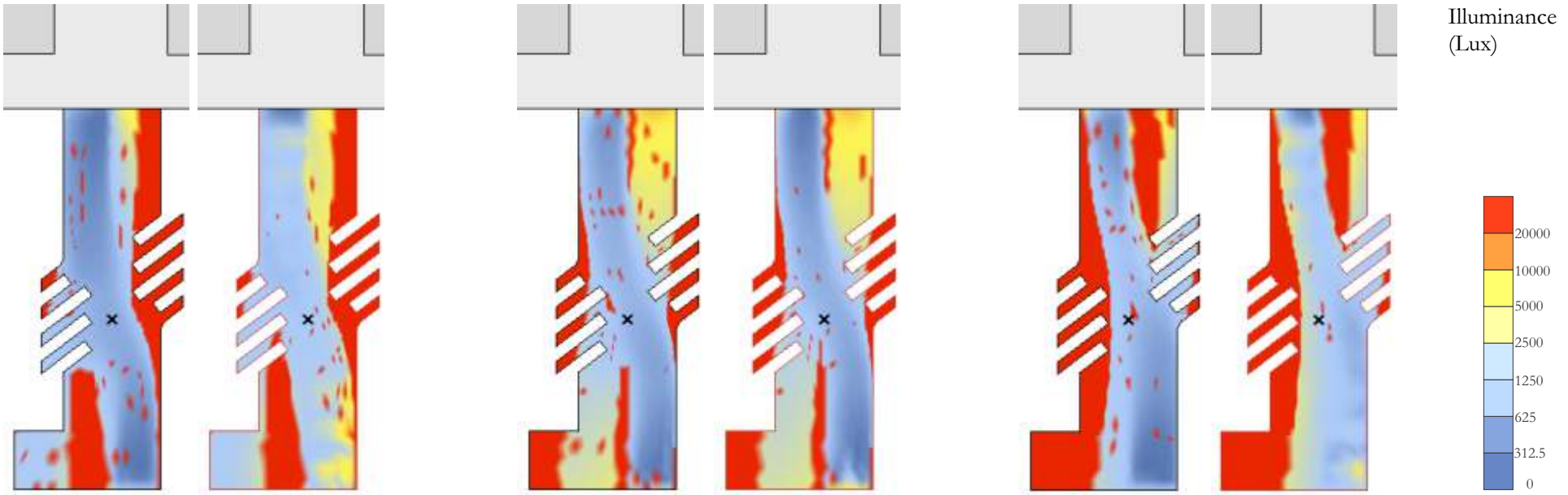


Summer Situation | June 21st _Sunny Sky

With Operable Shading

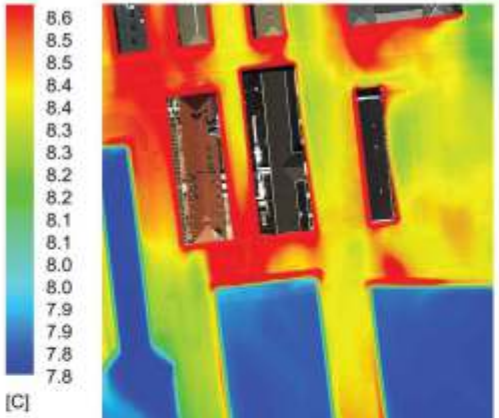


9 a.m. to 10 a.m. | 12 p.m. to 1 p.m. | 3 p.m. to 4 p.m.



9 a.m. | 12 p.m. | 3 p.m.

Temperature



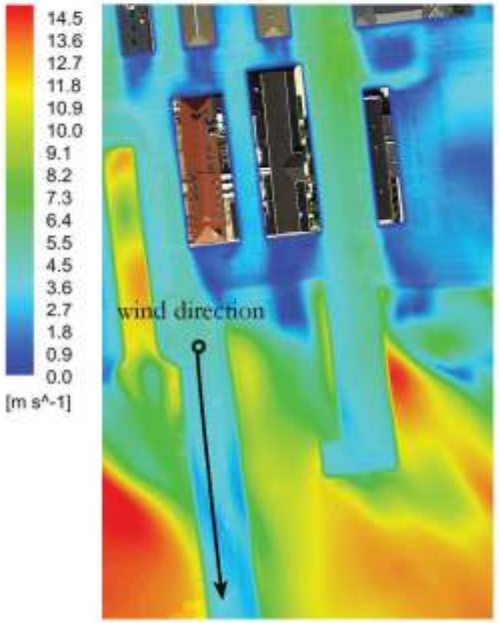
North

Winter Situation
Prevailing Wind
North-West

1. Canopy

\+

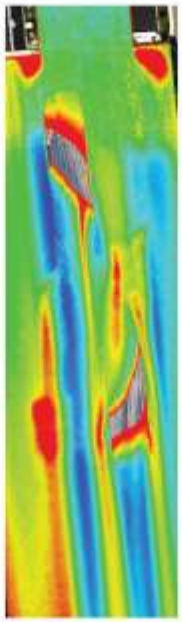
Velocity



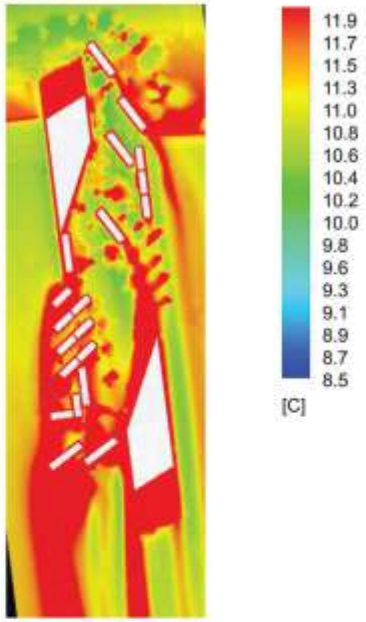
2. Movable Program

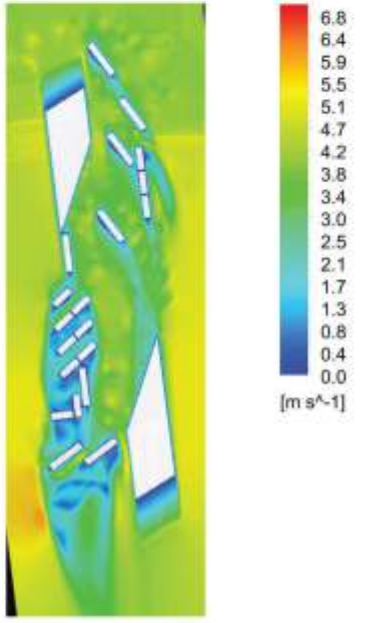
=

1. Canopy

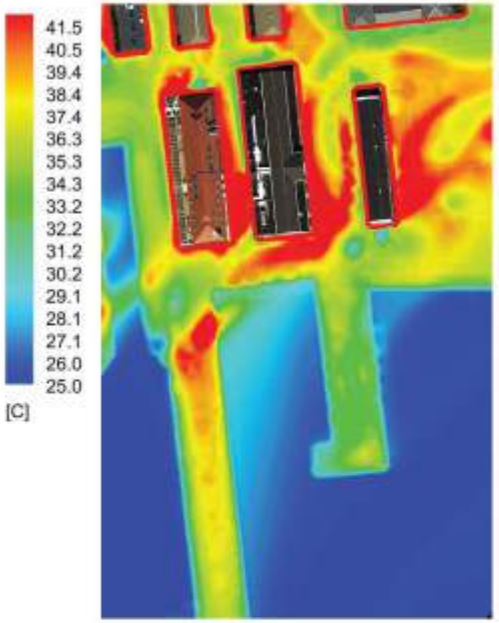


2. Movable Program





Temperature



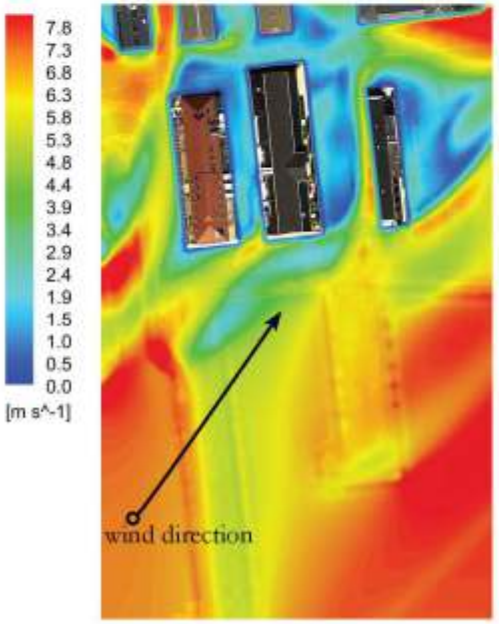
North

Summer Situation
Prevailing Wind
South-West

1. Canopy

+

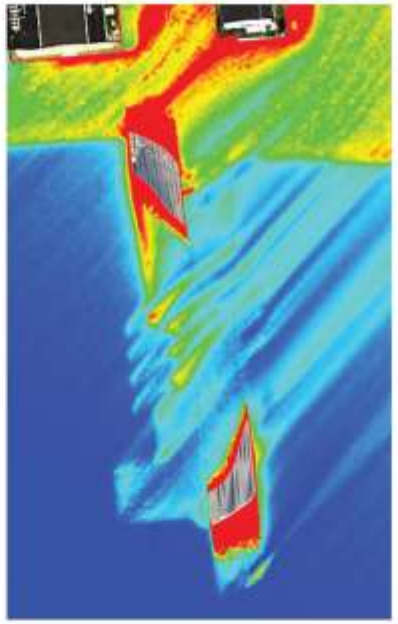
Velocity



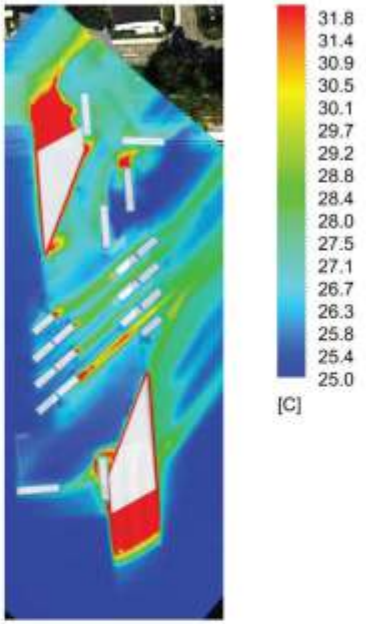
2. Movable Program

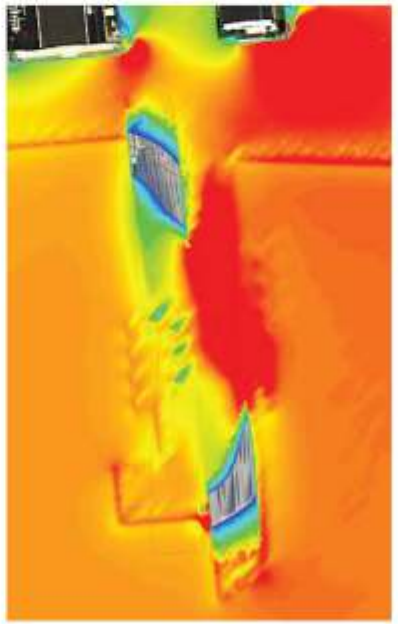
=

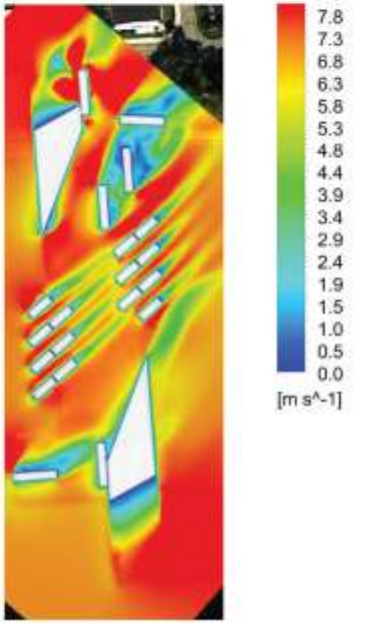
1. Canopy

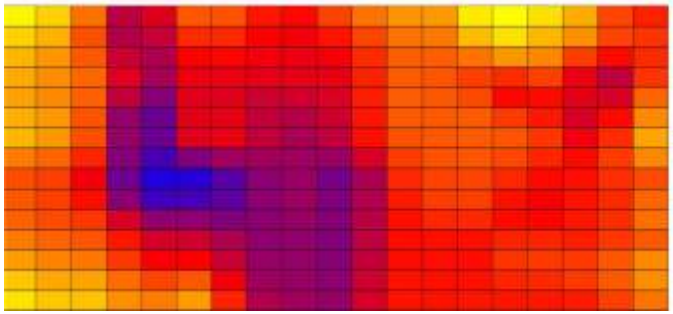
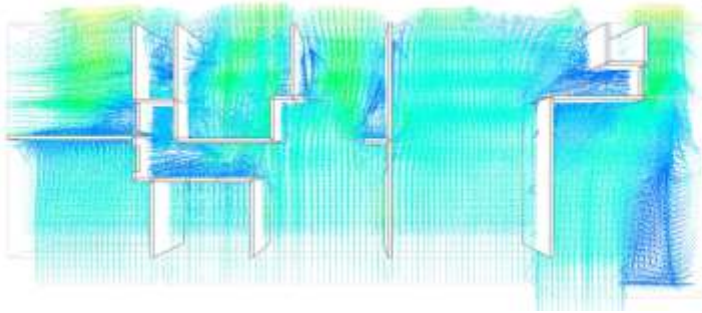
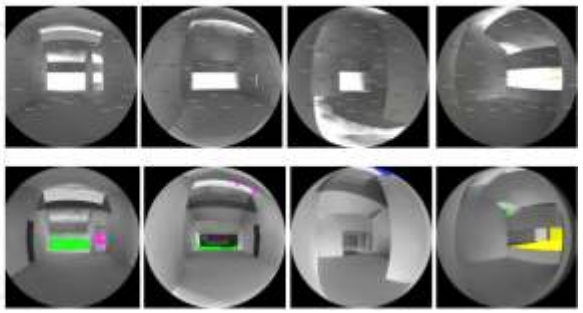


2. Movable Program







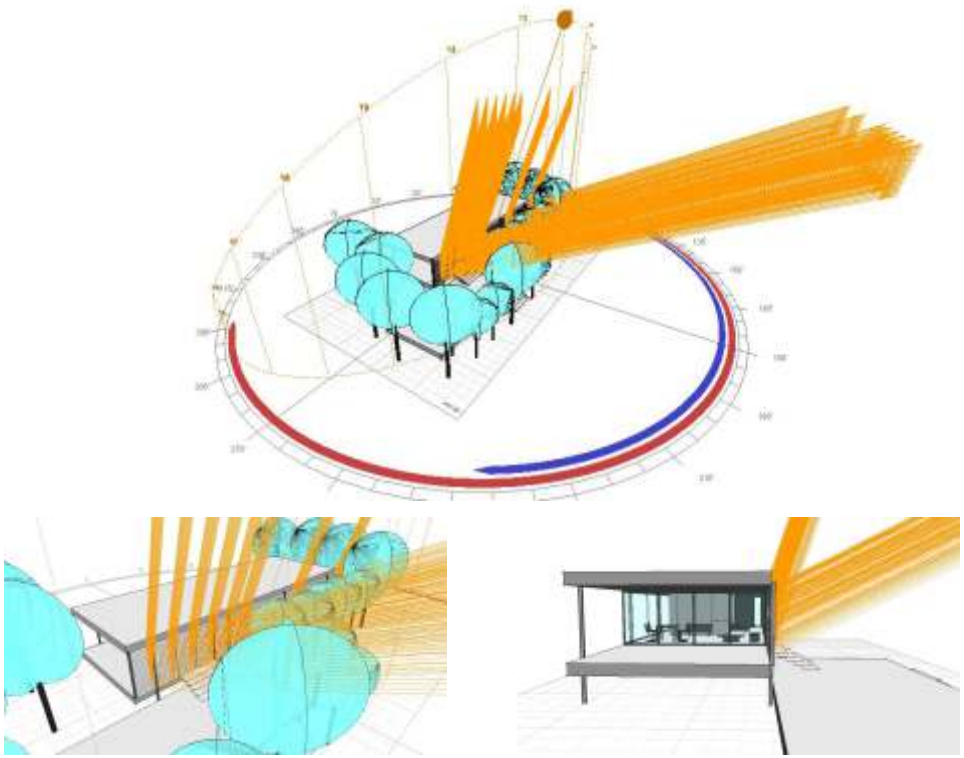




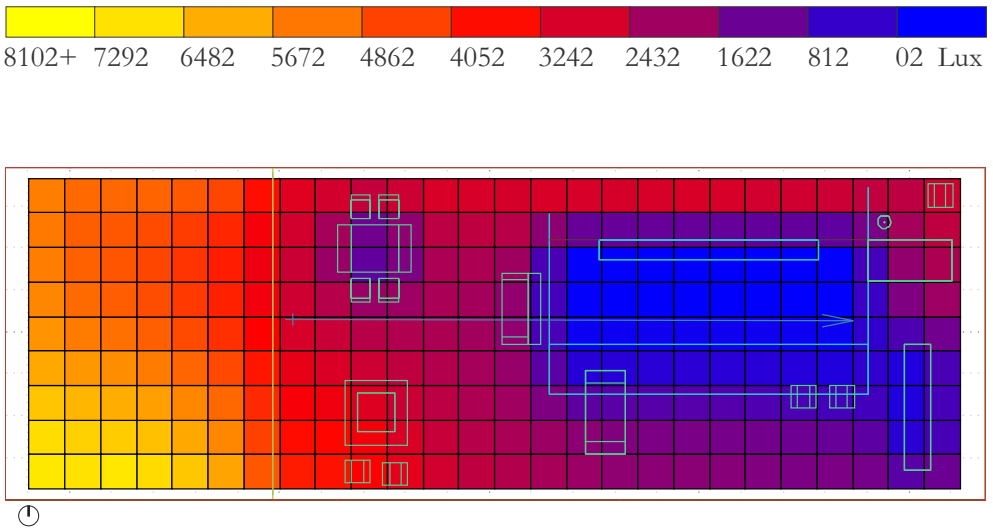
3. Standard Simulation

Daylight Simulation
CFD Simulation
Energy Simulation

Daylight Analysis and Shading
Farnsworth House

M.E.B.D. / **2012**
Advisor / **William Braham**

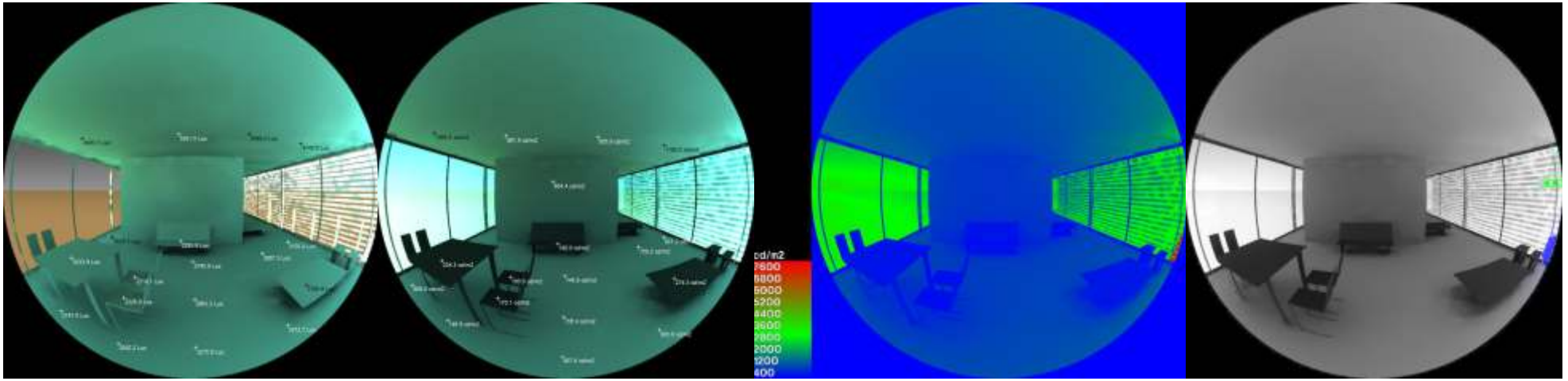




Illuminance **21st June @ 12 noon (Sunny Sky)**

Illuminance analysis and louver testing for Farnsworth House. Although louvers cuts off radiation and completely eliminates glare from high altitude summer sun, the illuminance level achieved inside the house is above the ideal illuminance range recommended by IES.

Illuminance | Luminance | False Color | Glare



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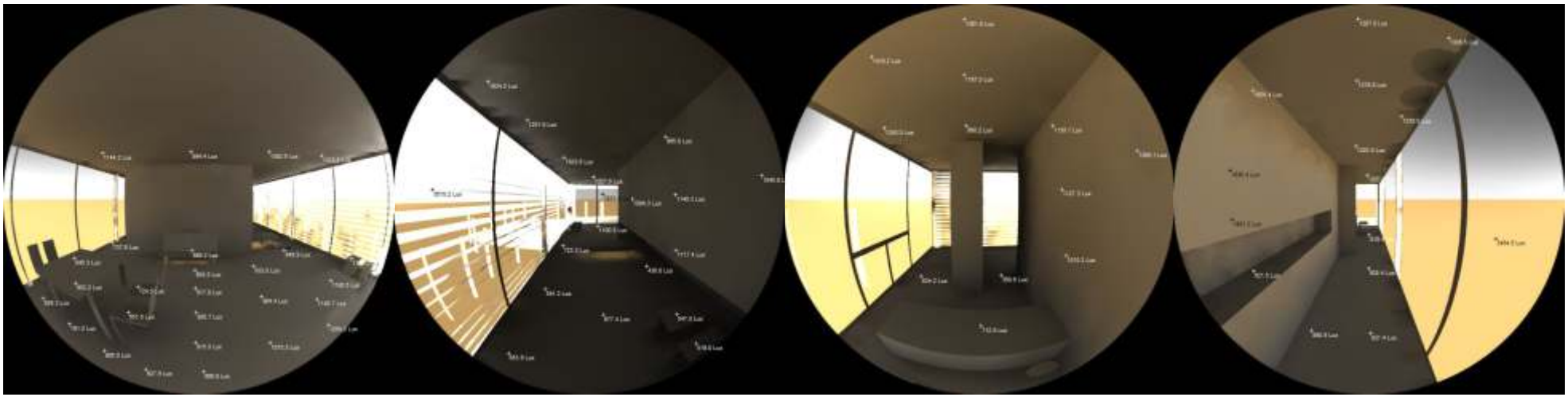
Final Rendering with Radiance

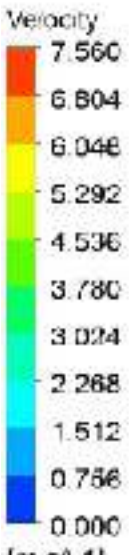


Achieved Illuminance

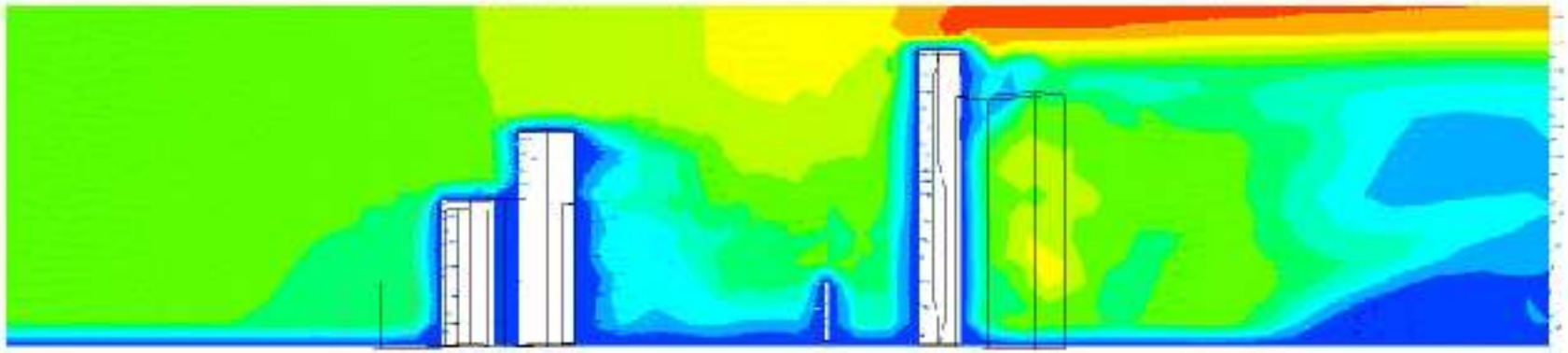
21st September @ 12 noon (Sunny Sky)

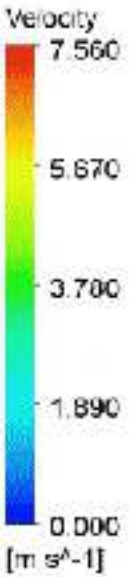
Luminance

21st September @ 12 noon (Sunny Sky)

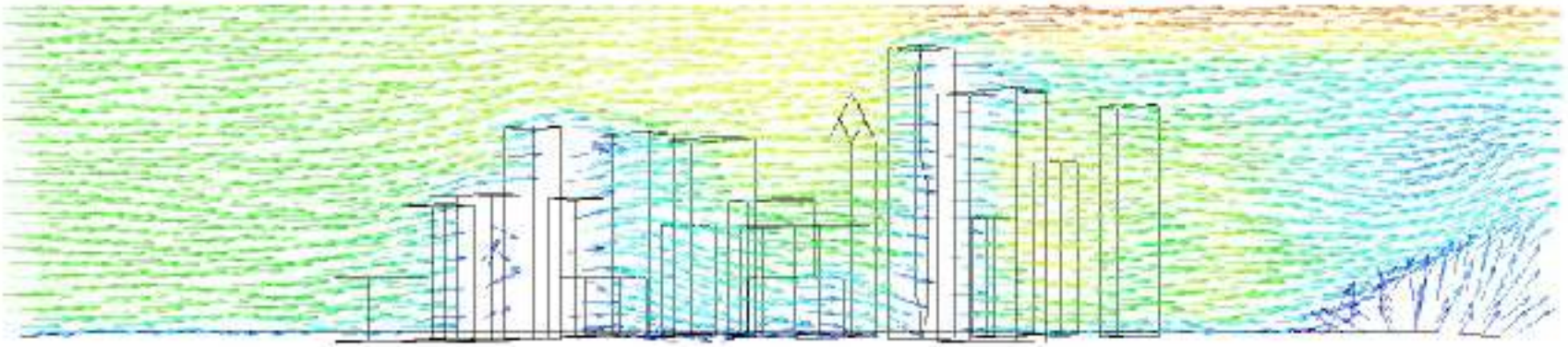


External Wind Accessibility Contour

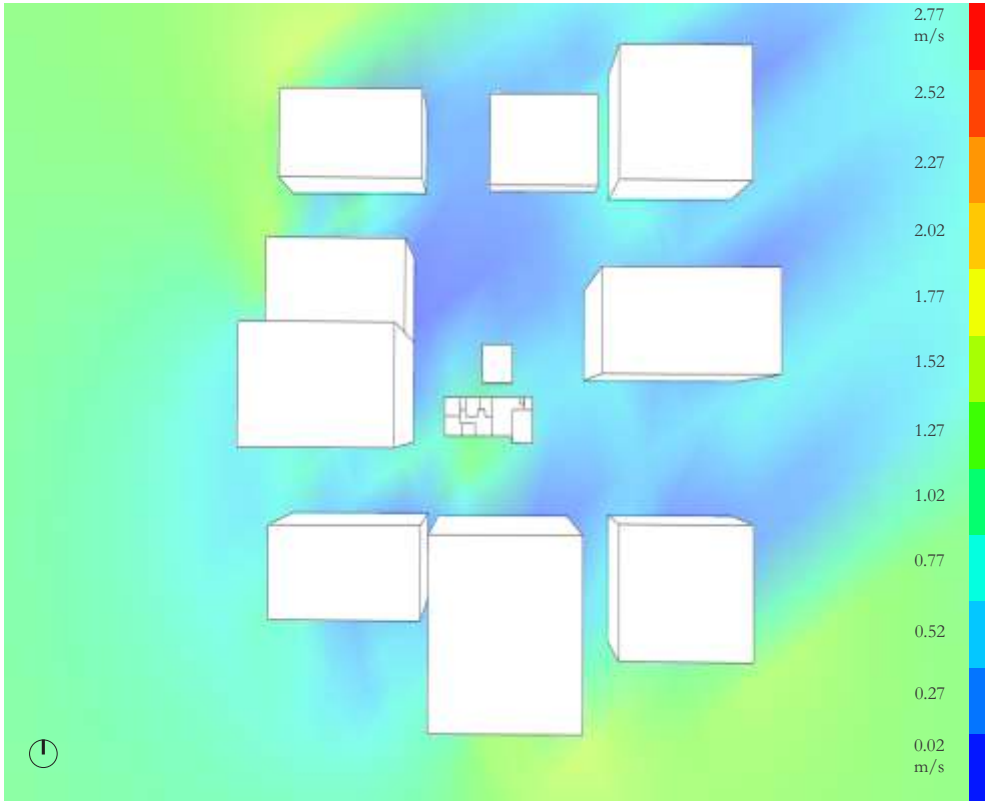




External Wind Accessibility Vector



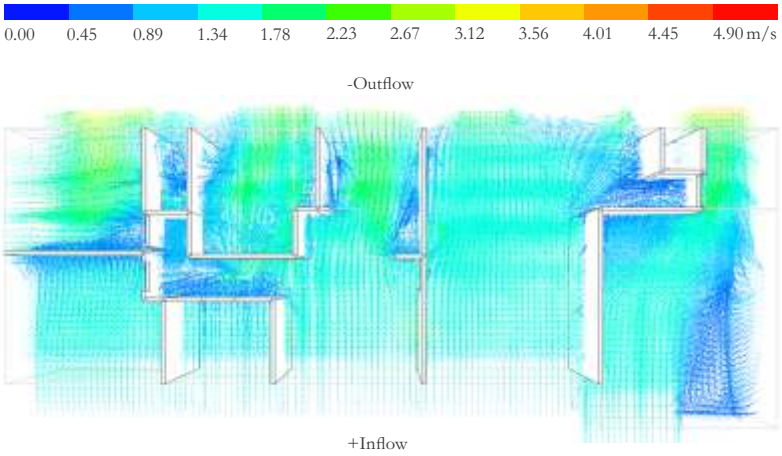
External Wind Accessibility Analysis



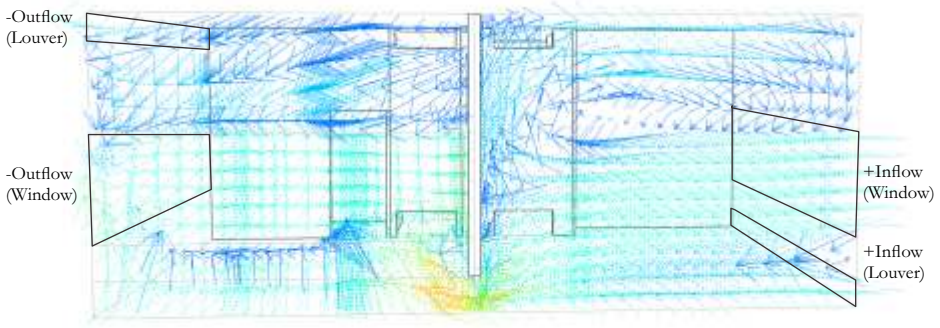
External wind accessibility analysis is was conducted to analyze microclimate wind pattern and to decide the location of openings. Buildings in close proximity of site influence and enhance local wind velocity near the house. Wind velocity at the boundary of is noted and is further used to conduct internal airflow analysis.

Based on external wind accessibility analysis, openings were provided on south and west faces of the house. In addition to that, louvered openings were proposed at the bottom of interior walls. Bottom level openings accentuate internal airflow and facilitates satisfactory wind velocity (1.0 to 2.0 m/s) for physiological cooling effect to residents during summer months.

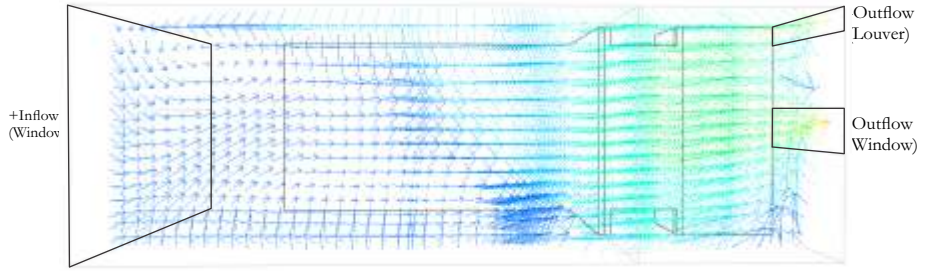
Internal Airflow Analysis



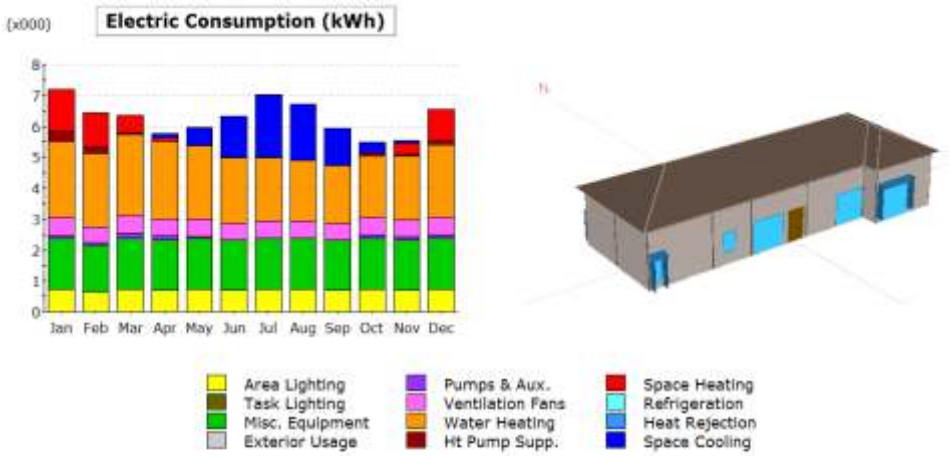
Velocity Vector showing airflow distribution inside the house in plan



Velocity Vector showing bottom level vent in one of the Interior wall



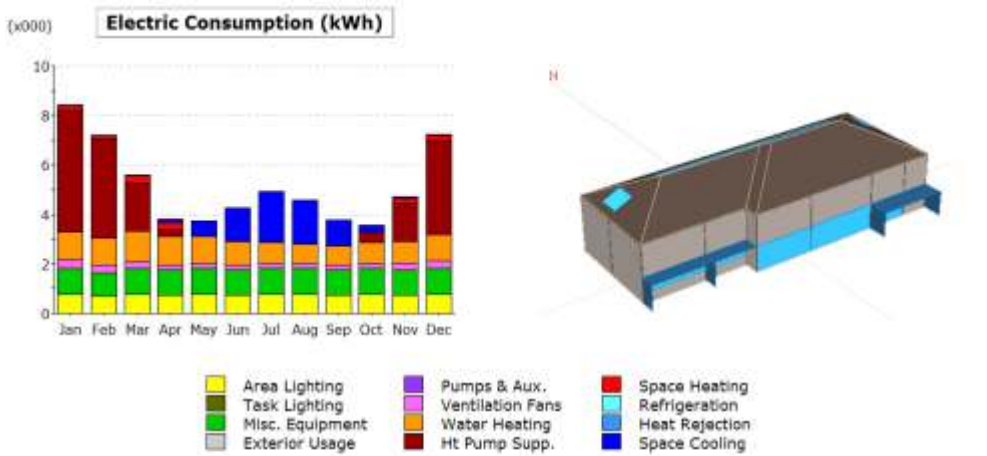
Energy Simulation_Baseline



Electric Consumption (kWh x000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	-	-	-	0.12	0.61	1.34	2.05	1.83	1.21	0.37	0.08	-	7.61
Heat Reject.	-	-	-	-	-	-	-	-	-	-	-	-	-
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	1.34	1.08	0.55	0.13	0.00	-	-	-	-	0.08	0.37	1.01	4.56
HP Supp.	0.32	0.24	0.06	0.01	0.00	-	-	-	-	0.01	0.04	0.14	0.80
Hot Water	2.49	2.36	2.63	2.50	2.38	2.13	2.02	1.93	1.86	1.99	2.08	2.34	26.71
Vent. Fans	0.56	0.51	0.56	0.54	0.56	0.54	0.56	0.56	0.54	0.56	0.54	0.56	6.61
Pumps & Aux.	0.08	0.09	0.15	0.15	0.03	0.00	-	-	0.00	0.09	0.11	0.11	0.82
Ext. Usage	-	-	-	-	-	-	-	-	-	-	-	-	-
Misc. Equip.	1.67	1.51	1.67	1.62	1.67	1.61	1.67	1.67	1.62	1.67	1.62	1.67	19.65
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	0.72	0.65	0.72	0.70	0.72	0.70	0.72	0.72	0.70	0.72	0.70	0.72	8.47
Total	7.18	6.42	6.35	5.75	5.97	6.33	7.02	6.72	5.93	5.49	5.54	6.55	75.24

Energy Simulation_Design Case



Electric Consumption (kWh x000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	0.01	0.01	0.03	0.13	0.61	1.39	2.03	1.75	1.07	0.27	0.06	0.01	7.38
Heat Reject.	-	-	-	-	-	-	-	-	-	-	-	-	-
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	0.19	0.12	0.26	0.29	0.02	-	-	-	0.00	0.10	0.18	0.22	1.37
HP Supp.	4.92	4.02	1.97	0.27	0.00	-	-	-	-	0.34	1.56	3.81	16.88
Hot Water	1.14	1.10	1.22	1.15	1.07	0.92	0.84	0.78	0.75	0.82	0.89	1.04	11.73
Vent. Fans	0.34	0.31	0.28	0.22	0.21	0.21	0.22	0.22	0.21	0.23	0.27	0.34	3.06
Pumps & Aux.	-	-	-	-	-	-	-	-	-	-	-	-	-
Ext. Usage	-	-	-	-	-	-	-	-	-	-	-	-	-
Misc. Equip.	1.05	0.95	1.05	1.02	1.05	1.02	1.05	1.05	1.02	1.05	1.02	1.05	12.41
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	0.76	0.69	0.76	0.74	0.76	0.74	0.76	0.76	0.74	0.76	0.74	0.76	8.95
Total	8.42	7.19	5.58	3.82	3.73	4.28	4.91	4.56	3.79	3.57	4.71	7.23	61.79

In this case, baseline energy analysis shows that Water Heating and Equipment are the primary consumers of energy in this example. Since daylight is not kept on in energy simulation process, the area lighting energy is constant throughout the year. The analysis shows energy for cooling during summer months and energy for heating during winter months. This profile validates the behavior of energy model in conjunction with Philadelphia weather and energy model settings. High energy consumption of water heating indicates that building suffers from high infiltration all round the year and heat loss during winter months. That calls for a relatively more insulated envelope in

Since the changes made in design were primarily governed by daylight and CFD studies, the glass area and due to that the electricity consumption increased. in order to address the issue, and energy efficient glass (Pilkington Solar-E Plus A) was selected and technical specification were drawn form the manufacturer's website. This brought down electricity consumption from 79000 Kwh to 72000 Kwh. In addition to that, wall construction information was changed from Plywood>Insulation board>Gypsum board (Outside>Inside) to Concrete>Minwool batt insulation>Brick (Outside>Inside). This further reduced the electricity consumption from 72000 Kwh to 62000 Kwh, providing approximately 20% reduction form baseline model.

Full Building Energy Simulation and Calibration with Skirkanich Hall, Upenn

M.E.B.D. / 2013
Advisor / Yun Kyu Yi

Skirkanich Hall, Upenn

EnergyPlus Model with DesignBuilder

Airflow

In addition to the heat source, airflow will help in faster air discharge. Also, will raise negative pressure at the outlet of atrium

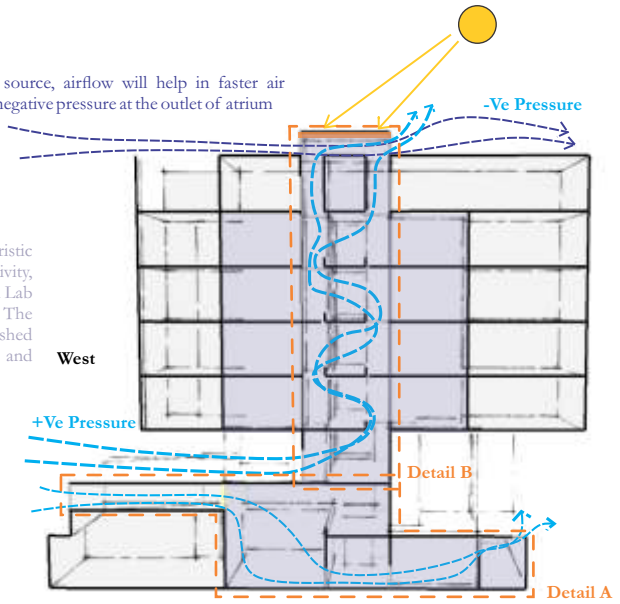
Glass in Atrium

Glass, due to its characteristic of high thermal conductivity, will help in heat loss from Lab rooms adjacent to atrium. The heat will eventually be flushed out through convection and airflow in atrium.

Air Inlet for Atrium

Air Inlet for Basement

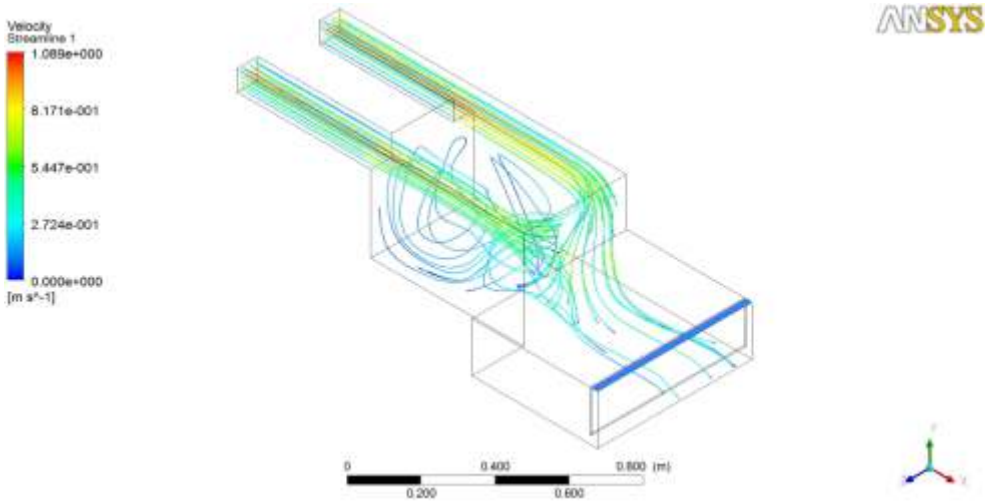
Inlets located on the windward side to capture air during the outside air temperature is in comfort range.



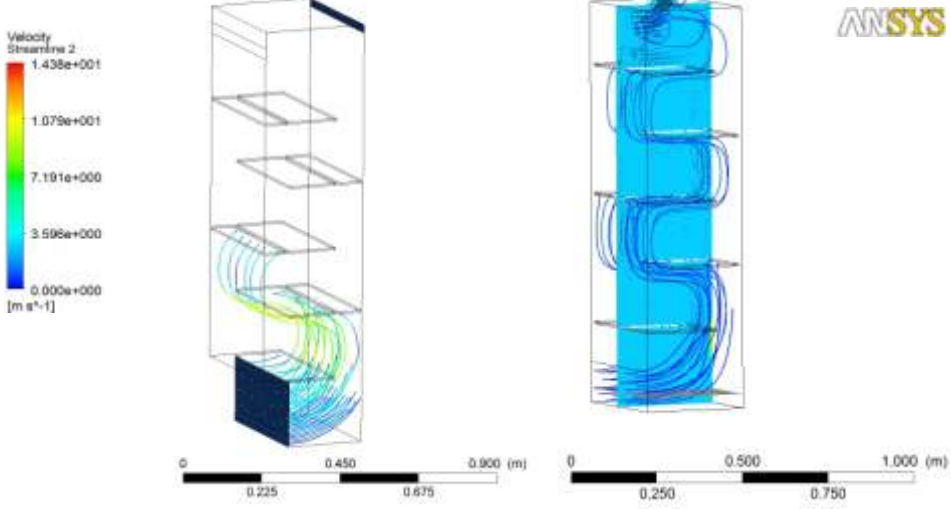
Heat Source

Heat source at the top of the atrium induces negative pressure and thus helps in convection.

Section Through Skirkanich Hall



Detail A | Internal Airflow
Testing | Satisfactory



Detail B | Internal Airflow
Testing | Not Satisfactory

Detail B | Internal Stack Effect
Testing | Satisfactory

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Devang
Works from 2010-2012 I **India**




2. Professional Work

Villa
Mid-Rise Apartment

A suburban villa primarily built with exposed R.C.C. construction. A common swimming pool divides the two residences. Strategically placed and structurally integrated exposed R.C.C. folded walls are special feature of the villa.

View 01

1. Bed Room
2. Bath Room
3. Dining
4. Living Room (Double height)
5. Powder Room
6. Kitchen
7. Wash
8. Store
9. Drawing Room
10. Entrance Foyer
11. Utility
12. Swimming Pool

LEGEND
- RCC WALL
- RCC COLUMN
- BRICK WALL
- WATER BODY
- CENTER LINE
- WALL SECTION LINE
- DOUBLE HEIGHT LINE
- SECTION LINE
- Exposed R.C.C. Shuttering Pattern
- 3D View

Ground Floor Plan

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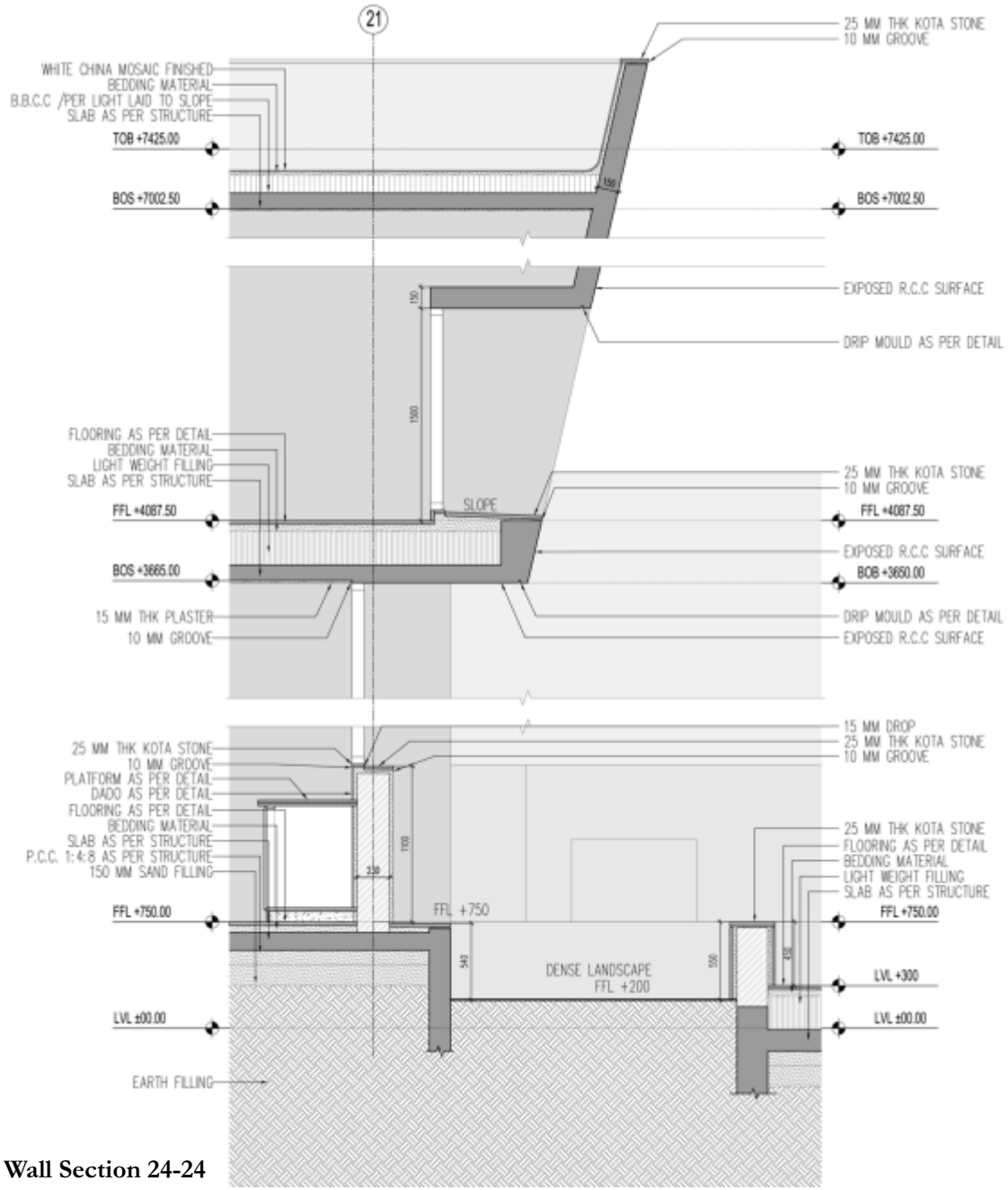
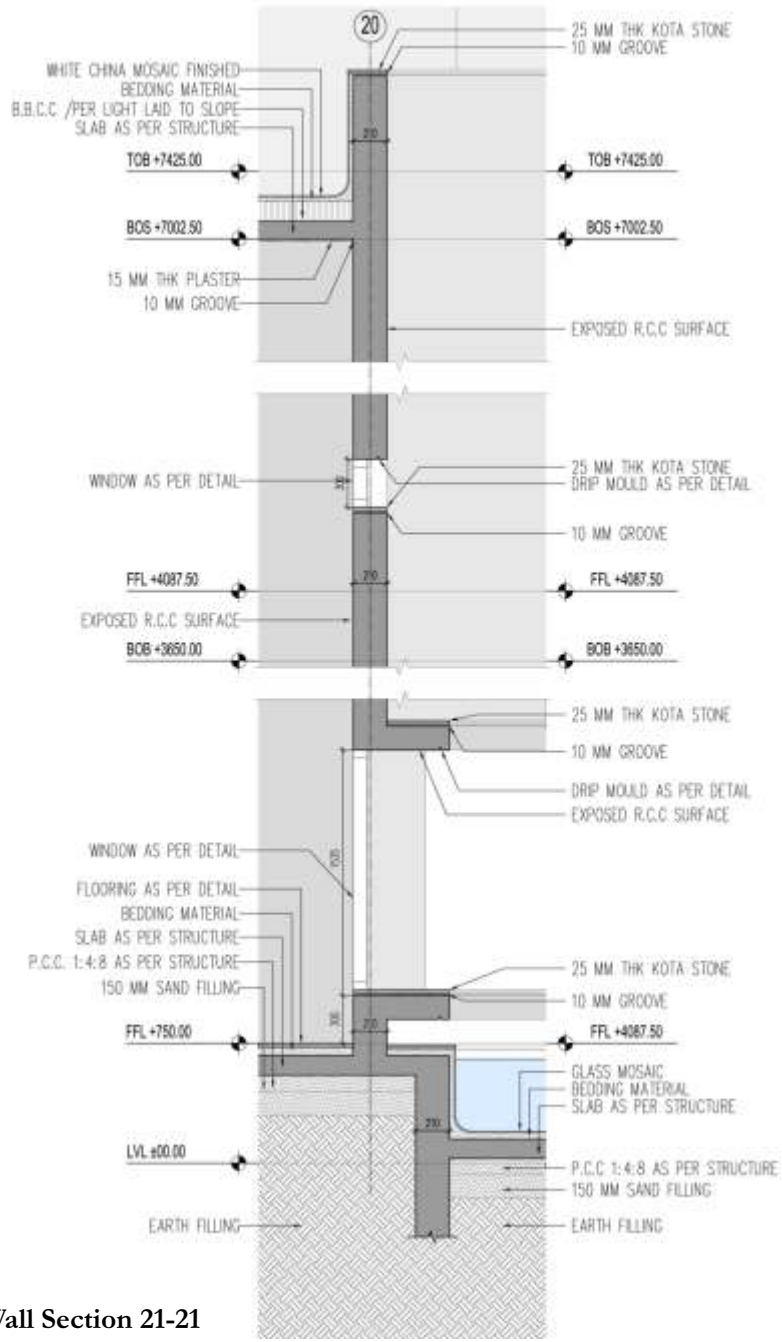


Wall Section 24-24



Wall Section 21-21

High-Rise Apartment

Role / **Architect**
Phase / **Under Construction**

SamARCH Architects / **2011**
Location / **Ahmedabad**

Professional
20

Brief A luxurious residential campus with high rise apartments of 3 bhk, 4 bhk, 5 bhk in configuration.

Replicated prototypes of planter, railing and sun breaker form a unique building facade.

Surrounded and shadowed by towers, the common landscaped area makes room for recreation with shared facilities like gymnasium and club house in immediate proximity.

Objective The design caters to local cultural trend and mainly addresses the local requirement of modern day housing solution for the joint families.

Typical Floor

01. Main Entry
02. 4 BHK apartment
03. 5 BHK apartment
04. 3 BHK apartment
05. Common landscaped garden
06. Gymnasium / Club house
07. Swimming pool
08. Tennis court

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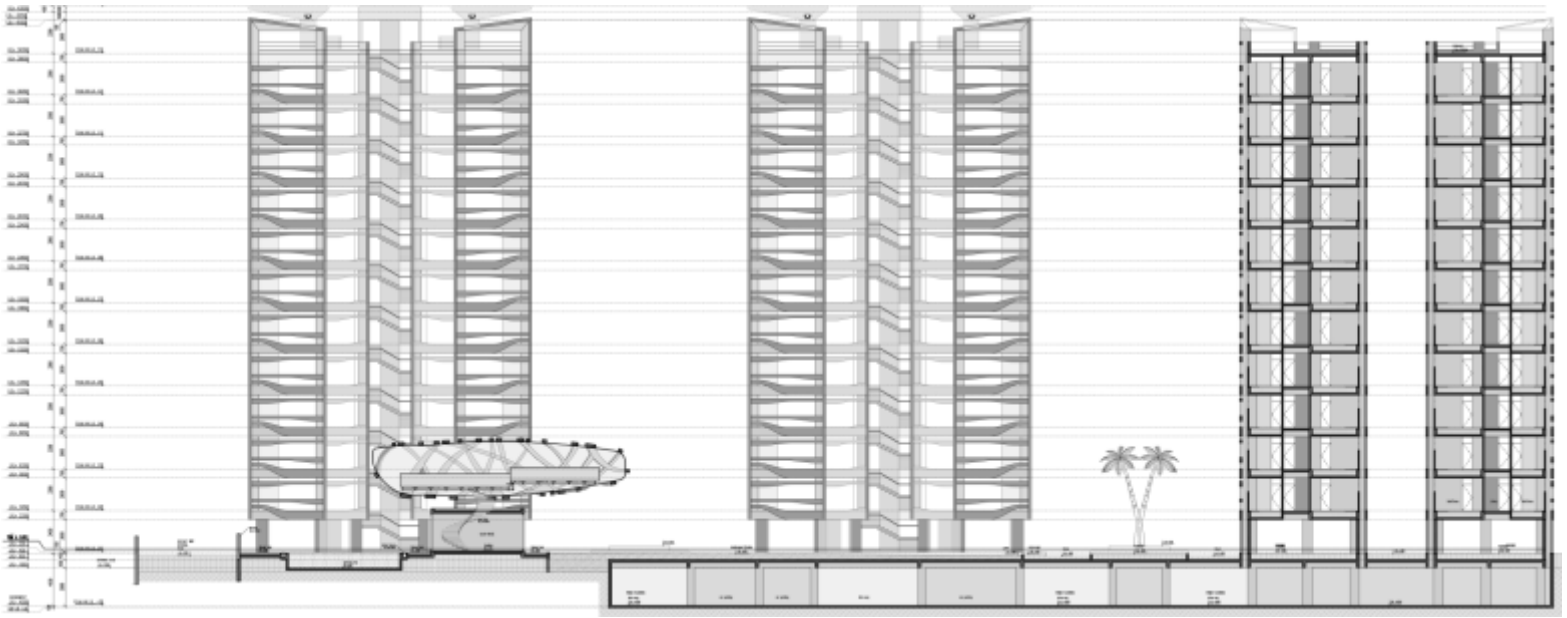
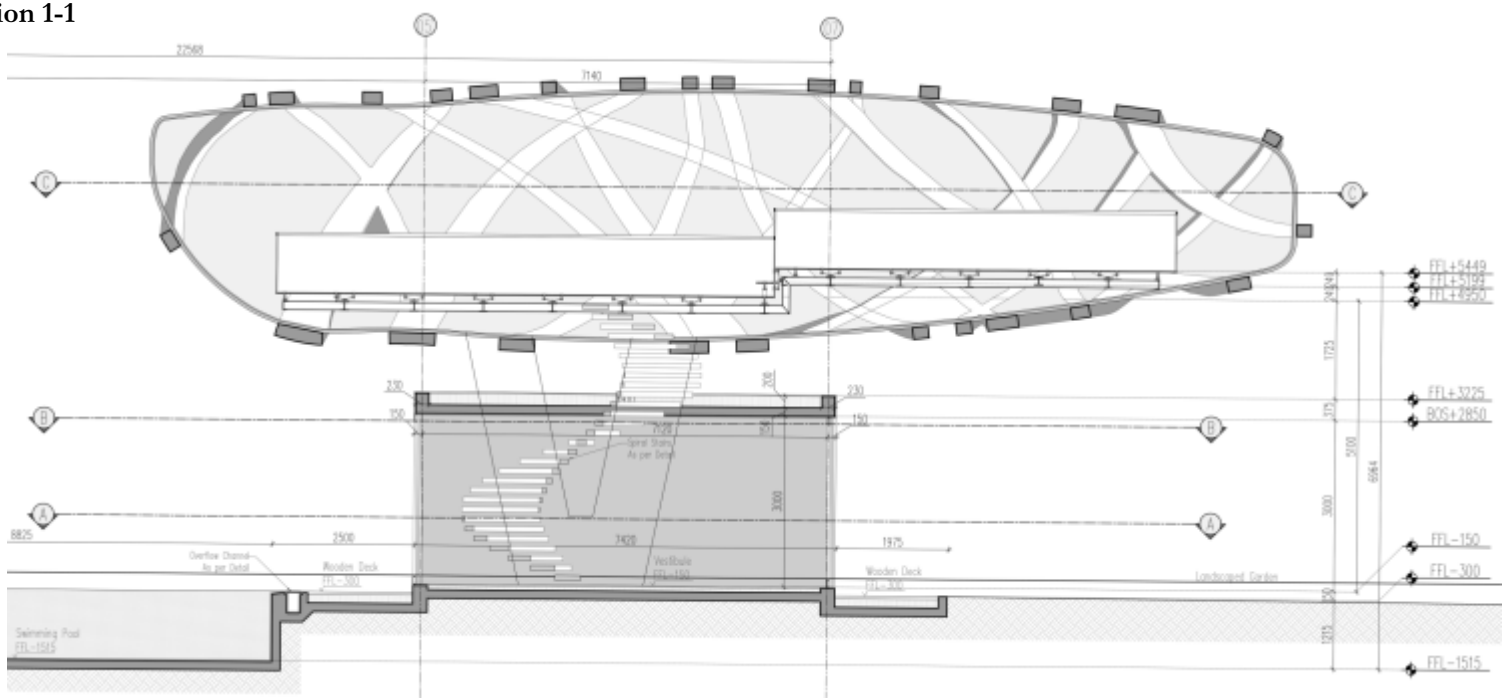
The centrally located gymnasium with swimming pool provides an ideal health facility in close proximity and makes for a common play area for children, within the residence campus and under parental watch.



Section 1-1

A shell structure with plexiglass cover of the club house is structurally designed to be a balanced cantilever. Radically distinctive outlook and centralized position makes the club house a focal point of outdoor activities.



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